AUTOMOTIVE Youth Educational Systems YES
The Passport to a Rewarding Automotive Career

ASE CERTIFIED

Modern Automotive Technology Chapter 76

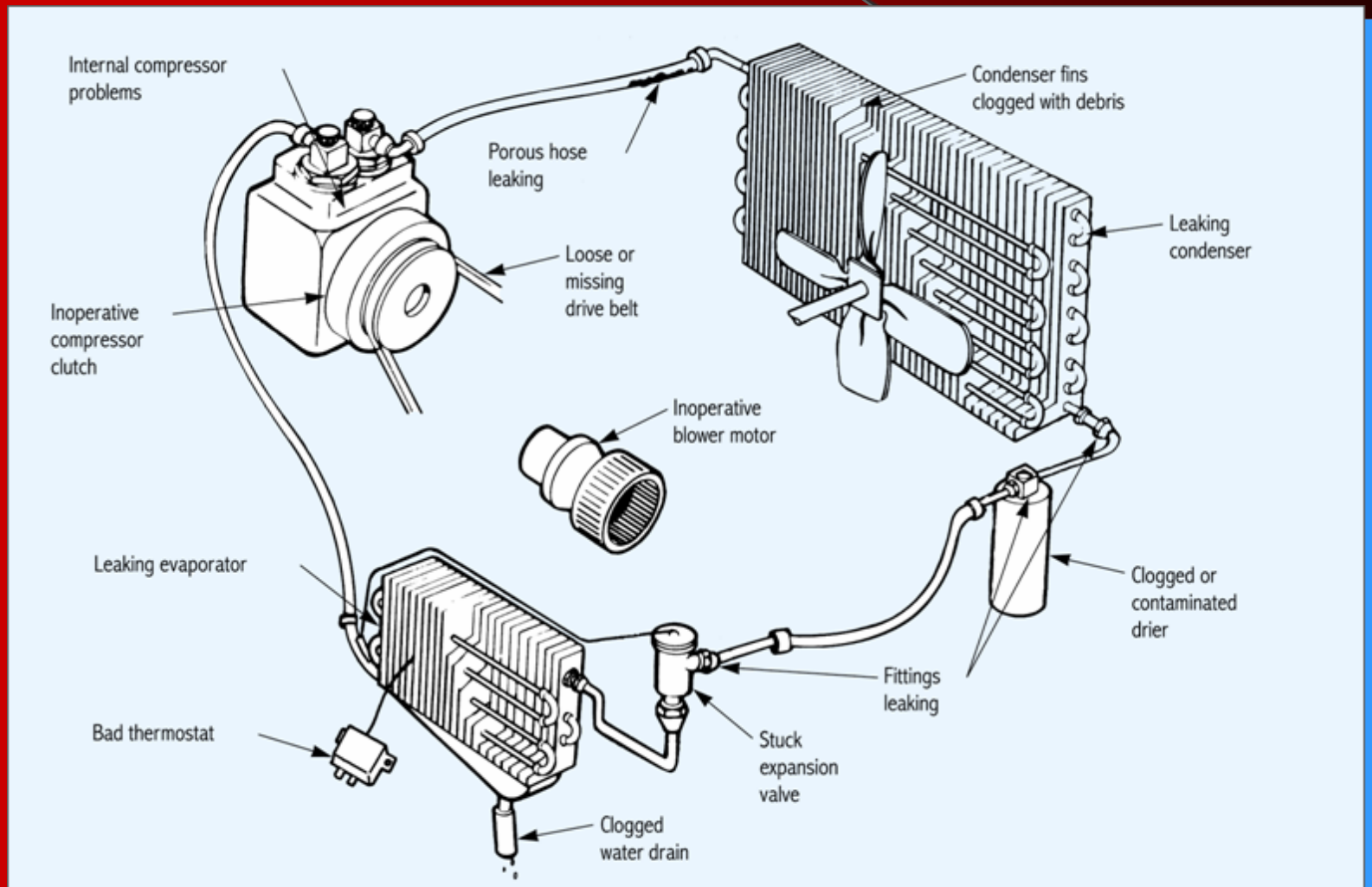
Heating and Air Conditioning Service

North Montco Technical Career Center

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



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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

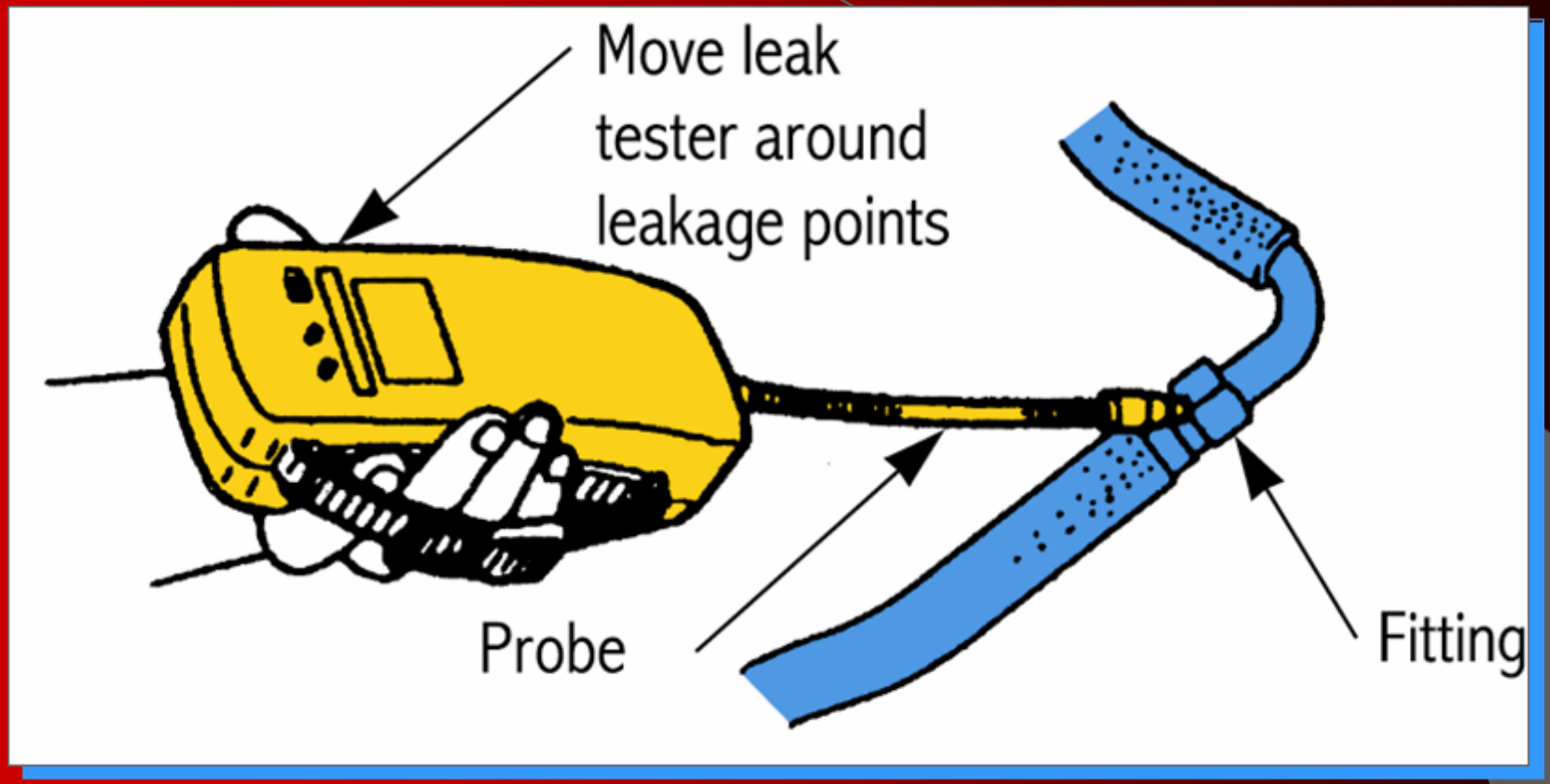
Ultra-Violet

Leak Detector

Electronic

Leak Detector

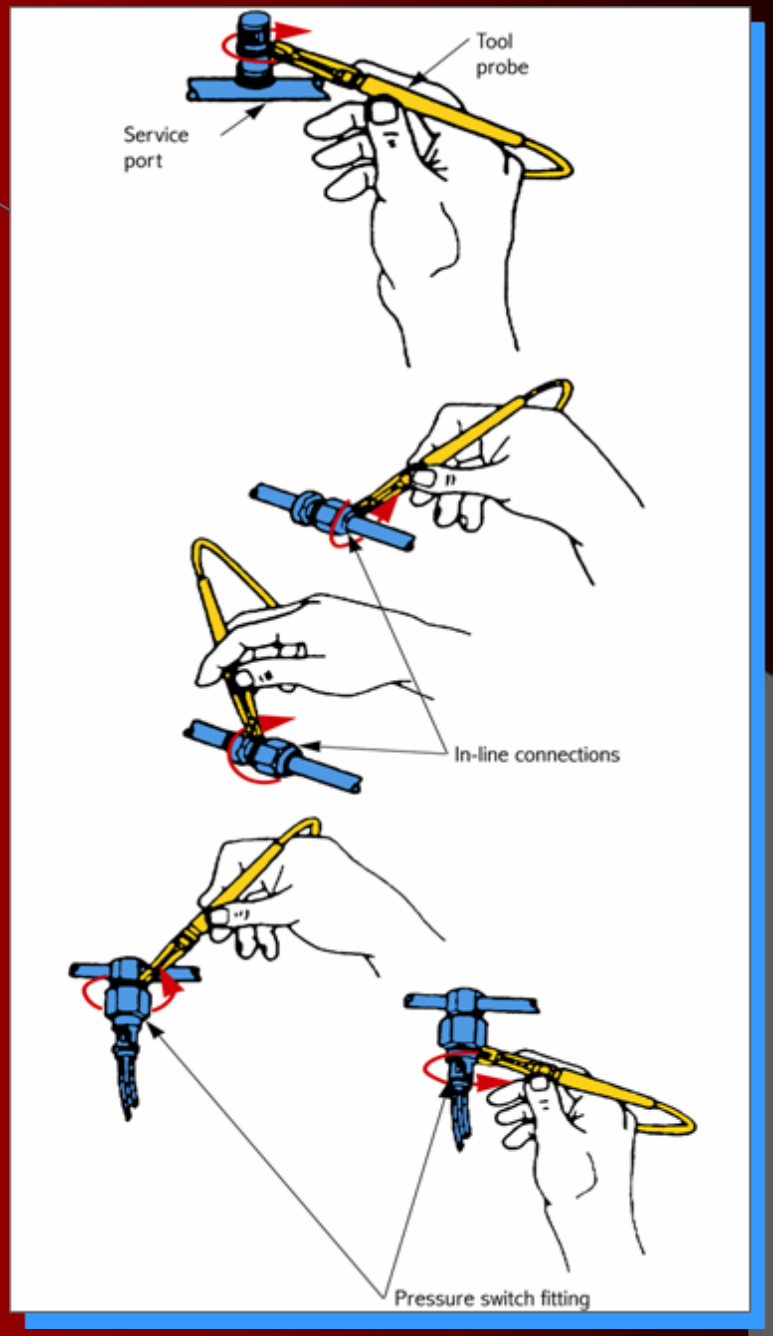
Electronic Leak Detector



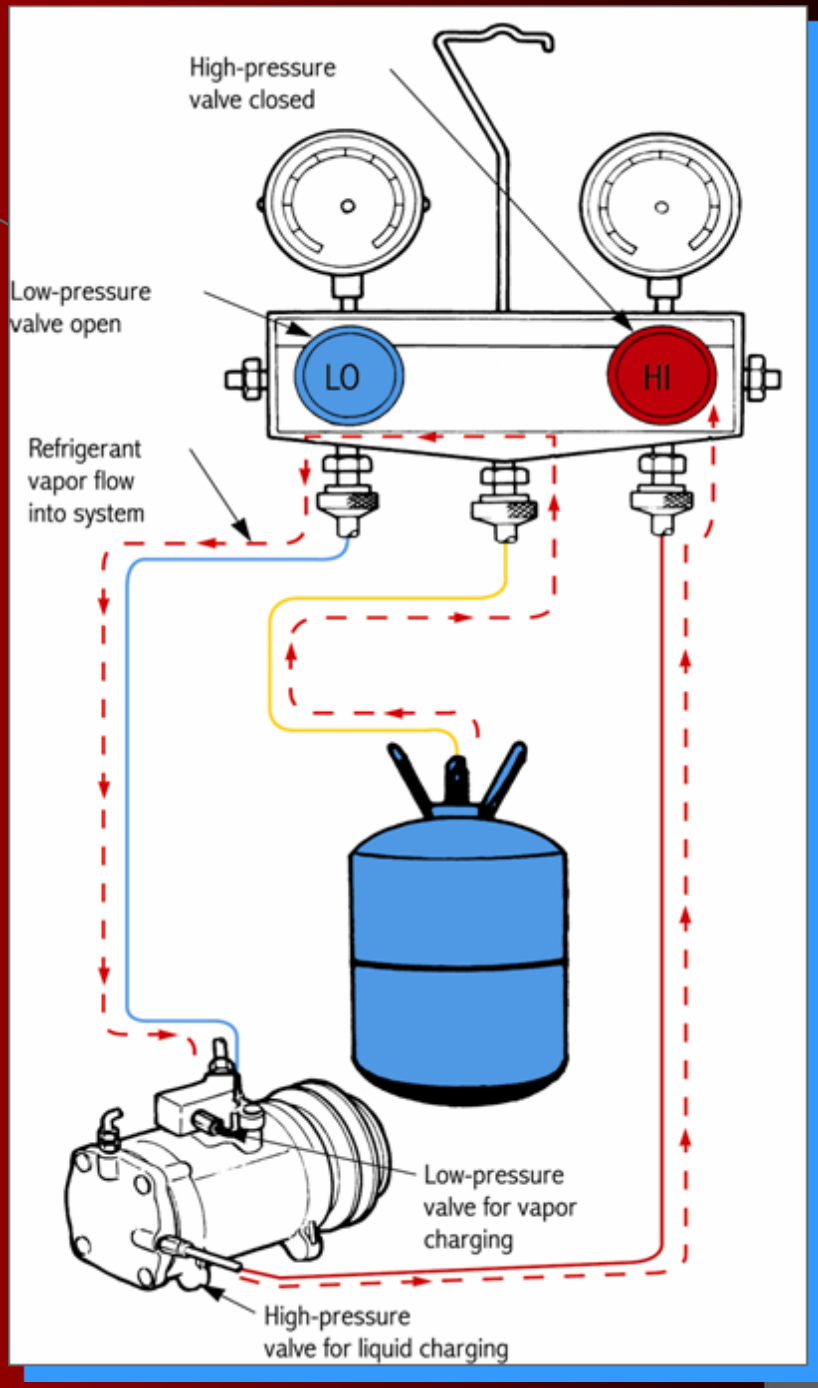
Produces a sound or light signal when refrigerant is detected

Leak Detection

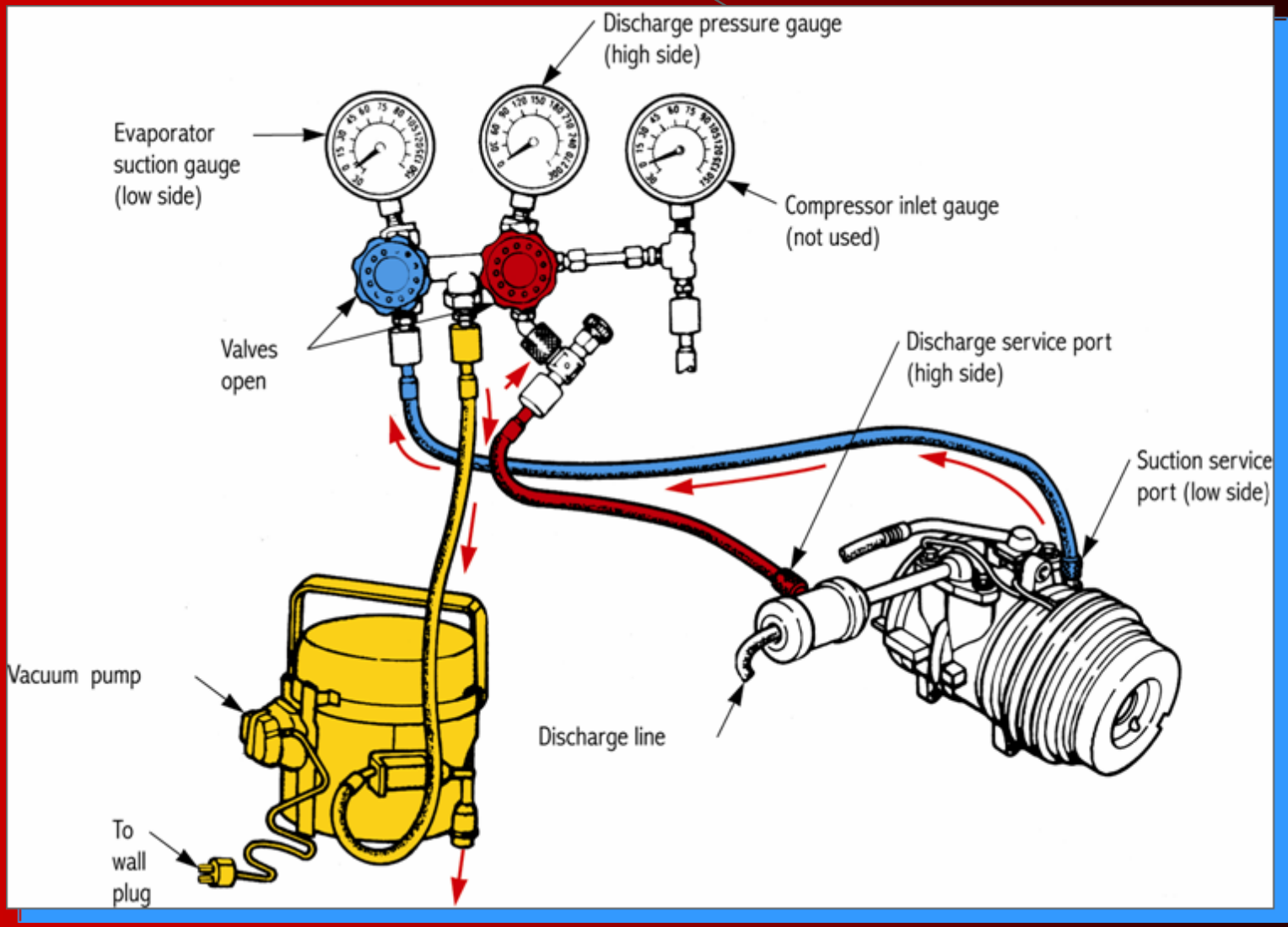
Probing with an electronic leak detector



Equipment Connections



Evacuating the System



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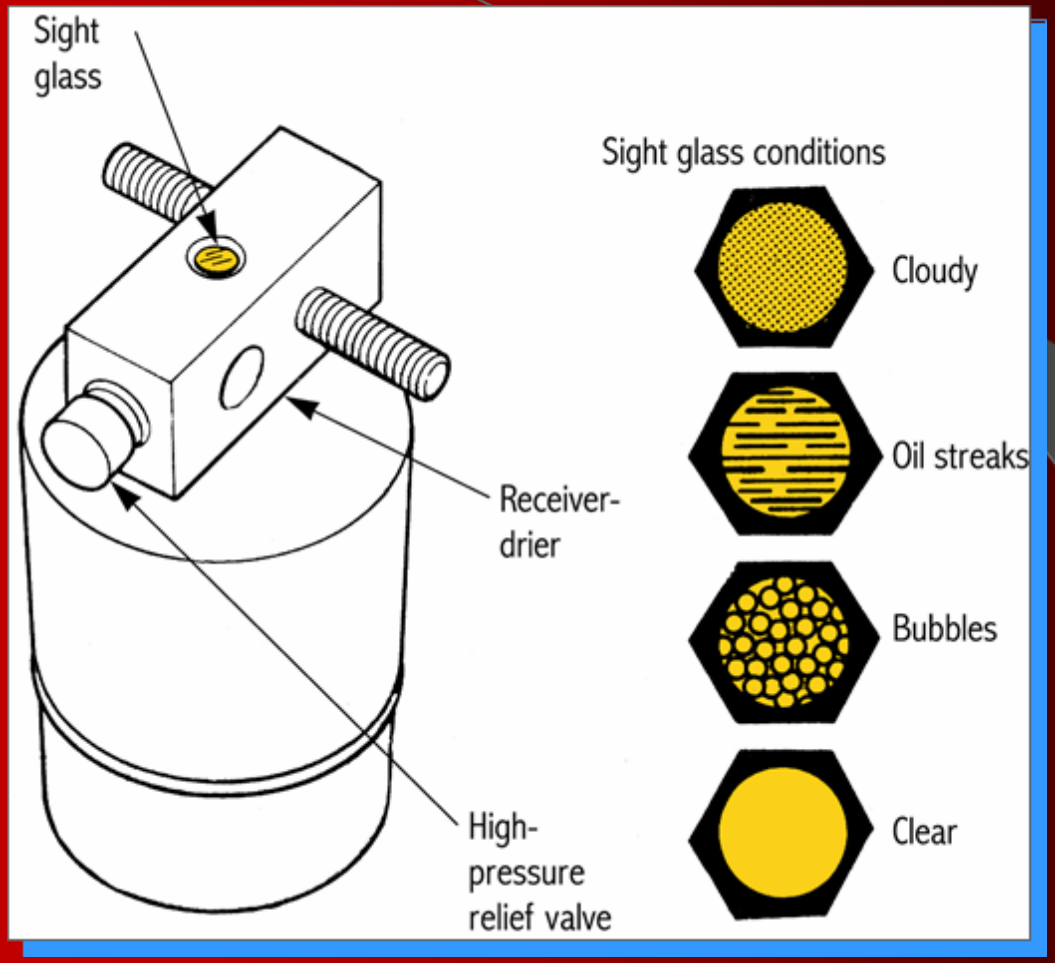
3. A Bubbling Sight Glass indicates the A/C system is low on refrigerant and that air is in the system.

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 Inspection



Sight glass may be in the top of the receiver-drier or in the line

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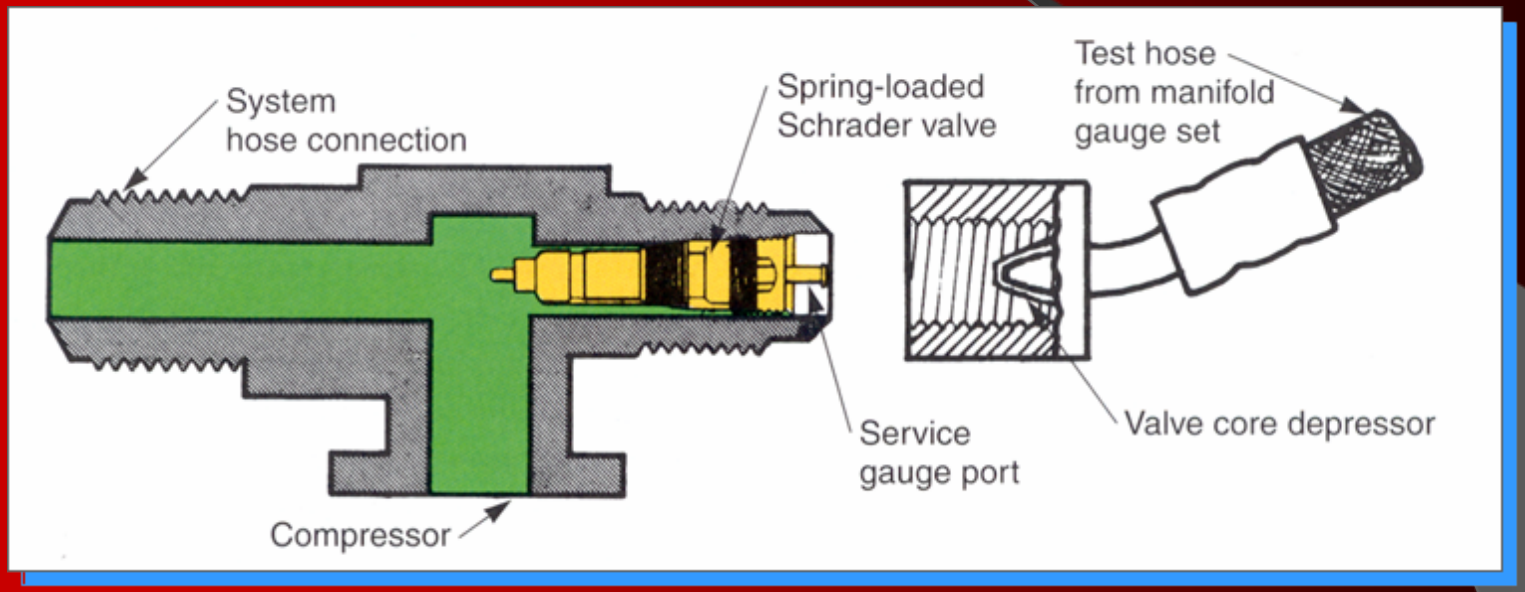
5. A Schrader Type Service Valve is a spring-loaded valve, similar to the air valve in a tire.

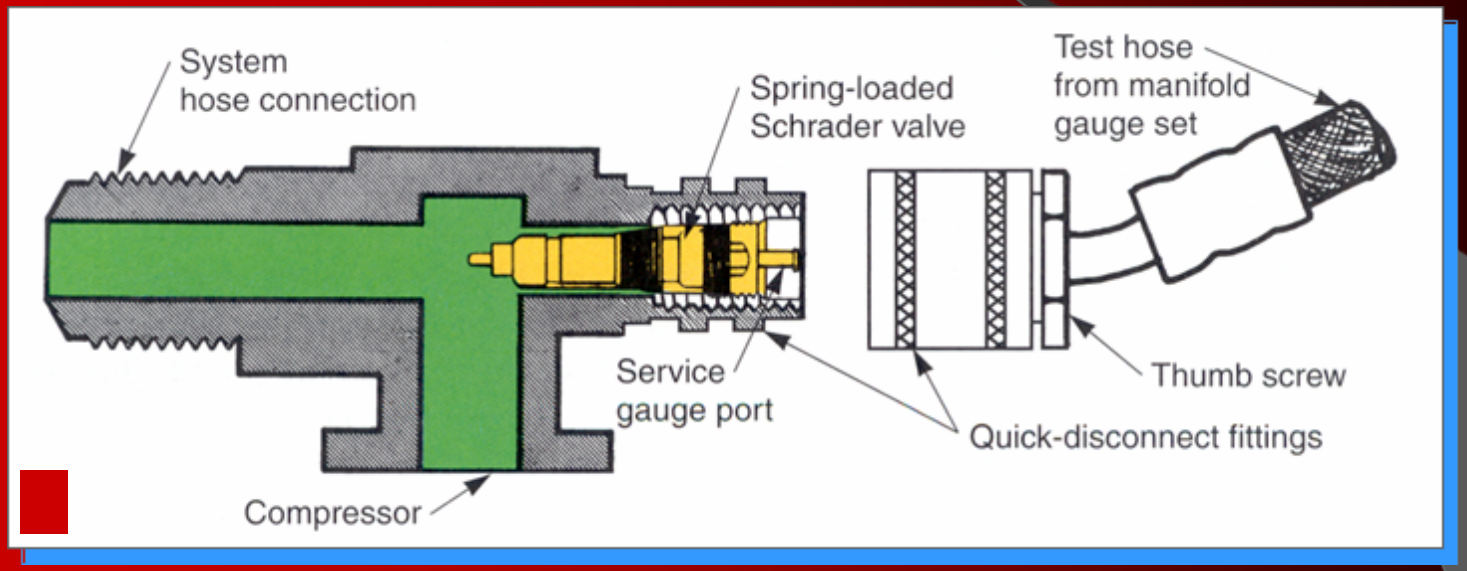
6. Pressure Gauge Assembly typically consists of two pressure gauges, a manifold, two on-off valves, and three service hoses.

Schrader Service Valve



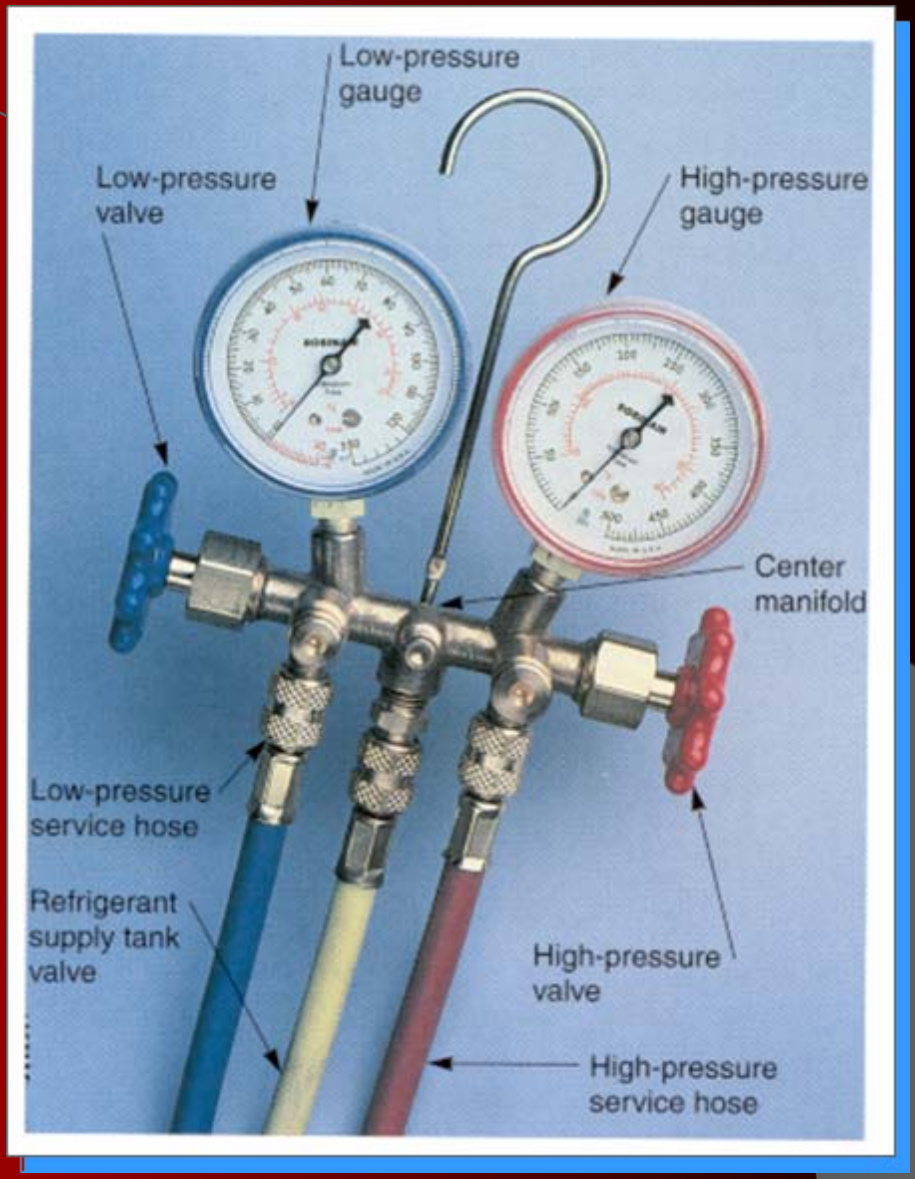
Depressor in the service hose opens the spring-loaded valve

R-134a Service Valve



Attach the quick-connect fitting using the sleeve, then tighten the thumb screw to depress the valve

Pressure Gauge Assembly



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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.

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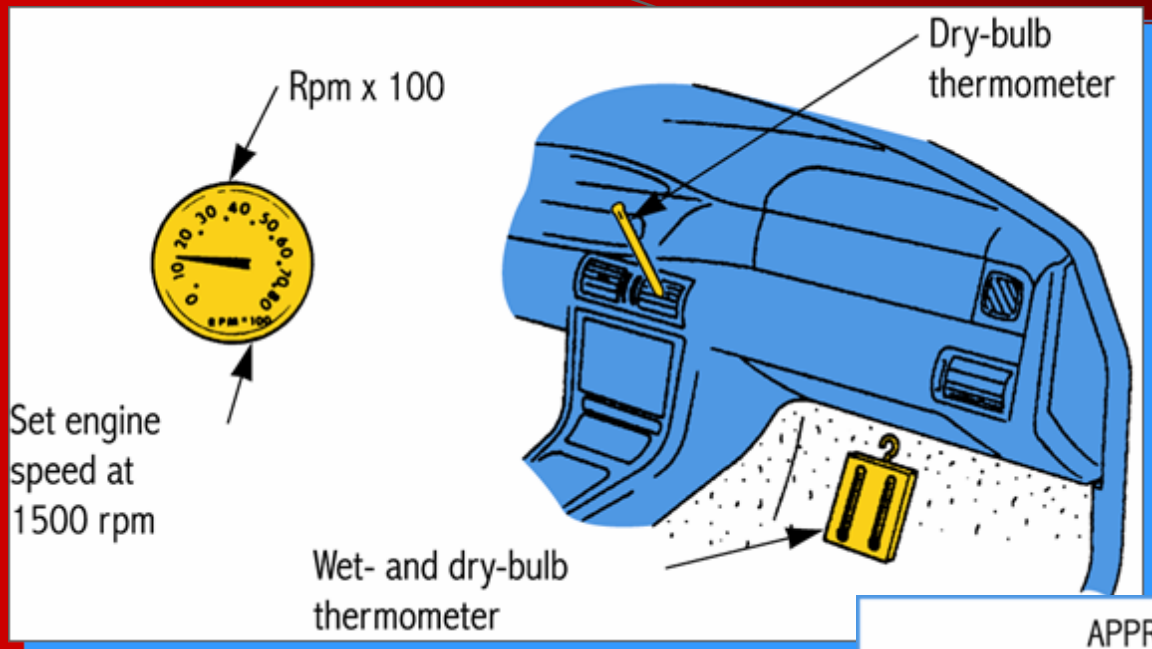
Performance Test

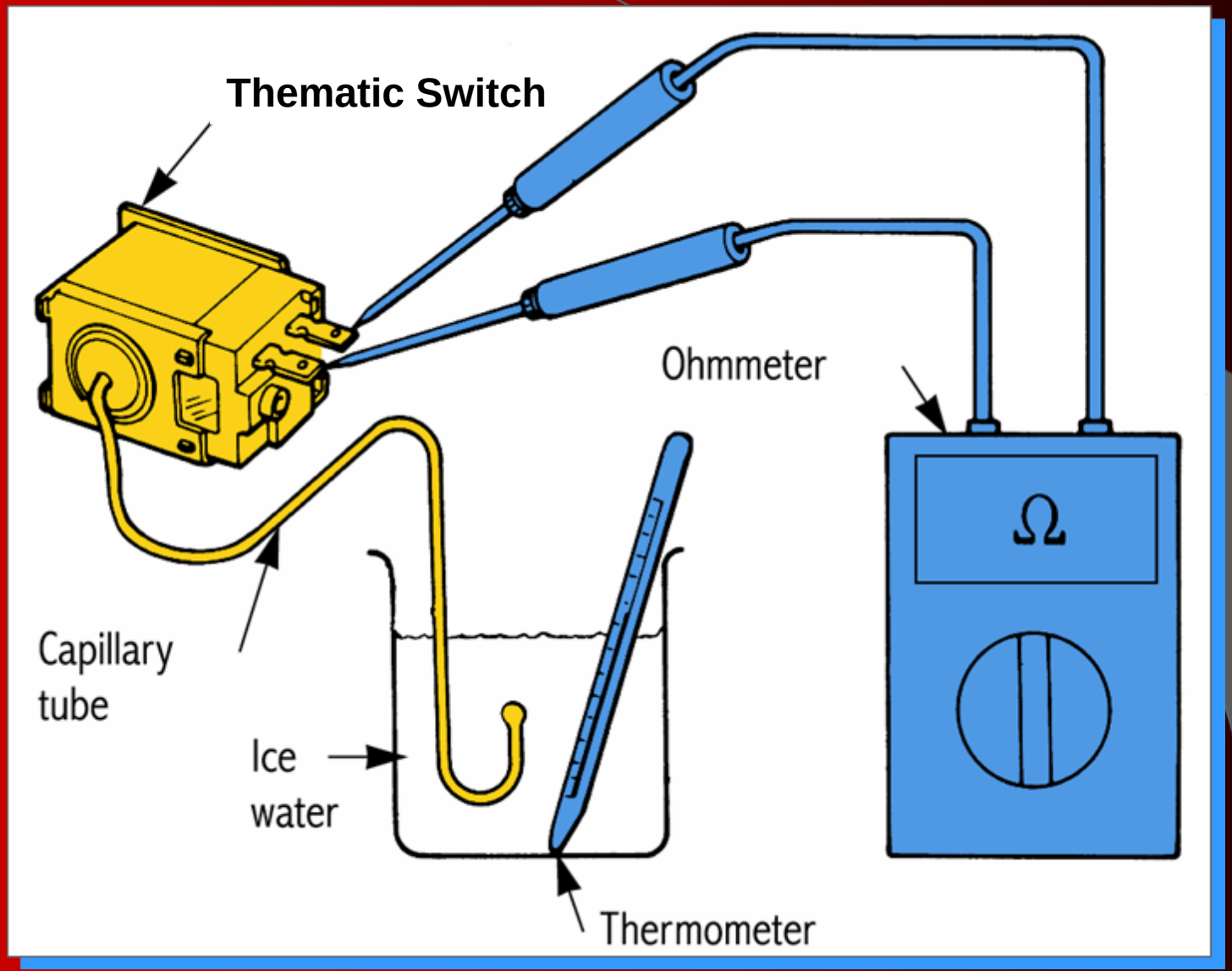


Temperature/Pressure Chart, Note Higher Temperatures Result in Higher AC System Pressures

APPROXIMATE TEST PRESSURE RANGES FOR NORMAL FUNCTIONING SYSTEMS

Outside temperatures	High-side pressures	Low-side pressures		
Ambient temperature in front of condenser	Psi at high pressure test fitting	Psi with STV, POA or VIR systems	Psi with expansion valve systems	Psi with orifice tube systems
60 F	120-170	28-31	7-15	–
70 F	150-250	28-31	7-15	24-31
80 F	180-275	28-31	7-15	24-31
90 F	200-310	28-31	7-15	24-32
100 F	230-330	28-35	10-30	24-32
110 F	270-360	28-38	10-35	24-32

Testing a Thematic Switch/Sensor



AC Charging Station

Refrigerant can be recovered, recycled, then charged back into the system when repairs are completed and include and usually contains a vacuum pump, pressure gauge set, oil injection cylinder, and a charging tank of refrigerant.

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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.

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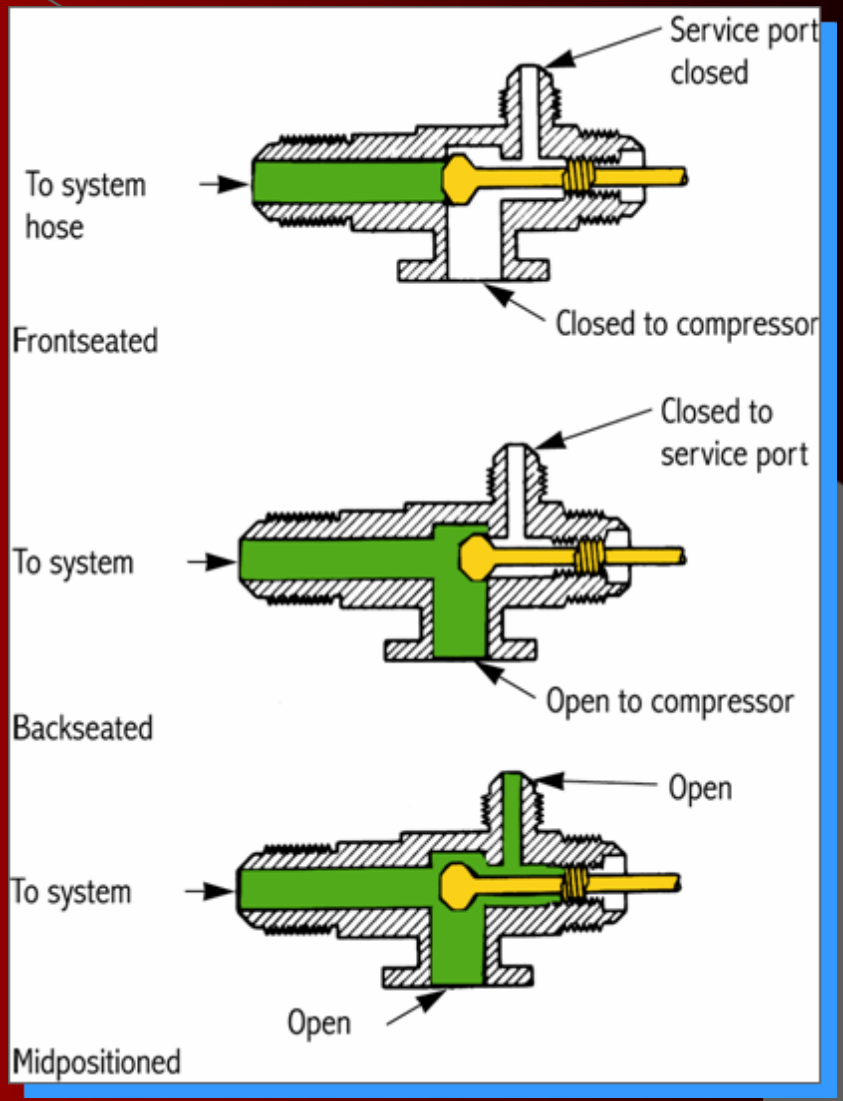
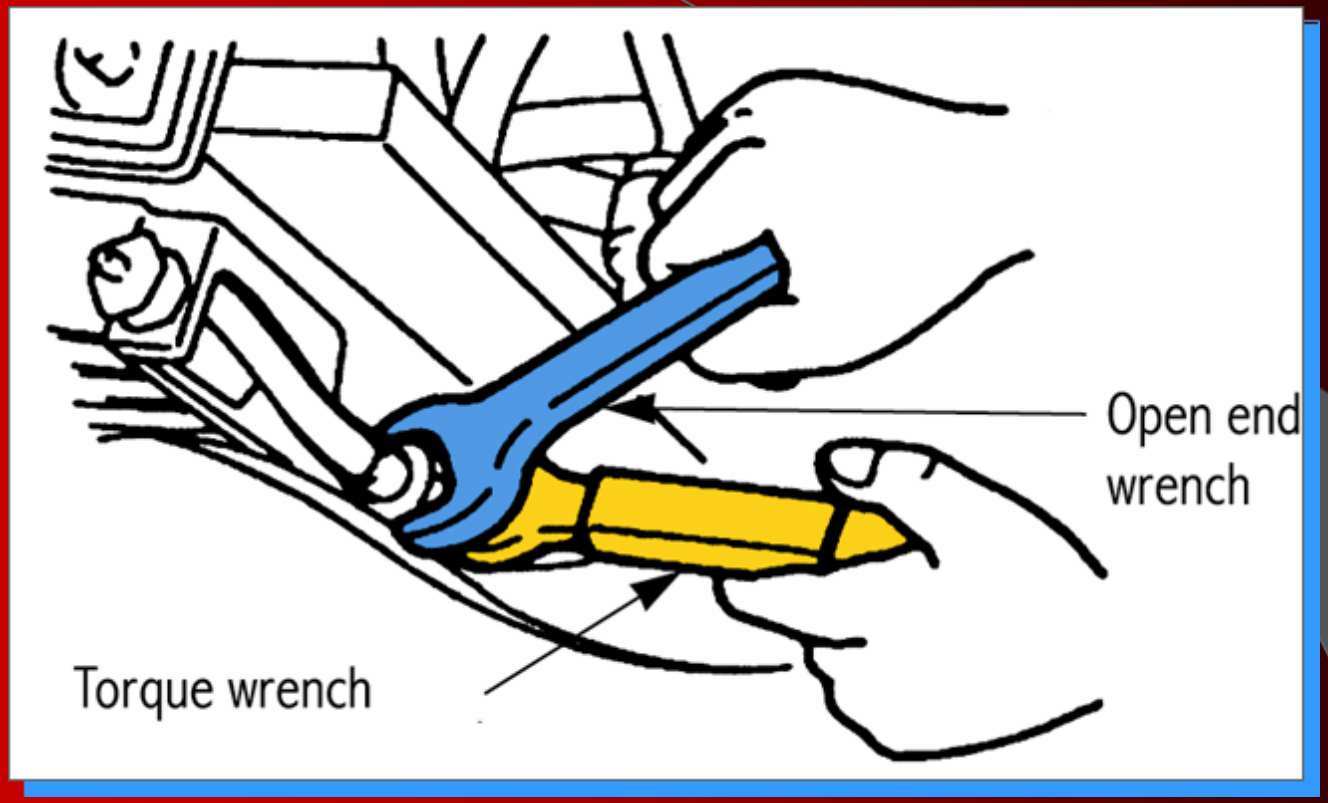
Stem-Type Valve

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

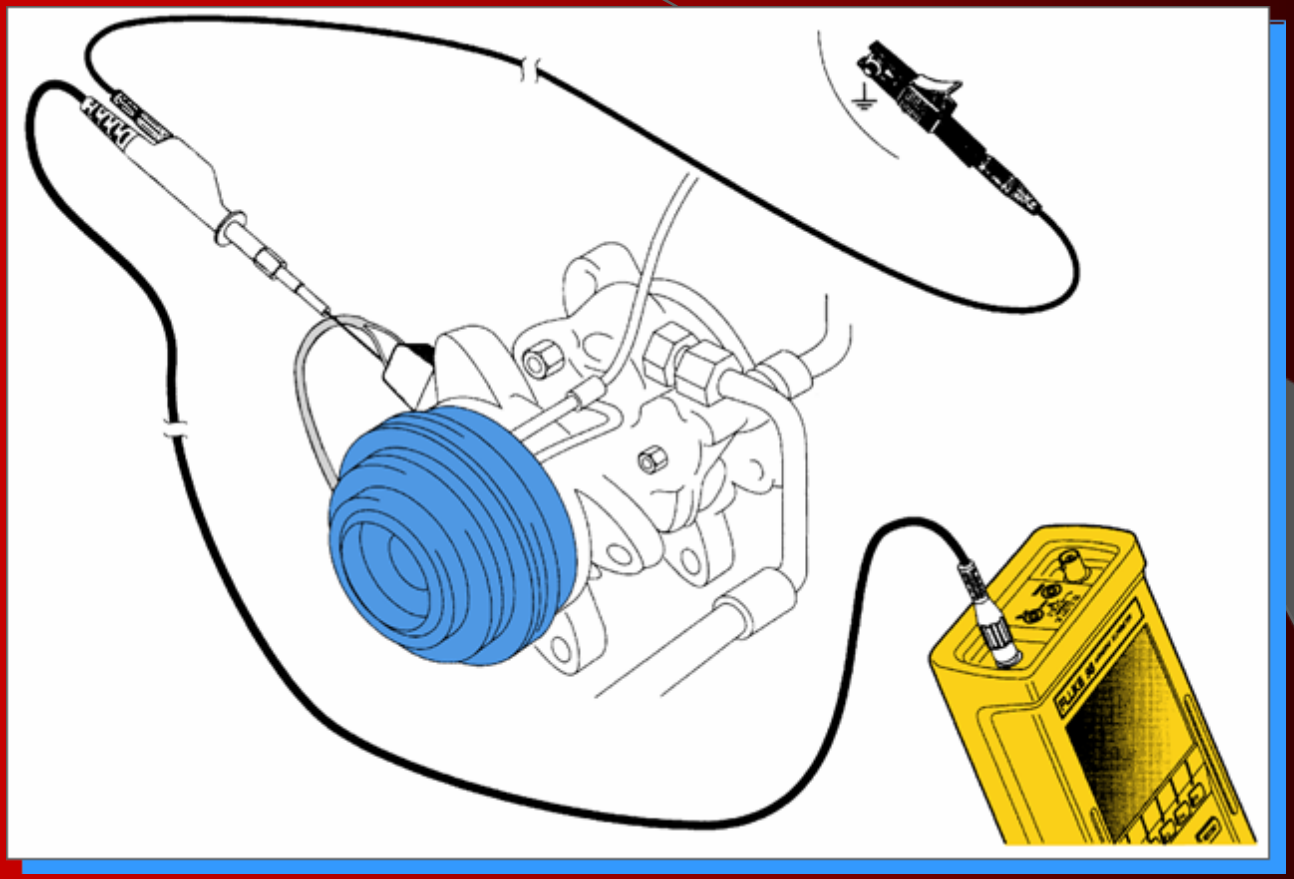


Servicing a Fitting



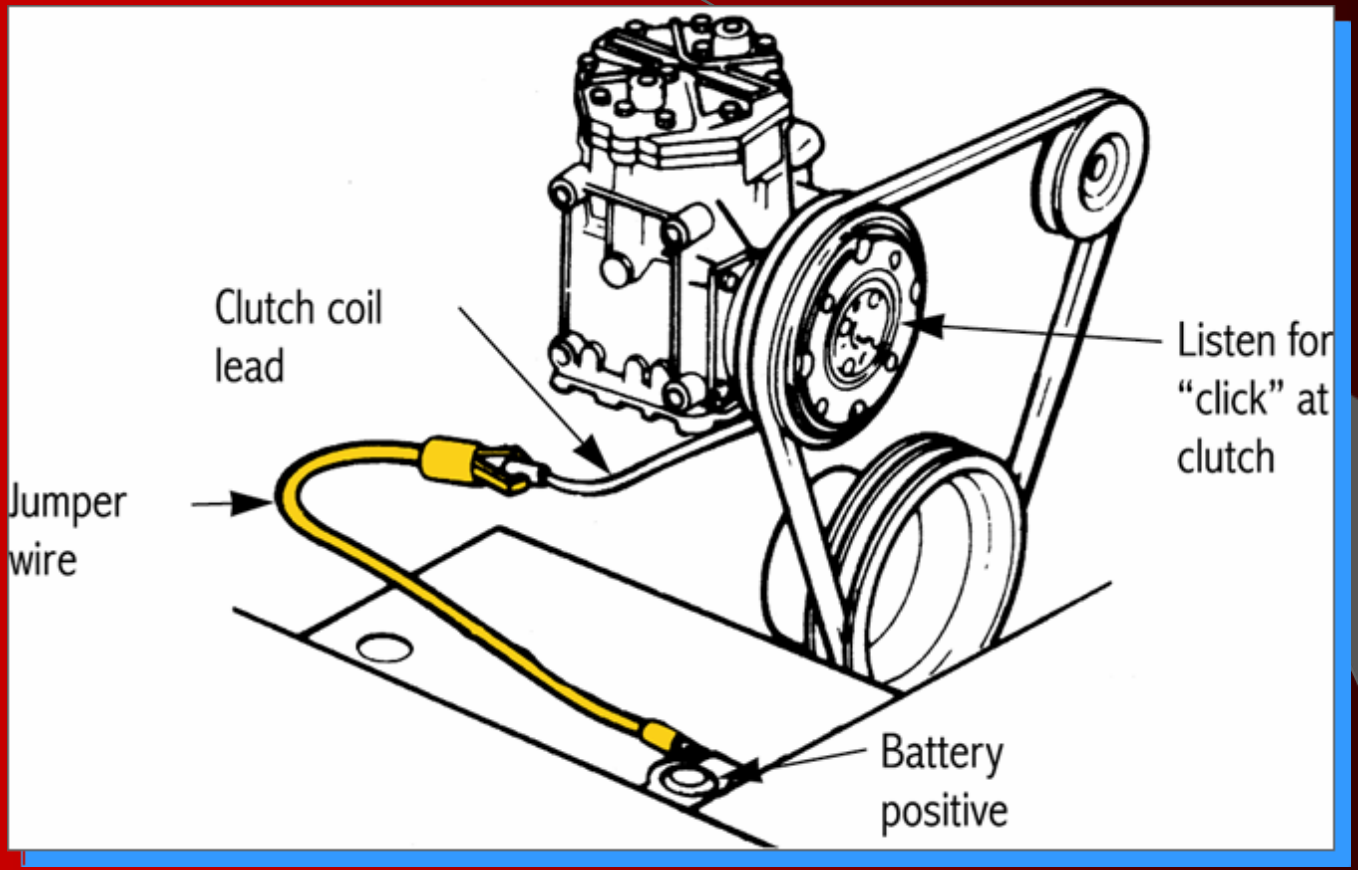
Tighten leaking fittings using a torque wrench and retest for leaks. Replace the hose or line if needed.

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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