



Cooling units built to last

800.227.3180

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How a Cooling Unit Works

RV refrigeration manufacturers have known the value of zinc protection for decades. In fact, all Dometic cores with tubes extending into the freezer compartment have a galvanized coating on these tubes to prevent rusting in a visible area. At one time Dometic also galvanized the tubes in the foam block. New models marketed within the last 20 years do not have this protection, giving ATCO cooling units a dramatically longer life than new Dometic or Norcold cores. We are the largest cooling unit manufacturer, new or remanufactured, to do this full-tube-set galvanizing. We believe with the new generator design and galvanized tubes, an ATCO replacement cooling unit will last longer than a new refrigerator.

Not Your Kitchen Refrigerator

An RV refrigerator works very differently than a household refrigerator. To get the most out of an RV refrigerator, it's helpful to know how the cooling unit keeps things cool. The refrigerator has hundreds of parts, and the cooling unit is the single most costly part to buy and the most time-consuming one to change. So you should be sure the cooling unit is the problem before replacing it. (See the Support section of our Web site for helpful information.)

Cooling Using Natural Forces

An RV refrigerator cooling unit uses ammonia as the refrigerant and has NO moving parts. No compressor, no fan, no pump. It does its job by using basic forces of nature, a minimum of added energy, and the principles that evaporation causes cooling and that water wants to absorb gaseous ammonia.

A Closed-loop System

The unit itself is 50 to 60 feet of steel tubing in a closed-loop system. It has a few cups of ammonium hydroxide (ammonia and water) refrigerant that is boiled in the boiler/generator to create a vapor that rises to the top of the unit. At the top, the condenser fins cool the vapor into a liquid that is rich in ammonia. This liquid, by gravity, flows down to a section of tubes that allow it to evaporate, causing cooling. This first set of cooling tubes is in the freezer section and is sometimes referred to as the primary evaporator.

A section of the tube set is covered with a rigid polyurethane foam block. This keeps the tubes insulated from the warm ambient air so they don't pick up heat from the outside. A tube comes out of the foam block in the refrigerator area, where it usually has an aluminum fin assembly screwed onto it to collect heat from the refrigerator box. This is called the secondary evaporator.

The Top-down Evaporation Cycle

In the top end of the unit (from the primary to the secondary evaporator) the rich ammonia fluid has been evaporating to cause cooling. After flowing through the evaporator sections the fluid is spent of its evaporating ammonia, and any remaining fluid is joined with the weak fluid from the boiler and flows into the oblong spiral of tubes above the tank. These are called absorber tubes, and their purpose is to allow the fluid to pick up gaseous ammonia that comes up from the tank that acts as a reservoir of ammonium hydroxide. The fluid absorbs the ammonia as it travels to the tank. The tank has a tube coming out the bottom that feeds the boiler to start the process all over again.

In Summary, the Sequence of Processes is:

- Liquid ammonium hydroxide is boiled;
- The ammonia vapor is condensed into liquid;
- The rich ammonia liquid evaporates;
- The weak ammonia liquid absorbs gaseous ammonia and is returned to the reservoir tank.

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How a Cooling Unit Works

Rust: the Enemy

Although many owners assume a cooling unit failure is caused by “blockage,” about 25 years ago manufacturers changed the boiler design to greatly reduce the tendency for the boilers to block. Until that redesign, the most common problem was a blockage caused by the anticorrosion salt additive in the refrigerant plating out on the inside of the boiler tubes. Today, the presence of a blockage is unusual.

By far the most common reason for cooling unit failure is the rusting of the tubes within the foam block. These tubes are encased in foam because they are cold and must be insulated from the warm air outside the refrigerator. Because these tubes are cold, they attract moisture that condenses on the outside of the tubes, causing them to rust through. Once there is a small leak, you might smell the ammonia that is characteristic of a failed unit. Sometimes these leaks are very small and are positioned so they off-gas the ammonia very slowly out the back of the unit, and you’ll smell nothing.

Galvanizing: the Answer

ATCO cooling units are galvanized to protect against rusting in the foam block. Galvanizing involves bonding pure zinc to the tubes encased in the foam block, a process that produces a protective coating with superior rust-resistant properties—and a process that only ATCO America Galvanized offers.

The advantage of a galvanized coating on the steel tubes within the foam block is based on the properties of the zinc itself. Zinc has a sacrificial nature, meaning it will be attacked by moisture first and give itself in protection of the steel. This is called cathodic protection, and it is the primary reason zinc is the best coating available.

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RV Refrigerator Cooling Unit Removal and Installation Instructions

Please carefully review these instructions, along with the Troubleshooting document on our Web site, when troubleshooting, removing or installing any cooling unit.

Removal Instructions

1. Turn off the propane.
 - a. Light the stovetop burner to burn off any propane left in the gas line.
 - b. Turn off the burner when the flame dies.
2. Disconnect the 12-volt DC power supply at the back of the refrigerator.
 - a. Tape off exposed wires with electrical tape.
3. Disconnect the propane line from the refrigerator.
 - a. Always use two wrenches when disconnecting the line. This will support the other fittings and prevent damage to them.
 - b. If the propane is turned on to the rest of the coach before the refrigerator is re-installed, plug the line to the refrigerator with the proper fitting and check for leaks with soapy water.
4. Unplug the 110-volt AC power cord.
 - a. Make sure the cord is not wrapped around anything, and then tuck the cord into the absorber (large coiled tubes).
5. Remove the two mounting screws or bolts (the type of fastener will differ by model) that hold the back of the refrigerator to the cabinet.
6. Remove the door(s).
 - a. Remove the top plastic trim (eyebrow) of the refrigerator.
 - b. Remove all hinge pins and take off door(s).
 - c. Remove the four to six plastic screw covers and the screws behind them.
7. Silicone is often used to seal the bottom edge of the refrigerator.
 - a. Cutting the silicone with a razor knife will make the refrigerator removal easier and won't rip the paneling.
8. Carefully push and pull the refrigerator until it slides out from the cabinet.
 - a. If possible, remove the refrigerator from the RV to continue with disassembly.
9. In the freezer compartment, remove all the screws that go through the back wall or into the freezer shelf.
 - a. Remove any freezer shelf and trim pieces.
10. Detach the thermistor or capillary tube from the fins inside the refrigerator compartment.
 - a. Some models will need to have it carefully removed from the refrigerator compartment. Dometic models RM 760, 761, 763, 1300, 1301 and 1303 have the capillary tube entering the back left of the refrigerator through a hollow sleeve. Pull the capillary tube out of the hollow sleeve and carefully tuck it out of the way of the cooling unit.
 - b. These parts can add time and expense if you're not careful in handling them. Capillary tubes are hollow; if they break, you need to replace the entire thermostat.**
11. Remove all screws from the refrigerator fin assembly.
 - a. If the screw heads start to strip, lay the refrigerator on its back so added pressure can be applied to the screws. This problem is most common with Norcold refrigerators.

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12. Refrigerator fins are attached in different ways, varying by make and model.
 - a. Norcold refrigerator fins will remain in place in the box during the entire removal and installation process. (The screws will be removed.)
 - b. Double-door Dometic fins will be extracted with the cooling unit (with the exception of the RM 100).
 - c. Single-door Dometic fins will be removed from inside the refrigerator.
 - d. If you are unsure of the procedure for your unit, remove all fin screws and determine if the refrigerator fins are behind or in front of the plastic liner. Fins that are in front of the liner can be removed before the unit is taken out.
13. Lay the refrigerator face down on the floor, using a blanket or some other protection under the front edge and hinges.
 - a. Remove all plastic trim to avoid damage to the bottom trim, door locks, etc.
14. Dometic double-door refrigerators have exposed freezer tubes that can be used to help extract the cooling unit. Please place a piece of 6x6 wood, 10 to 11 inches long, on the floor. Lay the refrigerator face down so the freezer tubes rest on the wood before the refrigerator touches the floor. This will help push the cooling unit out after the screws are removed.
15. Remove all cooling unit mounting screws from the back of the refrigerator.
16. Label and disconnect the heating element wires from the terminal junctions.
17. Remove the burner cover and mounting screws.
 - a. Some Dometic refrigerators have a lever lock burner mount. Remove it now.
 - b. Some models require the complete removal of the burner line and thermocoupler so the cooling unit will clear.
 - c. Some models require the complete removal of the circuit board and burner so the cooling unit will clear.
 - d. Check for a ground wire on the bottom of the cooling unit and remove it.
18. Make sure all cooling unit mounting screws have been removed.
 - a. Dometic models RM 760, 761, 763, 1300, 1301, 1303, 2800, 2801 and 2803 will usually have hidden screws near the large tube coming from the foam block. Look closely; you will have to remove some of the foil and foam backing to see them.
19. Pry and pull on the large tube near the middle of the cooling unit only.
 - a. Avoid prying on any brackets, as they may break away from the cooling unit, causing a spray of ammonia.
 - b. When using a pry bar, protect the refrigerator box with a block of wood under the pry bar to help prevent punctures.
 - c. If you're using a block of wood in the freezer of Dometic models (see step #14 above), push hard and steady on the top corners of the refrigerator toward the floor. When the seal is broken the cooling unit can be removed.
 - d. All cooling units need a steady lift on the large tube coming out of the foam block to be removed.
20. If the fins are still attached, carefully remove them without bending them.
 - a. If necessary you can chip away some of the foam block of the unit to assist in removal of the fins. Do not damage the foam of the refrigerator box.
21. Remove the sheet metal, insulation, heating element and flue tube baffle from the old cooling unit.
 - a. Install these items onto your new ATCO America cooling unit.
 1. If the insulation is wet it has to be dried or replaced with high-temperature insulation before installing the sheet metal on the cooling unit.
 2. If the insulation is wet, check your RV refrigerator roof vent and repair or replace it if it's damaged or missing, to prevent future leaks. Insulation must be dry for the unit to function properly.

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1. Clean all the old thermal mastic from the fins, freezer shelf or the back of the freezer plate.
2. Shave down the foam as needed to allow the back of the fins to sit flush and make contact with the evaporator tubes. A wood rasp works well for this purpose. The secondary evaporator tubes in the face of the foam block should protrude slightly from the foam.
 - a. Before applying thermal mastic, dry-fit the cooling unit to the refrigerator box to make sure the foam block fits correctly. If necessary, trim the foam block to obtain an optimum fit, keeping the freezer tubes level. Recheck the fit and take the cooling unit back out of the refrigerator box.
 - b. Attached to the cooling unit is a bag of thermal mastic. Remove the bag and cut one corner off.
 - c. Squeeze the bag of thermal mastic so a 1/2-inch bead is applied to the exposed tubes in the foam block and the tubes that are covered by the aluminum freezer shelf.
 - d. **Do not spread transfer mastic on the foam block!**
3. Norcold fins remain in the box. Do not attach them before setting the cooling unit in the box.
4. To install flush-mount cooling units (Norcold and Dometic):
 - a. With transfer mastic applied, press the cooling unit in place.
 - b. Install one screw in the top of Norcold models and two screws in the top of Dometic models. Carefully stand the refrigerator up and check the alignment of the freezer screw holes.
 - c. **Never drill new holes in the cooling unit!**
 - d. Install all the freezer screws and fin screws.
5. You may need to put new holes through the refrigerator fins of Norcold models to align the cooling unit screw holes.
 - a. Set the refrigerator down on its face and continue securing the cooling unit.
 - b. On Norcold models the boiler (generator) tube on the right should be parallel with the edge of the refrigerator when secured.
6. To install Dometic cooling units with perpendicular freezer tubes:
 - a. With transfer mastic applied, fasten the refrigerator fins to the cooling unit.
 - b. Set the cooling unit into the box and fasten it to the refrigerator.
 - c. Stand the refrigerator up and install the freezer trim and shelf. Also make sure the freezer shelf with the tubes is level, using a two-way level.
 - d. If the tubes from the cooling unit are not visible, the level should be placed on the freezer compartment floor.
7. Airtight installation is important on all cooling units.
 - a. We recommend one of two options. The first is to seal the seam between the foam block and the refrigerator box with silicone caulking. The second is to use a putty knife to push fiberglass insulation into the crack of the seam and then cover the seam with foil-backed or duct tape.
 - b. Failure to seal the seam will cause inadequate cooling.
8. Finish attaching all remaining parts: burner, heating element, circuit board, capillary tube, etc.
9. Rock the refrigerator 45 degrees off vertical in all four directions to ensure the liquid is at the bottom before start-up.
 - a. If possible, test the refrigerator before installing it in the RV.

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10. Install the refrigerator in the RV.
 - a. Make all the proper connections.
 - b. When the propane is turned on, check all the fittings for leaks with soapy water.
 - c. Tighten all the leaks you discover.
 - d. Let the refrigerator run for six to eight hours on electric, if possible. Put a thermometer in the freezer and refrigerator compartments, and do not open the door.

To Best Serve You after Installation, it is Helpful to Have the Following Information:

1. Make, model and ATCO identification number from the tank of the unit you purchased.
2. Freezer, refrigerator and ambient temperatures.
3. Verification that the freezer is level.

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