when the system is inoperative. Because of the excessive amount of drag the condenser causes, most aircraft have a throttle interlock switch that automatically retracts it when full power is applied, while simultaneously disengaging the compressor clutch from the engine. After leaving the condenser, the liquid refrigerant goes to the receiver/dryer.

The receiver/dryer functions as the system's reservoir. It contains a desicant (typically silica gel) that absorbs moisture; a single drop of water can freeze, lodge in the expansion valve, and completely stop the system! There also is another problem when water and refrigerant mix; they form highly corrosive hydrochloric acid, which literally will eat up the system from within. To further prevent particle blockage of the expansion valve, a filter is installed at this point. There also is a sight glass in the receiver/dryer, similar to the one in automobiles. With the system running, the sight glass should appear perfectly clear; bubbles mean flow fluid level.

Next is the thermal expansion valve. This meters the refrigerant and maintains high pressure upstream. As the liquid leaves the valve, it is sprayed through the coils, expanding as it goes, assuring complete evaporation of the liquid by the end of the coils. The valve varies refrigerant discharge, depending on the amount of heat to be removed from the cabin. This is where the low-pressure side begins, with the refrigerant turning into a low-pressure liquid. It is effectively the low-pressure equivalent of the condenser unit and consists of parallel circuits of copper tubing with fins. As the hot cabin air passes around the evaporator fins with the help of the blower, its heat transfers to the refrigerant and continues on into the cabin as cool air. This heat raises the refrigerant temperature to boiling, causing it to change state from liquid to vapor. One indication of insufficient Freon is little or no cooling air and a buildup of frost on the evaporator; a hissing sound in the evaporator is yet another indication. Completing the system, the liquid Freon now goes back to the compressor to begin the process again.

Preflight

Preflighting the air-conditioner consists of a visual inspection of the compressor, drive belt, pulley system, hoses, condenser inlet, and condensation outlet drain. The emphasis should be on system integrity—primarily damage or other signs of obvious system failure. When the system is turned on initially, it should operate within one to two minutes; otherwise, shut it down. As with all systems, it is important to read and follow the POH carefully with respect to preflight, operation, preventive, and periodic maintenance.

As adaptable as humans have proven themselves to be over the centuries, they still have a very limited temperature range. Within that range, there is an even smaller one that dictates comfort and efficiency. Properly maintained environmental systems promote safe, comfortable flying.