

# Automotive Technology 5<sup>th</sup> Edition












## Chapter 17 Preventative Maintenance

### Opening Your Class

KEY ELEMENT	EXAMPLES
<b>Introduce Content</b>	This Automotive Technology 5 <sup>th</sup> text provides complete coverage of automotive 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.
<b>Motivate Learners</b>	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.
<b>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.</b>	Explain the chapter learning objectives to the students as listed: <ol style="list-style-type: none"> <li>1. Describe the steps to be followed when getting a vehicle ready for service.</li> <li>2. Explain the process to be followed in safety inspection, windshield wiper service, cabin filter replacement, and air filter inspection.</li> <li>3. Describe the brake fluid and engine oil inspection procedure.</li> <li>4. Explain the process of inspecting the cooling system.</li> <li>5. Explain how to check automatic transmission and power steering fluids.</li> <li>6. Describe how to check wheels and tires.</li> <li>7. Describe how to lubricate the chassis, check the differential and the manual transmission fluid, and perform under-vehicle inspection.</li> </ol>
<b>Establish the Mood or Climate</b>	Provide a <b>WELCOME</b> , Avoid put downs and bad jokes.
<b>Complete Essentials</b>	Restrooms, breaks, registration, tests, etc.
<b>Clarify and Establish Knowledge Base</b>	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 5<sup>th</sup> Edition Chapter Images found on Jim's web site @ [www.jameshalderman.com](http://www.jameshalderman.com)**

**LINK CHP 17: [ATE5 Chapter Images](#)**

ICONS	Ch17 Preventative Maintenance
          	<p><b>1. SLIDE 1 Ch17 Preventative Maintenance</b></p> <p>Check for <b>ADDITIONAL VIDEOS &amp; ANIMATIONS</b>  @ <a href="http://www.jameshalderman.com/">http://www.jameshalderman.com/</a>  <b>WEB SITE IS CONSTANTLY UPDATED</b></p> <p><b>HOLD DISCUSSION ON IMPORTANCE OF PREVENTATIVE MAINTENANCE: DISCUSS IMPORTANCE OF PREVENTATIVE MAINTENANCE</b></p> <p><b>2. SLIDE 2 READ &amp; EXPLAIN Figure 17-1</b> Before service begins, be sure to cover the seats, floor, and steering wheel with protective coverings.</p> <p><b>PREVENTATIVE MAINTENANCE VIDEOS</b>  <a href="http://www.youtube.com/watch?v=GH5qC7QC1_Q">http://www.youtube.com/watch?v=GH5qC7QC1_Q</a>  <a href="http://www.youtube.com/watch?v=NReBgigzuhE">http://www.youtube.com/watch?v=NReBgigzuhE</a></p> <p><b>HOLD DISCUSSION ON KEEPING INTERIOR CLEAN: DISCUSS STEPS TO PROTECT THE INTERIOR OF THE VEHICLE WHILE BEING SERVICED</b></p> <p><b>3. SLIDE 3 READ &amp; EXPLAIN Figure 17-2</b> An exhaust system hose should be connected to the tailpipe(s) whenever the engine is being run indoors.</p> <p><b>4. SLIDE 4 EXPLAIN 17-3</b> Installing a wiper blade insert into a wiper arm.</p> <p><b>ON-VEHICLE TASK: HAVE STUDENTS DO A PRE-SERVICE WALK-AROUND ON A LAB VEHICLE TO NOTICE ANY BODY DAMAGE OR MISSING PARTS. THIS IS TYPICALLY DONE AT A DEALERSHIP SERVICE APPOINTMENT</b></p> <p><b>STUDENTS COMPLETE SAFETY INSPECTION</b>  <b><u>W3D2-TS1</u> TASK SHEET 1</b></p> <p><b><u>DEMO</u> WIPER BLADE REPLACEMENT</b></p>

**ICONS****Ch17 Preventative Maintenance****DO W3D2-TS2 TASK SHEET 2 ON WIPER BLADE REPLACEMENT**

5. SLIDE 5 READ & EXPLAIN Figure 17-4 (a) windshield wiper fluid reservoir cap is usually labeled with a symbol showing a windshield washer.
6. SLIDE 6 READ & EXPLAIN Figure 17-4 (b) use only the recommended washer fluid. Never use antifreeze in the windshield washer reservoir.
7. SLIDE 7 READ & EXPLAIN Figure 17-5 cabin filter can be accessed either through the glove compartment or under the hood on most vehicles.
8. SLIDE 8 EXPLAIN Figure 17-6 (a) typical dirty air filter.

**HOST DISCUSSION ON CLEAN AIR FILTERS: DISCUSS IMPORTANCE OF A CLEAN AIR FILTER FOR ENGINE OPERATION****COMPLETE BELOW TASK SHEETS****SAFETY CHECK PAGE 30****WINDSHIELD WIPER BLADE SERVICE PAGE 31**

9. SLIDE 9 READ & EXPLAIN Figure 17-6 (b) Always check the inlet passage leading to the air filter for debris that can reduce airflow to the engine.
10. SLIDE 10 READ & EXPLAIN Figure 17-7 master cylinder with a transparent reservoir. The brake fluid level should be between the MAX and the MIN levels as marked on the reservoir.
11. SLIDE 11 READ & EXPLAIN Figure 17-8 DOT 3 brake fluid. Always use fluid from a sealed container because brake fluid absorbs moisture from the air.

**HAVE STUDENTS RESEARCH INTERNET OR LRC TO FIND WHICH VEHICLES USE DOT 5 AND WHY**

12. SLIDE 12 Figure 17-9 Brake fluid test strips are a convenient and easy-to-use method to determine if the brake fluid needs to be replaced.

## ICONS

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**HOST DISCUSSION: BRAKE FLUID TYPES, DOT 3, ETC.**

**DEMONSTRATION BRAKE FLUID TEST STRIPS. DEMO BRAKE FLUID TEST STRIPS, IF YOU HAVE THEM.**

**HAVE STUDENTS DO A BRAKE FLUID INSPECTION HAVE STUDENTS DO A VISUAL INSPECTION OF BRAKE FLUID**

13. SLIDE 13 READ & EXPLAIN Figure 17-10 A typical oil level indicator (dipstick).

14. SLIDE 14 READ & EXPLAIN Figure 17-11 oil level should be between the MAX and the MIN marks when the vehicle is on level ground and the oil has had time to drain into the oil pan.

### **HANDS-ON TASK**

**ENGINE OIL DIPSTICK TEST (A1-A-7) PAGE 32  
ENGINE OIL CHANGE (A1-D-13) PAGE 33**











15. SLIDE 15 READ & EXPLAIN Figure 17-12 Visually check level and color of coolant in coolant recovery or surge tank.

**HAVE STUDENTS DO A VISUAL CHECK OF COOLANT AND REPORT CONDITION: HAVE STUDENTS DO A VISUAL INSPECTION OF COOLANT**

16. SLIDE 16 EXPLAIN Figure 17-13 (a) refractometer is used to measure the freezing point of coolant. A drop of coolant is added to a viewing screen, lid is closed, and then held up to the light to view display on tool.

17. SLIDE 17 EXPLAIN Figure 17-13 (b) use of tests strips is a convenient and cost-effective method to check coolant condition and freezing temperature.

**DEMONSTRATE REFRACTOMETER OR TEST STRIPS**

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	<p>18. SLIDE 18 EXPLAIN Figure 17-14 Used coolant should be stored in a leak-proof container until it can be recycled or disposed of according to local, state, or federal laws. Storage barrel is placed inside another container to catch any coolant that may spill out</p>
	<p><b>HOLD DISCUSSION ON RECYCLING ANTI-FREEZE</b></p>
	<p>19. SLIDE 19 EXPLAIN Figure 17-15 Using hand-operated pressure tester. Do not exceed the pressure rating of the radiator cap when pressurizing the system. This vehicle had a leaking upper radiator that only leaked when the system was pressurized</p>
	<p><b>DEMO COOLING SYSTEM PRESSURE TEST.</b> <b>DEMO</b> how to pressure test a cooling system</p>
	<p><b>HANDS-ON TASK</b> <b>COOLING SYSTEM INSPECTION (A1-D-3) PAGE 34</b></p>
	<p>20. SLIDE 20 EXPLAIN Figure 17-16 Hose clamps come in a variety of shapes and designs.</p> <p>21. SLIDE 21 EXPLAIN Figure 17-17 typical automatic transmission dipstick.</p>
	<p><b>ATF FLUID COLOR DISCUSSION</b> <b>DISCUSSION ON BROWN OR PINK COLORED AT</b></p>
	<p><b>DEMONSTRATION: PREPARE UNLABELED CLEAR JARS OF ANTI-FREEZE, ATF, ENGINE OIL, &amp; POWER STEERING FLUID, &amp; GASOLINE. HAVE STUDENTS IDENTIFY THESE FLUID BY COLOR &amp; SMELL</b></p>
	<p>22. SLIDE 22 EXPLAIN Figure 17-18 Most vehicles use a combination filler cap and level indicator (dipstick) that shows the level of power steering fluid in the reservoir.</p>
	<p><b>HANDS-ON TASK</b> <b>STUDENTS DO FLUIDS CHECK (A8-A-5) PAGE 38</b></p>

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23. SLIDE 23 EXPLAIN FIGURE 17.19 A special tool is useful when installing a new accessory drive belt.
24. SLIDE 24 EXPLAIN FIGURE 17.20 A typical worn serpentine accessory drive belt.
25. SLIDE 25 EXPLAIN FIGURE 17.21 A belt tension gauge displays the belt tension in pounds of force.
26. SLIDE 26 EXPLAIN FIGURE 17.22 A spring-loaded accessory drive belt tensioner.



### **HANDS-ON TASK**

#### **ACC DRIVE BELT INSPECTION (A1-D-4) PAGE 35**



27. SLIDE 27 EXPLAIN FIGURE 17.23 The specified tire inflation pressure is printed on a placard on the driver's door or doorpost.
28. SLIDE 28 EXPLAIN FIGURE 17.24 An electronic tire pressure gauge is usually more accurate than a mechanical "pencil type" gauge and more likely to provide consistent pressure readings.
29. SLIDE 29 EXPLAIN FIGURE 17.25 The method most often recommended is modified X method.
30. SLIDE 30 EXPLAIN FIGURE 17.26A A torque absorbing adaptor commonly called a "torque stick" is being used to tighten lug nuts.
31. SLIDE 31 EXPLAIN FIGURE 17.26B A color-coded assortment of torque sticks.







### **HANDS-ON TASK**

#### **TIRE ROTATION (A4-F-3) PAGE 36**



32. SLIDE 32 EXPLAIN FIGURE 17.27 A hand-operated grease gun is being used to lubricate the steering component through a grease fitting.
33. SLIDE 33 EXPLAIN FIGURE 17.28 Most vehicle manufacturers recommend the use of grease meeting the NLGI #2 and "GC" for wheel bearings and "LB" for chassis lubrication.
34. SLIDE 34 EXPLAIN FIGURE 17.29 This differential assembly has been leaking fluid.
35. SLIDE 35 EXPLAIN FIGURE 17.30 Always ensure that the fill plug can be accessed and removed *before* draining the fluid from a manual transmission.



ICONS	Ch17 Preventative Maintenance
   	<p>36. SLIDE 36 EXPLAIN FIGURE 17.31 A broken coil spring was found during under vehicle inspection.</p> <p>37. SLIDE 37 EXPLAIN FIGURE 17.32 This corroded muffler was found during a visual inspection, but was not detected by driver because it was relatively quiet.</p> <p><b><u>COMPLETE BELOW TASK SHEETS</u></b>  <b><u>LUBRICATION SERVICE (A4-D-6) PAGE 37</u></b></p> <p><b><u>HOMEWORK RESEARCH INTERNET FOR LOCAL, STATE, AND FEDERAL LAWS REGARDING RECYCLING OF COOLANT</u></b></p> <p><b><u>HOMEWORK</u></b>  <b><u>CROSSWORD PUZZLE (MICROSOFT WORD) (PDF)</u></b>  <b><u>WORD SEARCH PUZZLE (MICROSOFT WORD) (PDF)</u></b></p>

Crossword