

Servel® RA1302
Refrigerators

DIAGNOSTIC SERVICE MANUAL

by
The Dometic Corporation

Foreword

This service manual is the result of the dedication of The Dometic Corporation and its engineers in giving service people the necessary instruction for making accurate analyses of certain conditions. Provided is a diagnostic chart leading a qualified mechanic into the service manual pages to locate and solve symptoms which may occur. Dometic has continued its commitment in providing service people with this, the most up-to-date information about servicing Dometic RV accessories.

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This program will address the most common system problems associated with the RA1302 Refrigerators supplied by The Dometic Corporation. Our intent is to provide you with a guideline of checks to make, should you encounter one of the following symptoms.

SYMPTOM	CAUSE	REFER TO SECTION	STEP
1. No operation	Wiring Switch	5 2.3	
2. No electric operation 	AC Volts Heating Element Thermostat Switch Wiring	1 2.1 2.2 2.3 5.2	
3. No gas operation - no spark	Igniter Electrode High Voltage Cable Switch Wiring	4.12 4.13 4.14 2.3 5.2	
4. No gas operation - sparks but no flame	LP gas Filter Orifice Burner Shutoff Valve Safety Valve Thermocouple	3 4.2 4.11 4.7 4.1 4.5 4.6	
5. No cooling on any mode	Level Ambient Temperature Cooling Unit	6.1 6.5 6.6	
6. No cooling on gas - cools properly on electric	LP Gas Thermostat Filter Orifice Burner Flue Baffle Flue Tube	 4.3 4.2 4.11 4.7 4.8 4.10	
7. No cooling on electric - cools properly on gas	AC Volts Heating Element Thermostat Switch Wiring	1 2.1 2.2 2.3 5.2	
8. Insufficient cooling on all modes	Level Ventilation Ambient Temperature Air Leaks Thermostats Cooling Unit	6.1 6.2 6.5 6.3 2.2 & 4.3 6.6	
9. Insufficient cooling on electric - cools properly on gas	AC Volts Heating Elements Thermostat	1 2.1 2.2	

SYMPTOM	CAUSE	REFER TO SECTION	STEP
10. Insufficient cooling on gas - cools properly on electric	LP Gas Pressure Thermostat Filter Orifice Burner flue Baffle Flue Tube	3 4.3 4.2 4.11 4.7 4.8 4.10	
11. Freezes on electric - cools properly on gas	Thermostat Wiring	2.2 5.2	
12. Freezes on gas - cools properly on electric	Bypass Screw Thermostat	4.4 4.3	
13. Won't stay lit on gas	LP Gas Safety Valve Thermocouple Flue Baffle flue Cap Orifice Burner	3 4.5 4.6 4.8 4.9 4.11 4.7	
14. Rapid formation on frost	Food Storage Air Leaks Interior Liner Seal to Frame High Humidity	6.7 6.3 6.9 6.8	



SECTION 1

AC VOLTAGE REQUIREMENTS

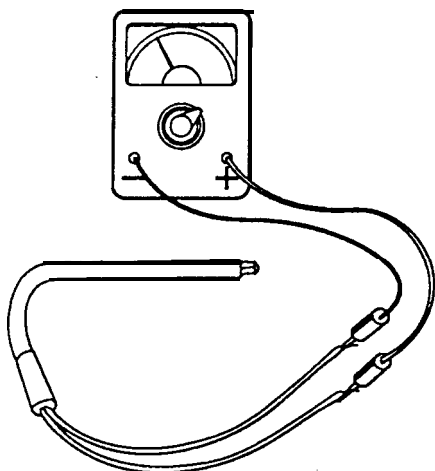
The refrigerator is a 120-volt AC, 60 Hz appliance. The proper operating range is 100 to 132 volts. Check the AC volts at the receptacle where the refrigerator is attached. If voltage is outside of the proper operating range, correct the power source problem.

SECTION 2

AC COMPONENTS

2.1 HEATING ELEMENT

The heating element is designed to deliver a predetermined amount of heat to the cooling unit. To check a heating element, remove the heater leads from the terminal block and measure for proper resistance across the two leads with a properly calibrated ohm meter. This check is to be done with the heating element at room temperature. The proper ohms for the RA1302 is 44 with a tolerance of ten percent. If the resistance is outside the tolerance range, replace the heating element.



2.2 THERMOSTAT

The thermostat is a combination electric/gas component. In this section the electric portion is covered. To diagnose the thermostat in the gas mode, see Section 4.3.

The thermostat is calibrated by the manufacturer so that at mid-range, the cabinet temperature should be approximately 40 degrees Fahrenheit. Mid-range is a setting of 4. To check the calibration of the thermostat, see Section 4.3.

The thermostat regulates the cabinet temperature by making and breaking the heat source circuit. The internal mechanism breaks contact (continuity) when adequate cabinet temperature has been reached. Check the thermostat for continuity or use a jumper wire with insulated clips and bypass the thermostat.

NOTE: USE CAUTION. DO NOT short to the thermostat casing. Also, remove the jumper after testing is completed.

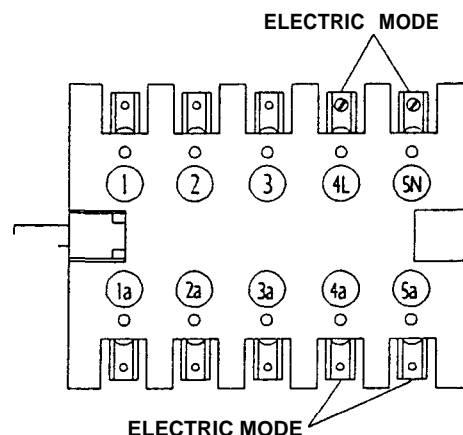
If the above test allows the refrigerator to operate, replace the thermostat.

If the thermostat has continuity all of the time, regardless of setting, check the position of the thermostat sensing tube. It should be inserted at least 36 inches into the tube on the cooling unit.

2.3 SWITCH

This is the switch that selects the mode of operation — 120 volt AC or gas. It is also a circuit interrupter for the 120 volt mode of operation.

To check the switch in the electric mode, continuity should exist between these terminals: 4L to 4A and 5N to 5A. With the switch in the OFF position, a continuity reading SHOULD NOT be indicated on any terminal.

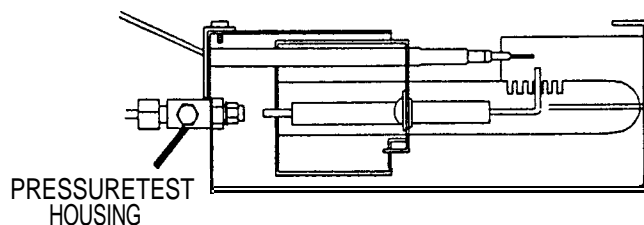


If the above test results are correct, **DO NOT** REPLACE the switch. If either of the above tests are not correct, REPLACE the switch.

SECTION 3

LP GAS REQUIREMENTS

The LP gas pressure to the refrigerator should be 11 inches water column with half of all BTU's of the gas system turned on. With all other appliances turned off, the pressure to the refrigerator should not exceed 12 inches water column. To check the gas pressure, when the refrigerator is operating, there is a pressure test housing located just prior to the orifice.



SECTION 4

LP GAS COMPONENTS

4.1 SHUT-OFF VALVE

It is the valve where the incoming LP gas supply is attached. This valve is direct coupled to the selector switch. When the selector switch is turned to the electric mode, the shut-off valve is automatically closed. When this same switch is turned to the LP gas mode, the valve opens and allows gas flow and the electric circuit to the heating element is also automatically interrupted.

To check the shut-off valve, remove and inspect for any obstructions.

4.2 FILTER

A filter is located in the inlet of the thermostat. It is to protect the internal valve portion of the thermostat by collecting any particles and/or oil that could get into the LP gas line. The filter can become saturated and cause a restriction to gas flow. This could cause a lack of cooling on gas mode. If you suspect a restriction, first verify the by-pass screw is good (see Section 4.4). Then replace the thermostat if proper gas pressure is supplied to the refrigerator and if you cannot get proper gas pressure at the pressure test housing.

4.3 THERMOSTAT

The thermostat is a combination electric/gas component. In this section the gas portion is covered. To diagnose the thermostat in the electric mode, see Section 2.2.

On the LP gas mode, full line pressure is directed through the thermostat to the burner until the thermostat senses that the refrigerator cabinet has reached proper cooling temperature. At that time an internal valve closes and redirects the gas flow through the by-pass screw. This reduces the amount of LP gas going to the burner assembly. The gas flow remains in this "by-pass" mode until the thermostat senses that the refrigerator cabinet needs more cooling. Again, the thermostat directs LP gas, flow through the thermostat at full line pressure until the cabinet temperature is sufficient. The thermostat is calibrated by the manufacturer so that at mid-range the cabinet temperature should be approximately 40 degrees Fahrenheit. To check the calibration of thermostat place a container of water in the cabinet of the refrigerator and operate at mid-range setting until the thermostat is satisfied. Then, check the temperature of the water. It should be approximately 40 degrees. We do not recommend any calibration in the field. If calibration is not correct, replace the thermostat. To check the thermostat for proper flow, set the thermostat to maximum and check the gas pressure at the pressure test port. It should be line pressure between 11 to 12 inches water column. If you have less than 11 inches of water column pressure, the next step would be to shut off the gas supply and remove the by-pass screw. Then install a by-pass screw that does not

have the small o-ring on it. Next, turn on the gas supply and take a reading. If the manometer now reads 11 inches of water column, the thermostat is defective and must be replaced. If the by-pass screw test shows no change in pressure, the problem lies in the filter (see Section 4.2), the shut-off valve (see Section 4.1) or the gas supply (see Section 3). Shut off the gas supply, remove the by-pass screw, replace it with a proper one that has an o-ring and turn the gas on.

NOTE: Check for leaks with an approved LP gas leak solution whenever any part of the gas system has been worked on.

If the thermostat stays on high flame (11 inches of water column pressure at the pressure tap) regardless of the setting, check the position of the sensing tube of the thermostat. It should be inserted 36 inches into the tube on the cooling unit.

4.4 BY-PASS SCREW

The by-pass screw is a small brass screw located on any Servel gas thermostat that regulates gas flow in the low flame mode. There are three common sizes of this screw: S-17(350 BTU), S-I 4(325 BTU) and S-I 1(300 BTU). To check the by-pass screw, connect a manometer at the pressure test housing. The pressure on low flame mode should be 3 to 5 inches water column. Above 5 inches water column on low flame mode could cause an over-cooling situation. The by-pass screw used on the RA1 302 is S-I 4.

4.5 SAFETY VALVE

The safety valve is an assembly that shuts off the supply of LP gas to the burner if the flame goes out for any reason. This is to ensure that a concentration of unburned gas does not accumulate in the refrigerator vent area.

To check the safety valve, use a known good thermocouple (see Section 4.6) and install into the safety valve.

Next, supply flame to the tip of the thermocouple for 2 to 3 minutes while holding in on the safety valve stem. Next, remove flame from thermocouple tip and release safety valve stem. The safety valve should hold in for at least 30 seconds. If it releases earlier than 30 seconds, replace the safety valve.

4.6 THERMOCOUPLE

The thermocouple is a component extending above the burner assembly so the tip is in the path of the flame. It will produce 14 to 30 millivolts DC in normal operation. To check the thermocouple, use a known good safety valve (see Section 4.5) and attach to the thermocouple. Next, supply flame to the tip of the thermocouple for 2 to 3 minutes while depressing the safety valve. Remove the flame and release the safety valve. The valve should hold for at least 30 seconds.

4.6 THERMOCOUPLE CONTINUED

If it does not hold the safety valve open for 30 seconds, replace the thermocouple. If it does hold for 30 seconds or more, the thermocouple is good -do not replace it.

NOTE: Be sure the tip of the thermocouple is clean.

4.7 BURNER

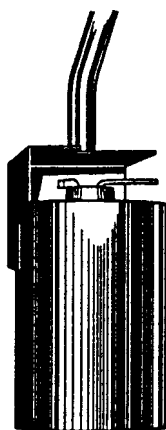
The burner is a slotted metal tube located below the flue tube on the cooling unit. It should be level and the slots in the burner should be directly below the flue tube. The burner should be cleaned periodically, at least once a year. To clean the burner, remove from the refrigerator and check for any foreign residue that could cause a deflection of the gas flow or the flame. Next, soak the burner in an alcohol based solvent and allow to air dry. After cleaning, reinstall in the refrigerator.

4.8 FLUE BAFFLE

The flue baffle is designed to concentrate the heat from the gas flame at a certain area of the flue tube. It should be cleaned periodically, at least once a year. To clean, remove from flue tube and check for any damage, then clean thoroughly. The length of the flue baffle assembly (flue baffle and wire) for the RA1302 is 38 inches. The flue baffle itself is 3/4 inch wide and 5-7/8 inches long. The proper baffle position for the RA1302 is 3-5/8 inches from the burner to the bottom of the baffle.

4.9 FLUE CAP

The flue cap is located at the top of the flue tube. It must be properly attached or flame outage could occur.



4.10 FLUE TUBE

The flue tube is a component of the cooling unit. It must be cleaned periodically, at least once a year. To clean, remove flue cap and flue baffle. Then cover the burner and clean by using a flue brush (Part Number 0151404001). If the flue tube becomes coated with scale or residue from combustion of LP gas, the efficiency of gas operation decreases.

NOTE: After cleaning be sure to reinstall the flue baffle and flue cap.

4.11 ORIFICE'

The orifice is a small brass fitting that has a ruby membrane that is laser beam drilled and is mounted on the gas line just prior to the burner. The orifice is cleaned by using an alcohol based solvent and allowing to air dry. NEVER use a drill bit or jet tip cleaner to clean any orifice as these devices will damage the factory machined part and create a potentially dangerous condition. The correct orifice for the RA1302 for propane use is No. 58 jet and for butane use, it is No. 63 jet.

NOTE: Always use the proper orifice. Never use a larger orifice as this could cause a lack of cooling problem.

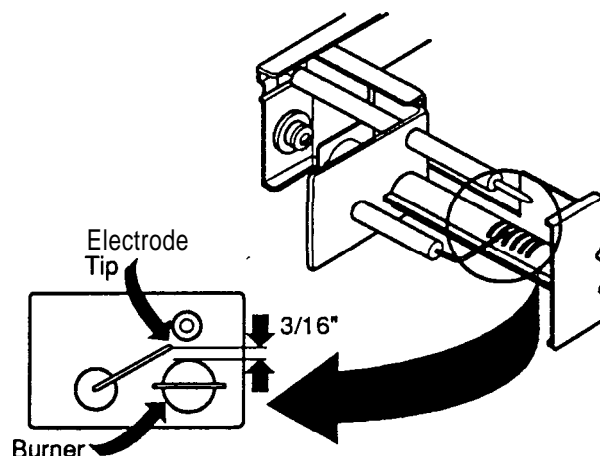
4.12 IGNITER

The igniter is an electronic device within a self-contained assembly that produces high voltage to create a spark at the burner, which generally does not need maintenance. When the button is pushed, a spring loaded striker creates a spark. If there is no resistance when pressing the button, the igniter is defective and must be replaced. If there is resistance when pressing the button, but there is no spark, the problem lies in the electrode (see Section 4.13) or high voltage cable (see Section 4.14).

4.13 ELECTRODE

To check the electrode, first do a visual inspection for cracks or breaks on the ceramic insulator. Also, verify the mounting bracket is attached properly to the electrode. If either of the above conditions are found, replace the electrode.

Next, check the spark gap. It must be set at three sixteenths (3/16) of an inch and the tip of electrode above the slots in the burner.



NOTE: If igniter (see Section 4.12) and high voltage cable (see Section 4.14) are good and there is no spark at the tip of the electrode, REPLACE THE ELECTRODE.

4.14 HIGH VOLTAGE CABLE

This item transfers the high voltage, produced by the igniter, to the electrode and is a component of the igniter. If the cable has a short or the insulation is damaged, it is defected. Replace the igniter.

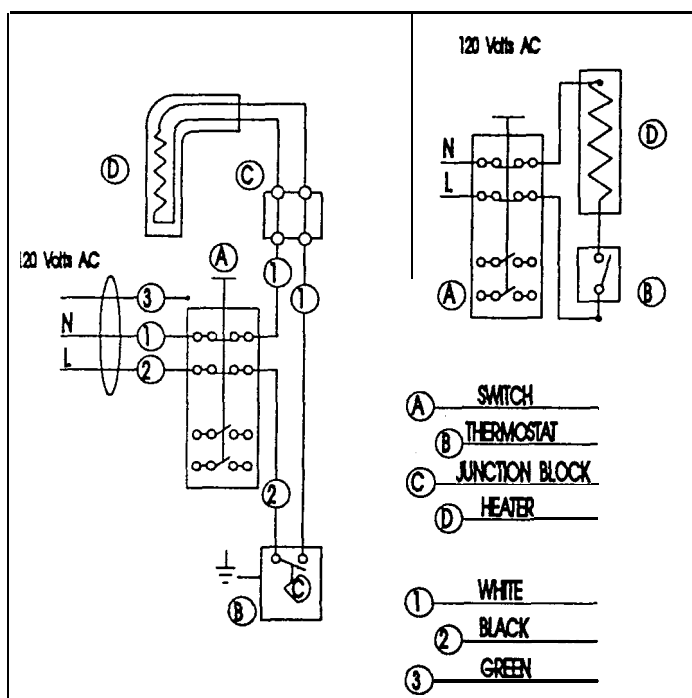
SECTION 5 WIRING

5.1 EXTERNAL WIRING

120 volts AC connection: The refrigerator is equipped with a three prong (grounded) plug for protection against shock hazards and should be plugged directly into a proper grounded three prong receptacle. Do not cut or remove the grounding prong from this plug.

5.2 INTERNAL WIRING

Check all wires and the connectors to ensure a proper and tight connection. Also verify the refrigerator is wired per the wiring diagram for the model you are working on.



SECTION 6 OTHER

6.1 LEVELING

Leveling is one of the requirements for proper operation with absorption refrigerators. The absorption design utilizes no mechanical pumps or compressors to circulate the refrigerant within the system, so proper leveling must be maintained to provide the correct refrigerant flow.

Without proper leveling, refrigerant within the cooling unit will collect and stagnate at certain areas. Without proper refrigerant flow, the cooling process will stop. To check the level of the appliance, place a spirit or bubble level in the approximate front and center of the floor of the freezer compartment.

6.2 VENTILATION

Ventilation is one of the requirements for proper cooling unit operation. The vent system must be able to provide a way to direct the hot air, produced by the action of the cooling unit, out away from the installation of the refrigerator. The refrigerator extracts heat from the interior of the refrigerator cabinet and dissipates the heat out through the vent system.

In a proper installation there is a free space of at least 4 inches (10 cm) above the refrigerator and the ventilation opening on top of the cabinet is not covered in any way.

DO NOT place the refrigerator in a space where air circulation is restricted.

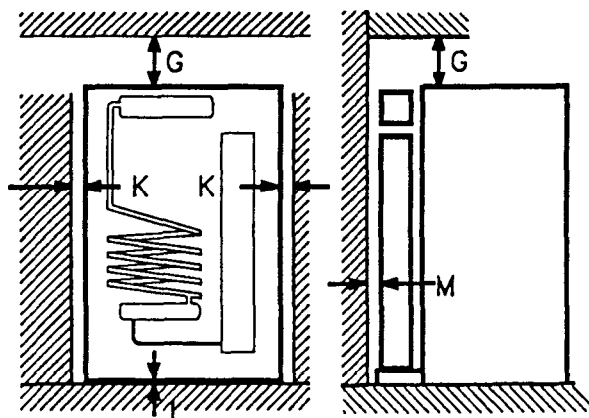
A clearance of at least 1 inch (25 mm) should be left between the rear and sides of the refrigerator and the surrounding walls.

This free-standing refrigerator requires accessibility to the back for servicing the gas equipment. If allowed by the local authorities, the accessibility can be obtained by using a certified Flexible Metal Connector of Gas Hose Assembly which would allow the refrigerator to be withdrawn without disrupting the gas supply. However, if the local authorities require a rigid gas supply connector, the refrigerator should be located with sufficient space at the back for servicing or, if located against a wall, a removable panel of a minimum size of 16" x 20" should be provided in the wall to allow access to the back of the refrigerator.

Minimum clearances in Inches to combustible materials are:

G:	Top	4
K:	Side	1
L:	Bottom	0
M:	Rear	1

Clearance M between the rearmost part of the refrigerator and the wall behind the refrigerator.



6.2 VENTILATION CONTINUED

Some free-standing models come with 4 plastic feet. These feet should be mounted on the underside to ensure free air circulation around the cooling unit.

NOTE: Do not install the appliance directly on carpeting. Carpeting must be protected by a metal or wood panel beneath the appliance which extends at least full width and depth of the appliance.

6.3 AIR LEAKS

Check the gasket on the doors to be sure of a positive air seal. A simple method to check gaskets is to 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. If a gasket is not sealing properly, first warm the gasket material with a hair dryer.

CAUTION

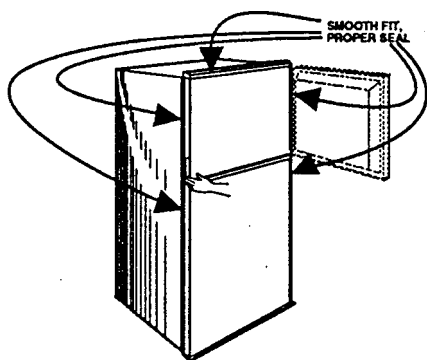
**DO NOT OVERHEAT
AS YOU CAN MELT THE MATERIAL**

Then close the door and the magnetic strip should pull the gasket to the metal frame. Leave door closed until the material has cooled. Then re-check for a positive seal. If a positive seal cannot be achieved, replace the gasket. Also check that the cooling unit is installed properly. The cooling unit's foam block, the portion that surrounds the evaporator coils, must be flush to the cabinet at the back of the refrigerator and have a positive seal. If the cooling unit is not installed properly, remove and install properly.

NOTE: Air leaks will cause insufficient cooling as well as rapid formation of frost.

6.4 DOOR POSITION:

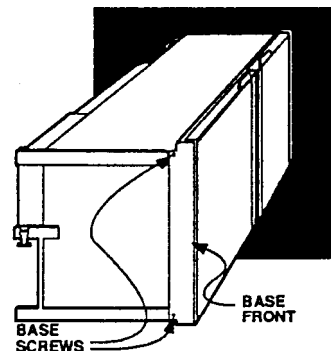
The door position can be checked by observing any misalignment of the door in relation to the frame.



To correct door alignment, loosen the hinge screws slightly and re-orient the door in the proper position. Hold the door in its new position and carefully re-tighten the hinge screws.

If the door needs more adjustment than is available through the hinge adjustment, the base can be

repositioned to reorient the door. Turn the refrigerator on its side to gain access to the two front base screws. Loosen both screws slightly. Reposition the base until the door is re-oriented. Re-tighten the base screws while holding the base in its new position.



6.5 AMBIENT TEMPERATURE

This is the temperature surrounding the appliance, as well as the temperature of air at the back of the refrigerator. As the ambient temperature increases, the air temperature in the area of the cooling unit increases. Improper venting at this point will cause the cooling unit to have reduced efficiency.

6.6 COOLING UNIT

The cooling unit is a self-contained, hermetically sealed set of coils where the refrigeration process takes place. The chemicals involved in the cooling process include hydrogen, ammonia, water and a rust inhibiting agent. There are no repairs recommended on the cooling unit.

To check the cooling unit, first verify the AC heating element is good (see Section 2.1). Then place approximately one gallon of water inside the refrigerator and place a thermometer in one of the containers of water. Next, supply 115 volts direct to the AC heating element and operate for at least 12 hours. Then check the temperature on the thermometer. It should be at 45 degrees or lower depending on test conditions (see ambient temperature, Section 8.5). If so, the cooling unit is good. If the temperature of the water is above 45 degrees, replace the cooling unit.

6.7 FOOD STORAGE

Proper refrigeration requires free air circulation within the food storage compartment. Restricted air circulation within this compartment will cause higher cabinet temperatures. To remedy this situation, simply rearrange your foodstuffs. It is also essential that the shelves are not covered with paper or large storage containers. Always remember to allow for proper air circulation.

6.7 FOOD STORAGE CONTINUED

Odorous or highly flavored foods should always be stored in covered dishes, plastic bags or wrapped in foil or waxed paper to prevent food odors. Vegetables, lettuce, etc., should be covered to retain their crispness. ***NEVER PUT HOT FOOD INTO THE REFRIGERATOR.***

To reduce frost formation in and on the freezing compartment, cover stored liquids and moist foods and do not leave the door open longer than necessary.

When the refrigerator is heavily loaded, it takes a longer time for refrigerator temperatures to lower, also increasing the ice making time. A very heavy load may also cause defrosting.

6.8 HIGH HUMIDITY

High humidity may cause a small amount of condensation to form on the frame of the refrigerator. In some cases it can develop to such a degree that it will run off the frame. As the humidity is reduced, the sweating will decrease. High humidity can also be a factor in rapid formation of frost.

6.9 INTERIOR LINER SEAL TO FRAME

There is a seal that is applied to the liner in the area where the metal frame makes contact with the interior liner. If this seal is incomplete, cold air can migrate out to the metal frame. If this happens, condensation could form on the frame and could promote rapid formation of frost. If you suspect an improper seal, apply a small bead of silicone all the way around the perimeter where the frame meets the interior liner.