A. Safety/Environmental

**INSERT GENERIC STATEMENT (ANNOUNCE STAND ALONE DOCS)**

1. Each TPM sensor contains a lithium-ion battery that should be disposed/recycled properly. Many companies provide licensed lithium ion battery disposal/recycling services. Some States/Provinces may enforce disposal/recycling under general battery disposal/recycling regulations.
   - Provide a storage pail in the tire changing area to collect all discarded TPM sensors.
   - When pail is (nearly) full, arrange pick up through the providing recycler; or ship via licensed carrier to a recycling center.
   - This process typically requires full hazardous waste disposal/recycling chain of custody documentation.

B. Education/Training

- for additional standards of practice, handling, installation, part application data set, including relearn procedures and tech tips for TPMS. [www.tireindustry.org](http://www.tireindustry.org)
- [www.RMA.org](http://www.RMA.org) for consumer and service shop education on the benefits, functionality and recommend maintenance of sensors and service kits.
- [www.amra.org](http://www.amra.org) for consumer bulletins and automotive maintenance practices that provide further information of their vehicles Tire Pressure Monitoring System.
- [www.TireIndustry.org](http://www.TireIndustry.org) for additional standards of practice, handling, installation, part application data set, including relearn procedures and tech tips for TPMS.
- [http://www.us-tra.org/](http://www.us-tra.org/) for specifications and industry standards, including testing requirements.
- [www.safecar.gov](http://www.safecar.gov) for standards on motor vehicle, tire maintenance, and highway safety, including consumer programs highlighting key safety features like TPMS (NHTSA).

**INSERT APPLICABLE AMRA MEMBER (VENDOR)WEBLINKS**

a. **Product (Manufacturer and Vendor)**
   - Provide in-depth support, technical service bulletins, help centers, tech lines, informational bulletins, product knowledge through a variety of training classes and online data support.
   - Contact your supplier for more details.

b. **Product Knowledge**
   - Part selection based upon make/model/year and custom applications.
   - Service Kits, fasteners, and alternative devices if suitable.
   - Variations of valve stems and designs. Including rubber, aluminum, angles, and adjustments.
   - Valve cap recommendations and variety. Including metal versus plastic.
   - Sensor makeup and key markings.
   - Aftermarket versus OEM parts and resources for interchanging.
   - Sensors can be broken down into three distinct groups based on how prepared or applied. They are: direct replacement, programmable, and multi-application. Within each group there is some
variation on terminology and function like programmable can be Fully LF programmable, Contact Programmable or ID only programmable.

c. Equipment and Tools
- Provide in-depth support, technical service bulletins, help centers, tech lines, informational bulletins, product knowledge through a variety of training classes and online data support. Contact your supplier for more details.
- TPMS scan tools. Including coverage, approach to software update, adapters for unique applications and how to perform, OBD capability or not and the benefits, battery charging process, additional tools provided with kits, and simple troubleshooting tips on the tool.

Resources

C. Equipment

Hand Tools –
Below are the minimum required tools
- sensor removal holding devices
- core removal/reseating tool
- washer and grommet removal/reseating tools
- T-10/T-20/hex nut/lock nut sockets, bits and adapters.
- torque tools for
  - stem to sensor fastener
  - valve stem nut
  - valve core
  - sensor nut

f. Diagnostic Tool(s) Options include:
- Activation Only Tools - as the name implies, this type of TPMS Service tool activates the TPMS Sensors. In most cases the ACTIVATION tool will also decode sensor output and provide critical information like the sensor ID, pressure, and whether or not this is the proper sensor for the MMY application.
- Scan Tools –(OE and/or aftermarket) Obviously the OE variety is brand specific, whereas the aftermarket version will cover many makes and models. SCAN TOOLS communicate the to the vehicle’s BCM’s via the OBDII connection and can complete the ID writing process, however in most cases an ACTIVATION tool is required to accomplish this task.
- Combination Tools - offer the best of both and is a very efficient way of servicing TPMS since in the same tool a technician can test for sensor fit and function, diagnose system problems, and complete the relearn step.
- Special Situations – it is important to note that special circumstances exist by application, ie. Mitsubishi, Toyota Loop, Sensor mode changing.
• Know the Pros and Cons for each - choose the tool that fits your business and invest in the solution that provides the best coverage and support. In most cases it will be more than one type of tool. For instance an ACTIVATION tool at the front counter for the pre-service inspection, and a combination tool in the back shop for diagnostics and relearns.

g. OPTIONAL TOOLS
• Sensor test chambers are available for testing sensors in a pressured environment outside of the tire/wheel assembly.
• cradle, pad, or other select holding device to enable or provide a method of programming.

D. Vehicle Inspection
a. Visual Inspection – Identify potential concerns (and inform customer) before performing service including proper operation of all TPMS dashboard and information center indicators.

b. Test Before You Touch – Test the operation of the sensors prior to performing service on the vehicle.

• Additionally, test the sensors if the TPMS light is on (flashing or solid light), a loose tire is dropped off for service, or confirmation of a working system prior to performing service on the vehicle.
• Validate if a sensor(s) will activate by waking up and transmitting or not and for further troubleshooting. This may include, pulling data from the sensor for functionality accuracy, pulling DTC’ (diagnostic trouble codes), and matching or defining ID’s pending the problem and solution that is being sought after.
• Performing a relearn on required vehicles or when replacing one or more sensors, rotating tires, or adjustment of air pressure. This is vehicle specific.
• Testing a remote key FOB for frequency output and battery life if the vehicle requires it in order to complete the relearn process.
• Sharing or integration of the data that is collected on the tool following testing of the TPM sensors or performing a relearn. This is process dependent based upon the service facility.
• Importance of performing software updates on a quarterly basis when available.

c. Process (inspection/diagnosis/repairing - technician focused)
• Inspection of the vehicle’s TPMS prior to performing any service.
• Inspection of the commonly replaced or serviced components. Including but not limited to the valve stems, caps, cores, washers, rubber grommets, fastening devices (screws, bands, cradles) and sensors.
• Understanding of how the system functions and reacts to a low tire or system malfunction.
• Identification of current components and sensors, proper replacement parts and install instructions on specialized parts.
• Communication of the system. This includes sensors in the tire/wheel assembly (direct systems), wheel speed sensor (indirect systems), wheel well actuators/targets for location specific, ECU, and OBD when required.
• Installation or removal of the service kits (valve stem, core, cap, hex nut, washer, rubber grommet, fastening device, ball joint), sensors (fixed and adjustable angles, aluminum clamp in, rubber snap in, patch and container, fixed and removable stems when applicable).
• Proper usage of install and removal tools including torque values and where to find them.
• Proper install and removal of tire(s) on wheels equipped with TPMS, or using aftermarket wheels where dimensions, valve stem hole(s) and angles, reverse mounts, RFT’s, and custom applications may be present (different brands).
• Identifying mixed components and sensors and the best approach.

E. Vehicle Service

Search Term: TPMS

UICS Component Name: Tire Pressure Monitoring System Sensor

<table>
<thead>
<tr>
<th>Condition:</th>
<th>Code</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inoperative</td>
<td>A</td>
<td>Require repair or replacement</td>
</tr>
<tr>
<td>Includes intermittent operation; battery discharged; air inlet restricted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loose</td>
<td>B</td>
<td>Require repair or replacement</td>
</tr>
<tr>
<td>Missing (Non-OE Wheel and/or Tire Applications)</td>
<td>2</td>
<td>Suggest replacement if appropriate sensor is available</td>
</tr>
<tr>
<td>Missing (OE Wheel and Tire Applications)</td>
<td>C</td>
<td>Require replacement</td>
</tr>
<tr>
<td>Not Responding (Asleep)</td>
<td></td>
<td>Further inspection required</td>
</tr>
<tr>
<td>If Sensor does not Wake Up, follow manufacturers recommended diagnostic procedure to determine cause</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPMS sensor NOT removed during tire/wheel service</td>
<td>1</td>
<td>Suggest replacement of Service Kit</td>
</tr>
<tr>
<td>Tire/wheel service is defined as when tire is removed from the wheel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPMS sensor removed during tire/wheel service</td>
<td>A</td>
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</tr>
<tr>
<td>Tire/wheel service is defined as when tire is removed from the wheel</td>
<td></td>
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</tr>
</tbody>
</table>

a. Wheel package installed on vehicle – may require TPMS service or a second set of Sensors to be installed depending upon the year/make/model of vehicle.
b. **Seasonal Tire Change Out** – may require TPMS service or a second set of Sensors to be installed depending upon the year/make/model of vehicle.

c. Relearn – may need to be performed on vehicle if one or more of the following have taken place, (year/make/model dependent). Tire rotation, tire pressure adjustment, wheel change, tire change, service kit replacement, or Sensor(s) replacement.

F. **Customer Service**

a. Acronyms – simply the process for the customer so acronyms are not used during the education or informing process, i.e. TPMS should be called Tire Pressure Monitoring System.

b. Inform consumer of:
   i. Any non-functioning /malfunctioning system or TPMS warning indicators prior to any vehicle service
   ii. Any Suggested or Required TPMS service or component replacement
   iii. Provide MAP TPMS Info Bulletin
   iv. How TPMS system works
   v. How TPMS benefits them
   vi. Driver awareness items:
   vii. TPMS light/info on the dash
   viii. Tire inflation and DOT pressure placard
   ix. Proper TPMS valve caps
   x. Driving on an underinflated or flat tire
   xi. Flat tire sealant
   xii. TPMS battery life expectancy

G. **FAQs**

a. What does the TPMS dashboard light/warning indicate?
   - There are two commonly found lights on the dashboard indicating a TPMS concern. After starting a vehicle, a TPMS light will illuminate for approximately two seconds. If the light stays on (solid), it indicates that one or more of the tires on the vehicle (possibly the spare tire) has an inflation pressure at least 25% below as shown on the vehicle’s driver door placard.
   - If the light flashes continuously after the two seconds following startup, it indicates TPMS System malfunction. A TPMS System malfunction could be caused by a number of things and will require further diagnosis.

b. Why should a relearn procedure be performed?
   A relearn may need to be performed if one or more of the following have taken place, (year/make/model dependent) tire rotation, tire pressure adjustment, wheel change, tire change, service kit replacement, or Sensor(s) replacement. A relearn allows the vehicle to see the ID of the Sensors in each wheel and on some applications, the Sensor’s location. Completing this procedure allows the vehicle’s TPMS to function properly.
c. Why should a Service Kit(s) be installed?
   • Valve sealing components are not designed to be reused once they are removed. Additionally, over time, valve sealing components wear, crack, break or corrode, due to climate, road elements and driving conditions, potentially causing air loss or system malfunction.

d. What if I break the Sensor or valve stem while servicing the vehicle?
   i. Federal TPMS regulation requirements state that, if you knowingly disable a functioning TPMS system, you must ensure it is restored to proper working order before the vehicle leaves your facility.

e. Can I use any 315 MHz Sensor on a 315 MHz vehicle?
   i. No. Refer to a TPMS data guide for accurate part numbers and replacement procedures.

f. Do spare tires have TPMS Sensors?

g. Some vehicles have Sensors in their spare tires. Refer to your year/make/model TPMS data guide for accurate information. Some TPMS scan tools also contain this information in their data set.

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