SECTION 4

SEALED SYSTEM INFORMATION

HFC-134a REFRIGERANT SERVICE INFORMATION:

The 400 Series sealed system contains HFC-134a refrigerant. This section gives some general rules for working with 134a, and explains procedures to be followed while servicing the sealed system.

⚠ 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.

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 filter-drier when servicing the sealed system.
- The filter-drier must be cut from the sealed system. Never un-braze the drier as the heat will drive moisture back into the sealed system.
- Do not leave sealed system nor replacement compressor open to the atmosphere for more than 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.

NOTE: *The 427R Refrigerator Sealed System Service Procedures for 134a are the same as those in the table at right, except for the "NOTE" in the second column of the table.*

WINE STORAGE SEALED SYSTEM REPAIR PROCEDURES

Problem	Service Procedures
Non-Operating, Inefficient, Noisy Compressor *(**NOTE**: To check for a non-operating compressor, a hard start kit can be used)*	a. Capture refrigerant b. Replace Compressor c. Replace filter-drier d. Evacuate or sweep charge system ***NOTE:*** *If evacuating the sealed system, you must evacuate from both the low & high sides, due to the refrigerant valves. If sweep charging the sealed system, you must energize each refrigerant valves during the sweeping procedure. (See Manual Valve Activation Mode in Section 3)* e. Recharge system with Virgin 134a refrigerant.
High Side leak	a. Capture refrigerant. b. Repair leak. c. Replace filter-drier. d. Evacuate or sweep charge system. ***NOTE:*** *If evacuating the sealed system, you must evacuate from both the low & high sides, due to the refrigerant valves. If sweep charging the sealed system, you must energize each refrigerant valves during the sweeping procedure. (See Manual Valve Activation Mode in Section 3)* 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. Replace compressor. e. Replace filter-drier. f. Evacuate or sweep charge system. ***NOTE:*** *If evacuating the sealed system, you must evacuate from both the low & high sides, due to the refrigerant valves. If sweep charging the sealed system, you must energize each refrigerant valves during the sweeping procedure. (See Manual Valve Activation Mode in Section 3)* g. Recharge system with Virgin 134a refrigerant.
Contaminated Sealed System *Examples:* > *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. ***NOTE:*** *If evacuating the sealed system, you must evacuate from both the low & high sides, due to the refrigerant valves. If sweep charging the sealed system, you must energize each refrigerant valves during the sweeping procedure. (See Manual Valve Activation Mode in Section 3)* 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. ***NOTE:*** *If evacuating the sealed system, you must evacuate from both the low & high sides, due to the refrigerant valves. If sweep charging the sealed system, you must energize each refrigerant valves during the sweeping procedure. (See Manual Valve Activation Mode in Section 3)* f Recharge system with Virgin 134a refrigerant.
Overcharge	a. Capture refrigerant. b. Replace filter-drier. c. Evacuate or sweep charge system. ***NOTE:*** *If evacuating the sealed system, you must evacuate from both the low & high sides, due to the refrigerant valves. If sweep charging the sealed system, you must energize each refrigerant valves during the sweeping procedure. (See Manual Valve Activation Mode in Section 3)* d. Recharge system with Virgin 134a refrigerant.

SEALED SYSTEM OPERATION:

This section begins with the basic wine storage sealed system components listed in order of refrigerant flow, with an explanation of their fundamental role as part of this sealed system. This is followed by the 427R refrigerator sealed system, then refrigerant flow diagrams of the four Sub-Zero wine storage units.

The Sub-Zero Wine storage Sealed System Components and Their Role:

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. This high-pressure/high-heat gas exits the discharge line and is routed around the door gasket seat *(except on the refrigerator section of the 427R)* to prevent sweating. *(On the models 424 and 430, this gas is also routed through a drain pan loop to help evaporate water in the drain pan.)* The high-pressure/high-heat gas is then routed to the condenser.

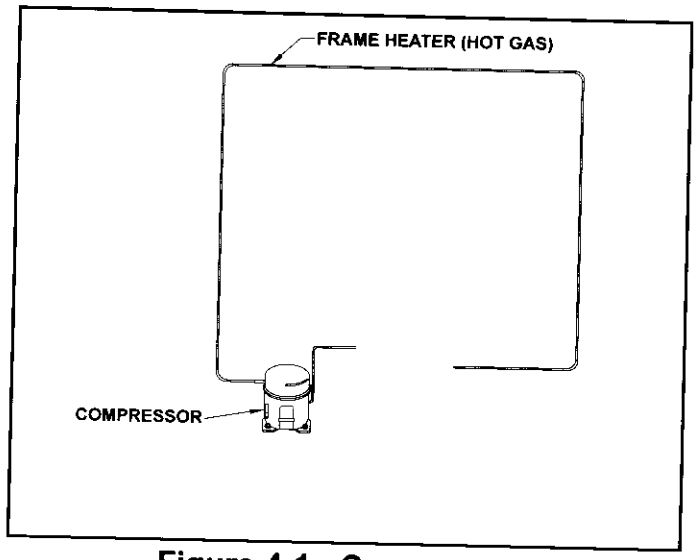

Figure 4-1. Compressor

Condenser (Figure 4-2)
The high-pressure/high-heat gas travels through the condenser, where the heat is dissipated by cooler air being drawn over the condenser tubing. This changes the gas into a high-pressure warm liquid before it enters the high-side filter-drier.

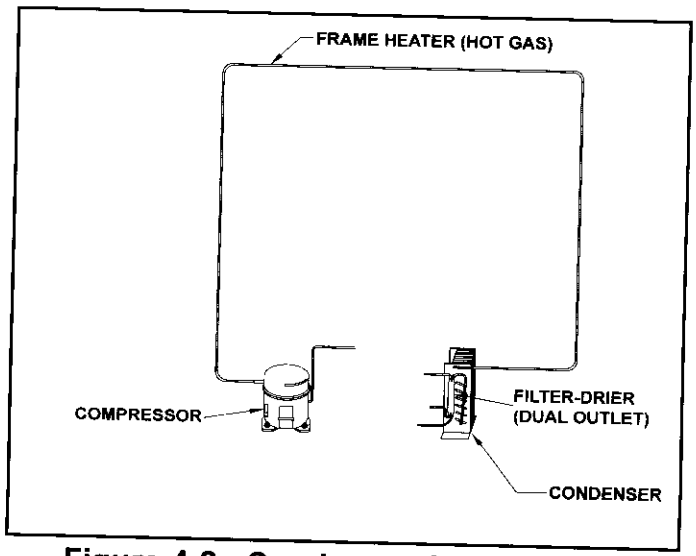

Figure 4-2. Condenser & Filter-Drier

Filter-Drier (Figure 4-2)
The high-pressure warm liquid travels through the high-side filter-drier, where moisture is removed from the refrigerant before it enters the refrigerant valve.

NOTE: *The refrigerator section of the 427R does not utilize refrigerant valves. The high-pressure warm liquid travels directly from the filter-drier to the capillary tube.*

Refrigerant Valve(s) (Figure 4-3)
The refrigerant valves open or close depending on the wine storage compartment calling for cooling. When one refrigerant valve is energized/open, the other is de-energized/closed. When open, the refrigerant valve allows the high-pressure warm liquid to enter the appropriate capillary tube.

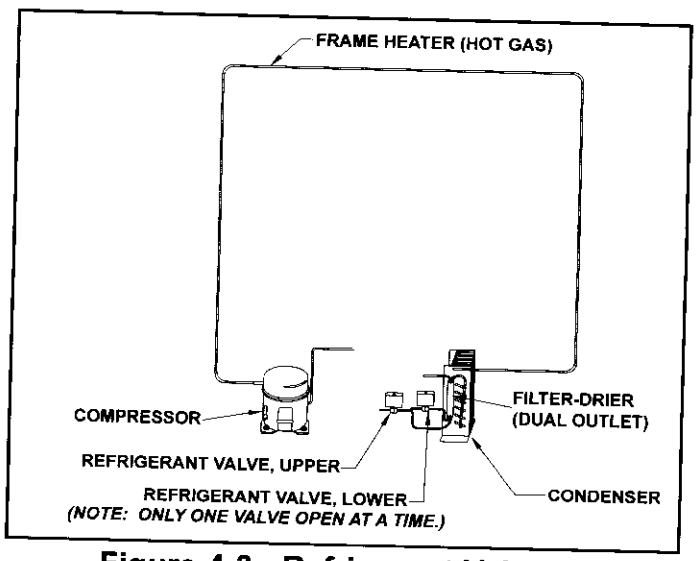

Figure 4-3. Refrigerant Valve(s)

Capillary Tube(s) (Figure 4-4)
As the warm liquid refrigerant travels through the capillary tube the pressure drops, cooling the liquid before it enters the evaporator.

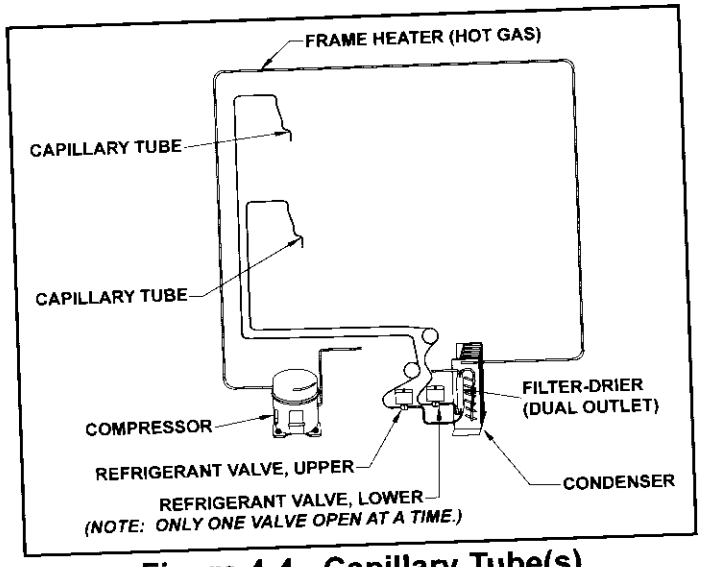

Figure 4-4. Capillary Tube(s)

Evaporator(s) (Figure 4-5)
The low pressure/cooled liquid refrigerant travels through the evaporator absorbing heat from the compartment, gradually converting it to a cool gas. This cool gas then enters the suction line.

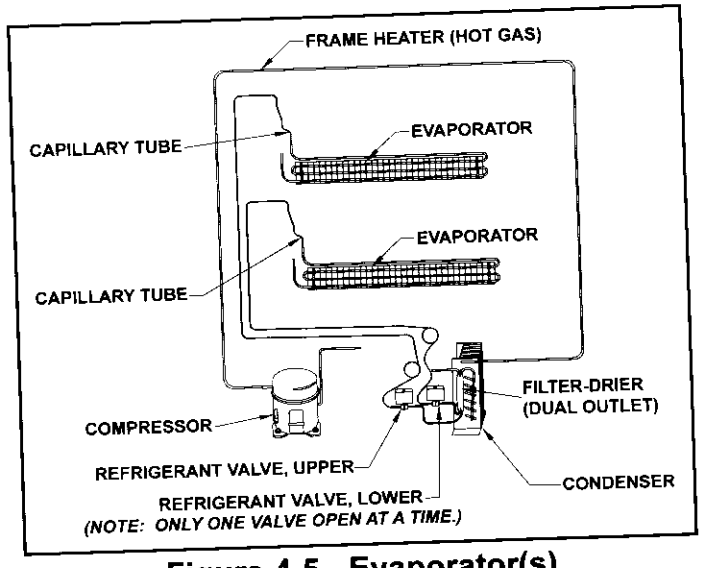

Figure 4-5. Evaporator(s)

Suction Line(s) & Heat Exchanger(s) (Figure 4-6)
The cool gas travels through the suction line which is soldered to the capillary tube. (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. The lukewarm refrigerant gas then returns to the compressor where the process begins again.

NOTE: *There is a suction line "T" connection in the wine storage sealed system that diverts the two separate suction lines from the evaporators to one suction line that enters the compressor.*

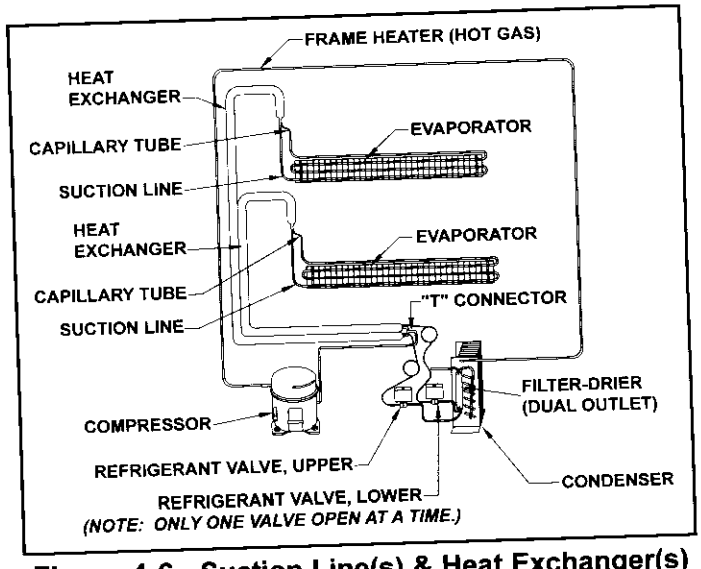

Figure 4-6. Suction Line(s) & Heat Exchanger(s)

The Sub-Zero Model 427R Refrigerator Sealed System Components and Their Role:

Compressor (Figure 4-7)

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. This high-pressure/high-heat gas exits the discharge line and is routed to the condenser.

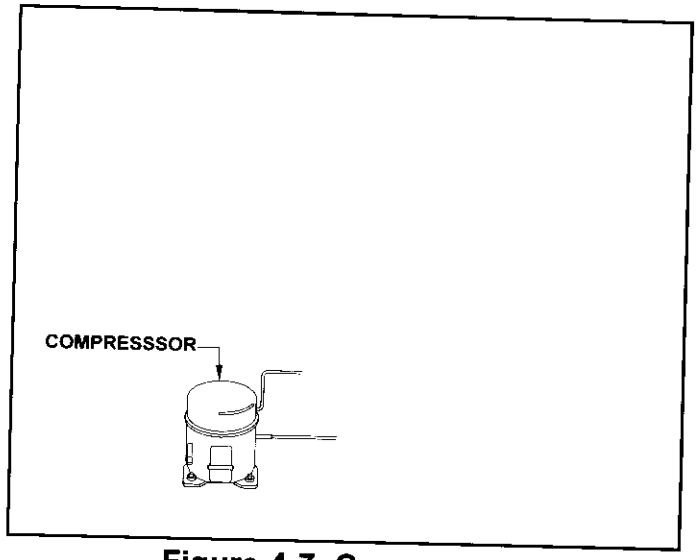

Figure 4-7. Compressor

Condenser (Figure 4-8)

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

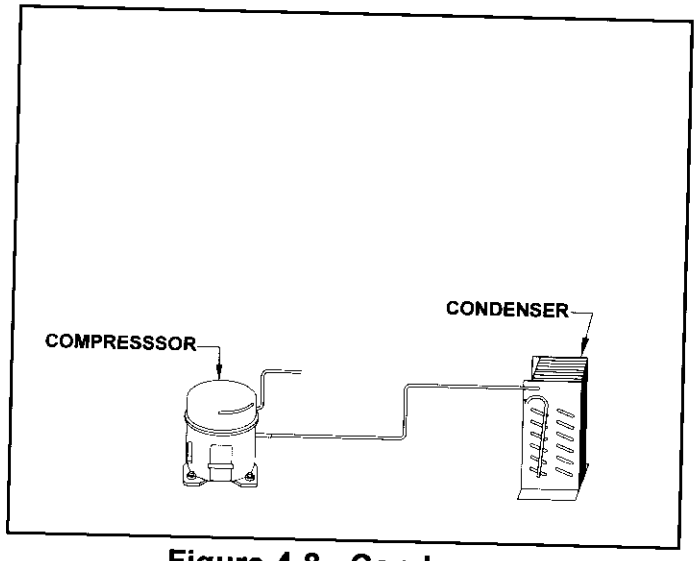

Figure 4-8. Condenser

Filter-Drier (Figure 4-9)

The high-pressure warm liquid travels through the high-side filter-drier, where moisture is removed from the refrigerant before it enters the capillary tube.

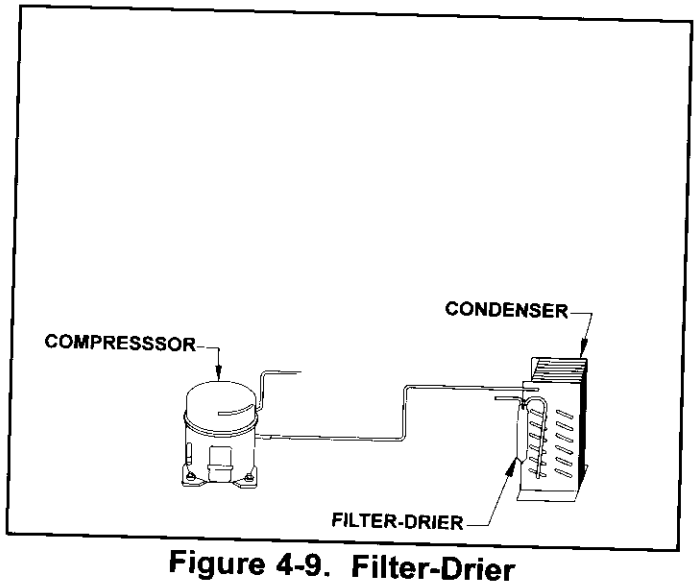

Figure 4-9. Filter-Drier

Capillary Tube (Figure 4-10)
As the warm liquid refrigerant travels through the capillary tube the pressure drops, cooling the liquid before it enters the evaporator.

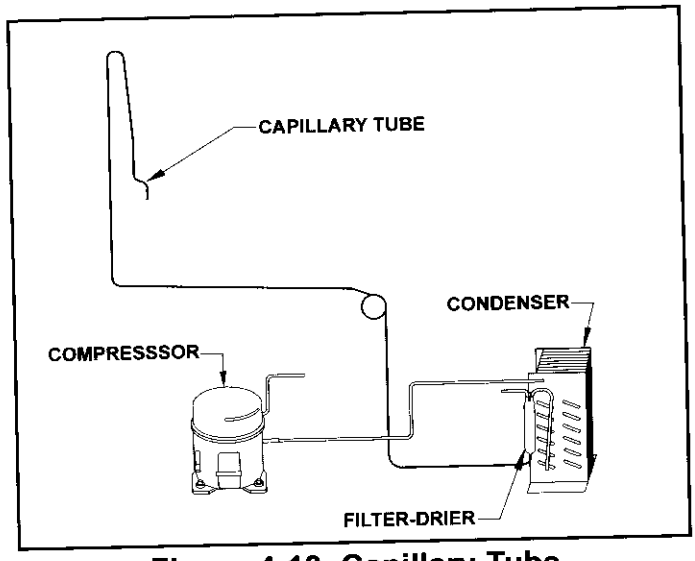

Figure 4-10. Capillary Tube

Evaporator (Figure 4-11)
The low pressure/cooled liquid refrigerant travels through the evaporator absorbing heat from the compartment, gradually converting it to a cool gas. This cool gas then enters the suction line.

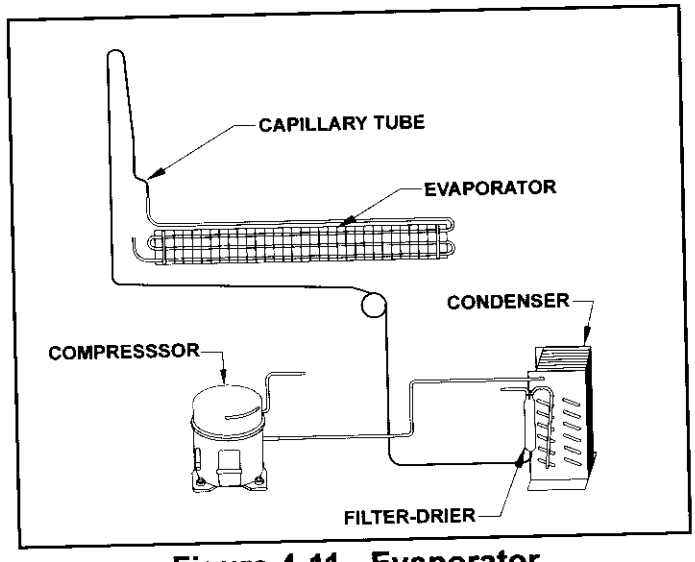

Figure 4-11. Evaporator

Suction Line & Heat Exchanger (Figure 4-12)
The cool gas travels through the suction line which is soldered to the capillary tube. (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. The lukewarm refrigerant gas then returns to the compressor where the process begins again.

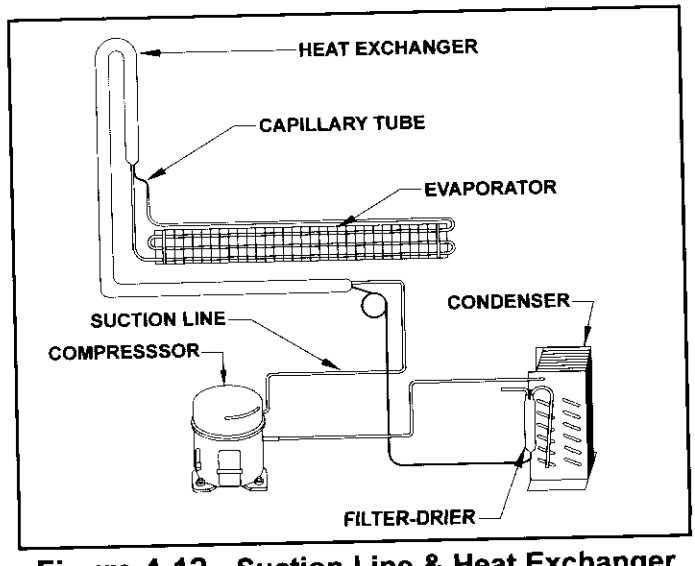

Figure 4-12. Suction Line & Heat Exchanger

SEALED SYSTEM REFRIGERANT FLOW DIAGRAMS:

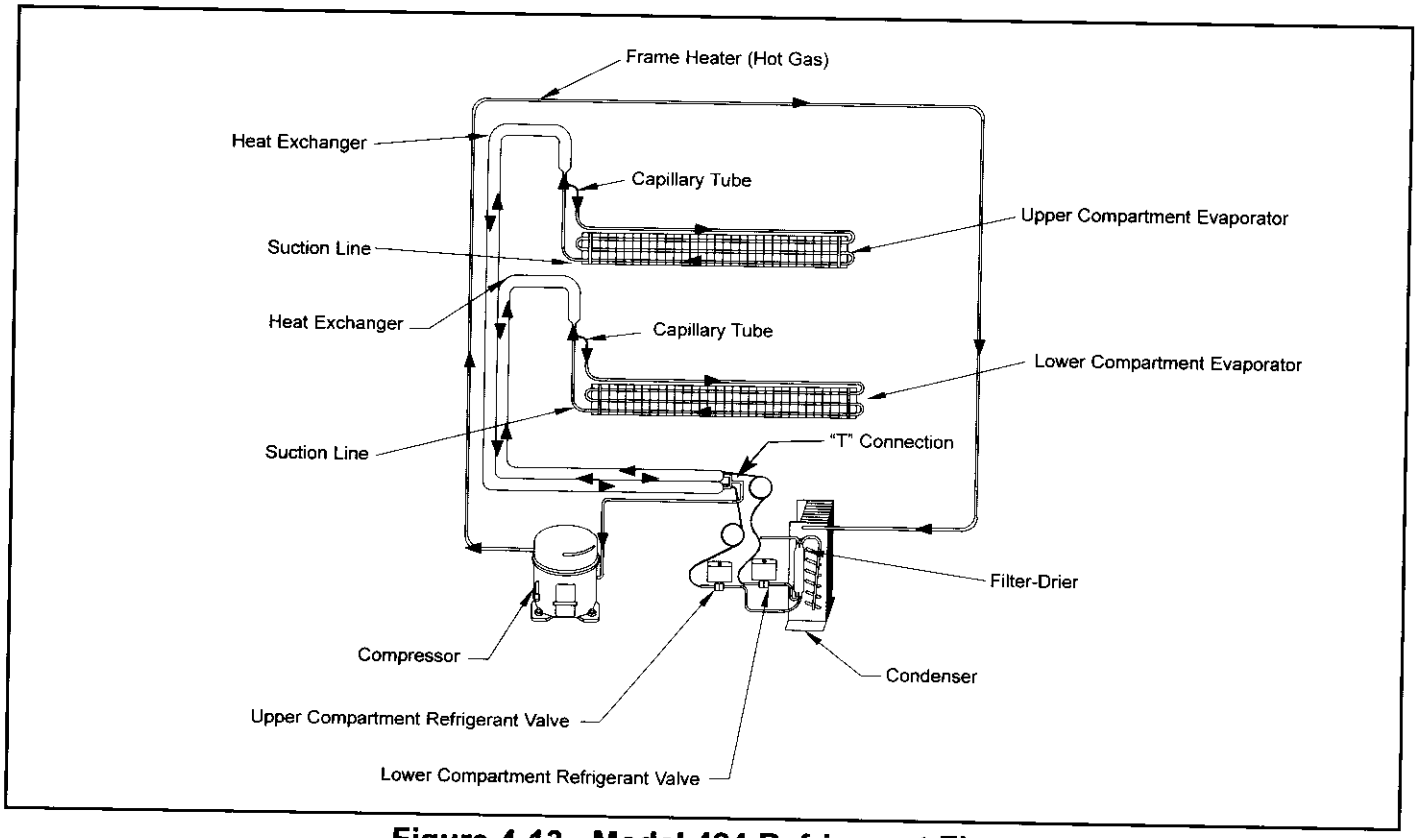

Figure 4-13. Model 424 Refrigerant Flow

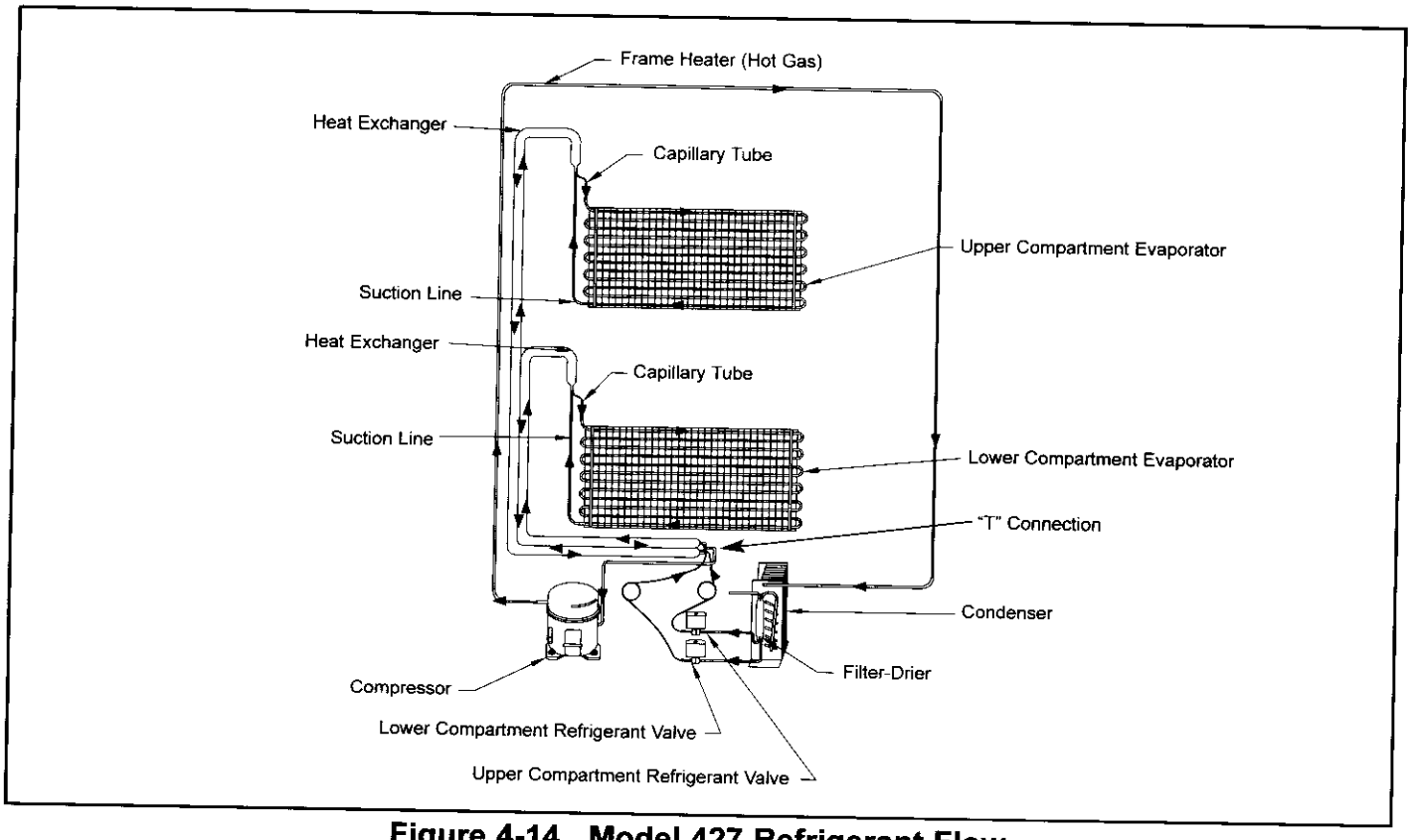

Figure 4-14. Model 427 Refrigerant Flow

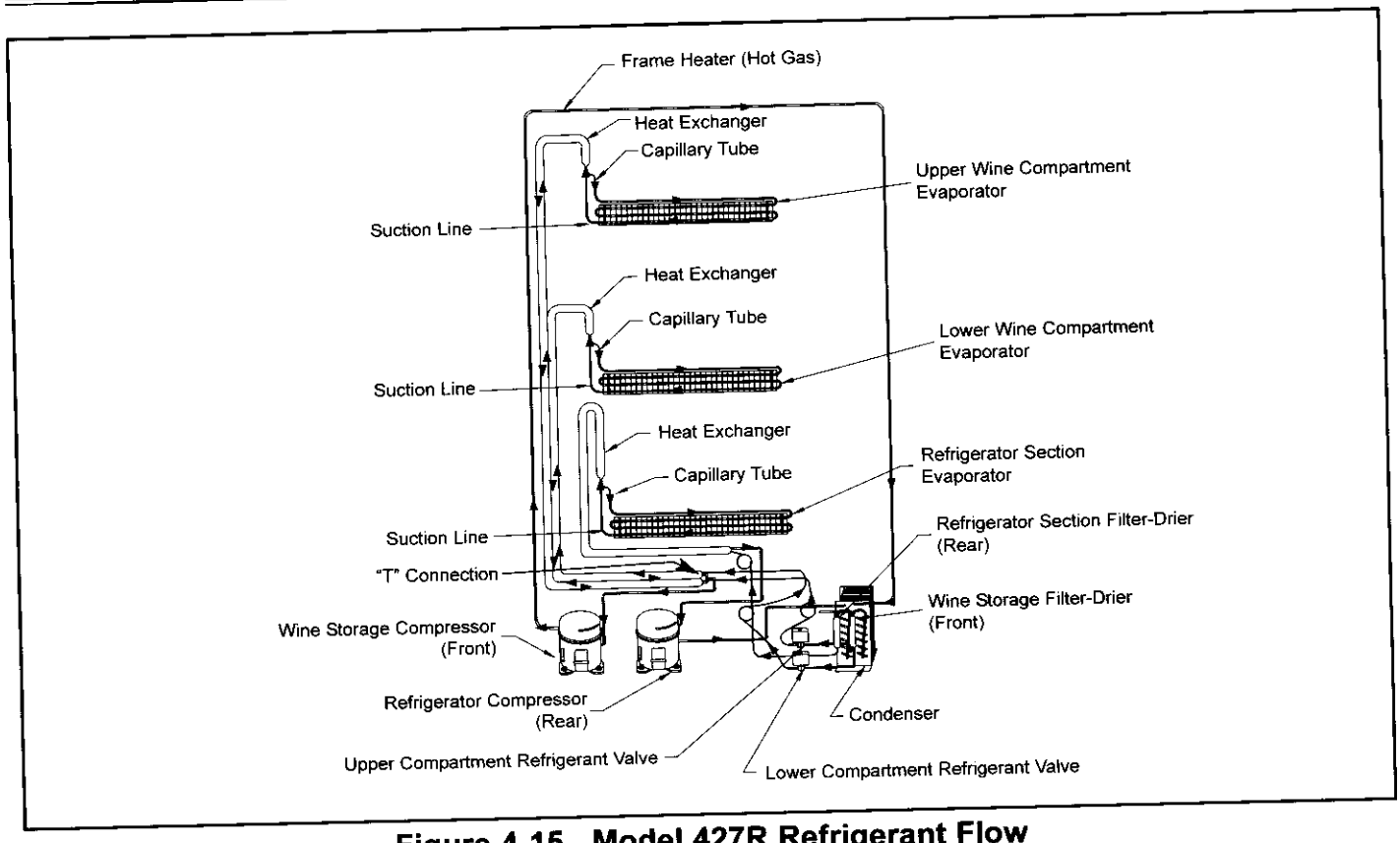

Figure 4-15. Model 427R Refrigerant Flow

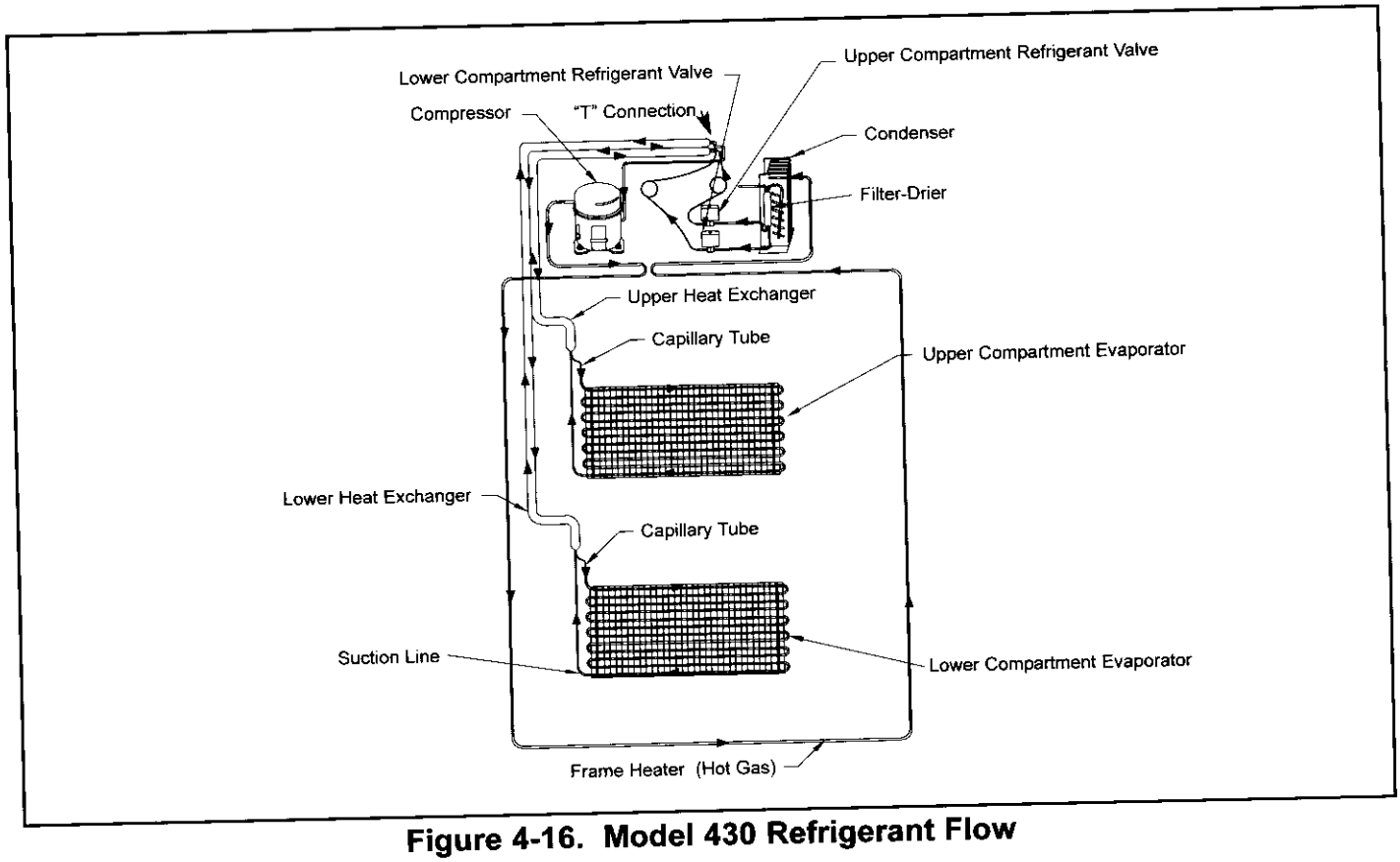

Figure 4-16. Model 430 Refrigerant Flow