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Coding Information

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Title: Bendix SmartWave SmarTire Pressure Maintenance System TPMS

Applies To: Trucks and buses built with Feature Codes 16VHT 16VHY

CHANGE LOG

Please refer to the change log text box below for recent changes to this article:

04/19/2019 - Added note about firmware update required with sensor change.
 04/12/2018 - Author updated for feedback purposes
 07/28/2015 - Removed a link to SFN1004 (it is no longer posted because it is outdated)

Introduction

SmartTire for Commercial Vehicles

SmartWave is a new wireless sensing platform designed to help fleets operate more cost effectively and safely than ever before. The system creates a wireless network around a vehicle allowing different sensing and communication technologies to seamlessly interact. Industrially designed for the rugged needs of commercial trucks, busses, and off-highway equipment, the first application on the SmartWave platform is SmarTire's industry proven active tire pressure and temperature monitoring system.

Application 01: Active Tire Pressure & Temperature Monitoring

The SmartWave active tire pressure and temperature monitoring system simplifies and automates a fleet's tire maintenance process resulting in an overall reduction of fleet operating costs. At the push of a button on the dash mounted display or wireless hand tool, the system provides accurate, real-time tire pressure and temperature information. With SmartWave on board, drivers on the road and maintenance personnel in the yard will be able to easily maintain accurate tire pressures for each vehicle in their fleet

Why SmartWave TPMS?

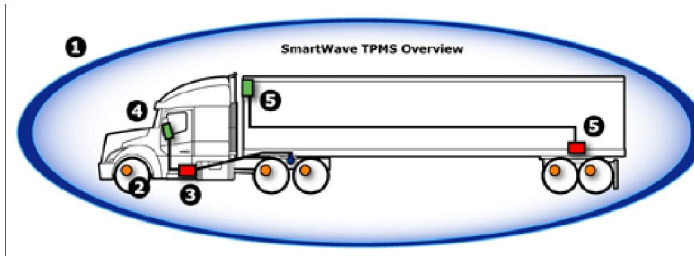
Though maintaining accurate tire pressure for every tire on possibly hundreds of fleet vehicles can be a challenge, proper tire maintenance can have a significant impact on your bottom line. After all:

- Only 44% of all truck tires are within 5 psi of their target inflation
- 90% of all tire failures are a result of tire under-inflation
- Almost half of all emergency roadside assistance calls are a result of tire failure
- 20% under-inflation reduces carcass life by 30%
- 20% under-inflation reduces tread life by 25%
- 20% under-inflation reduces fuel mileage by 2%

Properly inflated tires will provide you with:

- Longer tread life
- Longer tire carcass life and additional retreads
- Improved fuel economy
- Less vehicle downtime
- Improved vehicle and driver safety

System Overview



1. The SmartWave Wireless Gateway receiver creates a wireless bubble around a vehicle allowing various sensing technologies to seamlessly interact.
2. Tire sensors mounted on each wheel measure tire pressure and temperature every 12 seconds and wirelessly transmit tire data every three to five minutes. If a sensor detects a pressure change of 3 PSI, it breaks its regular schedule and transmits tire data immediately.
3. Industrially designed for the rugged requirements of a commercial vehicle chassis, the wireless gateway can monitor up to 20 wheel positions and is able to handle the most complex commercial and off-highway vehicle configurations.
4. Real-time tire pressure and temperature information is available to the driver on demand via the SmartWave display. Ranging from a simple warning light to an easy to read and simple to use interactive gauge that provides real-time tire status information, the SmartWave display will alert the driver to a low pressure or high temperature condition before it becomes dangerous.
5. Trailer tires can also be monitored using a stand alone system and trailer lamp.
6. SmartWave's universal hand tool acts like an 'electronic billy-club' allowing maintenance personnel to wirelessly 'ping' a tire to measure its real-time tire pressure. The SmartWave maintenance hand tool improves inflation accuracy and reduces diagnostic time in order to keep every tire rolling cost effectively.

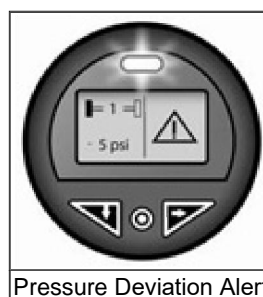
This data can then be used to:

- Alert the driver of a loss of air pressure or of a dangerously high tire temperature
- Inform the fleet manager of tire-related issues by linking through Telematics systems
- Provide inflation information to maintenance personnel to ensure optimum operating conditions
- Reduce overall vehicle operating costs and safety risks

Alert & Warnings

Real-Time Tire Warnings and Alerts:

At the push of a button, SmartWave will provide the driver with real-time tire status information for each wheel on their vehicle. For every moment in between, SmartWave has 3 automated tire alerts to instantly warn the driver of an under-inflated tire before it becomes dangerous.



The Pressure Deviation Alert is the first warning of an under-inflated tire. If a tire deviates 10% from its "proper" inflation pressure, the driver is alerted to the condition by a warning light and an audible alarm (optional). SmartWave calculates a tire's "proper" inflation pressure by first mathematically calculating the amount of pressure that is supposed to be in the tire based on

its operating temperature and its cold inflation pressure setting, and then comparing this calculated value to the actual, measured pressure value of the tire. The pressure deviation value that is displayed is the difference between the actual pressure and the calculated "correct" pressure. This temperature compensation calculation enables SmartWave TPMS to provide pressure deviation values and alerts even when a tire is hot.

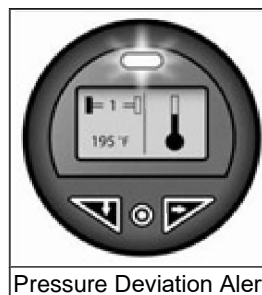
The default setting triggers the pressure deviation alert when a tire is 10% under or over inflated. This setting can be customized by the user. The alert can also be customized to be a fixed pressure alert rather than a temperature compensated alert. The units of measure can also be customized to PSI, bar, or kPa.



The Critical Low Pressure Alert is the second warning of an under-inflated tire. It warns the driver when a tire's pressure falls 15% below the programmed cold inflation pressure (CIP) value. This visual and audible (optional) warning is intended to alert the driver to a critical tire condition in order for them to take immediate precautions.

Unlike the Pressure Deviation Alert, the default setting for the Critical Low Pressure Alert does not include the temperature compensation calculation. As such, if a tire's pressure falls below the default setting, the tire is critically under-inflated and should be addressed immediately.

Like the Pressure Deviation Alert, the default settings for the Critical Low Pressure Alert can be customized by the user. The alert can also be set to be temperature compensated.



The High Temperature Alert warns the driver when a tire's temperature exceeds 195°F (90°C). High tire temperatures are typically caused by under-inflation and the SmartWave system will usually provide a Pressure Deviation Alert and a Critical Low Pressure Alert well in advance of a High Temperature Alert. If triggered on its own, the High Temperature Alert can be an indication of an alternative problem such as a dragging brake or a bearing failure. Like the other two alerts, the default High Temperature Alert setting can be customized by the user.

Components

SmartWave Tire Sensor



Industrially designed for the harsh environment of a commercial vehicle tire, the SmartWave tire sensor measures internal tire pressure and temperature every 12 seconds and transmits data to the receiver regularly every three to five minutes. If the system detects a pressure change of 3 PSI or greater, it breaks its regular schedule and transmits data immediately.

Sensors are easily installed on a vehicle's rims using a stainless steel strap and cradle. Proven on thousands of wheels worldwide, strap mounting is the simplest and most universal method for mounting sensors. SmartWave sensors are mounted in a

patented, in-expensive, break-away cradle in order to reduce the cost impact of breakage. To save battery life, sensors activate when the vehicle begins a trip by means of a centrifugal switch.

If a gold series sensor is being replaced by a black series sensor the TPMS firmware will need to be updated to 200.0224 or newer refer to [Bendix PNU-248](#) for info on the differences in the sensors and sensor part numbers changes. The firmware version can be checked and updated through ACOMs.

SmartWave Wireless Gateway Receiver



The SmartWave Wireless Gateway receiver captures transmissions from the sensors and then analyzes the data against user-defined settings. If it determines that a tire is under-inflated or running over temperature, an alert is automatically triggered. Robust and weatherproof in design, the Wireless Gateway can be conveniently mounted directly to the vehicle's chassis and can be connected to the vehicle's J1939 communications network to provide messaging for display and control functions.

Display



Real-time tire pressure and temperature information is available to the driver on demand via the SmartWave display. Ranging from a simple warning light to an easy to read and simple to use interactive display that provides real-time tire status information, the SmartWave display will alert the driver to a low pressure or high temperature condition before it becomes dangerous.

Hand Tool



Maintaining tires in the yard is just as important as real-time tire information for the driver, but most TPMS systems don't take maintenance personnel into account. SmartWave's universal hand tool acts like an 'electronic billy-club' allowing maintenance personnel to wirelessly 'ping' a tire to measure its real-time tire pressure. The SmartWave hand tool improves inflation accuracy and reduces diagnostic time in order to keep every tire rolling cost effectively.

Configuration Software

The SmartWave System components can be easily customized to a specific vehicle by means of the SmartWave configuration software. Since no two vehicles are the same and different jobs may require different tire pressures, SmartWave can be easily customized to fit any vehicle or application.

Temperature Compensation

No matter how hot it is outside or how hot a tire gets rolling down the road, SmartWave's temperature compensation will always provide accurate tire inflation information. After all, temperature is a tire's biggest enemy.

As a tire deflates, its rolling resistance increases, and its operating temperature goes up. As its temperature increases, the air inside the tire expands so the tire appears to be operating at correct inflation. When measured using a non-temperature compensated gauge, a tire can be 30% under-inflated and still appear to be normal. SmartWave measures a tire's temperature in addition to pressure in order to do a temperature compensation calculation. The system provides deviation numbers in its on-demand tire information and first level alert showing exactly how many PSI under or over inflated a tire is at its operating temperature.

Features & Benefits

SmartWave TPMS Features

- Provides early warning of pressure loss before tire is damaged.
- Temperature compensation provides highly accurate pressure deviation readings.
- Simple installation, setup and configuration.
- Robust, weatherproof components tested and proven in the harshest environmental conditions.
- Interfaces with standard diagnostic tools and on-board communications protocols (J1939 Interface).
- Can be installed at any point in the vehicle's life.
- Display options range from simple warning light to full tire pressure/temperature information, highlighting wheel position.

With SmartWave on board, fleet managers and owner operators alike will benefit from:

- **Improved Tire Carcass Life and Tread Life**
With as little as 20% under-inflation, tire carcass life is reduced by 30% and tire tread life is reduced by 25%. When tires are maintained at an accurate inflation value, their tread will last longer, and their carcass will accommodate more retreads.
- **Reduced Maintenance Costs & Downtime**
Statistics show that 90% of all tire failures are a result of under-inflation and almost 50% of all fleet emergency road-side assistance calls are attributed to tires. Accurate and consistent tire inflation can significantly reduce vehicle downtime and overall fleet maintenance costs.
- **Improved Fuel Economy**
Tires operated at 20% under-inflation will reduce a vehicle's fuel mileage by 2%. Considering that 56% of all commercial truck tires are under-inflated and that the combined mileage of a commercial fleet is millions of miles per year, a 2% fuel savings represents a significant cost savings to any fleet's bottom line.
- **Improved Dual Wheel Assembly Performance**
When one tire of a dual wheel assembly has a lower inflation pressure than the other, its circumference is smaller than the tire next to it resulting in improper axle weight distribution and wheel drag. This condition rapidly generates heat that destroys the tire's integrity and creates the environment for catastrophic tire failures and tire fires. Proper dual wheel inflation will result in better tire life and a safer trip for the driver, vehicle, and cargo.

Tool Information

BX09000.21 SmarTire LF Tool

This tool is used to quickly check and monitor tire pressure or reprogram in the case that a sensor has been relocated to a different position.

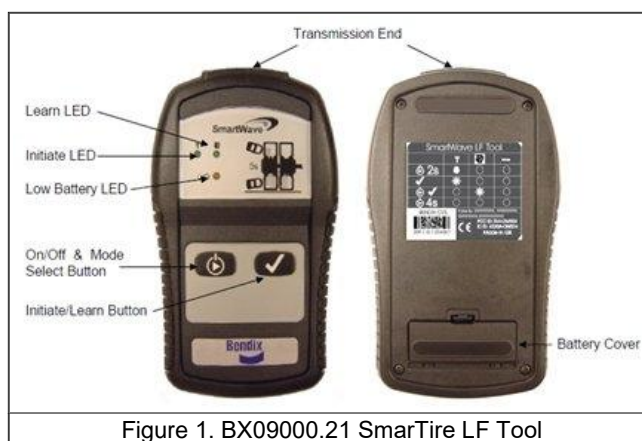


Figure 1. BX09000.21 SmarTire LF Tool

The BX09000.21 SmarTire LF Tool is Navistar's recommended tool and all that is needed to service this system. The tool is not being shipped essential to dealers.

BX0900011 SmarTire Maintenance Tool

Bendix also offers this more expensive tool with added functionality.

Additional functions available with the BX0900011 SmarTire Maintenance Tool are as follows:

- The ability to check tire pressures without powering the truck
- Knowledge of the sensor ID number allowing for manual entry when programming with laptop based software
- NOTE: This tool is not needed for reprogramming.



Figure 2. BX0900011 SmarTire Maintenance Tool

Other Resources

Reference the following G-letter for further information.

https://evaluate.internationaldelivers.com/sales/adobe/parts/parts_gletters/g-04-8358-a.pdf

Ordering Instructions

Order directly from Navistar Parts.

Service and Support Information

All Service Information is provided by Bendix - Always refer to the vendor support website for the most current information.

Bendix SmarTire Support Website

<http://www.smartire.com/support/manuals>

Customer Service

- For technical support, please call 1-800-AIR-BRAKE (1-800-247-2725)

SmarTire Manuals

- SmarTire Kit Notice (13S1538) :
[English - 223KB](#) - Read before installing a SmarTire System
***Not for use with 200.0153 & 200.0180 model Receivers!**
- SmarTire Tire Pressure Monitoring System Operator's Manual (BW2799) :
[English - 4MB](#)
***Not for use with 200.0153 & 200.0180 model Receivers!**
- SmarTire Tire Alert Card for use with 2" SmarTire Gauge (BW2823):
[English - 550KB](#)
- Pressure\Temperature Correlation Card (BW2824):
[English - 1MB](#)
- SmarTire LF Tool User Manual (BW2820):
[English - 875KB](#)
- SmarTire Maintenance Hand Tool (BW2809)
[English - 386KB](#)

- SmarTire Compatibility Chart (BW2825):
[English - 213KB](#)

Downloads

- SmarTire Maintenance Tool 090.0011 (200.0182) Firmware Update Version 1.4:
[Version 1.4 \(Feb 2011\) 787KB](#)
***This update adds communication compatibility for sensor IDs ending in 7 digits**
- SmarTire Diagnostic Software - For use with SmarTire system by Bendix CVS:
[Version 1.5.0 \(Feb 2010\) 8.4MB](#)
***Limited functionality with older Receiver Revisions of Model 200.0184 Rev. 1-0; 1-1; 1-2
(see receiver barcode label 184-Release-Revision-Serial Number i.e. 184-1-1-0000020)
*Not for use with 200.0153 & 200.0180 Model Receivers!**
- Previous SmarTire Diagnostic Software - For use with older Receiver Revisions of Model 200.0184 Rev. 1-0; 1-1; 1-2; 1-3
[Version 1.0.25 \(Oct 2006\) 3.1MB](#)
***Not for use with 200.0153 & 200.0180 model Receivers!**
- SmarTire Sensor Learn Instructions - For use with SmarTire system by Bendix CVS:
[English PDF - 473KB](#)

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