HVAC Tools, Equipment, and Service Information

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Diagnostic and Test Equipment

- Manifold Gauges
- Temperature Gauges
- Leak Detectors
- Refrigerant Identifiers
- Sealant Detector
- Electrical Test Equipment
- Miscellaneous

Manifold Gauges

- Used to measure the pressure inside the refrigerant system.
- Components:
  - Gauges, measuring in PSI and also pressure to temperature measurements.
  - Hoses and fittings both ends of hoses are specific to the type of refrigerant.
    - (R-134a-½" Acme / R-12- ¼" SAE)
  - Fittings are also specific to refrigerant.

Temperature Gauges

- Mechanical
  - Always have a trusty mechanical thermometer for quick checking and for test drives.

- Electronic Contact
  - Older style pyrometer style. Many DVOM's have an included pyrometer interface.

- Electronic Non-Contact
  - Fancy infrared no contact. Just point and shoot. When purchasing be sure that it will do the ranges that your job requires.

Leak Detector

- There are many types and each has its strengths.
- Types
  - Soap and water
    - Very cheap
  - Halide
    - Cheap
  - Electronic
    - Accurate
  - Dye
    - Cheap and accurate

Soap and Halide

- Soap and water
- Used to find large leaks by covering the suspect area and watching for bubbles. Not very quick.

- Halide
- Uses the idea that a propane flame will change colors as it produces phosgene gas. If small the flame will burn green if large the flame will burn blue.

Electronic and Dye

- Electronic
- Are specific to different types of refrigerant.
- Are possibly dangerous due to high sensor temperatures.
- Are quick and easy, but often provide false readings. Know your detector.
- Corona discharge: uses a stream of electrons, if anything disrupts the path the sensor indicates a leak.
- Heated diode uses a catalyst like reaction to sense the presence of refrigerant

- Dye
- Added to a system and where ever the system leaks there will be a dye present
- A/C dyes fluoresce so dyes are best found with an ultraviolet light.

Refrigerant Identifier

- Refrigerant Identifiers are used to aid in diagnosis and prevent contaminated refrigerant sources.
- For diagnosis refrigerant identifiers are helpful in determining the amount of air in the system.
- Some A/C systems could have been filled with various aftermarket refrigerants or propane. Even a small amount could potentially contaminate a 30lbs bottle of recycled refrigerant.

Sealant Detector

- Many aftermarket refrigerant bottles come with sealants which pose a risk when you attempt to diagnose and reclaim the A/C system.
- Sealants are designed to plug holes in the presence of oxygen.
- This tool uses a small orifice which passes the refrigerant as in a small leak. If the orifice clogs then sealant is present.

Questions ???

- In an empty refrigerant system what takes the place of the refrigerant?
  - Air
- What is the most important small hole in the A/C system?
  - Orifice or Expansion Valve.
- What happens to the most important hole in the system?
  - It becomes clogged

Electrical Test Equipment

- Test lights
  - Checking for power
- DVOMS
  - Checking for voltage, resistance, amperage, and temperature.
- Oscilloscope
  - Could be used for monitoring clutch cycling time.

Miscellaneous

- Belt tension gauge
  - Used to measure the deflection of the belt which is relative to belt tension.
- Vacuum gauge
  - Used mainly for air management testing of vacuum modulators.

Service Tools

- Compressor
- Orifice Removal Tools
- Line Tools
- Disconnection Caution 

Compressor Tools

- Clutch service Tools
  - Jaw pullers
  - Snap ring tool
  - Shaft Seal Tools
  - Pulley installer
  - Pulley holding tool
  - Feeler gauges
- Used to service A/C compressor, clutch, or front shaft seal.
- Clutch R&R Procedure
- Shaft Seal Procedure

Orifice Tools

- Orifice Removal tools
- The removal of the orifice often requires specialized tools. An orifice may be stuck or its placement may be too deep for pliers.
- Removal Procedure

Line Tools

- Some tools are specific to the type of coupling used on the A/C line. Spring lock couplings require a specific release tool. Other fittings may not use specific tooling.
- Spring lock removal Procedure

Disconnection Tools 

- Be cautious of any residual refrigerant that may be released after evacuating the system. A quick evacuation followed by a break time could allow the system to build up to 50psi.

Service Information

- OASIS
  - Online Automotive Service Information System
- WSM
  - Work Shop Manual
- ETM
  - Electrical Troubleshooting Manual
- PCED
  - Power-train Control/Emission Diagnosis.

Oasis

- Provides:
  - Service history
  - TSB
  - FSA
  - Access to Hotline
- OASIS should be used to its fullest extent, but if you know the solution to the problem you don't always have to search through the information. At the very least look at the prior work history for similar symptoms. Hotline should only be utilized when absolutely necessary, do not call on every ticket just to get a little help.

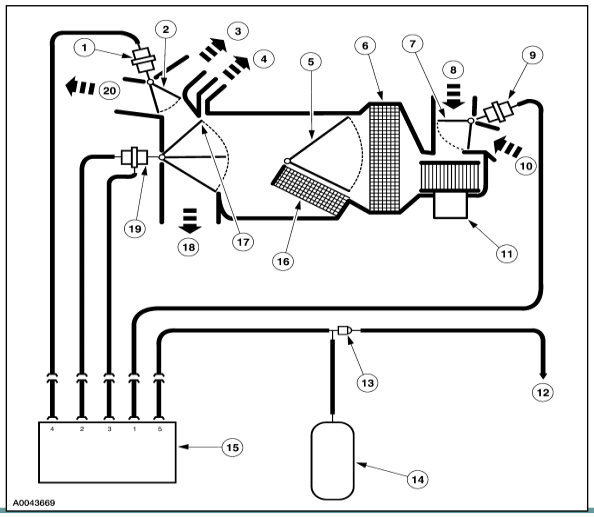
WSM

- Work Shop Manuals
- Provides:
  - Description and Operation
  - Vacuum Diagrams
  - Function Selector Switch Logic
  - Symptom Chart
  - Pinpoint tests (non-PCM)
  - Service Procedures

Function Selector Switch Vacuum Application

Switch Port	Color	Function	Function Selector Switch Position						
			MAX A/C	AC	Vent	OFF	Floor	Mix	Defrost
1	White	Recirc/Fresh	V	NV	NV	V	NV	NV	NV
2	Red	Floor	NV	NV	NV	V	V	NV	NV
3	Blue	Panel/floor	NV	NV	NV	V	V	V	NV
4	Yellow	Panel/defrost	V	V	V	NV	NV	NV	NV
5	Black	Vacuum source	V	V	V	V	V	V	V

Vacuum Diagram



ETM

- Electrical Troubleshooting Manual
- Provides:
  - Electrical diagrams
  - Component Function Testing
- A/C Cell 54
- EATC Cell 55

PCED

- Powertrain Control/Emission Diagnosis
- Provides PCM Related:
  - Description and Operation
  - Diagnostic Methods
  - Symptom Charts
  - DTC Charts
  - Pinpoint Tests
  - Reference Values