

# AVI

*YOUR TRAINING STARTS HERE*



**TIRE PRESSURE  
MONITORING  
SYSTEMS**



**WE SUPPORT  
PROFESSIONAL  
CERTIFICATION**

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### Why do we need TPMS systems?



Nov. 2000 NHTSA and Congress pass Transportation Recall Enhancement Accountability Documentation (TREAD) Act.

### TPMS Background



Tire Pressure Monitoring Systems (TPMS) have been mandated by the Transportation Recall Enhancement Accountability Documentation (TREAD) Act.

TPMS is already present in some new and late models and will be phased in over the next few years.

#### Phase-In Schedule:

- 1.) Applies to all vehicles under 10,000 GVWR except those with dual rear wheels.
- 2.) Motorcycles also exempt.
- 3.) 20% of all models from Oct. 2005 to Aug. 2006.
- 4.) 70% of all models from Sept.06 to Aug.07.
- 5.) 100% of all models after Sept. 2007.

**TPMS Background (CONTINUED)**

**Under Inflated Tires**

- Increase Heat due to Increase in Rolling Resistance.
- Increased heat leads to tire tread separation or blowout.
- Low Pressure reduces handling due to increased sidewall deflection.

**Latest Rule, NHTSA April 8, 2005**

In the latest ruling, NHTSA requires a TPMS to notify the driver when any tire is 25% below the pressure on the placard.

TIRE AND LOADING INFORMATION			
SEATING CAPACITY		TOTAL 88	FRONT 8 REAR 88
The combined weight of occupants and cargo should never exceed XXX kg or XXX lbs.			
TIRE	ORIGINAL SIZE	COLD TIRE PRESSURE	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT	P235/60R17XL	200 kPa, 29 PSI	
REAR	P235/60R17XL	200 kPa, 29 PSI	
SPARE	P235/60R17XL	200 kPa, 29 PSI	

**Owners Manuals must accomplish the following:**

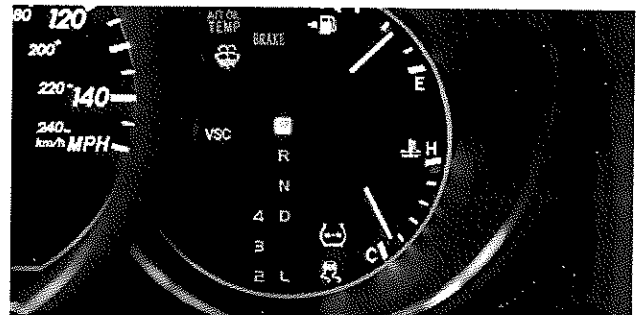
- 1.) Explain TPMS.
- 2.) PSI Must be Checked via Vehicle Placard.
- 3.) PSI checked monthly.
- 4.) TPMS is not a substitute for maintenance.

**Consumer Benefit Facts**

**4.4 PSI Low**

- Tire Life is Reduced by 25%
- Fuel Consumption Increases 2 %
- Reduced Braking
- DOUBLE IT FOR 6 PSI

**85 % of all tire PSI loss is gradually. For every 10° change, we loose 1 PSI.**



## TPMS Background (CONTINUED)

### Underinflated Tires:

The following set of pictures depicts a car and a mounted tire (Drivers side, front) with an initial cold inflation pressure of 32 psi. The tire pressure was decreased in 10% increments from 100% to 10% (32.0 psi to 3.2 psi).

% Inflation	Actual PSI
100	32.0
90	28.8
80	25.6
70	22.4
60	19.2
50	16.0
40	12.8
30	9.6
20	6.4
10	3.2



**100%  
INFLATION**

TPMS Background (CONTINUED)

**90%  
INFLATION**



**80%  
INFLATION**



**TPMS Background (CONTINUED)**



**70%  
INFLATION**



**60%  
INFLATION**



TPMS Background (CONTINUED)

**50%  
INFLATION**



**40%  
INFLATION**



**TPMS Background (CONTINUED)**



**30%  
INFLATION**



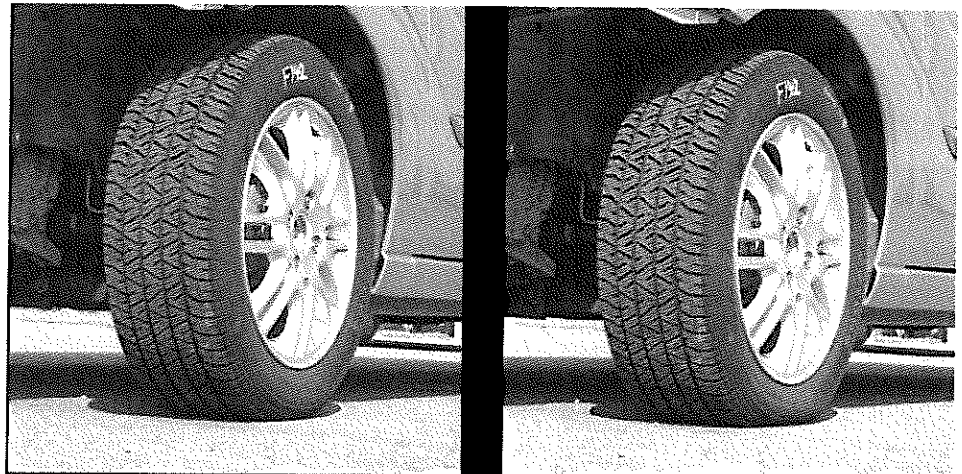
**20%  
INFLATION**

TPMS Background (CONTINUED)

**10%  
INFLATION**



**100%  
VS  
40%  
INFLATION**



### TPMS Background (CONTINUED)

#### What can we learn from this series of pictures?

It is difficult to visually determine the level of under-inflation. With the tire inflated at 70% (activation level for TPMS) it visually appears that the tire is inflated to 100%. This series of pictures highlights the need for TPMS.

#### Run Flat Tires - The NEW Problems of Consumer Neglect

Run Flats can run without Air Pressure for 50-200 miles at 50-55 mph and Retain same ride and handling, which allows the low psi tire to go unnoticed by the driver.



*Goodyear's F1 Steel tire was the first run-flat tire offered as standard fitment on a production model, the fifth generation Corvette, in 1997.*

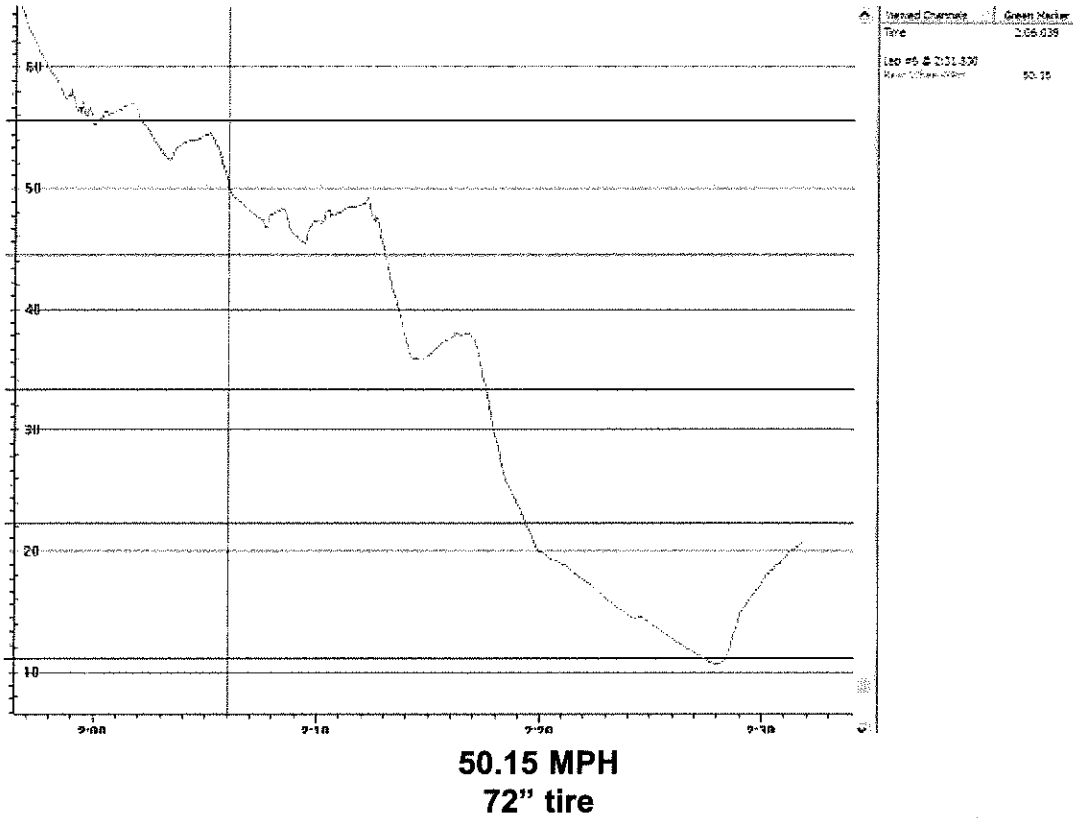


*This cutaway photo of a tire using the Michelin-developed PAX system clearly shows the solid "ring" that supports the tire tread in the event of a pressure loss.*

TPMS Background (CONTINUED)

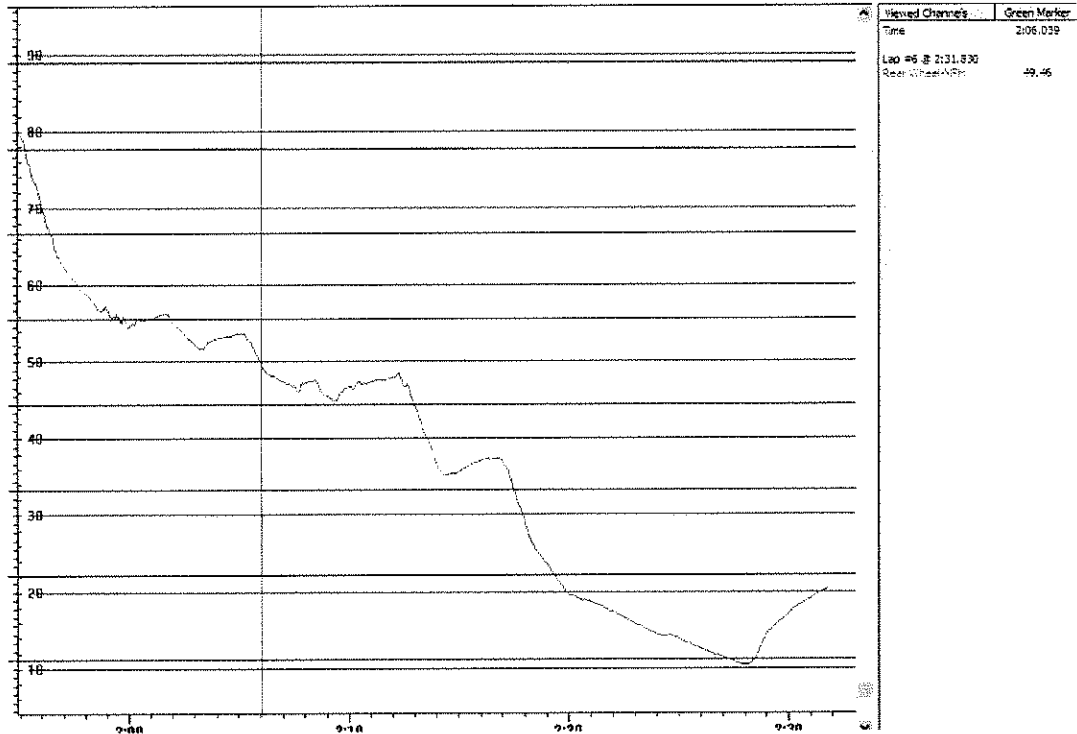
Two Types of TPMS

Indirect: Indirect systems use speed sensors on ABS to detect a tire with a different rotational speed. Loss of tire pressure reduces tire diameter. A smaller tire increases rotational speed. An example of this would be a space saver tire.

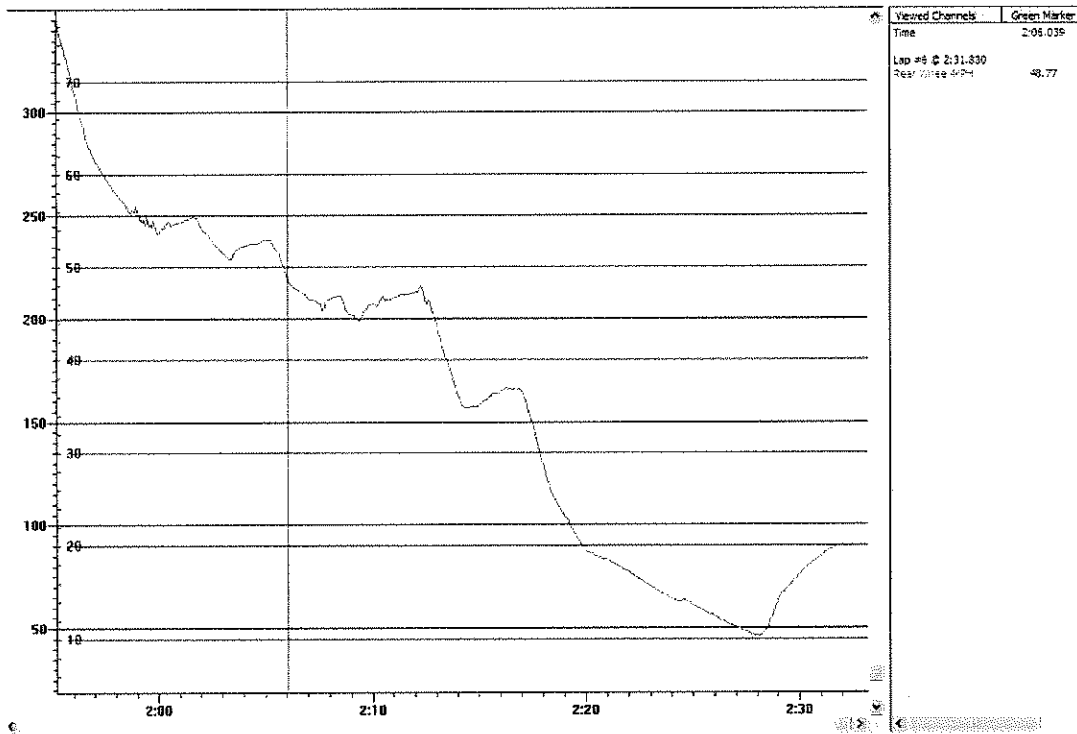


# TIRE PRESSURE MONITORING SYSTEMS (TPMS)

## TPMS Background (CONTINUED)



**51.46 MPH**  
**71.5" tire**



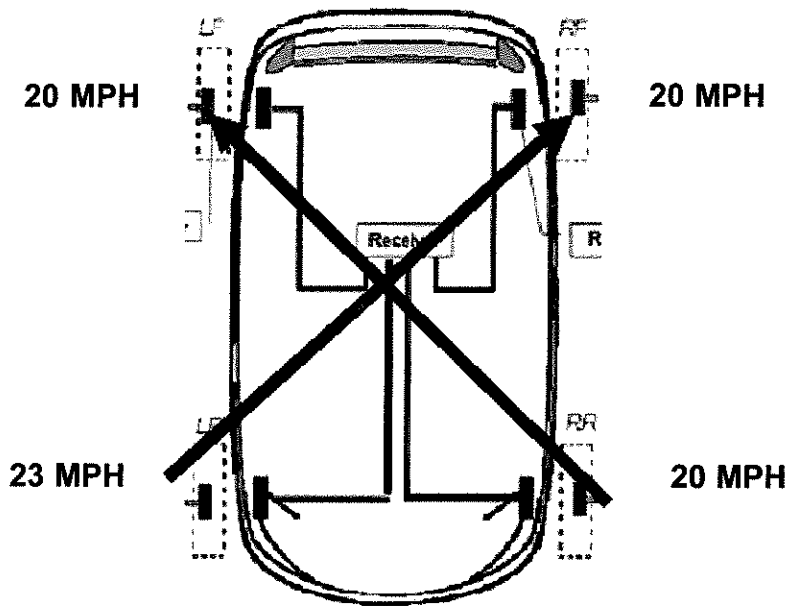
**52.77 MPH**  
**70.5" tire**

**TPMS Background (CONTINUED)**

**INDIRECT Calculation Method**

**LF + RR = 40 mph   RF + LR = 43 mph   Sum = 83 mph**

**NOTE: At least two tires on the same diagonal must be properly inflated or there is no reference point to ID a low tire.**



**Average Wheel Speed = 20.75 mph (83 / 4)**

**Wheel Speed Difference = 3 mph**

**Calculated Value = .140 ( 3 / 20.75) (light on)**

**Program Threshold = .125 (what it takes to turn the light on)**

**Disadvantages of an Indirect System:**

Current indirect systems will not warn the driver if all four tires are equally underinflated.

No longer compliant with NEW TPMS regulations.

## TPMS Background (CONTINUED)

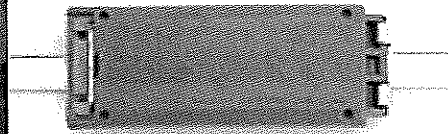
### DIRECT TPMS



Most systems use a sensor attached to the bottom of the valve stem.



Some systems use a sensor attached to a band secured around the rim drop center.





**TPMS Background (CONTINUED)**

**SUMMARY OF TPMS TYPES**

**INDIRECT TPMS:**

**Alerts only when any SINGLE tire loses pressure.**  
**Will NOT indicate to driver which tire is low.**  
**No ALERT if all tires are losing pressure over time or at the same rate.**  
**Will NOT alert in time to prevent tire damage especially if heavily loaded.**  
**Alerts ONLY when pressure drops >30%.**

**Direct TPMS:**

**Alerts when ANY OR ALL Tires drop in pressure.**  
**Indicates to driver which tire is low.**  
**Instant alert when pressure drops below preset level.**  
**Heavy load does not affect the alert.**  
**Alerts when pressure drops 25% and can also provide incremental pressure measurements.**

The latest NHTSA Ruling mandates installation of a TPMS that is capable of detecting 25% under-inflation and warning the driver. Only the Direct TPMS is capable of meeting these requirements. Every TPMS must include a Malfunction Indicator Lamp to warn the driver that the system is not operating.

**Dashboard Lights**

**Must be yellow.**  
**Must bulb check.**  
**Light On: Low PSI.**  
**Light Flashing: Problem with TPMS system.**

Common Problem Indication: Telltale will flash for 1 minute and then remain on steady with a problem, and will repeat on start up until the problem is fixed.

**TPMS SYSTEMS AND COMPONENTS**



**HOW do they work?**  
**Direct TPMS Sensors**

**Optional Factory Tire Pressure Monitoring Systems**

Does your vehicle already have a tire pressure monitoring system? Here are the three most common direct tire pressure monitoring systems currently being offered as optional equipment on select U.S. vehicles



**BERU**  
Audi/Volkswagen  
BMW  
Land Rover  
Mercedes-Benz  
Porsche



**SCHRADER**  
Ford  
Chrysler  
GM  
Nissan/Infiniti



**PACIFIC**  
Lexus

Because proper fitment of the sensor/transmitter to the wheel is so crucial, The Tire Rack has been working with wheel manufacturers to develop and supply aftermarket alloy wheels that properly accommodate direct tire pressure monitoring system sensors/transmitters.

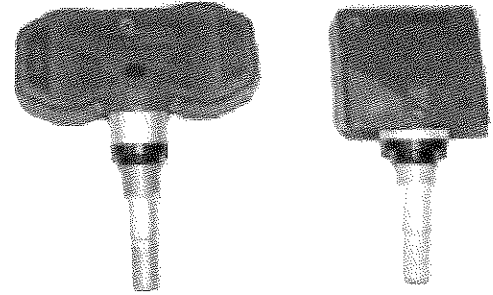
**TPMS SYSTEMS AND COMPONENTS (CONTINUED)**

**Valve Stem Details**

Typical weight: 28 grams

Typical sensor operating range: 24-39 psi

***Most operate at speeds above 19 mph***



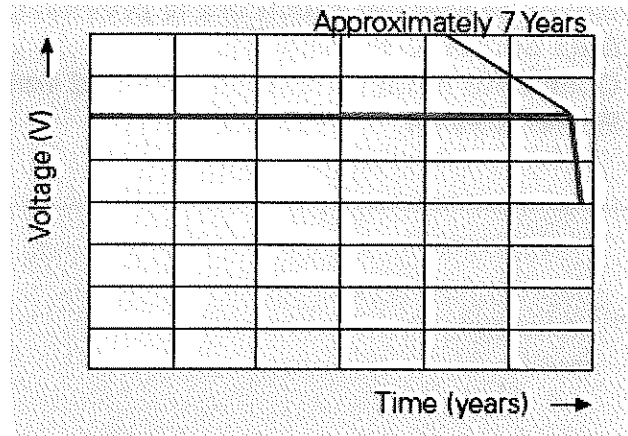
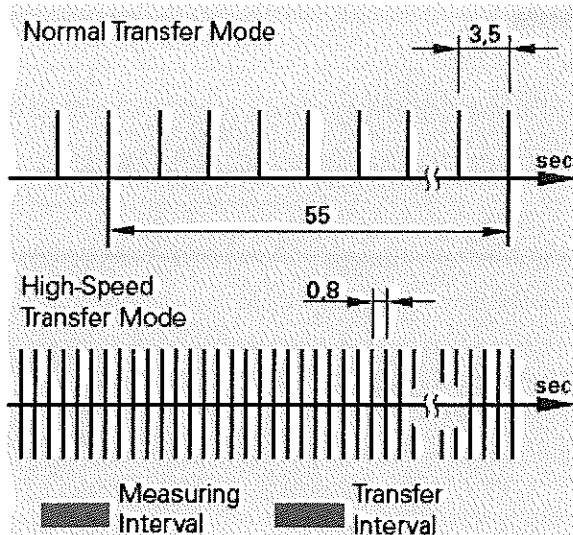
The sensor's internal roll switches are open when the vehicle is stationary for more than 15 to 20 minutes. While stationary, sensors read tire pressure every 30 seconds and transmit data every 60 minutes (depending on the vehicle).

As the vehicle speed increases to 20 mph, centrifugal force closes the sensor's internal roll switch (drive mode). Sensors sample tire pressure every 30 seconds and transmit data to PDM or RCDLR every 60 seconds. If a 1.6 psi change in pressure has occurred since last transmission sensor transmits in re-measure mode.

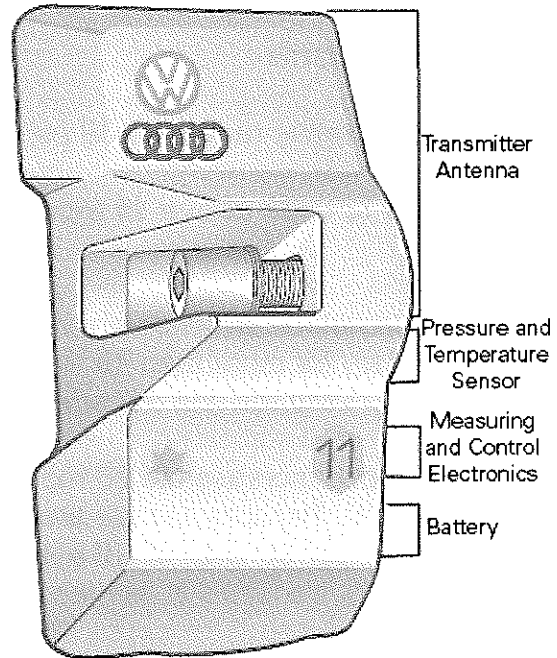
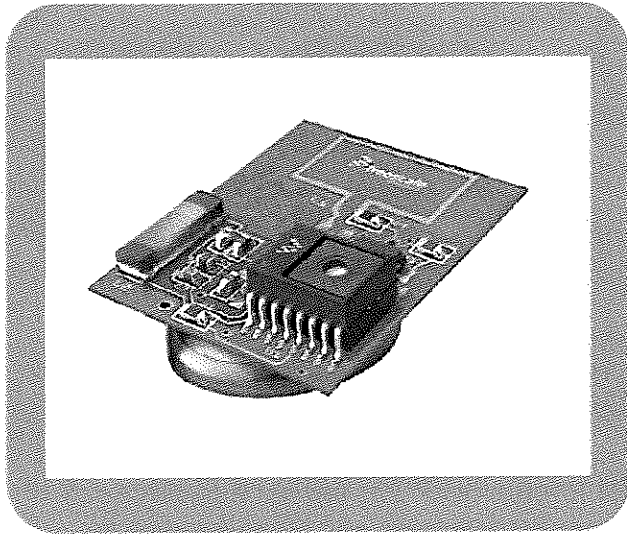
Driver Information Center (DIC) message is cleared when tire pressure is corrected.

**Battery Life**

Projected lithium battery life 7-10 years



## TPMS SYSTEMS AND COMPONENTS (CONTINUED)



### Valve Stem Details

- Sensors for measuring pressure and temperature inside the tire.
- Optional sensors to detect wheel speed and/or direction of rotation.
- Controller with time base for periodic measurements.
- Means to identify which tire is providing the data.
- Data output to the vehicle chassis.
- Command input for diagnostics and wake up.
- Power Source.

NOTES

## TPMS SYSTEMS AND COMPONENTS (CONTINUED)

- Sensing

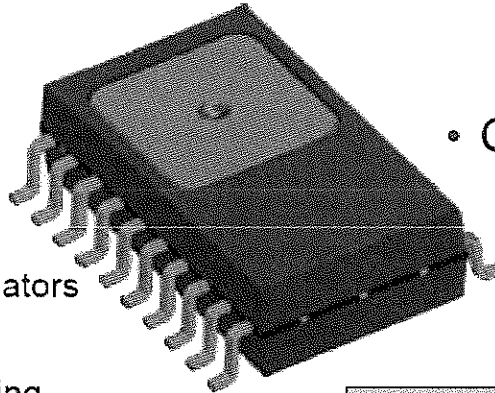
- Pressure
- Temperature
- Voltage
- Acceleration
- Motion

- Control

- Microcontroller
- State Machine
- Low Power Oscillators
- Timers
- ADC
- Sensing Processing

- Wheel Identification

- Serial Numbers in NVM



- Data Output

- RF Transmitter
- ASK/FSK Modulation
- 315/434 MHz
- Various Protocols

- Command Input

- Low Level Signal Input with AGC
- Input Command Decoder

**ALL THESE FUNCTIONS CAN  
BE PLACED WITHIN ONE  
DEVICE PACKAGE**

### NOTES

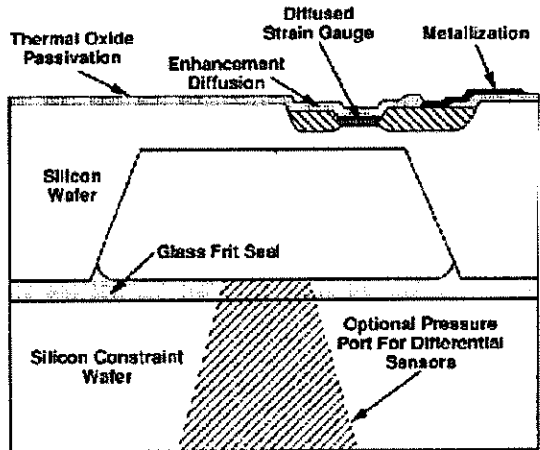
**TPMS SYSTEMS AND COMPONENTS (CONTINUED)**

**Bulk MEMS**

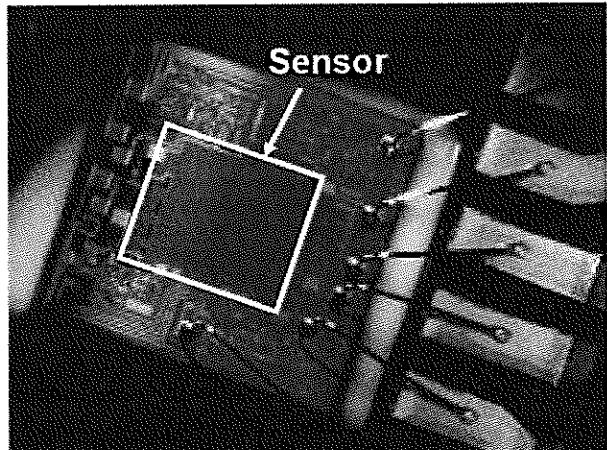
Resistance varies with Pressure

One cell – bridge network used for sensing

Absolute or differential pressure possible



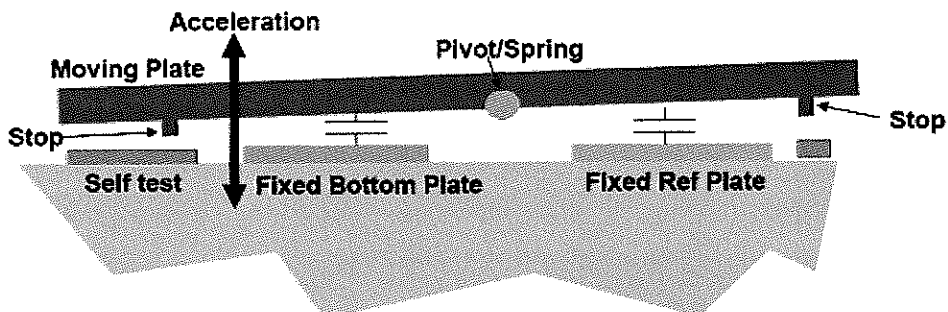
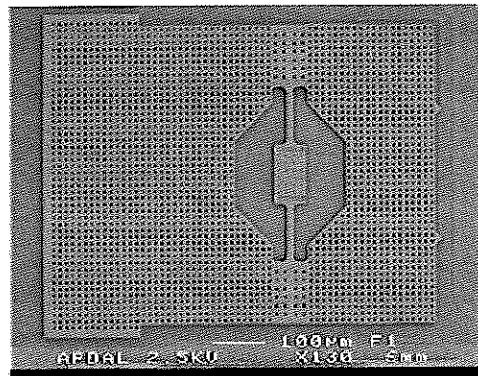
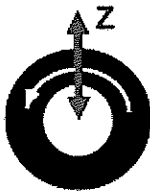
**Cross Section**



**Photograph**

**TPMS Solutions – Sensing Z-Axis Acceleration**

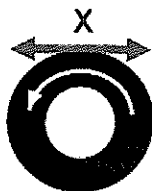
- Detects increase in wheel centripetal force (senses angular speed)
- Surface MEMS: Capacitance varies with acceleration  
Two capacitors – one increases while the other decreases



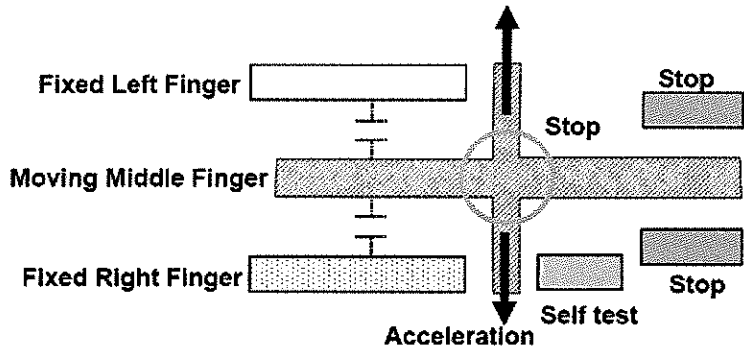
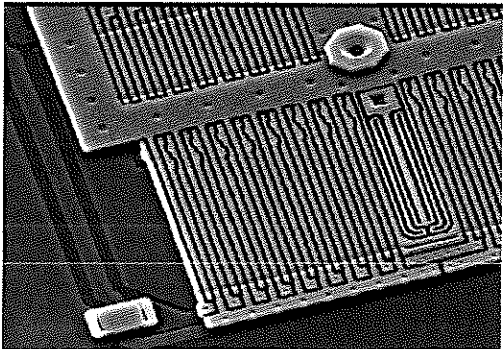
**TPMS SYSTEMS AND COMPONENTS (CONTINUED)**

**TPMS Solutions – Sensing X-Axis Acceleration**

- Detects variations in wheel angular force (detects gravity)



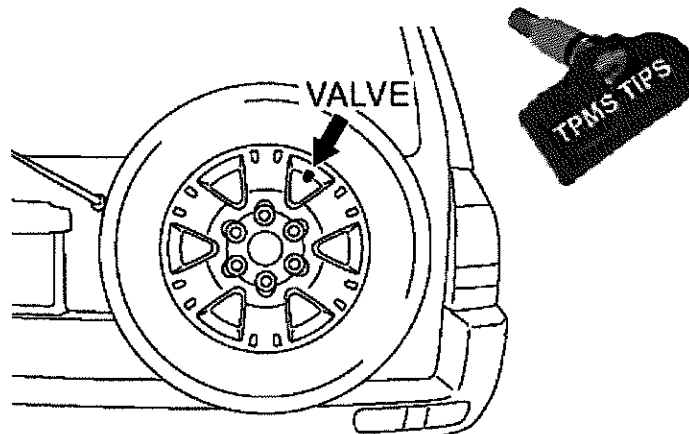
- Surface MEMS:  
Capacitance varies with acceleration. Two capacitors: one increases while the other decreases



Mass produced  
Bulk X-axis MEMS  
Accelerometer  
Not Available

NOTES

## TPMS SYSTEMS AND COMPONENTS (CONTINUED)



### Mitsubishi

- 11.) Repeat the above steps 8 and 9 for all tires (including the spare tire).

**NOTE:** If the spare tire pressure sensor ID cannot be registered, bring the spare tire near one of the road tires. Then register the tire pressure sensor ID. There is no TPMS antenna for the spare tire, so this work helps the road tire TPMS antenna receive signal from the spare tire securely.

**CAUTION:** If the spare tire is removed, always reinstall it as shown. If the spare tire valve (TPMS transmitter) is not positioned as shown, the roll switch, which is incorporated in the TPMS transmitter, may operate. In that case, the system may determine the spare tire as a road tire incorrectly.

- 13.) Check the completion of the tire pressure sensor ID registration (display on the screen).

---

### NOTES



**TPMS SYSTEMS AND COMPONENTS (CONTINUED)**

**CARRIER FREQUENCIES**

433.92 MHz: (433 or 434 on tools)  
315 MHz.

Unique ID code: Not just from vehicle to vehicle BUT also, **EACH WHEEL SENSOR HAS ITS OWN CODE!**

AIR PSI

Air Temp

Battery

**VALVE CORES**

**VALVE CORES ARE ALL DIFFERENT!** You must always put in a new electroless nickel-plated valve core. Electroless Nickel-plated valve cores must be used with the aluminum valve stem. Failure to use electroless nickel-plated cores will result in galvanic corrosion and eventual loss of tire pressure. Tighten core with an approved core tool to **0.17Nm - 0.37 Nm**.

**DO NOT OVERTIGHTEN!**

**Valve CAPS are different!**

Usually Aluminum, Plastic with rubber seal in cap.

Plastic without rubber seal is not a sealing cap.

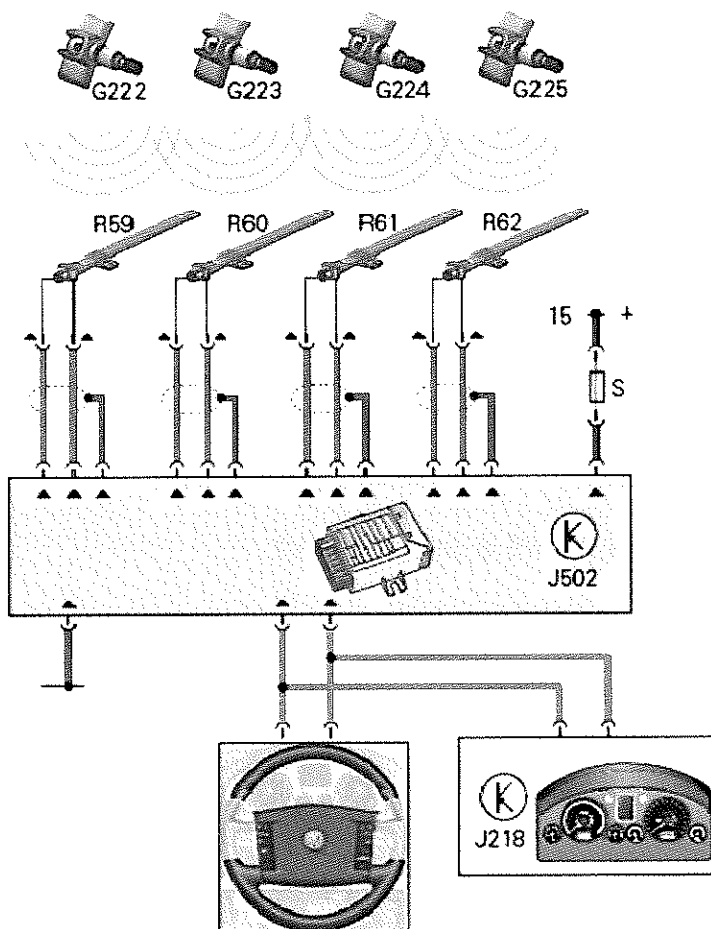
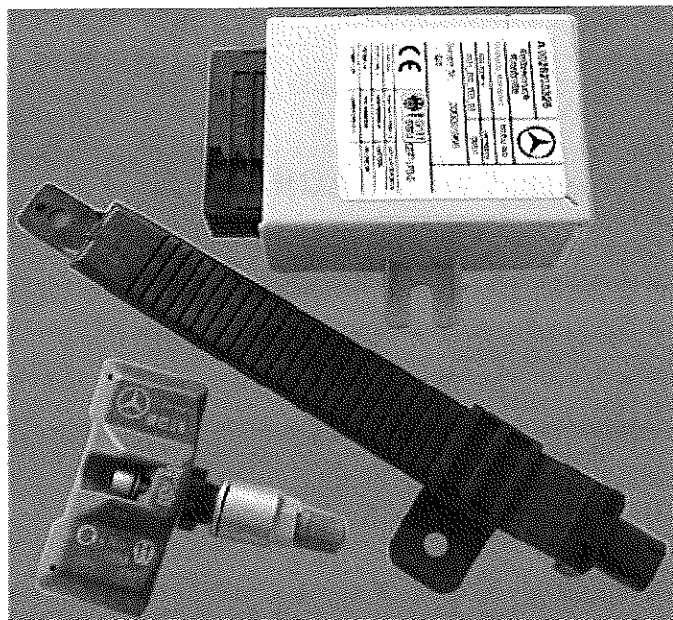
**TPMS SYSTEMS AND COMPONENTS (CONTINUED)**

**HOW do the systems work?**

**Direct TPMS Sensors**

The sensor contains a battery and communicates with the vehicle via radio waves.

**Three parts. stem, antenna (initiator), control module.**



**TPMS SYSTEMS AND COMPONENTS (CONTINUED)**

**GM Sensor Transmission Issues**

Tire pressure sensors transmit to RCDLR through antenna grid at 315 MHz on FM Band. A coax cable connects grid to RCDLR.

A TPMS malfunction can occur if:

- a.) Coax cable connection is loose at RCDLR.
- b.) Center wire in coax is bent.
- c.) Shielding is not fully secure.

Rear defroster grid may have very small cracks. When defroster is ON, micro-arcing occurs at 315 MHz. Since the defroster grid is very close to antenna grid, **arcing causes TPMS malfunction.**

To verify rear defroster grid condition:

- a.) Clear stored TPMS DTC's with TECH 2 (or equivalent).
- b.) Drive vehicle above 20 mph for at least 10 minutes.
- c.) Turn rear defroster ON.
- d.) Note if TPMS malfunctions.
- e.) If TPMS malfunctions, refer to the appropriate service information for rear window replacement or grid repair procedure.

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NOTES

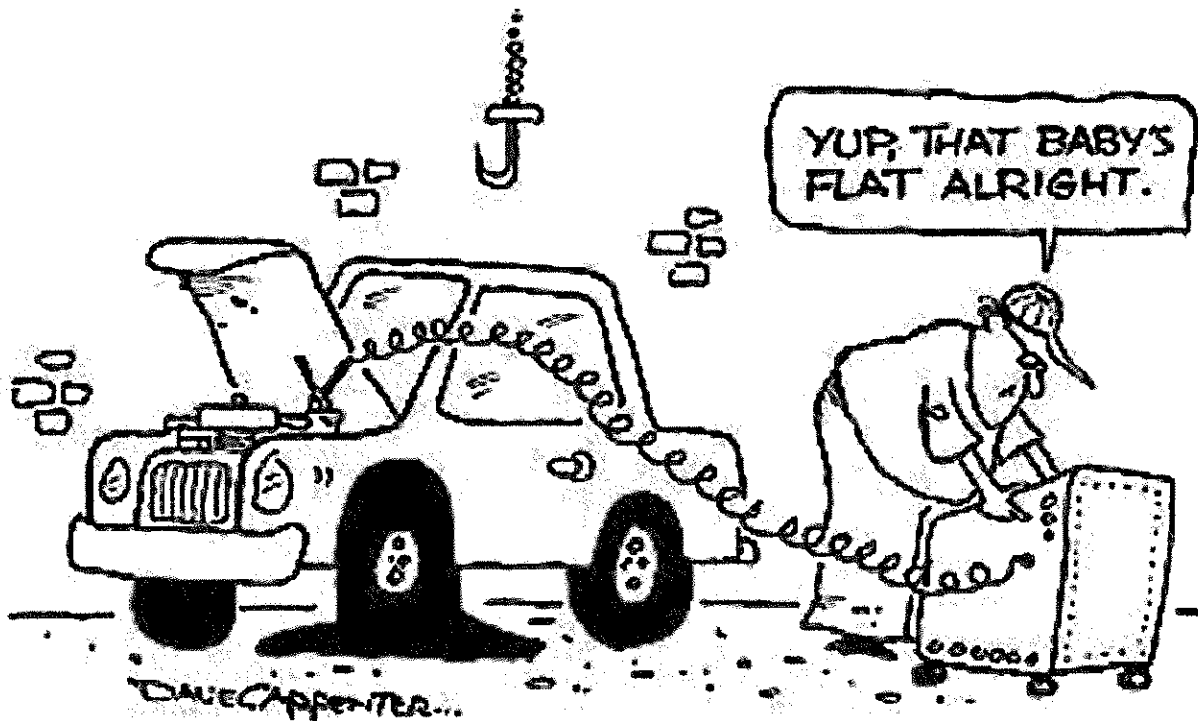
TPMS SYSTEMS DIAGNOSTICS

What do I do if the light is ON Or FLASHING, or I have to change or rotate tires?

The first thing to remember is that if the light is ON steady it means that a tire is low. Check all five tires (yes, that includes the spare). If the light is FLASHING, there is a problem with the system and it needs further diagnosis.

If the tires have been rotated, you need to find out what system the vehicle uses to display the error message. **LOOK IN THE OWNERS MANUAL!** Also, add 2-4 psi for a tire that IS NOT COLD.

Tire Pressure "Hokey Pokey"



**TPMS SYSTEMS DIAGNOSTICS (CONTINUED)**

**Recalibration & Training Terms**

Calibrate, Recalibration, Initialization, Relearn & Reprogramming are all terms that are similar ways of saying do the "Tire Pressure Hokey Pokey".

**2004 Sienna AWD  
TIRE PRESSURE WARNING SYSTEM INDIRECT!**

**CAUTION:**

**The tire pressure warning system need to be initialized in the following conditions:**

- When the low tire pressure warning light blinks every 0.25 seconds.
- After replacing or rotating tires or wheels

When initializing the system, the present tire condition is stored as a standard.

**INITIALIZING THE LOW TIRE PRESSURE WARNING SYSTEM**

**To initialize the system, perform the following:**

- 1.) Park the vehicle at a safe place and apply the parking brake. Stop the engine.
- 2.) Adjust the pressure of all the installed tires to the specified level.
- 3.) Turn the ignition key to "ON".
- 4.) Push and hold the reset switch until the low tire pressure warning light blinks three times.

### TPMS SYSTEMS DIAGNOSTICS (CONTINUED)

5.) Initialization is completed after driving at the speeds of 30 km/h (19 mph) or over for about 8 hours total, when the tire pressure warning system detects the normal tire pressure.

When initializing the system, make sure the low tire pressure warning light blinks three times. If the warning light does not blink three times, initializing will be failed and the tire pressure warning system will not function properly.

Do not push the reset switch without adjusting the tire pressure to the specified level. Otherwise, the low tire pressure warning light may not come on even if the tire pressure is low, or it may come on when the tire pressure is actually normal.

If you push the reset switch while the vehicle is moving, initialization is not performed.

If the low tire pressure warning light does not blink when you push and hold the reset switch, have the low pressure warning system checked.

When the warning light blinks every 0.25 seconds while driving, you may be unable to reset the system. In this case, set the system again according to the above procedure.

---

#### NOTES

**TPMS SYSTEMS DIAGNOSTICS (CONTINUED)**

**Recalibration & Training**

With vehicles that incorporate an instrument cluster display with tire positions, each time the wheels change position on the vehicle, the system must be reprogrammed.

**Direct TPMS**

With vehicle in learn mode, the sensor transmitters are “triggered” in a specific order and learned by the vehicles EVIC or similar on-board computer system.

The challenge? Multiple sensor manufacturers (Siemens, TRW, Beru, and Schrader to name a few) have developed different means to “trigger” the sensor transmitters.

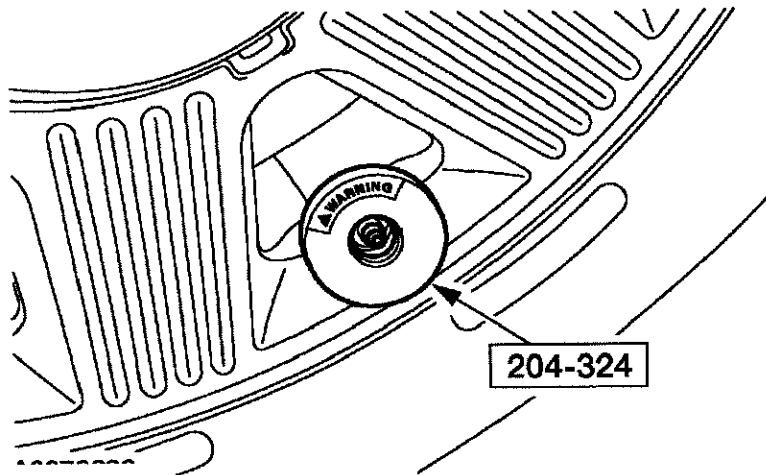
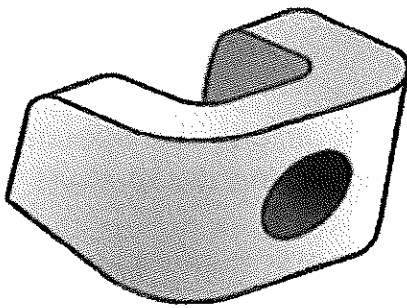
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NOTES

TPMS SYSTEMS DIAGNOSTICS (CONTINUED)

Type 1: Magnetically Triggered Sensors (Aluminum Wheels Only)

Ford 2003-2006 Expedition, Navigator, 2003-2005 Explorer, Mountaineer,  
2004-2005 Aviator  
Sensor Training



**NOTE:** The tire pressure monitoring system is not affected by wheel and tire rotation.

**NOTE:** The tire pressure sensor training procedure must be done on a single vehicle, in an area without radio frequency (RF) noise. RF noise is generated by electrical motor and appliance operation, cellular telephones, and remote transmitters.

- 1.) Turn the ignition switch to the OFF position.
- 2.) Turn the ignition switch from the OFF position to the RUN position three times, ending in the RUN position. Do not wait more than two minutes between each key cycle.
- 3.) Press and release the brake pedal.
- 4.) Turn the ignition switch to the OFF position.
- 5.) Turn the ignition switch from the OFF position to the RUN position three times, ending in the RUN position. Do not wait more than two minutes between each key cycle.



**TPMS SYSTEMS DIAGNOSTICS (CONTINUED)**

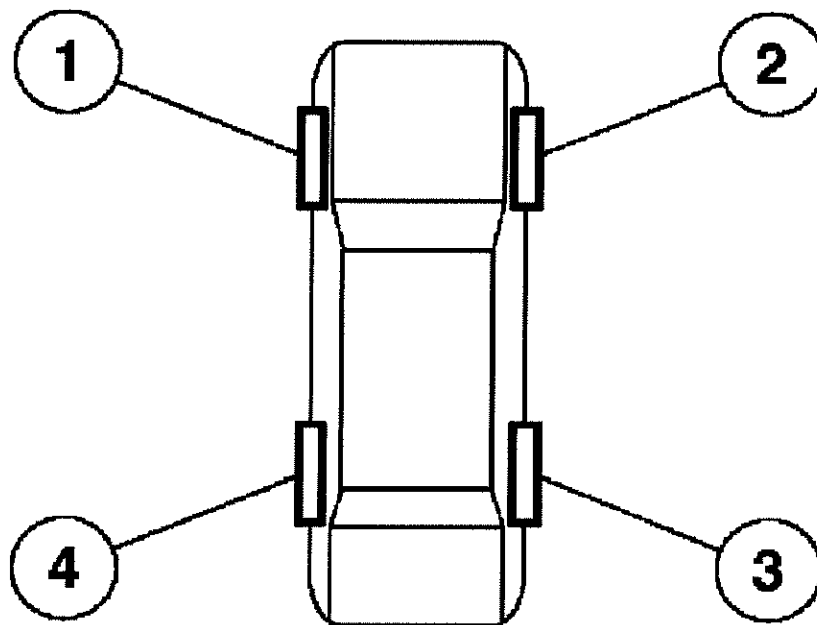
6.) When the message center displays "TRAIN LEFT FRONT TIRE", place the magnet on the valve stem of the LF tire pressure sensor. The horn will sound briefly to indicate that the tire pressure sensor has been recognized by the TPMS module.

7.) Within two minutes after the horn sounds, place the magnet on the valve stem of the RF tire pressure sensor.

**NOTE: If the TPMS module does not recognize any one of the five tire pressure sensors during the tire training procedure, the horn will sound twice and the message center will display "TIRE TRAINING MODE INCOMPLETE" and the procedure must be repeated.**

8.) Repeat Step 7 for the RR, LR, and spare tires.

When the tire training procedure is complete, the horn will sound once and the message center will display "TIRE TRAINING MODE COMPLETE".



### TPMS SYSTEMS DIAGNOSTICS (CONTINUED)

This procedure demonstrates us being able to do the “Tire Pressure Hokey Pokey” with no special tools. Just the Manufacturers procedure and a magnet. This however will not always be the case.



### Type 2: Continuous Wave

There are many instances where TPMS sensors cannot be “Woke Up” using a magnet. We will call these Type 2 or Continuous Wave Sensors. These sensor transmitters are designed to trigger when exposed to a 4-7 second continuous wave signal.

Vehicle manufacturers (OEM’s) use more than one frequency band (315 MHz and 433.92 MHz) to support radio frequency communication between devices on the vehicle.

**HOLD TOOL UP TO TIRE: NOT TO WHEEL OR VALVE** when activating RF  
may not penetrate aluminum or steel wheel.

**TPMS SYSTEMS DIAGNOSTICS (CONTINUED)**

**Check for BAND Mounted Sensors. Sensor is typically 180 across from valve stem. Run tool around tire until it is located.**

Below is a GM Sensor Relearn procedure using the Bartec Tool.

- 1.) Turn ignition switch ON and engine OFF.
- 2.) Ensure Parking Brake is SET.
- 3.) Cycle parking lamps On and OFF 4 times in 4 Seconds.
- 4.) Horn will sound and "**LOW TIRE PRESSURE**" indicator flashes.
- 5.) Hold Bartec Tool against LF tire sidewall near the valve stem.
- 6.) Press the TEST button on the tool.
- 7.) Horn sounds once after sensor's unique ID is learned by the PDM or RCDLR.
- 8.) REPEAT procedure in the following order RF, RR, and LR. The horn will sound twice after last sensor is learned.
- 9.) Drive vehicle above 20 mph to update the Driver Information Center (DIC).

**Stray signals or re-measure modes from another vehicle can accidentally be learned if both vehicles are being relearned at the same time. Perform relearn procedures away from other vehicles being serviced for TPMS concerns.**

Note PDM = Passenger Door Module, RCDLR = Remote Control Door Lock Receiver.

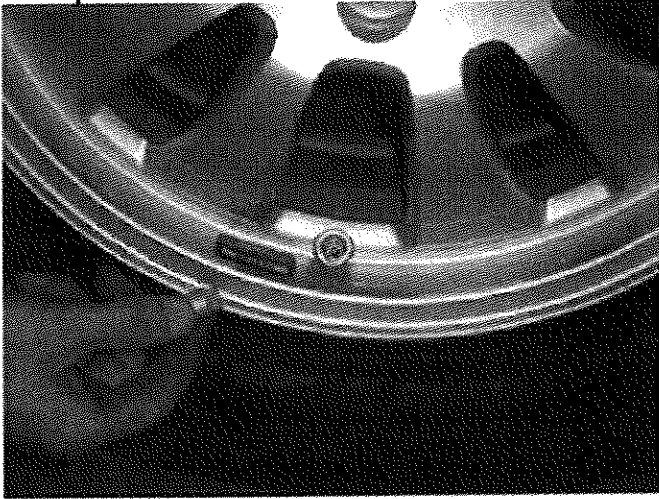
**Type 3 : Pulse Modulated**

Pulse modulated sensor transmitters (designed to trigger when they are exposed to a modulated wave signal or specific electronic pattern. Many OEM's have exclusive electronic patterns. The net result is multiple sensor protocols that will have to be triggered).

There are some vehicles that will not trigger with a magnet or a tool of any kind. On these vehicles you will need to use the "Hyper Mode" procedure.

The Hyper mode procedure is when you release pressure from the tire quickly. This wakes the sensor up so you can do the "Hokey Pokey".

**TECH TIPS (CONTINUED)**

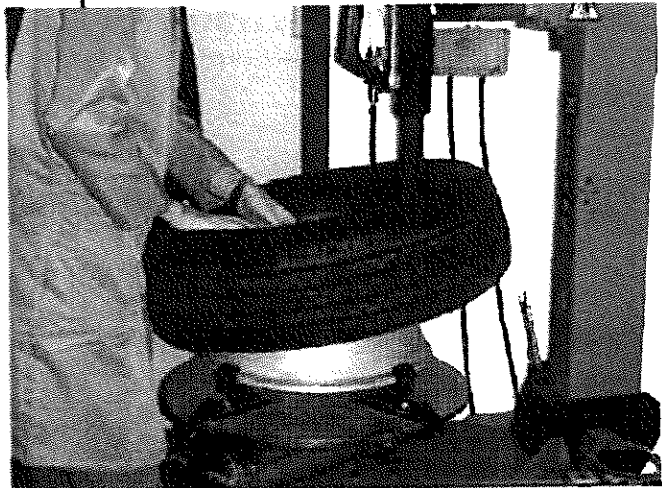


**2.) The Nut is removed and the Transmitter dropped into the tire.**

**3.) Gently bounce the tire to ensure that the transmitter falls to the bottom of the tire.**



**4.) Place Wheel on the Tire Changing machine and break both beads. Again, ensure that the transmitter is at the bottom. Unseat the bead away from the valve stem and check for a sensor.**



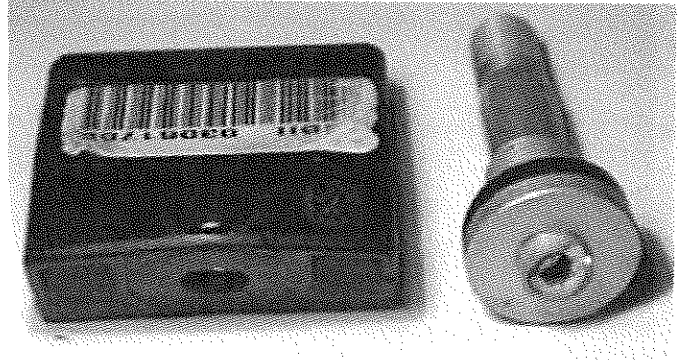
**5.) Place the tire onto the turntable and remove the tire.**

**6.) Now the transmitter can be removed safely from the tire.**

**TECH TIPS (CONTINUED)**

**Record the Number!**

**When replacing a valve stem record ALL the numbers of the new and old stem, you may need them!**



**7.) The grommet seal MUST be removed. Use a PLASTIC tool to remove it.**



**8.) The new seal can be put on using the open end of the Schrader core screwdriver tool.**



**TECH TIPS (CONTINUED)**

**Tire Sealant**

Still OK to use just remember to clean the holes in the sensor GENTLY.

**Run-Flat Tires & TPMS**

Customer: Can I use a non runflat tire?

Answer: Don't think so?

Runflat sidewalls are racing tire stiff. May alter handling if you use a tire that wasn't designed for the vehicle?

There is no spare if the customer gets a flat.

**REVIEW & TEST QUESTIONS**

*The following are list of questions pertaining to the information on this DVD. After answering these questions, cut them out of this manual along the dotted line and return them to AVI .*

*Automotive Video, Inc.  
6280 Arc Way  
Ft. Myers, FL 33966*

*1.) True or False. When replacing a valve core, it is recommended that you tighten the core with an approved torque tool AND the torque spec should be between 0.17Nm - 0.37Nm.*

- A. TRUE*
- B. FALSE*

*2.) List the two types of TPMS.*

- 1: \_\_\_\_\_*
- 2: \_\_\_\_\_*

*3.) True or False. A Flashing Warning Light Indicates a tire with a low psi.*

- A. TRUE*
- B. FALSE*

*4.) True or False. Valve Cores are all different.*

- A. TRUE*
- B. FALSE*

*5.) List the three types of TPMS sensors.*

- 1: \_\_\_\_\_*
- 2: \_\_\_\_\_*
- 3: \_\_\_\_\_*

*6.) True or False. When mounting a tire with a TPMS, you must ensure that the valve hole is just ahead of the traction point at 270 degrees from the mounting head.*

- A. TRUE*
- B. FALSE*

*7.) True or False. It is acceptable to replace a run-flat tire with a standard tire.*

- A. TRUE*
- B. FALSE*

**REVIEW & TEST QUESTIONS**

8.) *True or False. Indirect TPMS are no longer compliant with the new TPMS regulations.*

- A. TRUE
- B. FALSE

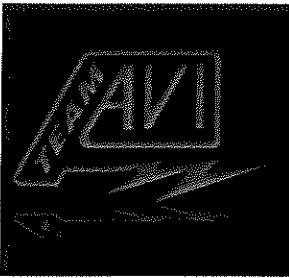
9.) *True or False. NHTSA requires a TPMS to notify the driver when ANY tire is 25% below the pressure published on the vehicle placard.*

- A. TRUE
- B. FALSE

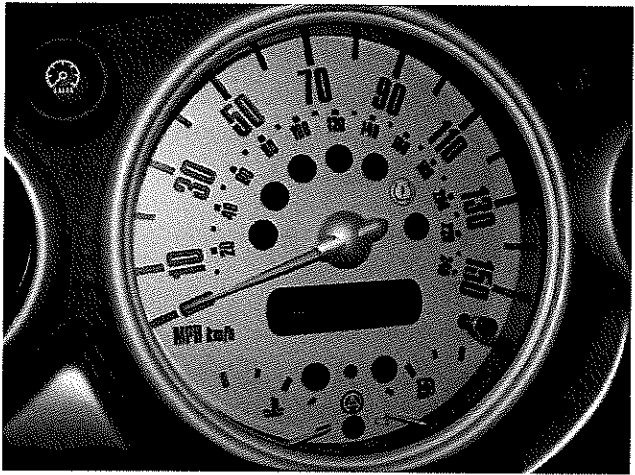
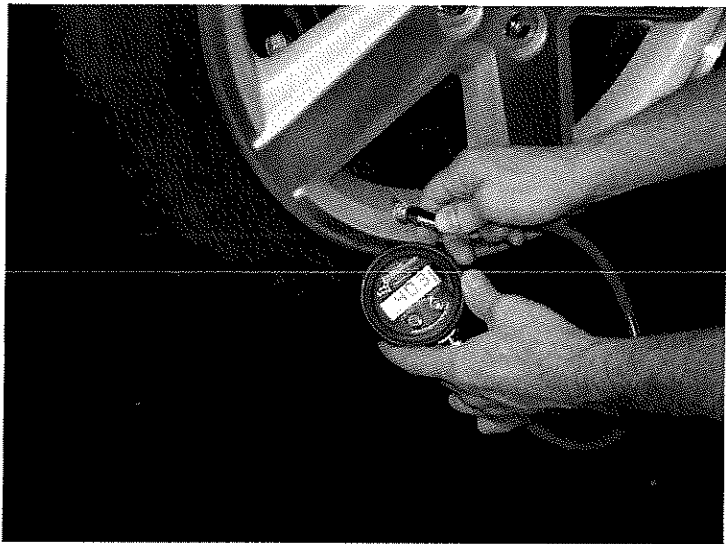
10) *True or False. Tire sealant can no longer be used in tires with TPMS.*

- A. TRUE
- B. FALSE





# TPMS TIPS & TECHNIQUES



TIRE AND LOADING INFORMATION			
SEATING CAPACITY: TOTAL 88, FRONT 8, REAR 88			
The combined weight of occupants and cargo should never exceed XXX kg or XXX lbs.			
TIRE	ORIGINAL SIZE	COLD TIRE PRESSURE	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT	P235/60R17XL	200 kPa, 29 PSI	
REAR	P235/60R17XL	200 kPa, 29 PSI	
SPARE	P235/60R17XL	200 kPa, 29 PSI	



**By Dave Scaler**

## **TEAM AVI TPMS TIPS & TECHNIQUES**

or identify the first sensor, since it is expecting to see only one sensor turned on and it sees 4 and it doesn't know which one to choose. What is most important here is that the car has no way of telling you "hey I am a little confused there are too many sensors turned on"! My recommendation is that if you just tested the sensors and you are having difficulty getting a car to "take" during a relearn, the best practice is to let the car sit for 30 minutes. Some may say that 30 minutes is overkill, but the problem is often you cannot tell whether the sensor has gone back to sleep yet unless you test it and wake it up. So if you are unsure wait 30 minutes go back and do the re-learn and I think what you will find that the car will then cooperate, where it may not have before.

### **Installing Sensors WITHOUT the Factory Tool!:**

The other piece that is significantly advanced in the video in a short period of time is the replacement of sensors. We talked about how to test them, we talked about how the fact that there are some vehicles that when you replacing the valve stem that you cannot automatically learn to the car even if you have a TPMS tool. These are vehicles that require a factory scanner plugged into the OBDII connector in order to put the new sensor identification number into the TPMS module or the module that is controlling the TPMS (wireless control module, door lock module whatever the case maybe). We talked in the video about the after market catching up and that there will be tools available. This is most notable on Toyota Lexus products because if you replace the valve stem on a Toyota or Lexus product you are required to put the new identification in with a factory Toyota / Lexus tool. Many manufacturers have now come out with tools to remedy this problem. One such tool is the Bartec 400. The Bartec 400 this tool will do all the things that the original tool will do. What I mean by that, is it will do not only perform TPMS testing, TPMS wakeup, the TPMS learn, and download sensor information to a PC, but what it will also do is program new TPMS Valve stem ID numbers into the vehicle. This



is because it comes with a connector that is going to plug into the OBD II terminal and the software to marry the new stem to the vehicle. So what this allows you to do on the vehicles that need it, (most notably Toyota, Lexus, Honda, Kia, Nissan, Infinity, Subaru, Isuzu, Mitsubishi) it allows me to put the wire into the bottom of the tool, connect my tool to the vehicle OBD II connector and program them. How this is done, is that we use the tool to go and identify each sensor at each wheel first. So we will go to left front and get the special ID code from the sensor, right front get its code, right rear, left rear and if it has a spare of course we have to do the spare. Now we have all the numbers from the sensors

## **TEAM AVI TPMS TIPS & TECHNIQUES**

stored into the tool, it means that I do not need the numbers off the labels. (no dismounting of the tires!) Once I have all the numbers stored, I hit "program" and it will send those numbers in through the OBD II connector and obviously program them into the TPMS module. Needless to say the tools have come a long way since the video and now we have in the after market tools that will do multiple brands. The advantage of this is that we do not have to buy a factory scan tool from each manufacturer in order to replace the valve sensors. So these new generation of tools, are a replacement for all the other tools. While these new tools cost a little more, if you are doing a valve stem replacement they can become your best friend. Keep in mind that if I do not replace the valve stems I can still use the "standard" TPMS tools to do all the other work, as long as we do not have to do a valve stem replacement that require us to have a tool to go through the OBD II connector. I am sure there will be some additional updates in these tools over time, particularly for European cars and others as time goes on with the new TPMS systems.



### **NO Nissan or Infiniti to the dealer!:**

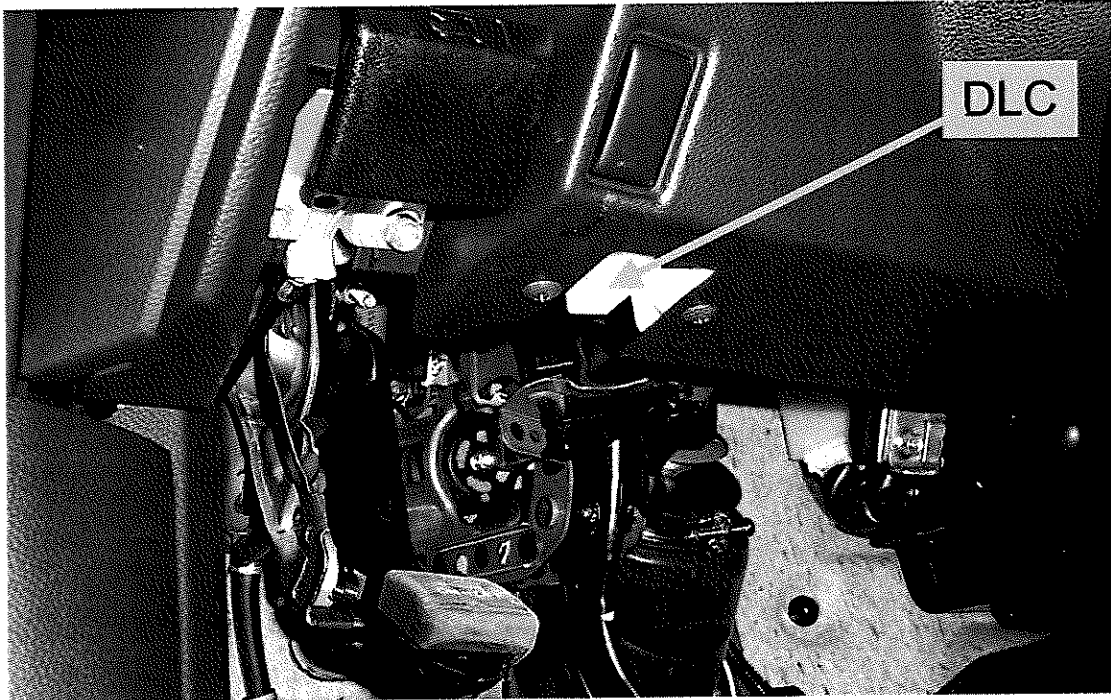
One of things I think is very important that we talk about is Valve stem replacement on Nissan and Infiniti vehicle. Now we just talked about in the previous section that the fact that the Nissan Infiniti requires a special tool to program the TPMS stem. Which can be done with tools we talked about earlier. But if you do not have one of those tools, there is a work around. So if you do not have a special tool at this time there is a way to get Nissan and Infiniti done. What I am finding that a lot of technicians are either reading the manual or calling the dealer and the dealer will say you need a special tool that you don't have, so you have to send the car back to us. Unfortunately that is a lot of lost opportunity. I want to show you the work around that we have done many times that it is a great way to get new sensors put into a Nissan without the factory tool. Where I find this to be most appropriate outside of new sensor installation is you have a vehicle owner that is changing his tires from summer to winter. He puts snow tires on in the winter and obviously they have TPMS valve stems but those valve stems are not matched to the vehicle. Some cars are now coming with a summer/winter button to alleviate that, but many cars don't which means we have to learn it every time we swap the tires. The way you can do this



without a scan tool is to follow these simple steps below; this is a 08 Infiniti but Nissan and Infiniti are essentially the same.

## **TEAM AVI TPMS TIPS & TECHNIQUES**

What we have to do is get under the dashboard, pull the panel down, and once panel is down we are going to look for is the OBD II connectors. We are going to look for the DLC or the OBD II connector go up below the dash is going to be an additional connector. But the OBD II connector kind of gives us a reference point.

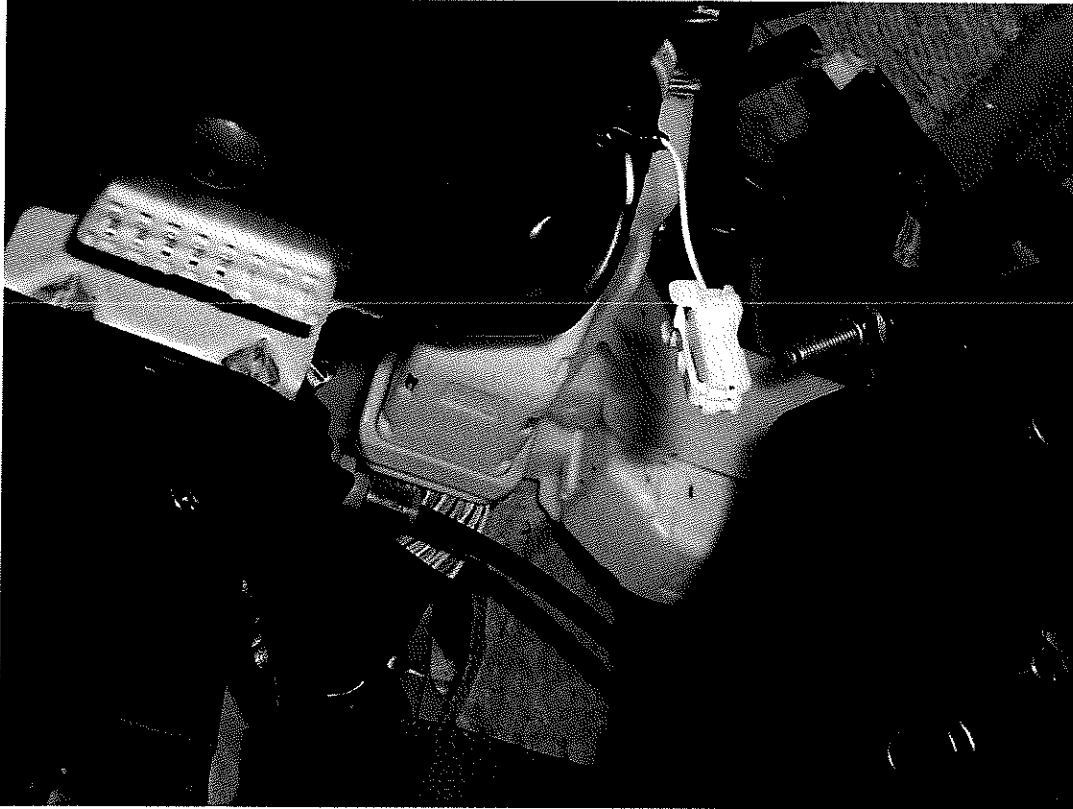


Once we are up under the dash what you want to look for is a white connector taped to the main harness with a single wire nothing plugged into it.



## TEAM AVI TPMS TIPS & TECHNIQUES

What you are going to do is un-tape that connector out of the harness and follow this procedure. Once we pull the TPMS connector out we simply ground that single wire,



With ignition off ground the single wire, then turn the ignition to the run position.

At this point momentarily un-ground and ground this wire 5 times in ten seconds. If done successfully the TPMS lamp will start to flash, remove jumper wire and start engine. Light will continue to flash

Now you have two options:

1. with the reset tool starting with the left front working clockwise trigger each sensor this is the recommended way
2. or simply drive the vehicle over 31 mph until the lamp stops blinking and goes out. Be aware this drive method can take over 10 min.

## **TEAM AVI TPMS TIPS & TECHNIQUES**

### **NO Nissan or Infiniti to the dealer!(cont.)**

turn the ignition to the run position at that point after we reach the run position we are going to ground and un-ground this wire five times in 10 seconds. Obviously we are doing this relatively quickly. We are going to ground and un-ground 5 times in 10 seconds. If we are successful doing this and the way you will know is if the TPMS lamp will start to flash at this point you have two options. I have had much more success with option 1 then option 2. The first option is once you have that TPMS light flashing you go out with your TPMS tool and you wake up the left front tire, the right front tire, right rear and left rear until the job is done. The alternative to that if you do not own a TPMS tool is to drive the vehicle over 31mph until the lamp stops blinking. I have more success with the TPMS tool way, but if you do not have a tool obviously that is an alternative. Keep in mind that this is another a great example of a car that “won’t take”. Meaning the common call that I get is that I cant get this car to learn. If you check the sensors before doing this test they are already awake. If you go and so this ground connector and un-ground connector if you go out there and you cant get that lamp to stop blinking obviously you are in a scenario where you need to let the car sit for 30 minutes and go through the process again. So this is a very, very valuable alternative until you get yourself a tool, so don’t send Nissan and Infiniti vehicles back to the dealers.

### **Instant Mobility Fluid?:**

A few final notes on TPMS before we finish up this update. First of all there is a new term out there, which is called Instant Mobility Fluid. Essentially Instant mobility fluid is a fancy name for “fixes a flat”. You may say to yourself “why is that important to me?” Well it is important because we have a new realm of instant mobility fluid scenarios. Meaning we now have “fix a flat” installed from the vehicle manufacturer. You may say to yourself well how can that be? What I am showing is temporary mobility kit. using instant mobility fluid. What manufacturers are doing is increasing their spare tire options. Option number 1 is to put a spare tire in the vehicle and let the vehicle go with a spare. It could be a full size spare or of course it could be a space saver spare. The second option is to equip the vehicle with run flats. Run Flats do not require any spare tire at all, because run flats can be run without air so those cars do not come with a



spare tire. They have run flats. What manufacturers are doing now on some cars, is that they are providing vehicles that do not have run flats, but yet also do not have a spare tire. So you don’t equip the car with a spare tire or run flats, the alternative on many new generation cars is that you will find a temporary mobility kit. This is essentially a compressor that is going to compress sealant into the tire in order to get the customer going! Look out for new cars start to come with temporary mobility kits which essentially allows the customer and the manufacturer not to have run flats on the car, not to have a spare and still have a way to get the customer going. One note regarding this solution, both tire manufacturers as well as most TPMS stem manufacturers are struggling to know

## **TEAM AVI TPMS TIPS & TECHNIQUES**

if this fluid is going to void the warranty on either the tire or the valve stem, but that information is yet to come.

### **That the end of it, PAX that is!**

Other notes whether you like it or not Michelins has decided to get away from their run flat idea which Michelins PAX. Michelins PAX tires was one of the more difficult tires to mount because it required special equipment, so depending on your investment I will assume this will make you either happy or unhappy about the decision to no longer produce PAX tires.



PAX Tire were equipped on the following vehicles:  
2005-2007 Honda Odyssey Touring  
2006-2007 Nissan Quest w/ Nav.  
2006-2007 Acura RL

### **Eating Batteries, charge them don't replace them!**

Another note surrounding TPMS tools. One thing that is very important to understand better is the battery life of your TPMS tool. As we get more advanced tools with displays on them is that these tools are going to need batteries more than any other tool in your toolbox. Bottom line: TPMS tools use a lot of batteries. Some say it is because of the display, and while the displays on some tools have greater power requirements, what can be more important than the display itself eating batteries is the fact that when we wake up many sensors we have to do a low frequency output which is a very high wattage. Many sensors require a 10-watt signal; meaning a 10-watt electrical signal is needed to turn the sensor on. That requires a lot of battery power. My point in telling you this is simply that almost all the TPMS tools today are coming with rechargeable batteries, because they have to. If you have an older TPMS tool and you are still replacing batteries too often, I highly recommend that you switch over to the rechargeable type as you are going to find that this is a cost savings can be pretty significant.

## **TEAM AVI TPMS TIPS & TECHNIQUES**

### Summary:

TPMS a constantly evolving project that will continue to bring us more technology in the future. AVI is going to be committed to bring you updates as they come out regularly in the TPMS world. Stay with AVI and we will keep you up with the latest TPMS information. I am Dave Scaler Thank you for your purchase!





# AVI



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