Components of a Refrigeration System

The Primary Elements in an Air Conditioning Unit

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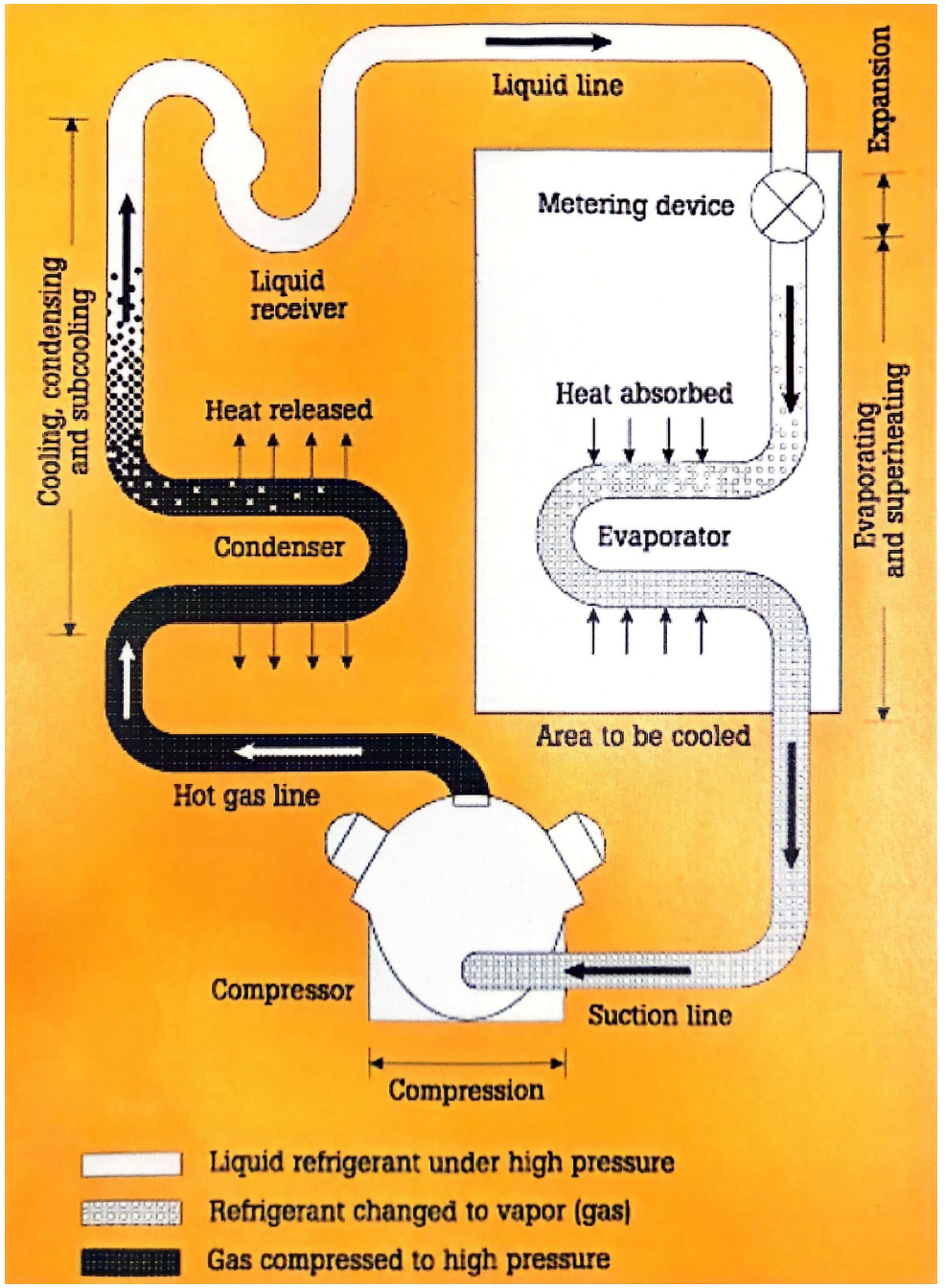
EST. 1978

The Refrigerant System

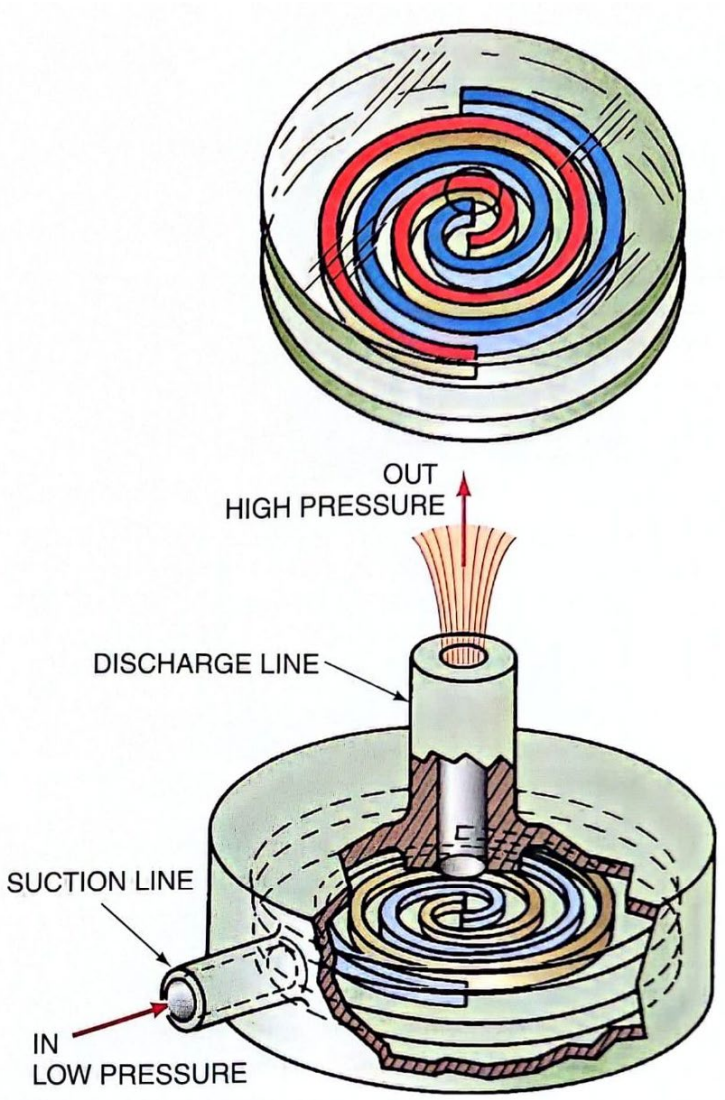


The Compressor

- The HEART of a refrigerant system. Receives low-pressure, low-temperature, superheated 100% saturated vapor from the evaporator coil via the suction line and compresses this vapor, raising its temperature and pressure.
- This pressure differential causes the refrigerant to flow through the system.
- Any liquid that hits the compressor will torpedo the compressor!

https://www.youtube.com/watch?v=706gqr1Q1aU

https://www.tiktok.com/@wojosheating/video/7340016075070819626



The Condenser Coil

- Receives hot, high-pressure gas from the compressor through the hot gas line. Entering the condenser coil at the top, the hot gas in the coil is cooled by the ambient air flowing through the coil and changes state at 125°F.
- The condenser coil THROWS OFF HEAT (both sensible and latent) from the refrigerant.

The Condenser Fans

- Crucial for Heat Transfer: The spinning blades move air over the condenser coil, which removes heat from the refrigerant and transfers it outside.
- This process is essential for the air conditioner's cooling cycle.

The Filter-Drier

- Removes foreign material from the refrigerant, including dirt, flux, solder beads, filings, moisture, parts, and acid caused by moisture.

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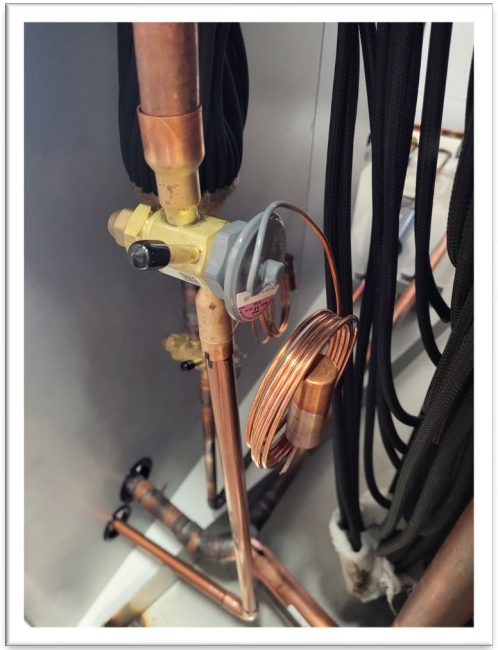
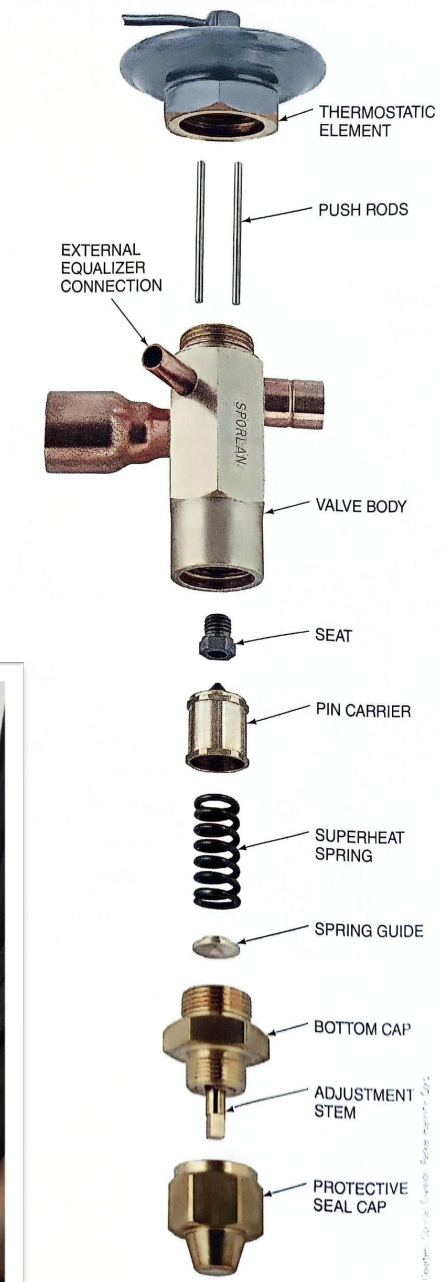
The Metering Device (TXV)

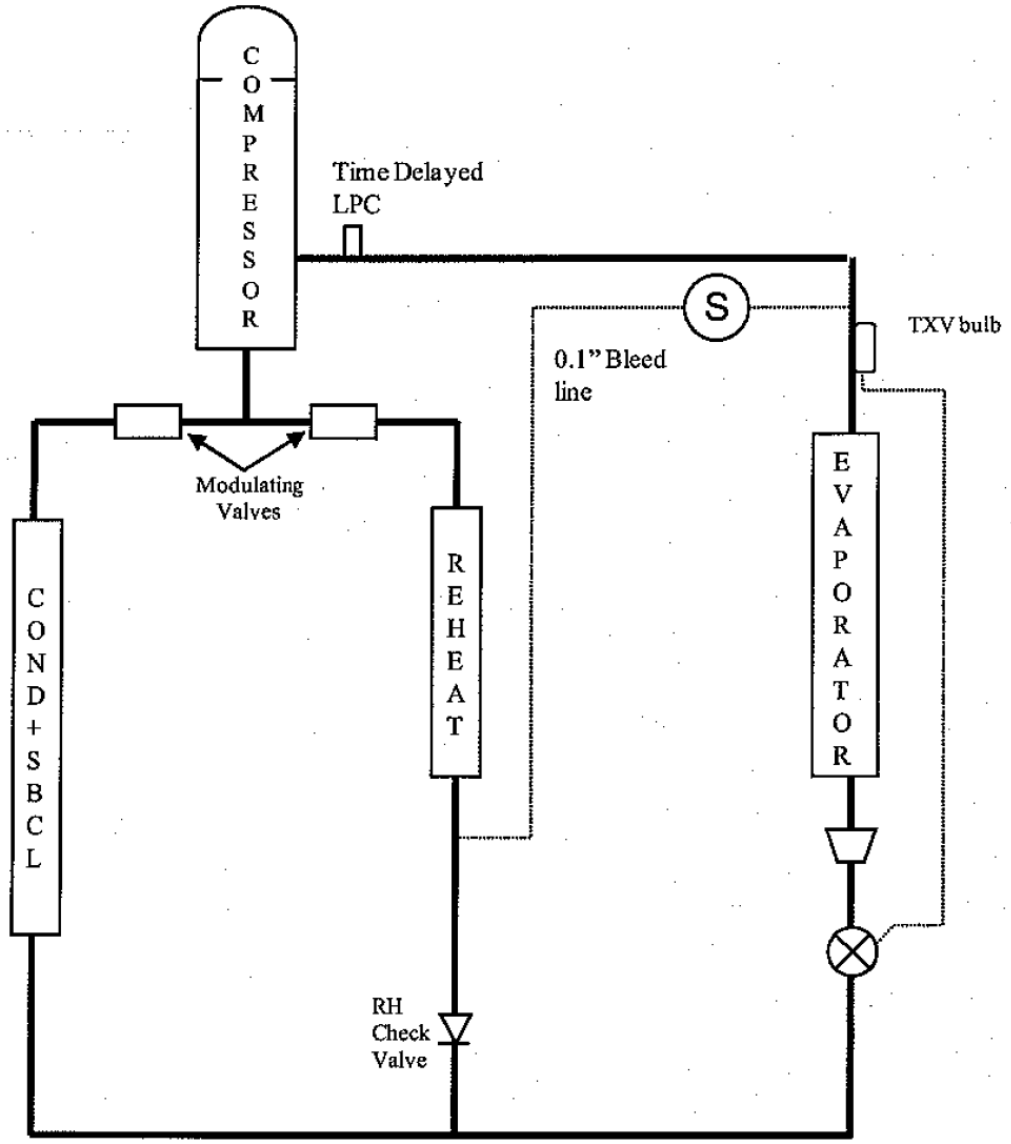
- Receives high-pressure, high-temperature, subcooled liquid from the condenser coil and aerosolizes the liquid, lowering its temperature and pressure significantly.
- The Thermostatic Expansion Valve (TXV) meters the correct amount of refrigerant to the evaporator, using a thermal sensing element to monitor the superheat.
- Divides the HIGH side from the LOW side of the system, like the Compressor.





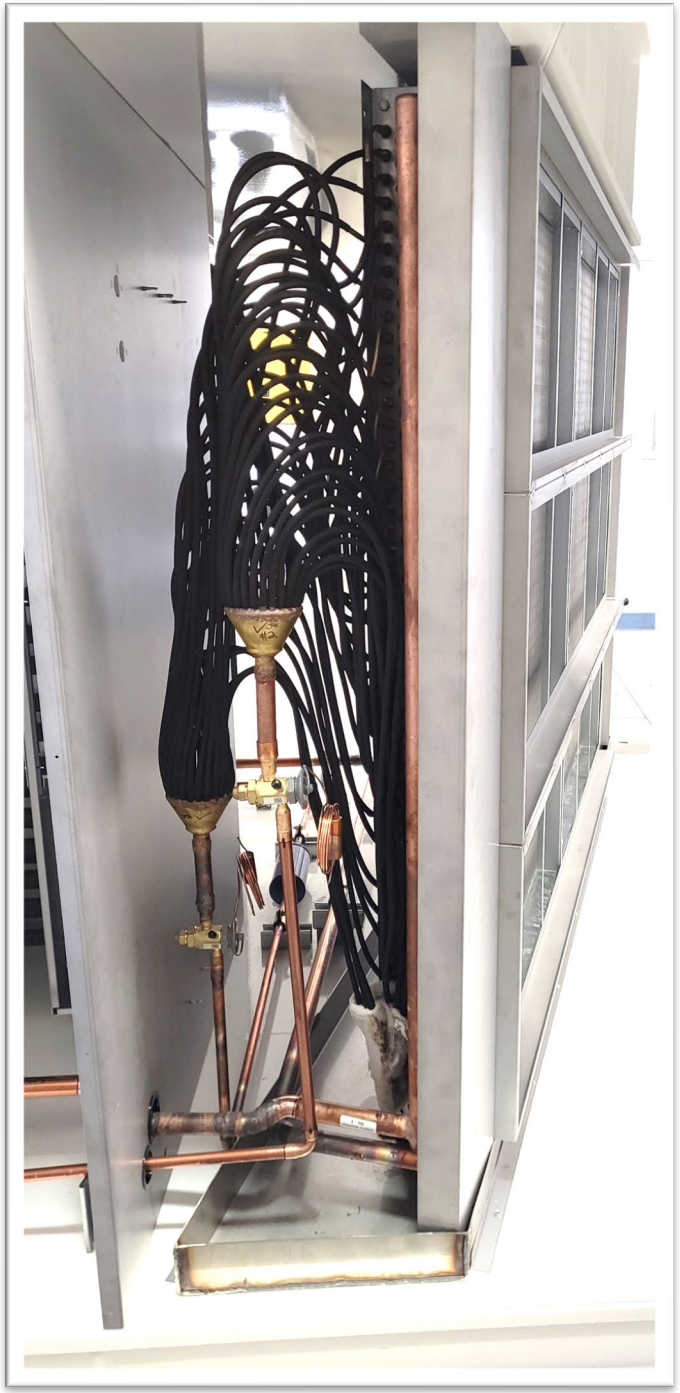
The Hot Gas Bypass

- Diverts high-pressure refrigerant vapor from the discharge line to the low-pressure side of the system.
- This can help the system run better in off-peak conditions, such as when the load is low or the airflow is low.



The Evaporator Coil

- Receives 75% liquid/25% vapor mixture from the metering device (TXV). Entering the evaporator coil, the cool mixture in the coil is heated by the ambient air flowing through the coil and changes state at 40°F.
- The evaporator coil ABSORBS HEAT (both sensible and latent) into the refrigerant. The evaporator coil is a ‘heat sponge’ for the system, which cools the conditioned space.



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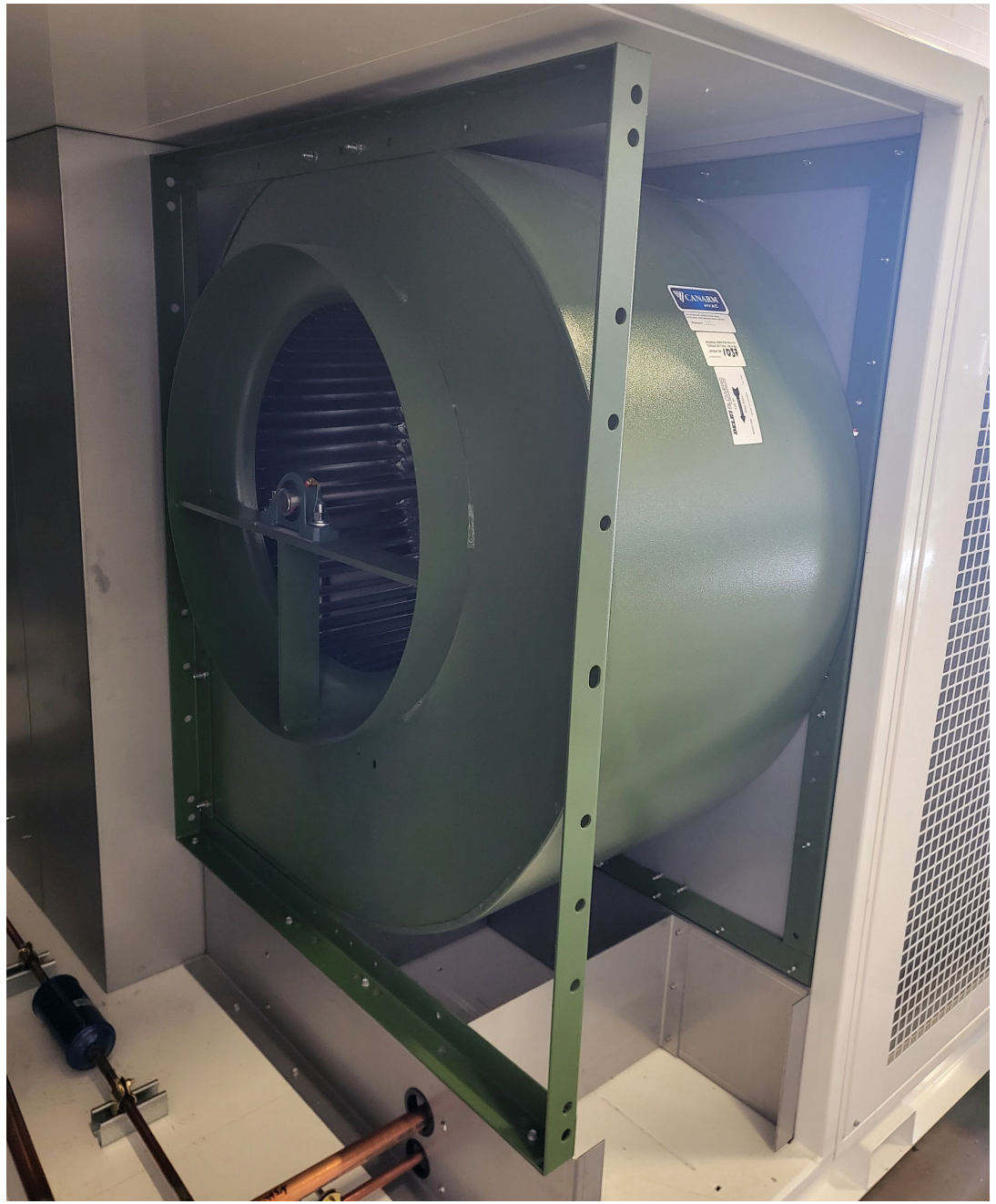
The Evaporator Blower

- Moves warm ambient air across the evaporator coil, which warms the refrigerant and absorbs heat from the air.
- The cooled air is then circulated throughout the building through ductwork.



The Suction Accumulator

- Stops and stores liquid refrigerant before it reaches the compressor crankcase.
- Located in the suction line between the evaporator and the compressor, it must be designed so that oil can return to the crankcase and not get trapped in the accumulator.