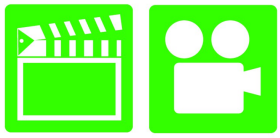
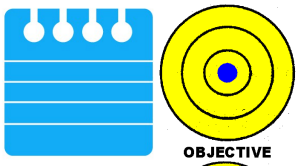
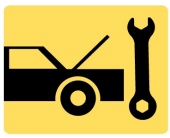
A8 Engine Performance 4th Edition

Chapter 19 Onboard Diagnosis

Opening Your Class

KEY ELEMENT	EXAMPLES
Introduce Content	This course or class covers operation and service of **Automotive Engine Performance.** 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. Prepare for ASE Electrical/Electronic systems (A6) certification test content area "A" (General Electrical/Electronic Systems Diagnosis). 2. Explain the purpose and function of onboard diagnosis. 3. List the various duties of the diagnostic executive (task master). 4. List five continuous monitors. 5. List five non-continuous monitors.
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.

ICONS	Ch19 Onboard Diagnosis
	1. SLIDE 1 CH19 Onboard Diagnosis
	Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/ WEB SITE REGULARLY UPDATED POWER POINTS DONE BY INDIVIDUAL LEARNING OBJECTIVES, SO THERE IS POWER POINT FILE FOR EACH LEARNING OBJECTIVE
	2. SLIDE 2 EXPLAIN OBJECTIVE CH19 AEP_LO1 3. SLIDE 3 EXPLAIN On-Board Diagnostics Generation-II (OBD-II) Systems
	VIDEO: 5 MINUTES OBD DIAGNOSTICS WWW.MYAUTOMOTIVELAB.COM HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=DIAGNOSTICS&CLIP=PANDC/CHET/2012/AUTOMOTIVE/OBD2_GETTING_ON_BOARD/CLIP9.MOV&CAPTION=CHET/CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/OBD2_GETTING_ON_BOARD/XML/CLIP9.XML
	4. SLIDE 4 EXPLAIN Figure 19-1 typical malfunction indicator lamp (MIL) often labeled “check engine” or “service engine soon” (SES). 5. SLIDE 5 EXPLAIN On-Board Diagnostics Generation-II (OBD-II) Systems
	DISCUSSION: HAVE STUDENTS TALK ABOUT PURPOSE OF ONBOARD DIAGNOSTIC SYSTEMS. HOW DID COMPUTER CONTROL SYSTEMS FUNCTION PRIOR TO OBD-I? HAVE THE STUDENTS DISCUSS OBD-I. WHAT WERE SOME OF SHORTCOMINGS/PROBLEMS OF OBD-I?
	2. SLIDE 2 EXPLAIN OBJECTIVE CH19 AEP_LO2 3. SLIDES 3-4 EXPLAIN Diagnostic Executive and Task Manager
	HANDS-ON TASK: HAVE THE STUDENTS LOCATE THE DIAGNOSTIC LINK CONNECTOR (DLC) ON SEVERAL OBD-I VEHICLES USING COMPONENT LOCATORS. ASK STUDENTS TO COMPARE VARIOUS LOCATIONS TO STANDARDIZED LOCATIONS ON AN OBD-II VEHICLE

ICONS	Ch19 Onboard Diagnosis
	2. SLIDE 2 EXPLAIN OBJECTIVE CH19 AEP_LO3 3. SLIDES 3-4 EXPLAIN MONITORS
	**ON-VEHICLE NATEF TASK:** LOCATE AND INTERPRET VEHICLE AND MAJOR COMPONENT IDENTIFICATION NUMBERS:_ DIAGNOSE CAUSES OF EMISSIONS OR DRIVEABILITY CONCERNS WITH STORED OR ACTIVE DTCS; OBTAIN, GRAPH, & INTERPRET SCAN TOOL DATA: DESCRIBE IMPORTANCE OF RUNNING ALL OBDII MONITORS FOR REPAIR VERIFICATION.
	**DISCUSSION:** HAVE THE STUDENTS DISCUSS EXAMPLES OF OBD-II MONITORS AND HOW THEY OPERATE. WHAT IS A MONITOR?
	**DEMONSTRATION:** CONNECT A SCAN TOOL TO OBD-II VEHICLE & SHOW STUDENTS HOW TO ACCESS MONITOR STATUS. THEN DEMONSTRATE COMPREHENSIVE COMPONENT MONITOR OPERATION BY DISCONNECTING A SENSOR SUCH AS ENGINE COOLANT TEMPERATURE WITH THE KEY ON. SHOW ILLUMINATED MIL & STORED DTC
	CERTAIN 1996 & 1997 OBD-II VEHICLES COULD SET A MISFIRE DTC FROM OPERATION ON ROUGH ROADS. MISFIRE MONITOR WAS VERY SENSITIVE ON THESE VEHICLES & COULD MISINTERPRET SLIGHT CRANKSHAFT SPEED VARIATIONS CAUSED BY ROUGH ROADS AS IGNITION MISFIRES
	**DEMONSTRATION:** DEMONSSTRATE OPERATION OF MISFIRE MONITOR BY CLOSING ELECTRODE GAP ON SPARK PLUG AND OPERATING THE ENGINE. ONCE MISFIRE HAS BEEN DETECTED, CONNECT SCAN TOOL & SHOW DTC
	DEPENDING ON PCM'S DETERMINATION OF MISFIRE'S SEVERITY, MISFIRE MONITOR MAY SET PENDING CODE UNTIL IGNITION IS CYCLED OFF & ENGINE IS OPERATED 2ND TIME. AFTER 2ND FAILURE, MATURED DTC SETS, WITH MIL ON

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	**SHOW VIDEO: 2 MIN MISFIRE DETECTION WWW.MYAUTOMOTIVELAB.COM** HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=MISFIRE%20DETECTION&CLIP=PANDC/CHET/2012/AUTOMOTIVE/OBD2_GETTING_ON_BOARD/CLIP2.MOV&CAPTION=CHET/CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/OBD2_GETTING_ON_BOARD/XML/CLIP2.XML
	**SHOW VIDEO: 2 MIN EVAP MONITOR WWW.MYAUTOMOTIVELAB.COM** HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=EVAP&CLIP=PANDC/CHET/2012/AUTOMOTIVE/OBD2_GETTING_ON_BOARD/CLIP8.MOV&CAPTION=CHET/CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/OBD2_GETTING_ON_BOARD/XML/CLIP8.XML
	**VIDEO: 2 MIN COMPREHENSIVE COMPONENT MONITOR [CCM] WWW.MYAUTOMOTIVELAB.COM** HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=COMPREHENSIVE%20COMPONENTS&CLIP=PANDC/CHET/2012/AUTOMOTIVE/OBD2_GETTING_ON_BOARD/CLIP1.MOV&CAPTION=CHET/CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/OBD2_GETTING_ON_BOARD/XML/CLIP1.XML
	5. **SLIDES 5-6 EXPLAIN** COMPREHENSIVE COMPONENT MONITOR 7. **SLIDES 7-9 EXPLAIN MONITORS**
	**DISCUSSION: HAVE THE STUDENTS DISCUSS ENABLING CRITERIA AND WHY THEY ARE IMPORTANT. WHAT ARE CONDITIONS THAT MUST BE MET FOR EACH MONITOR TO RUN?**
	**DISCUSSION: HAVE THE STUDENTS DISCUSS CRITERIA FOR A TRIP AND WHY THEY ARE IMPORTANT FOR THE OBD-II SYSTEM. WHAT IS A TRIP?**
	**DISCUSSION: HAVE THE STUDENTS TALK ABOUT DRIVE CYCLES. WHAT IS A DRIVE CYCLE AND HOW DOES IT DIFFER FROM A TRIP?**
	**SHOW ANIMATION: DTC EXPLAINED WWW.MYAUTOMOTIVELAB.COM** HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/A16_ANIMATION/CHAPTER54_FIG_54_2/INDEX.HTM
	**DISCUSSION: DISCUSS NUMBERING OF DTCS. WHAT ARE MAJOR CATEGORIES OF OBD-II DESIGNATED DTCS? EXPLAIN NUMBERING FOR OBD-II DTCS & GIVE SOME EXAMPLES & EXPLANATIONS (E.G., P0301- CYLINDER #1 MISFIRE DETECTED; P0441- INCORRECT EVAPORATIVE PURGE FLOW DETECTED)**

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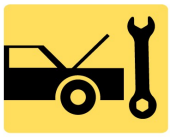
	2. SLIDE 2 EXPLAIN OBJECTIVE CH19 AEP_LO4 3. SLIDES 3-4 EXPLAIN TROUBLE CODES
	ON-VEHICLE NATEF TASK: RETRIEVE AND RECORD DIAGNOSTIC TROUBLE CODES, OBD MONITOR STATUS, AND FREEZE FRAME DATA; CLEAR CODES WHEN APPLICABLE
	ON-VEHICLE NATEF TASK: DIAGNOSE EMISSIONS OR DRIVEABILITY CONCERNS W/O STORED DIAGNOSTIC TROUBLE CODES; DETERMINE NECESSARY ACTION
	DISCUSSION: HAVE THE STUDENTS TALK ABOUT TYPES OF DTCS. HOW ARE OBD-II DTCS CLASSIFIED FOR IMPORTANCE?
	DEMONSTRATION: CREATE A ONE-TRIP FAILURE OF A TWO-TRIP CODE; FOR EXAMPLE, CREATE A TYPE B MISFIRE BY CLOSING SPARK PLUG ELECTRODES & OPERATING ENGINE ONE TIME. SHOW STUDENTS HOW TO FIND PENDING DTCS WITH SCAN TOOL
	DISCUSSION: HAVE THE STUDENTS DISCUSS PENDING CODES. WHAT ARE PENDING CODES AND WHERE ARE THEY STORED?
	HANDS-ON TASK: HAVE THE STUDENTS CREATE PENDING DTCS ON LAB VEHICLES THEIR OWN CARS. HAVE THEM RETRIEVE THE PENDING CODES AND FREEZE-FRAME DATA.
	DISCUSSION: HAVE THE STUDENTS DISCUSS PCM TESTS. WHAT IS RATIONALITY TESTING? WHAT IS FUNCTIONALITY TESTING?
	DEMONSTRATION: ON OBD-II VEHICLE DISCONNECT A SENSOR, SUCH AS A COOLANT TEMPERATURE SENSOR, TO SHOW STUDENTS HOW PCM TESTS FUNCTIONALITY. SHOW STUDENTS DTC AND CREATE AN OPPOSING DTC BY SHORTING CONNECTOR TERMINALS TOGETHER.

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 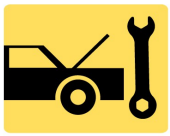	**DISCUSSION:** HAVE THE STUDENTS TALK ABOUT **MODE SIX INFORMATION.** WHAT IS MODE SIX DATA, AND HOW CAN IT BE USEFUL FOR DIAGNOSIS? **HANDS-ON TASK:** HAVE THE STUDENTS CONNECT AN **ENHANCED SCAN TOOL** TO A LAB VEHICLE OR THEIR OWN VEHICLES. HAVE THEM ACCESS OEM DATA & LIST AVAILABLE PARAMETERS. HAVE THEM ACCESS GENERIC OBD-II DATA AND CREATE SIMILAR LIST FOR COMPARISON.