Automotive Chassis Systems 7th Edition

Chapter 18 ABS Diagnosis and Service

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of **Automotive Chassis Systems.** 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 the chapter learning objectives to the students. 1. Identify and describe Bendix antilock braking systems. 2. Explain the operation and components of Bosch antilock braking systems. 3. Describe the operation of Delphi antilock braking systems. 4. Identify and describe Kelsey-Hayes antilock braking systems. 5. Describe the operation and components of Teves antilock braking systems. 6. Identify and describe Toyota rear-wheel and four-wheel antilock braking systems. **This chapter will help you prepare for the Brakes (A5) ASE certification test content areas "G" (Electronic Brake Control Service).**
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 Chassis Systems 7th Edition Chapter Images found on Jim's web site @ www.jameshalderman.com

LINK CHP 18: Chapter Images

ICONS	Ch18 ABS Diagnosis and Service
	**1. SLIDE 1 ABS DIAGNOSIS & SERVICE**
	**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**
	**Word Search Puzzle (Microsoft Word) (PDF)**
	**Word Search Puzzle (Microsoft Word) (PDF)** **Wheel Speed Sensor, AC Voltage (View) (Download)** **Wheel Speed Sensor, Bias Voltage (View) (Download)** **Wheel Speed Sensor, Resistance (View) (Download)** **Wheel Speed Sensor, Short to Ground (View) (Download)**
	2. **SLIDE 2** EXPLAIN **Figure 18-1** On most vehicles equipped with ABS, amber ABS and red BRAKE warning lamp should come on as a bulb check when the ignition is first switched on.
	3. **SLIDE 3** EXPLAIN **FIGURE 18.2** amber ABS
	**DISCUSSION: DISCUSS PROCEDURE FOR DIAGNOSING A FAULT IN ABS. ASK STUDENTS TO TALK ABOUT WHAT RED BRAKE WARNING LAMP (RBWL) INDICATES WHEN IT IS ILLUMINATED. WHAT ABS PROBLEMS DOES IT SIGNAL? ASK STUDENTS TO DISCUSS OPERATION OF AMBER ABS WARNING LAMP.**
	**DEMONSTRATION: SHOW STUDENTS HOW ABS DIAGNOSTICS WORKS ON THE TRAINER**
	4. **SLIDE 4** EXPLAIN **Figure 18-3** thorough visual inspection should include carefully inspecting around the electrohydraulic unit for signs of obvious problems or the installation of aftermarket devices such as alarm systems.

ICONS	Ch18 ABS Diagnosis and Service
	**DEMONSTRATION:** SHOW HOW TO DO A VISUAL INSPECTION LOOKING FOR TELLTALE CLUES OF HOW VEHICLE HAS BEEN DRIVEN & MAINTAINED.
	**DISCUSSION:** HAVE STUDENTS TALK ABOUT THE IMPORTANCE OF DOING A COMPLETE VISUAL INSPECTION OF THE ENTIRE VEHICLE BEFORE MAKING A DIAGNOSIS
	**HANDS-ON TASK:** HAVE STUDENTS PERFORM A COMPLETE VISUAL INSPECTION OF THE ANTILOCK BRAKING SYSTEM.
	**DISCUSSION:** ASK STUDENTS TO TALK ABOUT THE IMPORTANCE OF A TEST DRIVE IN DIAGNOSING AN ABS FAULT. WHAT SYMPTOMS SHOULD TECHNICIANS LOOK FOR IN SUCH A TEST?
	**DEMONSTRATION: SHOW HOW** TO RETRIEVE ABS-RELATED DIAGNOSTIC CODES BY USING A SCAN TOOL. ASK THEM TO EXPLAIN THE RESULTS.
	**DISCUSSION:** ASK STUDENTS TO DISCUSS THE PROCEDURES FOR CLEARING THE DIAGNOSTIC TROUBLE CODES FOR THE VEHICLES ON WHICH THEY ARE WORKING.
	5. **SLIDE 5** EXPLAIN **Figure 18-4** GM diagnostic connector on a pre- 1996 vehicle. Flash codes are available by using jumper wire to ground (terminal A) to terminal H.
	6. **SLIDE 6** EXPLAIN **FIGURE 18.5** A breakout box is being used to diagnose an ABS problem
	7. **SLIDE 7** EXPLAIN **FIGURE 18.6** A Tech 2 scan tool being used to diagnose an ABS problem on a General Motors' vehicle.

DISCUSSION: ASK STUDENTS TO DISCUSS THE ANTILOCK BRAKING SYSTEMS COVERED IN THIS CHAPTER. WHAT ARE THE ADVANTAGES AND DISADVANTAGES OF EACH TECHNOLOGY? ON WHAT TYPES OF VEHICLES DO YOU TYPICALLY FIND EACH SYSTEM?

8. **SLIDE 8 EXPLAIN FIGURE 18.7** Bluetooth adapter that plugs into DLC and transmits global OBD-II information to a smart phone that has a scan tool app installed
9. **SLIDE 9 EXPLAIN FIGURE 18.8** The data link connector (DLC) can be located in various locations.

DEMONSTRATION: DEMO WHEEL SENSOR OPERATION

10. **SLIDE 10 EXPLAIN FIGURE 18.9A** This corroded electrical connector to the ABS hydraulic control module helped explain why there were many stored diagnostic trouble codes (DTCs).
11. **SLIDE 11 EXPLAIN FIGURE 18.9B** male terminals also showed signs of corrosion inside this connector.

DEMONSTRATION: SHOW STUDENTS HOW TO INSPECT THE CONNECTIONS INVOLVED IN THE WHEEL SPEED SENSOR CIRCUIT FOR DEFECTS AND CORROSION.

DISCUSSION: ASK STUDENTS TO TALK ABOUT THE PROBLEMS CAUSED BY DAMAGED OR CONTAMINATED WHEEL SPEED SENSORS (WSS). WHAT ARE THE POSSIBLE CAUSES OF LOW VOLTAGE READINGS?

HANDS-ON TASK: HAVE STUDENTS PERFORM STEPS IN THE QUICK AND EASY WHEEL SPEED SENSOR DIAGNOSIS TO TEST FOR A FAULT IN WHEEL SPEED SENSOR.

12. **SLIDE 21 EXPLAIN FIGURE 18.10** Typical wheel speed sensor. When a tooth on the sensor ring is close to the sensor, the strength of the magnetic field is stronger because the metal of the tooth conducts magnetic lines of force better than air.
13. **SLIDE 13 EXPLAIN Figure 18-11** Measuring the resistance of a wheel speed sensor

14. **SLIDE 14 EXPLAIN Figure 18-12** A scope can be used to check for proper operation of a wheel speed sensor
15. **SLIDE 15 EXPLAIN Figure 18-13** A broken tooth on a wheel speed sensor tone ring shows on the scope trace as a missing wave

DEMONSTRATION: SHOW STUDENTS HOW TO TEST A WSS BY USING A SCOPE.

HANDS-ON TASK: HAVE STUDENTS TEST A WSS BY USING A SCOPE ON A LAB VEHICLE

16. **SLIDE 16 EXPLAIN Figure 18-14** Use a nonmagnetic brass or plastic feeler gauge to check wheel speed sensor gap. A steel gauge would be attracted by magnet in sensor and would produce a drag on the gauge as it is moved between the sensor and the tone ring. This drag could be interpreted as a correct clearance reading.

DISCUSSION: ASK STUDENTS TO DISCUSS THE PROCEDURES FOR ADJUSTING WHEEL SPEED SENSORS. WHAT IS THE SIGNIFICANCE OF THE PAPER OR PLASTIC PROTECTIVE COVERING ON THE TIP END OF A WSS?

17. **SLIDE 17 EXPLAIN Figure 18-15 (a)** Always use a nonferrous (brass or plastic) feeler (thickness) gauge when measuring the gap between the toothed ring and the wheel speed sensor.
18. **SLIDE 18 EXPLAIN Figure 18-15 (b)** Sometimes a sensor is equipped with a paper spacer that is the exact thickness of the spacing required between the toothed ring and the sensor. If equipped, sensor is simply installed with paper touching the toothed wheel. A typical gap ranges from 0.020-0.050 in. (0.5 to 1.3 mm)

DEMONSTRATION: SHOW STUDENTS HOW TO USE A NONMAGNETIC FEELER GAUGE TO CHECK THE WHEEL SPEED SENSOR GAP.

HANDS-ON TASK: HAVE STUDENTS USE A NONMAGNETIC FEELER GAUGE TO CHECK THE WHEEL SPEED SENSOR GAP ON A LAB VEHICLE

ON-VEHICLE NATEF TASK: TEST, DIAGNOSE, AND SERVICE ABS WHEEL SPEED SENSORS.

19. **SLIDE 19 EXPLAIN FIGURE 18–16** Special bleed valve tools are often required when bleeding some ABS units such as the Kelsey-Hayes 4WAL system.
20. **SLIDE 20 EXPLAIN FIGURE 18–17** Two bleed valve tools are needed to bleed the Kelsey-Hayes 4WAL system, which attach to the bleeder valves on the accumulator.

HANDS-ON TASK: HAVE STUDENTS USE A SCAN TOOL TO TEST A WSS AND EXPLAIN THE RESULTS.

DEMONSTRATION: SHOW STUDENTS HOW TO MAKE CERTAIN THAT THE ABS SYSTEM IS NOT PRESSURIZED BEFORE YOU OPEN A BLEEDER SCREW OR LOOSEN A HYDRAULIC LINE.

ON-VEHICLE NATEF TASK: IDENTIFY AND INSPECT ELECTRONIC BRAKE CONTROL SYSTEM COMPONENTS; DETERMINE NECESSARY ACTION

ON-VEHICLE NATEF TASK: DIAGNOSE ELECTRONIC BRAKE SYSTEM FAULTS; DETERMINE NECESSARY ACTION

ON-VEHICLE NATEF TASK: BLEED ELECTRONIC BRAKE CONTROL SYSTEM HYDRAULIC CIRCUITS.

ON-VEHICLE NATEF TASK: REMOVE AND INSTALL ELECTRONIC BRAKE CONTROL SYSTEM ELECTRICAL/ELECTRONIC AND HYDRAULIC COMPONENTS

ON-VEHICLE NATEF TASK: DIAGNOSE ELECTRONIC BRAKE CONTROL SYSTEM BRAKING CONCERNS CAUSED BY VEHICLE MODIFICATIONS (TIRE SIZE, CURB HEIGHT, FINAL DRIVE RATIO)

SEARCH INTERNET: HAVE STUDENTS USE INTERNET TO RESEARCH THREE VEHICLE ANTILOCK BRAKING SYSTEMS. ASK THEM TO WRITE A BRIEF DESCRIPTION OF THE ABS TECHNOLOGY USED FOR EACH VEHICLE AND THE ADDITIONAL COST OF THIS OPTION.