TT459: TIRE PRESSURE MONITORING SYSTEM (TPMS)

2020-02-03

Electrical

APPLIES TO	SYMPTOMS
Tire Pressure Monitoring System (TPMS)	• Literature Updates or Corrections

Reason for Revision

Refer to Table 1.

Table 1. Document History

Date	Revision Description
2020-02-03	Update for models and new procedures
	* Updated Purpose for Technical Tip, Air Temperature Impact on Tire Pressure : Table 4, Tire Remove and Install
	* Added Guide, TPMS Remove and Install
2018-06-12	Title change
	* Updated Title
2017-02-22	Initial release

Guide

Table 2. Technical Tip Guide

Purpose for Technical Tip	Sensor Communication
Vehicle Affected	Air Temperature Impact on Tire Pressure
Markets Affected	TPMS Diagnosis Help
System Overview	Tire Remove and Install
Tire Pressure Sensor Mode Information	TPMS Remove and Install

Purpose for Technical Tip

To inform dealers of the use and operations of vehicles equipped with TPMS (Tire Pressure Monitoring System). This system offers convenient monitoring of air pressure within each tire, and alerts the rider if tire pressures fall below specification.

Both dealers and customers have raised questions regarding TPMS and how the system works. The intention of this bulletin is to answer some questions, and improve the general knowledge of:

- Functioning tire pressure sensors
- Installation practices

All testing of the TPMS is done by using the TPMS diagnostics and diagnostic tips in the service manual or its supplement of that year and model vehicle or using DIGITAL TECHNICIAN II (PART NUMBER: HD-48650).

Vehicle Affected

Refer to Table 3.

Table 3. Vehicles With TPMS

Years	Models
2016-2019	CVO Touring
2020	Touring, CVO Touring, Touring Police, CVO Trike[(1)]
(1) All vehicles except Trike equipped with RDRS (Reflex™ Defensive Rider Systems) .	

Markets Affected

All markets are affected.

System Overview

Tire Pressure Sensor: Monitors tire pressure and sends data to RF antenna at predetermined intervals based on sensor mode.

RF antenna: The antenna is wired into the main wiring harness. The RF antenna acts as the antenna for both the security fob and tire pressure sensors. The signal from the tire pressure sensors is provided to the BCM (Body Control Module).

BCM: Processes the signal from tire pressure sensor. Then communicates that data to the infotainment system, odometer display and fault lamps through the CAN (Controller Area Network) system.

Infotainment system display/Odometer: The infotainment system and odometer are used to display tire pressure, warn of low pressure, sensor failure and sensor battery life concerns.

Tire Pressure Sensor Mode Information

Test Mode: This mode is used for new sensors before installation to help conserve battery life. No transmission of data occurs in Test Mode. Test Mode is only seen when a new replacement sensor is installed. After sensor installation and tire pressure is applied, approximately 103.4 kPa (15 psi) for four minutes, the sensor will automatically enter Park Mode. The sensor cannot change back into the Test Mode.

Park Mode: The sensor is in Park Mode when the vehicle is at rest. Normal data collection is less frequent, and normal data transmissions occur at approximately 4-hour intervals. Park Mode is entered from Drive Mode when a vehicle is at rest for seven minutes or more.

Drive Mode: The sensor enters drive mode when the vehicle is ridden. In drive mode, normal data collection is accelerated and normal data transmissions occurs at approximately 64-second intervals. Drive Mode is entered from Park Mode automatically when the sensor detects vehicle movement of approximately 40.2 km/h (25 mph) for about 20 seconds.

Sensor Communication

The TPMS ACTIVATION TOOL (PART NUMBER: HD-51794) is used to force the sensor to transmit data immediately. It does NOT force the sensor to change mode. Additionally this tool is used with DIGITAL TECHNICIAN II (PART NUMBER: HD-48650) to pair a new sensor with the proper wheel location.

When pressure changes inside the tire by approximately 20.7 kPa (3 psi), the sensor transmits the updated information to maintain current pressure data and possible alerts. Pressure changes of less than 20.7 kPa (3 psi) does not register immediately, but does once the next transmission is sent.

All sensor transmissions require the vehicle to have the vehicle battery connected and main fuse installed. When the sensor sends data and vehicle battery is not within specs (below 9.6 V), the BCM cannot receive it.

The tire pressure sensor accurately reads tire pressure to approximately 358.5 kPa (52 psi) (depending on altitude). Any pressure above 358.5 kPa (52 psi), the sensor cannot track and the radio or odometer display does not display accurate readings. Do not replace if the sensor is exhibiting this behavior, it is a normal condition.

The BCM uses programmed thresholds to turn on a low-pressure alert. These thresholds are different between front and rear tires. The pressure threshold to turn on an alert is different than the pressure to turn it off.

Air Temperature Impact on Tire Pressure

“Cold” tire pressure is defined as the tire pressure at 20 °C (68 °F) outside air temperature, and the vehicle has not been ridden for 3-4 hours. Tire pressure changes as the outside temperature changes. The rule is to add 6.9 kPa (1 psi) for each 5.6 °C or 10 °F increase in outside air temperature. Temperatures at or below 20 °C (68 °F) the tire pressure is maintained at the cold pressure shown in the owner’s manual.

The air inside the tire heats up as the vehicle is ridden, pressure increases while riding and decreases again upon being parked.

See Table 4 and Table 5. Example- Tire pressure chart in the owner’s manual states the rear tire pressure is 275.8 kPa (40 psi) cold, and the vehicle has not been ridden for several hours. With a current outside temperature of 36.7 °C (98 °F), adjust the “cold” tire pressure to 296.5 kPa (43 psi). The formula would be 275.8 kPa (40 psi) per the chart plus 20.7 kPa (3 psi) per the graph.

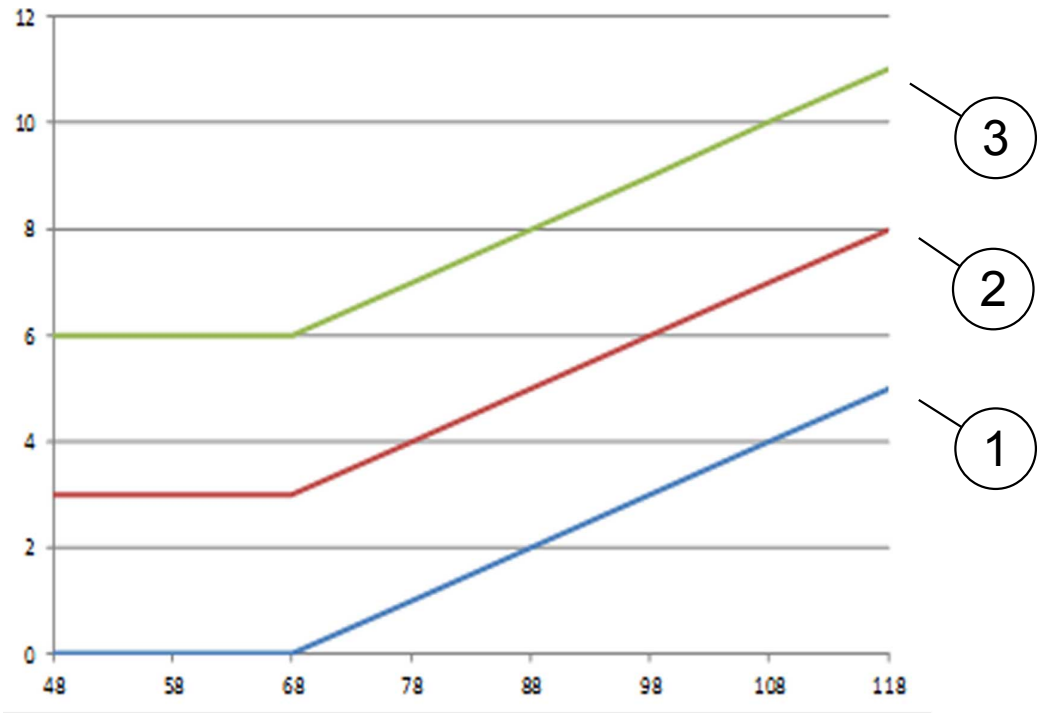
Table 4 can be used to reference how to adjust tire pressure when tires or temperatures are warm or hot.

Table 4. Specified Tires

MOUNT	SIZE	APPROVED TIRE	PRESSURE (COLD 20 °C (68 °F))
Front	17 in	Dunlop D408F 130/80B17 M/C 65H	248 kPa (36 psi)
	18 in	Dunlop D408F 130/70B18 63H BW	
	19 in	Dunlop D408F 130/60B19 61H BW	
		Dunlop D408F 130/60B19 61H	
	21 in	Dunlop D408F 130/60B21 M/C 63H	
Rear	16 in	Dunlop D407T 180/65B16 M/C 81H	276 kPa (40 psi)
		Dunlop D407T 180/65B16 81H BW	
	18 in	Dunlop D407T 180/55B18 80H BW	
		Dunlop D407 180/55B18 M/C80H	
		Dunlop TK100 P215/45 R18 83T	179 kPa (26 psi)

- Tire pressures vary with changes in ambient and tire temperature. Check pressure with tires cold (20 °C (68 °F)). Increase tire pressure by 6.9 kPa (1 psi) for every 5.6 °C or 10 °F in ambient air temperature above this point.
- Do not use the TPMS as a pressure gauge when adding or removing air from a tire. Sensor data is sent to the TPMS at varying intervals which does not refresh immediately when adding or removing air from the tire. Over-inflation or under-inflation can result.
- The TPMS sensor will not communicate pressures above 345–414 kPa (50.0–60.0 psi) depending on altitude.
- Air is used to calibrate the TPMS. Use of 100% nitrogen does affect the accuracy of the system.
- Do not rotate TPMS assemblies from their properly installed position. Can affect the valve stem seal and result in a leak.
- Verify TPMS assemblies are properly seated in the rims (pocket, receiver, integrated feature).
- Do not use liquid tire balancers or sealing agents in wheels with a TPMS sensor. Damage to the sensor can result.

Table 5. Tire Pressure Adjustment

Tire pressure adjustment above published cold pressure (PSI)	
	Air Temperature °F
1	Vehicle cold (not ridden for three or more hours)
2	Vehicle warm (ridden within 1-2 hours)
3	Vehicle hot (ridden over one hour recently)

TPMS Diagnosis Help

Testing has been done on returned warranty sensors. Some of these sensors were determined to be “No Trouble Found” (NTF). Based on the warranty claim notes, it would seem that many tires are not being properly inflated after delivery. With the information in this bulletin, technicians are now better able to diagnose and resolve tire pressure-related concerns without needless replacement of sensors.

General tips

- Use the TPMS activation tool to force a data update once the pressure has been properly adjusted.
- If a low-pressure lamp is illuminated, adding 34.5 kPa (5 psi) to that tire forces a data transmission to update the displayed pressure. The low-pressure lamp shuts off when adequate pressure is achieved.
- Watch temperature influence on tire pressure, and consider that when determining the target pressure.
- Tire pressure gauges are often inaccurate. Verify gauge accuracy before assuming that the TPMS system is malfunctioning.
- Clear all DTC (Diagnostic Trouble Code) after adjusting tire pressure.

- TPMS sensor does not read pressures above the operating range of (358.5 kPa (52 psi). The sensor is not defective, do not replace sensor. Use correct tire pressure.

Tire Remove and Install

The service manual or supplement contains information related to proper tire removal and installation procedures for TPMS wheels. It is important to follow these procedures or sensor damage can occur.

Remove

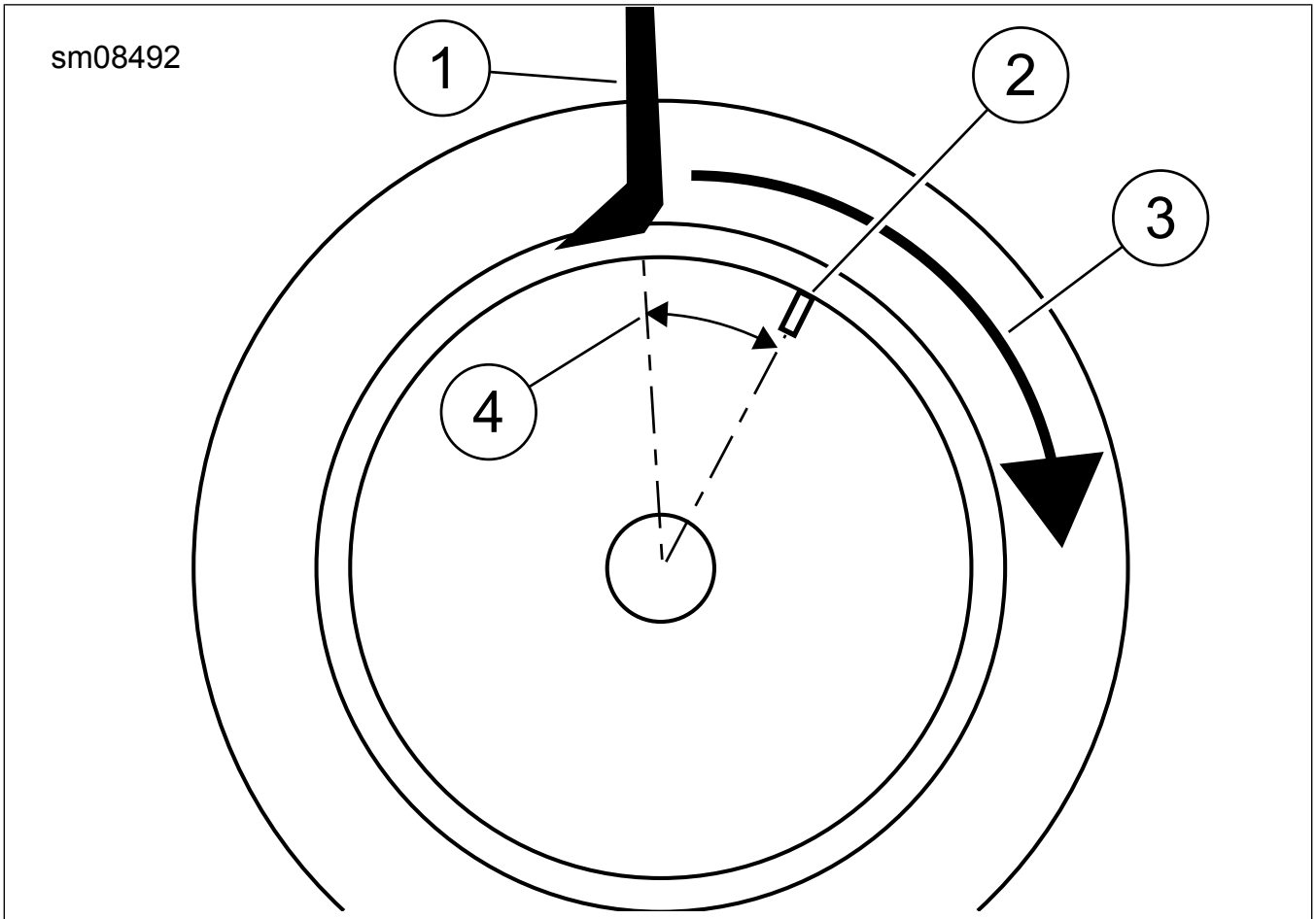
NOTE

- *Wheels equipped with tire pressure sensors require special tire mounting and dismounting procedures. Sensor damage occurs if procedures are not followed.*
- *Never allow tire machine spoon, tire iron or tire bead to contact sensor. Sensor damage can occur.*

1. Break the bead of the tire, careful not to damage tire pressure sensor.
2. See Figure 1. Engage tire machine spoon (1) 30° (4) from the valve stem (2) in the direction of tire machine rotation (3).
3. While rotating wheel away from the valve stem, remove the first bead.
4. Repeat with remaining bead. Remove tire

Install

1. Install tire on wheel. Start the first bead opposite from the valve stem.
2. Install first bead.
3. Engage the second bead 30° from the valve stem in the direction of machine rotation.
4. While rotating away from the valve stem, install the second bead.
5. Inflate to the correct pressure.



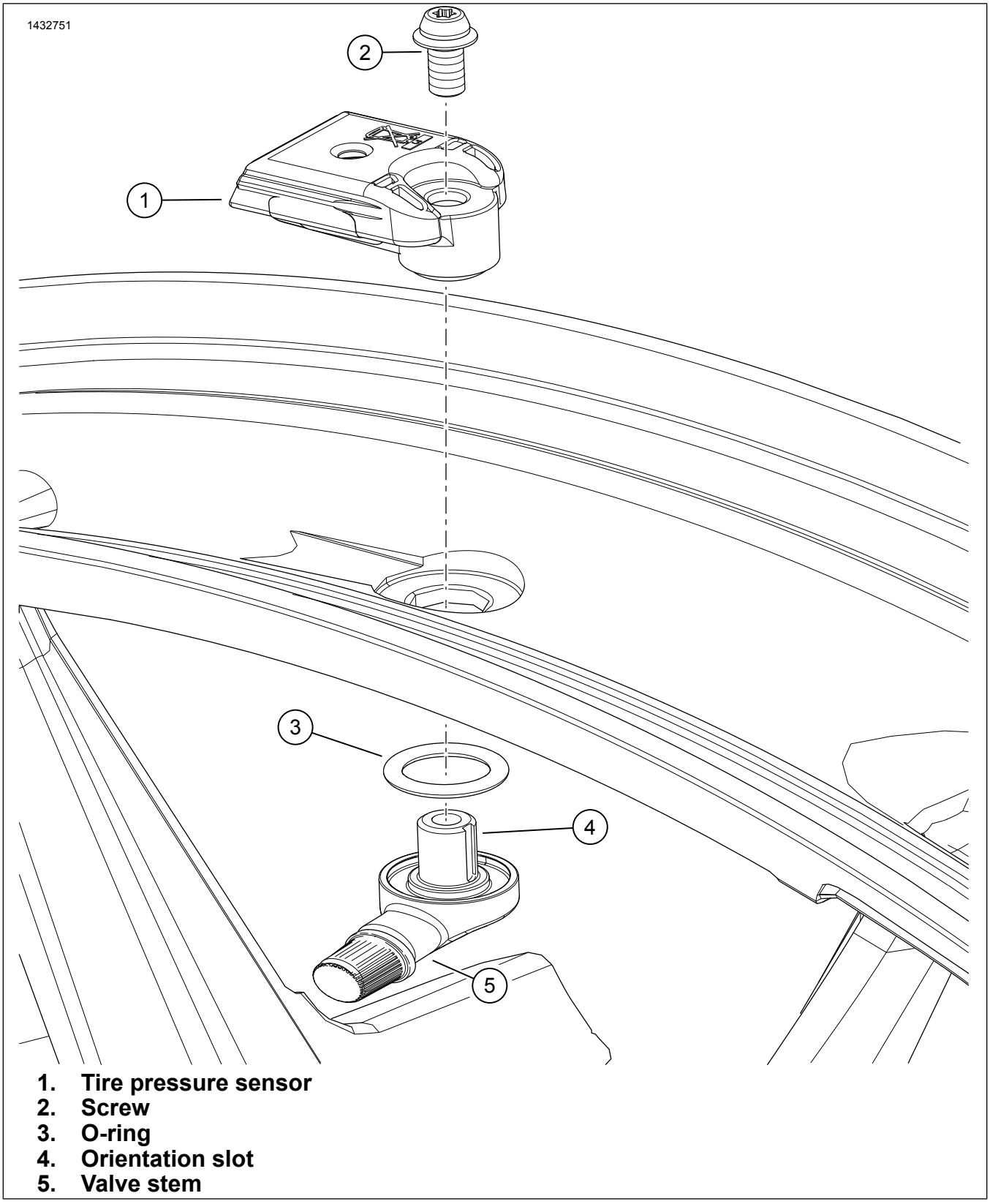
1. **Tire machine spoon**
2. **Valve stem**
3. **Tire machine rotation**
4. **30°**

Figure 1. Tire Machine Operation

TPMS Remove and Install

The service manual or supplement contains information related to proper sensor removal an installation procedures for TPMS wheels. It is important to follow these procedures or sensor damage can occur.

See Figure 2. Verify that the TPMS sensor (1) is fully seated in the valve stem bore. Check position of sensor by attempting to insert a 1.25 mm (0.05 in) feeler gauge between the sensor body and the machined slot in the wheel. If the sensor is fully seated, insertion of the shim should be prevented.



1. **Tire pressure sensor**
2. **Screw**
3. **O-ring**
4. **Orientation slot**
5. **Valve stem**

Figure 2. Tire TPMS Valve