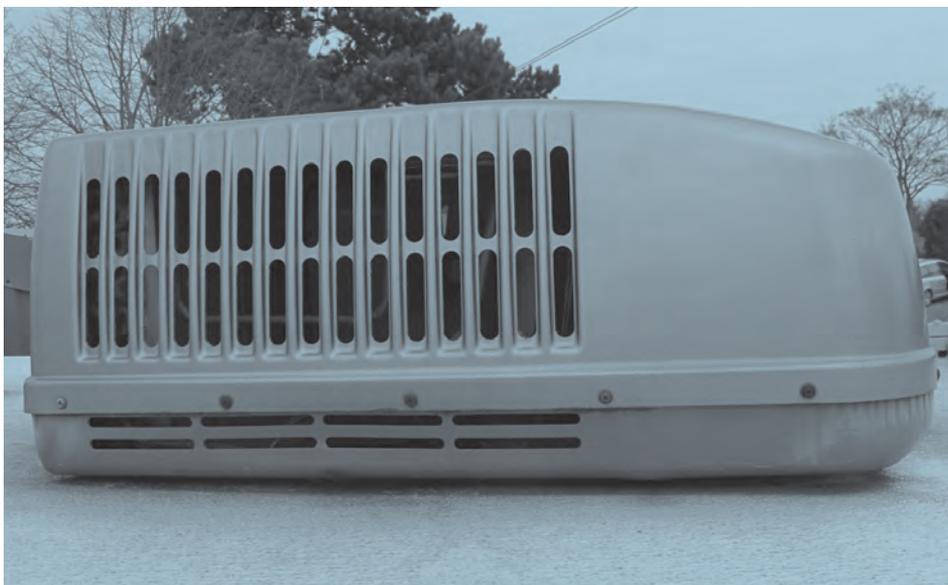


Many RV owners find the workings and maintenance required of roof mounted air conditioning units on RVs a complete mystery and possibly beyond their capabilities to keep them in top working order.

Basic maintenance of these units is fairly straight forward and will avoid expensive repair bills.

DO THE MAINTENANCE BEFORE YOU NEED THE UNIT TO WORK HARD IN WARM CLIMATES.

HOW TO USE AND MAINTAIN ROOF AIR CONDITIONERS



PART 2

AIR CONDITIONER MAINTENANCE

The most important service procedure, other than monitoring voltage, is to keep the roof air unit clean. The roof-top air conditioner should be kept covered in the off-season. This keeps out dirt, debris, and small animals. Remove the cover shroud on a yearly basis and blow out the unit with compressed air, or give it the once over with a vacuum-cleaner hose. Inside the RV, the ceiling cover should be removed frequently and the intake filter pads washed or replaced. Most roof air manufacturers recommend that the intake filters be cleaned every two weeks during continuous use.

General cleaning and maintenance can be carried out by any competent DIYer but if they require any other than a clean and oil then you should get them checked out by an experienced air conditioning service centre.

Before working on any air conditioning unit it is important to remember that, because of the use of high-pressure refrigerant and AC power you should be especially careful before proceeding with any type of maintenance or repair of a compressor air conditioner. In fact, the entire sealed compressor/refrigerant system should not be opened or tinkered with except by a trained technician. There are, however, several things an RV owner can do to check for faults and also maintain the unit in proper working order.

TEMPERATURE TEST

A simple test with a thermometer can help you determine if your system is operating efficiently. Place a thermometer in the outlet air grille, take a reading of the temperature and write it down. Be careful not to touch the thermometer to any metal parts, as this will give a false reading. Place the same thermometer in the air intake, take a reading of the temperature and write it down. Subtract the reading at the intake air grille from

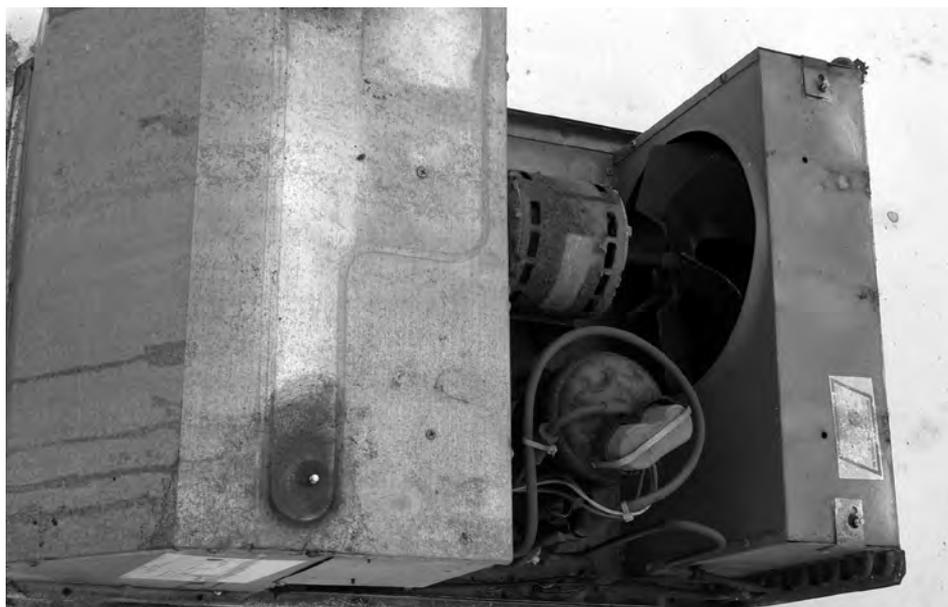
the outlet air grille reading. The amount of temperature change varies with the relative humidity (dampness). Air-conditioner manufacturers design the units to produce a temperature differential between 18 and 22 degrees at 50 percent humidity. When the humidity is higher, expect less of a temperature differential between intake and outlet, the effect caused by humidity can be several degrees, so be sure to consider this with your measurements. If the difference between the intake and outlet readings is too high, you have slow air movement. This can normally be solved by cleaning your filter, cleaning your coil, cleaning your blower fan or by removing any obstructions in the ductwork. If the difference is less than about 16 or 18 degrees you may have a refrigeration problem.

COMPRESSOR EFFICIENCY

Sometimes this problem is caused by the compressor short cycling on high temperature. You can determine this by listening to the compressor outside. If it cuts on and off, it is short-cycling may cause serious damage to the compressor. Check the condenser air flow (outside coil) for obstructions (leaves, dirt on the coil, etc.) and clear all obstructions. Another possible cause of refrigeration problems is a low level of refrigerant, or a drop in the compressor's efficiency. Either one of these two problems requires the help of an airconditioning service technician.

WATER LEAKAGE INTO THE RV

One of the most frustrating problems





Condensate drain (above) and fan drive motor (below) on a Coleman air conditioner.

caused by lack of maintenance in an RV air-conditioning system is water leakage into the RV. This is caused by one of two things: 1) the seal around the air-conditioning unit is loose and/or not fitted properly, causing water to come in when it rains; 2) the condensate drain is blocked.

If you suspect the seal is not fitting properly, remove the bottom cover from your air-conditioner and tighten the four hold-down bolts that secure the unit to the roof (this is usually done from the inside, not the outside). If your seal is in good condition, this should solve the problem. If not, you may have to remove the unit and replace the seal. Many motorhome air conditioners will work loose after the coach has been driven over rough ground for some time, so this should be checked periodically.

The second possible cause of water leaks, and the more common one, is a

blocked condensate drain. This is easily remedied. To begin, turn off all power to the unit at the breaker panel to prevent electrical shock. Remove the outside cover from your unit (on the roof) and clear any obstructions in the drain line. This is a good opportunity to check the outside condenser coil for obstructions. Be sure there are no leaves or any debris that would obstruct the airflow through the outside coil. You can brush and or blow through the coils with an air line or even use a small vacuum cleaner but be careful not to damage the coil. If you have an older model, this is also a time to oil your fan motor which should be done no more than once a year. If your fan motor has no oil holes, there is no need to oil the fan motor because it has sealed bearings. Most air-conditioners made in the last 20 years have sealed bearings.

DIRTY AIR FILTERS

Motorhome air-conditioners come with either one or two intake air filters, and dirty filters are a common problem of low efficiency. Always keep the filters clean;

change them regularly. Dirty filters not only restrict the air conditioner's cooling capacity, but they can also cause damage. Dirty filters can cause icing on the inside evaporator coil from vapourising; when the refrigerant returns to the compressor in liquid form, it can damage the compressor and may require its replacement.

Dirty filters cause slow air movement. One obvious sign of slow air movement is sweating grilles. Ordinarily, this problem can be remedied by cleaning or changing your air filters. Do this routinely about once a month when the

motorhome is in use. Most filters can be simply cleaned by rinsing under a gentle stream of running water. Let the filter stand for a few minutes and air dry before reinstalling it. Finally check the efficiency of your system by using the thermometer test as described above.

FAULT FINDING

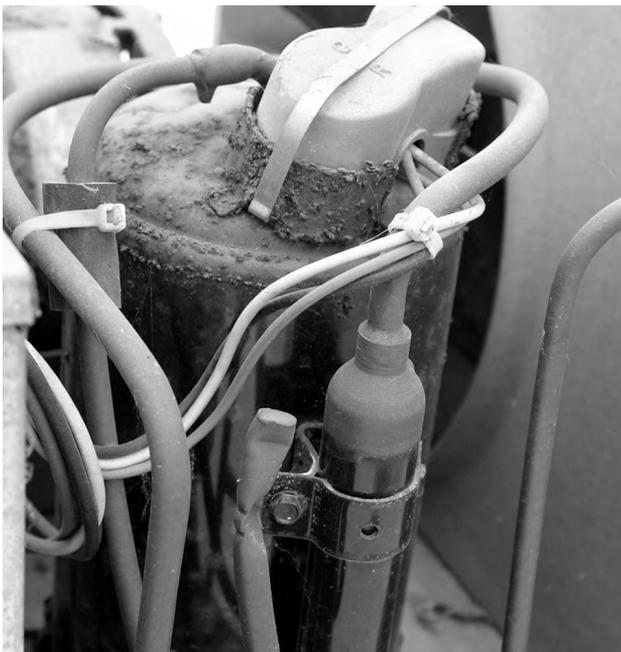
Failure of the air-conditioning unit to operate may be caused by several electrical abnormalities. CAUTION: 120/240-volt AC power can be dangerous and deliver a fatal shock. If you're not certain of the procedures, seek qualified help. Here's what you can do safely:

VOLTAGE CHECK

Check 120/240-volt AC voltage using a multimeter, insert the probe into any convenient outlet inside the RV. It's always a good practice to check the incoming voltage from the available hookups or the onboard AC generator after arriving in the campsite. The minimum voltage while the air conditioner compressor is running should be 100/200 volts. Most air conditioners are equipped with thermal-overload protection that will shut down the compressor if it becomes overheated. Overheating is caused by low voltage; as voltage drops, current rises and that creates abnormal heat. Most thermal-overload controls will shut down the compressor when the voltage is not high enough. The newer electronically controlled air conditioners have electronic protection built into the circuit that automatically shuts down the compressor when voltage drops below a preset limit.

If when you check the voltage it is just above the minimum allowable then monitor it periodically because the voltage may drop further when other users plug in and switch on. If your air conditioner is still running when the voltage is low then it should be turned off until a high voltage is available.

A common cause of low voltage at the RV end of a hook-up cable is an inadequately sized cable and one that is



too long. Only use good quality and properly sized cables and keep them as short as possible. Never leave hook-up cables coiled up when in use because a high load such as an air-con unit will cause the cable to overheat and will probably destroy the insulation. A new cable and connectors is then the only remedy.

If there is no power present, ensure that the power cable is plugged into its proper socket when using generator power (if your RV is so equipped). Usually this receptacle is located inside the same compartment as the hook-up cable. Newer RVs usually have automatic changeover switches fitted when there is an on-board generator. Next check the main breaker and the individual breaker for the air conditioner. If either is tripped, reset and try the air conditioner again. Continual tripping of the breakers is an indication of excessive current draw by the unit itself, low voltage, or a defective breaker. If the generator is the source of power, check the circuit breaker on the generator. If no power is available at the campsite outlet and there is no exterior trip on the hook-up then contact the site warden for assistance.

If power is available to the air-con unit and it still will not operate then the problem may be at the connector terminal under the air conditioner ceiling shroud. To check this connection, turn off all power and remove the control knobs and retaining screws from the panel. Pull the panel down. After ensuring that the control switches connector is plugged in and tight, turn on the power. If the unit will not start at this point, seek qualified help if you are not sure what to do next.

POWER SWITCH CHECK

If the main on-off switch is a manual type and not a solid-state electronic switch, it can be checked with a multimeter (ohms). To check the switch, turn off the 120-volt AC power and remove the ceiling shroud assembly and wires from the on-off switch. Make a note of the proper cable location. With a multimeter, check the continuity from one side of the switch to the other. If the switch is found to be faulty then you get the help of an experienced person.

If all the above checks pass but the motor still does not run, then the cause may be a shorted or burned-out motor. Seek qualified electrical help to determine the condition of the motor and compressor assembly.

CHECKING FOR FAN-OPERATING PROBLEMS

If the fan runs at a slow speed, check these points: (1) Measure the voltage present. Low voltage will cause slow running speed. (2) A tight fan-motor shaft can be tested by removing the outside cover shroud and spinning the fan by hand with the power turned off. Many fan motors (particularly the older ones) have a small oil cup on the top of the motor. Remove the plastic plug from the cup and place three or four drops of an SAE 20 grade non-detergent oil in the cup once a year. Do not over oil. If the motor still is slow and tight, the bearings have

failed and the assembly should be replaced by a qualified service technician.

CHECKING FOR COMPRESSOR FAILURE

If the fan motor operates correctly, but the compressor will not operate when the thermostat calls for cooling then either the thermostat is faulty or the compressor, or control circuitry has failed. The air conditioner's thermostat determines when the compressor will start, make sure that it is set to a sufficiently cool temperature. If the compressor still does not run then the temperature-sensing bulb mechanism that sends a signal to the thermostat may be defective or improperly placed. The thermostat may also be defective. Seek qualified service to check these points.

If the compressor will not switch off once it has started then there are several things that should be checked. (1) Check to see that the thermostat is not set too low. If it is set on maximum cold, the unit will run excessively. (2) Make sure the condenser coils are clean and unclogged. If not, the unit can't cool to its full potential, so it tries to run all the time to make up for the inefficiency. (3) Continuous running may be the result of excessive heat gain. That is, the rate that the RV absorbs heat is faster than the air conditioner can remove heat. In this case the unit will never shut down. Make sure that all windows and doors are closed. If the RV is parked in direct sunlight, seek shade, sunlight causes a great deal of heat gain. If the condition persists, it is simply too hot, or the air conditioner is not large enough to deal with the volume of heat it is receiving.

EVAPORATOR COIL FREEZING UP PROBLEMS

During long-term operation in hot, humid weather the evaporator coils may freeze up, causing the compressor to run continually, but failing to cool adequately because the airflow over the coils is blocked with ice. To correct this situation make sure the RV doors and windows are opened infrequently. Do not release large amounts of heat and steam while cooking. If this cannot be avoided, set the thermostat to a slightly warmer temperature. This will allow the compressor to cycle off more frequently, which will melt any ice buildup. If the buildup is very heavy, the air conditioner should be shut down for a period of time until the ice melts (30 minutes is usually adequate).

Thermostat switch contacts can become stuck together, which will cause the compressor to run on. If this is suspected, seek qualified assistance in testing and replacing the thermostat assembly.

LACK OF REFRIGERANT

The last possibility of compressor run-on is lack of refrigerant. This can only be determined with a pressure test by qualified service personnel. If the system is low on refrigerant, there is most likely a leak in the system requiring repair before recharging takes place. An air conditioner service facility should deal with these problems.

NEXT MONTH MORE TECHNICAL INFORMATION

Troubleshooting the Compressor Air Conditioner

<i>Problem</i>	<i>Possible Cause</i>	<i>Correction</i>
Unit will not run	No 120-volt AC power Tripped 120-volt breaker Defective on-off switch Loose connector plug Defective on-off switch	Connect to power source Reset circuit breaker Replace switch Check connection integrity Replace main switch
Fan runs too slowly	Poor electrical contact Low line voltage Undersize power cord Tight motor shaft Blower/fan misaligned Intake filters clogged	Check all connections Check supply voltage Replace with proper size Check shaft Check alignment Clean or replace filters
Fan runs but compressor will not start	Low voltage Undersize power cord Starting capacitor Improper temperature setting Defective thermostat Defective time delay High compressor pressure Defective compressor	Inspect supply output Replace with correct size Replace capacitor Reset thermostat Replace thermostat Replace delay switch Defective time-delay switch Replace compressor
Compressor will not cycle off	Thermostat set too low Clogged condenser coils Excess heat gain Iced-over evaporator Stuck thermostat switch Low refrigerant charge	Set to warmer temperature Clean condenser Reduce heat-gain areas Turn system off to melt ice Replace switch Recharge unit