
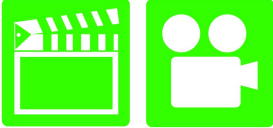










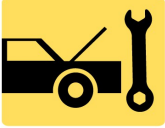







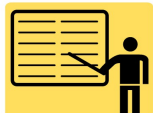

Automotive Maintenance and Light Repair, 1ST Edition



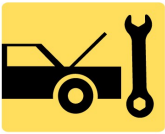





Chapter 40 Fuel Delivery System










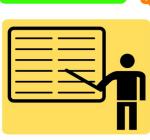
Opening Your Class












KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers Automotive Maintenance and Light Repair . 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. <ul style="list-style-type: none">— Prepare for ASE Engine Performance (A8) certification test content area “C” (Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair).— Describe how to check an electric fuel pump for proper pressure and volume delivery.— Describe how to test and replace fuel filters.
Establish the Mood or Climate	Provide a <i>WELCOME</i> , 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	Ch40 Fuel Delivery System
	<p>1. SLIDE 1 CH40 Fuel Delivery System 2. SLIDE 2 EXPLAIN OBJECTIVES</p>
	<p>Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ WEB SITE REGULARLY UPDATED</p>
	<p>3. SLIDES 3-5 EXPLAIN Fuel Delivery System</p>
	<p><u>DISCUSSION:</u> HAVE THE STUDENTS TALK ABOUT THE VARIOUS COMPONENTS USED IN FUEL DELIVERY SYSTEM. WHAT IS THE <u>PURPOSE OF FUEL DELIVERY SYSTEMS?</u></p>
	<p><u>DISCUSSION:</u> HAVE THE STUDENTS DISCUSS THE USE OF <u>BAFFLES IN FUEL TANKS.</u> ASK THEM IF THEY HAVE EVER HEARD FUEL SLOSHING IN A FUEL TANK</p>
	<p><u>DISCUSSION:</u> HAVE THE STUDENTS TALK ABOUT ONBOARD FUELING VAPOR RECOVERY SYSTEMS. HOW IS THIS SYSTEM DIFFERENT FROM THE RECOVERY SYSTEM USED ON GASOLINE PUMPS?_</p>
	<p><u>DEMONSTRATION:</u> SHOW EXAMPLES OF <u>METAL & PLASTIC FUEL TANKS.</u> DISCUSS WHETHER THERE ARE ADVANTAGES TO USING TANKS MADE FROM EITHER OF THESE MATERIALS</p>
	<p><u>DEMONSTRATION:</u> SHOW <u>FUEL PUMP/PICKUP TUBE ASSEMBLY.</u> POINT OUT FILTER SOCK & FUEL RETURN LINE.</p>
	<p><u>DEMONSTRATION:</u> SHOW THE STUDENTS <u>CHARCOAL CANISTER STORAGE DEVICE FOR FUEL VAPORS</u></p>
	<p><u>DISCUSSION:</u> HAVE THE STUDENTS DISCUSS THE COMPONENTS OF AN <u>EVAPORATIVE EMISSION CONTROL SYSTEM.</u> HOW ARE FUEL VAPORS VENTED?</p>

ICONS	Ch40 Fuel Delivery System
	<p>HANDS-ON TASK: HAVE STUDENTS LOCATE & IDENTIFY FUEL SYSTEM COMPONENTS ON LAB VEHICLE. GRADE THEM ON ACCURACY IN IDENTIFYING COMPONENTS AND THEIR UNDERSTANDING OF THE FUEL SYSTEM.</p>
	<p>6. SLIDES 6-7 EXPLAIN Fuel Tanks</p> <p>8. SLIDE 8 EXPLAIN Figure 40-1 typical fuel tank installation.</p> <p>9. SLIDES 9-11 EXPLAIN Fuel Tanks</p>
	<p>12. SLIDE 12 EXPLAIN Figure 40-2 three-piece filler tube assembly. The main three parts include the upper neck, hose, and lower neck</p>
 <p data-bbox="350 842 456 869">QUESTION</p>	<p>DISCUSSION: HAVE THE STUDENTS DISCUSS THE MOUNTING POSITION OF FUEL TANKS. WHAT FACTORS ARE CONSIDERATIONS IN FUEL TANK LOCATION?</p>
	<p>13. SLIDE 13 EXPLAIN Figure 40-3 view of a typical filler tube with the fuel tank removed. Notice the ground strap used to help prevent the buildup of static electricity as the fuel flows into the plastic tank. The check ball looks exactly like a ping-pong ball</p>
 <p data-bbox="350 1184 456 1211">QUESTION</p>	<p>DISCUSSION: DISCUSS ONBOARD FUELING VAPOR RECOVERY SYSTEMS. HOW IS THIS SYSTEM DIFFERENT FROM THE RECOVERY SYSTEM USED ON GASOLINE PUMPS? <u>FIGURE 40-3</u></p>
	<p>14. SLIDE 14 EXPLAIN CHART 40-1</p> <p>15. SLIDE 15 EXPLAIN Figure 40-4 Vehicles equipped with onboard refueling vapor recovery usually have a reduced-size fill tube.</p>
	<p>DEMONSTRATION: SHOW FUEL TANK FILLER NECK FROM VEHICLE EQUIPPED WITH AN ONBOARD REFUELING VAPOR RECOVERY SYSTEM, POINTING OUT REDUCED NECK SIZE & VENT. <u>FIGURE 18-4</u></p>
	<p>16. SLIDE 16 EXPLAIN Figure 40-5 fuel pickup tube is part of the fuel sender and pump assembly</p>
	<p>DEMONSTRATION: SHOW <u>FUEL PUMP/PICKUP TUBE ASSEMBLY</u>. POINT OUT FILTER SOCK & FUEL RETURN LINE. <u>FIGURE 40-5</u></p>

ICONS	Ch40 Fuel Delivery System
	<p><u>DEMONSTRATION: SHOW THE STUDENTS CHARCOAL CANISTER STORAGE DEVICE FOR FUEL VAPORS</u></p>
	<p><u>DISCUSSION: HAVE THE STUDENTS DISCUSS THE COMPONENTS OF AN EVAPORATIVE EMISSION CONTROL SYSTEM. HOW ARE FUEL VAPORS VENTED?</u></p>
	<p><u>HANDS-ON TASK: HAVE STUDENTS LOCATE & IDENTIFY FUEL SYSTEM COMPONENTS ON LAB VEHICLE. GRADE THEM ON ACCURACY IN IDENTIFYING COMPONENTS AND THEIR UNDERSTANDING OF THE FUEL SYSTEM.</u></p>
	<p><u>DISCUSSION: HAVE THE STUDENTS DISCUSS DIFFERENT TYPES OF FUEL LINES. WHAT ARE ADVANTAGES & DISADVANTAGES OF DIFFERENT MATERIALS?</u></p>
	<p>17. SLIDE 17 EXPLAIN Figure 40-6 Fuel lines are routed along the frame or body and secured with clips</p>
	<p><u>DEMONSTRATION: SHOW EXAMPLES OF RIGID & FLEXIBLE FUEL LINES USED ON A VEHICLE. DISCUSS MATERIAL, ROUTING, & RETENTION METHODS USED</u></p>
	<p><u>SAFETY EXPLAIN THE DANGERS INVOLVED WHEN WORKING WITH FUEL SYSTEMS. SOME OF THESE SYSTEMS CAN OPERATE AT PRESSURES OF 80 TO 100 PSI. ANY TIME A FUEL LINE NEEDS TO BE DISCONNECTED, FUEL PRESSURE MUST BE RELEASED USING OEM RECOMMENDED METHOD.</u></p>
	<p><u>DISCUSSION: HAVE THE STUDENTS DISCUSS NEWER FUEL SUPPLY SYSTEMS THAT DO NOT UTILIZE A RETURN LINE. WHAT COMPONENTS HAD TO BE MODIFIED OR CHANGED FOR THIS SYSTEM TO OPERATE PROPERLY?</u></p>

ICONS	Ch40 Fuel Delivery System
	<p>18. SLIDE 18 EXPLAIN Figure 40-7 Some Ford metal line connections use spring locks and O-rings.</p>
	<p>19. SLIDE 19 EXPLAIN Figure 40-8 Ford spring-lock connectors require a special tool for disassembly.</p>
	<p>20. SLIDE 20 EXPLAIN Figure 40-9 Typical quick-connect steps</p>
	<p>DEMONSTRATION: SHOW EXAMPLES OF FUEL LINE SPRING-LOCK FITTINGS. SHOW SPECIAL TOOLS NEEDED TO DISCONNECT THESE FITTINGS. FIGURES 40-7 TO 40-9</p>
	<p>HANDS-ON TASK: HAVE STUDENTS DISASSEMBLE AND REASSEMBLE FUEL LINE CONNECTIONS, INCLUDING SPRING-LOCK FITTINGS.</p>
	<p>ANIMATION: FUEL PUMP CONTROL WWW.MYAUTOMOTIVELAB.COM</p>
	<p><small>HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/A16_ANIMATION/CHAPTER53_FIG_53_5/INDEX.HTM</small></p> <p>21. SLIDE 21 EXPLAIN Electric Fuel Pumps</p>
	<p>22. SLIDE 22 EXPLAIN Figure 40-10 A roller cell-type electric fuel pump</p>
	<p>23. SLIDES 23-24 EXPLAIN Electric Fuel Pumps</p> <p>DEMONSTRATION: SHOW EXAMPLES OF ROTARY FUEL PUMPS AND DISCUSS HOW THEY WORK.</p>
	<p>25. SLIDE 25 EXPLAIN Figure 40-11 The pumping action of an impeller or rotary vane pump</p>
 <p>QUESTION</p>	<p>DISCUSSION: DISCUSS ROTARY VANE FUEL PUMP SHOWN IN FIGURE 40-11. WILL PUMP BE ABLE TO PUMP MORE FUEL IF IT TURNS FASTER?</p>
	<p>26. SLIDE 26 EXPLAIN Figure 40-12 exploded view of a gerotor electric fuel pump</p>

ICONS	Ch40 Fuel Delivery System
	<p>DISCUSSION: DISCUSS THE <u>GEROTOR-TYPE PUMP</u>. WHAT PROCESS DOES THIS TYPE OF PUMP USE TO PRESSURIZE FUEL?</p>
	<p>DEMONSTRATION: SHOW GEROTOR TYPE FUEL PUMP. EXPLAIN DIFFERENCE BETWEEN IT & VANE-TYPE PUMP. THEN, SHOW STUDENTS EXAMPLE OF A TURBINE TYPE FUEL PUMP.</p>
	<p>DEMONSTRATION: SHOW EXAMPLE OF A <u>MODULAR FUEL SENDER ASSEMBLY</u> USED IN MODERN VEHICLES. POINT OUT THE PUMP, CONVOLUTED TUBE, & FLOAT ASSEMBLY</p>
	<p>DISCUSSION: DISCUSS REASON <u>FUEL PUMP MODULES ARE SPRING-LOADED</u>. DOES FUEL TANK MATERIAL MAKE A DIFFERENCE?</p>
	<p>DISCUSSION: HAVE THE STUDENTS TALK ABOUT <u>ELECTRIC FUEL PUMP CONTROL CIRCUITS</u>. WHY ARE RELAYS CONTROLLED BY THE PCM?</p>
	<p>27. SLIDES 27-28 EXPLAIN Fuel Filters</p>
	<p>29. SLIDE 29 EXPLAIN Figure 40-13 Inline fuel filters are usually attached to the fuel line with screw clamps or threaded connections. Fuel filter must be installed in the proper direction or a restricted fuel flow can result.</p>
 	<p>DEMONSTRATION: SHOW <u>LOCATION OF FUEL FILTERS ON VEHICLES</u>. ARE ALL FILTERS LOCATED IN COMMON AREAS? <u>FIGURE 40-13</u></p>
	<p>DEMONSTRATION: SHOW FUEL FILTERS. SHOW SOME FILTERS FROM CARBURETED ERA & HIGH PRESSURE FILTERS USED IN FUEL-INJECTED VEHICLES. POINT OUT THAT VEHICLE WITH RETURNLESS-TYPE FUEL SYSTEM WILL MOST LIKELY HAVE FUEL FILTER INSIDE FUEL TANK. <u>FIGURE 40-13</u></p>
	<p>DISCUSSION: DISCUSS NEED TO FILTER FUEL BEFORE IT GOES THROUGH ANY FUEL METERING DEVICE, SUCH AS A CARBURETOR OR FUEL INJECTOR. WHAT DO FUEL FILTERS REMOVE?</p>

ICONS	Ch40 Fuel Delivery System
 	<p>NATEF MLR TASK A8C1 REPLACE FUEL FILTERS</p>
  <p>QUESTION</p>	<p>DISCUSSION: DISCUSS FUEL PUMP TEST PROCEDURES. WHAT DRIVABILITY PROBLEMS WOULD WARRANT A FUEL PUMP TEST?</p>
 <p>DEMO</p>	<p>DEMONSTRATION: SHOW HOW TO JAR A STALLED FUEL PUMP INTO OPERATION BY STRIKING THE FUEL TANK. WHY SHOULD A RUBBER Mallet BE USED FOR THIS PROCEDURE? THEN, SHOW STUDENTS HOW TO LISTEN FOR FUEL PUMP OPERATION BY REMOVING FUEL CAP & INSERTING A FUNNEL INTO FILLER NECK</p>
  <p>QUESTION</p>	<p>DISCUSSION: DISCUSS PRESSURE-TESTING FUEL PUMP. IF PRESSURE IS CORRECT AT IDLE, WILL IT ALSO BE CORRECT UNDER LOAD? DISCUSS REST PRESSURE TEST. WHAT COULD HAPPEN IF PRESSURE LEAKS DOWN RAPIDLY? DISCUSS DYNAMIC PRESSURE TEST. IF PRESSURE DOESN'T CHANGE WHEN THROTTLE IS CYCLED, WHAT PROBLEMS MIGHT EXIST?</p>
  <p>QUESTION</p>	<p>DISCUSSION: HAVE THE STUDENTS TALK ABOUT THE NEED FOR PROPER VOLUME OF FUEL. WHAT ARE SOME INDICATORS OF CLOGGED FILTER?</p>
 <p>DEMO</p>	<p>DEMONSTRATION: DEMONSTRATE QUICK & EASY FUEL PUMP VOLUME TEST. IS THIS TEST 100% ACCURATE?</p>
  <p>QUESTION</p>	<p>DISCUSSION: HAVE STUDENTS DISCUSS WHETHER REMOVING BED FROM A PICK-UP TRUCK MIGHT MAKE IT EASIER TO REPLACE A FUEL PUMP. IF TANK WAS COMPLETELY FULL OF FUEL, WOULD THIS PROCEDURE HELP?</p>
	<p>SAFETY EXTREME CAUTION ADVISED WHEN WORKING AROUND ANY COMPONENT OF THE FUEL SYSTEM, ESPECIALLY WHEN THE ENGINE IS HOT.</p>
