

Why Monitor Tire Pressure?

Tires are one of the most critical safety features on a vehicle and most people ignore them. There is a flat tire for every 46,000 miles driven with more than half due to under-inflation and more than two-thirds of all tire problems are due to a slow loss of pressure. A loss of 3 PSI relates to an increase of tire wear by 1.5 percent and the life of the tire is reduced by 10 percent.

Tires influence the vehicle's ability to handle, steer, brake, and maintain stability. If the tires are under-inflated, vehicle safety is compromised. Sudden tire failure can have serious consequences, especially at high speeds. For example, a 32 PSI tire with a 25 percent loss runs at 24 PSI. At 32 PSI the tire can support 1085 lbs. per axle – at 24 PSI it can only support 900 lbs. per axle and the car will be dangerously overloaded resulting in potentially catastrophic tire failure. Besides improving safety, monitoring tire pressure can save at the pump and improve overall vehicle performance as vehicles with properly inflated tires run more efficiently.

One of these tires is dangerously under-inflated... Can you tell which one?



100% Inflated



70% Inflated

Citing tire pressure maintenance as a key safety issue, in 2000 Congress passed the TREAD Act (Transportation Recall Enhancement, Accountability and Documentation) requiring that new vehicles have a tire pressure monitoring system (TPMS) that measures, identifies and warns the driver when one or more tires becomes significantly under-inflated. All 2008 models must comply, while the phase in period calls for 20 percent of all 2006 vehicles and 70 percent of all 2007 models to be equipped with a TPMS system.

Tire Pressure Monitoring System (TPMS)

What constitutes potentially hazardous under-inflation? When the tire pressure monitoring system identifies one or more tires with a loss of 25 percent or more below the vehicle manufacturer's recommended specification, this tire can no longer operate safely; a warning light will illuminate to alert the driver to this dangerous condition.

There are two types of TPMS systems. Most vehicles are outfitted with a direct system that has a sensor in each wheel to transmit data relating to temperature, sensor location, and air pressure to the vehicle's computer. The computer interprets the data, illuminating the TPMS warning light when required. An indirect system utilizes the vehicle's existing ABS system to measure individual wheel speeds. When the indirect TPMS determines that the revolution of one of the tires is 30 percent under-inflated compared to the others, it triggers the TPMS warning light.

Both systems are designed to help protect consumers by raising awareness of tire pressure, resulting in proper tire maintenance. Because proper tire inflation leads to better vehicle handling, decreased tire wear and improved fuel efficiency, it is estimated that we will save upwards of \$2 billion in fuel consumption, decrease roadside flat tires by over 50 percent, reduce tire related traffic accidents and save innumerable lives – annually.

There are already approximately 15 million vehicles on the road with TPMS and this number is rapidly growing. TPMS presents the market with a new category of replacement parts and BWD provides you with a comprehensive line of TPMS sensors, TPMS kits and accessories to meet the growing sales and service opportunities.

"When OE fails...trust BWD."

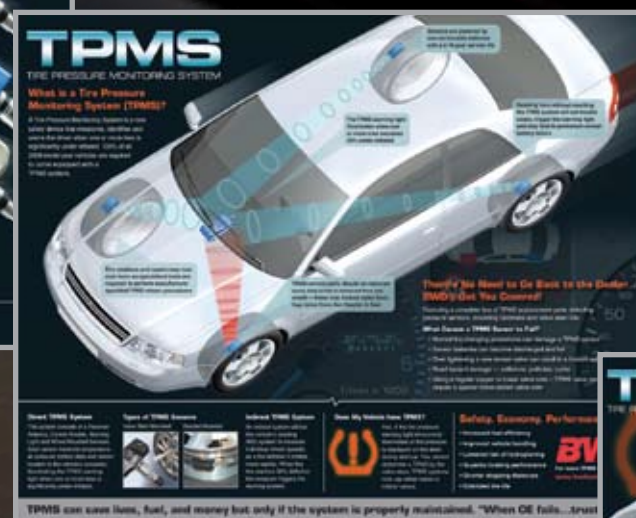
Complete Marketing Support

In addition to complete TPMS line coverage, BWD offers a comprehensive marketing support program to help you grow your business and maximize your profits. Our materials include:

- TPMS Poster
- TPMS Counter card
- TPMS Sales Brochures
- TPMS Counter mat
- Maintenance Handbook
- TPMS Training Videos
- Online Selling Support



TPMS Poster



TPMS Counter mat



Now Available Online — Click **BWD Store** On Our Website



TPMS Counter card and Brochure



TPMS Illustrated Catalog & Online Selling Support

A Counterperson's Guide To

Tire Pressure Monitoring Systems



TPMS Sensor Replacement And Service



Major TPMS system replacement parts include pressure sensors, mounting hardware and valve stem kits. TPMS replacement or service may be required multiple times on a vehicle unlike a typical replacement part. While the TPMS sensor needs to be replaced only if it fails or is damaged, the service parts should be replaced every time the tire is serviced. The valve-type direct TPMS sensor requires service of the valve stem



Tip: Nickel plated electro-less valve cores must be used with TPMS valves. Regular copper or brass valve cores will cause galvanic corrosion of the valve stem and may damage the sensor.

What Causes a TPMS Sensor to Fail?

Sensors fail primarily due to battery failure or improper service procedures. Initially there will be a learning curve for identifying, installing and checking the TPMS system, but most service technicians will quickly learn how to identify and service the system efficiently.

- Sensor batteries can become discharged and fail – the internal lithium battery is not serviceable, and it has a life expectancy of 3-10 years, depending on driving habits and conditions
- Installing the incorrect valve core will cause failure – TPMS sensors require a special nickel-plated valve core instead of the regular copper or brass valve core
- Normal tire changing procedures can damage a TPMS sensor – this includes flat repairs, new tire replacement, snow tire change or a wheel upgrade
- Pulling a typical looking rubber valve stem out of the wheel will lead to a broken sensor. TPMS systems now use either metal or rubber valves
- Over tightening a new sensor valve will result in a broken sensor
- Typical road hazards - collisions, potholes, curbs - can damage the TPMS system
- TPMS sensors contain delicate electronics that are subject to failure over time



Tip: Sensor damage or failure may occur from day one of vehicle ownership.

How To Tell If A Vehicle Is Equipped With TPMS

Here are three ways to identify vehicles equipped with a TPMS.

- TPMS symbol temporarily light ups on dashboard during start-up
- Tire pressure is displayed on dashboard during start-up
- Tires can be scanned by a specialized TPMS tool

You cannot determine the presence of a TPMS simply by looking at the valve stem; TPMS systems now use both metal and rubber valves.



Which valve stem can be ripped out of the wheel?



Tip: Identifying the TPMS valve stem is easy with the cap removed. The stem has a bevel and the rubber coating does not go all the way to the threads like a typical rubber stem.



Direct TPMS System Operation

This system consists of a Receiver Antenna, Control Module, Warning Light and Wheel Mounted Sensors. Each sensor measures information including vehicle acceleration then transmits data relating to temperature, air pressure, battery state and sensor location to the vehicle's computer; illuminating the TPMS warning light when one or more tires is more than 25 percent under-inflated or 20 PSI whichever is greater. This self-powered unit transmits across a 315 MHz radio frequency to the receiver at specified intervals. The computer receives and compares this data from the sensors to determine if there is a problem, illuminating the low pressure warning light. Many direct TPMS systems require a relearn procedure any time a wheel position is changed, a tire is removed, or a sensor is replaced. There are some direct systems that utilize antennas at each wheel to pick up the signal produced by the sensor. These systems are self-calibrating and do not require a relearn procedure when the tires or sensors are serviced.

Indirect TPMS System Operation

An indirect TPMS system utilizes the vehicle's existing ABS system to measure individual wheel speeds. As a tire deflates it becomes smaller and rotates more rapidly. The computer will calculate the increase in wheel speed. When a tire reaches 30 percent deflation in comparison to the other tires the computer will trigger the warning system. The problem with the indirect TPMS system is that the under-inflation levels are conditional and the system cannot differentiate when two or more tires are under-inflated as long as they are within 30 percent of each other. For this reason the indirect TPMS system fails to meet the standards established by TREAD.

TPMS Relearn Process



Every tire rotation or replacement will require a sensor relearn procedure. Rotating tires without resetting the TPMS system will set trouble codes, trigger the warning light, and may lead to premature sensor battery failure. In addition to consulting the Owner's Manual or TPMS reference guide, specialty tools are typically required to perform this service, minimizing the time required to perform the relearn process. These dedicated service tools can be used to diagnose failed sensors, activate, or wake-up sensors to perform a relearn process. TPMS service tools can also be used to check the internal sensor battery condition to help determine if a sensor is

not operational. Without these tools, a time consuming manual relearn procedure would be required.

Tip: Before any tire service, rotation or replacement the TPMS sensors should be checked to make certain they are operational. Sensor operation can be verified in minutes by checking for a warning light or instrument read out or by using the TPMS diagnostic tool before work begins to check sensor output and internal battery state.

Each vehicle manufacturer has developed a specific relearn process.

Some vehicles have automated relearn or the system can be activated by placing a magnet over the valve stem. For most however, the process involves:

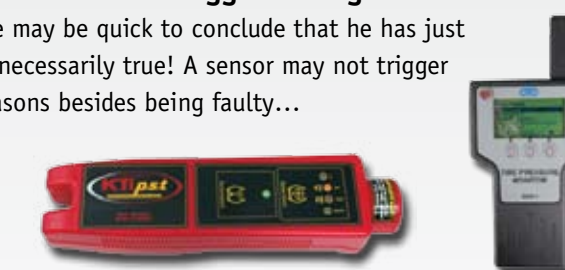
- Placing the system into relearn mode
- Activating each sensor using a tool beginning with the left front tire working clockwise around the vehicle ending with the left rear
- The tool is pointed at each tire sending out a low frequency signal (125 KHz) which will wake-up the pressure sensor
- The sensors send a signal to the receiver that identifies the sensor location



What does it mean when the TPMS sensor does not trigger during a relearn?

If an installer has just replaced a TPMS sensor, he may be quick to conclude that he has just installed a "bad" replacement sensor. This is not necessarily true! A sensor may not trigger during the relearn process due to a number of reasons besides being faulty...

- The tool is not positioned correctly
- Incorrect tool protocol is being used
- The tool needs to be updated



Tip: TPMS tools should be kept up-to-date and most can be updated using a PC or laptop via the internet. With software installed on the PC, the tool manufacturer's website can be accessed and the latest firmware can be downloaded to the tool. As new TPMS systems are introduced by vehicle manufacturers, these updates keep the tool from becoming obsolete or transmitting incorrect information.

We Have Your Tire Pressure Sensor

Valve Stem Type Direct TPMS

Located on the back of the valve stem, direct TPMS systems use four tire pressure sensors and a receiver to monitor and relay information about air pressure, temperature, location, and battery charge to the ECM as a continuous data stream.



Valve Stem TPMS Kits

Valve stem TPMS sensors require new hardware kits to be installed whenever a tire is changed. These kits consist of a new seal, washer, valve nut, valve cap, and a nickel-plated valve core.



Banded Type Direct TPMS and Accessories

TPMS systems utilizing banded style sensors operate identically to those using the valve type - the only difference is that banded sensors are mounted directly to the wheel by a band and a carrier located inside the tire 180° from the valve stem. Replacement bands and carriers are available in the event that the originals become damaged or replacement wheels are installed on the vehicle.



Indirect TPMS

Indirect tire pressure monitoring systems use the vehicle's existing four wheel anti-lock braking components and an air temperature sensor in conjunction with specialized calculations to determine if a tire is significantly under-inflated.



TPMS can save lives, fuel, and money but only if the system is properly maintained. "When OE fails...trust BWD."