Before You Change That Cooling Unit

Dometic
DUO-THERM

REFRIGERATOR
BULLETIN R61/7A
DEC. 1987

PART I. PROPER DIAGNOSIS

Cooling units are sometimes diagnosed as being defective when the actual problem is something else. Cooling units are expensive to replace, so it is important to make the correct diagnosis. By using the proper test procedures, you can eliminate all other possibilities before condemning the cooling unit.

Any time the cooling unit is a possible suspect, use the following step-by-step procedure before replacing it.

A. PRELIMINARY CHECKS

1. Check for an ammonia smell around the cooling unit and inside the refrigerator. This could indicate a possible refrigerant leak. Check for any deposits of yellow powder on the tubing which will sometimes form around the area of a leak. **NOTE:** A yellow deposit in the area of the fill valve could be due to splashing of refrigerant during manufacture, and would not indicate a leak.

2. Determine if the refrigerator works on one heat source but not another by testing it in the alternate modes. Also, ask the customer if he gets better cooling results from one energy source than another. If this is true, it indicates the problem is <u>NOT</u> in the cooling unit.

3. Make sure the refrigerator is level. Sometimes the vehicle is level but the refrigerator is not, due to improper installation. Place a level on the bottom of the freezer compartment and check side-to-side and front-to-back levels (see FIG. A1). Use a mirror, if necessary to read the level.

4. Carefully check door gaskets for proper seal. A leaking gasket can allow enough warm air inside the refrigerator to overcome most of the cooling being produced.

   For a simple method to check gaskets, close the door on a dollar bill, then pull the dollar bill out. If no resistance is felt, the gasket is not sealing properly. This should be done on all four sides of the door.

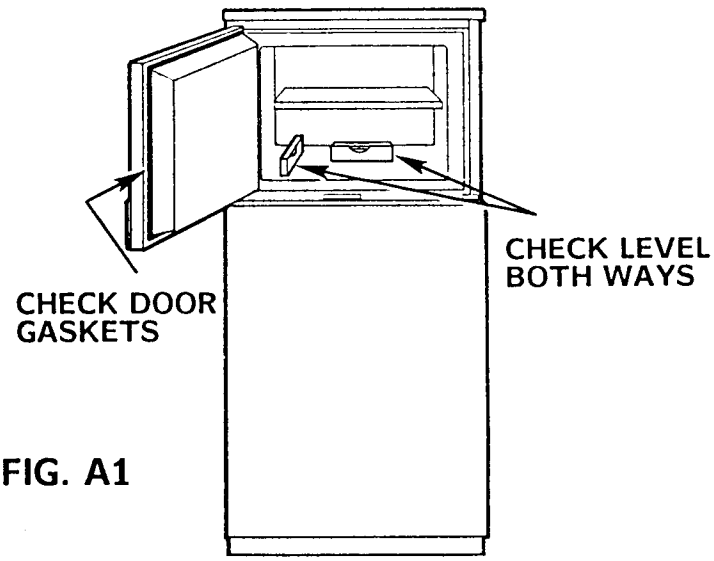
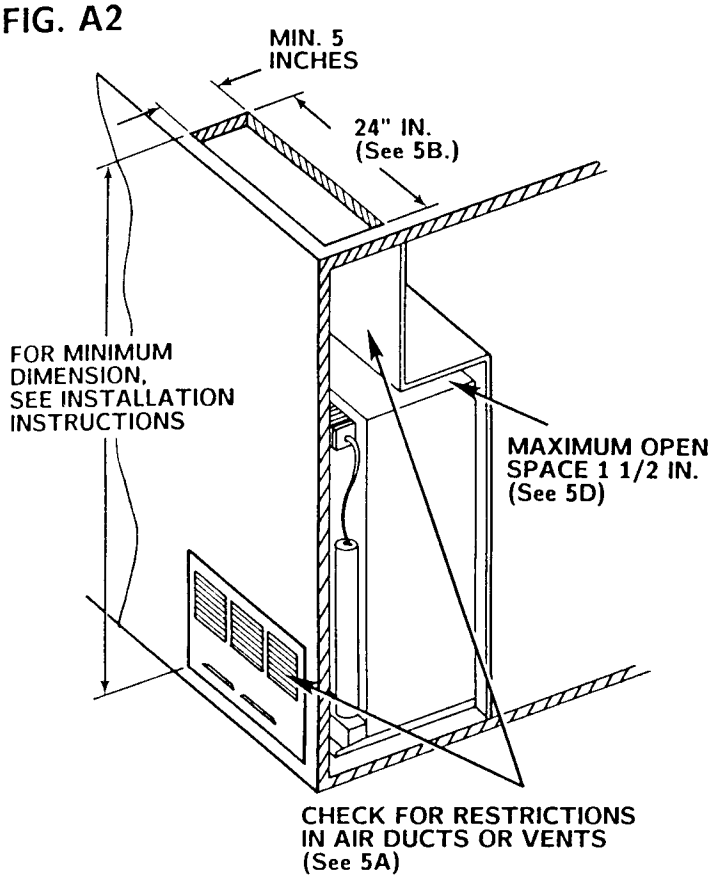


FIG. A1

5. Check the venting system to insure that ample air flow is provided at the back of the refrigerator.
   A. Check for, and remove, any restrictions in the vents, such as filters installed by the customer, bird nests in the roof vent, or smashed louvers in the wall vents (see FIG. A2).
   B. Make sure the correct roof vent has been installed. Larger models such as RM 100, 760, 761, 1300, 1303, 2600, 2800, 2802, 3600, 3800, 3802 and 4801, require a 5" X 24" opening for the roof vent. Smaller models will also use the 5" X 24" roof opening. To check this, measure the actual opening in the roof - **DO NOT** measure the roof vent itself. See FIG. A2.

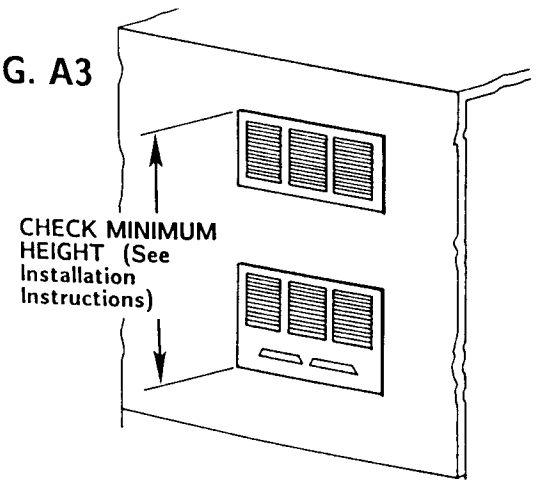
Also, make sure the distance from the bottom of the refrigerator to the roof vent is at least the minimum dimension given in the Installation Instructions for each model. See FIG. A2.

FIG. A2



C. Some smaller models may be installed with two side wall vents instead of using a roof vent. For this type of installation make sure the top of the upper vent is the correct distance above the refrigerator. See FIG. A3. The minimum dimension for this measurement is listed in the Installation Instructions for each model.

FIG. A3



D. Check the open space above the refrigerator. If this space is 1 1/2 inches or more it must be blocked off to prevent hot air from being trapped above the refrigerator. See FIG. A2.

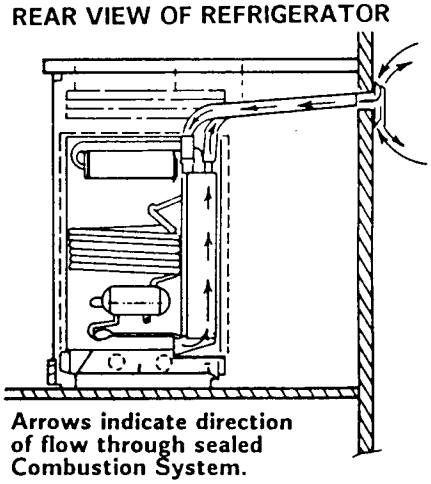
If venting is suspected as a problem, run the performance test described below with the refrigerator installed, then run the same test with the refrigerator removed. If there is a definite improvement in performance, a venting problem is indicated. Also, see **Section B. PERFORMANCE TEST, Item 9.**

SPECIAL VENTING FOR DIRECT-VENT MODELS RM 182, 215, 2192

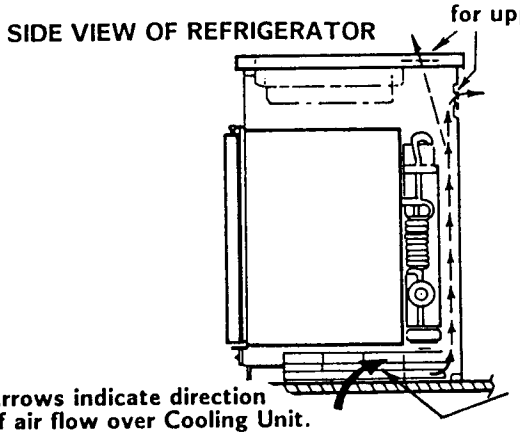
These models are designed to be installed in small vans and are usually placed in a cabinet that is not open to the outside of the vehicle. This means that air from within the vehicle must be used to cool the condenser.

Customers with this type of installation must be made aware that the vehicle interior must be kept from getting too hot. If the vehicle is left parked in the sun, with all doors and windows closed, the inside temperature can quickly exceed 100 degrees, and the cooling process will slow down or stop completely.

REAR VIEW OF REFRIGERATOR



SIDE VIEW OF REFRIGERATOR



B. PERFORMANCE TEST

1. First perform all the preliminary checks described previously.
2. Remove all food from the refrigerator and place all controls in the OFF position.
3. Place an accurate thermometer in an ice cube tray, half filled with water, and place the tray in the center of the lower food storage compartment. **NOTE**: If a remote-reading thermometer is used (allowing temperature readings without opening the door) the tray of water is not required.
4. Make sure the AC heating element is the correct wattage for the model being tested, and that the resistance reading is correct. (See *"Checking Resistance of a Heating Element"* below.)

   Connect 120 volt AC power directly to the heating element leads (make sure the leads are not connected to the refrigerator circuit), then check the voltage at the element with a volt meter. Reading must show at least 115 volts.

CHECKING RESISTANCE OF A HEATING ELEMENT

A simple test to check a heating element is to measure the resistance through the element with an ohmmeter. The correct resistance, in ohms, can be calculated if the wattage and voltage ratings are known. (These ratings are stamped on all Dometic heating elements.)

Use this Formula:

Volts ÷ (Watts ÷ Volts) = Ohms

Example:
Heating element rated 135 Watts at 110 Volts.

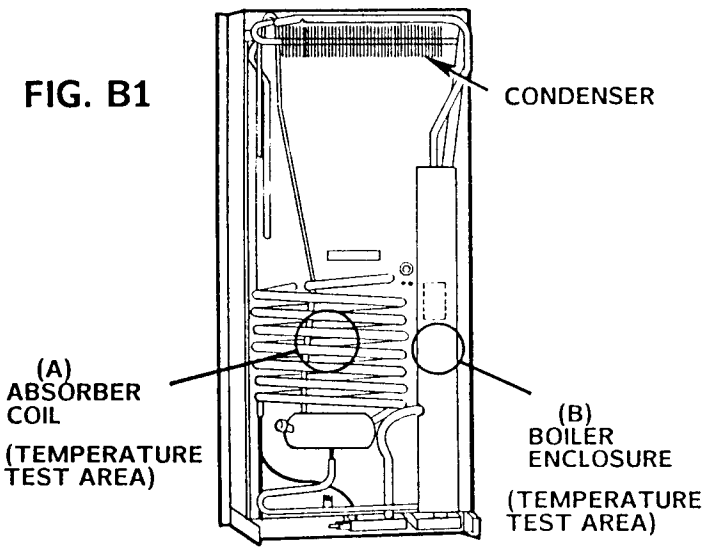
110 ÷ (135 ÷ 110) or,
110 ÷ 1.23 = 89.4 ohms

The ohm reading should be within 10% of this figure, or between 80.46 and 98.34 ohms. Use the lowest setting on the ohmmeter which will give an accurate reading.

When testing a 12 volt heating element, a very accurate ohmmeter must be used because of the very low readings that will be found. For example, a 200 watt element will have a reading of .72 ohms (less than 1 ohm).

5. After two hours of operation, check the temperature on the back of the cooling unit with your hand, at the locations shown.

FIG. B1

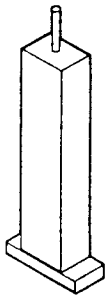


Under normal operation the temperature at the absorber coils **(A)** and the boiler **(B)** should be approximately the same. If the temperature at the absorber coils **(A)** is much hotter it indicates loss of refrigerant and the cooling unit must be replaced. If the temperature at the boiler **(B)** is very hot and the absorber coils **(A)** are cool it indicates that the refrigerant is not circulating properly. This could indicate:

A. Liquid trapped in the evaporator sections, caused by out-of-level operation for a period of time. Resetting the refrigerator to a level position will not necessarily correct the problem as liquid can remain trapped even after level is corrected. Shut off the heat source and let the system cool down, then re-start it and observe the temperatures at **A** and **B** again after several hours. If the same condition exists it could indicate:

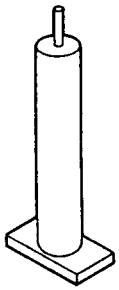
B. A permanent blockage within the boiler pump tube, caused by too much heat applied to the burner (oversized orifice or heating element) or prolonged operation of the unit when out-of-level or with restricted ventilation. This type of blockage consists of hard deposits inside the boiler pump tube. This condition is not repairable and the cooling unit must be replaced.

NOTE: The cooling units currently being used are specially designed to prevent overheating of the boiler tube even when operated out-of-level. This special design can be identified by the round insulation box around the boiler, rather than the square-cornered box used on older units.



Older Style Boiler Enclosure

FIG. B2



Current Style Boiler Enclosure

Blockage symptoms on the newer cooling units almost always indicate trapped liquid in the evaporator, which can be corrected by proper leveling and allowing the cooling unit to cool off before restarting.

6. If the temperatures are satisfactory in Step 5, continue operating the unit, with power directly to the heating element, for a total of 10-12 hours. The doors must be kept closed for this entire period.

7. If the temperature is within the previously mentioned guidelines the problem is not in the cooling unit. See **Section II. OTHER CAUSES** for additional items that could be causing a loss of cooling.

8. If the temperature in the food compartment is higher than the acceptable limit, the cooling unit is probably defective. If you are still in question as to the performance of the cooling unit, please contact our Technical Service Department (219) 463-4858. See the next paragraph before changing the cooling unit.

9. The importance of adequate air flow across the cooling unit cannot be emphasized too much. A minor restriction in the venting system will not create a problem on cooler days - the available air flow will still provide adequate cooling due to the lower temperature. However, on a hot day (90° or more) even a minor restriction will cause overheating of the cooling unit and the cooling process will slow down or stop.

■ ONE LAST CHECK ■

If the previously mentioned test was performed in air temperatures above 90°, and the temperature in the refrigerator is above the acceptable ranges, it may indicate a restricted air flow. To make sure there is no problem with the venting system repeat the performance test with the refrigerator removed from its installed location and placed on the floor, or in your service shop. If the second test indicates satisfactory performance, re-check the venting and installation.

PART II. OTHER CAUSES FOR LOSS OF COOLING

If the previously mentioned performance test shows that the refrigerator is working satisfactorily, and the customer still experiences loss of cooling, the following items need to be considered:

1. Make sure the customer is using the refrigerator properly. The cooling capacity of an absorption refrigerator is usually much lower than the refrigerator the customer has in his home, so the customer should be advised to follow the instructions for proper use in his Owner's Manual.

   A. Start the refrigerator the day before it is to be filled with food.
   B. When the refrigerator is being filled when preparing for a trip, the food should be pre-cooled, and frozen foods should be pre-frozen, before placing them in the refrigerator. Ice making should be avoided until the refrigerator has cooled the lower compartment to the desired temperature.
   C. Air circulation within the food compartment is important for proper cooling. **DO NOT** place paper on the shelves or over-fill the compartment with large cartons, etc.
   D. Do not put hot food in the refrigerator. Allow it to cool in room air first.