ATE5 Chapter 97 Brake Bleeding Methods & Procedures

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class provides complete coverage of the components, operation, design, and troubleshooting. It correlates material to task lists specified by ASE and NATEF and emphasizes a problem-solving approach. Chapter features include Tech Tips, Frequently Asked Questions, Real World Fixes, Videos, Animations, and NATEF Task Sheet references.
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 below: 1. Discuss the need for brake bleeding and the various methods of loosening the brake bleeder valve. 2. Describe the manual bleeding procedure. 3. Discuss how to gravity bleed the hydraulic brake system. 4. Discuss how to pressure bleed the hydraulic brake system. 5. Describe how to service the hydraulic ABS and flush brake fluid.
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 the 5th Edition Chapter Images found on Jim's web site @ www.jameshalderman.com

LINK CHP 97: ATE5 Chapter Images

ICONS	Chapter 97 Brake Bleeding
	**1. SLIDE 1 CH97 BRAKE BLEEDING PROCEDURES** 2. **SLIDE 2 EXPLAIN Figure 97-1** Bench bleeding a master cylinder. Always clamp a master cylinder in a vise by the mounting flange to prevent distortion of the cylinder bore. Bench bleeding tubes can also be used that route the fluid back into the reservoir.
	**Check for ADDITIONAL VIDEOS & ANIMATIONS @** **http://www.jameshalderman.com/** **WEB SITE IS CONSTANTLY UPDATED**
	**Videos**
	**DEMONSTRATION: Show how to bench bleed a master cylinder using the proper tubing and fittings. Show bleeder locations on the master cylinder, valves, wheel cylinders, and brake calipers**
	**DISCUSSION: discuss process of brake bleeding. What problems are caused by air trapped in the hydraulic brake system?**
	**HANDS-ON TASK: Have students bench bleed a master cylinder using the proper procedure. Also using proper caution when working with brake fluid**
	3. **SLIDE 3 EXPLAIN Figure 97-2** Typical bleeder valve from a disc brake caliper. Arrows point to taper section that does actual sealing. It is this taper that requires a shock to loosen. If the bleeder is simply turned with a wrench, bleeder usually breaks off because tapered part at bottom remains adhered to the caliper or wheel cylinder. Once loosened, brake fluid flows around taper and out through hole in side of bleeder valve. Hole is clogged in this example and needs to be cleaned out. 4. **SLIDE 4 EXPLAIN Figure 97-3** Typical bleeder locations. Note that the combination valve and master cylinder shown do not have bleeder valves; therefore, bleeding is accomplished by loosening the brake line at the outlet ports. 5. **SLIDE 5 EXPLAIN Figure 97-4** Using an air punch next to the bleeder valve to help "break the taper" on the bleeder valve.

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	**DEMONSTRATION: Show students an example of a brake bleeder valve and describe the various methods recommended to loosen it.**
	6. **SLIDE 6 EXPLAIN Figure 97-5** Most vehicle manufacturers recommend starting brake bleeding process at the rear wheel farthest from master cylinder.
	7. **SLIDE 7 EXPLAIN Figure 97-6** Bleeding brakes using clear plastic tubing makes it easy to see air bubbles. Submerging hose in a container of clean brake fluid helps ensure that all of air will be purged by system.
	**DISCUSSION: Talk about the 4 types of brake bleeding. Ask students to discuss benefits of performing a gravity bleed during an oil change. Why is this a good time to bleed the brake system?**
	8. **SLIDE 8 EXPLAIN Figure 97-7** Using a compressed air-powered vacuum bleeder. 9. **SLIDE 9 EXPLAIN Figure 97-8** Vacuum bleeding uses atmospheric pressure to force brake fluid through the hydraulic system.
	Bleeding Brakes and Air (View) (Download) Bleeding Brakes, Gravity (View) (Download) Bleeding Brakes, Pressure Bleeder (View) (Download) Bleeding Brakes, Reverse Injection (View) (Download) Bleeding Brakes, Vacuum (View) (Download)
	10. **SLIDE 10 EXPLAIN Figure 97-9** Gravity bleeding is simply opening bleeder valve & allowing gravity to force brake fluid out of bleeder valve. Because air is lighter than brake fluid all of air escapes before fluid runs out.
	11. **SLIDE 11 EXPLAIN Figure 97-10** typical pressure bleeder. The brake fluid inside is pressurized with air pressure in the air chamber. This air pressure is applied to the brake fluid in the upper section. A rubber diaphragm separates the air from the brake fluid. 12. **SLIDE 12 EXPLAIN Figure 97-11** Brake fluid under pressure from power bleeder is applied to top of master cylinder. It is very important that the proper adapter be used for the master cylinder. Failure to use the correct adapter or failure to release the pressure on the brake fluid before removing the adapter can cause fluid to escape under pressure.

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	13. **SLIDE 13 EXPLAIN Figure 97-12** Metering valve override tool on a GM vehicle. 14. **SLIDE 14 EXPLAIN Figure 97-13** Pull-out-type metering valves being held out using override tool.
	**DEMONSTRATION: Show students how to do a pressure, or power, bleeding of brake hydraulic system, and discuss advantages of this method.**
	**ON-VEHICLE NATEF TASK: Bleed and/or flush brake system. Page 297**
	**DEMONSTRATION: Show students a metering valve override tool, and discuss how to use it in pressure-bleeding front brakes.**
	**HANDS-ON TASK: Have students pressure bleed a brake system without using the metering valve override tool. Then have them redo the process using the metering valve override tool** 15. **SLIDE 15 EXPLAIN Figure 97-14** Special bleed valve tools are often required when bleeding some ABS units such as the Kelsey-Hayes 4WAL system. 16. **SLIDE 16 EXPLAIN Figure 97-15** Two bleed valve tools are needed to bleed the Kelsey-Hayes 4WAL system, which attaches to the bleeder valves on the accumulator. 17. **SLIDE 17 EXPLAIN Figure 97-16** To perform an automated brake bleed procedure on an ABS, first connect a factory or enhanced scan tool to the data link connector (DLC) located under the dash on this vehicle. 18. **SLIDE 18 EXPLAIN Figure 97-17** Access the menu that includes antilock brake system (ABS) functions. 19. **SLIDE 19 EXPLAIN Figure 97-18** Scroll through the menus and select automated bleed procedure and follow the on-screen instructions. 20. **SLIDE 20 EXPLAIN Figure 97-19** A turkey baster can be used to remove the old brake fluid from the master cylinder reservoir. A rubber hose was attached to end of turkey baster to get access to brake fluid.
	

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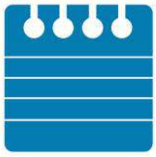
	**HANDS-ON TASK:** Have students complete a brake fluid change. Make sure students dispose of the old brake fluid properly.
	When replacing caliper brake pads, never let the calipers hang from the brake hose. You could damage hose or shorten its life.
	**SEARCH INTERNET:** Have students research the effect of quenching on the molecular structure of steel? How will this affect brake parts that are heated to remove rusted parts? Give a verbal report during next class.
	Crossword Puzzle (Microsoft Word) (PDF) Word Search Puzzle (Microsoft Word) (PDF)