

Troubleshooting and Repair of Your Air Conditioning System

(Cooling, Heat Pump & Heat Strip)

INTRODUCTION

To cool your RV you must remove the heat from inside the vehicle and release it to the outside air. This process is essentially the same for your RV, automobile or house air conditioning system. The components may be somewhat different but the functions performed are identical. You require some refrigerant that can be pressurized and then converted to a liquid (usually Freon). Getting the cool air inside the RV and the heated air outside is accomplished by circulating the Freon through two sets of coils (similar to your water based automobile radiator). By blowing on the coils with two fans, the cool inside air can be circulated in the vehicle while the heat removed from the RV is discharged to the outside. Figure (1), illustrates the basic components of a home air conditioning system. Since we are constantly discharging the warm air (externally) and circulating the cold air (internally), we only need one motor to drive both fans. A squirrelcage fan blade is used to circulate the high airflow inside (cool air) and a conventional fan blade for the outside (hot air) discharge. The compressor does the main work by circulating the refrigerant in order to provide the heat transfer. The evaporator, condenser and refrigerant are all part of an inter-connected sealed system that is usually not serviceable. The compressor itself is also a sealed unit with no serviceable parts. An internal failure usually means replacement of the complete unit. After about 15 to 20 years if your compressor has failed, it is time to replace the entire A-C unit.

There is a high-pressure side, and a low-pressure side to all A-C systems. The cooling cycle starts with lowpressure Freon vapor, which enters the compressor and leaves as a high-pressure vapor. When gases are compressed, they get hot because the molecules are forced closer together. The high- pressure vapor then enters the **condenser** coil where it is cooled and condensed into a liquid.

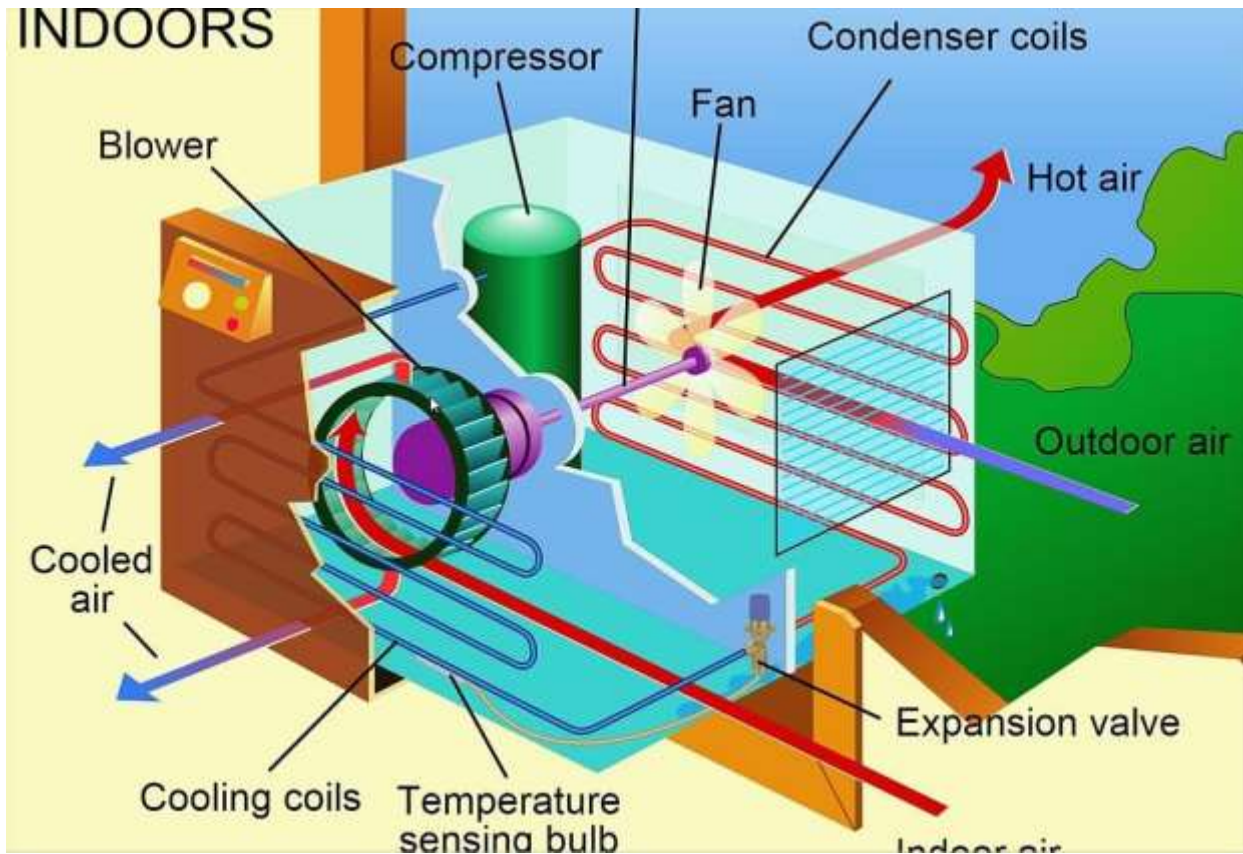


Figure (1) Home Air Conditioner

Going through the condenser, with air blowing over the coils, removes the heat from the freon using the outside airflow through the A-C. The high-pressure liquid Freon now flows through a capillary tube or an expansion valve (older units usually have the capillary tube) that serves to control the refrigerant flowing through the evaporator coils to control the refrigerant. For optimum cooling efficiency, the force and quantity of Freon must be accurately controlled. The refrigerant flowing through the **evaporator (cooling coils)** changes from a high- pressure liquid to a low-pressure vapor. This process removes heat from the air flowing through the coil thus providing cool air, which is circulated through the RV. The low pressure Freon now goes back to the compressor, where the whole process starts over again. This process is illustrated in Figure (2) Basic A-C.

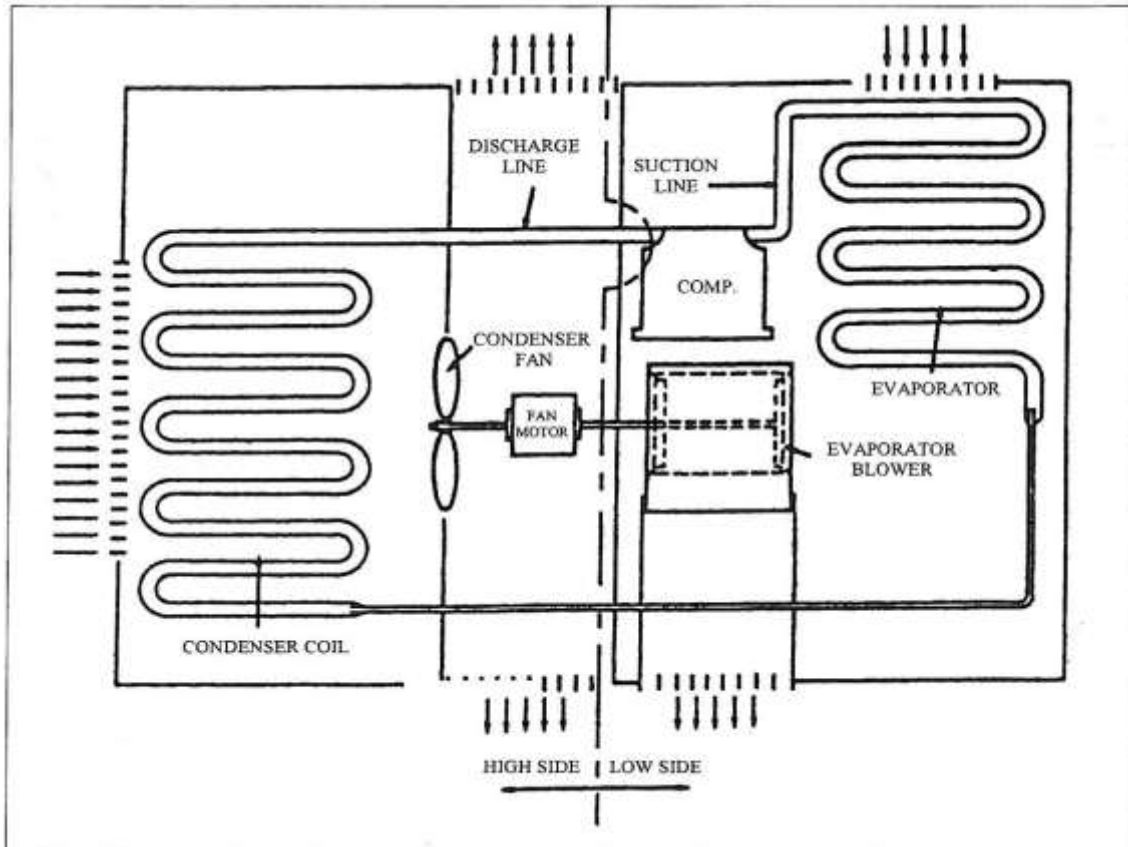


Figure (2) Basic A-C

The process of converting the high-pressure fluid into a vapor (**evaporator or cooling coils**) will remove moisture from the air flowing over the coils thus reducing the humidity of the conditioned air being circulated through your RV. This moisture is deposited in a drain pan and allowed to flow over the side of the RV. In some units, there are small hoses that are fed through the RV walls to drain the base pan. If you get water, dripping into the coach through the internal air filter it usually means that the drain hoses are filled with dirt. Simply use an air hose and blow air back through the drain tubes to clean them. If water is coming through the A-C into the coach, only when it is raining then the problem is usually cracks in the fiberglass A-C cover or a poor seal in the roof gasket. Figure (3) illustrates the airflow through an RV rooftop A-C and the evaporator drain pan location. Reducing the internal air humidity considerably enhances the cooling ability of an A-C.

The above discussion applies to any vehicle or home installation. They all work in a similar manner with the same basic components. Compressors may be cylindrical and driven by engine belts (automobile) or could be direct gear drive with internal motors (RV or home unit).