



RV REFRIGERATOR MAINTENANCE

Tips for keeping the food in the refrigerator cool, and keeping hungry travelers happy.

Like many other pieces of equipment in an RV, the refrigerator needs periodic maintenance to ensure good performance. The appliance's owners manual usually will refer to the specific items that require attention on a regular basis, but often the language is generic, leaving a bit to be desired when it comes to actually doing the job.

In this article I'd like to delve a bit deeper into the systems and components of RV refrigerators, including some pointers to help make the maintenance process more understandable. Since each refrigerator manufacturer has several different

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models, and the physical location of the various components might vary, I, too, will have to be somewhat general with the descriptions.

The primary advantage of an absorption refrigerator when compared to a compressor refrigerator is the former's ability to operate on both electricity and LP gas. The electrical mode (or modes) requires virtually

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ANSWERS TO SOME OF THE MORE COMMON QUESTIONS PERTAINING TO RV REFRIGERATORS

Why does the refrigerator need to be level?

If the absorber coils are more than 3 degrees out of level, the fluid will accumulate in the downhill turns. This will stop the gravity circulation of the fluid and block the upward recirculation of the hydrogen. The fluid level in the boiler also will be affected, as tilting in the direction of the boiler initially will flood the boiler, and tilting away from the boiler will starve it. A starved boiler will overheat, because of total or partial loss of circulation. If the refrigeration solution is grossly overheated, the sodium chromate in the solution could precipitate, forming small, hard particles capable of restricting or blocking small passages. This damage to the refrigeration solution is cumulative and permanent.

Most of us have heard of "burping" the refrigerator by turning it upside down. This procedure uses the fluid to back flush the system and, it is hoped, dislodge any debris that may be restricting circulation. Although this may work, most often the cure is only temporary, as the debris is still present, and the problem likely will recur.

How much is 3 degrees?

For each 8 feet of length or width, 3 degrees equals 5 inches. Thus, an RV measuring 32 feet long and 8 feet wide would have to be 20 inches off level on one end or 5 inches low on one side to be 3 degrees off level. When half of the bubble on a bull's-eye bubble level falls inside the black ring, this is approximately 1.5 degrees. Most likely, if the coach is level enough for your comfort, it is level enough for the refrigerator. However, when level, the absorber circulation will be at maximum efficiency.

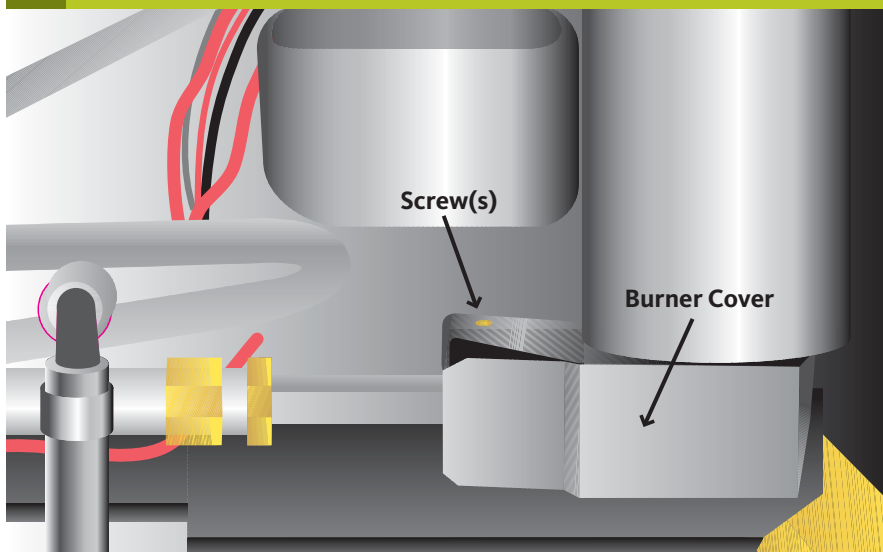
If any water enters the evaporators when a refrigerator is burped, inverted, or carried on its side, the water should gravity drain back to the absorber vessel. In order for this to happen, the refrigerator should be placed upright and level for a few minutes and then tilted in all directions slowly to allow any water to drain out of these pipes. Lightly vibrating the pipes is also a good idea, as it will break any capillary tension. If water remains in the evaporators, it will freeze and cause a restriction or total blockage to circulation. Some replacement cooling units are condemned as defective simply because water got into the evaporators during shipment or handling and the technician did not follow the above procedure after installing the cooling unit. Thus, all the fluid didn't have an opportunity to return to the boiler and absorber vessel.

What if I forget to turn off the refrigerator when the coach is severely out of level and then the refrigerator quits working?

Cooling units made since 1983 have an improved style of boiler construction. A water jacket effect makes it difficult for the boiler temperature to elevate to the point of precipitating the sodium chromate. Again, it's a temperature

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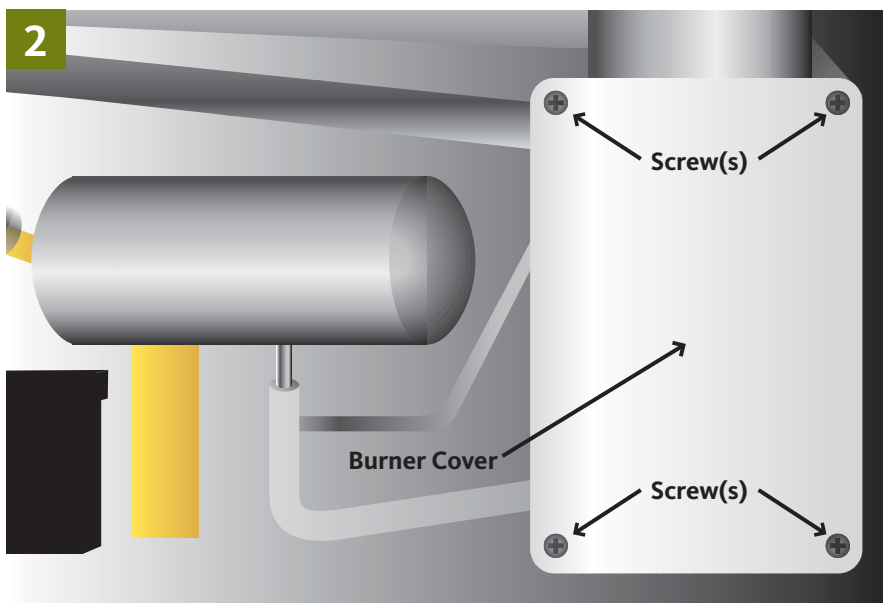
1 HOW TO ACCESS THE BURNER



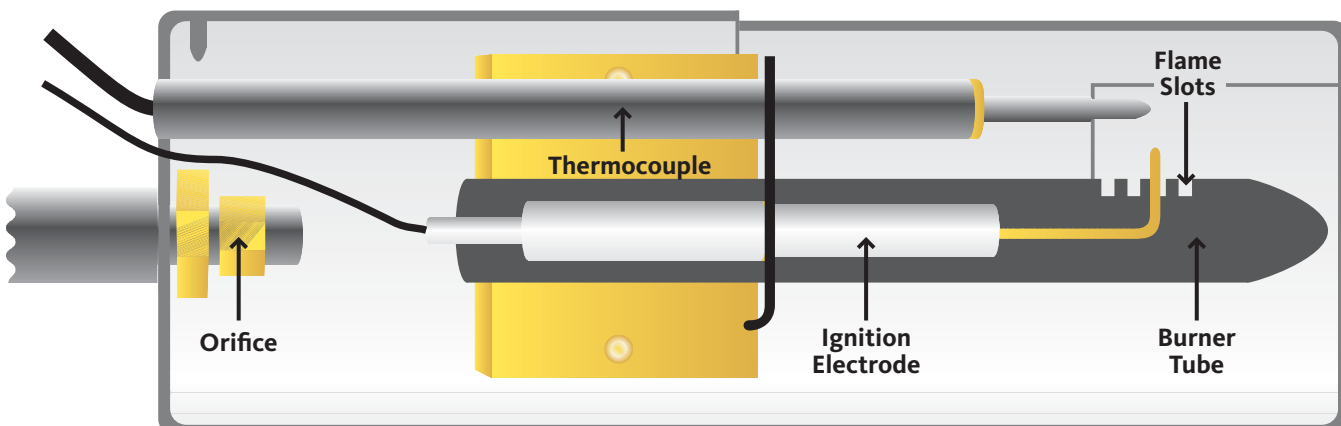
no maintenance as far as the boiler is concerned. The electric element is just a resistance heater that produces a specific amount of heat to boil the refrigerant upon command of the thermostat. If the heating element does not heat, it must be replaced; however, heating elements normally last for a very long time. I have never replaced the heating element in any of the refrigerators in our personal motorhomes. Electric heating element failure is normally the result of over-voltage caused by plugging into an improperly wired outlet, or by a runaway generator or a lightning strike. Normal line surges below 135 volts are not a problem.

The LP-gas mode, however, does require some attention. In order to produce the proper amount of heat at the boiler, several conditions must be right. The LP-gas regulator at the tank must provide 11 to 11 ½ inches of water column pressure. Higher pressure can damage the cooling unit and produce excessive carbon from a richer mixture. Low pressure will result in poor cooling and possible failed ignition at higher altitudes. The new regulators are preset and should deliver the correct pressure for several years. After approximately five years, however, it is a good idea to have a service technician check the pressure and reset it if necessary. The technician can perform a test to determine whether the regulator is faulty and needs to be replaced. An

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3 TYPICAL BURNER ASSEMBLY WITH BURNER COVER REMOVED



article in the January 2003 issue of *Family Motor Coaching* ("Technical Details About RV LP-Gas Systems," page 76) illustrates this procedure for those who are technically oriented.

The next item in the LP-gas operation is the orifice (often called the jet). This is a restrictor with a very small but precisely sized hole that permits the correct volume of gas to flow into the burner. The hole, or the orifice, is predetermined for that particular size cooling unit in order to give the boiler the correct amount of heat. After a few years of operation, the oily, waxy impurities in propane, and possibly some microscopic metal flakes from the gas manifold, may contaminate the orifice and restrict the volume of gas, which would then not produce the proper amount of heat, materially affecting cooling performance in hot weather.

Open the outside refrigerator vent door and you will see a gas line coming into that compartment and terminating at a brass connection on the back of the refrigerator. Follow this manifold along to its termination just before the burner. The final item on the gas manifold is the orifice, pointing at or into the mouth of the burner. The burner is located on the lower right or lower left as you are looking at the back of the refrigerator through the outside vent door. Some sort of sheet-metal shield, held in place by one to three screws, protects the burner from wind gusts. To gain access to the burner, remove the screws and the metal plate (see illustrations 1 and 2), and the burner will be visible.

Operate the refrigerator on LP gas and observe the flame. If the flame is not well-defined or is lazy, this would be an indication of low gas pressure or a dirty orifice. A well-defined flame will have a prominent and erect blue cone over each of the burner slots. A moderate amount of orifice contamination is not distinguishable by visual observation; so, while the technician is checking the gas pressure, have the orifice removed and

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ANSWERS TO COMMON QUESTIONS PERTAINING TO RV REFRIGERATORS

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thing, so no certain time frame can be stated, but in average temperatures it now takes a few hours of critically off-level operation to cause damage. If this does happen, however, turn off the refrigerator and level the RV so all the fluid will return to the absorber vessel and boiler. Allow the cooling unit temperature to come down to the ambient temperature — this will probably take a couple of hours. Then turn the refrigerator back on, and it should resume working.

How long should a cooling unit last?

Cooling units are much like batteries, heat exchangers, and washing machines — they are not going to last forever, and their longevity is unpredictable. It makes little difference whether the cooling unit is working or resting. The metal pipes are exposed to the ammonia, and the anticorrosive agent does not have the ability to stop oxidation completely. If or when the corrosive action of the ammonia penetrates a pipe or a weld, the resulting leakage of ammonia or hydrogen soon will cause the unit to stop cooling.

Many exceptions exist, as some cooling units are more than 25 years old and still work very well. Keep in mind that a household refrigerator operates in a relatively friendly environment. The ambient temperature generally is around 72 degrees, and the appliance rests on a firm, stationary floor. RV refrigerators, on the other hand, are subject to extreme swings in temperature, varying degrees of off-level operation, and trips down jarring highways.

Why doesn't the RV refrigerator cool immediately?

The system must be brought up to its operating temperature in order to distill the optimum amount of ammonia. The amount of cooling available will depend upon the amount of ammonia condensed. The hotter the weather, the more slowly the ammonia condenses. It normally will take approximately 30 minutes before cooling is noticeable on the freezer plate, and around two hours for noticeable cooling of the fins in the cooler. This is a slow system with a limited capacity.

Always precool the RV refrigerator before loading the food, and always precool the food. It could take two to three days before a warm refrigerator loaded with warm food can attain satisfactory temperatures in warm weather.

How can the freezer work great and the cooler not work?

Remember, evaporation takes place first in the freezer. If the cooling unit is failing; has an insufficient heat source, a dirty burner, or inadequate ventilation; is marginally out of level; or for any reason isn't operating at optimum levels, the available ammonia will evaporate first in the freezer. What is left takes care of the cooler. If all the available ammonia is evaporating in the freezer, there won't be any evaporation for the cooler.

Why do I need to adjust the thermostat to a colder setting in hot weather?

Since the system reacts slowly, the thermostat regulates the temperature of the fins in the cooler, not the air temperature. Air temperature in the

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cleaned as well. If you are mechanically inclined, you may remove the orifice and clean it with alcohol. Just rinse thoroughly several times and blow dry with an air hose. A jeweler's loupe or magnifying glass is needed to inspect the orifice after cleaning to ensure that no debris remains.

Now for the maintenance that should be performed at least once each year — or twice a year if the gas mode is used frequently. Although propane is a relatively clean-burning fuel, it is a hydrocarbon (C₃H₈); therefore, it does leave some carbon residue. This usually results in a slight accumulation of carbon on the ignition electrode, the thermocouple, and the inside of the flue tube and spiral baffle (see illustrations 3 and 4). After months of operation, the carbon buildup might become sufficient enough to ground out the electrode and cause the burner not to light at a most inopportune time. Any carbon or debris falling from the flue tube, which is directly above the flame,

could contaminate the burner and reduce the amount of heat available, resulting in poor cooling performance (more noticeable in warmer weather).

After gaining access to the burner, it is easy to dislodge any carbon from the electrode and thermocouple with a small screwdriver. The electrode and thermocouple are directly above the burner and slightly into the flame. For reliable flame ignition, the

tion in the flue.

For optimal cooling operation, the refrigerator needs to expel the heat to the atmosphere through the upper vent. While you are at the back of the refrigerator, look up to make certain that nothing obstructs the free upward flow of warm air from the back of the cooling unit. Birds and squirrels are known for building nests in such sheltered places, and

Closing the door on a food spill, even so slight, can cause a tear in the door seal.

air gap between the electrode and the burner should be 1/8-inch to 3/16-inch. If you have access to compressed air, use only 20 psi to 30 psi and blow away all the debris from the burner area, out of the burner barrel, and up the flue. It's important to use low air pressure only, as you do not want to blow the spiral baffle from its posi-

these types of obstructions have a pronounced impact on the refrigerator's cooling ability.

The most common cause of refrigerator malfunction in the gas mode is debris in the burner area. Most of the time, upon a visual inspection of the burner, the reason for the flame failure is very obvious. You and any

Carrier AirV™ Ceiling Unit Safety Recall

Model Numbers: 68RV0010BA, 68RV0012CA, and 68RV0010EA

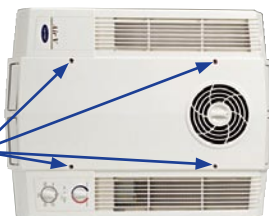
Carrier is voluntarily recalling its AirV™ ceiling units with heater assemblies manufactured between May 2007 and July 2009, with the first 5 digits of the serial numbers ranging from 1807Y (**18th week of 2007**) through 3009Y (**30th week of 2009**).

The heater assembly in the ceiling unit may be defective, which could potentially create a fire hazard. Carrier will retrofit each unit's heater assembly at no charge. The AirV unit should not be operated until the heater assembly has been retrofitted.

Caution: Disconnect external circuit breaker or fuse to the air conditioning unit before removing cover.

Remove 4 cover screws to see model and serial number label.

AirV ceiling unit



Serial & model number label

Carrier Transport AC	MODEL No.	68RV0010BA
Carrier Transport Air Conditioning, Inc.	PART No.	99-00469-02
UL LISTED ROOM AIR CONDITIONER 120V	SERIAL No.	5008Y85439
	Ceiling section Part No.	99-00469-02 or-03
	Is for use with Roof top section	
	Part No.	99-00468-00 or-01

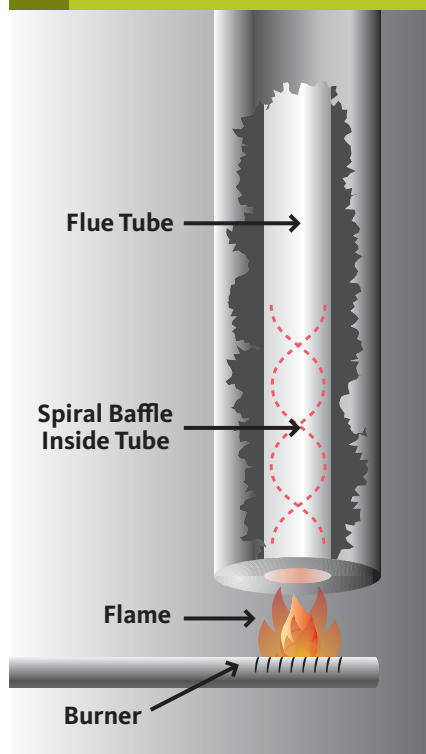
Model number

First 5 digits of serial number (ex., 50th week of 2008)

Please contact Carrier at 1-877-584-7059 or an authorized Carrier Service Center to arrange for the retrofit of your AirV ceiling unit heater assembly.



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travel companions should take the time to familiarize yourselves with the burner inspection and cleaning procedure. If you aren't mechanically adept, have a service technician lead you through the process. It isn't complicated, and just a little familiarization could save you a lot of anguish, time, and money.

The proper gas pressure, a clean jet, a clean burner, and a clean flue will give the right amount of heat in order to produce optimum cooling that is so necessary in hot weather.

The inside of the refrigerator deserves a little attention as well. The door seals or gaskets are extremely important in order to keep the cold air in and the warm air out. Two things contribute to the demise of door seals: accidental food spills that go unnoticed, and mold or bacteria accumulation in the fold of a seal. Many foods will turn into a sort of glue when they dry. Closing the door on a food spill, ever so slight, can cause a tear in the door seal.

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refrigerator fluctuates widely with door openings and is not indicative of food temperature. Heat will be absorbed by the fins, and this heat will be passed on to the absorber to be dissipated out the roof vent. The more heat that reaches the cooler, as in hotter weather, the colder the fins should be in order to be capable of absorbing this greater quantity of heat.

How cold should the freezer be?

During the design process for the cooling unit, the evaporation chamber for the freezer and the chamber for the cooler are sized to provide roughly a 30-degree temperature differential. If the cooler is set for approximately 38 to 40 degrees, the freezer should operate at close to 8 to 10 degrees. However, not even identical items will always operate exactly the same. If you bought two identical cars, I'm certain one would outperform the other. The same goes for refrigerators, so these numbers aren't set in concrete.

How often should the freezer be defrosted?

There is no specific time interval. Remember, the freezer plate is absorbing heat. Moisture in the air will condense as frost on the subfreezing temperature of the freezer plate. The amount of moisture available is dependent on the humidity and frequency of opening the freezer door. Ice making also will contribute moisture for frost. As frost builds up on the freezer plate, the frost becomes an insulator of sorts. Heat must first penetrate the frost in order to get to the plate, so it can be transferred to the absorber and out the roof vent. The more frost present, the less effective the heat transfer. If there is an inch of frost between your ice cream and the freezer plate, the temperature transfer will be much slower. In mild weather, this may not be as noticeable, but if the weather turns very hot, it could affect the food temperature in the freezer. In warm weather, don't let the frost accumulate to more than ¼-inch.

Why do I get so much frost so quickly?

Frost comes from moist air. If your freezer is generating a great deal of frost, it could be that an air leak is allowing this moist air to enter the refrigerator all the time, not just when the door is opened. The most likely suspect would be the door gasket. This can be corrected with a replacement gasket, which should be available for most models. A slight tear in a door gasket may be repaired using vinyl cement. If the gasket checks out okay, it is possible that air could be entering just behind the door seal because of a slight separation of the plastic inner liner from the metal cabinet frame. A small bead of clear silicone sealant around the perimeter of the liner will fix that.

Which mode of operation will give the most cooling?

The gas mode and the 120-volt-AC mode are designed to give near equal performance. On three-way models, the 12-volt-DC mode normally is designed just to maintain the temperature during travel.

Is the 120-volt-AC mode more economical than the gas mode?

This depends on how much you pay for electricity and how much you pay

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Ordinary household dust can accumulate in the accordion fold of the door seal and culture mold and bacteria that can attack the vinyl.

Use a weak solution of liquid soap with warm water and a soft cloth to clean the contact surface of the seal and the face of the refrigerator. Spread the fold of the door seal and clean down in the groove that makes the fold. Given proper care, the door seals should outlast the refrigerator.

When cleaning the interior of the refrigerator, don't use anything that contains abrasives. Doing so will destroy the high luster of the plastic liner and provide microscopic scratches in which bacteria can grow. Again, use a weak solution of liquid soap in warm water. For the final wipe-down, put a few drops of vanilla extract in clean rinse water; this will leave a pleasant, fresh aroma.

Always prop the doors slightly ajar when the motorhome is being stored.

Try to visualize that heat is being absorbed from the food by the colder surfaces of the cooling unit. When there is a heavy layer of frost, the cooling process slows down, as the frost is an effective insulator. (It works very well for igloos.) The colder you operate the refrigerator, the more frost you must deal with. An aquarium thermometer in a glass of water will indicate food temperature as opposed to air temperature. Regulate the food temperature in the range of 38 to 42 degrees Fahrenheit for good performance and minimum frost. Therefore, especially in hot weather, defrost at reasonable intervals.

For the Dometic automatic defrost model (NDA 1402 SideWise), it is very important to set the internal clock to local time for the defrost sequence to begin at an appropriate time. Under certain circumstances, it may be necessary to initiate a manual defrost cycle. Refer to the owners manual for details and instructions.

With a well-maintained RV refrigerator aboard, you should be able to ward off unforeseen problems in operation, ensuring that you and your food keep your cool. **FMC**

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for propane. It will take approximately 20 kilowatt hours of electricity to operate a refrigerator for the same period as one gallon of propane. Multiply your kilowatt rate by 20 and compare this to the cost of a gallon of propane. The smaller number indicates the most economical mode.

Why do some people tell me not to operate the refrigerator using propane while traveling?

This is a safety issue. If you have an accident, the refrigerator flame could kindle a fire or spark an explosion. Should there be personal injury or loss of life, criminal charges could result, depending upon the circumstances and the prevailing laws of that jurisdiction. In the case of motorized RVs, the 12-volt-DC mode works very well when traveling. If you have a two-way model and the vehicle is equipped with an inverter, install an inverter outlet for the refrigerator and run it on inverted 120-volt-AC power while traveling down the highway. With the refrigerator turned off and the doors left closed, the unit will maintain its temperature for four to six hours even in warm weather. Most of us don't drive longer than that anyway.

Should a fan be added to the rear of the cabinet to help move the air?

A healthy cooling unit with proper ventilation does not need a fan. Tests have shown that some fans, if improperly placed, actually hinder natural air circulation.

What about the little fan on the inside of the cooling compartment?

If you pack the refrigerator so tightly that air can't circulate naturally, the fan won't be able to accomplish this task, either. Natural convection airflow exists inside the cooling compartment. Cold air is heavy and falls downward from the cooling fins to the bottom of the compartment. It then circulates toward the door, up the front, and back to the fins. Shelf liners and plastic bags used to hold fruits and vegetables will block this circulation, and uneven temperatures will result. When the person packing the refrigerator leaves a little room for air circulation, this natural current will supply reasonably even temperatures. If you want to use a fan, place it so that it assists the natural airflow — blowing down in the rear or up in the front.

What should I do if my cooling unit fails?

You have three options. You can have a rebuilt cooling unit installed, which is the most economical option initially. Most rebuilt cooling units have a limited life, probably averaging about a year. The second option is to install a new cooling unit. The new unit will have a longer life expectancy, and you also may find that an extended warranty is available and that service can be obtained from a network of the manufacturer's warranty stations. The third choice is to install a new refrigerator. Sometimes the cost of the second and third options is so similar that installing a new unit becomes more realistic.

My personal standard is rather simple. I don't spend major dollars repairing old equipment. Be it a refrigerator, a washing machine, or any other appliance, if it is more than five years old, I'll buy a new one and get the added advantage of a full warranty. **FMC**