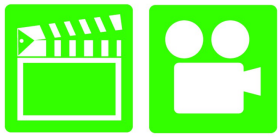
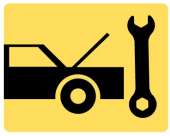
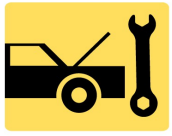
Automotive Maintenance and Light Repair, 1ST Edition

Chapter 38 Heating & Air Conditioning System Inspection

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. ≅ Describe how to verify AC compressor clutch operation. ≅ Discuss normal AC discharge outlet temperatures. ≅ Discuss how to verify proper heating and cooling airflow to the inside of the vehicle. ≅ Explain how to inspect the AC condenser. ≅ Discuss AC odors and how to eliminate them.
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	Ch38 Heating & A/C Inspection
	1. **SLIDE 1 CH38 Heating & Air Conditioning Inspection** 2. **SLIDES 2-3 EXPLAIN OBJECTIVES** **Check for ADDITIONAL VIDEOS & ANIMATIONS @ http://www.jameshalderman.com/** **WEB SITE REGULARLY UPDATED**
	4. **SLIDES 4-5 EXPLAIN** AC System Working As Designed 6. **SLIDE 6 EXPLAIN FIGURE 38-1** compressor is working if the center of compressor clutch is rotating with the engine running. 7. **SLIDE 7 EXPLAIN FIGURE 38-2** AC compressor drive belt tensioner is used to keep a constant and even tension on drive belt so it can properly transfer engine torque to the AC compressor
	
	**SERVICING AC COMPRESSOR WWW.MYAUTOMOTIVELAB.COM** HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=SERVICING%20THE%20AC%20COMPRESSOR&CLIP=PANDC/CHET/2012/AUTOMOTIVE/CLIMATE_CONTROL/A7T4.MOV&CAPTION=CHET/CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/CLIMATE_CONTROL/XML/A7T4.XML
  QUESTION	**DISCUSSION: ASK STUDENTS TO TALK ABOUT THE MAJOR COMPONENTS OF A COMPRESSOR SYSTEM. WHAT SHOULD BE CHECKED ON EACH COMPONENT WHEN THE COMPRESSOR FAILS?**
	**HANDS-ON TASK: HAVE STUDENTS FOLLOW PROCEDURES TO REMOVE A COMPRESSOR. WHAT SAFETY PRECAUTIONS SHOULD BE TAKEN PRIOR TO REMOVING COMPRESSOR?**
	**ANY TIME YOU REPLACE A COMPRESSOR DUE TO MECHANICAL PROBLEMS, FLUSHING AC SYSTEM IS RECOMMENDED. THIS HELPS ENSURE THAT NEW COMPRESSOR IS FREE FROM METAL DEBRIS THAT COULD SHORTEN ITS LIFE.**
We Support NATEF 	**NATEF MLR TASK A7B1 INSPECT AND REPLACE A/C COMPRESSOR DRIVE BELTS, PULLEYS, AND TENSIONERS; DETERMINE NECESSARY ACTION.**

ICONS	Ch38 Heating & A/C Inspection
	8. **SLIDE 8 EXPLAIN FIGURE 38-3** air-conditioning thermometer being used to check the discharge temperature at the center vents
	**NATEF MLR TASK A7D1 INSPECT A/C-HEATER DUCTS, DOORS, HOSES, CABIN FILTERS, AND OUTLETS; PERFORM NECESSARY ACTION**
	9. **SLIDES 9-10 EXPLAIN HVAC System Inspection** 11. **SLIDE 11 EXPLAIN FIGURE 38-4** typical cabin filter being removed from behind the glove compartment.
	**NATEF MLR TASK A7D1 INSPECT A/C-HEATER DUCTS, DOORS, HOSES, CABIN FILTERS, AND OUTLETS; PERFORM NECESSARY ACTION**
	12. **SLIDE 12 EXPLAIN FIGURE 38-5** Heater hoses are smaller coolant hoses that run from and back to engine
	**DISCUSSION: ASK STUDENTS TO DISCUSS MALFUNCTIONING HEATER SYMPTOMS THAT POINT TO A DEFECTIVE THERMOSTAT.**
	**NATEF MLR TASK A7C1 INSPECT ENGINE COOLING AND HEATER SYSTEMS HOSES; PERFORM NECESSARY ACTION.**
	13. **SLIDE 13 EXPLAIN FIGURE 38.6** The air-conditioning condenser is located in front of the radiator and is therefore more likely to be become partially restricted due to road debris and dirt.
	**DISCUSSION: ASK STUDENTS TO DISCUSS RECOMMENDED SERVICING PROCEDURES FOR CONDENSER, EVAPORATOR, RECEIVER/DRIER OR ACCUMULATOR DRIER, & ORIFICE TUBE OR EXPANSION VALVE**
	14. **SLIDE 14 EXPLAIN Figure 38-7** fin comb is used to straighten fins on condenser to help increase airflow and heat transfer
	**DEMONSTRATION: SHOW HOW TO USE FIN COMB TO STRAIGHTEN FINS OF CONDENSER. WHY MIGHT THIS ACTION BE NECESSARY? FIG 37-7**

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	**NATEF MLR TASK A7B3 INSPECT A/C CONDENSER FOR AIRFLOW RESTRICTIONS; DETERMINE NECESSARY ACTION**
	15. **SLIDE 15 EXPLAIN FIGURE 38-8** Black light being used to look for refrigerant leakage after a fluorescent dye was installed in the system.
	16. **SLIDE 16 EXPLAIN Hybrid Vehicle AC Systems** 17. **SLIDE 17 EXPLAIN FIGURE 38-9** Hybrid electric vehicle AC compressor. Note that this unit is primarily belt-driven but has a high-voltage electric motor built in to allow the AC system operation during idle stop
	**NATEF MLR TASK A7B2 IDENTIFY HYBRID VEHICLE A/C SYSTEM ELECTRICAL CIRCUITS AND THE SERVICE/SAFETY PRECAUTIONS**
	18. **SLIDE 18 EXPLAIN Handling AC Odors**
	**USE A BIOCIDE TO GET RID OF MILDEW THAT FORMS IN THE EVAPORATOR.**
	**NATEF MLR TASK A7D2 IDENTIFY THE SOURCE OF A/C SYSTEM ODORS**
	**DEMONSTRATION: SHOW STUDENTS PROPER PROCEDURES FOR REFRIGERANT RECOVERY.**
	**DEMONSTRATION: SHOW STUDENTS AN EXAMPLE OF A QUICK DISCONNECT SERVICE VALVE FOR R-134A SYSTEM, AND DISCUSS THE PURPOSE AND FUNCTION OF SERVICE VALVES**
	**RECOVERY, EVACUATION & RECHARGE** **WWW.MYAUTOMOTIVELAB.COM** HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=RECOVERY,%20EVACUATION%20AND%20CHARGING&CLIP=PANDC/CHET/2012/AUTOMOTIVE/CLIMATE_CONTROL/A7T3.MOV&CAPTION=CHET/CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/CLIMATE_CONTROL/XML/A7T3.XML

ICONS	Ch38 Heating & A/C Inspection
	**REFRIGERANT CONTAMINATION & ID WWW.MYAUTOMOTIVELAB.COM** HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYLABS/AKAMAI/TEMPLATE/VIDEO640X480.PHP?TITLE=CHECK%20FOR%20REFRIGERANT%20CONTAMINATION&CLIP=PANDC/CHET/2012/AUTOMOTIVE/TEST_READINESS_A7/A7_CE_T2_5.MOV&CAPTION=CHET/CHET_MYLABS/AKAMAI/2012/AUTOMOTIVE/TEST_READINESS_A7/XML/A7_CE_T2_5.XML
 	**DISCUSSION: ASK STUDENTS TO TALK ABOUT IMPACT OF MIXING REFRIGERANTS ON HIGH-SIDE PRESSURE. WHAT ARE THE RESULTS OF SUCH CONTAMINATION?** **SHOW ANIMATION: SCHRADER VALVE OP WWW.MYAUTOMOTIVELAB.COM** HTTP://MEDIA.PEARSONCMG.COM/PH/CHET/CHET_MYAUTOMOTIVELAB_2/ANIMATIONS/A77_ANIMATION/CHAPTER51_FIG_51_8/INDEX.HTM
	 **DEMONSTRATION: SHOW EXAMPLE OF A SCHRADER VALVE FOR AN R-12 SYSTEM. DISCUSS THE DIFFERENCE BETWEEN HOW SCHRADER VALVES FUNCTION VS. R-134A SERVICE VALVES.**