

Advanced Automotive Electricity & Electronics

Chapter 22 TPMS

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of Advanced Automotive Electricity & Electronics . It correlates material to task lists specified by ASE and NATEF.
Motivate Learners	Explain how the knowledge of how something works translates into the ability to use that knowledge to figure why the engine does not work correctly and how this saves diagnosis time, which translates into more money.
State the learning objectives for the chapter or course you are about to cover and explain this is what they should be able to do as a result of attending this session or class.	Explain learning objectives to students as listed on SLIDE. <ol style="list-style-type: none">1. Explain why a tire-pressure monitoring system is used.2. Explain indirect TPMS.3. Discuss the TREAD act.4. List the two types of TPMS pressure sensors.5. Explain direct TPMS diagnosis and TPMS diagnostic tools.6. Describe how to relearn TPMS sensors and the tools needed to service a TPMS
Establish the Mood or Climate	Provide a WELCOME , Avoid put downs and bad jokes.
Complete Essentials	Restrooms, breaks, registration, tests, etc.
Clarify and Establish Knowledge Base	Do a round robin of the class by going around the room and having each student give their backgrounds, years of experience, family, hobbies, career goals, or anything they want to share.

ICONS



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1. SLIDE 1 CH22 TIRE PRESSURE MONITORING SYSTEMS

Check for **ADDITIONAL VIDEOS & ANIMATIONS** @ <http://www.jameshalderman.com/>
WEB SITE IS CONSTANTLY UPDATED

2. SLIDE 2 **EXPLAIN** Need For Tire Pressure Monitoring
3. SLIDE 3 **EXPLAIN** Figure 22-1 tire pressure placard (sticker) on the driver's side door or door jamb indicates the specified tire pressure.
4. SLIDE 4 **EXPLAIN** CHART 22.1 effects of outside temperature on tire inflation, assuming a placard pressure of 32 PSI.

DISCUSSION: Ask the students to discuss possible effects if tires are consistently underinflated

5. SLIDE 5 **EXPLAIN** Indirect TPMS
6. SLIDE 6 **EXPLAIN** FIGURE 22-2 A tire with low inflation will have a shorter distance (radius) between the center of the wheel and the road and will therefore rotate faster than a tire that is properly inflated
7. SLIDE 7 **EXPLAIN** FIGURE 22-3 The speeds of the diagonally opposed wheels are added together and then compared to the other two wheels to check if one tire is rotating faster.
8. SLIDE 8 **EXPLAIN** Figure 22-4 indirect tire-pressure monitoring system has a reset switch that should be depressed after rotating or replacing tires.

DISCUSSION: Have the students discuss why **Indirect TPMS** is appealing to OEMS

DEMONSTRATION: Demonstrate wheel speed sensor signals using a scan tool.

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HANDS-ON TASK: Have students check wheel speed sensor signals using scan tool. Have students scan wheel speed sensors. Have students spin the tires by hand to see sensor values change.

DEMONSTRATION: Show how to determine proper tire pressure by using the information on door placards.

DISCUSSION: Ask the students why a pressure drop of less than 25% should be corrected.

HANDS-ON TASK: Have the students inflate tires on a vehicle to 75% of recommended pressure

HANDS-ON TASK: Have the students compare tire pressure recommendations of several automobiles by using information on door placards.

DISCUSSION: Ask the students to discuss why it is important to know how to identify a vehicle with TPMS.

9. SLIDE 9 **EXPLAIN TREAD ACT**

10. SLIDE 10 **EXPLAIN CHART 22.2** Placard inflation pressure compared with the pressure when the TPMS triggers a warning light

11. SLIDE 11 **EXPLAIN TECH TIP**

12. SLIDE 12 **EXPLAIN Identifying a Vehicle With TPMS**

13. SLIDE 13 **EXPLAIN Figure 22-5** A clear plastic valve-stem tire-pressure monitoring sensor, showing the round battery on the right and the electronic sensor and transistor circuits on the left.

14. SLIDE 14 **EXPLAIN Figure 22-6** A conventional valve stem is on the right compared with a rubber TPMS sensor stem on the left. Notice the tapered and larger brass stem. The rubber TPMS sensor also uses a longer cap that makes it easy for a technician to spot that this is not a conventional rubber valve stem.

ICONS

DEMO



QUESTION

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DEMONSTRATION: Show conventional rubber valve stems and rubber TPMS valve stems.

FIGURE 22-6

15. SLIDE 15 **EXPLAIN TECH TIP**
16. SLIDE 16 **EXPLAIN** TPMS Pressure Sensors: Types
17. SLIDE 17 **EXPLAIN** Figure 22-7 three styles of TPMS sensors most commonly found include two stem-mounted (rubber and aluminum, left and top), & banded style (right)
18. SLIDE 18 **EXPLAIN** TPMS Sensor Operation
19. SLIDE 19 **EXPLAIN TECH TIP**
20. SLIDE 20 **EXPLAIN FIGURE 22-8** A typical tire-pressure monitoring system tester. The unit should be held near the tire and opposite the valve stem if equipped with a wheel-mounted sensor, and near the valve stem if equipped with a valve-stem-type sensor
21. SLIDE 21 **EXPLAIN TECH TIP**
22. SLIDE 22 **EXPLAIN** TPMS Receiver
23. SLIDE 23 **EXPLAIN** Figure 22-9 Some vehicles display the actual measured tire pressure for each tire on a driver information display.
24. SLIDE 24 **EXPLAIN TECH TIP**

HANDS-ON TASK: Have students locate a TPMS receiver on a vehicle equipped with direct TPMS.

25. SLIDE 25 **EXPLAIN DIRECT TPMS DIAGNOSIS**
26. SLIDE 26 **EXPLAIN** Figure 22-10 A tire-pressure warning light can vary depending on the vehicle, but includes a tire symbol
27. SLIDE 27 **EXPLAIN NOTE**

DISCUSSION: Ask the students why an overinflated tire is a safety hazard?

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HANDS-ON TASK: Have the students install a pressure sensor.

28. SLIDE 28 **EXPLAIN** TPMS Diagnostic Tools
29. SLIDE 29 **EXPLAIN** Figure 22-11 The parts of a typical stem-mounted TPMS sensor. Notice the small hole used to monitor the inflation pressure. The use of stop-leak can easily clog this small hole

Tire Pressure Monitor System, TPMS (Failed Sensor)

Tire Pressure Monitor System, TPMS (Normal)

Tire Pressure Monitor System, TPMS (With Tire Leak)

30. SLIDE 30 **EXPLAIN** Figure 4-12 When replacing a TPMS sensor, be sure to record the sensor ID because this needs to be entered into the system through the use of a tester or scan tool
31. SLIDE 31 **EXPLAIN** TPMS Sensor Activation
32. SLIDE 32 **EXPLAIN** Figure 22-13 A magnet is placed around the valve stem to reprogram some stem-mounted tire-pressure sensors.
33. SLIDE 33 **EXPLAIN** TPMS RELEARN PROCEDURE
34. SLIDE 34 **EXPLAIN** NOTE
35. SLIDE 35 **EXPLAIN** TPMS Sensor Service Tools
36. SLIDE 36 **EXPLAIN** Figure 22-14 Always use an accurate, known-good tire pressure gauge. Digital gauges are usually more accurate than mechanical gauges.

DEMONSTRATION: Show the students how to use the TPMS scan tool to view the transmitter ID, perform initialization, and monitor sensor values.

HANDS-ON TASK: Have the students use the TPMS scan tool to view the transmitter ID, perform initialization, & monitor sensor values.

DISCUSSION: Ask the students to discuss why the delta pressure method may not be practical for a service technician to use.

ICONS

DEMO



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DEMONSTRATION: Show how to do a TPMS Relearn using magnetic tool.

HANDS-ON TASK: Have the students perform the relearn procedures on an indirect TPMS.

HANDS-ON TASK: Have students how to do a TPMS Relearn using magnetic tool

ON-VEHICLE NATEF TASK Inspect, diagnose and calibrate tire pressure monitoring system

If the horn does not “chirp,” try honking horn using the horn button. It would be a waste of time trying to troubleshoot a TPMS problem only to find a bad horn.

37. SLIDE 37 **EXPLAIN** Figure 22-15 A clicker-type valve core tool ensures that the valve core is tightened to factory specifications
38. SLIDE 38 **EXPLAIN** Figure 22-16 An assortment of service parts that include all of the parts needed to service a stem-mounted TPMS sensor being installed after removal for a tire replacement or repair
39. SLIDE 39 **EXPLAIN** TPMS Sensor Service Tools
40. SLIDE 40 **EXPLAIN TECH TIP**

41. SLIDE 41 **EXPLAIN TECH TIP**

DISCUSSION: Ask the students to discuss why it is so important to tighten the valve core to the correct torque.

HANDS-ON TASK: Have the students remove and replace a valve core on a TPMS sensor.

SEARCH INTERNET: Have students search Internet for The TREAD Act is more than tire pressure monitoring. Have the students search the Internet to find other standards set by the TREAD Act. Have students share their findings in a class discussion.

