
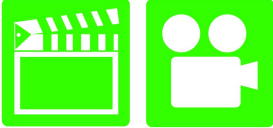


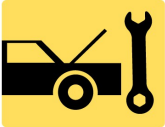







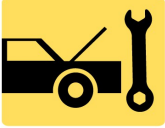









# Automotive Maintenance and Light Repair, 1<sup>ST</sup> Edition









## Chapter 39 IGNITION SYSTEM




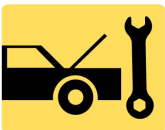



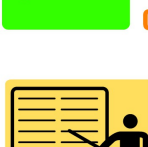

### Opening Your Class












KEY ELEMENT	EXAMPLES
<b>Introduce Content</b>	This course or class covers <b>Automotive Maintenance and Light Repair</b> . It correlates material to task lists specified by ASE and NATEF.
<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. <ul style="list-style-type: none"><li>— Prepare for ASE Engine Performance (A8) certification test content area “B” (Ignition System Diagnosis and Repair).</li><li>— Explain how ignition coils create 40,000 volts or more.</li><li>— Describe the operation of distributor, waste-spark, and coil-on-plug ignition systems</li><li>— Explain how to inspect and replace spark plugs.</li><li>— Discuss what to inspect and look for during a visual inspection of the ignition system.</li></ul>
<b>Establish the Mood or Climate</b>	Provide a <i>WELCOME</i> , 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.

ICONS	Ch39 IGNITION SYSTEM
	<p><b>1. SLIDE 1 CH39 IGNITION SYSTEM</b></p> <p><b>2. SLIDES 2-3 EXPLAIN OBJECTIVES</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 REGULARLY UPDATED</b></p>
	<p><b>4. SLIDES 4 EXPLAIN</b> Ignition System Operation</p>
	<p><b><u>DEMONSTRATION: SHOW A POINT-TYPE DISTRIBUTOR. REVIEW ITS MAJOR COMPONENTS &amp; SHOW HOW TO SET AIR GAP. SHOW MAJOR COMPONENTS OF A DISTRIBUTOR IGNITION SYSTEM.</u></b></p>
	<p><b><u>HANDS-ON TASK: PASS AROUND POINT-TYPE DISTRIBUTOR &amp; HAVE STUDENTS SET AIR GAP</u></b></p>
	<p><b>5. SLIDES 5 EXPLAIN</b> FIGURE 39-1 high-voltage pulse is sent to spark plug to ignite air–fuel mixture in cylinder.</p>
	<p><b><u>DISCUSSION: DISCUSS THE PRIMARY &amp; SECONDARY IGNITION CIRCUITS. HOW DO 2 CIRCUITS FUNCTION INDEPENDENTLY &amp; HOW DO THEY INTERACT?</u></b></p>
	<p><b>6. SLIDE 6 EXPLAIN</b> Distributor Ignition</p> <p><b>7. SLIDE 7 EXPLAIN</b> FIGURE 39-2 primary ignition system is used to trigger and, therefore, create the secondary (high-voltage) spark from the ignition coil. The high-voltage spark is then sent to the spark plugs by the distributor and through spark plug wires.</p>
	<p><b>8. SLIDE 8 EXPLAIN</b> FIGURE 39-3 firing order is cast or stamped on the intake manifold on most engines that have a distributor ignition</p>
	<p><b><u>DISCUSSION: HAVE THE STUDENTS DISCUSS HOW FIRING ORDER CAN BE USED TO FIND COMPANION CYLINDERS. WHERE CAN FIRING ORDER BE FOUND?</u></b></p>

ICONS	Ch39 IGNITION SYSTEM
	<p><b>HANDS-ON TASK: PROVIDE THE STUDENTS WITH A VEHICLE THAT HAS INCORRECT FIRING ORDER. HAVE THEM USE SPECIFICATIONS TO INSPECT AND CORRECT FIRING ORDER</b></p>
	<p><b>DISCUSSION: DISCUSS DISTRIBUTOR INDEXING. HOW DOES INCORRECT DISTRIBUTOR INDEXING AFFECT OPERATION? <u>FIGURE 17-11</u></b></p>
	<p><b>VIDEO: 3 MIN <u>DISTRIBUTOR R&amp;R</u> <a href="http://www.myautomotivelab.com">WWW.MYAUTOMOTIVELAB.COM</a></b></p> <p><small><a href="http://media.pearsoncmg.com/ph/chet/chet_myLABS/akamai/template/video640x480.php?title=distributor%20removal%20and%20instalation&amp;clip=pandc/chet/2012/automotive/installing_efi_system/t12cd3.mov&amp;caption=chet/chet_myLABS/akamai/2012/automotive/installing_efi_system/xml/t12cd3.xml">HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=DISTRIBUTOR%20REMOVAL%20AND%20INSTALATION&amp;CLIP=PANDC/CHET/2012/AUTOMOTIVE/INSTALLING_EFI_SYSTEM/T12CD3.MOV&amp;CAPTION=CHET/CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/INSTALLING_EFI_SYSTEM/XML/T12CD3.XML</a></small></p>
	<p><b>DEMONSTRATION: SHOW THE STUDENTS HOW TO PERFORM A ROTOR AIR GAP TEST TO CHECK DISTRIBUTOR CAP AND ROTOR CONDITION.</b></p>
	<p><b>DISCUSSION: HAVE THE STUDENTS TALK ABOUT IGNITION COIL OPERATION. WHAT PROCESS DOES AN IGNITION USE TO PRODUCE A HIGH-VOLTAGE SPARK FROM AN IGNITION COIL?</b></p>
	<p><b>SHOW ANIMATION: <u>IGNITION OPERATION</u> <a href="http://www.myautomotivelab.com">WWW.MYAUTOMOTIVELAB.COM</a></b></p> <p><small><a href="http://media.pearsoncmg.com/ph/chet/chet_myAUTOMOTIVELAB_2/animations/a16_animation/chapter56_fig_56_4/index.htm">HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/A16_ANIMATION/CHAPTER56_FIG_56_4/INDEX.HTM</a></small></p>
	<p><b>DISCUSSION: USING AN IGNITION SYSTEM WIRING DIAGRAM, HAVE THE STUDENTS <u>LOCATE</u> TRIGGERING DEVICE. HOW DOES THIS TRIGGERING DEVICE WORK?</b></p>
	<p><b>ANIMATION: <u>SIGNAL GENERATION FORM PERMANENT MAGNET</u> <a href="http://www.myautomotivelab.com">WWW.MYAUTOMOTIVELAB.COM</a></b></p> <p><small><a href="http://media.pearsoncmg.com/ph/chet/chet_myAUTOMOTIVELAB_2/animations/a1_animation/chapter18_fig_18_7/index.htm">HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/A1_ANIMATION/CHAPTER18_FIG_18_7/INDEX.HTM</a></small></p>
	<p><b>HANDS-ON TASK: HAVE THE STUDENTS TEST A MAGNETIC SENSOR (PICKUP COIL) USING AN OHMMETER TO DETERMINE ELECTRICAL INTEGRITY OF SENSOR</b></p>
	<p>9. SLIDE 9 EXPLAIN FIGURE 39-4 Ford V-6 engine that uses a <b>waste-spark-type ignition system</b>. Note that each of the three coils has two spark plug wires. Both the cylinders fire at the same time.</p>

ICONS	Ch39 IGNITION SYSTEM
	<p><b>DEMONSTRATION: DEMO WASTE-SPARK IGNITION SYSTEM OPERATION</b></p>
	<p><b>ANIMATION: WASTE SPARK</b>  <b>WWW.MYAUTOMOTIVELAB.COM</b>  <small>HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/A16_ANIMATION/CHAPTER56_FIG_56_21/INDEX.HTM</small></p>
	<p><b>Waste Spark Ignition System 1</b>  <b>Waste Spark Ignition System 2</b>  <b>DISCUSSION: HAVE THE STUDENTS TALK ABOUT WASTE-SPARK IGNITION SYSTEMS. REVIEW REVERSE POLARITY THAT IS OCCURRING IN A DIS. WHAT IS THE PATH OF THE CURRENT?</b></p>
	<p><b>DISCUSSION: HAVE THE STUDENTS TALK ABOUT SCOPE-TESTING A WASTE-SPARK SYSTEM. WHY IS THE FIRING VOLTAGE MEASURED ACROSS THE WASTE CYLINDER LOWER THAN THE VOLTAGE MEASURED ACROSS POWER CYLINDER?</b></p>
	<p><b>10. SLIDE 10 EXPLAIN Coil-ON-Plug Ignition</b>  <b>11. SLIDE 11 EXPLAIN FIGURE 39-5</b> An overhead camshaft engine equipped with variable valve timing on both the intake and exhaust camshafts and the coil-on-plug ignition  <b>12. SLIDE 12 EXPLAIN FIGURE 39-6</b> GM V-8 engine is equipped with a coil-near-plug ignition. Each cylinder has a coil and uses a short spark plug wire from the coil to the spark plug</p>
	<p><b>SHOW ANIMATION: COIL-ON-PLUG OP</b>  <b>WWW.MYAUTOMOTIVELAB.COM</b>  <small>HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/A1_ANIMATION/CHAPTER18_FIG_18_16_B/INDEX.HTM</small></p>
	<p><b>DEMONSTRATION: SHOW THE STUDENTS COP IGNITION SYSTEMS WITH 2 &amp; 3 PRIMARY WIRES AND EXPLAIN THE DIFFERENCES.</b></p>
	<p><b>DISCUSSION: DISCUSS COP IGNITION. WHAT DOES THE COIL-ON-PLUG (COP) IGNITION SYSTEM ELIMINATE?</b></p>

ICONS	Ch39 IGNITION SYSTEM
	<p><b><u>DEMONSTRATION:</u> SHOW THE STUDENTS COP IGNITION SYSTEMS WITH 2 &amp; 3 PRIMARY WIRES AND EXPLAIN THE DIFFERENCES.</b></p>
	<p><b><u>HANDS-ON TASK:</u> HAVE STUDENTS DRAW WIRING DIAGRAMS OF 2 &amp; 3 WIRE COP PRIMARY IGNITION SYSTEMS. GRADE THEM ON ACCURACY</b></p>
	<p><b><u>DEMONSTRATION:</u> USING OSCILLOSCOPE, SHOW IGNITION WAVEFORM PATTERN_</b></p>
	<p><b><u>HANDS-ON TASK:</u> HAVE THE STUDENTS TEST IGNITION COILS, USING OHMMETER TO DETERMINE COIL CONDITION</b></p>
	<p><b><u>PERFORM CAREFUL VISUAL INSPECTION OF COIL HOUSING TO HELP TO LOCATE BURN MARKS OR CRACKS THAT INDICATE A FAULTY COIL.</u></b></p>
	<p><b><u>DISCUSSION:</u> HAVE THE STUDENTS DISCUSS WHAT RESULTS FROM <u>LOW/NO VOLTAGE TO PRIMARY SIDE OF COIL.</u> HOW DOES LOWER-THAN-NORMAL VOLTAGE IN THE PRIMARY CIRCUIT AFFECT SECONDARY CIRCUIT?</b></p>
	<p><b><u>DISCUSSION:</u> HAVE STUDENTS TALK ABOUT RELATIONSHIP BETWEEN <u>TEMPERATURE &amp; RESISTANCE.</u> HOW DOES TEMPERATURE AFFECT RESISTANCE OF SENSORS AND COILS?</b></p>
	<p><b>13. SLIDE 13 EXPLAIN Testing For Spark</b></p> <p><b>14. SLIDE 14 EXPLAIN FIGURE 39-7</b> spark tester looks like a regular spark plug with an alligator clip attached to the shell. This tester has a specified gap that requires at least 25,000 volts (25 kV) to fire.</p> <p><b>15. SLIDE 15 EXPLAIN FIGURE 39-8</b> close-up showing the recessed center electrode on a spark tester. It is recessed 3/8 in. into the shell and the spark must then jump another 3/8 in. to the shell for a total gap of 3/4 inch</p>
	<p><b><u>DEMONSTRATION:</u> SHOW HOW TO PROPERLY USE A <u>SPARK TESTER TO CHECK FOR SPARK_</u></b></p>

ICONS	Ch39 IGNITION SYSTEM
  <p>QUESTION</p>          <p>QUESTION</p>	<p><b>DISCUSSION: DISCUSS SPARK COLOR. HOW CAN SPARK COLOR BE USED TO DETERMINE SPARK QUALITY?</b></p> <p>YOU SHOULD NOT CHECK FOR SPARK BY PULLING PLUG WIRE ON RUNNING ENGINE. YOU COULD DAMAGE OR SHORTEN ELECTRONIC IGNITION COMPONENTS LIFE. METHOD OF CHECKING FOR CYLINDER FIRING WAS USED ON OLDER SYSTEMS.</p> <p><b>SAFETY HAVE STUDENTS REVIEW HAZARDS OF WORKING WITH ELECTRICAL COMPONENTS. EXPLAIN TO REDUCE CHANCES OF BEING SHOCKED, THEY SHOULD NOT HOLD/TOUCH A SPARK TESTER WHILE CHECKING FOR SPARK</b></p> <p><u><b>NATEF MLR TASK</b></u></p> <ol style="list-style-type: none"> <li>16. SLIDE 16 EXPLAIN Spark Plug Wires</li> <li>17. SLIDE 17 EXPLAIN FIGURE 39-9 Spark plug wires carry high-voltage pulses from ignition coil or distributor to the spark plugs. Always take time to install spark plug wires back into original holding brackets (wiring combs)</li> <li>18. SLIDE 18 EXPLAIN FIGURE 39-10 Spark plug wire boot pliers are a handy addition to any tool box.</li> <li>19. SLIDE 19 EXPLAIN FIGURE 39.11 This spark plug boot on an overhead camshaft engine has been arcing to the valve cover causing a misfire to occur.</li> <li>20. SLIDE 20 EXPLAIN FIGURE 39.12 Measuring the resistance of a spark plug wire with a multimeter set to the ohms position. The reading of 16.03 kΩ (16,039 ohms) is okay because the wire is about 2-ft long. Maximum allowable resistance for a spark plug wire this long would be 20 kΩ (20,000 ohms).</li> </ol> <p><b>DISCUSSION: HAVE THE STUDENTS TALK ABOUT OIL-FOULED SPARK PLUGS AND FUEL- OR CARBON-FOULED SPARK PLUGS. WILL CHANGING FOULED SPARK PLUGS PROVIDE A LONG-TERM CURE FOR DRIVABILITY COMPLAINTS?</b></p>

**ICONS****Ch39 IGNITION SYSTEM**

**DISCUSSION: DISCUSS WHY SOME SPARK PLUGS USE MULTIPLE GROUND ELECTRODES. HOW DO MULTIPLE GROUND ELECTRODES AFFECT OPERATION AND SERVICE LIFE?**

21. SLIDE 21 EXPLAIN Spark Plugs
22. SLIDE 22 EXPLAIN FIGURE 39-13 Parts of spark plug.
23. SLIDES 23-24 EXPLAIN Spark Plug Service
25. SLIDE 25 EXPLAIN FIGURE 39-14 When removing spark plugs, it is wise to arrange them so that they can be compared and any problem can be identified with a particular cylinder.
26. SLIDE 26 EXPLAIN FIGURE 39-15 A spark plug thread chaser is a low-cost tool that hopefully will not be used often, but is necessary in order to clean the threads before installing new spark plugs

**HANDS-ON TASK: HAVE STUDENTS USE OHMMETER TO TEST SPARK PLUG WIRES FOR CONTINUITY AND COMPARE COLLECTED VALUES TO SPECIFICATIONS TO DETERMINE CONDITION**




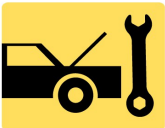






**DISCUSSION: HAVE STUDENTS DISCUSS SPARK PLUG HEAT RANGE & HOW IT AFFECTS ENGINE OPERATION AND EMISSIONS. IS IT EVER ACCEPTABLE OR BENEFICIAL TO VARY FROM OEM RECOMMENDATIONS?**

**DISCUSSION: DISCUSS PURPOSE OF "SUPPRESSION" WIRES. HOW DO THEY WORK?**


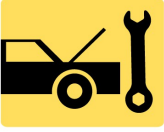






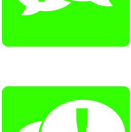








**HANDS-ON TASK: REMOVE SPARK PLUG WIRES TO INSPECT FOR EVIDENCE OF SPARK LEAKAGE. MAKE SURE WIRES ARE REINSTALLED CORRECTLY, FOLLOWING PROPER ROUTING & USE OF WIRE SEPARATORS. CHECK FOR CORROSION**


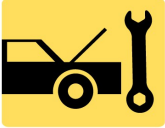




42. SLIDE 42 EXPLAIN FIGURE 17-19 When removing spark plugs, it is wise to arrange them so that they can be compared and any problem can be identified with a particular cylinder.

**DISCUSSION: DISCUSS IMPORTANCE OF KEEPING SPARK PLUGS IN CORRECT ORDER DURING REMOVAL. HOW CAN SPARK PLUGS HELP TO DIAGNOSE ENGINE OPERATING CONDITION?**

ICONS	Ch39 IGNITION SYSTEM
	<p><b>DISCUSSION:</b> DISCUSS STEPS FOR REPLACING SPARK PLUGS. WHY SHOULD THE ENGINE BE COOL BEFORE REMOVING SPARK PLUGS?</p>
	<p><b>VIDEO: 2 MIN SPARK PLUGS &amp; WIRES (CH70) WWW.MYAUTOMOTIVELAB.COM</b>  <a href="http://media.pearsoncmg.com/ph/chet/chet_myLABS/akamai/template/VIDEO640X480.PHP?TITLE=SPARK%20PLUG%20AND%20WIRES&amp;CLIP=PANDC/CHET/2012/AUTOMOTIVE/AUTO_SHOP_SAFETY/CLIP17SPARKPLUGS1.MOV&amp;CAPTION=CHET/CHET_MYLABS/akamai/2012/AUTOMOTIVE/AUTO_SHOP_SAFETY/XML/CLIP17SPARKPLUGS1.XML">HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=SPARK%20PLUG%20AND%20WIRES&amp;CLIP=PANDC/CHET/2012/AUTOMOTIVE/AUTO_SHOP_SAFETY/CLIP17SPARKPLUGS1.MOV&amp;CAPTION=CHET/CHET_MYLABS/akamai/2012/AUTOMOTIVE/AUTO_SHOP_SAFETY/XML/CLIP17SPARKPLUGS1.XML</a></p>
	<p><b>INSTALLING SPARK PLUGS WITH THE WRONG REACH INTO AN ENGINE MAY CAUSE SEVERE ENGINE DAMAGE.</b></p>
	<p><b>HANDS-ON TASK: HAVE THE STUDENTS GAP A SET OF SPARK PLUGS USING PROPER TOOLS.</b></p>
	<p><b>VIDEO: 5 MIN RANDOM MISFIRE DETECTION WWW.MYAUTOMOTIVELAB.COM</b>  <a href="http://media.pearsoncmg.com/ph/chet/chet_myLABS/akamai/template/VIDEO640X480.PHP?TITLE=CASE%20STUDY%203%20RANDOM%20MISFIRE%20DETECTED&amp;CLIP=PANDC/CHET/2012/AUTOMOTIVE/OBD2_FORD/ST15_CS3.MOV&amp;CAPTION=CHET/CHET_MYLABS/akamai/2012/AUTOMOTIVE/OBD2_FORD/XML/ST15_CS3.XML">HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=CASE%20STUDY%203%20RANDOM%20MISFIRE%20DETECTED&amp;CLIP=PANDC/CHET/2012/AUTOMOTIVE/OBD2_FORD/ST15_CS3.MOV&amp;CAPTION=CHET/CHET_MYLABS/akamai/2012/AUTOMOTIVE/OBD2_FORD/XML/ST15_CS3.XML</a></p>
	<p><b>VIDEO: 8 MIN DTC P0300 MISFIRE DIAG. WWW.MYAUTOMOTIVELAB.COM</b>  <a href="http://media.pearsoncmg.com/ph/chet/chet_myLABS/akamai/template/VIDEO640X480.PHP?TITLE=CASE%20STUDY%201%20DIAGNOSING%20%20ENGINE%20MISFIRE%20P0300&amp;CLIP=PANDC/CHET/2012/AUTOMOTIVE/OBD2_GM/CS1.MOV&amp;CAPTION=CHET/CHET_MYLABS/akamai/2012/AUTOMOTIVE/OBD2_GM/XML/CS1.XML">HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=CASE%20STUDY%201%20DIAGNOSING%20%20ENGINE%20MISFIRE%20P0300&amp;CLIP=PANDC/CHET/2012/AUTOMOTIVE/OBD2_GM/CS1.MOV&amp;CAPTION=CHET/CHET_MYLABS/akamai/2012/AUTOMOTIVE/OBD2_GM/XML/CS1.XML</a></p>
	<p><b>VIDEO: 6 MIN SINGLE CYLINDER MISFIRE DIAG. WWW.MYAUTOMOTIVELAB.COM</b>  <a href="http://media.pearsoncmg.com/ph/chet/chet_myLABS/akamai/template/VIDEO640X480.PHP?TITLE=CASE%20STUDY%203%20SINGLE%20CYLINDER%20MISFIRE&amp;CLIP=PANDC/CHET/2012/AUTOMOTIVE/OBD2_CHRYSLER_CORP/ST16CS3.MOV&amp;CAPTION=CHET/CHET_MYLABS/akamai/2012/AUTOMOTIVE/OBD2_CHRYSLER_CORP/XML/ST16CS3.XML">HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=CASE%20STUDY%203%20SINGLE%20CYLINDER%20MISFIRE&amp;CLIP=PANDC/CHET/2012/AUTOMOTIVE/OBD2_CHRYSLER_CORP/ST16CS3.MOV&amp;CAPTION=CHET/CHET_MYLABS/akamai/2012/AUTOMOTIVE/OBD2_CHRYSLER_CORP/XML/ST16CS3.XML</a></p>
	<p><b><u>NATEF MLR TASK</u></b></p>
	<p><b>DEMONSTRATION: USE A DSO TO SHOW DIFFERENT WAVEFORMS GENERATED BY PICKUP COIL, HALL-EFFECT, AND OPTICAL SENSORS</b></p>
	<p><b>HANDS-ON TASK: HAVE STUDENTS LOCATE AND INSPECT CKP &amp; CMP IGNITION SENSORS TO DETERMINE TYPES OF SENSORS. <u>CHECK THEM USING A SCAN TOOL</u></b></p>



ICONS	Ch39 IGNITION SYSTEM
 	<p><b>DEMONSTRATION:</b> SHOW HOW TO PREPARE A <u>DSO (DIGITAL STORAGE OSCILLOSCOPE)</u> TO OBTAIN PRIMARY CIRCUIT PATTERNS.</p>
 	<p><b>DEMONSTRATION:</b> SHOW STUDENTS HOW TO USE SCAN TOOL ON A <u>LAB VEHICLE</u> TO OBTAIN ENGINE RPM.</p>
  <p>QUESTION</p>	<p><b>DISCUSSION:</b> HAVE THE STUDENTS DISCUSS WHAT CAN CAUSE <u>NO-START CONDITION</u>. HOW DO YOU SYSTEMATICALLY TEST IGNITION SYSTEM COMPONENTS &amp; CIRCUITRY TO DETERMINE CAUSE OF NO-SPARK CONDITION?</p>
  <p>QUESTION</p>	<p><b>DISCUSSION:</b> DISCUSS TERM <u>TRACKING</u>. <u>WHAT IS TRACKING?</u> WHAT TYPES OF PROBLEMS DOES IT CAUSE? HOW CAN IT BE FOUND?</p>
  <p>QUESTION</p>	<p><b>DISCUSSION:</b> DISCUSS THE DIFFERENCE BETWEEN BTDC &amp; ATDC. HOW WOULD CHANGES IN IGNITION TIMING AFFECT ENGINE OPERATION?</p>
	<p><b>ANIMATION:</b> <u>SECONDARY IGNITION SCOPE PATTERN</u> <a href="http://media.pearsoncmg.com/ph/chet/chet_myautomotivelab_2/animations/a16_animation/chapter57_fig_57_32/index.htm">WWW.MYAUTOMOTIVELAB.COM</a></p>
<p><small><a href="http://media.pearsoncmg.com/ph/chet/chet_myautomotivelab_2/animations/a16_animation/chapter57_fig_57_32/index.htm">HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/A16_ANIMATION/CHAPTER57_FIG_57_32/INDEX.HTM</a></small></p>	
  <p>QUESTION</p>	<p><b>DISCUSSION:</b> DISCUSS HOW SCOPE CONNECTION POINTS DIFFER BETWEEN DISTRIBUTOR, WASTE-SPARK, COP SYSTEMS. ARE ANY SPECIAL ADAPTERS NEEDED? ARE THERE ANY DIFFICULTIES YOU MAY FACE WHEN TESTING DIFFERENT TYPES OF SYSTEMS?</p>
  <p>QUESTION</p>	<p><b>DISCUSSION:</b> HAVE THE STUDENTS DISCUSS THE DIFFERENT PARTS OF A TYPICAL <u>SECONDARY IGNITION PATTERN</u>. WHAT DOES EACH SECTION REPRESENT?</p>
  <p>QUESTION</p>	<p><b>DISCUSSION:</b> HAVE THE STUDENTS DISCUSS HOW FIRING LINE ANALYSIS CAN BE USED TO DETERMINE SECONDARY IGNITION SYSTEM COMPONENT CONDITION. WHAT ARE COMMON CAUSES OF ABNORMALLY HIGH OR LOW FIRING LINE VOLTAGE?</p>

ICONS	Ch39 IGNITION SYSTEM
	<p><b>VIDEO: 2 MIN CRANKSHAFT LEARN</b>  <b><a href="http://www.myautomotivelab.com">WWW.MYAUTOMOTIVELAB.COM</a></b>  <small>HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=CRANKSHAFT%20LEARN  %20PROCEDURE&amp;CLIP=PANDC/CHET/2012/AUTOMOTIVE/OBD2_GM/VC1.MOV&amp;CAPTION=CHET/CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/OBD2_GM/XML/VC1.XML</small></p>
	<p><b>HANDS-ON TASK: HAVE THE STUDENTS HOOK UP A SECONDARY IGNITION SCOPE AND USE DIFFERENT PATTERNS TO DETERMINE SECONDARY IGNITION SYSTEM CONDITION.</b></p>
	<p><b>DISCUSSION: HAVE THE STUDENTS TALK ABOUT THE IMPORTANCE OF DWELL &amp; FACTORS THAT AFFECT IT. HOW DOES DWELL DIFFER BETWEEN DISTRIBUTOR IGNITION, WASTE-SPARK, AND COIL-ON-PLUG SYSTEMS?</b></p>
	<p><b>DISCUSSION: HAVE THE STUDENTS DISCUSS HOW FIRING VOLTAGE AFFECTS SPARK DURATION. HOW IS REQUIRED VOLTAGE AFFECTED BY A LEAN CYLINDER?</b></p>
	<p><b><u>NATEF MLR TASK A8A1</u> RESEARCH APPLICABLE VEHICLE AND SERVICE INFORMATION, VEHICLE SERVICE HISTORY, SERVICE PRECAUTIONS, AND TECHNICAL SERVICE BULLETINS.</b></p>
	<p><b><u>NATEF MLR TASK A8A7</u> REMOVE AND REPLACE SPARK PLUGS; INSPECT SECONDARY IGNITION COMPONENTS FOR WEAR AND DAMAGE.</b></p>