Automotive Steering, Suspension, & Alignment 7e

Chapter 4 TPMS (Tire Pressure Monitoring System)

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of **Automotive Steering and Suspension Systems with Wheel Alignment and Drive Axles.** 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. 1. Explain why a tire-pressure monitoring system (TPMS) is used. 2. Discuss the TREAD Act. 3. Explain indirect and direct TPMS. 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. This chapter will help you prepare for ASE Suspension and Steering (A4) certification content area "E" (Wheel and Tire Diagnosis and Repair).
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.

NOTE: This lesson plan is based on Automotive Steering, Suspension, & Alignment 7th Edition Chapter Images found on Jim's web site @ www.jameshalderman.com
LINK CHP 4: Chapter Images

ICONS	Chapter 4 TPMS
	**1. SLIDE 1 CH4 TIRE PRESSURE MONITORING SYSTEMS**
	**Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/** **WEB SITE IS CONSTANTLY UPDATED**
	**Videos**
	**At the beginning of this class, you can download the crossword puzzle & Word Search from the links below to familiarize your class with the terms in this chapter & then discuss them**
	**Crossword Puzzle (Microsoft Word) (PDF)** **Word Search Puzzle (Microsoft Word) (PDF)**
	**Tire Pressure Monitor System, TPMS-Failed Sensor (View) (Download)** **Tire Pressure Monitor System, TPMS (Normal) (View) (Download)** **Tire Pressure Monitor System, TPMS (With Tire Leak) (View) (Download)**
	**2. SLIDE 2 EXPLAIN Figure 4-1** tire pressure placard (sticker) on the driver's side door or door jamb indicates the specified tire pressure.
	**DISCUSSION: Discuss possible effects if tires are consistently underinflated**
	**3. SLIDE 3 EXPLAIN FIGURE 4.2** Inflation pressure increases as the temperature increases. When checking or correcting inflation pressure when the tires are hot, add 2 to **4 PSI to the placard cold inflation pressure.** **4. SLIDE 4 EXPLAIN FIGURE 4.3** 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 **5. SLIDE 5 EXPLAIN FIGURE 4–4** speeds of diagonally opposed wheels are added together and then compared to other two wheels to check if one tire is rotating faster.

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	6. **SLIDE 6 EXPLAIN Figure 4-5** 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.**
	**HANDS-ON TASK: Have the students check wheel speed sensor signals using a 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.**
	7. **SLIDE 7 EXPLAIN Figure 4-6** 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. 8. **SLIDE 8 EXPLAIN Figure 4-7** 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. valve stem.

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	**DEMONSTRATION: Show conventional rubber valve stems and rubber TPMS valve stems.**
	FIGURE 4-6
	9. **SLIDE 9 EXPLAIN FIGURE 4.8** The parts of a typical clamp-in TPMS sensor. Notice the small hole used to monitor the inflation pressure. The use of stop leak can easily clog this small hole. 10. **SLIDE 10 EXPLAIN Figure 4-9** three styles of TPMS sensors most commonly found include two stem-mounted (rubber and aluminum, left and top), & banded style (right) 11. **SLIDE 11 EXPLAIN Figure 4-10** Some vehicles display the actual measured tire pressure for each tire on a driver information display.
	**HANDS-ON TASK: Have students locate a TPMS receiver on a vehicle equipped with direct TPMS.**
	12. **SLIDE 12 EXPLAIN Figure 4-11** The TPMS warning lamp on this vehicle is a separate light from the tire icon light that warns of low tire pressure. In this case, both warning lights were on all of the time 13. **SLIDE 13 EXPLAIN FIGURE 4.12** The codes set were for low pressure and sensor signal failure.
	**DISCUSSION: Ask the students why an overinflated tire is a safety hazard?**
	**HANDS-ON TASK: Have the students install a pressure sensor.**
	14. **SLIDE 14 EXPLAIN Figure 4-13** A typical tire-pressure monitoring system tester 15. **SLIDE 15 EXPLAIN FIGURE 4.14** A tire-pressure warning light can vary depending on the vehicle, but includes a tire symbol. 16. **SLIDE 16 EXPLAIN Figure 4-15** magnet is placed around the valve stem to reprogram some stem-mounted tire-pressure sensors. 17. **SLIDE 17 EXPLAIN FIGURE 4.16** When replacing a TPMS

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	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.
	**17. SLIDE 17 EXPLAIN FIGURE 4.17** sensor relearn procedure is performed in the following order after the system has been placed in learn mode: LF, RF, RR, and then LR.
	18. SLIDE 18 EXPLAIN FIGURE 4.18 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.**
	**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 horn does not "chirp," try honking horn using horn button BEFORE troubleshooting the TPMS**

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	19. **SLIDE 19 EXPLAIN Figure 4-19** clicker-type valve core tool ensures that the valve core is tightened to factory specifications 20. **SLIDE 20 EXPLAIN Figure 4-20** 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
	**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.**