Learning Objectives

- Visually inspect a heating and air conditioning system and locate obvious troubles.
- Diagnose common heating and air conditioning problems.
- Describe the functions and uses of air conditioning test equipment.
- Locate air conditioning and heating system leaks.
- Explain how to replace major heating and air conditioning components.
- Describe the general procedures for evacuating and charging an air conditioning system.
- Demonstrate safe working practices when servicing heating and air conditioning equipment.
Air Conditioning System Problems

- Internal compressor problems
- Inoperative compressor clutch
- Porous hose leaking
- Loose or missing drive belt
- Condenser fins clogged with debris
- Leaking condenser
- Inoperative blower motor
- Leaking evaporator
- Bad thermostat
- Clogged or contaminated drier
- Fittings leaking
- Stuck expansion valve
- Gagged water drain
Chapter 76

1. Electronic Leak Detectors locate refrigerant leaks by producing a sound or light signal.

2. A/C System Evacuation uses a vacuum pump to remove air and moisture from the inside of the A/C system.
Air Conditioning System

Leak Detectors

Ultra-Violet Leak Detector

Electronic Leak Detector
Electronic Leak Detector

-produces a sound or light signal when refrigerant is detected
Leak Detection

Probing with an electronic leak detector
Equipment Connections
Evacuating the System
Chapter 76

3. A Bubbling Sight Glass indicates the A/C system is low on refrigerant and that air is in the system.

4. A Cloudy Sight Glass may indicate the drying agent in the receiver-drier or accumulator has broken down and is circulating through the system.
Sight glass may be in the top of the receiver-drier or in the line
Chapter 76

5. A Schrader Type Service Valve is a spring-loaded valve, similar to the air valve in a tire.

6. Pressure Gauge Assembly typically consists of two pressure gauges, a manifold, two on-off valves, and three service hoses.
Schrader Service Valve

Depressor in the service hose opens the spring-loaded valve
Attach the quick-connect fitting using the sleeve, then tighten the thumb screw to depress the valve.
Pressure Gauge Assembly
7. A Performance Test indicates A/C system condition by measuring system pressures with the engine running.

8. An AC Charging Station usually contains a vacuum pump, pressure gauge set, oil injection cylinder, and a charging tank of refrigerant.
Temperature/Pressure Chart, Note Higher Temperatures Result in Higher AC System Pressures
Testing a Thematic Switch/Sensor

Diagram showing a Thematic Switch connected to an Ohmmeter, a capillary tube filled with ice water, and a thermometer.
AC Charging Station

Refrigerant can be recovered, recycled, then charged back into the system when repairs are completed and usually contains a vacuum pump, pressure gauge set, oil injection cylinder, and a charging tank of refrigerant.
9. A Stem Type Service Valve is a manually opened and closed by screwing the valve stem in or out.

10. An Oil-Streaked Sight Glass denotes low refrigerant level, which is allowing excessive compressor oil to circulate through the system.
Stem-Type Valve

Manual valve that is opened and closed by screwing the valve stem in or out
Servicing a Fitting

Tighten leaking fittings using a torque wrench and retest for leaks. Replace the hose or line if needed.
Clutch Diagnosis

Check for voltage and ground at the clutch connector
Clutch Diagnosis

Power the clutch through a jumper wire—clutch plate and pulley should lock together.
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