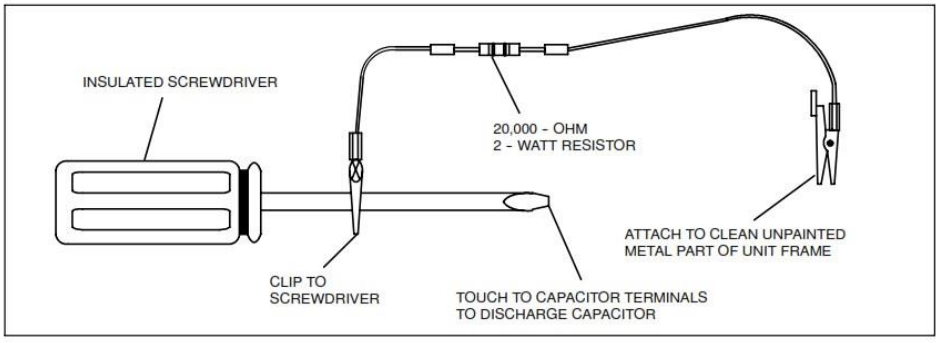
Air Conditioning System

Electrical

Figure (4) is an electrical drawing (schematic) of a basic RV air conditioner. It does not include the electronic control system board. It is not very complicated looking and has just a few components. There are actually three capacitors shown. On the far left is a dual capacitor which has both a fan and a compressor run time unit contained in the same case. The fan motor requires a run capacitor just like the compressor to provide a smooth running speed. The compressor has two electrical windings consisting of both a start and a run coil. The run capacitor is hooked to the 'R' terminal (run coil) and an additional start capacitor is hooked to the 'S' terminal (start coil). The 'C' terminal is connected to the common bus line. The multiple wires to the fan motor provide the ability to switch to different fan speeds. The use of an additional start capacitor depends on the size of the A-C compressor. These are very high value capacitors capable of storing significant energy in order to be able to start the compressor under very high air temperature conditions. They can hold their voltage levels for long time periods after power has been removed from the A-C. They can easily become a source for severe shocks that can startle you and cause you to lose your footing on the roof.

Figure (5) illustrates a dual fan-compressor **run** capacitor and a single compressor **start** capacitor. Figure (6) illustrates a dual capacitor with a special cover and a capacitor that is using a bleed resistor to drain the charge from the unit. Most of the time there is no bleed resistor and the charge on these capacitors **must be removed** before you do any work on the A-C. **Get in the habit of discharging the capacitors as soon as you remove the A-C cover and before you do any work on the A-C.**



This circuit will do a fine job discharging the capacitors and not put any burn marks on your screwdrivers or the rig.

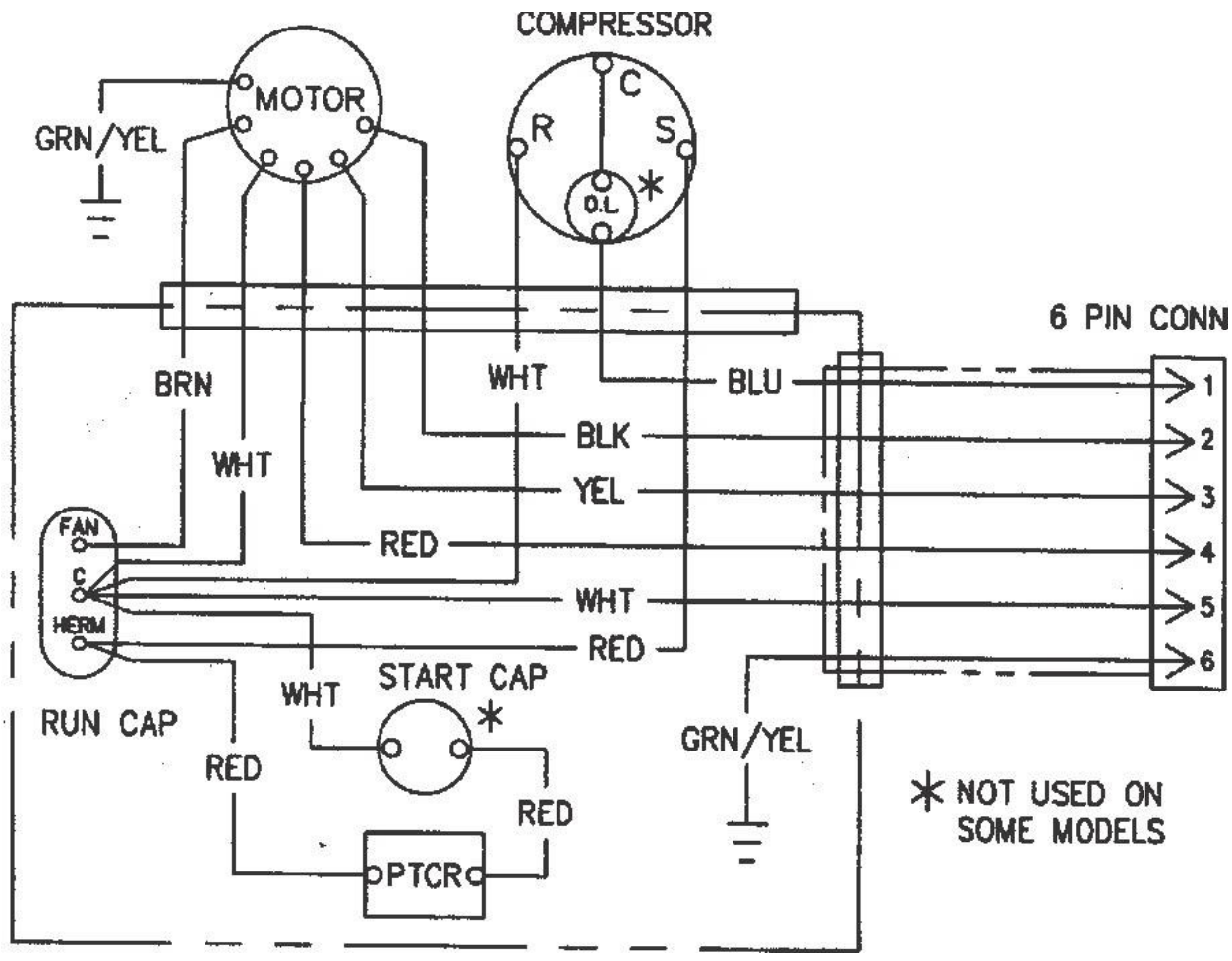


Figure (4) A-C Schematic

The 'OL' on the compressor is an over load circuit which will remove the power if the unit gets too hot. If your compressor turns off during an extremely hot day, it may be responding to low line voltage (below 105 vac). Since the power requirement does not change, low line voltage will result in increased current required. At a certain current level, the OL circuit will turn off the unit. You must wait several minutes until the compressor cools before turning on the A-C system again.

Figure (6) Single Start and Dual Run Capacitors

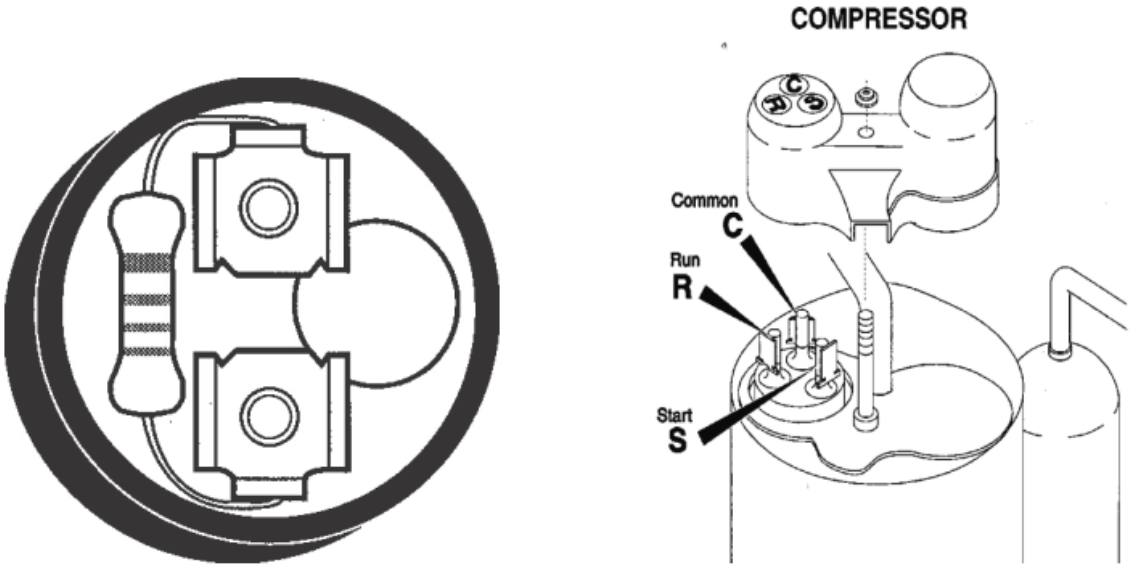


Figure (6) Capacitors with Drain and Special Cover

In series with the compressor start capacitor is a PTCR (positive temperature coefficient resistor) device that increases its resistance to the flow of current as its temperature increases. Initially the resistance is very low and the start capacitor is effectively connected to the compressor start winding. After the compressor starts and warms up the PTCR resistance increases in value until the start capacitor is disconnected from the compressor. In earlier models, this function was performed by a time delay relay that opened and closed a relay switch to help start the compressor. The PTCR must also cool off before re-starting the A-C. Many of the required time delays are built into the circuit board electronics, which is why the A-C, doesn't work immediately when you turn on the switch. PTCR's burn out on occasion, which results in the compressor not starting, particularly when it is under high loads (hot day). Usually they will look and or smell burned and if removed from the circuit can be easily measured with an ohmmeter. The usual failure mode is to open. The resistance should be from 10 to 25 ohms. The PTCR is designed to remain hot and run continuously for as many hours as you run the unit so wait a few minutes after you shut the A-C off for it to cool down.

Figure (7) shows a fan kit which includes the dual shaft motor and both the squirrel and six bladed fans. For maximum airflow, the squirrel blade is used for circulating the RV's internal, cool air.

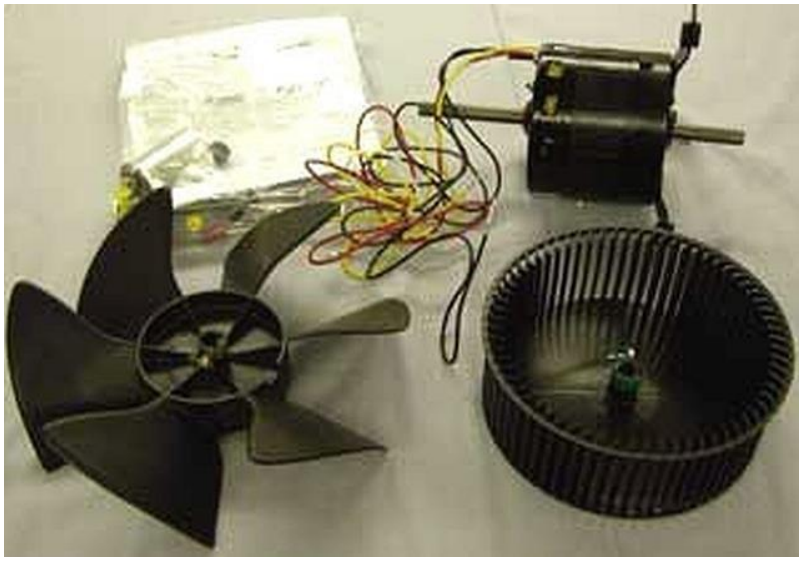


Figure (7) A-C Fan Kit