HEATING AND AIR CONDITIONING, 8TH

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AC Component Identification
Meets NATEF Task: (None specified)

Name _______________________________   Date ___________  Time on Task ________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

1. Locate the air-conditioning system label. Describe the location.

2. According to the label, what type of refrigerant is used in the vehicle?
   _____ HFC-134a (R-134a or SUVA®)
   _____ CFC-12 (R-12 or Freon®)

3. According to the label, what is the capacity of the system?
   _____ ounces

4. Describe the location of the compressor __________________________

5. Describe the location of the condenser __________________________

6. Describe the location of the evaporator __________________________

7. Describe the location of the accumulator or receiver-drier ______________

8. Does the system use an expansion valve?  _____ Yes  _____ No

9. Does the system use an orifice tube?  _____ Yes  _____ No
A/C Component Purpose and Function

Meets NATEF Task: None specified.

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

1. Describe the purpose and function of the A/C compressor. _______________________

2. Describe the purpose and function of the condenser. _______________________

3. Describe the purpose and function of the thermal expansion valve (TXV). __________

4. Describe the purpose and function of the orifice tube (OT). _______________________

5. Describe the purpose and function of the evaporator. _______________________


A/C Compressor Clutch Control Diagnosis

Meet NATEF Task: (A7-D-2) Test and diagnose A/C compressor clutch control system; determine necessary action. (P-1)

Name _______________________________   Date ___________   Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check service information and determine the testing and diagnostic procedures to follow when diagnosing faults in the A/C compressor clutch control circuit (describe tests).

__________________________________________________________________
__________________________________________________________________

_____ 2. What test equipment is specified for use during the diagnosis? Check all that apply.
   ____ a. DMM
   ____ b. Scope
   ____ c. Scan tool
   ____ d. Special tester (describe) ________________________________________
   ____ e. Other (describe) ___________________________________________

_____ 3. After testing the A/C compressor clutch circuit, what is the necessary action?

__________________________________________________________________
__________________________________________________________________
Air Conditioning Compressor Service

Meets NATEF Task: (A7-B-2, A7-B-3, A7-B-6) Inspect and replace A/C compressor drive belt(s); determine necessary cause. (P-1, P-2, P-1)

Name _______________________________   Date ___________   Time on Task ____________

Make/Model/Year _____________________   VIN ________________   Evaluation: 4 3 2 1

____ 1. Check service information and list the inspection and replacement procedures for the A/C compressor drive belt clutch and replacement. ___________________________

_________________________________________________________________

_________________________________________________________________

____ 2. What is the specified method to use to determine the quantity of refrigerant oil? _____

_________________________________________________________________

_________________________________________________________________

____ 3. Inspect lines and fittings (describe) ________________________________________

____ 4. Based on the inspection, what is the necessary action? _______________________

_________________________________________________________________
Refrigerant Oil Inspection

Meets NATEF Task: (A7-A-7, A7-A-8) Inspect condition of the refrigerant oil removed from the A/C system/ determine necessary action. (P-2, P-1)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Recover the refrigerant oil during the evacuation procedure.

_____ 2. How much oil was recovered? ______________

_____ 3. Visually check the condition of the oil. Describe the condition: _________________
                                                                                       ______________________________________________________________________
                                                                                       ______________________________________________________________________

_____ 4. What type of oil and viscosity is specified to be used?

   Type = __________________________________________
   Viscosity = _____________________________________

_____ 5. Based on your inspection, what is the necessary action? ________________________
                                                                                       ______________________________________________________________________
                                                                                       ______________________________________________________________________

---

[Image of refrigerant oil container]
## Refrigerant Handling Equipment

Meets NATEF Task: (A7-E-1) Perform correct use and maintenance of refrigerant handling equipment. (P-1)

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1. What brand and type of refrigerant handling equipment is being used (describe)?

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

2. Check the instructions for the equipment and list the maintenance items that should be performed.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

3. Check the instructions and describe how to properly use the refrigerant handling equipment.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
Inspect the Air Conditioning Condenser

Meets NATEF Task: (A7-B-7) Inspect A/C condenser for airflow restriction; perform necessary action. (P-1)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

1. Check service information on how to gain access to the front side of the condenser (describe what needs to be done).

2. What is the recommended method and/or tools needed to clean the condenser?

3. Based on the inspection, what is the necessary action?
Receiver/Drier Accumulator Drier

Meets NATEF Task: (A7-B-8) Remove, inspect, and reinstall drier assembly; determine required oil quantity. (P-1)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check service information for the procedure and tools needed to remove the drier assembly. __________________________________________________________
__________________________________________________________________
__________________________________________________________________

_____ 2. Check service information and determine the required amount of oil needed to be added to the system if the drier assembly is replaced. _________________ oz.

_____ 3. What was the condition of the removed drier assembly? ________________________
__________________________________________________________________
Replace Expansion Valve/Orifice Tube

Meets NATEF Task: (A7-B-9) Remove and install expansion valve or orifice tube. (P-1)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check service information for the exact procedures to follow when replacing the expansion valve or orifice tube. _____________________________________________
____________________________________________________________________
____________________________________________________________________

_____ 2. List the tools needed to perform the removal and installation of the expansion valve or orifice tube.
   a. ___________ d. ___________ g. ___________
   b. ___________ e. ___________ h. ___________
   c. ___________ f. ___________ i. ___________
Blower Motor Diagnosis

Meets NATEF Task: (A7-D-1) Inspect and test A/C blower motor and circuit; perform necessary action. (P-1)

Name _______________________________   Date ___________  Time on Task __________

Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

____ 1. Locate the blower motor schematic and determine the following information:
   A. Describe the location ___________________________________________
   B. Is the blower motor accessible from inside the vehicle or from under the hood?
   __________________________________________________________________
   C. List the wire colors and their gauge:
      Power = _____________________
      Ground = ___________________

____ 2. List the specified testing procedure: ____________
   ______________________________________
   ______________________________________

____ 3. How are the various speeds controlled?
   _____ Resistor pack
   _____ Electronic controller
   _____ Other (describe) _____________________________________________

____ 4. What fuse number (label) and amperage rating are used for the blower motor?
   A. Fuse number (label) ____________________________________________
   B. Fuse rating ____________________________________________

____ 5. Describe the location of the ground(s) for the blower motor circuit. ______________
   ___________________________________________________________________

____ 6. Measure the current draw of the blower motor on high speed.
   Amperage = ___________ (normal blower motor amperage draw is about 12-14 amperes)

____ 7. Based on the test results, what is the necessary action? ______________________________
A/C and Heater Controls
Meets NATEF Task: (A7-D-3, A7-D-4, A7-D-5) Inspect and diagnose malfunctions with HVAC controls. (P-2, P-3, P-3)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check for proper operation of the vacuum, mechanical, and electrical components and controls of the HVAC system. Describe the operation and/or faults detected.
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

_____ 2. Check the operation of the A/C heater control panel assembly. Describe the operation and/or faults detected.
_____________________________________________________________________

_____ 3. Check the operation of the AC heater control cables (if equipped) and motors. Describe the operation and/or faults detected.
_____________________________________________________________________

_____ 4. Based on the inspection, what is the necessary action? __________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________


Test and Replace Coolant

Meets NATEF Task: (A1-D-7) Test coolant; drain and recover coolant; flush and refill cooling system with recommended coolant; bleed air as required. (P-1)

Name _______________________________   Date ___________  Time on Task __________

Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

____ 1. Check service information for the recommended coolant testing, recover, flushing, and refilling procedures.

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

_____ 2. What is the recommended coolant? __________________________________________

_____ 3. Is the cooling system equipped with bleeder valves to help with bleeding trapped air from the cooling system when it is refilled?

____ No   ____ Yes (describe location) __________________________________________

__________________________________________________________________
Cooling System Inspection

Meets NATEF Task: (A7-C-1) Perform cooling system pressure tests; perform necessary action. (P-1)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____  1. Check the level of coolant in the coolant recovery tank. It should be between the “full hot” and “full cold” lines.

          OK_____     NOT OK_____

_____  2. After the engine has cooled, remove the radiator cap.

          CAUTION: Do not remove the radiator cap if the engine is hot. The coolant will explosively expand when the cap is removed which can cause severe burns to anyone near the vehicle.

          OK_____     NOT OK_____

_____  3. The coolant should be at the full level in the radiator.

          OK_____     NOT OK_____

_____  4. Check the freezing point and boiling point of the coolant.

          Freezing point = ___________  [should be -34° F (-36° C) or lower]
          Boiling point = ___________

          OK_____     NOT OK_____

_____  5. Pressure test the cooling system by installing a cooling system pressure tester and pump until the pressure is equal to the pressure cap value. Pressure should hold if there are no leaks.

          OK_____     NOT OK_____

_____  6. Test the radiator cap using the cooling system pressure tester with an adapter that fits the cap. The cap should hold its rated pressure.

          OK_____     NOT OK_____

_____  7. What is the necessary action?

________________________________________________________________________
Heating System Performance Check

Meets NATEF Task: (A7-A-1, A7-C-2) Diagnose temperature control problems; determine necessary action. (P-2)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _____________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check the front of the radiator and air-conditioning condenser for debris that could limit airflow. Clean as required.

   OK_____  NOT OK_____

_____ 2. Perform a thorough visual inspection of the cooling system. Look for hoses that may be leaking, cut, or swollen.

   OK_____  NOT OK_____

_____ 3. Start the engine and operate the heater and air-conditioning controls for proper operation including:

   defroster (airflow to windshield)   OK_____  NOT OK_____
   heater (airflow to floor)          OK_____  NOT OK_____
   A/C (airflow to vents)             OK_____  NOT OK_____
   blower motor on all speeds         OK_____  NOT OK_____  

_____ 4. Using an infrared pyrometer, measure the temperature of the upper radiator hose.

   Temperature = ________ (should be close to the same temperature as the thermostat rating)

   OK_____  NOT OK_____

_____ 5. Based on the test results, what is the necessary action? ________________________

_________________________________________________________________
Heater System Service

Meets NATEF Task: (A7-C-3, A7-C-4) Inspect and test heater control valve(s); perform necessary action. (P-2) / Remove heater core. (P-3)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check service information for the specified procedures to follow to test the heater control valves. ________________________________________________________
__________________________________________________________________
__________________________________________________________________

_____ 2. Based on the inspection of the heater control valve(s), what is the necessary action? ___________________________________
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________

_____ 3. Remove and install heater core as needed. ___________________________________
A/C Ducts and Doors

Meets NATEF Task: (A7-C-3, A7-D-6) Diagnose temperature control problems in the heating system and determine procedures. (P-2)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check the operation of the heating and ventilation system. Describe the operation and/or faults detected. __________________________________________________
_____________________________________________________________________
_____________________________________________________________________

_____ 2. Based on the inspection, what is the necessary action? _________________________
_____________________________________________________________________
_____________________________________________________________________


# HVAC Electrical Controls

**Meets NATEF Task:** (A7-D-1) Diagnose malfunctions in the HVAC electrical controls; determine necessary action. (P-2)

| Name _______________________________ | Date ___________ | Time on Task ________ |
| Make/Model/Year _________________ | VIN ________________ | Evaluation: 4 3 2 1 |

1. Check service information and describe the specified procedures to follow to diagnose HVAC electrical control faults.

2. Check all of the test equipment specified that is needed to diagnose HVAC electrical control faults.

   - **a. DMM**
   - **b. Scan tool**
   - **c. Special tester (describe)**
   - **d. Other (describe)**

3. After diagnosis following the specified procedures, what is the necessary action?

Automatic/Dual Climate System ID

Meets NATEF Task: (A7-A-2) Research vehicle and service information. (P-1)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check service information and identify the type of automatic or dual climate system
and check all that apply:
    _____ automatic system
    _____ dual climate system
    _____ semi-automatic system

_____ 2. Check service information and determine what sensors are being used and where they
are located.
    a. Ambient air temperature sensor; location ______________________________
    b. Evaporator outlet temperature sensor; location _________________________
    c. Passenger component temperature sensor; location ______________________
    d. Sunload sensor; location ___________________________________________
    e. Other (describe) ___________________; location _______________________

_____ 3. Describe the location of the other major components of the system.
    Compressor(s); location ______________________________________________
    Evaporator(s); location ______________________________________________
    Blower motor(s); location ____________________________________________
Automatic AC System Operation

Meets NATEF Task: (A7-A-9, A7-D-8) Check operation of automatic HVAC system; determine necessary action. (P-3)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _____________________   VIN ________________   Evaluation:   4    3    2    1

1. Check service information for the specified procedures to follow to inspect and test the A/C system operation. Describe the procedures. ___________________________
_________________________________________________________________
_________________________________________________________________

2. What test equipment was specified to test the A/C system operation? Check all that apply.
   a. DMM
   b. Scan tool
   c. Special tester (describe) __________________________
   d. Other (describe) __________________________

3. Based on the test results, what is the necessary action? __________________________
_________________________________________________________________
Hybrid Vehicle A/C System Precautions

Meets NATEF Task: (A7-B-4) Identify hybrid vehicle A/C system electrical circuits, service, and safety precautions. (P-3)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

1. Check service information for the vehicle manufacturer’s specified safety precautions regarding the A/C system electrical circuits, safety, and service.

A. Electrical circuit precautions:

___________________________________
___________________________________
___________________________________
___________________________________
___________________________________

B. Safety precautions: _____________________________________________

________________________________________________________
________________________________________________________

C. Service precautions: ______________________

____________________________________
____________________________________
____________________________________
____________________________________
____________________________________
Hybrid A/C System Circuits

Meets NATEF Task: (A7-B-4) Identify hybrid vehicle A/C system circuits and safety precautions. (P-3)

Name _______________________________   Date ___________  Time on Task __________

Make/Model/Year _________________   VIN ________________   Evaluation:  4  3  2  1

____ 1. Check service information for the specified A/C system electrical circuits precautions.

__________________________________________________________________

__________________________________________________________________

____ 2. What is the part number of the specified refrigerant oil that should be used when servicing the air conditioning system?

__________________________________________________________________

____ 3. List the A/C service procedures that can be performed. ____________________________

__________________________________________________________________

__________________________________________________________________
# Inspect A/C Compressor Drive Belt

Meets NATEF Task: (A7-B-1) Inspect and replace A/C compressor drive belts, pulleys, and tensioner; determine necessary action. (P-1)

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**Make/Model/Year** ________________  **VIN** ________________  **Evaluation:**  4  3  2  1

1. Check service information for the specified procedure to follow to inspect and replace the A/C compressor drive belt, pulleys, and tensioners. Describe the specified procedures.

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

2. Describe the condition of the following items:
   - A/C compressor drive belt ________________________________
   - A/C compressor drive belt pulleys __________________________
   - A/C compressor drive belt tensioners _______________________

3. Based on the inspection, what is the necessary action?

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
**Check A/C Condenser for Airflow Restriction**

Meets NATEF Task: (A7-B-3) Inspect A/C condenser for airflow restrictions; perform necessary action. (P-1)

| Name: _______________________________ | Date: ___________ | Time on Task: __________ |
| Make/Model/Year: _________________ | VIN: ________________ | Evaluation: 4 3 2 1 |

1. Check service information for the specified procedure to follow to get access to the condenser for inspection. Describe the procedure. ____________________________________
   
2. The specified procedure includes (check all that apply):
   - Hoisting the vehicle
   - Removing the grille
   - Removing the air dam
   - Other (specify) ____________________________________________

3. What is the specified method to use to clean the condenser? ____________________
   
4. Based on the inspection, what is the necessary action? _________________________
   
---

![Image of A/C condenser]
Cooling and Heater Hose Inspection
Meets NATEF Task: (A7-C-1) Inspect engine cooling and heater system hoses; perform necessary action. (P-1)

Name _______________________________   Date ___________   Time on Task _________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

1. Check service information for specified procedures to follow for inspecting engine cooling and heater system hoses. Describe specified procedure. ________________
____________________________________________________________________
____________________________________________________________________

2. The specified inspection procedure includes the following (check all that apply).
   ____ Visual inspection
   ____ Pressure testing the cooling system
   ____ Other (describe) _______________________________________________

3. Based on the inspection, what is the necessary action? _________________________
_____________________________________________________________________
_____________________________________________________________________


Inspect Cabin Filter and A/C Ducts

Meets NATEF Task: (A7-D-1) Inspect A/C-heater ducts, doors, hoses, cabin filter, and outlets; perform necessary action. (P-1)

Name _______________________________   Date ___________   Time on Task __________

Make/Model/Year _________________   VIN ________________   Evaluation:  4    3    2    1

_____ 1. Check service information for the specified procedure to follow to inspect the airflow ducts and cabin filter. Describe the specified procedure. _______________________
_____________________________________________________________________

_____ 2. Describe the location of the cabin filter: _____________________________________
_____________________________________________________________________

_____ 3. Check for proper airflow from the following vents (both left and right):
   • Defroster          OK ___  NOT OK ___
   • Heater (floor vents)  OK ___  NOT OK ___
   • Dash vents          OK ___  NOT OK ___

_____ 4. Based on the inspection, what is the necessary action? _________________________
_____________________________________________________________________
_____________________________________________________________________
Identify Source of A/C Odors

Meets NATEF Task: (A7-D-2) Identify source of A/C odors. (P-1)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check service information for the specified procedure to follow to determine and correct A/C system odors. Describe the specified procedure. ___________________

_____________________________________________________________________
_____________________________________________________________________

_____ 2. Odors are usually caused by moisture and the growth of mold, mildew, fungi, bacteria, as well as odors from food or smoking residue. The specified treatment includes (check all that apply).

____ Use of a deodorizer

____ Installation of an “after blow” kit that keeps the blower motor operating for several minutes after the engine has been stopped to dry out the evaporator.

____ Other (specify) _______________________________________________
Hybrid Vehicle A/C System Precautions

Meets NATEF Task: (A7-B-1-2) Identify hybrid vehicle A/C system electrical circuits, service, and safety precautions. (P-3)

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1. Check service information for the vehicle manufacturer’s specified safety precautions regarding the A/C system electrical circuits, safety, and service.

   A. Electrical circuit precautions:

      _____________________________________
      _____________________________________
      _____________________________________
      _____________________________________
      _____________________________________

   B. Safety precautions: _____________________________________________
      _____________________________________________________________
      _____________________________________________________________

   C. Service precautions: ______________________
      ______________________________________
      ______________________________________
      ______________________________________
      ______________________________________
      ______________________________________
Identify and Recover Refrigerant

Meets NATEF Task: (A7-E-1, A7-E-2) Identify and recover the air conditioning system refrigerant. (P-1)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year ____________________   VIN ________________   Evaluation:   4    3    2    1

____ 1. Check the instructions for the refrigerant identifying unit and describe the recommended procedure.  ______________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________

____ 2. What did the identifying unit indicate was in the A/C system? _____________________

   CAUTION: If contaminated, do not recover the refrigerant unless a separate container is used for the contaminated refrigerant.

____ 3. Following the equipment manufacturer’s instructions, recover the A/C system refrigerant.

____ 4. How much refrigerant was recovered? ____________

____ 5. How much oil was recovered? _________________
Recycle Refrigerant

Meets NATEF Task: (A7-E-3) Recycle the refrigerant. (P-1)

Name _______________________________   Date ___________  Time on Task _________

Make/Model/Year _________________   VIN ________________   Evaluation:  4  3  2  1

_____ 1. Check the operating instructions for the recycling machine and describe the procedures specified. _______________________________________________________________

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

_____ 2. How many ounces were recycled? ________________

_____ 3. What cautions or warnings were included in the instructions? ________________

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
Evacuate and Charge A/C System

Meets NATEF Task: (A7-E-4) Evacuate and charge air conditioning system. (P-1)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _____________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check the underhood decal or A/C pressure fittings to verify the type of refrigerant that should be in the system. CFC-12 ___  HFC-134a ___  other ______________

_____ 2. Connect an A/C refrigerant identification to the fitting and determine the type of refrigerant that is in the system. CFC-12 ___  HFC-134a ___  other ____________
(Do not proceed with the recovery unless the refrigerant is properly identified.)

_____ 3. Connect the hoses from the recovery unit to both the high-side and low-side fittings.

_____ 4. Recover the refrigerant and note the amount of refrigerant oil that was removed from the system. Amount of refrigerant oil recovered = ________________

_____ 5. Repair any leaks in the system and/or replace any failed component.

   NOTE: Most vehicle manufacturers recommend replacing the accumulator or receiver drier if the system has been open for any length of time or if the compressor has failed.

_____ 6. Evacuate the system to a vacuum of at least 27” Hg (best if 29” Hg) for at least 45 minutes.

   Lowest vacuum level reached = _____  Time spent evacuating = ______

_____ 7. Recharge the system with the specified amount of refrigerant.

_____ 8. Start the engine and check the high-side and the low-side pressures:

   low-side pressure = ___________  high-side pressure = ___________

_____ 9. Check the temperature of the air from the center air-conditioning vent.

   Air temperature = ______ [should be 35° - 45° F (2° - 7° C)]

   OK_____        NOT OK______
Air-Conditioning System Performance Test

Meets NATEF Task: (A7-A-1, A7-A-3) Performance test the A/C system and diagnose using principles of refrigeration. (P-1)

Name _______________________________   Date ___________   Time on Task __________

Make/Model/Year _____________________   VIN ________________   Evaluation:   4    3    2    1

NOTE: This test procedure is best performed when the temperature is above 70° F (21° C).

____  1. Start the engine, turn the air conditioning to maximum cooling, open the doors and windows, and increase engine speed to about 1500-2000 RPM.

____  2. Turn the blower motor to high speed.

____  3. Measure the temperature of the air at the air-conditioning vent in the center of the dash.

    Temperature = ______  [should be 35° - 45° F (2° - 7° C)]

    OK_____       NOT OK_____

____  4. Stop the engine and visually inspect the condition of the air-conditioning compressor drive belt (accessory drive belt).

    OK_____       NOT OK_____

____  5. Visually check for any signs of leaking refrigerant oil that could indicate a refrigerant leak.

    OK_____       NOT OK_____
Air Conditioning Noise Diagnosis

Meets NATEF Task: (A7-A-4) Diagnose abnormal operating noise; determine necessary action. (P-2)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check service information for the suggested method and procedures to follow when diagnosing abnormal noise concerns (describe procedure): ______________________
__________________________________________________________________
__________________________________________________________________

_____ 2. Describe the noise (check all that apply):

   _____ a. Under the hood
   _____ b. Inside the passenger compartment
   _____ c. Wind noise
   _____ d. Rattle
   _____ e. Shriek
   _____ f. Squeal
   _____ Other (describe): _____________________________________________

_____ 3. After diagnosis of the noise using the recommended procedures, what is the necessary action?
__________________________________________________________________
__________________________________________________________________
__________________________________________________________________
Refrigerant Identification/Read Pressures

Meets NATEF Task: (A7-A-5) Identify refrigerant type; connect the gauges and read the pressures. (P-1)

Name _______________________________   Date ___________   Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Read, understand, and follow the instructions for the refrigerant identification machine and determine the type of refrigerant in the system.

   Type: __________________________________________________________

   Contaminated?  Yes ____    No ____  If yes, state the results of the test:

   ____________________________________________________________________

_____ 2. Connect the gauges as per the equipment manufacturer’s instructions:

   Low pressure = ______________

   High pressure = ______________
## Leak Test the Air Conditioning System

**Meets NATEF Task:** (A7-A-6) Leak test the air conditioning system; determine necessary action. (P-1)

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1. Check service information and describe the leak detection recommended by the vehicle manufacturer. ____________________________________________________________________________

2. What type(s) of leak detection tools or equipment was used (describe)? _______________________________________________________________________

3. Was a leak detected? Yes ____ No ____ If yes, describe the location: _______________________________________________________________________

4. Based on the test results, what is the necessary action? _______________________________________________________________________

![Image of a vehicle engine with a leak detection tool]
Determine Need for Refrigerant Filter

Meets NATEF Task: (A7-B-5) Determine the need for an additional A/C system filter; perform necessary action. (P-3)

Name _______________________________   Date ___________   Time on Task __________

Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check service information and determine when the vehicle manufacturer recommends the installation of an additional filter in the refrigerant system.  

__________________________________________________________________  

__________________________________________________________________

_____ 2. Check aftermarket information and determine when an additional filter is recommended to be installed.  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________

_____ 3. Where is an additional filter installed? (describe the location)  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________

_____ 4. Why is the filter installed in this location?  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________

_____ 5. What was the necessary action?  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________  

__________________________________________________________________
AC System Performance Check

Meets NATEF Task: (A7-B-11) Perform test of air conditioning system. (P-1)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

NOTE: This test procedure is best performed when the temperature is above 70° F (21° C).

_____  1. Start the engine, turn the air conditioning to maximum cooling, open the doors and windows, and increase engine speed to about 1500-2000 RPM.

_____  2. Turn the blower motor to high speed.

_____  3. Measure the temperature of the air at the air-conditioning vent in the center of the dash.

   Temperature = ______ [should be 35° - 45° F (2° - 7° C)]

   OK_____    NOT OK_____

_____  4. Stop the engine and visually inspect the condition of the air-conditioning compressor drive belt (accessory drive belt).

   OK_____    NOT OK_____

_____  5. Visually check for any signs of leaking refrigerant oil that could indicate a refrigerant leak.

   OK_____    NOT OK_____
Air Conditioning Control System Diagnosis

Meets NATEF Task: (A7-D-3) Diagnose faults in the A/C, HVAC system; determine necessary action. (P-2)

Name _______________________________   Date ___________  Time on Task __________

Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____  1. Check service information and describe the tests specified to diagnosis faults in the vacuum, mechanical, and electrical controls of the heating, ventilation, and air conditioning system (describe the tests). ____________________________________

__________________________________________________________________

__________________________________________________________________

_____  2. What test equipment was specified to be used in the diagnosis of faults in the vacuum, mechanical, and electrical HVAC system? Check all that apply.

_____ a. Hand-operated vacuum pump

_____ b. DMM

_____ c. Scan tool

_____ d. Other (describe) ___________________________________________

_____  3. After diagnosing the HVAC system, what is the necessary action? _______________

__________________________________________________________________

__________________________________________________________________
Identify Source of A/C System Odors

Meets NATEF Task: (A7-D-7) Identify the source of A/C system odors. (P-1)

Name _______________________________   Date ___________  Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check the vehicle for odors that are noticeable when the A/C system is operating.
   Describe the odor. ________________________________________________________________
   ______________________________________________________________________________

_____ 2. Check service information for the specified procedure to follow to eliminate the
   source of the odor. Describe the specified procedure. ________________________________
   ______________________________________________________________________________
   ______________________________________________________________________________
Evaporator Housing Drain

Meets NATEF Task: (A7-B-10) Inspect evaporator housing water drain; perform necessary action. (P-3)

Name _______________________________ Date ___________ Time on Task __________
Make/Model/Year _________________ VIN ________________ Evaluation: 4 3 2 1

_____ 1. Check service information to determine what the customer concern would be if the evaporator drain were clogged. ________________________________________________

__________________________________________________________________

__________________________________________________________________

_____ 2. Check service information and determine the location of the evaporator drain (describe the location). ____________________________________________________

__________________________________________________________________

_____ 3. Inspect the drain. Was it clogged? Yes ____ No ____

_____ 4. Based on the inspection, what is the necessary action? ____________________________

__________________________________________________________________
Evaporator/Heater Core Replacement

Meets NATEF Task: (A7-B-12A7-C-4) Remove, inspect, and reinstall evaporator; determine required oil quantity. (P-3)

Name _______________________________   Date ___________   Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check service information and determine the specified procedures to follow to replace the evaporator. (list the procedures)
   a. ___________   d. ___________   g. ___________
   b. ___________   e. ___________   h. ___________
   c. ___________   f. ___________   i. ___________

_____ 2. Check service information and determine the amount of oil needed to add to the system when replacing the component.
   Oil amount = __________ oz.
Condenser Replacement

Meets NATEF Task: (A7-B-13) Remove, inspect, and replace condenser; determine required oil quantity. (P-3)

Name ______________________________   Date ___________   Time on Task __________
Make/Model/Year _________________   VIN ________________   Evaluation:   4    3    2    1

_____ 1. Check service information and determine the specified procedures to follow to replace the condenser. (list the procedures)
   a. ___________     d. ___________     g. ___________
   b. ___________     e. ___________     h. ___________
   c. ___________     f. ___________     i. ___________

_____ 2. Check service information and determine the amount of oil needed to add to the system when replacing the component.
   Oil amount = __________ oz.
## Inspect Belts and Hoses

**Meets NATEF Task:** (A7-B-1) Inspect engine cooling and heating system hoses and belts; perform necessary action. (P-1)

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|   | 4 | 3 | 2 | 1 |

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1. Check service information for the procedures and specifications for determining the condition of belts and hoses.

2. Describe the condition of the heater hoses.

3. Describe the condition of the radiator hoses.

4. Describe the condition of the drive belt(s).

5. Based on the inspection results, what is the necessary action?