



SECTION 4

SEALED SYSTEM INFORMATION

HFC-134a REFRIGERANT SERVICE INFORMATION

The sealed system in this Series contain HFC-134a refrigerant. This section of the manual provides general rules for working with 134a, and procedures to be followed while servicing the sealed system. This is followed by diagrams illustrating sealed system operation, then model-specific refrigerant flow diagrams.

⚠ CAUTION

- 134a refrigerant requires Synthetic Ester oil in the compressor, and does not tolerate contamination from other refrigerants, moisture, petroleum-based lubricants, silicone lubricants, cleaning compounds, rust inhibitors, leak detection dyes, or any other type of additive.
- If servicing the sealed system, do not leave it nor any replacement components open to the atmosphere for more than ten (10) minutes, as the Synthetic Ester oil will attract moisture.

General Rules for Working with 134a Refrigerant:

- Use equipment dedicated to 134a sealed system service only.
- Use only 134a refrigerant for back-flushing and sweep charging.
- Always replace the high-side filter-drier when servicing the sealed system.
- The high-side filter-drier must be cut from the sealed system. Never un-braze any sealed system joint as the heat will drive moisture into the sealed system.
- Do not leave the sealed system nor replacement compressor open to the atmosphere for more than then ten (10) minutes.
- When the rubber plugs are pulled from the service compressor, a release of pressure should be heard. If no release of pressure is heard, do not use the compressor.
- Use ONLY virgin 134a refrigerant when recharging the sealed system.



SEALED SYSTEM REPAIR PROCEDURES	
Problem	Service Procedures
Non-Operating, Inefficient, Noisy Compressor	a. Capture refrigerant b. Replace Compressor c. Replace filter-drier d. Evacuate or sweep charge system e. Recharge system with Virgin 134a refrigerant. NOTE: To check for a non-operating compressor, a hard start kit can be used.
High Side leak	a. Capture refrigerant. b. Repair leak. c. Replace filter-drier. d. Evacuate or sweep charge system. e. Recharge system with Virgin 134a refrigerant.
Low Side Leak	a. Capture refrigerant. b. Repair leak (if at solder joint) or replace part. c. Back flush high side of sealed system. d. If all refrigerant has escaped & system is in vacuum, replace compressor. e. Replace filter-drier. f. Evacuate or sweep charge system. g. Recharge system with Virgin 134a refrigerant.
Contaminated Sealed System <i>Examples:</i> > Burned out compressor > Excessive moisture from leak in condensate loop or in low side > Plugged capillary tube	a. Capture refrigerant. b. Repair leak (if at solder joint) or replace part. c. Back flush high side of sealed system. d. Replace compressor. e. Replace filter-drier. f. Replace heat exchanger if cap tube is clogged. g. Install a low side drier on suction line. h. Evacuate or sweep charge sealed system. i. Recharge with Virgin 134a refrigerant.
Restriction NOTE: If restriction is due to sealed system being contaminated, see Contaminated Sealed System above.	a. Capture refrigerant. b. Locate and remove restriction or locate and replace part. c. Back flush high side of sealed system. d. Replace filter-drier. e. Evacuate or sweep charge system. f. Recharge system with Virgin 134a refrigerant.
Overcharge	a. Capture refrigerant. b. Replace filter-drier. c. Evacuate or sweep charge system. d. Recharge system with Virgin 134a refrigerant.

SEALED SYSTEM OPERATION

The six diagrams on these pages illustrate a basic sealed system. The components are listed in order of refrigerant flow, with an explanation of their fundamental role as part of a sealed system. **NOTE:** *These illustrations do not represent any specific sealed system in this series.*

Compressor (Figure 4-1)

The compressor creates a high side and low side pressure difference in the sealed system by compressing the refrigerant gas, thus raising the pressure and temperature. The compressor pushes this high-pressure/high-heat gas through the drain pan heater loop then it is routed through the door gasket heater loop to prevent sweating.

Condenser (Figure 4-2)

The high-pressure/high-heat gas then travels through the condenser, where the heat is dissipated by cooler air being drawn over the condenser tubing by the condenser fan. This changes the gas into a high-pressure/warm liquid that then enters the high-side filter-drier.

Filter-Drier (Figure 4-3)

The high-pressure/warm liquid travels through the high-side filter-drier, which removes moisture from the refrigerant before it enters the capillary tube.

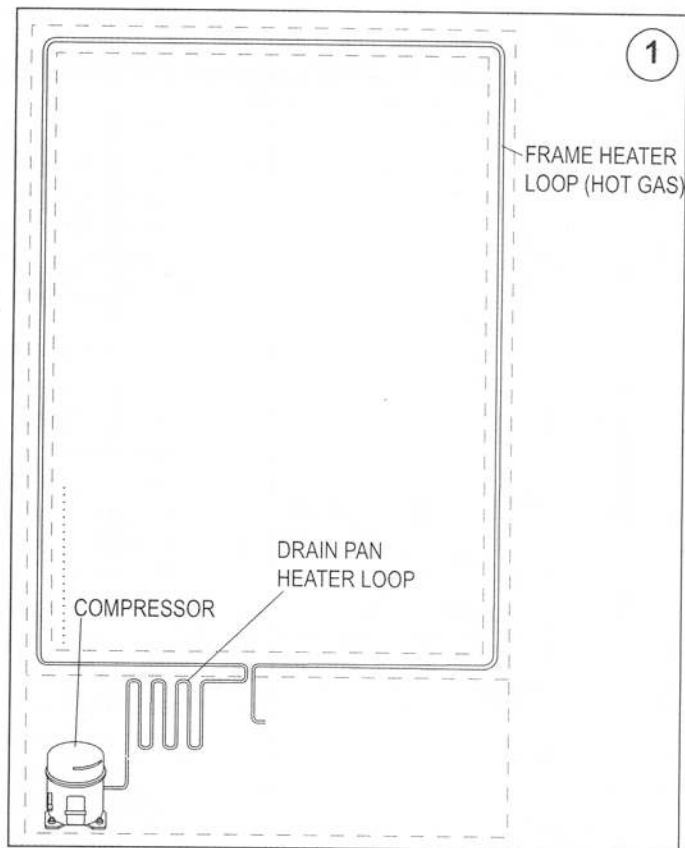


Figure 4-1. Compressor

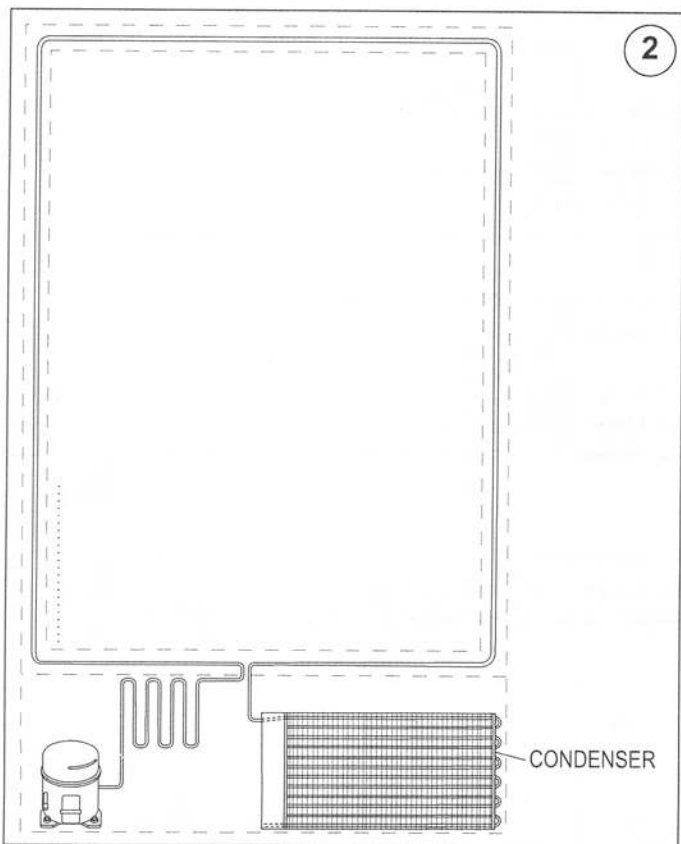


Figure 4-2. Condenser & Heater Loop

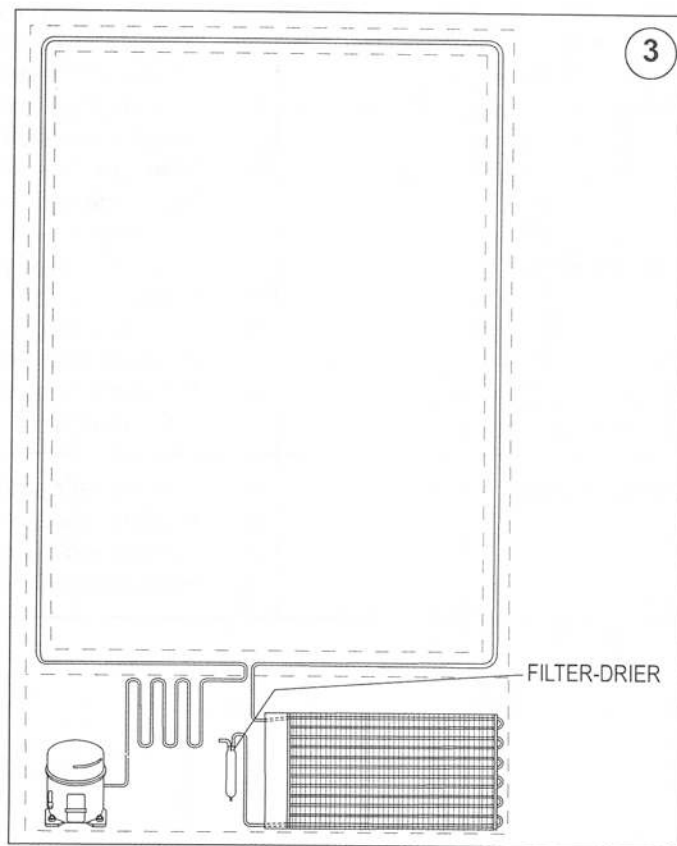


Figure 4-3. Filter-Drier

Capillary Tube (& Heat Exchanger) (Figure 4-4)

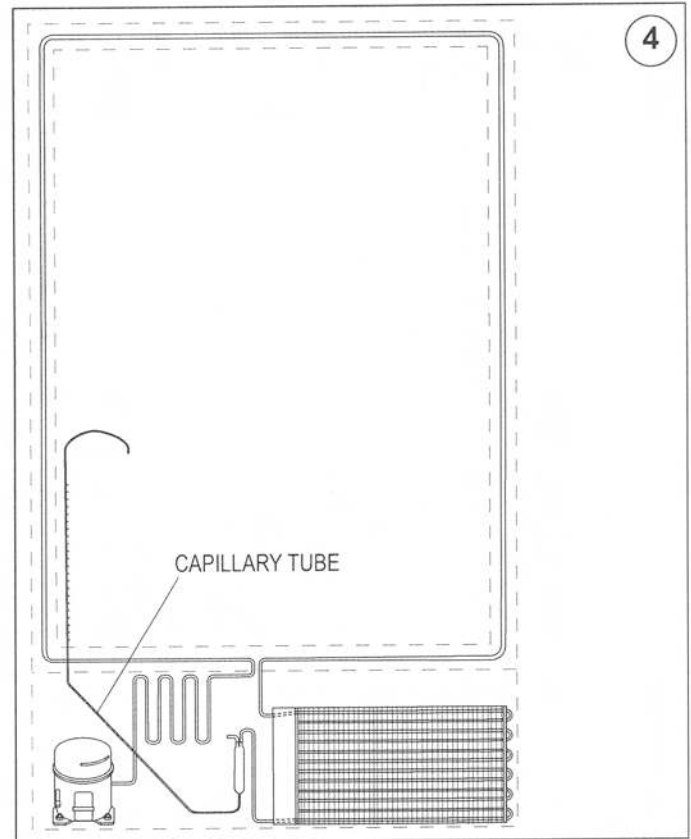
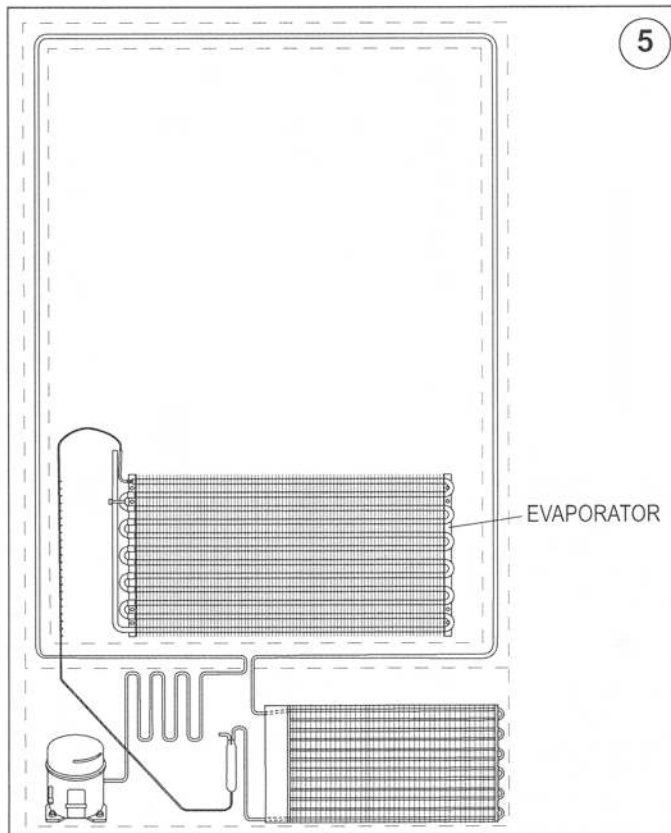
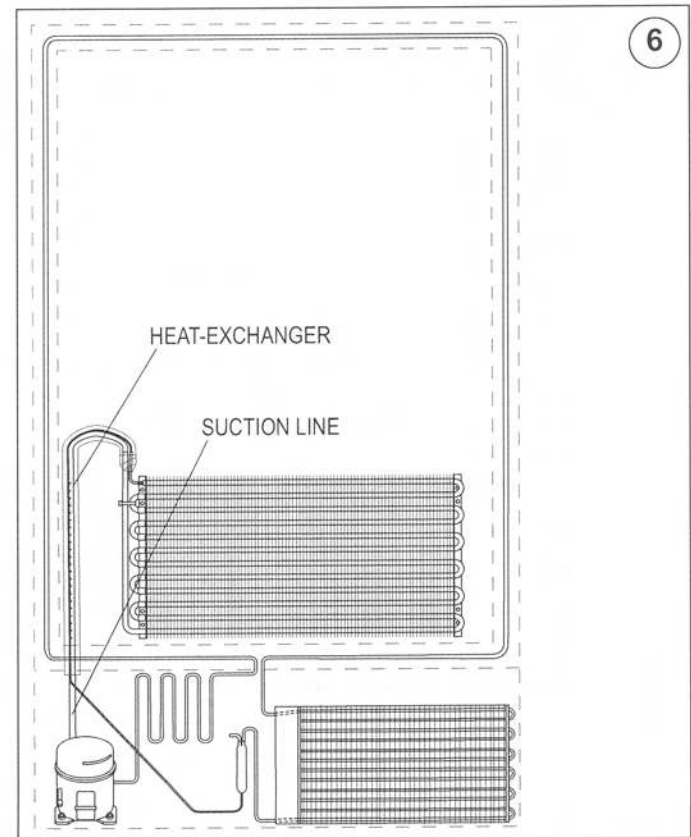
The warm liquid refrigerant travels through the long skinny capillary tube which is soldered to the suction line. (These two tubes soldered together create the heat exchanger.) As the warm liquid refrigerant travels through the capillary tube it gives up heat to the cool refrigerant gas traveling through the suction line and the pressure drops, so it is a low-pressure/cool liquid before it enters the evaporator.

Evaporator (Figure 4-5)

As the low-pressure/cool liquid refrigerant enters the evaporator, it vaporizes. This is caused by a dramatic pressure change which occurs when the refrigerant enters the larger diameter evaporator tubing from the smaller diameter capillary tubing. This vapor travels through the evaporator absorbing heat from the compartment, gradually converting it to a cool gas. This cool gas then enters the suction line.

Suction Line (& Heat Exchanger) (Figure 4-6)

The cool gas travels through the suction line which is soldered to the capillary tube. (As mentioned earlier, these two tubes soldered together create the heat exchanger.) As this cool refrigerant gas travels through the suction line it absorbs heat from the warm liquid refrigerant traveling through the capillary tube, making it a luke warm gas. The lukewarm refrigerant gas then returns to the compressor where the process begins again.


Figure 4-4. Capillary Tube (& Heat Exchanger)

Figure 4-5. Evaporator

Figure 4-6. Suction Line & Heat Exchanger

SEALED SYSTEM
REFRIGERANT
FLOW DIAGRAMS

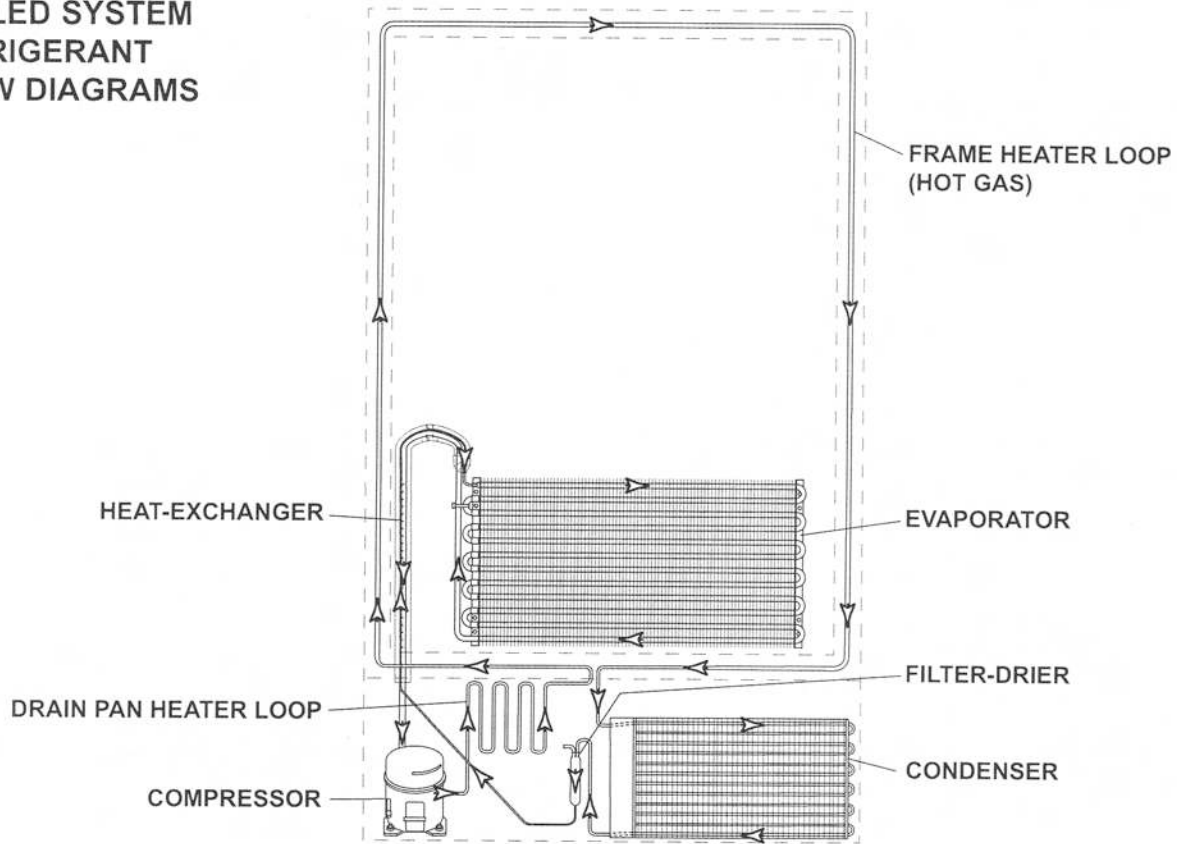


Figure 4-7. Models IC-27R Refrigerant Flow

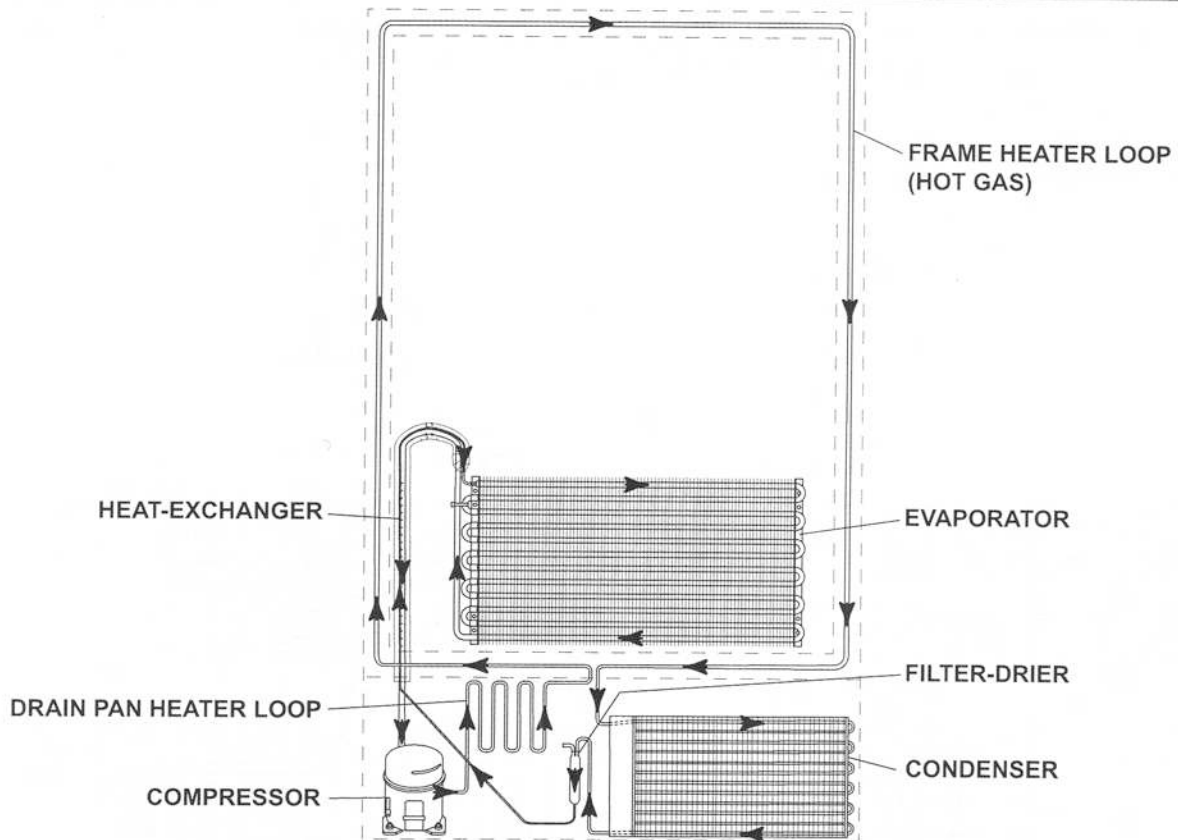


Figure 4-8. Models IC-27F Refrigerant Flow