DTU

DISCOUNT TIRE UNIVERSITY

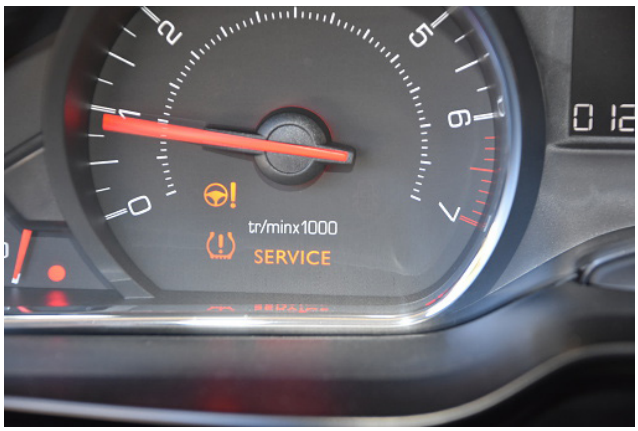
SERVICING TPMS

PARTICIPANT REFERENCE GUIDE

SERVICING TPMS

SERVICING TPMS

Introduction



The Tire Pressure Monitoring System, or TPMS, does exactly that. It monitors the tire and warns the customer of rapid air loss and potential tire failure. Very low tire pressure can lead to excessive or irregular wear, undue stress to the tires, and a reduction in vehicle performance and fuel mileage.

The TPMS is a federally mandated safety system similar to an air bag or seat belt, and therefore cannot be intentionally disabled by a service business. Every vehicle we service with an operational TPMS is required to leave our store with an operational TPMS.

TERMINOLOGY

TPMS Terms

Let's go over some commonly used terms:

Relearn or TPMS Relearn

The process completed after a routine service when a TPMS system is operational and simply requires some final adjustments before the vehicle hits the road.

Scan or Scan the Sensor

The action of triggering a sensor to communicate using a scan tool.

Program or Program the Sensor

The action of converting a blank, programmable sensor into a sensor for use on the vehicle it is being installed on. This is done using a scan tool.

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TERMINOLOGY *(continued)*

TPMS Terms *(continued)*

Troubleshoot or Troubleshoot the Vehicle

The process of determining the cause of an inoperable (or malfunctioning) TPMS system.

Resetting the Baseline

The process of changing the target pressure for the TPMS system to a new pressure due to alternate placard recommendations. It can also mean to calibrate an indirect system's measurements of the wheel speed sensors.

OBD

The connector in the vehicle where we attach the scan tool.

HOW THE TPMS WORKS

TPMS Categories

TPMS systems are divided into two categories: Direct and Indirect.

Direct systems utilize battery powered sensors mounted inside the tire to measure actual pressure in real time.

These sensors communicate pressure information, as well as their unique ID number, back to the vehicle's ECU (computer). This system displays the appropriate information to the driver.

Indirect systems use wired sensors attached to the vehicle's hub or axles to measure the rate at which each assembly is spinning. Indirect systems look for differences that can indirectly determine if a tire has low pressure.

When a tire is low on air, it spins quicker than the other tires.

An indirect system will detect this and display the appropriate information to the driver.

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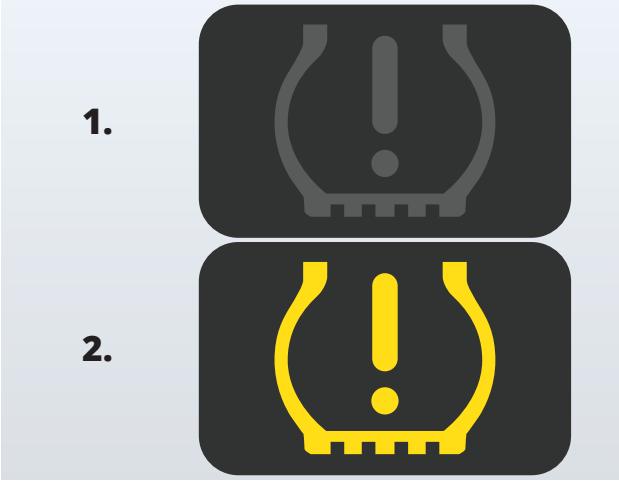
HOW THE TPMS WORKS *(continued)*

Operational TPMS



What does “operational” mean when we talk about the TPMS system?

Two things indicate a properly working TPMS:

1. Not illuminated: The symbol light on a vehicle’s dashboard is off.
2. Solid illumination: The symbol light is illuminated immediately following the vehicle being turned on, or the key is placed into the “on” position.

Inoperative TPMS

The TPMS is inoperative when the symbol light flashes for 60 seconds before going solid, when the vehicle is turned on or the key is placed into the “on” position.

HOW THE TPMS WORKS *(continued)*

Inoperative TPMS *(continued)*

Some vehicles have a secondary light on the dash that reads “TPMS.” If this is illuminated, the vehicle’s TPMS is inoperative.

A dash display, or navigation screen, may also provide a message describing the condition of the TPMS. This will always accompany one of the light behaviors shown above.

HOW THE TPMS WORKS *(continued)*

Using your Participant Reference Guide, search for the answers to the questions listed below.

1. **The categories of TPMS systems are_____. Select all that apply.**
    a. Indirect
    b. Direct
    c. Active
    d. Passive

2. **Direct systems utilize battery powered sensors mounted inside the tire to measure actual pressures in real time.**
    a. True
    b. False

3. **Indirect systems detect if a tire is low on air by _____.**
    a. Using GPS location
    b. Measuring engine RPM
    c. Measuring the rotational speed of the axle or hub
    d. Measuring the pressure within the tire

4. **How do you know when TPMS is NOT functioning properly in a vehicle? Select all that apply.**
    a. There is a secondary light on the dash that reads “TPMS”.
    b. The TPMS symbol on the dashboard illuminates immediately after starting the vehicle then turns off.
    c. The TPMS symbol on the dashboard flashes for 60 seconds before going solid when the vehicle is turned on or the key is placed into the “on” position.

THE BARTEC TECH400 PRO

TPMS processes require the use of a scan tool.

Discount Tire uses one of the best TPMS focused scan tools on the market: the Bartec Tech400 Pro.

Bartec Overview

The main menu is the starting point for the various processes you may need to complete on a vehicle.

THE BARTEC TECH400 PRO *(continued)*

Bartec Overview *(continued)*

From the main menu, you will select “New TPMS Service”, and then enter the vehicle you are servicing (or use the OBD to determine the correct vehicle). It is critical to enter the exact model and year of the vehicle you are working with. Incorrect information will cause you to have problems, as sensors can change from year to year.

Another way to set the tool for the correct vehicle is to use the OBD selection. This will have the Bartec determine the vehicle on its own.

THE BARTEC TECH400 PRO *(continued)*

Bartec Overview *(continued)*

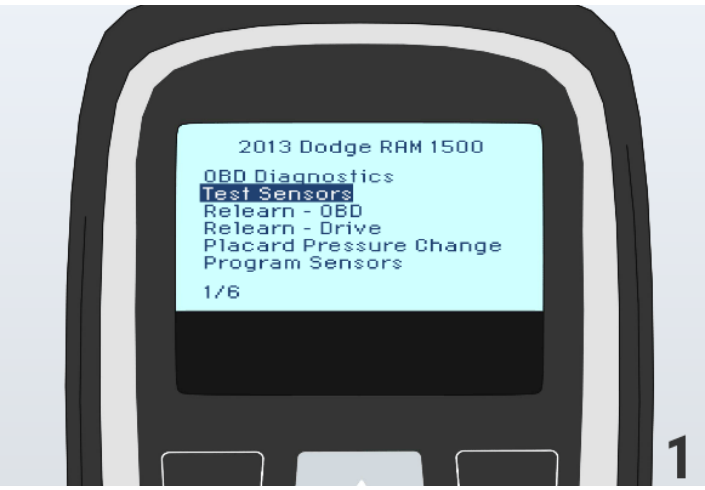
Once the vehicle is entered, you will see the list of available functions you can complete.

OBD Diagnostics

When the TPMS system is inoperative or malfunctioning, and this option exists for the vehicle being serviced, it should be the first one performed. This function will ask you to plug the Bartec into the vehicle, where it will gather the vehicle diagnostic troublecodes (DTC) and detect other things like spare tire position and current sensor ID locations.

THE BARTEC TECH400 PRO *(continued)*

Test Sensors



This function allows you to scan the sensors in the wheels. Doing this provides the sensor's ID number, the current tire pressure, and can indicate if a sensor is also flagging for low pressure. Just like OBD diagnostics, this selection should be used when the TPMS system is inoperative or malfunctioning. This can also be valuable when evaluating the current pressures or locations of sensor ID numbers on an operational system as well. Once you have entered this selection, you will be taken to the "Overhead View of the Car Screen".

Important

These first two selections are critical in identifying the issues causing a malfunctioning TPMS, so make sure you complete them both and do not stop at the first clue found. Make sure you get them all.

THE BARTEC TECH400 PRO *(continued)*

Test Sensors *(continued)*

The “Overhead View of the Car Screen” will direct you to start scanning all the sensors. Begin with the left front wheel and then continue clockwise around the vehicle. Press the scan button before each scan.

You can use the up and down buttons to move to each tire manually.

Bartec Troubleshooting

```
YEAR MAKE           MODEL           BODY     STYLE      DRIVE AIR SENSOR?
---- -------------- --------------- -------- ---------- ----- -----------
2016 HONDA          CIVIC COUPE     17"BASE  EX-L         F       N

TPMS Instr:  HON-4

 RESET TPMS AFTER:  PSI ADJUSTMENT / ROTATIONS / TIRE-WHEEL REPLACEMENT
 *Uses Intelligent Indirect TPMS system.
 Models without information display:
 1> Press Reset button on left side of dash until TPMS light blinks 2 times.
 2> Drive vehicle to complete calibration.
 Models with information display:
 1> Press UP/DOWN button to select VEHICLE SETTINGS/CUSTOMIZE SETTINGS
 2> Press RESET button or select TPMS CALIBRATION
 3> TPMS CALIBRATION appears.  Press RESET button, then select CALIBRATE
 4> Press RESET button a final time, screen will say CALIBRATION STARTED.
 5> Drive vehicle to complete calibration.

*** End report ***
```

If: There is reason to believe the sensors should be working, but the Bartec is not picking up the signal, or the Bartec will not communicate with the vehicle when plugged into the OBD,

Then: Reference the “View TPMS Instructions” on the POS.

This document will tell you if a temporary redirect to another vehicle selection on the Bartec is required. Using a temporary redirect will allow the Bartec Tech400 Pro to properly communicate with the vehicle and sensors being serviced.

If you are still having challenges with troubleshooting a vehicle, Bartec is another source for assistance. They have dedicated phone personnel ready to assist you in troubleshooting vehicles Monday through Friday during business hours. **Bartec tech support: 1-866-987-8767**

THE BARTEC TECH400 PRO *(continued)*

Bartec Troubleshooting *(continued)*

Once you have determined what the issues are with the TPMS, you will complete one of the following tasks:

1. Replace the sensors
2. Relearn the system
3. Reset sensor baseline

We will discuss this in more detail in the next sections.

Using your Participant Reference Guide, search for the answers to the questions listed below.

1. **All TPMS processes require the use of a scan tool.**
   a. True
   b. False

2. **Which of the following ways can the Bartec tool identify the vehicle you are servicing? Select all that apply.**
   a. Selecting the Year, Make, and Model manually
   b. Using the OBDII connection
   c. Scanning the VIN barcode
   d. Bluetooth

3. **If the Bartec will not communicate with the sensors or vehicle, you can find troubleshooting information _____.**
   a. On the KC
   b. In the Bartec manual
   c. In the LMS
   d. On the POS

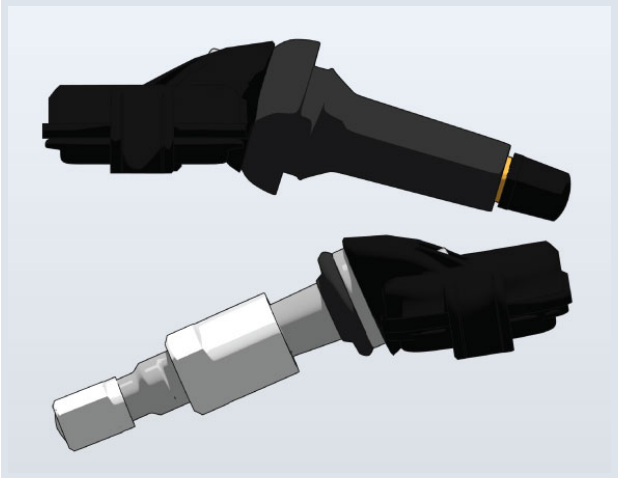
4. **When testing the TPMS sensors with the Bartec, you should scan in what order?**
   a. Begin with the right front wheel and continue clockwise.
   b. Begin with the right front wheel and continue counterclockwise.
   c. Begin with the left front wheel and continue counterclockwise.
   d. Begin with the left front wheel and continue clockwise.

REPLACING SENSORS

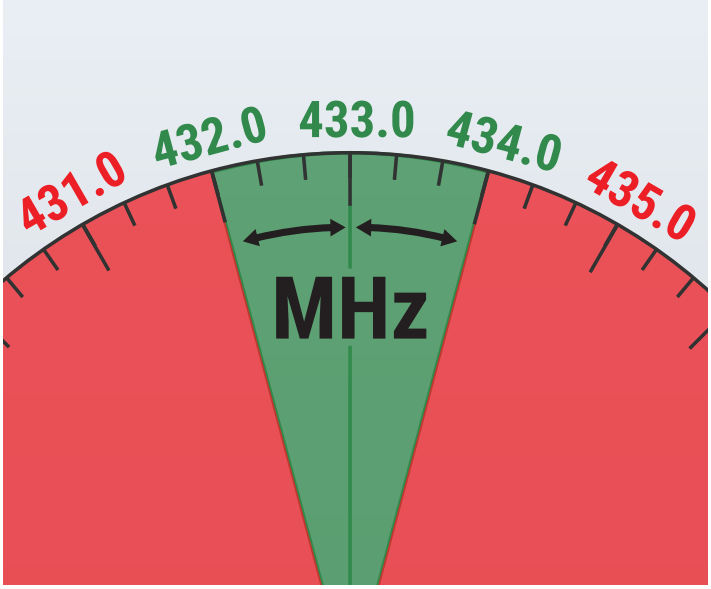
Identifying the correct replacement sensor is critical to ensuring that the TPMS operates properly, in both communication type and frequency.

Installing the wrong sensor guarantees the TPMS system will malfunction or continue to malfunction.

Before we explore the sensor categories, let's define a few terms related to TPMS sensors.



Frequency



Frequency is measured in Megahertz, or MHz for short. The sensor's frequency is printed on the sensor.

Replacement sensors must match frequency within one point in MHz.

You may see 433, 433.9, or 434 printed on the sensors. These are all considered the same frequency.

Some vehicle model years may list two different frequencies of replacement sensors.

Each vehicle serviced within these model years was built to accept one or the other, but never both.

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REPLACING SENSORS *(continued)*

Communication Type

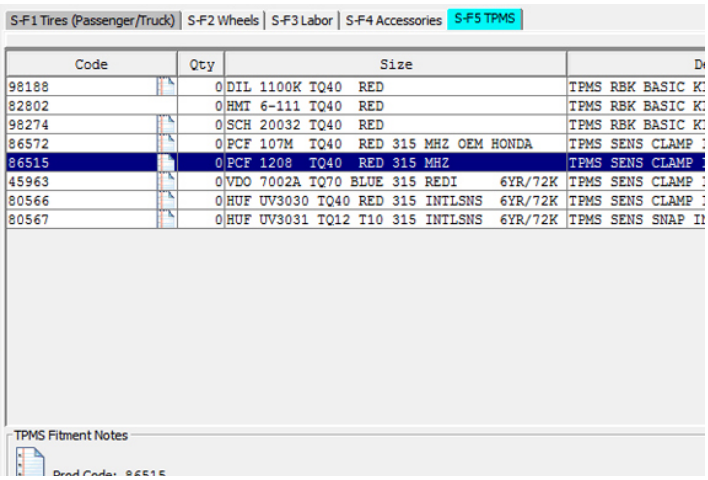
Communication Type is the language used by sensors.

Each vehicle manufacturer determines the language they want to use. They can even create a new one as technologies evolve.

At the time of this training, there are more than 70 different languages used on TPMS equipped vehicles. Communication types are not interchangeable. These languages are not printed on the sensor.

The sensor part number can be used to cross-reference the appropriate replacement sensor, when needed.

When original sensors are not available to cross-reference, the part number can be obtained by contacting a dealer parts department with the exact VIN of the vehicle you are servicing.



You can cross-reference the sensors by using the replacement sensor notes listed on the Details screen of the POS.

REPLACING SENSORS *(continued)*

Three Sensor Categories

The sensors we sell fall into three different categories:

- Direct fit sensors
- Multi-application sensors
- Programmable sensors

Each requires a slightly different process to prepare them for installation.

Direct Fit sensors are preloaded with the single communication type needed by the vehicle and a new, unique ID number.

Original equipment sensors are an example of a direct fit sensor.

This style of sensor is easily installed into the assembly.

The relearn process is completed with no extra steps.

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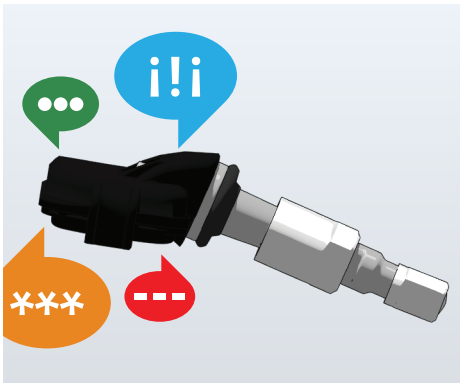
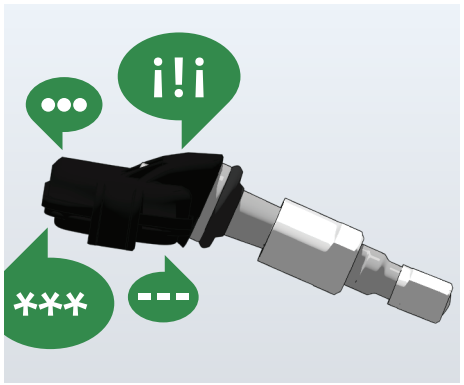
REPLACING SENSORS *(continued)*

Three Sensor Categories *(continued)*

Multi-Application sensors broadcast multiple communication types at the same time.



They can be installed in a variety of vehicles and include a new pre-programmed unique ID number.



Each vehicle will only “hear” the language they are programmed to understand.

Due to the many languages these sensors broadcast, they need to be “locked” into a grouping that includes the vehicle type on which they are being installed.

After assembly, installation, and inflation:

Sensors will lock by being scanned with the Bartec, using the current vehicle setting.

Do this even if the normal relearn process for the vehicle doesn’t require sensors to be scanned.

REPLACING SENSORS *(continued)*

Three Sensor Categories *(continued)*

1. Main Menu

If these sensors are locked into the wrong grouping, they can be unlocked using a selection on the Bartec located from the main menu:

1. Find the main menu
2. Locate tool kit
3. Unlock REDI 7002A/7003A

Once you have unlocked the sensor, you can continue with the lock process that was already covered.

2. Toolkit

3. Unlock

REPLACING SENSORS *(continued)*

Three Sensor Categories *(continued)*

Programmable sensors come blank, without a pre-programmed ID number, and have a catalog of programs to choose from. These sensors are not active until programmed.

1. Select Program Sensor

To program this type of sensor, we will use the Program Sensors selection from your Bartec's available functions list for the vehicle:

1. Select Program Sensor
2. Select Brand of Sensor being used

Determine if you want to copy an existing ID or create a new one.

2. Select Brand

ID Selection

REPLACING SENSORS *(continued)*

Three Sensor Categories *(continued)*

Copy

Choosing to copy the existing sensor ID allows the sensors to be replaced or swapped out without needing to complete the relearn process for new sensors.

Copying the sensor ID means the vehicle will still read pressure values from the sensor ID it knows.

The vehicle will not know anything has changed.

This is particularly valuable when a customer has two sets of wheels and tires, or when the Bartec is not capable of completing a relearn on the vehicle being serviced.

Create

Creating a new ID for sensors means it becomes a new, unique sensor that will need the normal relearn completed like the other sensor types.

REPLACING SENSORS *(continued)*

Three Sensor Categories *(continued)*

After Copy or Create are selected, you will be prompted to place the sensor in front of the tool and hit enter to begin programming the sensor.

Programmable sensors can be reprogrammed to another communication type at any point.

This means if they are programmed to an incorrect vehicle, they can easily be reprogrammed to the correct one.

Using your Participant Reference Guide, search for the answers to the questions listed below.

1. **TPMS sensors are designed to be a universal fit for all vehicles.**
   a. True
   b. False

2. **The frequency of a replacement TPMS sensor _____.**
   a. Is programmable using the Bartec tool
   b. Must match within one point in MHz
   c. Must match the original exactly
   d. Does not matter

3. **At the time of this training there are more than different languages used on TPMS equipped vehicles.**
   a. 70
   b. 120
   c. 37
   d. 50

4. **The three sensor categories are _____, Multi-application, and Programmable.**
   a. Standard
   b. OEM
   c. Direct fit
   d. Locked

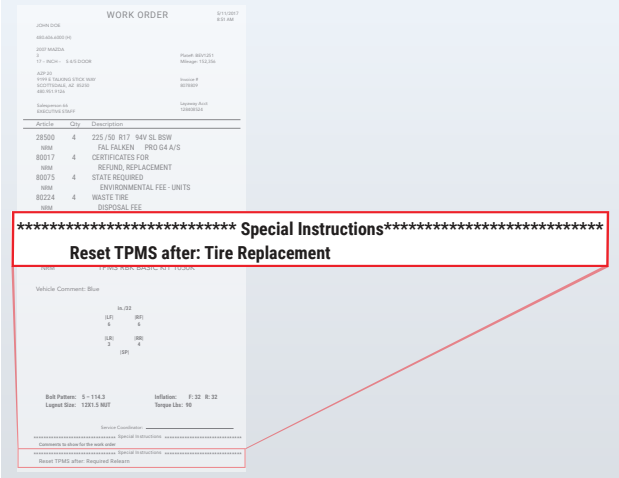
RELEARN

A relearn is needed following certain vehicle services and to pair new sensors to vehicles.

How do you know when to perform a relearn?

Start with the work order notes.

If a relearn is required, the services will be noted on the work order.



Relearn Types

You will see one or more types of relearns listed on your Bartec selections for the vehicle, and the process can be completed using any one of them.

These selections are categorized into three types:

1. Drive Relearn
2. Stationary Relearn
3. OBD Relearn

Let's take a look at what's involved in each of these:

RELEARN *(continued)*

Relearn Types *(continued)*

Drive Relearn

A drive relearn, also called an auto-relearn system, is a TPMS system that will automatically pair with new sensors and reposition their locations after a short period of driving, without any additional steps.

The specific info for the vehicle you are servicing will be shown when selecting Relearn – Drive from your Bartec selections.

Stationary Relearn

A stationary relearn requires manual initiation of the relearn process to pair sensors or reposition them.

The initiation process can vary from simply pressing a button on the dash, to navigating information screens, to complex combinations of turning the key on and off and pressing the brake pedal in specific sequences. All required steps will be shown when selecting “Stationary Relearn” from your Bartec selections.

Once the vehicle process has started, the sensors are then scanned in the normal clockwise order, starting at the left front. This process pairs the ID numbers and locations.

RELEARN *(continued)*

Relearn Types *(continued)*

OBD Relearn

An OBD relearn relies completely on the scan tool and its ability to communicate to the vehicle's computer directly. Sensor IDs are scanned by the Bartec.

After the scan, connect the Bartec to the OBD where it programs the new IDs into the vehicle's computer.

IMPORTANT NOTE

The stationary and OBD relearns clear trouble codes as part of the process. You should never complete a relearn on a malfunctioning system before troubleshooting it.

Need Help?

```
YEAR MAKE           MODEL           BODY     STYLE      DRIVE AIR SENSOR?
---- -------------- --------------- -------- ---------- ----- -----------
2016 HONDA          CIVIC COUPE     17"BASE  EX-L         F       N

TPMS Instr:  HON-4

 RESET TPMS AFTER:  PSI ADJUSTMENT / ROTATIONS / TIRE-WHEEL REPLACEMENT
 *Uses Intelligent Indirect TPMS system.
 Models without information display:
 1> Press Reset button on left side of dash until TPMS light blinks 2 times.
 2> Drive vehicle to complete calibration.
 Models with information display:
 1> Press UP/DOWN button to select VEHICLE SETTINGS/CUSTOMIZE SETTINGS
 2> Press RESET button or select TPMS CALIBRATION
 3> TPMS CALIBRATION appears.  Press RESET button, then select CALIBRATE
 4> Press RESET button a final time, screen will say CALIBRATION STARTED.
 5> Drive vehicle to complete calibration.

*** End report ***
```

If the instructions on the Bartec are not working properly for the vehicle you are servicing, go to the view TPMS button of the POS and review the Relearn Process.

This page is constantly updated and may have some helpful links or steps to aid in completing a relearn, or you may be redirected to use a different vehicle setting in the Bartec.

As with Troubleshooting, Bartec Support can also help with relearn issues.
Bartec tech support: 1-866-987-8767

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RELEARN *(continued)*

Using your Participant Reference Guide, search for the answers to the questions listed below.

1. **The work order notes will let you know when you need to perform a relearn.**

    a. True

    b. False

2. **What are the three types of relearns you may need to perform? Select all that apply.**

    a. Drive Relearn

    b. OBD Relearn

    c. ECU Relearn

    d. Stationary Relearn

RESETTING THE BASELINE

Resetting the baseline is executed to optimize the TPMS system operation when changing certain conditions that may impact the sensor.

There are two instances when this would happen:

1. Indirect Systems

Resetting the baseline for indirect systems may happen when tires have different tread depths, or there are changes in tire air pressure, tire position, or tire size.

These changes can alter the wheel speed the computer is expecting to read.

Some vehicles commonly have a button, or info screen selection, that allows the system to be calibrated to the new conditions during the first drive.

On these vehicles, resetting the baseline and a TPMS reset are one and the same.

RESETTING THE BASELINE *(continued)*

2. Direct Systems

Resetting the baseline on direct systems is typically necessary when changing tire type or size where a new Revised Cold Inflation Pressure is recommended on the work order.

Some vehicles with direct systems make baseline adjustments very easy to do with a single button or navigation screen selection. Unfortunately, this can cause it to be used improperly, or accidentally, causing a baseline to change to an improper pressure.

In these cases, you can have a solid yellow pressure light even when the pressures are at the stated placard pressures. When this happens, you can easily reset the baseline.

RESETTING THE BASELINE *(continued)*

Using the Bartec

The last method for resetting the baseline is through the use of the Bartec.

Using the Bartec selection for Placard Pressure Change, select the pressure setting needed, and forcibly write it into the vehicle's computer.

To use this function:

1. Select Placard Pressure Change.
2. Plug it into the vehicle's OBD.
3. Follow the on-screen prompts.

If the vehicle is recognized by the tool, it will allow the change of baseline pressure.

You can find a list of available vehicles for a Bartec Baseline Reset on the KC.

1. Select Placard Pressure Change

2. Plug it into the vehicle's OBD

3. Follow prompts

RESETTING THE BASELINE *(continued)*

Using your Participant Reference Guide, search for the answers to the questions listed below.

1. **Indirect systems need to have the baseline reset in which situations? Select all that apply.**

    a. Changes in tire size

    b. Tires that have different tread depths

    c. Each time the vehicle is started

    d. Each time the tire pressure is adjusted

2. **You can reset the baseline either through the vehicles onboard systems or by connecting the Bartec.**

    a. True

    b. False