

# SmarTire<sup>®</sup> Tire Pressure Monitoring System by Bendix CVS

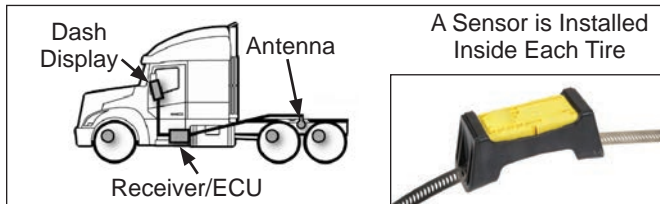
## SmarTire<sup>®</sup> TPMS Low Frequency (LF) Tool User Manual



THE SMARTIRE<sup>®</sup> TPMS BY BENDIX CVS LOW FREQUENCY (LF) TOOL SHOWING BUTTONS AND LEDs

### 1. INTRODUCTION

The SmarTire<sup>®</sup> Tire Pressure Monitoring System (TPMS) by Bendix CVS consists of sensors (mounted using steel bands onto the rim of the wheels), an antenna, receiver/Electronic Control Unit (ECU), and dash display unit or OEM integrated display.



**Each tire sensor has a unique ID code and it is important that the system knows the ID of the sensor used at each tire location on the vehicle.**

The SmarTire Low Frequency (LF) tool is a hand-held device used to communicate with SmarTire-brand tire pressure monitoring system sensors.

This document will describe how the tool can be used to program one or more new sensor ID codes into the receiver (for example, when replacing a sensor or after repairs/tire rotation, etc.); and how to check that all IDs are in the expected locations when conducting a vehicle inspection. (See BW2799 for information about other procedures, such as loading a system configuration.)

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NOTE: The SmarTire LF tool is compatible ONLY with SmarTire-brand commercial vehicle tire sensors.

NOTE: For dual-wheel assemblies, it is strongly recommended that the tire valve stems – where sensors are typically located – be arranged 180° from each other to avoid errors when communicating with the sensors.

## GENERAL SAFETY GUIDELINES



**WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS  
TO AVOID PERSONAL INJURY OR DEATH:**

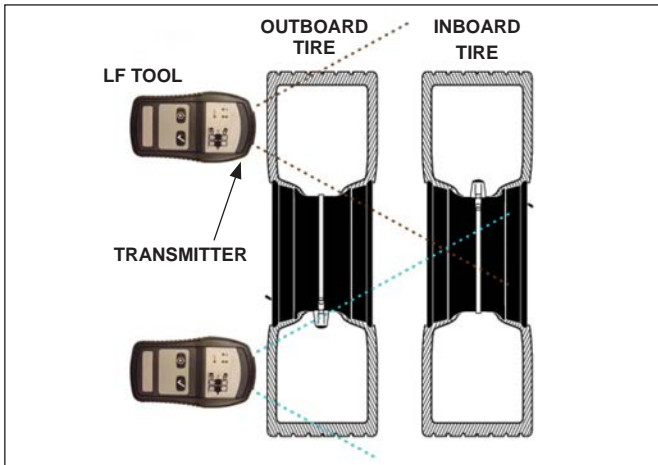


When working on or around a vehicle, the following guidelines should be observed **AT ALL TIMES**:

- ▲ Park the vehicle on a level surface, apply the parking brakes and always block the wheels. Always wear personal protection equipment.
- ▲ Stop the engine and remove the ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically-charged components.
- ▲ Do not attempt to install, remove, disassemble or assemble a component until you have read, and thoroughly understand, the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
- ▲ If the work is being performed on the vehicle's air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle. If the vehicle is equipped with a Bendix® AD-IS® air dryer system, a Bendix® DRM™ dryer reservoir module, or a Bendix® AD-9si® air dryer, be sure to drain the purge reservoir.
- ▲ Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.
- ▲ Never exceed manufacturer's recommended pressures.
- ▲ You should consult the vehicle manufacturer's operating and service manuals, and any related literature, in conjunction with the Guidelines above.
- ▲ Never connect or disconnect a hose or line containing pressure; it may whip and/or cause hazardous airborne dust and dirt particles. Wear eye protection. Slowly open connections with care, and verify that no pressure is present. Never remove a component or plug unless you are certain all system pressure has been depleted.
- ▲ Use only genuine Bendix® brand replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, wiring, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.
- ▲ Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.
- ▲ Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.
- ▲ For vehicles with Automatic Traction Control (ATC), the ATC function must be disabled (ATC indicator lamp should be ON) prior to performing any vehicle maintenance where one or more wheels on a drive axle are lifted off the ground and moving.
- ▲ The power **MUST** be temporarily disconnected from the radar sensor whenever any tests **USING A DYNAMOMETER** are conducted on a vehicle equipped with a Bendix® Wingman® system.

## 2. OVERVIEW OF THE TOOL FUNCTIONS

**Transmitter:** The top part of the tool must be pointed towards the tire to communicate with the sensor. See the diagram below. For dual-wheel assemblies it is strongly recommended that the tires are installed with their valve stems arranged 180° from each other to help make sure that the transmission reaches the correct sensors.



**ON/OFF/Mode Select Button:** Press and hold this button for two (2) seconds to power ON the tool. The tool will sound a beep and the Initiate LED will illuminate to show that the tool is ON. To toggle the tool between the sensor Initiate and sensor Learn functions, press the button briefly. The green LED for the current mode will be illuminated. To shut down the tool, press and hold the button for four (4) seconds. The battery LED illuminates to show that you can now release the button.



**Initiate LED:** The Initiate LED will be ON (green) as long as the Initiate Mode is selected. When pressing the Initiate button, the LED will blink rapidly for five (5) seconds and then change to one (1) blink per second after the initiation has been completed. In service, the sensor automatically communicates every 3-5 minutes, however the tool prompts an immediate response.



**Learn LED:** The Learn LED will be ON (green) as long as the Learn Mode is selected. Learn transmissions are used when reprogramming sensor ID codes into the SmarTire® TPMS receiver, either by using the PC-based Bendix® ACom® Diagnostic software, or by using the dash-mounted display. When pressing the Learn button, the LED will blink rapidly for five (5) seconds and then change to one (1) blink per second after the Learn transmission has been completed. Upon being prompted, the sensor communicates its unique ID code to the receiver.



**Initiate/Learn Button:** After selecting the initiate or learn mode, press this button to request the appropriate response from a sensor. Initiation transmissions are used to obtain new sensor readings for the SmarTire gauge or the diagnostics software.



**Low Battery LED:** The low battery LED will flash amber once every second when the tool is on and the onboard 9-Volt battery is near empty. Approximately 20 additional Initiate/Learn operations can be performed after the battery LED blinks for the first time. The battery LED will light up solid amber during the shut down process to signal that the user can release the ON/OFF button.



## 3. GETTING STARTED

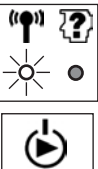
The SmarTire TPMS Low Frequency (LF) tool is powered by a standard 9-Volt battery. To install the battery, open the battery access panel on the back of the tool and connect the supplied battery to the 9-Volt battery connector.

## 4. USING THE SMARTIRE LF TOOL

Read and understand the General Safety Guidelines on page two of this document before beginning any maintenance work on a vehicle.

### IMPORTANT

It is important to make sure that there is no loss of power to the SmarTire TPMS during the Learn Sensor procedure. Power interruptions will result in some - and potentially all - stored sensor location information being lost, requiring the technician to start over again.

- To switch on the SmarTire LF Tool, press and hold the On/Off/Mode Select button (⏻) for two (2) seconds.
- Enter the Learn (❓) or the Initiate (📡) Mode by toggling the On/Off/Mode Select switch (⏻) and then pressing the Mode Select button.
 
- Hold the tool approximately two (2) in. (5 cm) away from the tire's surface, at the center of the tire's sidewall, close to the valve stem. (The recommended location for all SmarTire TPMS sensors is at the valve and rim-mounted labels indicate their location). Do not touch the rim with the tool. Press and release the Initiate/Learn (✓) button (a single beep will be heard) and hold the tool in place for five (5) seconds until four (4) quick beeps are heard to signal that the tool and sensor have communicated successfully.

## 5. REPROGRAMMING SENSOR ID CODES USING THE SMARTIRE® LOW FREQUENCY (LF) TOOL AND A PC WITH THE BENDIX® ACOM® DIAGNOSTIC SOFTWARE

### **! IMPORTANT**

It is important to make sure that there is no loss of power to the SmarTire® TPMS during the Learn Sensor procedure. Power interruptions will result in some - and potentially all - stored sensor location information being lost, and the procedure will have to be repeated.

**For SmarTire TPMS system maintenance, Version 6.5 (or higher) of the Bendix® ACom® Diagnostic Software is required.**

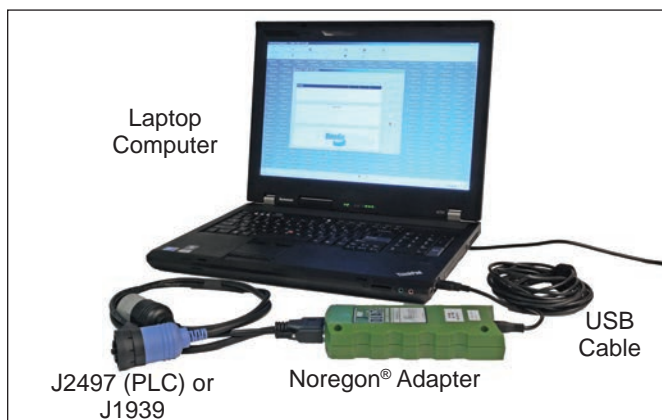
Read and understand the General Safety Guidelines on page two of this document before beginning any maintenance work on the vehicle.

Bendix ACom Diagnostic Software is an RP-1210 compliant PC-based diagnostic software program that provides the highest level of diagnostic support for the SmarTire TPMS system. The latest version of the software is available for download at [www.bendix.com](http://www.bendix.com).



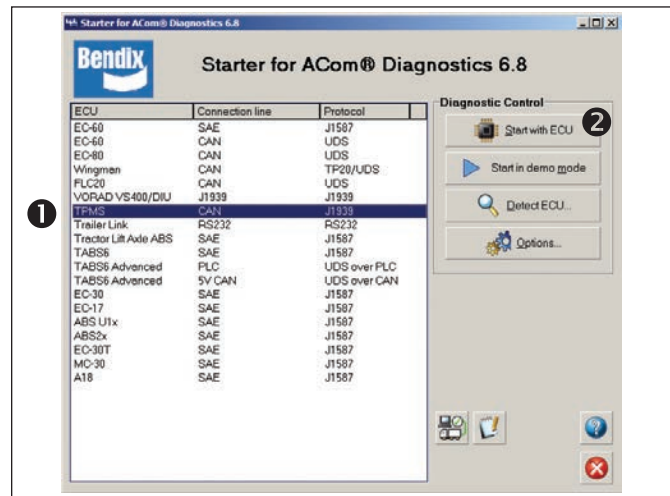
These instructions will cover the use of the software to program sensor IDs. For details about other functions such as: setting system warning parameters; retrieving Diagnostic Trouble Codes (DTCs); and verifying System configurations, please see BW2799.

Connect the SmarTire ECU in the receiver to your PC through the vehicle's diagnostic connector via an RP-1210 compliant communications device.



### To have the system learn a sensor position:

- A. Connect the PC to the vehicle and open the Bendix ACom Diagnostic Software. Select TPMS (for tractor systems) or Bendix™ Trailer-Link™ (for trailer systems) module and select the “Start with ECU” button.

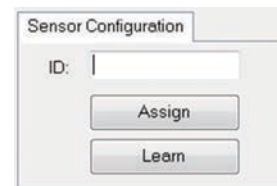


- B. Once connected to the ECU, select the Setup mode by pressing the Set Up icon displayed here.

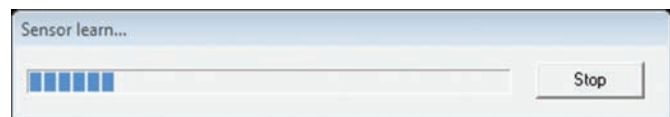


Select which sensor you would like to replace by clicking on the tire icon for that position. The tire symbol will be highlighted (it changes to green). See the illustration at the top of the next page.

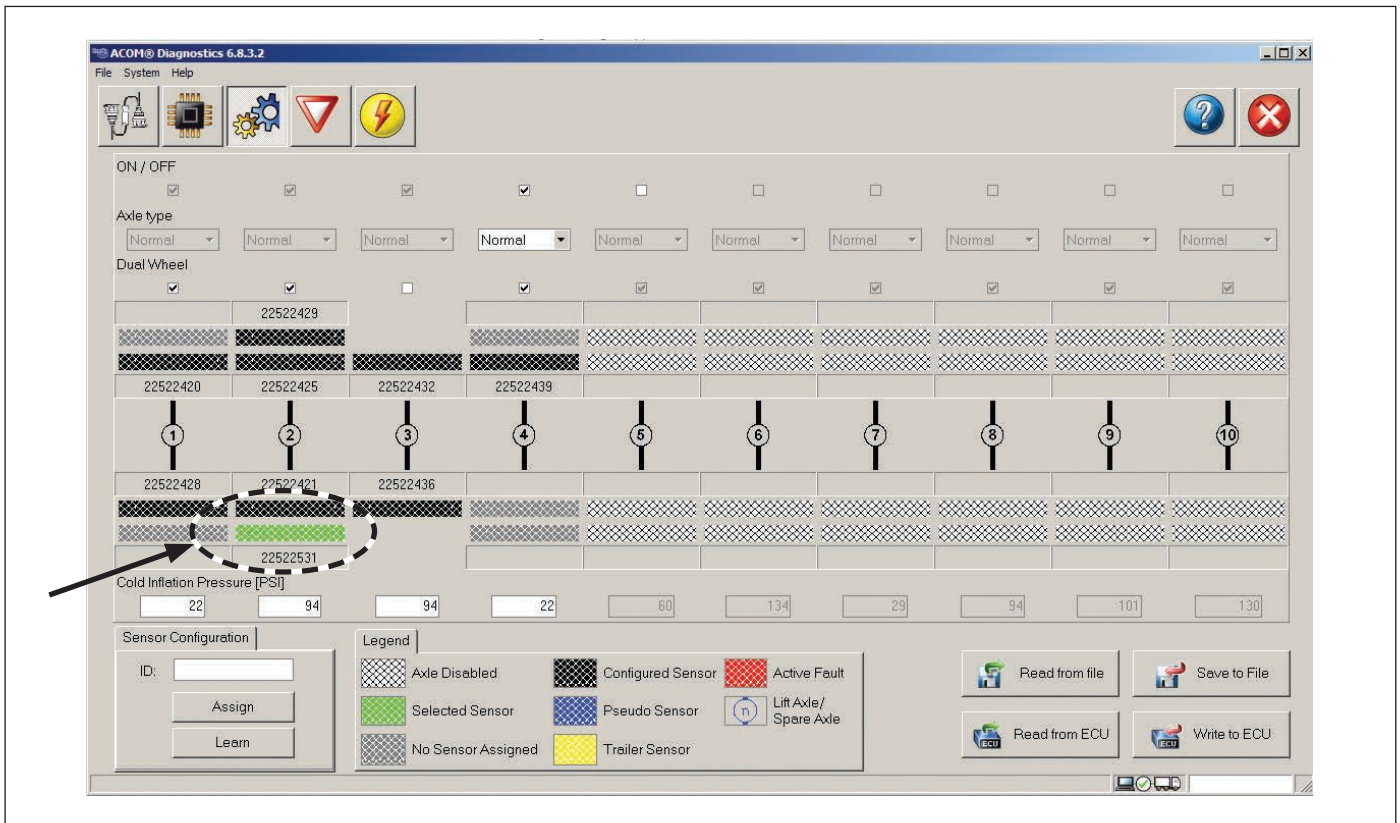
- C. Select the Learn Sensor button in the sensor configuration box (bottom right of the screen).



- D. The screen will indicate that the system is searching for a sensor.



- E. The technician has three (3) minutes to use the SmarTire LF Tool to send a request to the sensor in that tire, to transmit its ID. Switch on the SmarTire LF tool by pressing and holding the On/Off/Mode Select button (⏻) for 2 seconds. Toggle the tool mode to the Learn Sensor function by pressing the On/Off/Mode Select button (⏻) again.

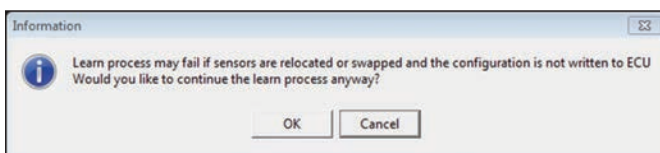


- F. Hold the SmarTire® TPMS Low Frequency (LF) tool with the transmission end pointed towards the tire’s sidewall adjacent to the sensor’s location approximately two (2) inches away from the tire’s surface. Press and release the Initiate/Learn Button (✓) (a single beep will be heard) and keep the tool in place for five (5) seconds until four (4) quick beeps are heard.

Note: Do not hold down the Initiate/Learn button (✓).

- G. Once triggered, it can take up to 30 seconds for the system to receive the transmission and complete the learn process. The ID code edit box for the wheel position will update with the new ID code and the Bendix® ACom® symbol for that location will turn yellow after a successful communication.
- H. Repeat this process for all the wheel positions that need to be programmed.

Note: The following warning may appear if you are learning more than one tire position:

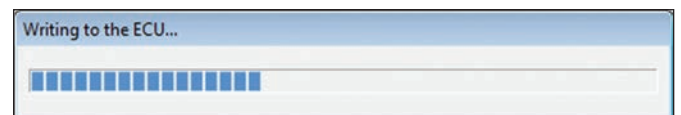


“Learn process may fail if sensors are relocated or swapped and the configuration is not written to ECU. Would you like to continue the learn process anyway?”  
Press the OK button to continue the process.

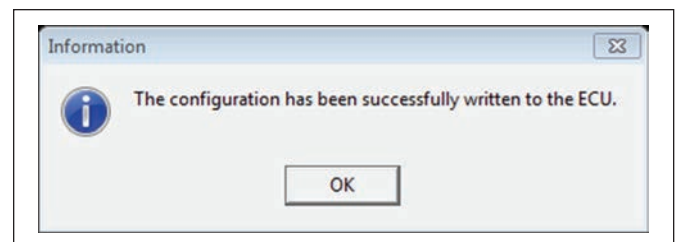
- I. It is important to save the changes you have just made. After the system has learned the ID codes for the targeted wheels, select the Write to ECU button to save them.



A dialog box will appear showing the progress.



Look for the following confirmation dialogue box.



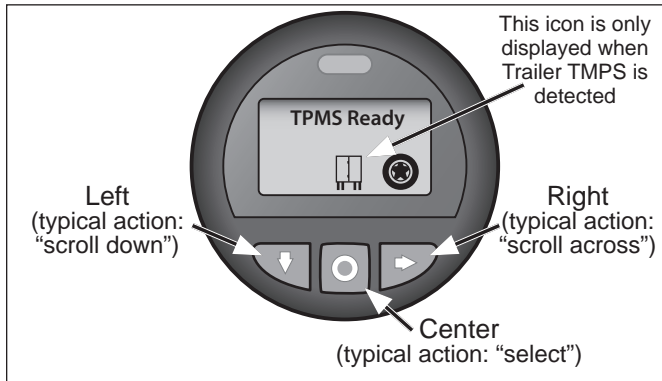
“The configuration has been successfully written to the ECU.”

## 6. PROGRAMMING SENSOR ID CODES USING THE DASH DISPLAY AND THE TOOL

### **! IMPORTANT**

As stated earlier, it is important to make sure that there is no loss of power to the SmarTire® TPMS during the Learn Sensor procedure.

Note: Not all functionality may be accessible using the dash display; if a menu item shown here is not visible on your display, it may be disabled, or not available because of the version of dash display being used. Use the Bendix® ACom® Diagnostic software for access to full functionality.



### For systems that are configured to require a password:

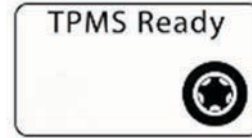
Press and hold the center button for two seconds and the display will show a password entry screen.



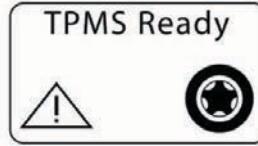
To enter a password, press the left button to scroll the first digit from 9 to 0. When the correct digit is displayed, press the right button to move to the next digit in sequence. Repeat this action until all four digits are entered correctly and then push the right button to enter the password. If the password is correct, the display will enter Setup Mode. If the password is incorrect, the display will indicate that the wrong password was entered and return to the password entry screen.

NOTE: If the system is not configured to use a password, the system will go directly to the setup mode.

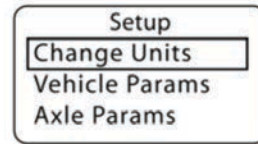
To enter the Setup Mode, on the dash display press the center button repeatedly until the TPMS Ready screen is displayed.



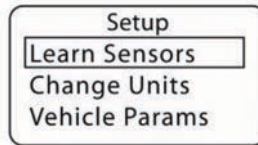
Above: With no active Diagnostic Trouble Codes (DTCs).



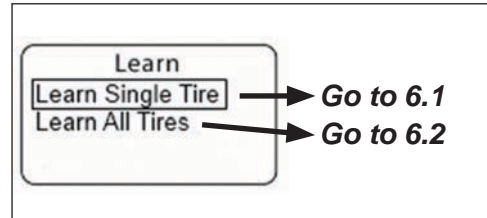
Above: If there are any active pressure or temperature DTCs present, a symbol with an exclamation point inside a triangle will be displayed.



When in Setup Mode, scroll to the “Learn Sensors” menu item. Press the right button to select the Learn Sensor function.



Depending on the version of the display installed, the following screen may vary.



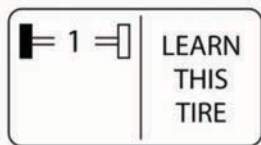
In cases where the “Learn All Tires” option is not shown, the vehicle has an older version of the dash display, and the technician will have to repeat Section 6.1 as many times as needed to learn the missing tire IDs.

## 6.1 TO HAVE THE SYSTEM LEARN A SINGLE TIRE POSITION

### **! IMPORTANT**

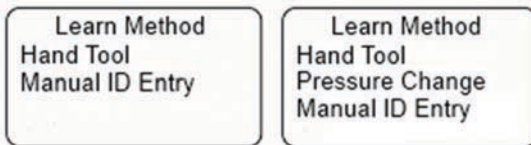
As stated earlier, it is important to make sure that there is no loss of power to the SmarTire® TPMS during the Learn Sensor procedure.

- 6.1.1 Press the right button on the dash display to select the learn single tire option. The display will now show the first axle on the vehicle. Press the left button to scroll through the axles, and then use the right button, if necessary, to scroll until the desired tire is selected. Then press and hold the center button for two seconds.



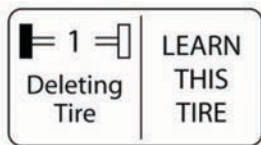
- 6.1.2 The next screen displayed will depend on the display and receiver versions installed.

Select the Hand Tool option (scroll down using the left button, then the right button to select it).

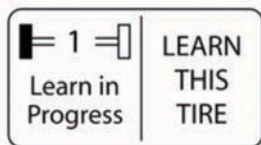


Earlier versions of software may instead take you directly to the next step.

- 6.1.3 The screen will then show "Deleting Tire" and the selected wheel position will flash.



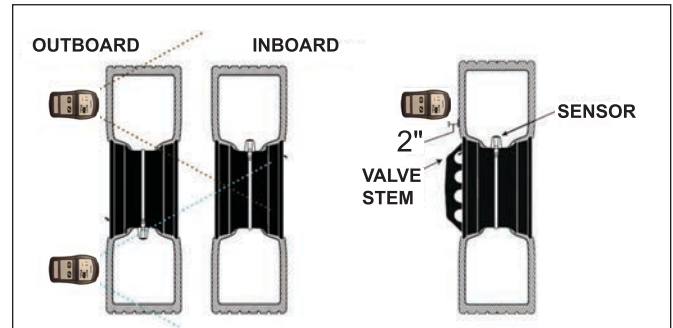
- 6.1.4 When the ID for the selected tire has been deleted, the screen will show "Learn in Progress".



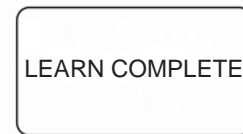
- 6.1.5 The technician has three (3) minutes to use the SmarTire Low Frequency (LF) Tool to send a request to the sensor inside that tire, to transmit its ID.

To do this, hold the SmarTire LF tool with the transmission end pointed towards the tire's sidewall adjacent to sensor's location approximately two (2) inches away from the tire's surface. Press and release the Initiate/Learn (✓) Button (a single beep will be heard) and keep the tool in place for five (5) seconds until four (4) quick beeps are heard.

**Note: Do not hold down the Initiate/Learn (✓) button.**



- 6.1.6 After the receiver registers the transmission, it can take up to 30 seconds for the learn process to be completed. Look for the "Learn Complete" screen to be displayed.



**IMPORTANT:** Press the center button once to save the changes and exit the "Learn" function.

Press the center button repeatedly to exit the Setup Mode.

**Potential error messages are:**

**Learn Time Out.** This may occur when the three (3) minute window for receiving the response from the sensor is exceeded.

**Duplicate Sensor ID.** When the ID code received is already being used on the vehicle.

**See the Troubleshooting Section (Section 7) for more information.**

## 6.2 TO HAVE THE SYSTEM LEARN ALL THE TIRE POSITIONS

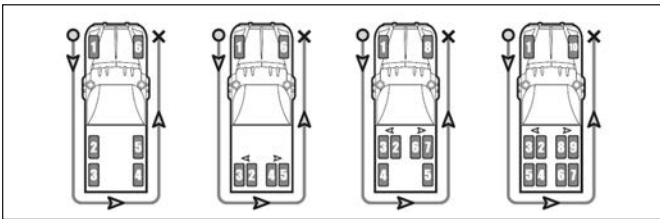


As stated earlier, it is important to make sure that there is no loss of power to the SmarTire® TPMS during the Learn Sensor procedure.

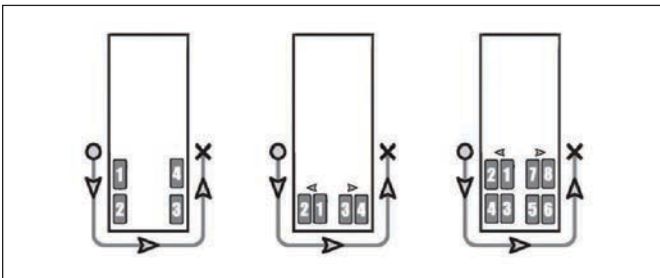
To learn all tire positions, follow the steps under Section 6 above, but instead of selecting the “Learn Single Tire” option, use the “Learn All Tires” option instead. (The display may vary.)



When learning all tire positions, the display will expect the responses from the tire sensors be received starting with the front left tire and moving around the vehicle in a counterclockwise pattern based upon the stored vehicle configuration. (Note that a spare tire may also be included in the tires to be identified).



Above tractors, below trailers



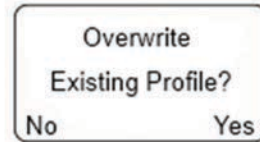
For dual tire axles, the inner tire is learned first and then the outer tire. Follow the prompts on the display as it will indicate the current position to be learned.

6.2.1 The next screen will permit you to select the “Hand Tool” option. (The display may vary.)



These instructions will cover the use of the hand tool to program the sensor IDs. For details about the Manual ID entry option, please see BW2799.

6.2.2 The next screen will prompt you to choose to overwrite the existing profile.

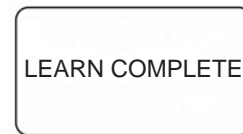


Select “Yes” (press the right button) to continue. The “Initializing Profile” screen will display the system’s progress in erasing the old profile.



6.2.3 Wait for the status bar to compete and the “Learn in Progress” message to be displayed before continuing.

The ID for the wheel position to be programmed will be displayed next and the SmarTire Low Frequency (LF) Tool must be used at that location within three (3) minutes.



6.2.4. Use the technique described in 6.1.5 to request the sensor to transmit its ID to the receiver.

6.2.5 Check that the “Learn Complete” has been displayed (this may take up to 30 seconds) and then move to the next tire position to be learned. Repeat these steps until all wheel positions are programmed.

6.2.6 **IMPORTANT:** Press the center button once to save the changes and exit the “Learn” function.

Press the center button repeatedly to exit the Setup Mode.

### Potential error messages are:

**Learn Time Out.** This may occur when the three (3) minute window for receiving the response from the sensor is exceeded.

**Duplicate Sensor ID.** When the ID code received is already being used on the vehicle.

**See the Troubleshooting Section (Section 7) for more information.**



## 7. TROUBLESHOOTING

The following messages may be displayed at the end of the Learn process if it was not completed successfully:

**A. Learn Time Out.** The receiver did not receive an expected response from a sensor within three (3) minutes after being requested to learn a tire, and so the system “timed- out”. Re-attempt to communicate at least twice. If unsuccessful, a sensor may be pointing directly down into the ground, or away from the Gateway or Antenna, causing the signal reception to be disrupted. In these cases, it may be useful to move the vehicle forward or backward about a half-turn of the wheels, to reposition the sensor, and then retry.

It can be useful to look to see if the tire stems for dual-wheel assemblies are installed with their valve stems arranged 180° from each other, as recommended. If still unsuccessful, try to initiate the sensor at the bottom of the wheel, no matter where the valve stem is located. If this attempt was successful, rotate the wheel 180 degrees forward and initiate the sensor again at the BOTTOM of the wheel. If the second initiation also provided a result, it is evidence of a broken cradle and/or strap. The sensor is simply falling to the lowest point in the wheel after each rotation. Remove the tire and replace the cradle and strap. Depending on the damage done to the sensor itself, it may simply be pressed into a new cradle for reuse, however, do not reuse the strap.

It is also important to check that the tool is held about two (2) inches from the tire during the procedure – and not touching the rim.

**B. Duplicate Sensor ID.** The sensor ID that was received for the wheel position is already programmed into the system at another wheel position. (This may occur when rotating wheels if the original set of locations has not been erased.) Repeat the process, ensuring you are initiating the sensor you wish to learn. Take care when working with dual tire assemblies to communicate with the correct tire position.

It can be useful to look to see if the tire stems for dual-wheel assemblies are installed with their valve stems arranged 180° from each other, as recommended. You can verify the location of the sensor in most cases, by looking for the label attached to the rim during installation. If still unsuccessful, try to initiate the sensor at the bottom of the wheel, no matter where the valve stem is located. If this attempt was successful, rotate the wheel 180 degrees forward and initiate the sensor again at the BOTTOM of the wheel. If the second initiation also provided a result, it is evidence of a broken cradle and/or strap. The sensor is simply falling to the lowest point in the wheel after each rotation. Remove the tire and replace the cradle and strap. Depending on the damage done to the sensor itself, it may simply be pressed into a new cradle for reuse, however, do not reuse the strap.

For more in-depth troubleshooting, consult the *SmarTire® Tire Pressure Monitoring System (TPMS) by Bendix CVS Operator’s Manual (BW2799)*, available for download from the Bendix website [www.bendix.com](http://www.bendix.com).

## FCC NOTICE

This device complies with Part 15 of the FCC Rules. The SmarTire® TPMS Low Frequency (LF) tool is a Part 15 low-power transmitter below 1705 kHz. The device has a rated RF power output of less than 0.2 micro Watts. Due to the frequency range of the transmitter – and the low-level of output power – the device is not subject to the routine RF exposure valuation as per Section 2.1093 of the FCC rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference; and,
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one, or more, of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this device without the express approval of the manufacturer may void the user's authority to use this device.

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## EUROPEAN REGULATIONS

This device complies with R&TTE 1999/5/EC through harmonized standards (EN301 489-1 and EN330 330-1). The equipment has been tested and found to comply with the above directive and in addition it meets the requirements for low powered transmitters/receivers as defined by the relevant radio approval authority and complies with low voltage directive 73/23/EEC. The directive is designed to provide reasonable protection against harmful interference or susceptibility. Changes made to this device without the express approval of the manufacturer may void the user's authority to use this device

## RSS210, RSSGEN

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference; and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

## TRADEMARKS

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## NOTES

***SmarTire***<sup>®</sup> *Tire Pressure Monitoring System*  
***by Bendix CVS***

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