



## ***SERVICE MANUAL***

***LINE 5***

***SIDE BY SIDE REFRIGERATORS***

 **FRIGIDAIRE** ***TAPPAN***<sup>®</sup>

 **White-Westinghouse**<sup>®</sup>

**Gibson**<sup>®</sup>

***Kelvinator*** <sup>®</sup>

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# SAFE SERVICING PRACTICES - ALL APPLIANCES

To avoid personal injury and/or property damage, it is important that **Safe Servicing Practices** be observed. The following are some limited examples of safe practices:

1. **DO NOT** attempt a product repair if you have any doubts as to your ability to complete it in a safe and satisfactory manner.
2. Before servicing or moving an appliance:
  - Remove the power cord from the electrical outlet, trip the circuit breaker to the OFF position, or remove the fuse
  - Turn off the gas supply
  - Turn off the water supply
3. Never interfere with the proper operation of any safety device.
4. **USE ONLY REPLACEMENT PARTS CATALOGED FOR THIS APPLIANCE. SUBSTITUTIONS MAY DEFEAT COMPLIANCE WITH SAFETY STANDARDS SET FOR HOME APPLIANCES.**
5. **GROUNDING:** The standard color coding for safety ground wires is **GREEN**, or **GREEN** with **YELLOW STRIPES**. Ground leads are not to be used as current carrying conductors. It is **EXTREMELY** important that the service technician reestablish all safety grounds prior to completion of service. Failure to do so will create a hazard.
6. Prior to returning the product to service, ensure that:
  - All electrical connections are correct and secure
  - All electrical leads are properly dressed and secured away from sharp edges, high-temperature components, and moving parts
  - All non-insulated electrical terminals, connectors, heaters, etc. are adequately spaced away from all metal parts and panels
  - All safety grounds (both internal and external) are correctly and securely connected
  - All panels are properly and securely reassembled

## WARNING

This service manual is intended for use by persons having electrical and mechanical training and a level of knowledge of these subjects generally considered acceptable in the appliance repair trade. Frigidaire Home Products cannot be responsible, nor assume any liability, for injury or damage of any kind arising from the use of this manual.

# SECTION A

## INSTALLATION INSTRUCTIONS

### UNCRATING

Uncrating instructions are clearly printed on the shipping carton. Under no circumstances should a refrigerator be uncrated until these instructions have been read.

Additional handling and installation information is provided in the "Installation Tips" affixed to the refrigerator door and in the Owner's Guide located in one of the drawers inside the refrigerator. Pay particular attention to the information regarding hand trucking, leveling and door alignment.

### MODEL AND SERIAL NUMBER

Model and Serial Numbers are found on the Serial Plate located on the ceiling of the refrigerator compartment, just behind the compartment light. (See Figure A1)

### AIR CIRCULATION

Proper air circulation must be maintained for efficient refrigerator operation. Refer to the Owner's Guide for recommended clearances. Install the refrigerator out of direct sunlight and away from the range, dishwasher, or other heat sources.

**CAUTION: Do not install the refrigerator where the temperature will drop below 60°F (15°C), or rise above 110°F (43°C) because the compressor will not be able to maintain proper temperatures.**

Allow an extra ½" (10-15mm) on each side for ease of installation in recessed areas. If the hinge side of the unit is placed against a wall, allow a 1¾" (44mm) space between the wall and refrigerator to permit proper door swing.

### ELECTRICAL INFORMATION

The refrigerator must be plugged into its own 115 Volt, 60 Hz, AC only electrical outlet. The circuit should be protected by a 15 or 20 Amp circuit breaker or time delay type fuse.

**NOTE:** If voltage varies by ±10% of 115 volts, performance of the refrigerator may be affected. Operating the refrigerator with insufficient power can damage the compressor.

The refrigerator power cord is equipped with a three prong grounding plug. It must be plugged directly into a properly grounded three prong receptacle. The receptacle must be installed in accordance with local codes and ordinances. **Do not use an extension cord or an adapter plug.**

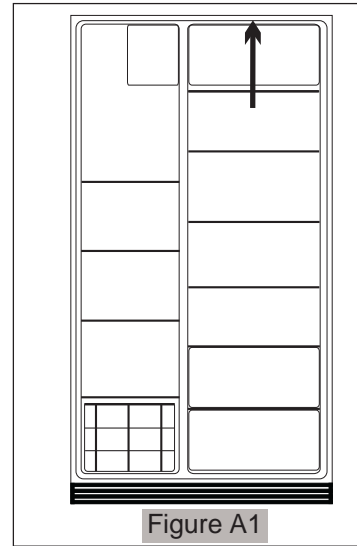


Figure A1

### LEVELING

The refrigerator must be leveled with all bottom corners resting firmly on a solid floor. Adjust the front rollers to level the cabinet from side-to-side and front-to-rear. Keep the cabinet as low as possible for stability. Never adjust the cabinet rollers so the front is lower than the rear.

To adjust the front rollers:

1. Open refrigerator and freezer doors.
2. Remove toe grill by pulling it straight out. (See Figure A2)
3. Adjust rollers by turning each roller adjusting bolt with adjustable wrench, socket wrench, or nutdriver until refrigerator is level and stable. (See Figure A3)

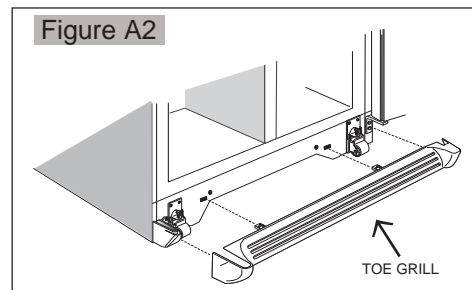


Figure A2

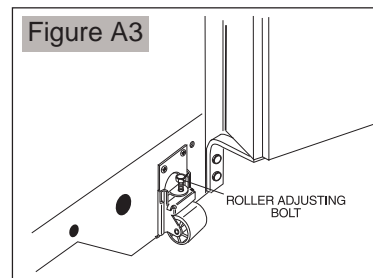


Figure A3

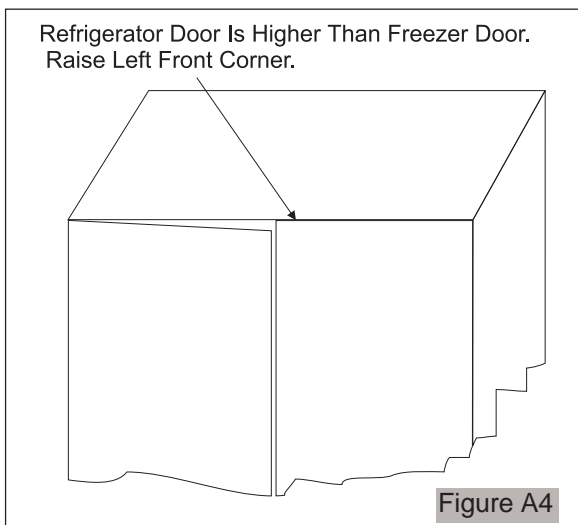
## LEVELING (Cont.)

Rear rollers are not adjustable.

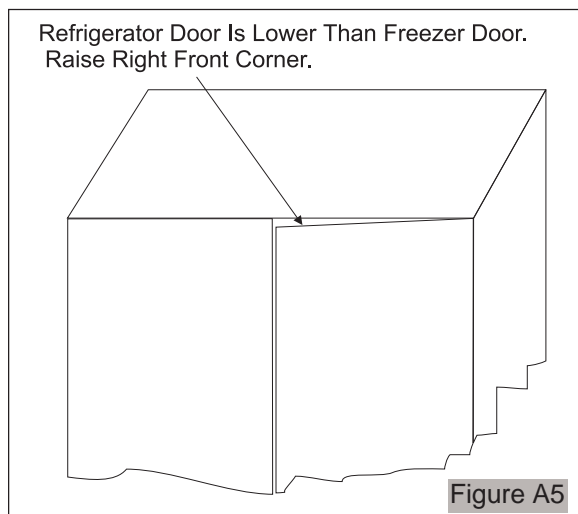
### Door Alignment

Side by Side cabinets, due to their large size, may flex when installed on an uneven floor. To correct alignment, proceed as follows:

1. Level refrigerator, front to back and side to side. Open doors and rock refrigerator after each adjustment to relieve cabinet strains.
2. After refrigerator is level, close doors and check for proper alignment.
3. If refrigerator door is higher than freezer door, raise left corner of cabinet by adjusting roller. (See Figure A4)



4. If refrigerator door is lower than freezer door, raise right corner of cabinet by adjusting roller. (See Figure A5)

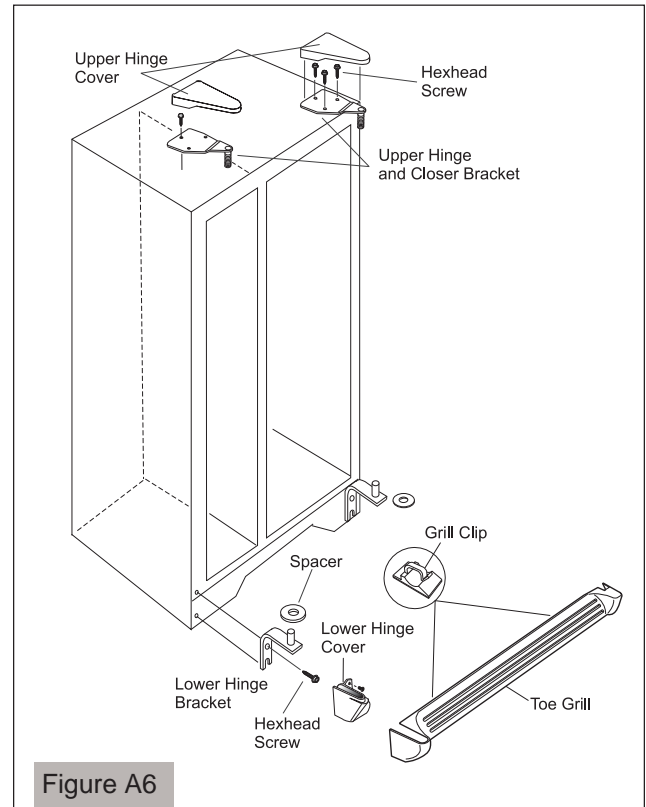


5. After cabinet is leveled and doors are properly aligned, ensure refrigerator sets solidly on all four corners.

## Door Removal

**NOTE:** If installation requires the removal of the doors, trace around all hinges with a soft lead pencil for easy relocation.

1. Open door to its full position and remove Top Hinge Cover.
2. Remove three (3) 3/8" Hex head screws from Upper Hinge and Closer Bracket. **Do not remove Upper Hinge and Closer Bracket from door.**
3. Lift door off of Lower Hinge Bracket. (See Figure A6)



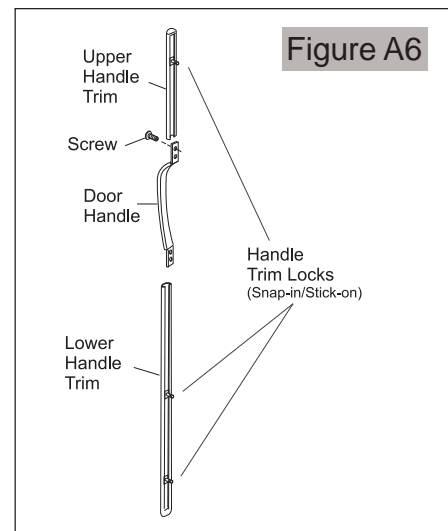
If it is necessary to remove the bottom hinge, remove the grill and hinge mounting screws after removing the door. Hinge screws should be torqued between 90 - 150 in/lbs.



## Door Handle Removal

The Door Handles are not removed as complete assemblies. The Door Handles, Upper Door Handle Trim, Lower Door Handle Trim and Handle Trim Locks (can be of the snap-in or stick on type) can be replaced on all models. (See Figure A6)

1. Remove Upper and Lower Handle Trim by sliding them off Door Handle. It's best to apply pressure with palm of hand and push up or down, respectfully.
3. Remove top and bottom screws securing handle to door panel.
4. Reverse this procedure to re-install door handles.



# SECTION B - REFRIGERATOR CABINET

## BASIC CONSTRUCTION

Line 5 models have clean back cabinets and forced air condensors. The condenser is located under the cabinet bottom. The cabinet wrapper consists of a one-piece top and sides formed of prepainted steel, with an interlocking, snap-in, galvanized steel back panel. A separate steel frame is attached to the cabinet bottom. The compressor compartment houses the compressor, condenser, and fan motor. The unitary drain pan, which mounts the compressor, condenser, and fan motor, and can be removed from the compressor compartment as a complete assembly (See Figure B1).

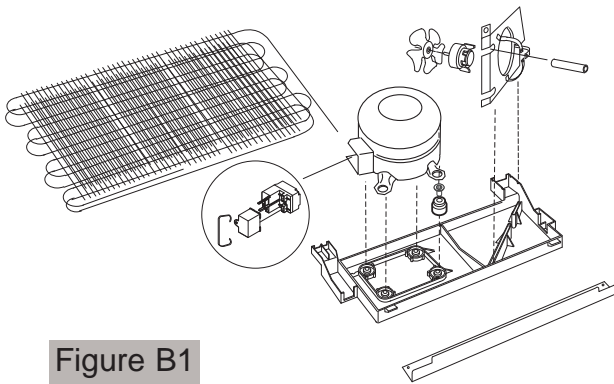


Figure B1

## INSULATION AND INNER LINER

The cabinet wrapper and compartment liner are bonded together with a core of "Urethane" foam insulation to form a slim three-ply wall of single-unit construction.

The one piece inner liner is vacuum formed of tough corrosion-proof ABS/HIPS plastic material. The liners are not removable.

## CABINET DOORS, INNER DOOR PANELS AND GASKETS

The exterior door panels are made from one piece of heavy gauge, deep drawn, cold-rolled steel. A wide flange of the periphery is formed integral with the exterior door panel.

Line 5 models doors are filled with rigid Urethane foam insulation prior to assembly of the inner panel and door gasket.

The outer door panels, inner door panels, and door gaskets are individually replaceable on all models.

The door inner panels are vacuum formed from high strength plastic material.

All models have "magnetic type" door gaskets. Full length magnets are embedded in all four sides of the gasket, in the front section of the ballon portion. (See Figure B2) A hook shaped flange of the inner door panel holds the gasket in firm contact with the outer door panel.

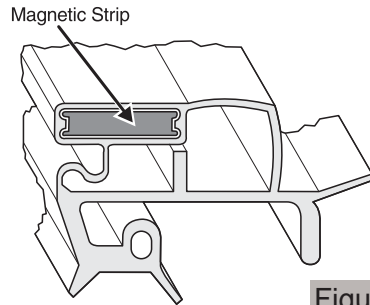


Figure B2

## Outer Door Panel Replacement (Food door & Freezer door on models without Ice/Water Dispenser)

1. Open door to stop position.
2. Remove Top Door Hinge Cover.
3. Remove screws securing Top Hinge and Closer Assembly to cabinet.
4. Lift door off of lower hinge.
5. Remove Top Closer and Hinge Assembly. (Refer to "To Remove Door Closer and Hinge Assembly" on page 10)
6. Remove handle and trim from outer panel.
7. Remove screws securing gasket and inner panel to outer panel.

## Door Rack Replacement

The Door Rack and Door Rack Supports are removed as an assembly. To remove, push in on tabs located on the inside of the Door Rack Supports and pull assembly out of inner door panel (See Figure B3).

To remove Door Rack Supports from the Door Rack, insert a small bladed screwdriver between Door Rack Support and Door Rack tab, and pull the Door Rack Support off.

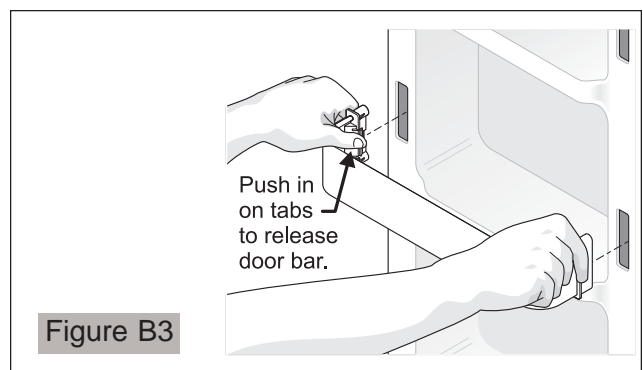


Figure B3

## DOOR HINGES AND CLOSER BRACKETS

The upper and lower hinge pins pivot in bearing sleeves pressed into the door outer panel. Nylon spacers on the hinge pins form weight bearing surfaces (See Figure B4).

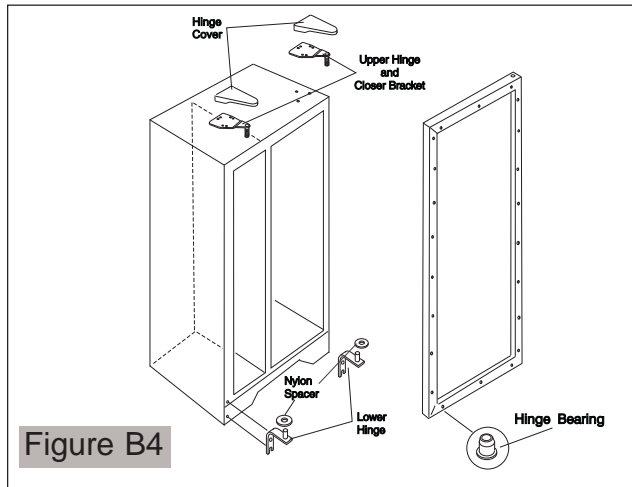


Figure B4

The Upper Hinge and Closer Bracket are one assembly. The door closer slides into the outer door panel and has one stop position at 135°.

### To Remove Door Closer and Hinge Assembly

1. Open door to stop position.
2. Remove top hinge cover.
3. Remove screws securing assembly to cabinet while supporting door.
4. Close door, and place a small, flat-bladed screwdriver under assembly. Lift assembly out of door panel. (See Figure B5)
5. Reverse procedure to complete repairs.

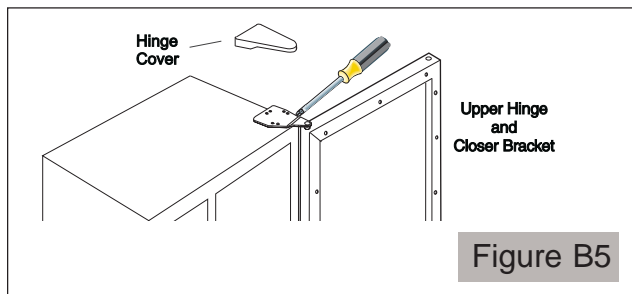


Figure B5

## CONTROL HOUSING

Control housings are mounted to the top front of each compartment with two ¼" screws. The refrigerator housing contains a refrigerator damper control knob, light switch, and light socket. The freezer housing contains a freezer control thermostat, light switch and light socket. (See Figures B6a & B6b)

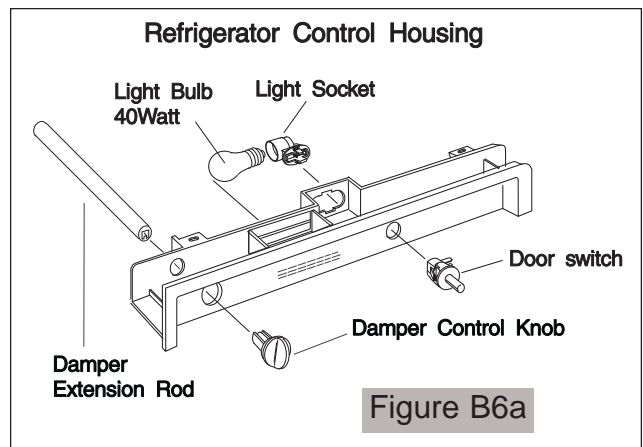


Figure B6a

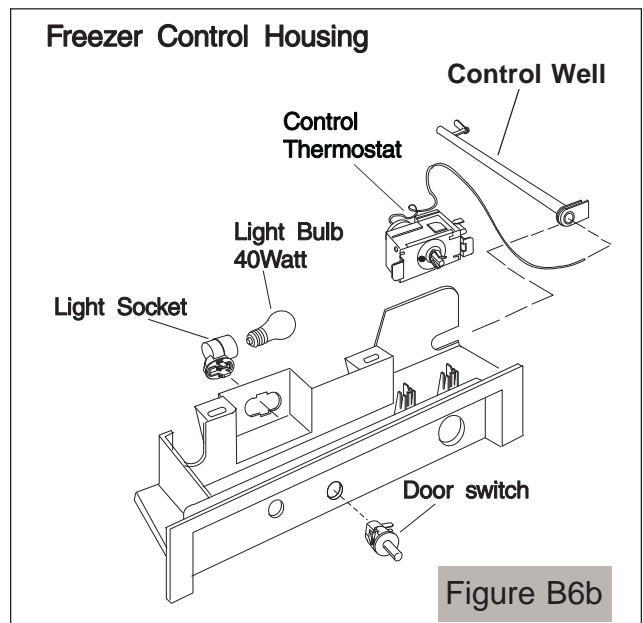


Figure B6b

## COMPRESSOR MOUNTING

All Line 5 models have a unitary drain pan assembly that mounts the compressor. The drain pan is mounted to the cabinet by a rear cabinet base rail. Another rail, mounted to the cabinet bottom, supports the complete assembly.

The compressor (with rubber grommets) is mounted onto pins that are pushed "up" through the drain pan. Clips secure the compressor to the pins. (See Figure B7)

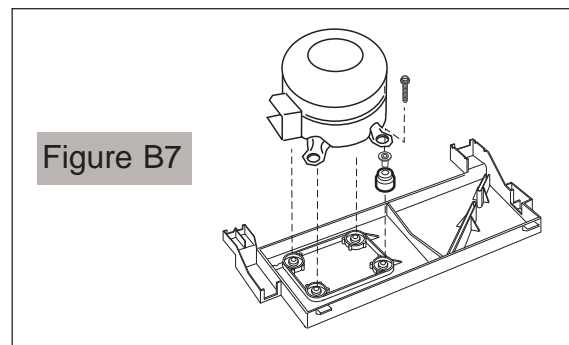
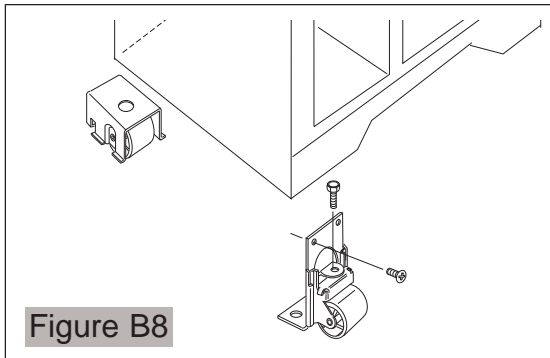


Figure B7

## ROLLERS, GLIDES, AND LEVELING LEGS

The front roller is mounted to the cabinet base with two screws. The adjustment screw at the top of the roller is turned clockwise to raise, and counterclockwise to lower the cabinet. While making adjustments, slightly raise the cabinet to reduce the strain on the roller assembly. To remove the roller assembly, raise and support the cabinet and remove the two mounting screws.

The rear roller assembly is mounted to the bottom frame of the cabinet. To remove, raise and support cabinet, and tap front of roller assembly with a hammer, letting assembly drop out of the frame. To replace, align slots on rear of roller bracket with cabinet frame, and tap assembly into place (See Figure B8).



## CABINET TOUCH-UP PROCEDURE

Vinyl gaskets are used on all models. Lacquer repairs can be made on all areas of the cabinet except any painted surface that comes in contact with the vinyl gasket. Since prolonged contact of vinyl gaskets with lacquer will soften the lacquer, repairs in these areas should not be attempted.

### Lacquer Refinishing

The following steps are necessary for touch-up or refinishing a white acrylic cabinet, **except gasket contact area**. When refinishing a cabinet other than white, follow the same outline but substitute the color of lacquer required.

1. Sand out spot to be repaired with 360 or 400 wet-or-dry sandpaper. Finish sanding to feather edge with 600 wet-or-dry sandpaper. Wipe area dry. Hand rub with fine rubbing compound (Dupont VZ1090® or equivalent), the area extending at least six inches beyond edges of lacquer repair spot. Wipe compound off and wash area with Naphtha. Dry with clean cloth.
2. Prepare bare metal with Sol-Kleen® cleaner and rust remover. Reduce cleaner with two parts water, and apply with a clean wet rag. Do not touch painted surface with this cleaner. Stub born or deep seated rust can be removed by applying cleaner with steel wool.

**NOTE:** Prepare surface of bare metal with Sol-Kleen® regardless if rust is present.

3. Before cleaner dries, wipe surface dry with clean rag.
4. Wipe over surface thoroughly second time with solution of 50-50 alcohol and water. Wipe again with clean dry rags, preferably new cheesecloth.
5. Allow to dry for at least 10 to 15 minutes.
6. Apply primer surfacer, reduced by approximately equal parts of lacquer thinner to build bare metal area up to surrounding surface. Any imperfections which primer surfacer has not filled should be knifed out with lacquer type putty glaze.
7. If no putty glaze is used, allow to dry about 30 minutes and, if necessary, sand out lightly with 360 wet-or-dry sandpaper. If putty glaze is used, allow about three hours before sanding with sandpaper and water. Remove sanding residue thoroughly by wiping with clean rag soaked with naphtha. Wiping with tack rag will ensure surface free from dust and lint.
8. Finish repair with two or more coats of lacquer (reduce approximately one part of lacquer to 1½ parts of thinner). Finally, apply mist coat of lacquer thinner to flow out surface.
9. Patched area should be allowed to dry three or more hours before being rubbed with compound or polish.

This procedure also applies to the complete refinishing of the cabinet, except gasket contact areas. All damaged areas should be repaired as outlined in steps 1 through 6 above. The overall surface of the cabinet should be sanded thoroughly and cleaned as outlined in step 7.

The cabinet should be given two or more coats of touch-up lacquer and polished as outlined in steps 8 and 9.

# SECTION C - ELECTRICAL COMPONENTS

## ELECTRICAL GROUNDING

All refrigerators are equipped with a power supply cord incorporating a three-prong grounding plug and a ground wire which is attached to the refrigerator cabinet for protection against shock hazard. Each electrical component is either cabinet mounted or connected through a ground wire to the cabinet to complete the ground. Certain components, such as defrost timers, may be double insulated and do not require a ground wire.

Ensure the electrical wall receptacle is of the three prong type and is properly grounded in accordance with the National Electrical Code and/or local codes.

## COMPRESSOR ELECTRICAL COMPONENTS AND CIRCUITS

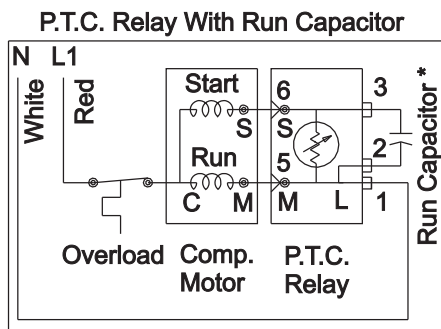
The new series of very high efficiency compressor is equipped with all new electrical components consisting of a solid state PTC relay with a thermally operated overload protector, and a run capacitor.

### Solid State Relay

The solid state relay has no moving parts. It consists of a PTC resistor mounted in a plastic case with appropriate terminals. PTC (Positive Temperature Coefficient) simply denotes a resistor which increases in resistance as its temperature is increased. The self-heating PTC resistor used in the solid state relay has the unique characteristic of changing from low to very high resistance very abruptly, thus serving as an on-off switch (See Figure C1).

The solid state relay plugs directly onto the compressor start and run terminals. Relay terminals 1, 2, and 5 are connected within the relay, as are terminals 3 and 6.

A run capacitor is connected to relay terminals 2 and 3, so it is connected in parallel with the PTC resistor. One side of the 120 VAC power is connected to relay terminal 1. The other side of line is connected to the overload protector. (See figure C1)



\* Capacitor Is Only Used With Some P.T.C. Models.

Figure C1

**NOTE:** There are two Exploded View Diagrams (Controls and System) at the end of this section, pages 18-19, to assist you in troubleshooting.

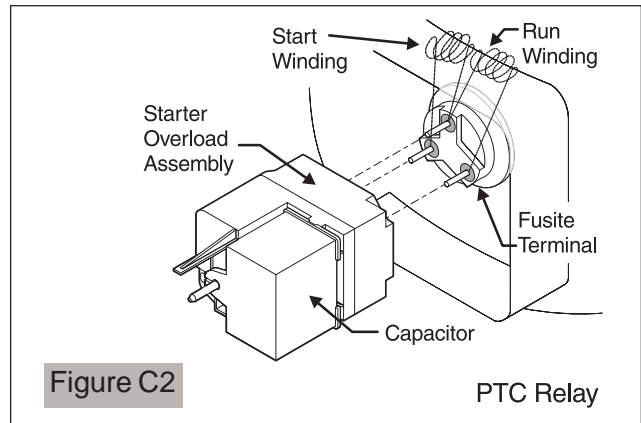


Figure C2

PTC Relay

### To Check/Replace Relay

1. Disconnect electrical supply to refrigerator.
2. Remove bale wire holding relay to compressor.
3. Remove relay assembly from compressor. (See Figure C3)

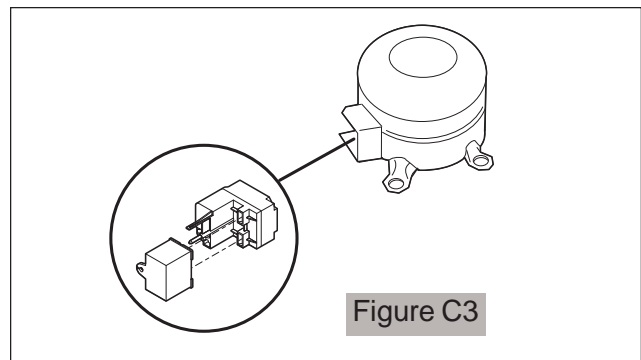


Figure C3

4. Use small, flat-bladed screwdriver to disconnect leads to relay assembly.
5. Use flat headed screwdriver to gently pry capacitor from relay assembly.
6. Use ohmmeter to check resistance between terminals 5 and 6. Resistance should be 3 to 12 ohms, at normal room temperature. Shorted relay will read 0 ohms. Open relay will read very high or infinite resistance.
7. If ohm readings are out of range, replace relay.
8. Reverse this procedure to re-assemble.

**NOTE:** When replacing leads to the PTC relay, ensure locking tabs snap into terminal.

## Overload Protector

The overload protector is completely thermally operated. It will open from excessive heat or current. Unlike prior overloads, the internal bi-metal is not self-heating, and is not a part of the electrical circuit. The overload has a small built-in coil heater that is in series with the compressor start and run windings (See Figure C1).

### To Check/Replace The Overload Protector

1. Disconnect electrical supply to refrigerator.
2. Remove bale wire holding relay to compressor.
3. Remove relay assembly from compressor.
4. Use flat headed screwdriver to gently pry capacitor from relay assembly.
5. Use small, flat-bladed screwdriver to disconnect leads to relay assembly. (Note: On some models you will have to remove bale wire and cover, to gain access to relay and overload protector.)
6. Use ohmmeter to check resistance between tab terminal and female pin terminal. Overload protector should have less than 1 ohm of resistance at normal room temperature.
7. If ohm readings are out of range, install new Starter/Overload Assembly. (See Figure C2)

**NOTE:** The Overload Protector is built into the Starter Overload Assembly.

8. Reverse this procedure to re-assemble.

**NOTE:** When replacing leads to the PTC Relay, ensure the locking tabs snap back into the terminal.

## Run Capacitor

The run capacitor has permanently attached terminals which are connected to relay terminals 2 and 3.

**NOTE:** Some models are not equipped with a Run capacitor

### To Check/Replace The Run Capacitor

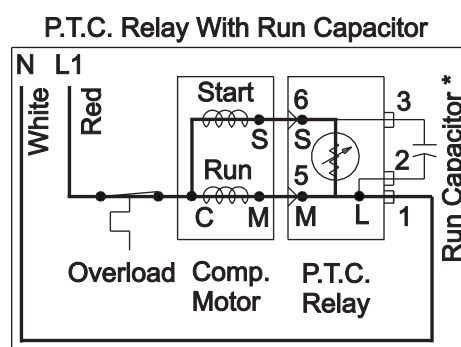
1. Disconnect electrical supply to refrigerator.
2. Remove bale wire holding relay to compressor.
2. Use small, flat-bladed screwdriver to disconnect leads to relay assembly.
3. Use flat-bladed screwdriver and gently pry capacitor from relay assembly.
4. Discharge capacitor by shorting across terminals with 500K (1 watt) resistor for one minute.
5. Use ohmmeter set on the “Ohms times 1000” scale (if available), to check resistance across capacitor wire terminals.
  - The needle should jump towards zero ohms and quickly move back to infinity.
  - If the needle does not move, the capacitor is open.

- If the needle reads a constant value at or near zero ohms, the capacitor is shorted out.
- If the needle jumps toward zero and then moves back to constant high resistance (not infinity), the capacitor has a high resistance leak.

6. If ohm readings are out of range, replace capacitor.
7. Reverse procedures to re-assemble.

## Compressor Start Circuit

When the compressor circuit is first energized, the solid state relay has low resistance (3-12 ohms), and both the run and start windings are energized to start the compressor. The run capacitor<sup>1</sup> is being bypassed by the relay, and it has a minor function during compressor starting (See Figure C4).



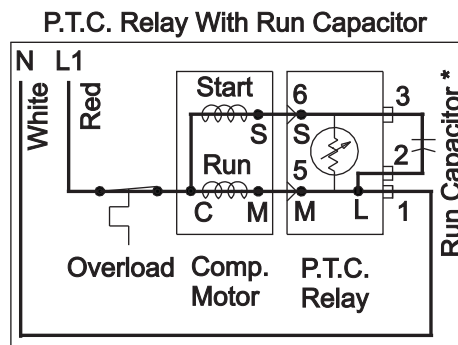
\* Capacitor Is Only Used With Some P.T.C. Models.

Figure C4

## Compressor Run Circuit

When the self-heating solid state relay has reached sufficient temperature, it will abruptly change from low resistance (3-12 ohms) to very high resistance (10-20K ohms) and, in effect, switches off the start windings.

The relay no longer shunts the run capacitor. The run capacitor is now in series with the start windings. The only purpose of the run capacitor is to improve compressor operating efficiency, which it does by correcting the power factor of the compressor motor (See Figure C5).



\* Capacitor Is Only Used With Some P.T.C. Models.

Figure C5

## COMPRESSOR OPERATING CHARACTERISTICS

- When the compressor electrical circuit is energized, the start winding current causes the relay to heat and switch off the start winding circuit.

**NOTE:** The relay will switch off the start winding circuit even though the compressor has not started (as when attempting to re-start after momentary power interruption).

- The overload protector is designed and calibrated to open the compressor electrical circuit with locked rotor run winding current only.
- With an open relay, the compressor will not start since there is little or no current to the start windings. The overload protector will open due to high locked rotor run winding current.
- With a shorted relay or capacitor, the compressor will start, and the overload protector will open.
- With an open or weak capacitor, the compressor will start and run. The compressor, however, will be operating at reduced efficiency of energy usage.

## COMPRESSOR ELECTRICAL CHECK

If the compressor will not run, make a voltage check across the power lead terminals on the PTC Relay. (See Figure C5.)

The voltmeter should show line voltage if the thermostat knob is in normal operating position and not in the OFF position. If this check does not show a live circuit, the control thermostat and defrost timer wiring should be checked for loose and/or broken connections.

A control thermostat check can be made by using a piece of wire as a temporary bridge across two thermostat terminals. If the compressor starts and runs with the bridge, the control thermostat is at fault and should be replaced.

If the voltage check shows power supply at the PTC Relay terminals, use a test cord to check the compressor.

If the compressor does not start and run with the test cord, check the line voltage to see if there is more than 10% variation from the rated voltage. If voltage is correct and the compressor will not start and run, replace the compressor.

If the compressor starts and runs with the test cord, replace the PTC Relay.

## CONTROL THERMOSTAT

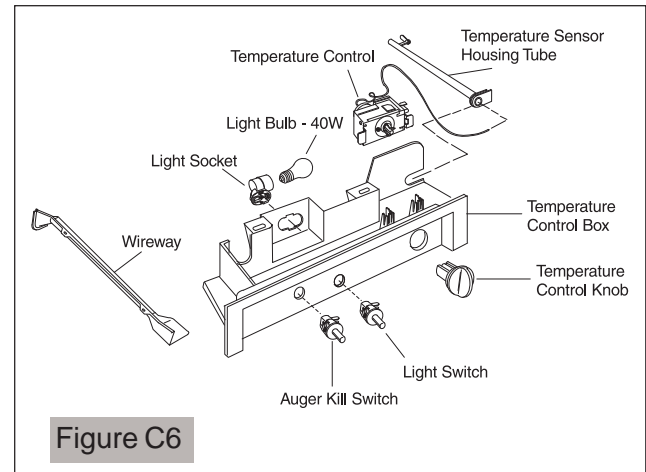
### Side-by-Side

The control thermostat is a variable cut-in type. When the thermostat knob is changed from one setting to another, both cut-in and cut-out temperature change.

The degrees of temperature change are determined by the knob setting.

### Control Thermostat Mounting

The control thermostat is mounted in a one-piece plastic control housing. The sensing element is attached to the projection, on the bottom of the housing, with a single bend (See Figure C6).



The control housing is attached to the refrigerator liner with two screws, and contains the control thermostat, defrost timer and lamp receptacle.

### To Remove The Control Thermostat

1. Disconnect electrical supply from refrigerator.
2. Remove two ¼" screws located at rear of freezer control housing.
3. Remove two screws securing wireway cover located on left side of liner.
4. Remove control knob.
5. Lower housing and release control from housing slots.
6. Remove control bulb from bulb housing.
7. Reverse this procedure to complete repairs.

**NOTE:** When installing the control thermostat, push the capillary tube into the housing until it bottoms out.

## DAMPER CONTROL

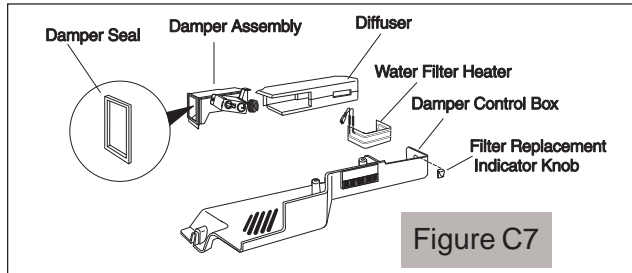
The damper control regulates the refrigerator compartment temperature. The damper control consists of the refrigerator control knob, control knob extension (on some models), capillary tube, and damper door. The capillary bulb monitors the air flow entering the refrigerator section. Depending on where the control knob is set, the capillary bulb will close the damper door when the desired refrigerator temperature is reached, and will open the damper door when the refrigerator compartment temperature is higher than selected.

### To Remove The Damper Control

1. Remove extension rod cover by releasing push pin located in front bottom corner.

**NOTE:** Some models do not use an extension rod. The knob fastens directly to the control.

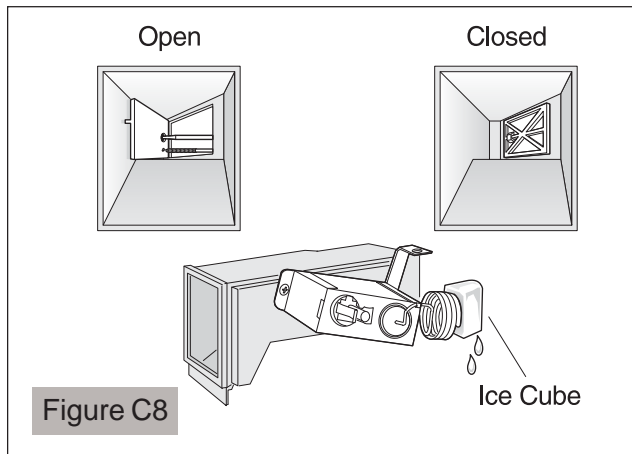
2. Leaving control knob attached, disengage extension rod from damper control, and push it through control housing.
3. Remove two (2) screws securing damper cover.
4. Remove two ¼" screws securing damper control assembly to liner.



### To Test The Damper Control

Hold an ice cube against the capillary of the damper control (See Figure C8). With the damper control set to warm, the door should close completely.

**NOTE:** At ambient temperature (no ice cube), the door will be open.



### LIGHT SWITCH

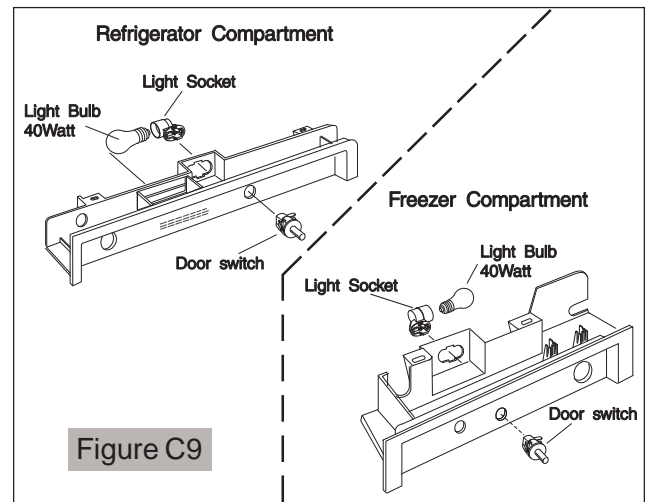
The light switch is a door activated, single-pole, single-throw switch (See Figure C9).

When the door is closed, the light circuit is open (OFF). Push on the terminal connectors to secure the wiring harness leads to the switch terminals.

To replace the switch, pry the switch out of the mounting, disconnect the wire leads and replace.

### To Remove Light Sockets

1. Disconnect refrigerator from electrical supply.
2. Remove two ¼" screws securing control housing.
3. Remove bulb.
4. Disconnect wire leads to socket.
5. Release socket from housing.
6. Reverse procedure to complete repairs.



### PERIMETER AND MULLION HOT TUBE

To reduce the possibility of condensation forming on the exterior of the cabinet in high humidity areas, units are equipped with a one piece perimeter and mullion hot tube which is part of the refrigeration system. No electric heaters are used. Refer to the Refrigeration Section for more information.

### EVAPORATOR FAN & MOTOR ASSEMBLY

The fan and motor assembly are located behind the freezer compartment air duct directly above the evaporator in the freezer compartment.

The fan is a suction type, pulling air up through the evaporator and blowing it through the refrigerator compartment fan grille.

Wired in series with the control thermostat and the contacts of the defrost timer, the freezer compartment fan motor operates when the control thermostat contacts are closed, except during the defrost cycle.

On current production models, the fan blade is not adjustable and is designed to be pressed onto the motor shaft until it bottoms out against the stop at the front of the fan blade.

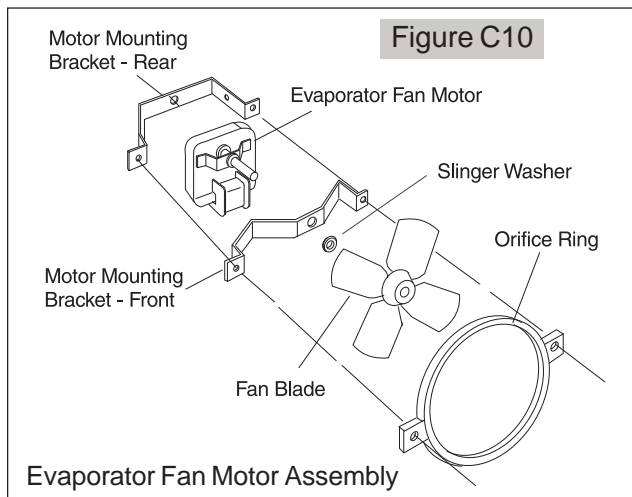


## To Remove Evaporator Fan Motor

**NOTE:** When replacing the fan blade, press the blade onto the motor shaft until the blade bottoms out on the shaft.

1. Disconnect refrigerator from electrical supply.
2. Remove freezer section bottom shelves and baskets.
3. Remove evaporator cover.
4. Disconnect fan motor multiconnector.
5. Remove two screws securing motor assembly to upper evaporator cover.
6. Remove fan blade.
7. Remove Slinger washer.
8. Remove fan motor mounting brackets and multiconnector.
9. Reverse procedure to complete repairs.

**NOTE:** The Slinger washer on the fan motor shaft must be adjusted to within 1/16" to 1/8" from motor to prevent water from entering motor bearing.

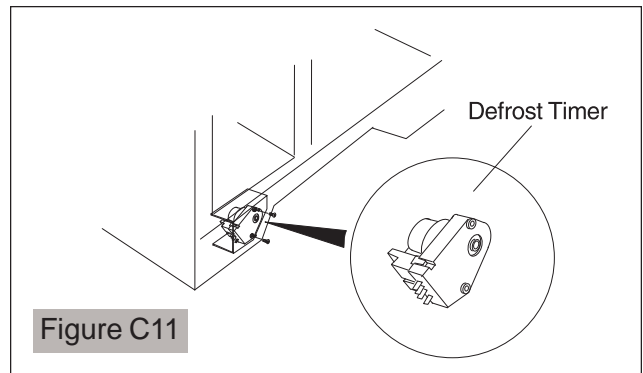


## DEFROST TIMER

The timer motor is energized during the defrost and compressor run cycles. The timer motor turns an internal cam. The cam opens and closes the electrical circuits to the compressor, evaporator fan motor, condenser fan motor, and defrost heater.

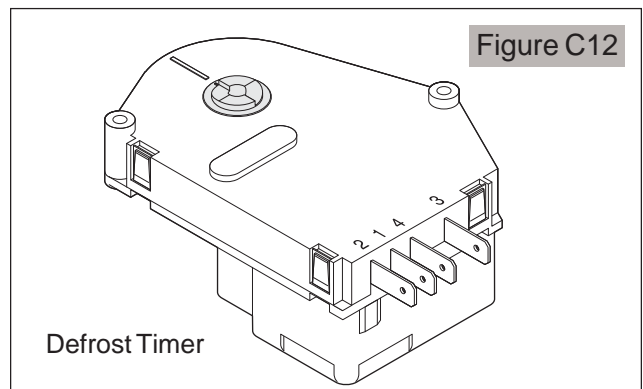
### To Remove The Defrost Timer

1. Disconnect refrigerator from electrical supply.
2. Remove toe grille.
3. Loosen two screws securing timer to cabinet and remove timer (See Figure C11).
4. Disconnect multiconnector.
5. Remove mounting screws to remove timer from shield.
6. Reverse procedure to complete repairs.



### To Check Defrost Timer

1. Disconnect electrical supply to refrigerator.
2. Remove defrost timer.
3. With timer in compressor run cycle, check continuity from terminals 1 and 4.
4. Rotate timer knob until a click is heard or infinite resistance is present.
5. With timer in defrost cycle, continuity should be present between terminals 1 and 2.
6. With ohmmeter, check resistance at, or between terminals 1 and 3. (Refer to data sheet, page 65)



To check the mechanical operation, connect the timer to the multiconnector. With 120 VAC present at terminals 1 and 3, the timer knob will rotate (check after ten minutes).

## DEFROST THERMOSTAT

The defrost thermostat is a temperature sensing device. Wired in series with the defrost timer and the evaporator defrost heater, it senses the rise in evaporator temperature during a defrost cycle and cycles the defrost heater off after all frost is melted. It is calibrated to permit a defrost cycle only when the temperature is below a preset temperature. The contacts in the defrost thermostat are set to open at 47°F and close at 25°F.

### To Remove The Defrost Thermostat

1. Disconnect refrigerator from electrical supply.
2. Remove bottom shelves and baskets.
3. Remove lower evaporator cover.
4. Disconnect leads to thermostat.
5. Remove thermostat from evaporator.
6. Reverse procedure to complete repairs.

### To Test The Defrost Thermostat

1. Measure resistance across two thermostat leads. At room temperature, resistance should be infinity. The contacts are open.
2. Place a couple ice cubes on sides of thermostat. After a few seconds, thermostat should reset.
3. Measure resistance again. This time, reading should be 0. Contacts have closed.
4. If you get resistance readings that differ from this procedure, replace defrost thermostat. Contacts are probably burnt.

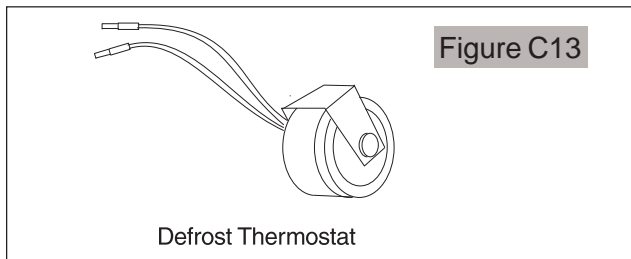


Figure C13

Defrost Thermostat

### DEFROST HEATER

The defrost heater is a radiant "U" shaped resistance heater, rated at 600 watts. The defrost heater is wired in series with the defrost thermostat and contacts 2 to 1 of the defrost timer. The defrost heater is energized during that period of the cycle when the defrost thermostat contacts are closed.

The length of time the heater is energized depends on the amount of frost accumulation on the evaporator.

### How To Remove The Defrost Heater

1. Disconnect refrigerator from electrical supply.
2. Remove bottom shelves and baskets.
3. Remove lower evaporator cover.
4. Disconnect leads to defrost heater.
5. Pull evaporator away from drain trough so bottom of evaporator is free of drain trough.

**NOTE:** The defrost heater is positioned in between the evaporator coils. It's a very snug fit.

6. Grab heater from bottom and pull free of the evaporator. It's very snug so you'll need to use a little force.

7. Check resistance of defrost heater using a multimeter. (Refer to data sheet on page 65)
8. Replace defrost heater if resistance readings are out of range.
9. Re-assemble in reverse order.

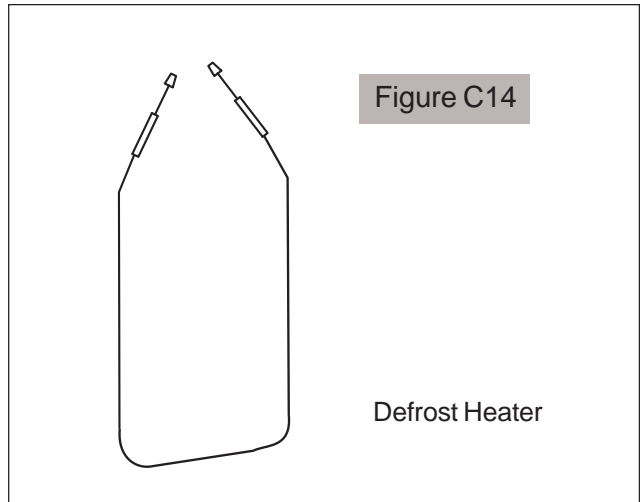
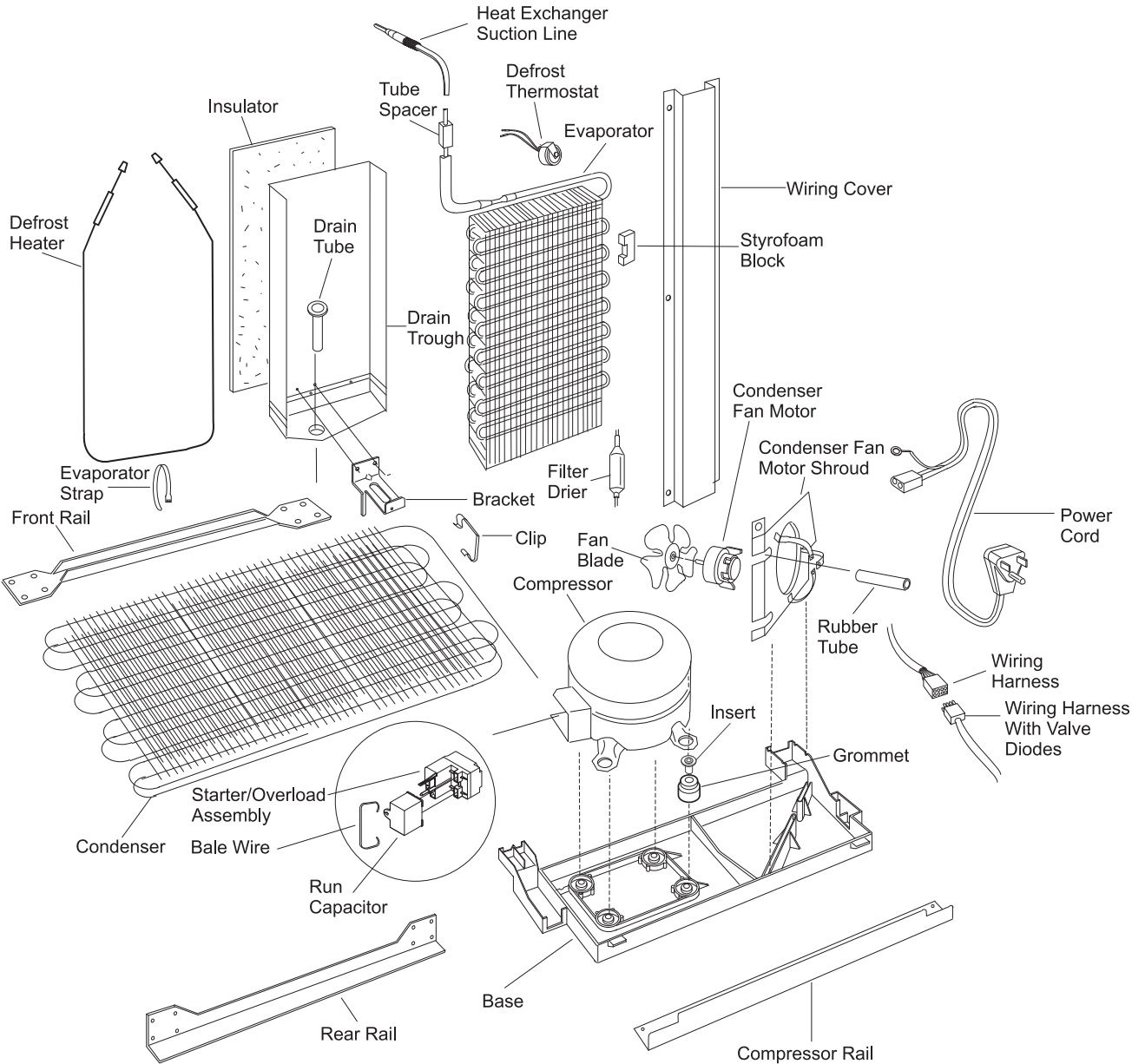


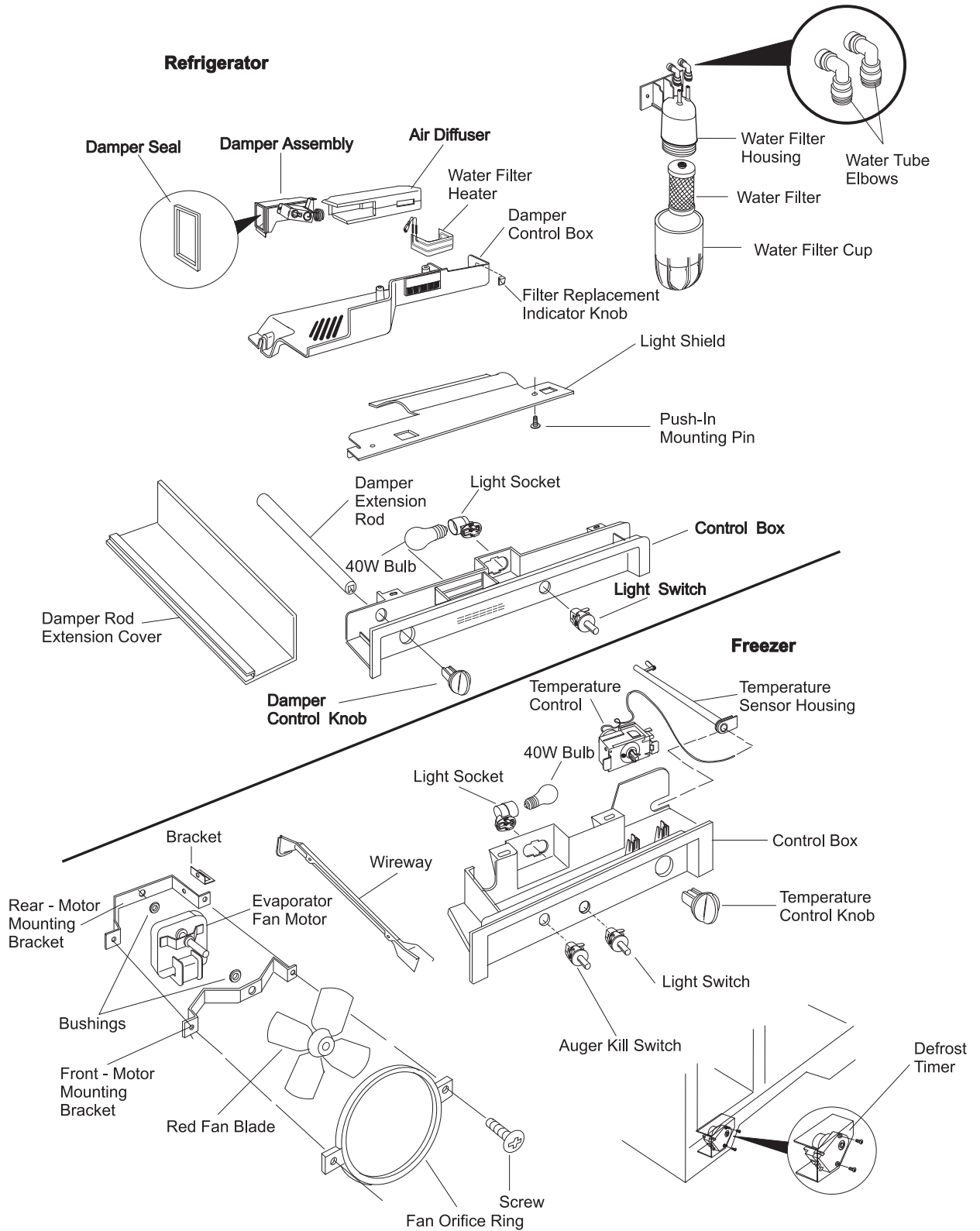
Figure C14

Defrost Heater

# SYSTEM DIAGRAM



# CONTROLS DIAGRAM



# SECTION D - AIR CIRCULATION

## AUTOMATIC DEFROST MODELS

### Principals Of Automatic Defrost Operation

Automatic defrost refrigerators operate on the principle that moisture or frost transfers or migrates to the coldest surfaces (evaporator) in the freezer compartment. For example, a small amount of water spilled from an ice cube tray in the freezer compartment will freeze immediately. However, this ice in time will evaporate and transfer to the colder surfaces of the freezer evaporator coil.

### Air Circulation Patterns

Automatic defrost models have a single evaporator in the freezer compartment, and have forced air cooling in the freezer and refrigerator compartments.

The “fin and tube” aluminum type evaporator is located on the back wall of the freezer compartment. A circulating fan (suction type) pulls air from the freezer and refrigerator compartments across the evaporator surfaces. The cold air is forced into a fan cover and discharged into the freezer and refrigerator compartments as shown in Figure D1. Return Air from the refrigerator compartment flows to the evaporator through a duct located in the separating wall in the bottom rear left hand corner.

The air circulating fan operates only when the compressor is running. During the defrost period, the compressor and circulating fan do not operate. The automatic defrost timer opens the electrical circuit to the fan motor and compressor.

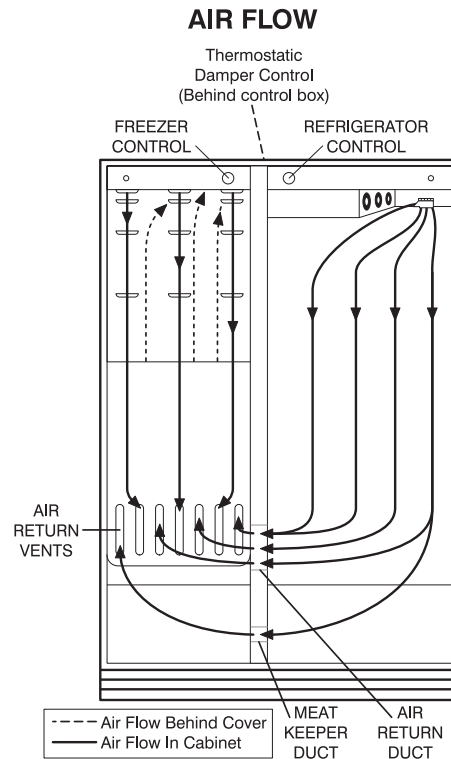


Figure D1

# SECTION E - REFRIGERATION SYSTEM

**NOTICE:** Instructions given here are furnished as a guide. Persons attempting to use these instructions to make repairs to the sealed refrigeration system should have a working knowledge of refrigeration and previous training on sealed system repair, and an EPA certification for servicing refrigeration systems.

## IMPORTANT NOTICE

**Effective July 1, 1992, the United States clean air act governs the disposal of refrigerants such as R-134a. therefore, when discharging or purging the sealed system, use an epa approved refrigerant recovery system as outlined in the final rule on the protection of stratospheric ozone and refrigerant recycling which was published in the Federal Register may 14, 1993.**

**NOTE:** Frigidaire does not permit the use of recovered refrigerant in the servicing of our products for in-warranty and out-of-warranty repairs or for products covered by service contracts. Therefore, only new refrigerant or refrigerant that has been reclaimed back to new specifications by a refrigerant manufacturer is to be used.

## DEFINITIONS

### Recovery:

To remove refrigerant in any condition from a system and store it in an external container without necessarily testing or processing it in any way.

### Recycling:

To clean refrigerant for reuse by oil separation and single or multiple passes through devices, such as replaceable core filter-driers, which reduce moisture, acidity and particulate matter. This term usually applies to procedures implemented at the field job site or at a local service shop.

### Reclaim:

To reprocess refrigerant to new product specifications by means which may include distillation. Will require chemical analysis of the refrigerant to determine that appropriate product specifications are met. This term usually implies the use of processes or procedures available only at a reprocessing or manufacturing facility.

## SAFETY WARNINGS

### Compressor Testing

Whenever testing a compressor, extreme caution should be used to prevent damaging the terminals. A compressor with a damaged terminal or a grounded winding can expel a terminal from its insulated housing when the compressor is energized. If this happens, a mixture of refrigerant and oil will be released that could be ignited by an external heat source (open flame, heater, etc.). Also, if there is air in the system when this happens, a spark at the compressor shell could ignite the refrigerant and oil mixture.

## Charging Sealed Systems

Overcharging a refrigeration system with refrigerant can be dangerous. If the overcharge is sufficient to immerse the major parts of the motor and compressor in liquid refrigerant, a situation has been created which, when followed by a sequence of circumstances, can lead to the compressor shell seam separating.

A hydraulic block occurs, preventing the compressor from starting. This condition is known as locked rotor. Electric current continues to flow through the compressor motor windings which become, in effect, electric resistance heaters. The heat produced begins to vaporize the excess refrigerant liquid, causing a rapid increase in system pressure. If the compressor protective devices fail, the pressure within the system may rise to extremes far in excess of the design limits. Under these conditions, the weld seam around the compressor shell can separate with explosive force, spewing oil and refrigerant vapor which could ignite.

To eliminate this exceedingly rare but potential hazard, never add refrigerant to a sealed system. If refrigerant is required, evacuate the existing charge and recharge with the correct measured amount of the refrigerant specified for the system.

## SOLDERING

**WARNING: WEAR APPROVED SAFETY GLASSES WHEN WORKING WITH OR ON ANY PRESSURIZED SYSTEM OR EQUIPMENT. HAVE AN APPROVED DRY TYPE FIRE EXTINGUISHER HANDY WHEN USING ANY TYPE OF GAS OPERATED TORCH.**

1. All joints to be soldered must have proper fit. Clearance between tubes to be soldered should be from .001" to .006". It is not practical to actually measure this; however, you do not want a dry fit or loose fit. Tubing joints should overlap about the distance of their diameter except for restrictor tubes, which should be inserted 1.25"
2. Clean all joint areas with fine steel wool or, preferably, an abrasive cloth, such as grit cloth No. 23 or Scotch-Brite.
3. Apply thin film of liquid flux recommended for silver soldering to surfaces to be joined, and to surfaces immediately adjacent to joint.
4. Align tubing so no stress is on joint. Do not move tubing while solder is solidifying or leaks will result.

**CAUTION: During application of heat, use wet cloths to prevent heat from conducting to areas other than soldered joint. Use a sheet of metal as a heat deflector to keep flame away from inflammable materials and painted surfaces.**

5. Use a torch of adequate capacity so joint can be quickly heated with a minimum of heat travel to other points. Use a good grade of silver solder.
6. Solder connections. If tubing is properly cleaned and fluxed, solder will flow readily. Use only enough solder to make a good bond.
7. Allow joint to cool, then wash exterior with water to remove flux.

## BASIC COMPONENTS

The basic components of a refrigerator are a compressor, condenser, evaporator, heat exchanger (capillary tube and suction line), drier, and perimeter hot tube.

## PERIMETER HOT TUBE

To reduce the possibility of condensation forming on the exterior of the cabinet in high humidity areas, a perimeter hot tube (refrigerant tube) has been installed in the unit. The perimeter tube extends up the left side, across the top of the freezer and down the center mullion and into the filter drier. When the compressor operates, warm refrigerant flows through the primary condenser, then, into the primary hot tube, warming the cabinet front exterior.

The perimeter hot tube is not replaceable. In the unlikely event of a leak in the hot tube, a kit is available to bypass the hot tube in the sealed system. A electrical heater wire must be installed within the tubing. Refer to the appropriate parts list of the model being serviced for the correct kit part number.

## REFRIGERANT CYCLE

The refrigerant cycle is a continuous cycle that occurs whenever the compressor is in operation. Liquid refrigerant is evaporated in the evaporator by the heat that enters the cabinet through the insulated walls, and by the heat from product load and door openings. The refrigerant vapor is then drawn from the evaporator, through the suction line, to the compressor. Compression raises the pressure and temperature of the vapor in the compressor, and the vapor is then forced through the discharge valve into the discharge line and into the condenser. Air passing over the condenser surface removes heat from the high pressure vapor which then condenses to a liquid. The liquid refrigerant then flows from the condenser to the evaporator, through the small diameter liquid line (capillary tube). Before it enters the evaporator, the liquid refrigerant is sub-cooled in the heat exchanger by the low temperature suction vapor in the suction line.

## LOW OR HIGH SIDE LEAK OR UNDERCHARGE

A loss of refrigerant can result in any of the following:

1. Excessive or continuous compressor operation.
2. Above normal freezer compartment temperature.
3. A partially frosted evaporator (depending on amount of refrigerant loss).
4. Below normal freezer compartment temperature.
5. Low suction pressure (vacuum).
6. Low wattage.

The condenser will be "warm to cool", depending on the amount of refrigerant lost.

When refrigerant is added, the frost pattern will improve, the suction and discharge pressures will rise, the condenser will become hot, and the wattage will increase.

In the case of a low side refrigerant leak, resulting in complete loss of refrigerant, the compressor will run, but will not refrigerate. Suction pressure will drop below atmospheric pressure and air and moisture will be drawn into the system, saturating the filter drier.

If a slight undercharge of refrigerant is indicated, and no leak can be found after a thorough leak test, the charge can be corrected without changing the compressor.

If there is reason to believe the system has operated for a considerable length of time with no refrigerant, and the leak occurred in the evaporator, excessive amounts of moisture may have entered the system. In such

cases, the compressor may need to be replaced to prevent repetitive service.

If a high side leak is located and some refrigerant remains in the system, it is not necessary to change the compressor.

### TESTING FOR REFRIGERANT LEAKS

If the system is diagnosed as short of refrigerant and the system has not been recently opened, there is probably a leak in the system. Adding refrigerant without first locating and repairing the leak, or replacing the component, will not permanently correct the difficulty. **The leak must be found.** Sufficient refrigerant may have escaped to make it impossible to leak test effectively. In such cases, add a 1/4" line piercing valve to the compressor process tube. Add sufficient refrigerant vapor to increase the pressure to 40 to 50 lb. per sq. in. Check the low side for leaks. Run the compressor 2 or 3 minutes and check the high side for leaks. Recover refrigerant using an EPA approved recovery system.

**NOTE:** The line piercing valve (clamp-on type) should be used for test purposes only. It must be removed from system after it has served its purpose.

### CHECKING FOR INTERNAL (HOT TUBE) LEAKS

Before checking for internal leaks, check all accessible system components and joints for leaks.

If an internal hot tube leak is suspected, it must be confirmed. Use the following procedure:

1. Recover refrigerant by using EPA approved recovery system.
2. After *system refrigerant* is completely recovered, disconnect drier from hot tube. Pinch off and solder end of hot tube closed.
3. Cut line from condenset to hot tube and solder a 1/4" charging hose fitting to open end of hot tube or put compressor fitting on tube.
4. Connect pressure gauge and access valve to hot tube, and pressurize to 250 psig using dry nitrogen or carbon dioxide.

**WARNING: NEVER PRESSURIZE WITH OXYGEN. NEVER OPEN A HIGH PRESSURE TANK UNLESS IT IS EQUIPPED WITH A PRESSURE REGULATOR. NEVER PUT HIGH PRESSURE ON DOME OF COMPRESSOR – IT COULD EXPLODE. MAKE SURE GAUGE FITTINGS ARE IN GOOD CONDITION AND DO NOT LEAK.**

5. Leave pressure on hot tube for 24 hours. Any drop in pressure is indication of leak.

**If dry nitrogen or carbon dioxide is not available, follow steps 1 through 3 above, then steps 4 and 5 below:**

4. Connect gauges to charging hose fittings. Pull vacuum on hot tube.
5. Leave vacuum on each side of system for 24 hours. Any loss of vacuum indicates leak.

### COMPRESSOR REPLACEMENT

**CAUTION: NEVER install a new compressor without first checking for possible system contamination.**

To check for contamination, obtain oil sample from old compressor.

- If the oil has burned odor, but no color change or residue — follow instructions in section "*Installing A New Compressor* on page 24".
- If oil has a burned sugar odor and shows contamination (dark color) — follow instructions in next section, *To Flush The System*, remove as much of contamination as possible from system before installing new compressor and filter-drier.

### To Flush The System

**NOTE:** It is recommended that system be flushed with dry Nitrogen. However, if refrigerant is used to flush system, you must look at the serial plate to see what type of refrigerant is used in the system. This is the only refrigerant that can be used to flush the system and it must be recovered.

**CAUTION: Use extreme care when using Dry Nitrogen to flush systems. Pressure in nitrogen cylinder could be as high as 2000 psi. Nitrogen cylinder must be equipped with approved pressure regulator and pressure relief valve. Ensure that your hoses have adequate ratings for pressure involved, and that all of your equipment is in good condition.**

**CAUTION: The end of flushing hose off tank regulator must be equipped with a hand shut-off valve (Robinair No. 40380). Close hand shut-off valve and adjust nitrogen regulator to correct pressure before proceeding with flushing procedure.**



*To Use Dry Nitrogen To Flush The System:*

1. Remove compressor and filter-drier. Connect process coupling to outlet tube of condenser.
2. Fasten cloth over other end of coil to prevent old oil from spraying over room.
3. Connect hand shut-off valve on flushing hose to process coupling.
4. Slowly open hand shut-off valve and allow nitrogen to flow through condenser until discharge is clear.

**CAUTION: DO NOT exceed 300 PSIG.**

5. Disconnect cap tube from evaporator. Flush evaporator in same manner as condenser.

**CAUTION: DO NOT exceed 150 PSIG.**

6. Flush cap tube. This is only possible if you have proper service valve adaptor.

**CAUTION: DO NOT exceed 300 PSIG.**

7. Reassemble system.

*To Use Refrigerant To Flush The System:*

**CAUTION: Refrigerant used for flushing must be recovered into a recovery bag. Meter amount of refrigerant used for flushing with your charging cylinder. DO NOT OVERFILL THE BAG.**

1. Disconnect the suction and discharge lines from the compressor and remove the filter-drier. Connect process coupling to outlet and inlet tube of condenser.
2. Connect hose to outlet process coupling and charging cylinder. Connect another hose to inlet coupling and recovery bag.
3. Open charging cylinder and allow refrigerant to flow through condenser until discharge into bag is clear.

**NOTE:** To flush evaporator and heat exchanger you must remove evaporator from inside product to disconnect cap tube.

4. Disconnect capillary tube from evaporator. Flush evaporator in same manner as condenser.
5. Flush cap tube. This is only possible if you have proper service valve adaptor.
6. Reassemble system.

**Installing a New Compressor**

**NOTE:** Entirely new compressors have been developed for use with R-134a and Ester oil refrigeration systems. Both compressor and electric motor have been modified. Old compressors intended for R-12 refrigerant must not be used for new systems charged with R-134a.

Replacement of compressor and installation of filter-drier must be done in continuous sequence so system is exposed to atmosphere no longer than necessary.

All replacement compressors are shipped with rubber plugs in the suction, discharge, and process tubes and contain the correct oil charge and a holding charge of inert gas. Compressors have a low-side process tube attached to the compressor shell. A high-side process tube is attached to the filter-drier.

**WARNING: DO NOT OPERATE RECIPROCATING COMPRESSOR WHEN CHARGING LIQUID REFRIGERANT INTO SYSTEM THROUGH ITS PROCESS TUBE.**

Replacement compressors for refrigerators and food freezers may have an oil cooler even if the original compressor did not. If the product is not equipped for an oil cooler, leave the plastic caps in place and install the compressor, connecting only to the suction and discharge lines of the new compressor.

Before installing the replacement compressor, remove the discharge plug and check for the pop sound of the inert gas leaving the compressor.

**CAUTION: DO NOT use compressor if you do not hear this sound.**

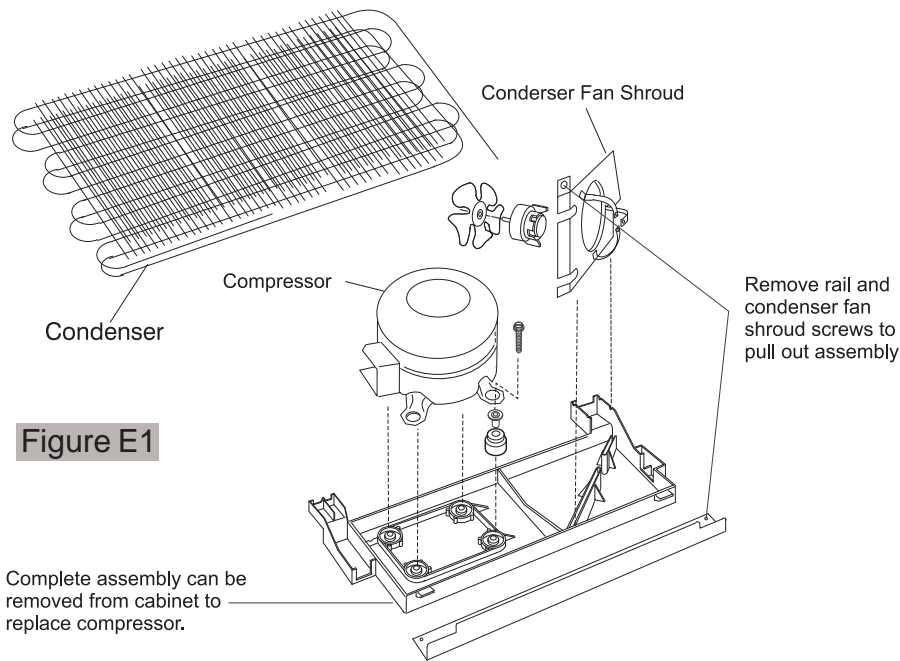
If the compressor checks OK, reinstall the plug. Do not remove any of the plugs again until the compressor is in position and you are ready to braze the lines.

**CAUTION: On R-134a systems, compressor must NOT be left open to atmosphere for more than 10 minutes to prevent moisture contamination of oil.**

A new compressor which is cold (e.g. after having been kept in a cold service van) should be left to warm to the surrounding temperature before the plugs on the compressor connections are removed. This will help prevent condensation from forming in the oil and the compressor. Also, avoid opening the system when any of the components or lines are cold.

**NOTE:** Release holding charge (release slowly to avoid oil discharge) on new compressor to ensure there is no leak in seam or tubing. Then, reinstall rubber plug.

1. Disconnect electrical supply to refrigerator.
2. Remove compressor access panel.
3. Remove rail and condenser fan shroud screws.
4. Remove fan motor harness clamp located below heat exchanger wiring harness cover.
5. Disconnect condenser fan motor multiconnector.
6. Pull compressor assembly straight out (See Figure E1).
7. Recover refrigerant by using EPA approved recovery system.
8. Remove leads from compressor motor terminals.
9. Remove mounting clips and washers.



10. After refrigerant is completely recovered, cut suction and discharge lines as close to compressor as possible. Leave only enough tubing to pinch off and seal defective compressor. Plug or tape any open system tubing to avoid entrance of moisture and air into system. Remove inoperable compressor and transfer mounting parts to new compressor.
11. Install new compressor in exact same manner as original compressor.
12. Reform both suction and discharge lines to align with new compressor. If they are too short, use additional lengths of tubing. Joints should overlap 0.5" to provide sufficient area for good solder joint. Clean and mark area where tubing should be cut. Cut tubing with tubing cutter. Work as quickly as possible to avoid letting moisture and air into system.

**NOTE:** If low-side process tube is too short, silver solder four inch piece of tubing onto process tube at this time.

13. Solder all connections according to soldering procedure outlined above.
14. Remove original filter-drier.

**CAUTION: DO NOT unbrazed old filter-drier from system. This will vaporize and drive moisture from desiccant back into system. The old filter-drier should be cut out of system.**

15. Install new filter-drier at condenser outlet.
16. Evacuate and charge system using recommended procedure described under Evacuating and Recharging on pages 27-28.

17. Reconnect compressor terminal leads in accordance with refrigerator wiring diagram.
18. Reassemble unit.

#### EVAPORATOR REPLACEMENT

**CAUTION: Remove any component part from the interior of the cabinet before attempting to solder. The excessive heat from soldering will warp the plastic liner.**

The evaporator is located in the lower section of the freezer and is secured to the drain pan by top and bottom brackets. Styrofoam blocks are located on each side, directly across from each other, to ensure proper air flow through the evaporator.

1. Disconnect refrigerator from electrical supply.
2. Remove all freezer section shelves and baskets.
3. Remove bottom evaporator cover.
4. Disconnect fan motor multiconnector.
5. Remove any clamps holding heat exchanger and wiring to liner.
6. Remove heater and thermostat.
7. On back of refrigerator, remove cover protecting heat exchanger and wiring harness.
8. Remove compressor service panel.
9. Recover refrigerant by using an EPA approved recovery system.
10. After refrigerant is completely recovered, disconnect capillary tube from filter-drier and suction tube from compressor.

11. Remove exchanger and evaporator.
12. Clean suction and capillary lines with an abrasive cloth. Connect lines to replacement evaporator and solder joints.
13. Install evaporator assembly in refrigerator. Connect suction line to compressor and solder joint.
15. Remove original filter-drier.

**CAUTION: DO NOT unbraid the old filter-drier from the system. This will vaporize and drive moisture from the desiccant back into the system. The old filter-drier should be cut out of the system.**

16. Install new filter-drier at condenser outlet.
17. Evacuate and charge system using recommended procedure described under Evacuating and Recharging on pages 27-28.
18. Reassemble unit. All sealing materials must be replaced where lines and wires pass through cabinet.

#### CONDENSER REPLACEMENT

1. Disconnect refrigerator from electrical supply.
2. Remove compressor access panel.
3. Remove rail and condenser fan shroud screws.
4. Remove fan motor harness clamp located below heat exchanger wiring harness cover.
5. Disconnect condenser fan motor multiconnector.
6. Pull compressor assembly straight out.
7. Recover refrigerant, using an EPA approved recovery system.
8. Remove wiring from compressor.
9. After refrigerant is completely recovered, disconnect suction and discharge lines from compressor.
10. Remove condenser mounting clips that secure drain pan and remove condenser.
11. Install replacement condenser.
12. Remove original filter-drier.

**CAUTION: DO NOT unbraid the old filter-drier from the system. This will vaporize and drive moisture from the desiccant back into the system. The old filter-drier should be cut out of the system.**

13. Install new filter-drier at condenser outlet.
14. Evacuate and charge the system using recommended procedure described under Evacuating and Recharging on pages 27-28.
15. Reassemble unit.

#### SUCTION LINE AND CAPILLARY TUBE REPLACEMENT

Follow the same procedure as for evaporator replacement.

#### FILTER-DRIER INSTALLATION

Any time the sealed system is opened and the refrigerant charge is removed, the liquid line filter-drier must be replaced and the system thoroughly evacuated before recharging.

**CAUTION: DO NOT unbraid the old filter-drier from the system. This will vaporize and drive moisture from the desiccant back into the system. The old filter-drier should be cut out of the system.**

**CAUTION: Use only a 15 gram XH9 liquid line filter-drier (part number 5303305677) when servicing refrigerator and freezer systems. This filter-drier is compatible with either R-12 or R-134a refrigerant.**

1. Disconnect unit from source of power.
2. Recover refrigerant by using an EPA approved recovery system.
3. Using a 3 cornered file, score a groove around capillary tube as close to old filter-drier as possible. Break capillary tube along score mark from filter-drier.
4. Cut condenser outlet tube at filter-drier. Discard filter-drier.
5. Thoroughly clean condenser outlet tube and capillary tube.
6. Place inlet connection of filter-drier over condenser tube approximately ¼" and solder.
7. Insert capillary tube input end into filter-drier outlet. Do not allow tube to bottom against screen. Solder carefully so that solder does not plug capillary tube.
8. Install process tube adaptor to filter-drier.
9. Evacuate and charge system using the recommended procedure described under Evacuating and Recharging on pages 27-28.
10. Reassemble unit.

## EVACUATING AND RECHARGING

**CAUTION:** Check the serial plate for the correct refrigerant type. It is extremely important to verify the type of refrigerant in the system before starting any sealed system repairs.

**CAUTION:** With the possible exception of the vacuum pump, all service equipment that comes in contact with R-134a during evacuation and recharging must be dedicated. Accordingly, R-134a will require a dedicated charging cylinder, manifold gauge set, process tube adaptors, and hoses. Any residual mineral oil on other tools (tubing cutter, etc.) must be thoroughly cleaned off before using on R-134a/Ester oil systems. It will be necessary to check with the manufacturer of your vacuum pump for refrigerant and oil compatibility issues.

**CAUTION:** If you use a vacuum pump with mineral oil to evacuate an R-134a system, it is **ABSOLUTELY ESSENTIAL** to have a shut-off valve between the pump and your manifold gauge set as shown in Figure E2. The hand valve must be closed during all times when the vacuum pump is not operating. This will prevent the migration of mineral oil vapor into the R134a/Ester oil system. If the vacuum pump should stop during evacuation for any reason, the hand pump shut-off valve must be closed immediately.

**CAUTION:** Ensure that your refrigeration hoses are specifically for use with R-134a refrigerant. Research has shown that compounds in standard refrigeration hoses may enter sealed systems and ultimately restrict the cap tube in an R-134a system.

### Equipment Needed:

- Heated Dial-A-Charge charging cylinder
- Standard 3-port manifold gauge set:
  - 4 charging hoses
  - Tee fitting with valve core stem removed (Robinair No. 40396)
  - Hand shut-off valve (Robinair No.40380)
- Two stage vacuum pump
- Process tube adapter kit (Robinair No. 12458)
- Tubing cutter
- Pinch-off tool capable of making leak proof seal
- Complete brazing torch set
- Small 3-corner file
- Grit cloth or Scotch-Brite
- 45% silver solder and flux

## Installing Evacuation and Recharging Equipment

1. Disconnect refrigerator from electrical supply.
2. If compressor was replaced, install correct sized process tube adaptor on process tube. If compressor was not replaced, cut process tube with tubing cutter, leaving as much tube as possible, and install correct size process tube adaptor.
3. Install correct sized process tube on high-side process tube.
4. Attach refrigeration service gauge manifold to system in following order:
  - Low-side (compound gauge) hose to suction side process tube adaptor.
  - High-side (pressure gauge) hose to high-side process tube adaptor.
  - Center port manifold hose before hand shut-off valve to charging cylinder.
  - Center port manifold hose after hand shut-off valve to vacuum pump.

### Evacuating System

**WARNING:** R-134A SYSTEMS ARE PARTICULARLY SUSCEPTIBLE TO MOISTURE CONTAMINATION WHICH CAN ONLY BE PREVENTED BY EVACUATING THE SYSTEM FOR A MINIMUM OF 30 MINUTES TO ATTAIN A MINIMUM 29.9 INCH (500 MICRON OR LOWER) VACUUM.

To achieve the required levels of evacuation, a properly maintained two stage vacuum pump in good condition is required. It is absolutely essential to maintain your vacuum pump according to the manufacturer's instructions including required oil changes at the recommended intervals. Vacuum pump oil should always be changed after evacuating a contaminated system.

Vacuum pump performance should be checked periodically with a micron gauge.

1. Make certain that charging cylinder valve, hand shut-off valve, and manifold gauge valves are closed.
2. Start vacuum pump.
3. Open hand shut-off valve and slowly open both manifold valves, turning counterclockwise, for two full rotations.

**CAUTION:** If high vacuum equipment is used, just crack both manifold valves for a few minutes, then open slowly for the two full turns, counterclockwise. This will prevent the compressor oil from foaming and being drawn into the vacuum pump.

4. Operate the vacuum pump for minimum of 30 minutes to minimum of 29.9" (500 micron) vacuum.

5. Close hand shut-off valve to vacuum pump. Watch compound gauge for several minutes. If reading rises, there is a leak in the system, go to step 6. If no leak is indicated, stop vacuum pump. System is now ready for charging.
6. If a leak is indicated, stop vacuum pump and introduce a small charge of refrigerant into system by cracking valve on bottom of charging cylinder until system is pressurized to 40 or 50 lbs, psig.
7. Leak test low-side. Close compound gauge. Run compressor for a few minutes and leak test high-side. When leak is found, recapture refrigerant using EPA approved recovery system, repair and go back to step 1.

### Charging The System

**CAUTION: Check the serial plate for the correct refrigerant type. It is extremely important to verify the type of refrigerant in the system before starting any sealed system repairs.**

**CAUTION: After charging the system with liquid, be certain to wait at least 5 minutes before starting the compressor to give the refrigerant a chance to disperse throughout the system. Otherwise, the compressor could be damaged by attempting to pump excessive quantities of liquid.**

### Preparing The Charging Cylinder:

1. Make certain that hand shut-off valve to vacuum pump is closed.
2. Close high-side manifold gauge valve.
3. Set charging cylinder scale to pressure indicated on cylinder pressure gauge.
4. Observe refrigerant level in sight glass. Subtract amount to be charged into system and note shut off point.

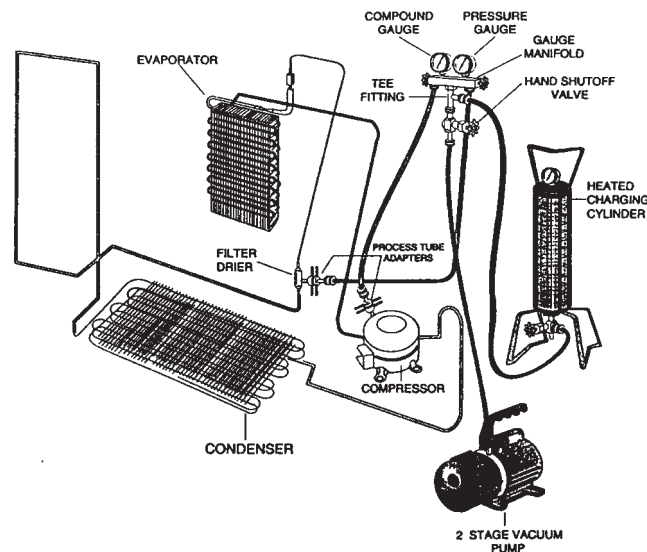
5. Open charging cylinder valve slowly and allow proper charge to enter system.
6. As soon as refrigerant in sight glass has gone down to predetermined level, close charging cylinder valve.

**WARNING: DISCONNECT THE CHARGING CYLINDER HEATER AT THIS TIME TO PREVENT THE CYLINDER PRESSURE FROM EXCEEDING ITS MAXIMUM LIMITS.**

7. Allow system to sit for five minutes.
8. Turn on refrigerator compressor. Run compressor for few minutes and monitor system pressures.
9. When satisfied that the unit is operating correctly, clamp the high-side process tube with the pinch-off tool while the unit is still running.
10. Slowly open the high-side manifold gauge valve to allow the compressor to remove any refrigerant trapped in the high-side hose and the process fitting.
11. Close both of the manifold gauge valves. If the high-side gauge reading rises, the pinch-off must be corrected before proceeding.
12. Remove the high-side process tube adaptor and solder the process tube closed.
13. Clamp the low-side process tube with the pinch-off tool while the unit is running. Remove the low-side process tube adaptor and solder the process tube closed.
14. Check the process tubes for refrigerant leaks.

### FINAL LEAK TEST

1. With the refrigerator turned OFF, leak test all low-side system components.
2. Turn the unit ON and run until the condenser is warm. Leak test the high-side system components.



**Figure E2**

# R-134a SERVICE INFORMATION

**NOTICE:** Instructions given here are furnished as a guide. Persons attempting to use these instructions to make repairs to the sealed refrigeration system should have a working knowledge of refrigeration and previous training on sealed system repair.

## VERIFY REFRIGERANT TYPE IN THE SYSTEM

**CAUTION: R-134a and R-12 are completely incompatible. Before starting any sealed system repair, it is extremely important to check serial plate of product to verify the type of refrigerant in the system.**

### Dedicated Equipment

R-134a must not be mixed with other types of refrigerants. R-134a must be recovered in dedicated and properly identified recovery bags and tanks.

It will be necessary to check with the manufacturer of your recovery equipment to determine R-134a compatibility. Some recovery equipment manufacturers have changeover instructions for switching between refrigerant types. Protect yourself and your equipment by following all manufacturer guidelines.

Also, ensure that your refrigeration hoses are specifically for use with R-134a refrigerant. Research has shown that compounds in standard refrigeration hoses may enter sealed systems and ultimately restrict the cap tube in an R-134a system.

### R-134a REFRIGERATION SYSTEMS

The sealed refrigeration system will consist of the same basic components being utilized in the R-12 systems.

There is a 10% to 15% discharge pressure increase using R-134a, with a 5% to 10% decrease in suction pressure when compared to the same product with an R-12 system operating at 90°F (32°C) ambient temperature conditions. Lower suction pressures result from the lower density of R-134a refrigerant which effects refrigerant flow rate. R-134a systems commonly operate in a 1"-2" vacuum on the suction side.

Products using R-134a refrigerant will generally have a longer capillary tube to maintain a similar flow rate and some models will have a larger condenser to reduce the discharge pressures and lower start-up sound transmission.

### MISCIBILITY OF R-134a AND ESTER OIL

A special synthetic oil known as Ester oil is used as a lubricant in refrigeration systems operating on R-134a. Ester oils are produced from alcohols and fatty acids

and are available in several different variants. Ester oils have a pleasant aroma reminiscent of fruit.

Ester oils generally include various types of additives for improving certain properties such as viscosity, temperature sensitivity, etc. These additives are often aggressive, and skin contact with Ester oils should therefore be avoided.

One of the most important requirements made on a refrigerant system is that the oil mix with the refrigerant. Since mineral oil and ordinary synthetic oil DO NOT mix with R-134a, Ester oil is used for lubrication. Ester oil dissolves in R-134a.

Ester oil is broken down by chlorine and cannot be used with R-12 (R-12 contains chlorine) or any other compound containing chlorine. Therefore, R-134a refrigeration systems have virtually no tolerance for chlorine molecules from CFC refrigerants (R-134a is an HFC and contains no chlorine).

**CAUTION: During R-134a service, it is extremely important to avoid using equipment that may contain residual amounts of mineral oil, CFC's or HCFC's which could enter and contaminate the sealed system.**

For example, hoses that were used for a refrigeration system operating on R-12 may contain small quantities of mineral oil which can block the capillary tube in a system operating on R-134a. As little as one milligram may be sufficient to cause a blockage. In addition, sealed system components that have been used with CFC systems must not be used with R-134a systems. These components may contain residual amounts of refrigerant and oil which could damage an R-134a system.

At the earliest stage of development work on R-134a, tests were carried out on a different type of synthetic oil known as Poly-Alkaline Glycol (PAG). This oil is also used in certain air conditioning systems for cars. PAG and Ester oil DO NOT mix with one another. Service equipment used for R-134a/ Ester oil must not come into contact with PAG.

## WATER IN THE REFRIGERATION SYSTEM

Even in very small quantities, water in any refrigeration system can cause the following problems:

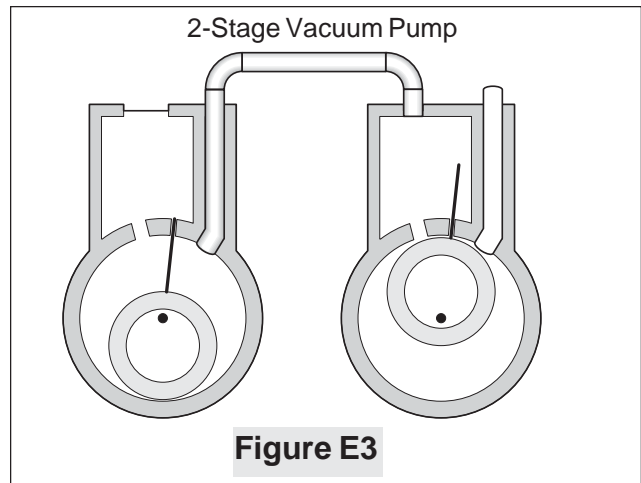
- Ice plugs in capillary tubes.
- Copper plating in compressor.
- Reactions with organic materials in systems.
- Corrosion of metals.

R-134a and Ester oil will aggravate the problem of water in the refrigeration system. Ester oil may react with water vapor and is hydroscopic (it will absorb water if it comes in contact with humid air). Water is also more soluble in R-134a than R-12.

To minimize the water content whenever service work is performed, the refrigeration system should always be thoroughly evacuated through process tube adaptors on both the high and low sides of the system. Evacuation must be for a minimum of 30 minutes to at least a 29.9 inch (500 micron) vacuum.

VACUUM CHART		
Vacuum Inches Hg.	Microns	Boiling Point of Water °F
28.940	25000	77.9
29.530	10000	52.0
29.832	4600	32.0
29.882	1000	1.0
29.901	500	-11.2
29.915	150	-32.8
29.917	100	-38.2
29.919	50	-49.0

To achieve the required 29.9 inch (500 micron) vacuum, a properly maintained two-stage vacuum pump in good condition is required. A two stage pump can reach a deeper vacuum than a single stage because the exhaust from the first pumping stage is discharged into the second pumping stage. This means the second stage begins pumping at a lower pressure so a lower ultimate vacuum can be achieved (See 2-Stage Vacuum Pump, Figure E3).



## VACUUM PUMP MAINTENANCE

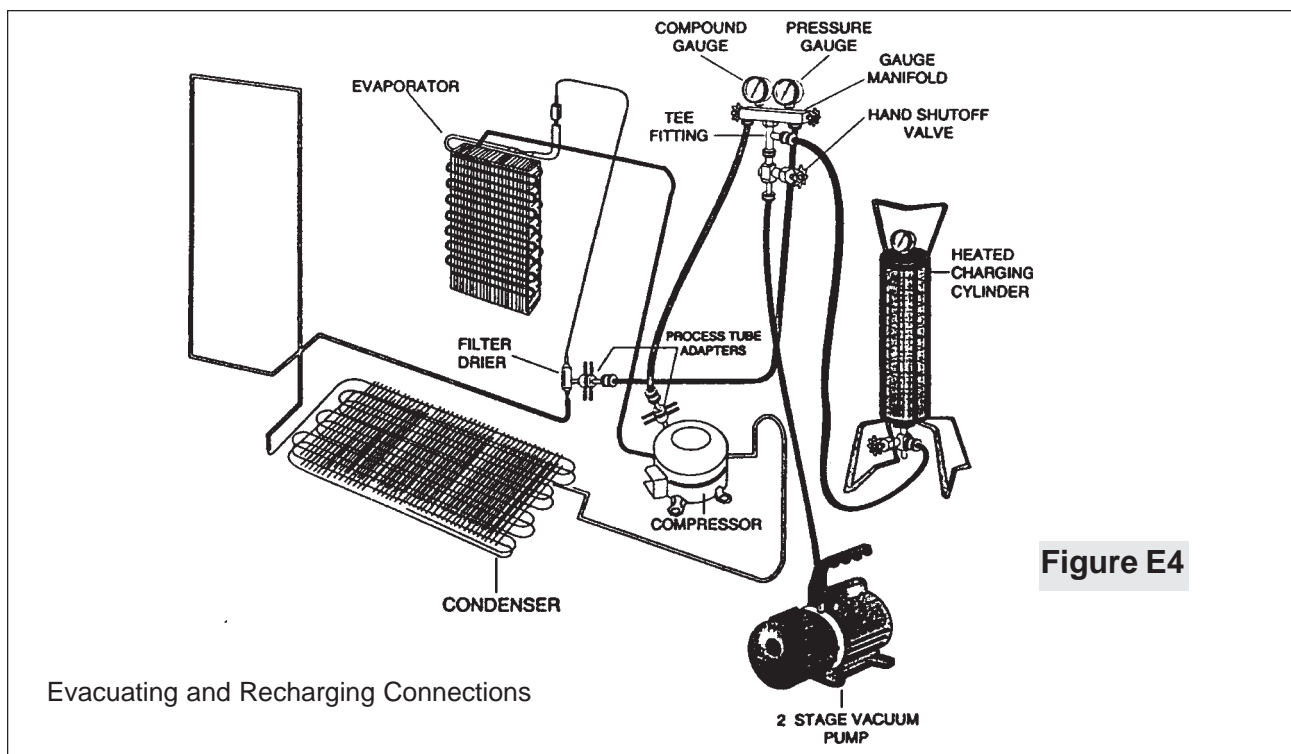
It is absolutely essential to maintain your vacuum pump according to the manufacturer's instructions including required oil changes at the recommended intervals. Vacuum pump oil should always be changed after evacuating a contaminated system. Vacuum pump performance should be checked periodically with a micron gauge.

Vacuum pump suppliers may or may not recommend changing the vacuum pump oil to the same type that's in the system being evacuated. Some manufacturers may recommend a vacuum pump that's dedicated to R-134a systems.

Robinair has stated that their current and discontinued vacuum pump models, using mineral oil currently specified for use in their vacuum pumps, can be used to evacuate R-134a/Ester oil systems. Robinair also states that it is acceptable to alternate between evacuating R-12/mineral oil and R-134a/Ester oil systems without adversely effecting the vacuum pump's performance.

For other brands of vacuum pumps, check with the manufacturer for restrictions and guidelines when using with R-134a.

**CAUTION: If you use a vacuum pump with mineral oil to evacuate an R-134a system, it is ABSOLUTELY ESSENTIAL to have a shut-off valve between pump and your manifold gauge set as shown in Figure E4. The hand valve must be closed during all times when vacuum pump is not operating. This will prevent migration of mineral oil vapor into R134a/Ester oil system. If vacuum pump should stop during evacuation for any reason, the hand pump shut-off valve must be closed immediately.**



## REFRIGERANT LEAKS

A system with R-134a and Ester oil will become saturated with moisture much faster than a system with R-12 and mineral oil. The compressor in an R-134a system will have to be replaced if the product has had a low side leak.

R-134a refrigerant molecules are smaller than R-12 molecules. This means that R-134a will pass more minor leaks and the rate of flow will be greater than for R-12. Therefore, it is now more important than ever to follow good brazing practices. Use a good grade of silver solder. 45% silver solder is recommended.

## LEAK DETECTION

R-134a system leaks can be pinpointed by means of an electronic leak detector or by bubble solution.

Electronic leak detectors for R-134a service are currently available from several manufacturers. The least expensive models are non-selective detectors that will detect any type of emission or vapor present, regardless of its chemical composition. Some non-selective detectors designed for use with R-12 may have a much lower sensitivity when used with R-134a. However, newly designed detectors with good R-134a sensitivity are now available. Be sure to consult with the manufacturer before selecting or using a non-selective detector with R-134a.

Halogen-specific detectors use a specialized sensor that allows detection of compounds containing chlorine, fluorine, bromine, and iodine without being activated by other species. The major advantage of this type of

detector is a reduction in the number of “nuisance alarms”. Halogen-specific detectors are generally more expensive than non-selective detectors but feature higher sensitivity.

## R-134a PROPERTIES

The properties of R-134a are very similar to those of R12. The principal data for the two refrigerants are shown in the chart below.

	REFRIGERANTS	
	R-12	R-134a
<b>NAME</b>	Dichlorodifluoromethane	1,1,1,2--Tetrafluoromethane
<b>Formula</b>	CCl <sub>2</sub> F <sub>2</sub>	CH <sub>2</sub> F-CF <sub>3</sub>
<b>Molecular Weight (g/mol)</b>	120.93	102.3
<b>Ozone Depletion Potential (ODP)</b>	1	0
<b>Global Warming Potential (GWP)</b>	3.1	0.3
<b>Boiling Point °F</b>	-21.6	-15.7
<b>Vapor Pressure (77°F)</b>	80 psig	82 psig
<b>Flammability</b>	None	None
<b>Solubility of Water in Refrigerant (wt% @ 77°F)</b>	0.009	0.11



## HFC-134a, CFC-12 PRESSURE TEMPERATURE CHART

°F	°C	HFC-134a	CFC-12		°F	°C	HFC-134a	CFC-12
-60	-51.1	21.8*	19.0*		55	12.8	51.1	52.0
-55	-48.3	20.4*	17.3*		60	15.6	57.3	57.7
-50	-45.6	18.7*	15.4*		65	18.3	63.9	63.8
-45	-42.8	16.9*	13.3*		70	21.1	70.9	70.2
-40	-40.0	14.8*	11.0*		75	23.9	78.4	77.0
-35	-37.2	12.5*	8.4*		80	26.7	86.4	84.2
-30	-34.4	9.8*	5.5*		85	29.4	94.9	91.8
-25	-31.7	6.9*	2.3*		90	32.2	103.9	99.8
-20	-28.9	3.7*	0.6		95	35.0	113.5	108.3
-15	-26.1	0.0	2.4		100	37.8	123.6	117.2
-10	-23.3	1.9	4.5		105	40.6	134.3	126.6
-5	-20.6	4.1	6.7		110	43.3	145.6	136.4
0	-17.8	6.5	9.2		115	46.1	157.6	146.8
5	-15.0	9.1	11.8		120	48.9	170.3	157.7
10	-12.2	12.0	14.6		125	51.7	183.6	169.1
15	-9.4	15.0	17.7		130	54.4	197.6	181.0
20	-6.7	18.4	21.0		135	57.2	212.4	193.5
25	-3.9	22.1	24.6		140	60.0	227.9	206.6
30	-1.1	26.1	28.5		145	62.8	244.3	220.3
35	1.7	30.4	32.6		150	65.6	261.4	234.6
40	4.4	35.0	37.0		155	68.3	279.5	249.5
45	7.2	40.0	41.7		160	71.1	298.4	265.1
50	10.0	45.3	46.7		165	73.9	318.3	281.4

**FIGURES WITH ASTERISKS (\*) = IN. HG. VACUUM**

**FIGURES WITHOUT ASTERISKS = PSIG**

# R-134A HEALTH AND SAFETY INFORMATION

## INHALATION TOXICITY

HFC-134a poses no acute or chronic hazard when it is handled in accordance with DuPont recommendations and when exposures are maintained at or below the DuPont Acceptable Exposure Limit (AEL) of 1,000 ppm (8 and 12 hour Time-Weighted Average or TWA).

An AEL is an airborne exposure limit established by DuPont scientists that specifies time-weighted average (TWA) airborne concentrations to which nearly all workers may be repeatedly exposed without adverse effects. The AEL for HFC-134a has the same value as the Threshold Limit Values (TLVs) established for CFC-12 and HCFC-22. TLVs are established by the American Conference of Governmental and Industrial Hygienists (ACGIH).

However, inhaling high concentrations of HFC-134a vapor may cause temporary central nervous system depression with narcosis, lethargy and anesthetic effects. Other effects that may occur include dizziness, a feeling of intoxication and a loss of coordination. Continued breathing of high concentrations of HFC-134a vapors may produce cardiac irregularities (cardiac sensitization), unconsciousness, and with gross overexposure, death. Intentional misuse or deliberate inhalation of HFC-134a may cause death without warning. This practice is **extremely dangerous**.

If you experience any of the initial symptoms, move to fresh air and seek medical attention.

## CARDIAC SENSITIZATION

If vapors are inhaled at a concentration of 75,000 ppm, which is well above the AEL, the heart may become sensitized to adrenaline, leading to cardiac irregularities and, possibly, to cardiac arrest. The likelihood of these cardiac problems increases if you are under physical or emotional stress.

Medical attention must be given immediately if exposed to high concentrations of HFC-134a. **DO NOT** treat with adrenaline (epinephrine) or similar drugs. These drugs may increase the risk of cardiac arrhythmias and cardiac arrest. If the person is having difficulty breathing, administer oxygen. If breathing has stopped, give artificial respiration.

## SPILLS OR LEAKS

If a large release of vapor occurs, such as from a large spill or leak, the vapors may concentrate near the floor or low spots and displace the oxygen available for breathing, causing suffocation.

Evacuate everyone until the area has been ventilated. Use blowers or fans to circulate the air at floor level. **DO NOT** reenter the affected area unless you are equipped with a self-contained breathing apparatus or unless an area monitor indicates that the concentration of HFC-134a vapors in the area is below the AEL.

Always use self-contained breathing apparatus or an air-line mask when entering tanks or other areas where vapors might exist. Use the buddy system and a lifeline. Refer to the Material Safety Data Sheet (MSDS) for HFC-134a for more information.

HFC-134a vapors have a slightly sweet odor that can be difficult to detect. Therefore, frequent leak checks and the installation of permanent area monitors may be necessary in enclosed spaces. Refer to ASHRAE Standards 15 and 34 for refrigeration machinery rooms.

To ensure safety when working with HFC-134a in enclosed areas:

1. Route relief and purge vent piping (if present) outdoors, away from air intakes.
2. Make certain area is well ventilated, using auxiliary ventilation, if necessary, to move vapors.
3. Make sure area is clear of vapors prior to beginning work.
4. Install air monitoring equipment to detect leaks.

## SKIN AND EYE CONTACT

At room temperature, HFC-134a vapors have little or no effect on the skin or eyes. However, in liquid form, HFC-134a can freeze skin or eyes on contact, causing frostbite. Following contact, soak the exposed area in lukewarm water, not cold or hot. If medical treatment cannot begin immediately, apply a light coat of a nonmedicated ointment, such as petroleum jelly. If the exposed area is in a location where the presence of the ointment would be awkward, such as on the eye, apply a light bandage. In all cases of frostbite, seek medical attention as soon as possible.

**Always** wear protective clothing when there is a risk of exposure to liquid HFC-134a. Where splashing is possible, **always** wear eye protection and a face shield.

## COMBUSTIBILITY OF HFC-134a

HFC-134a is nonflammable at ambient temperatures and atmospheric pressure. However, tests have shown HFC-134a to be combustible at pressures as low as 5.5 psig (139.3 kPa absolute) at 177°C (350°F) when mixed with air at concentrations generally greater than 60% volume air. At lower temperatures, higher pressures are required for combustibility. (HCFC-22 is also combustible at pressures above atmospheric in the presence of high air concentrations). Test results and calculations have shown:

- At ambient temperature, all concentrations of HFC-134a in air are nonflammable at pressures below 15 psig (205 kPa absolute).
- Combustible mixtures of air and HFC-134a will not form when liquid HFC-134a is pumped into closed vessel if initial air pressure in vessel is limited to one atmosphere absolute and final pressure is limited to 300 psig (2,170 kPa absolute). If initial air pressure is greater than one atmosphere, combustible mixtures may form as tank is filled.

Based on above information, the following operating practices are recommended:

### Leak Testing

- Equipment should **NEVER** be leak tested with a pressurized mixture of HFC-134a and air. HFC-134a may be safely pressured with dry nitrogen.

### Bulk Delivery and Storage

- Tanks should normally be evacuated at start of filling, and should never be filled while under positive air pressure.
- Tank pressure should never be allowed to exceed 300 psig (2,170 kPa) when filling with HFC-134a. Relief devices on either tanks or HFC-134a supply system usually prevent this.
- Tank pressures should be monitored routinely.
- Air lines should never be connected to storage tanks.

### Filling and Charging Operations

- Before evacuating cylinders or refrigeration equipment, any remaining refrigerant should be removed by recovery system.
- Vacuum pump discharge lines should be free of restrictions that could increase discharge pressures above 15 psig (205 kPa) and result in formation of combustible mixtures.
- Cylinders or refrigeration equipment should normally be evacuated at start of filling, and should never be filled while under positive air pressure.
- Final pressures should not exceed 300 psig (2,170 kPa).
- Filled cylinders should periodically be analyzed for air (nonabsorbable gas or NAG).

## Refrigerant Recovery Systems

Efficient recovery of refrigerant from equipment or containers requires evacuation at the end of the recovery cycle. Suction lines to a recovery compressor should be periodically checked for leaks to prevent compressing air into the recovery cylinder during evacuation. In addition, the recovery cylinder pressure should be monitored, and evacuation stopped in the event of a rapid pressure rise indicating the presence of noncondensable air. The recovery cylinder contents should then be analyzed for NAG, and the recovery system leak checked if air is present. **DO NOT** continue to evacuate a refrigeration system that has a major leak.

### THERMAL DECOMPOSITION

HFC-134a vapors will decompose when exposed to high temperatures from flames or electric resistance heaters. Decomposition may produce toxic and irritating compounds, such as hydrogen fluoride. The pungent odors released will irritate the nose and throat and generally force people to evacuate the area. Therefore, it is important to prevent decomposition by avoiding exposure to high temperatures.

# SECTION F - ICE MAKER

## ICE MAKER FOR SIDE BY SIDE MODELS

The automatic Ice Maker is mounted in the freezer compartment. It is attached to the freezer compartment's left wall with two screws and can be removed for servicing.

The Ice Maker is designed to produce ice automatically. The length of time between Harvest Cycles will vary, depending on load conditions, door openings, ambient temperature and freezer temperature. These factors must be taken into consideration when checking the ice production rate.

With a temperature of  $-2^{\circ}\text{F}$  to  $+5^{\circ}\text{F}$  in the freezer, the rate of harvest will be 8 - 12 cycles per 24 hour period.

The Ice Maker is wired across the line and will harvest ice in the refrigeration or defrost cycles.

The Water Valve and Solenoid Assembly is mounted in the compressor compartment.

A 3/16" polyethylene tube extends from the water valve up the rear wall of the refrigerator to a water inlet spout that directs the water into the fill trough. A bead of sealer around the inlet water tube prevents the migration of air and moisture into the freezer compartment.

### Front Cover

A decorative front cover, made of molded plastic, encloses the operating mechanism of the Ice Maker, protecting it from moisture. It is essential that the cover be in place on an operating Ice Maker to protect it against possible contact with the mechanism by the user. (See Figure F1)

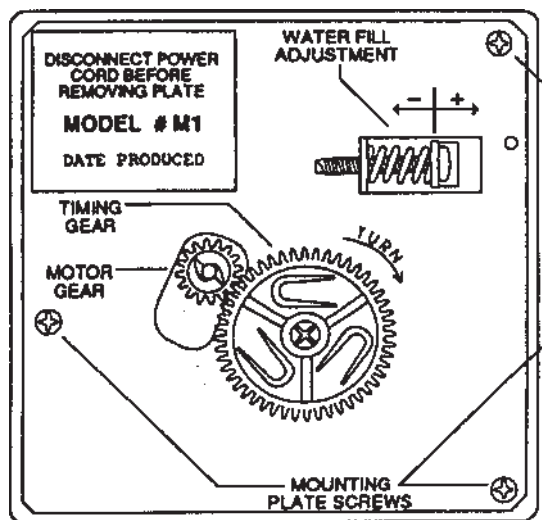


Figure F1

## COMPONENTS PARTS OF ICE MAKER

### Ice Mold

The ice Mold is die-cast aluminum with the Ice Maker Thermostat bonded to its front surface. The Mold has a semi-circular interior partitioned into equal size compartments. Water enters at the rear of the Mold, through a fill trough. A film of silicon grease on the top edge of the Mold prevents siphoning of water by capillary action.

### Mold Heater

A Mold Heater, rated at 165 watts and covered with an aluminum sheath, is embedded in the grooved section on the underside of the Mold. When the Mold Heater is energized, the ice contact surface within the Mold is heated enough to allow harvest of the ice pieces.

The Mold Heater is wired in series with the Ice Maker Thermostat, which acts as a safety device.

The original heater is staked in place, but can be removed for replacement. The replacement heater is secured to the Mold by four flat head retaining screws that thread into holes in the Mold, adjacent to the heater.

A thermal mastic sealer is placed between the heater and the Mold to ensure good thermal contact.

### Ice Stripper

An Ice Stripper is attached to the Mold to prevent ice pieces from falling back into the Mold. It also serves as a decorative side cover.

### Ice Ejector

The Ejector blades are molded from Delrin, and extend from a central shaft, which turns in nylon bearings at the front and rear. Each blade sweeps an ice section out of the Mold. The drive end of the Ice Ejector is "D" shaped. Silicone grease is used to lubricate the bearing surfaces.

### Water Valve Assembly

The Water Valve is solenoid operated and when energized, release water from the supply line into the Ice Mold. The amount of water released is directly proportional to the length of time the Water Valve Switch is energized. A flow washer, inside the Water Valve, maintains a constant rate of water flow over a supply line pressing ranging from 15 to 100 psig. It will not compensate for pressures below 15 psig, or greater than 100 psig. A No. 80-mesh screen, placed ahead of the flow washer, filters out foreign materials.

The solenoid coil draws 10 to 115 watts of power. The coil is wired in series with the Mold Heater, across the supply voltage.

## Thermostat

The Thermostat is a single-pole, single throw (SPST), bimetallic, disk-type, thermal switch. It automatically starts the Harvest Cycle when the ice is frozen. The Thermostat closes at a temperature of  $18^{\circ}\text{F} \pm 6^{\circ}$ . Wired in series with the Mold Heater, the Thermostat acts as a safety device against over-heating in the event of mechanical failure. A thermal mastic bond is provided where the Thermostat is mounted against the Mold. A gasket prevents water from leaking into the support housing.

## Sensing Arm & Linkage

The Sensing Arm is cam-driven and operates a switch that controls the quantity of ice produced. In the Harvest Cycle, the arm is raised and lowered during each of the two revolutions of the timing cam. If the Sensing Arm comes to rest on top of ice in the storage compartment during either revolution, the switch will remain open and stop the Ice Maker at the end of that revolution. When sufficient ice is removed from the Storage Container, the Sensing Arm lowers and ice production resumes. To manually stop the Ice Maker, raise the Sensing Arm until it locks in the upper position. Operation is resumed when the Sensing Arm is manually lowered.

## Timing Switches

The three (3) Timing Switches used are of the Single-Pole, Double Throw (SPDT) type. They are identical except for function, and can be used interchangeably.

1. **Hold Switch** - Assures completion of a revolution once the Ice Maker operation has started.
2. **Water Fill Switch** - Opens the Water Valve during the Fill Cycle. It is the only adjustable component in the Ice Maker.
3. **Shut-off Switch** - Stops Ice Maker operation when the Storage Container is full of Ice. The switch is opened after the Sensing Arm is raised to its most upright position. The switch is mounted to the top right wall of the Ice Maker Support. (Not shown in Figure F2)

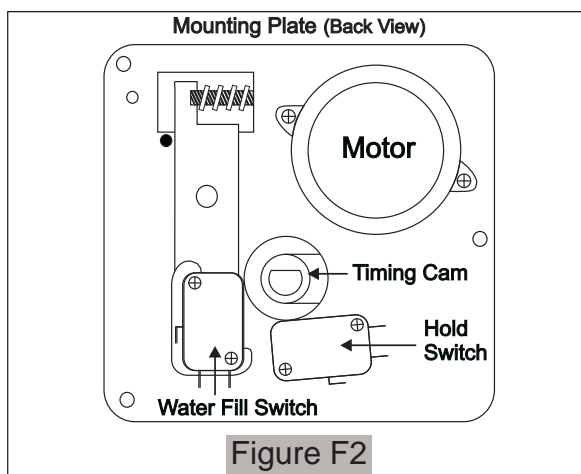


Figure F2

## TCO - Thermal Cut-Out

The Thermal Cut-Out is a one-time limit fuse used as a safety device. It is located under the mounting plate, in the head of the Ice Maker, between the Thermostat and wire connector.

If the Thermal Cut-Out opens, the cause of failure must be determined and corrected prior to replacing the TCO.

## Timing Cam & Coupler

Three separate cams are combined in one molded Delrin part:

1. Inner Cam operates Shut-Off Switch lever arm.
2. Center Cam operates Hold Switch.
3. Outer Cam operates Water Fill Switch.

One Cam end is attached to a large Timing Gear. The other Cam end is coupled to the Ejector.

## Timing Gear

This large molded plastic gear is driven by the Motor and, in turn, rotates the Cam and Ejector. A "D" shaped hole in the gear fits over the Timing Cam Hub. Spacer tabs on the backside of the gear prevent the gear from binding on the mounting plate.

## Motor

A low wattage, stall-type Motor drives the Timing Gear. This gear turns the Timing Cam and ejector Blades approximately one revolution every three minutes (1/3 RPM).

## Fill Trough

The Fill Trough is molded nylon. It supports the Inlet Tube and directs the water into the Mold. It also forms a bearing for one end of the Ejector Blades.

## Wiring

A four-prong plug connects the Ice Maker wiring to the cabinet wiring harness. The Ice Maker Assembly is wired across the line and will harvest in either the Refrigeration or Defrost Cycles. A wiring diagram is located inside the front cover of the Ice Maker. (See Figure F3)

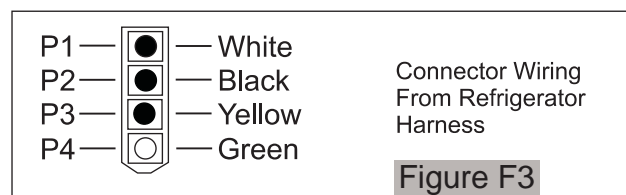


Figure F3

## INSTALLING WATER SUPPLY LINE TO ICE MAKER

Make sure that the installation complies with all applicable plumbing codes.

The Ice Maker kit includes an adaptor to connect the ¼" tubing to the Ice Maker water valve.

The ¼" tubing, and any other plumbing materials required, should be obtained locally.

The Ice Maker should be connected to a frequently used cold water line to ensure a fresh water supply.

**NOTE:** A vertical cold water line should be selected for the water supply. If a vertical line is not available, a horizontal line may be used, providing the connection is on the side or top of the pipe, but **not on the bottom**. Scale and foreign material in the pipe could cause stoppage of water flow if the connection is on the bottom.

Be sure to leak test all connections after the water supply has been turned on.

## TEST CYCLING ICE MAKER (See Ice Maker Testing Procedures on pages 41-50)

It may be necessary, on occasion, to test-cycle an Ice Maker to check its operation. This can be done on the repair bench or while mounted in the Refrigerator.

If the Ice Maker is in an operating Refrigerator, take a precaution against the formation of condensate by allowing the cold, metal components to warm up before removing the front cover. This can be expedited by cycling the assembly with the cover in place and the water supply valve closed.

To manually cycle the Ice Maker, slowly turn the Ejector blades clockwise until the Hold Switch circuit to the Motor is completed. When the Motor starts, all components except the Ice Maker Thermostat should perform normally. Once the Ice Maker completes its cycle, remove the front Cover; see instructions for replacing the front Cover in PARTS REPLACEMENT Section.

If further test cycling is necessary, place screwdriver blade in slot located in the Motor Drive Gear and turn counterclockwise until the Hold Switch circuit to the Motor is completed.

## WATER VALVE SWITCH – WATER FILL VOLUME

The amount of water fill is directly proportional to the length of time terminals "C-NC" of the Water Fill Switch are closed. Closing occurs when the switch plunger drops into a cavity formed in the Cam.

Different water valves have different flow rates. For this reason, any time a Water Valve is replaced, the Water Fill Switch must be adjusted.

The correct water fill volume is 120-125 cc for Ice & Water models, and 145 cc for manual models, or about 5 ounces. To measure the fill volume, test-cycle the Ice Maker and collect the water. Measure in a container calibrated in cubic centimeters (cc) or ounces.

The fill volume is adjusted by increasing or decreasing the length of time the Water Fill Switch remains closed.

To adjust the Water Fill Switch, first determine how much water is needed. The adjusting screw is calibrated so that one complete revolution changes the water fill about 18 cubic centimeters. Turning the screw clockwise decreases the fill, while turning counterclockwise increases the fill.

**EXAMPLE:** An Ice Maker is test-cycled and the water fill sample is 158 cubic centimeters. Subtracting 145 cc from 158, the adjustment needed is 13 cc. Since one turn of the adjusting screw changes the fill 18 cc, ¾ of a turn clockwise would reduce the fill about 13 cc, the desired amount. (This example is for manual models only.)

## PARTS REPLACEMENT

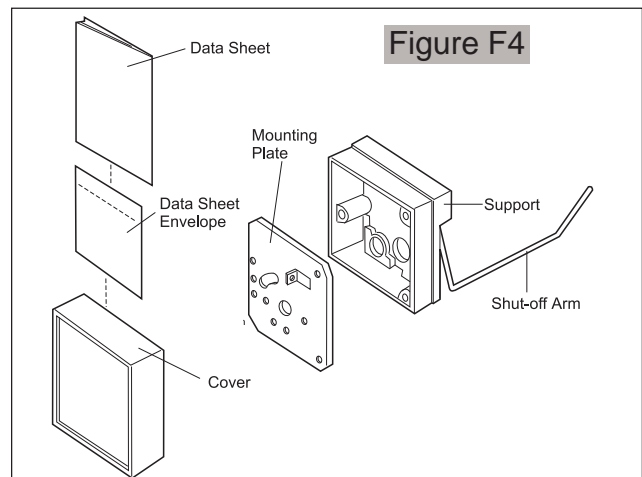
First disconnect the Refrigerator service cord from the power supply. If the Refrigerator is operating and cold, allow the Ice Maker to warm up to room temperature before removing the front cover. This prevents moisture from condensing on the metal components.

### To Replace Front Cover

1. Ensure Ice Maker is at room temperature before removing Cover.
2. Place straight blade of screwdriver in slot at bottom of Mold Support and pry Cover loose.

**NOTE:** Ensure that the retaining tabs inside the Cover are located on the top and bottom when installing the Cover.

3. Snap Cover in place.



### To Replace Fill Trough and Bearings

1. Push Trough retaining tab back away from Mold.
2. Rotate Trough counterclockwise until it is clear.
3. Pull from back to detach from Mold and Ejector Blades.
4. Replace in reverse order.

### To Replace Ice Stripper

1. Remove Ice Maker from Refrigerator.
2. Remove retaining screw at back of mold.
3. Pull back on Ice Stripper to disengage it from front of Mold Support housing.
4. Replace in reverse order.

### To Replace Ejector Blades

1. Remove front Cover.
2. Remove three (3) screws holding Mounting Plate in place.
3. Carefully remove Mounting Plate, disengaging end of Sensing Arm and Ejector Blades from Motor coupling, noting relative position of Sensing Arm Spring.
4. Remove Fill Trough and bearing.
5. Turn blades to 12 O'clock position.
6. Slide Ejector Blades back and up to remove.
7. Replace in reverse order.
8. Lubricate bearing ends of Ejector with Silicone grease.

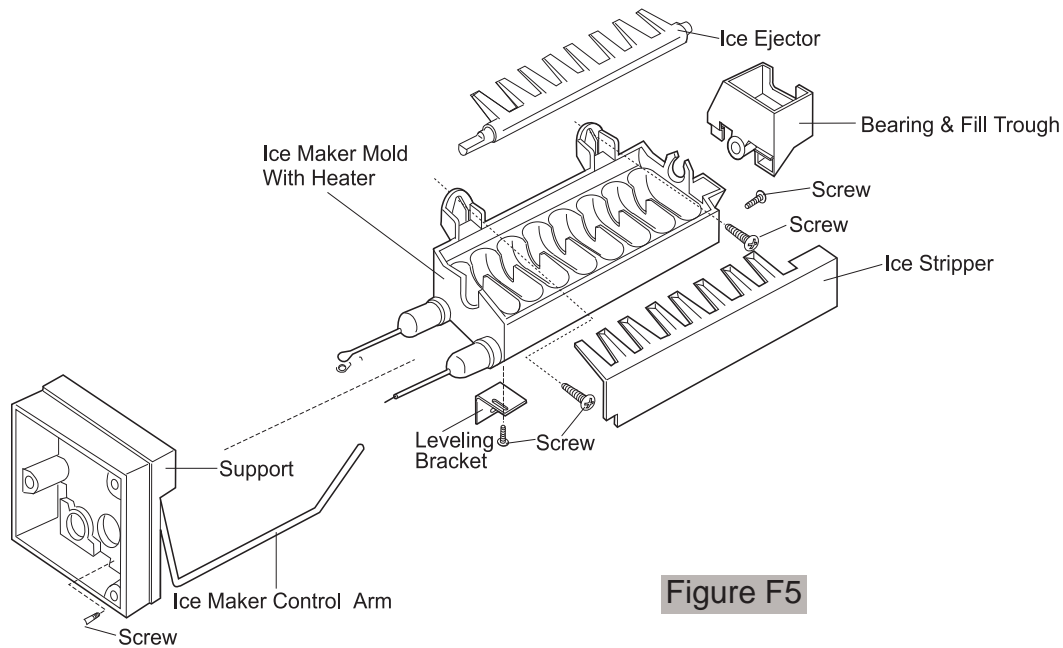


Figure F5

### To Replace Motor and Switch Mounting Plate

1. Remove front Cover.
2. Remove three (3) screws that attach Mounting Plate to Support Housing.
3. Carefully remove Mounting Plate, disengaging end of Sensing Arm and noting relative position of Sensing Arm Spring.
4. Transfer Motor, Switches, Cam, Gear, and Water Fill Adjusting Spring and Arm to replacement Mounting Plate.
5. Attach new Mounting Plate to Support Housing with three (3) screws.

**NOTE:** Ensure that the wiring harness is properly positioned and the Sensing Arm is in place.

6. Check Water Fill Cycle and adjust as required.
7. Replace front Cover.

### To Replace Motor

1. Remove front Cover.
2. Remove three (3) screws that attach Mounting Plate to Support Housing.
3. Disconnect two (2) Motor leads.
4. Remove two (2) Motor mounting screws.
5. Replace Motor in reverse order.

### To Replace Water Fill Switch

1. Remove front Cover.
2. Remove three (3) screws that attach Mounting Plate to Support Housing.
3. Disconnect two (2) Water Fill Switch wire leads.
4. Remove two (2) switch mounting screws.
5. Remove switch.
6. Replace switch in reverse order, ensuring switch insulator is in place.
7. Check Water Fill Cycle and adjust as required.

### To Replace Hold Switch

1. Remove front Cover.
2. Remove three (3) screws that attach Mounting Plate to Support Housing.
3. Disconnect six (6) Hold Switch wire leads.
4. Remove two (2) Hold Switch mounting screws.
5. Remove Hold Switch.
6. Replace in reverse order.

### To Replace Sensing Arm Shut-off Switch

1. Remove front Cover.
2. Remove three (3) screws that attach Mounting Plate to Support Housing.
3. Disconnect three (3) Sensing Arm Shut-off Switch wire leads.
4. Raise Sensing Arm Lever.
5. Remove two (2) Sensing Arm Shut-off Switch mounting screws.
6. Remove switch.
7. Replace switch in reverse order.

### To Replace Ice Maker Thermostat

1. Remove front Cover.
2. Remove three (3) screws that attach Mounting Plate to Support Housing.
3. Loosen two (2) Thermostat retaining clip mounting screws.
4. Disconnect two (2) thermostat wire leads and remove thermostat.
5. Apply thermal mastic sealer to sensing surface of replacement thermostat to ensure a positive bond to mold.
6. Replace thermostat in reverse order.

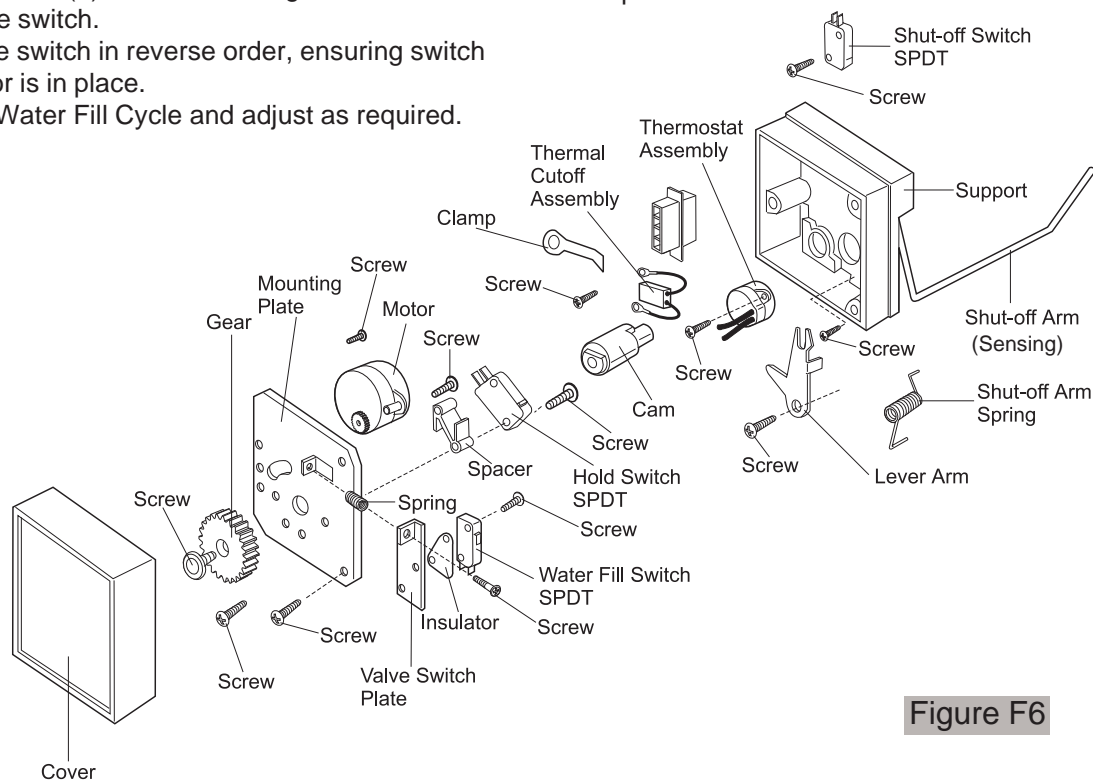


Figure F6



## To Replace Mold Heater

1. Remove front Cover.
2. Remove Ice Stripper. (Refer to Section "To Replace Ice Stripper" on page 38)
3. Remove three (3) screws that attach Mounting Plate to Support Housing.
4. Remove three (3) screws that attach Mold to Support Housing.

**NOTE:** One of the 3 screws is attached to the 2 Green/Yellow ground wires and another one is holding the Clamp in place. The 3rd screw is located in the lower right corner of the Support Housing.

5. Unscrew wire nut holding three (3) black leads together and separate them.

**NOTE:** One black lead is connected to the Mold Heater. Another is connected to the Thermostat and the third lead goes to the Hold Switch.

6. Disconnect remaining Mold Heater lead. It's connected to brown Motor lead and black Thermal Cut-Out lead.
7. Separate Mold from Support Housing.

**NOTE:** Be careful not to destroy the thermostat gasket located between the mold and support housing.

8. Remove Hex head screw holding Ice Maker Leveling Bracket to Mold.

**NOTE:** The Mold is Crimped in six (6) places holding the Mold Heater firmly in the Mold groove. It may be necessary to use a hammer and screwdriver to remove the heater from the Mold groove.

9. Use flat-bladed screwdriver to pry inoperative heater from Mold groove.
10. Clean remaining thermal mastic sealer from Mold groove.
11. Apply layer of thermal mastic sealer to Mold groove.
12. Install replacement Mold Heater.
13. Replace parts in reverse order. Ensure Thermostat gasket is in place. Bond the Thermostat to Mold with thermal mastic sealer.

**NOTE:** For best operation, the freezer temperature should be between -2°F to +4°F.

## FAULT DIAGNOSIS

### Complaint - Ice Maker Fails to Start

1. Check to see if Signal Arm is locked in raised position.

2. Check terminals from Cabinet wiring to Ice Maker for open circuit in wiring or components.
3. Check operation of the Maker with test service cord.
4. Check Mold temperature at a mounting screw. If temperature is above 15°F, freezer air temperature is not cold enough to switch Ice Maker Thermostat to closed position. If Mold is below 9°F, manually start Ice Maker by rotating Timer gear. If motor fails to start, check Motor for continuity. If Motor starts, Thermostat, Shut-off Switch, or Hold Switch is inoperative.
5. Check Hold Switch first. With Ejector blades in the starting position, check terminals "C" and "NC" for continuity. Replace switch if continuity readings are open. Check Shut-off Switch linkage. Then check terminals "NO" and "C" for continuity with Signal Arm in lowest position. Replace switch if continuity readings are open. If Hold Switch and Shut-off Switch are operative, then replace Thermostat.

### Complaint - Ice Maker Fails to Complete Cycle

1. With Ejector blades at 10 O'clock position, and Hold Switch Plunger depressed, check terminals "C" and "NO" for continuity. Replace switch if continuity readings are open.
2. With Ejector blades at 12 O'clock position, check Shut-off Switch terminals "C" and "NC" for continuity. Replace Thermostat if continuity readings are open.
3. With Ejector blades at 4 O'clock position, check Mold Heater and Ice Maker Thermostat for continuity. Replace heater if continuity readings are open. If heater shows continuity, replace Thermostat.
4. Check Motor operation with a test cord. Replace Motor if it fails to start.

### Complaint - Ice Maker Fails to Stop at End of Cycle

With the Ejector blades in the starting position, check the Hold Switch terminals "C" and "NO" for continuity. Replace the switch if the continuity readings are indicating a closed circuit.

### Complaint - Ice Maker Continues to Eject When Container is Full

1. Check for loose linkage to the Signal Arm Shut-off Switch. Switch should open when arm is in raised position. Adjust, if required.
2. Check Shut-off Switch terminals "C" and "NO" for continuity with Signal Arm raised. Replace switch if continuity readings are indicating a closed circuit.

### Complaint - Ice Maker Produces Undersized Ice Pieces

1. Ensure Ice Maker mold is level.
2. Check for partial restriction in supply line or Water Valve Strainer.

3. Ensure water pressure to Water Valve is sufficient. (20 psi min., 120 psi max.)
4. Ensure Water Valve Switch is adjusted for proper water fill. (145 cc. non Ice & Water, 125 cc. Ice and Water. models)
5. Check thermal bond between Thermostat and Mold. If necessary, rebond with thermal mastic sealer.

### Operating Cycle

The operation of the Ice Maker, water refilling, and controlled ice storage, require proper functioning and timing of all components.

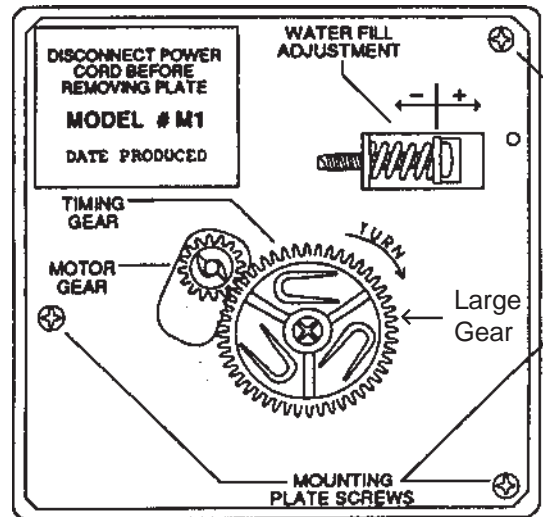
Consider the following:

- Has Refrigerator been properly installed and connected to sources of electrical power and water?
- Has Freezer compartment Evaporator pulled down to temperature?
- Have several ice making cycles been completed and is the Ice Maker in the Freeze Cycle?
- Is the Ice Maker Thermostat single-throw switch in series with the Mold Heater?
- Do the Ejector Blades make two (2) revolutions per cycle? Is ice stored on blades after harvest?
- Is the Water Solenoid wired in series with the Mold Heater?

### Operating Cycle Illustrations - Manual Cycle

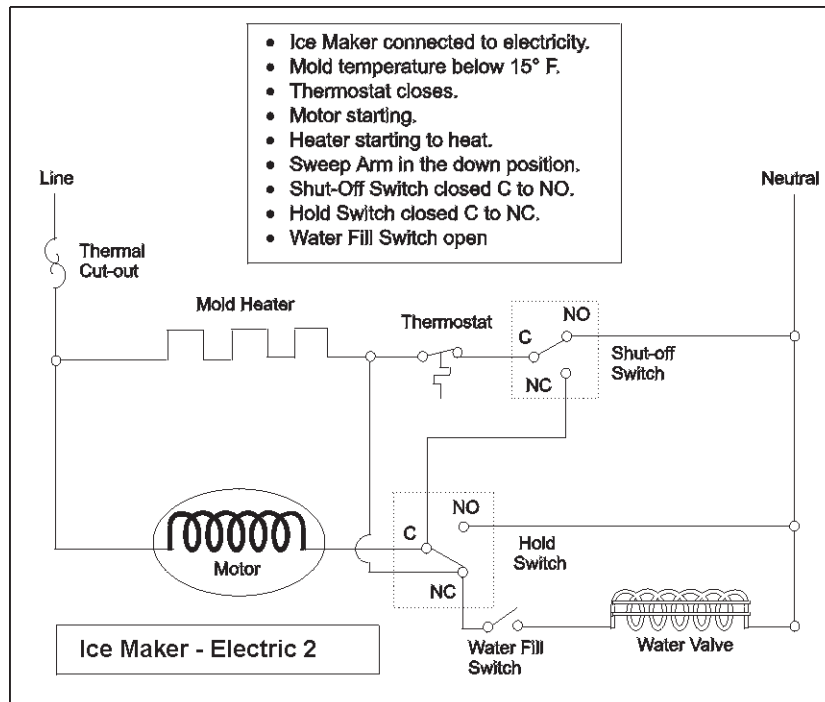
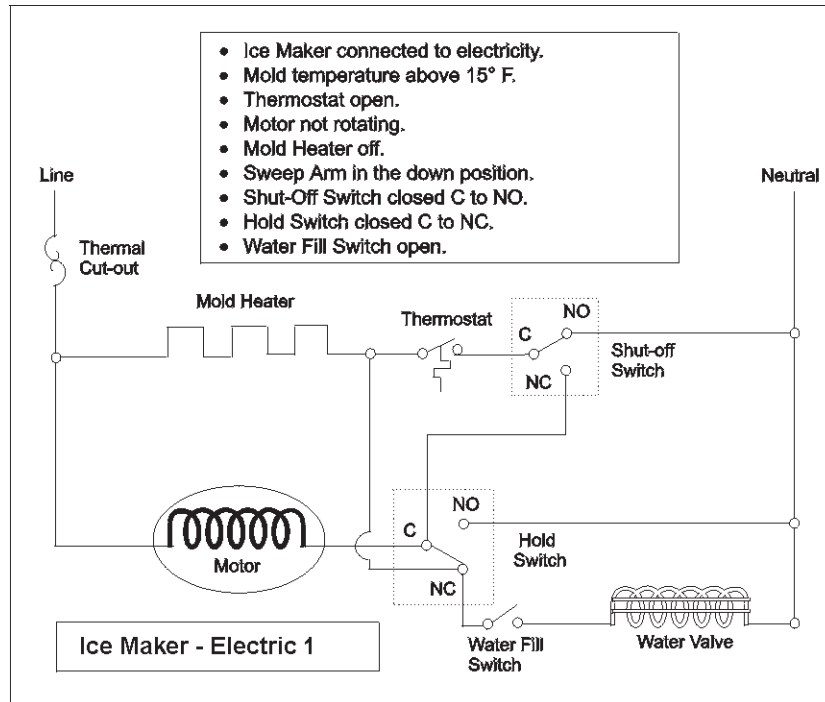
To manually cycle Ice Maker:

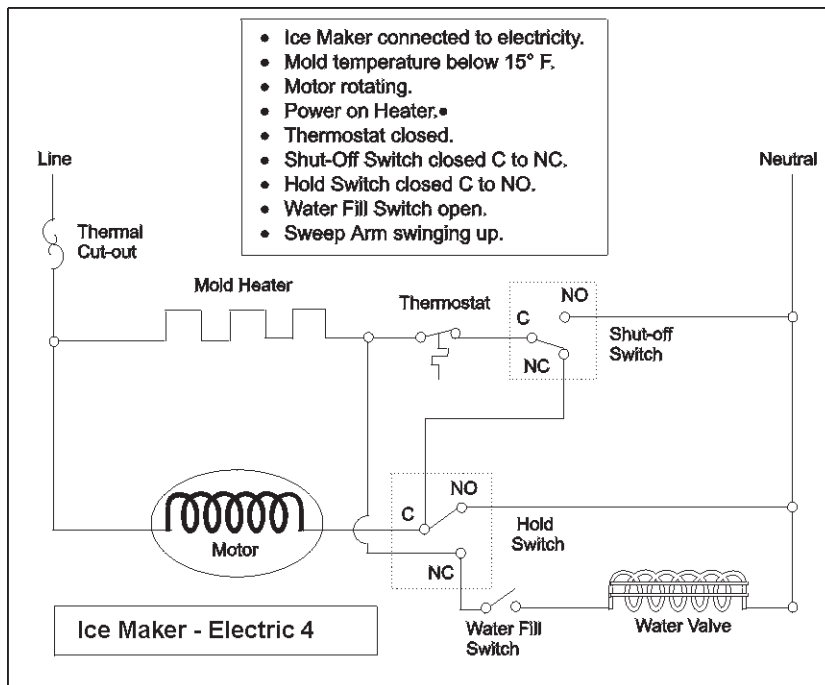
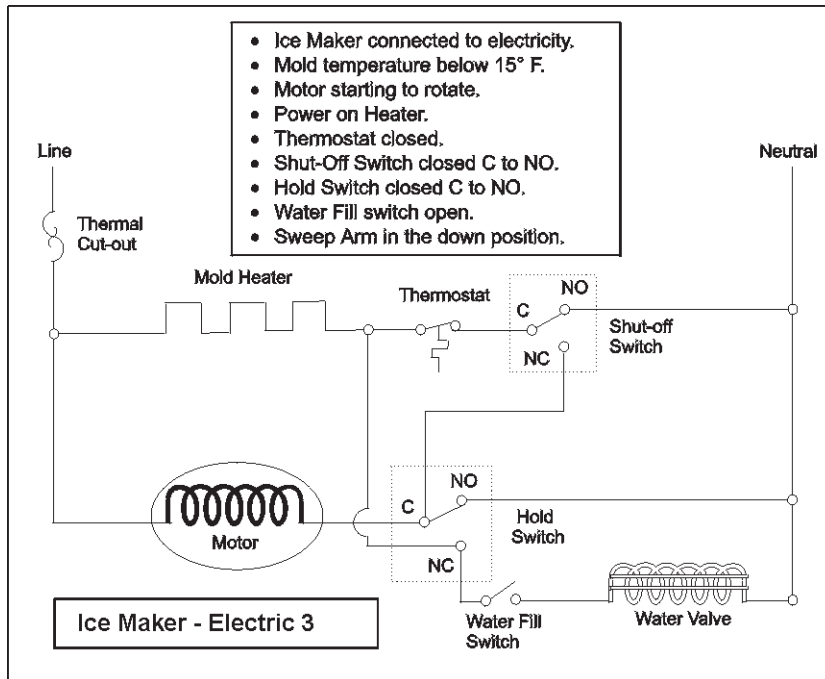
1. Remove Cover from Ice Maker head.
2. Insert a Phillips® into screw on large gear.
3. Turn gear clockwise until Motor starts to run.

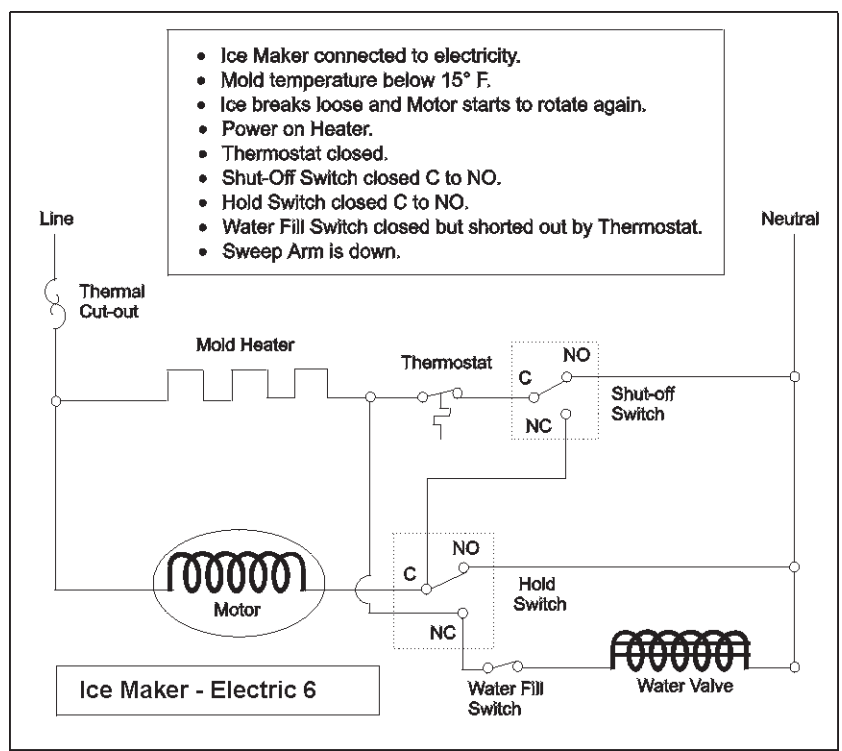
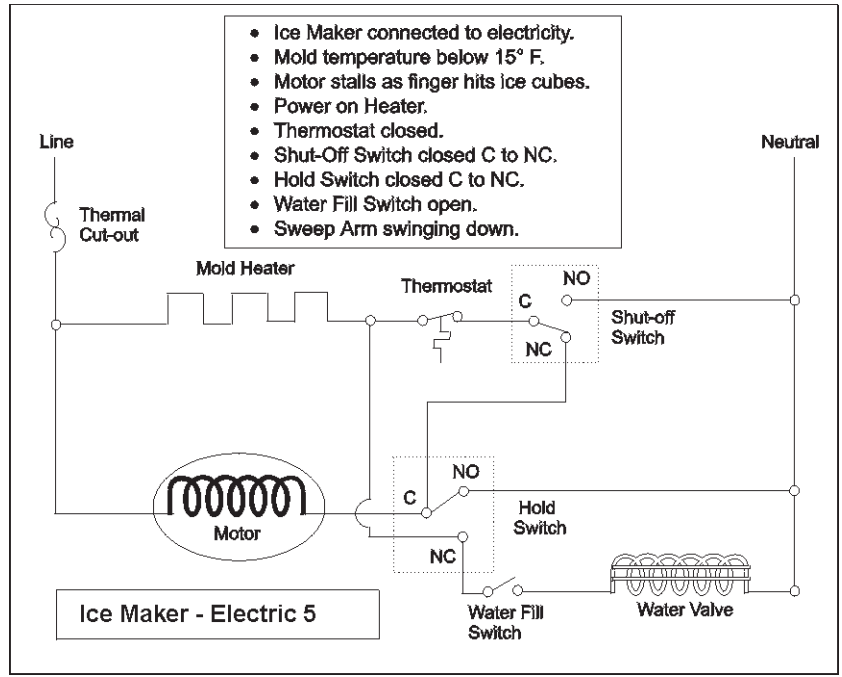


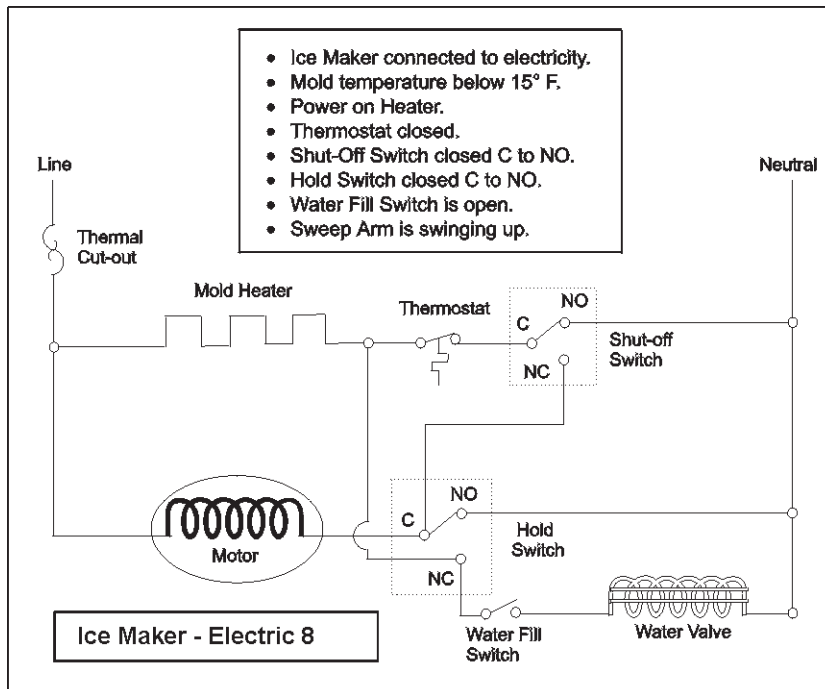
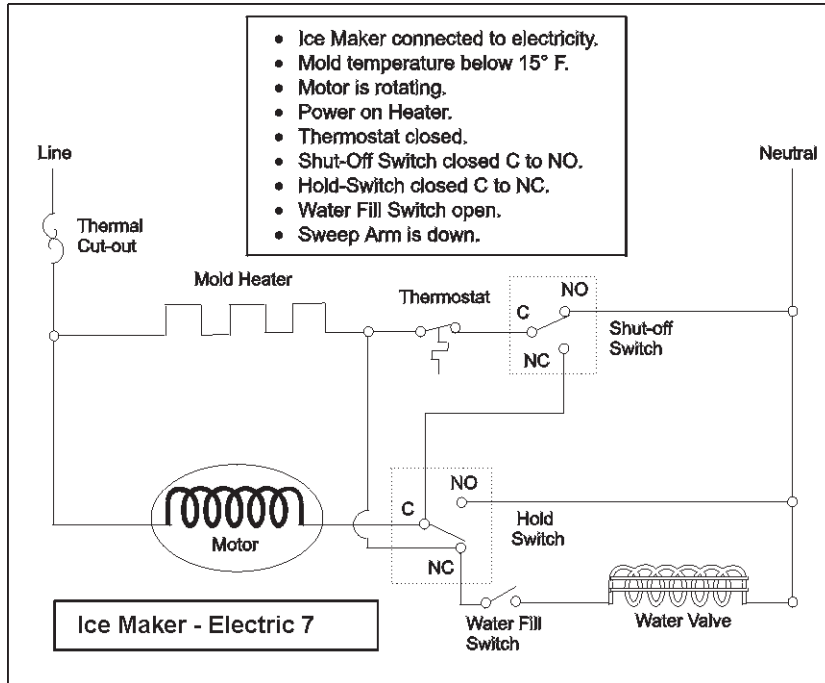
## Operating Cycle Illustrations - Electrical

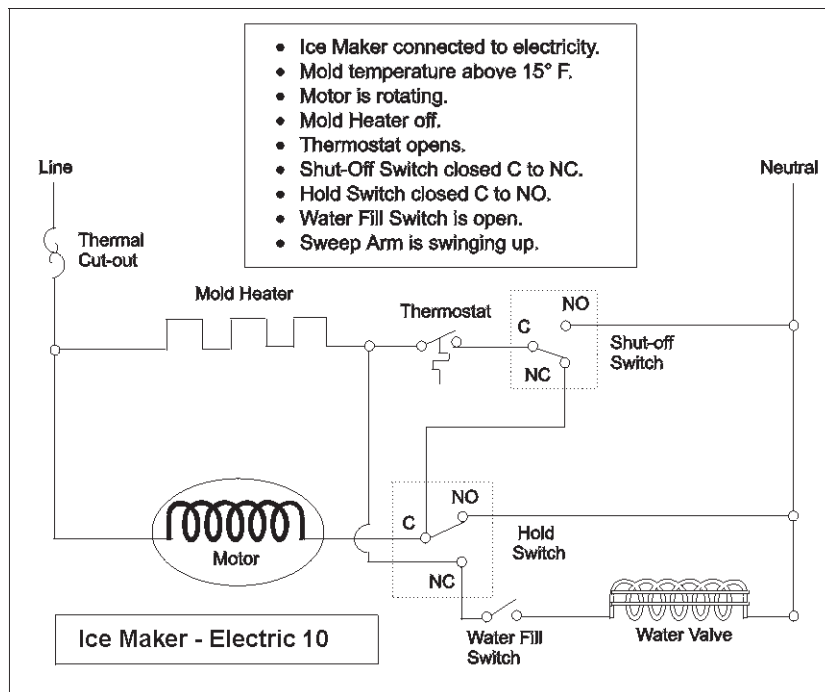
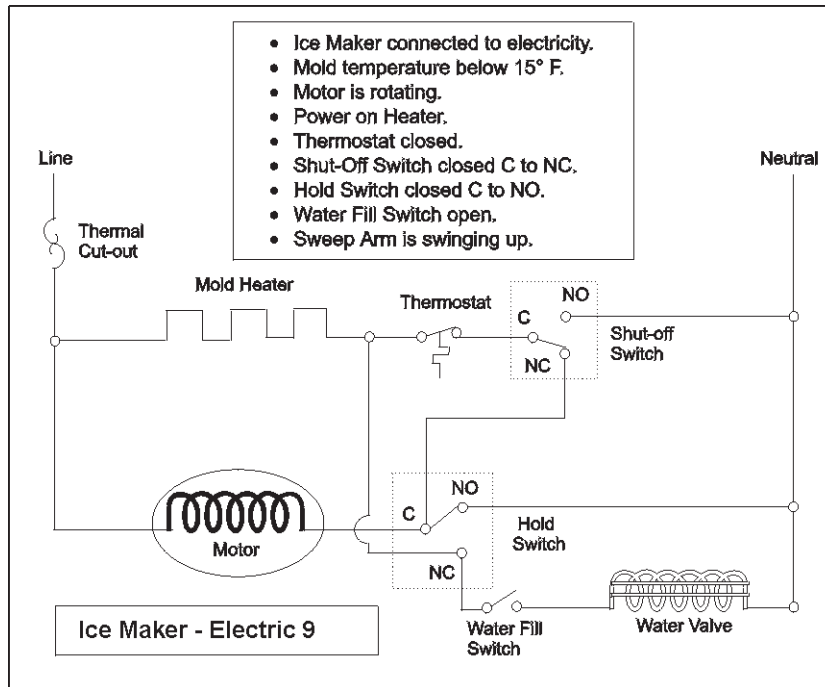
The following wiring diagrams illustrate the electrical operation of an Ice Maker.  
 This procedure is on the Internet at <http://www.frigidaire.com/tip/icemaker/>

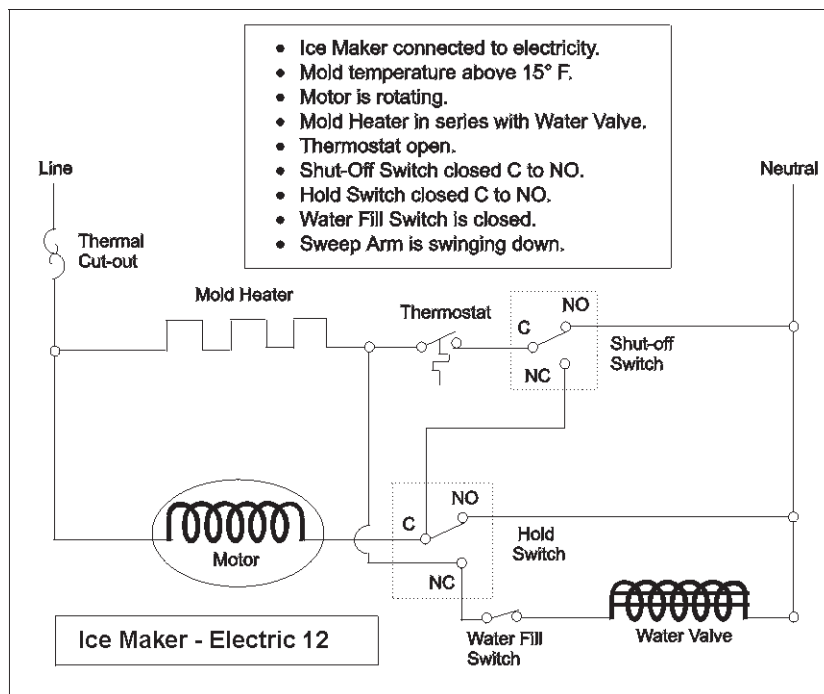
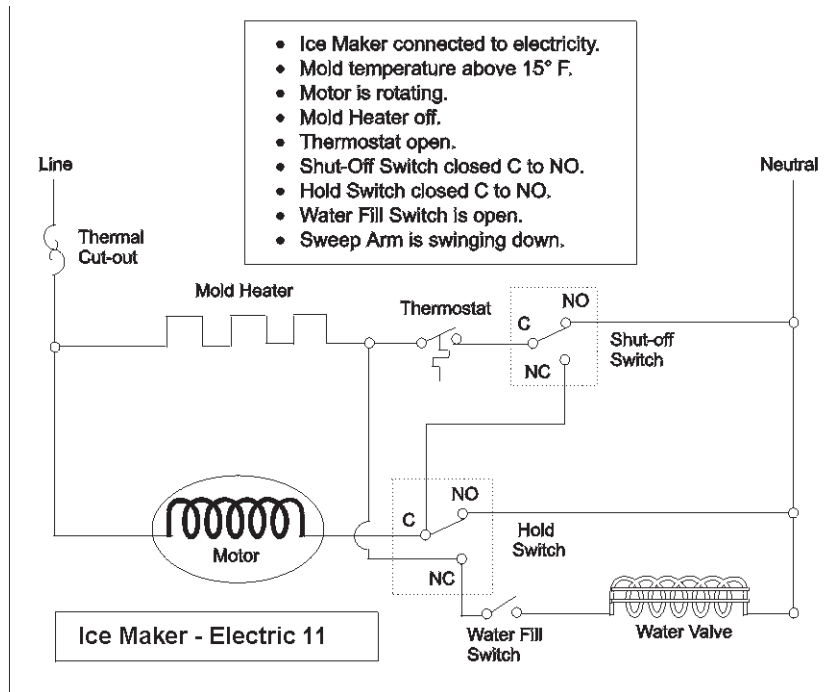




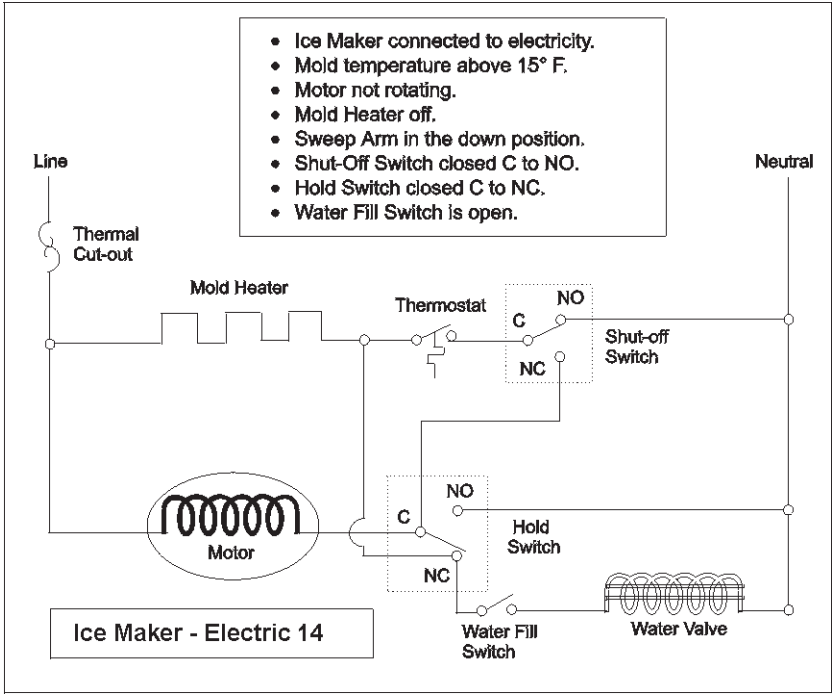
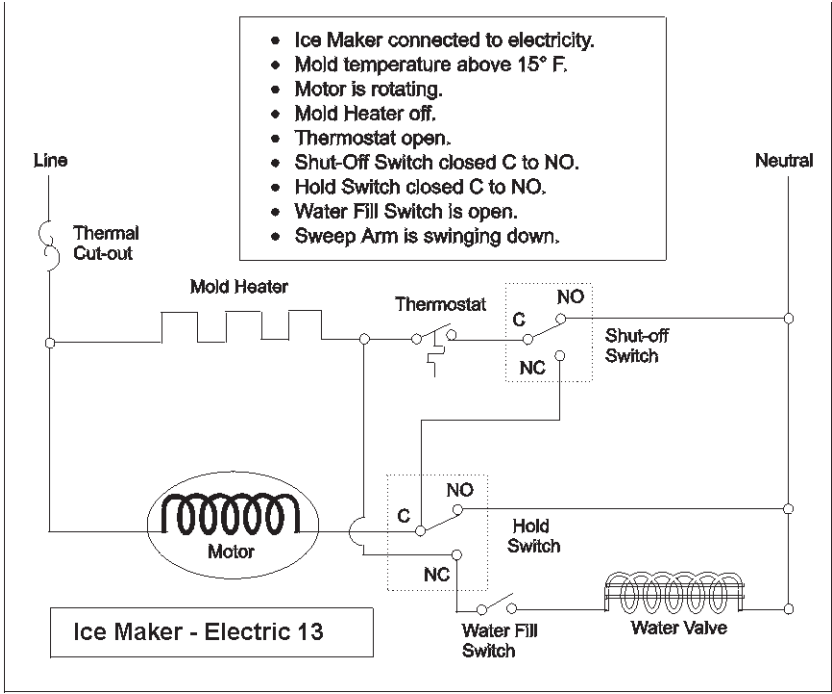








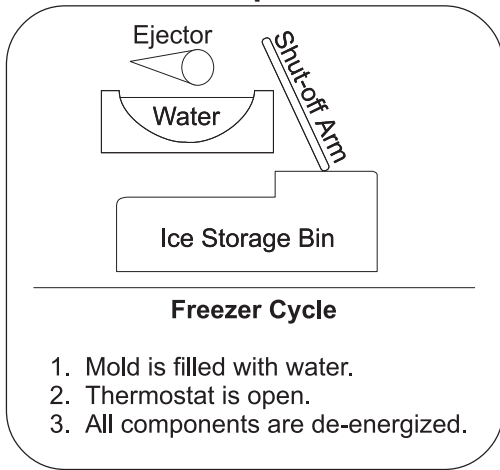




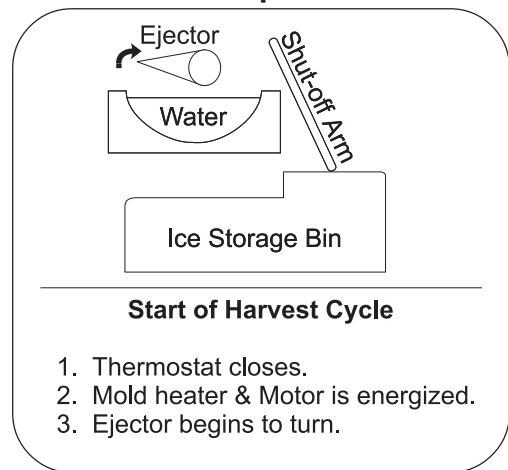
## Operating Cycle Illustrations - Mechanical

The following Figures illustrate the mechanical operation of an Ice Maker.

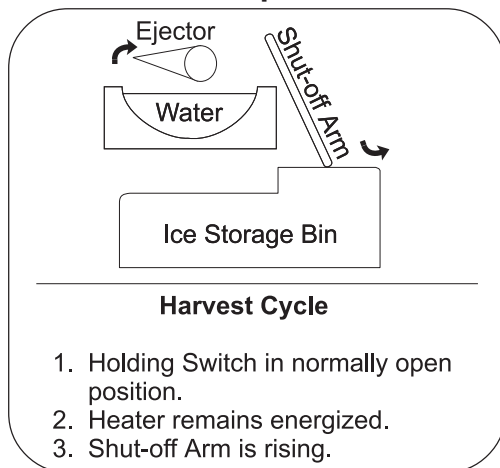
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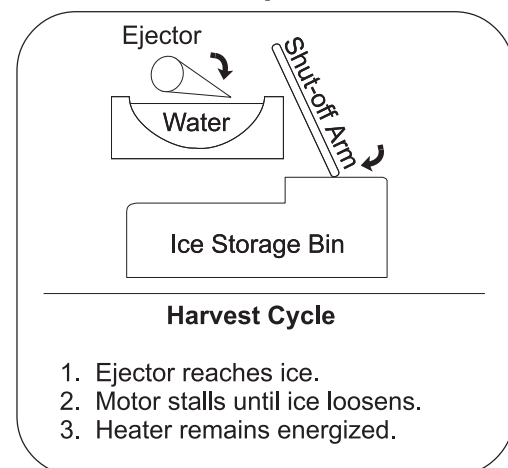
### Step 2



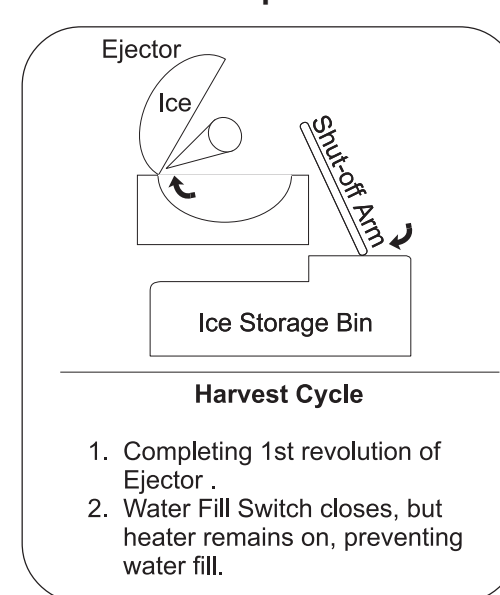
### Step 3



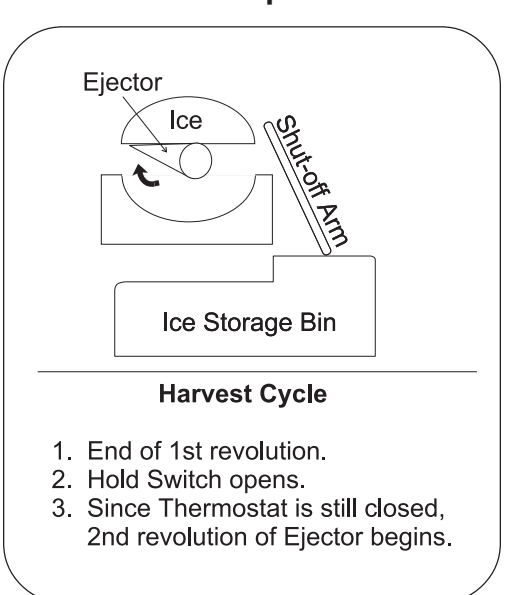
### Step 4



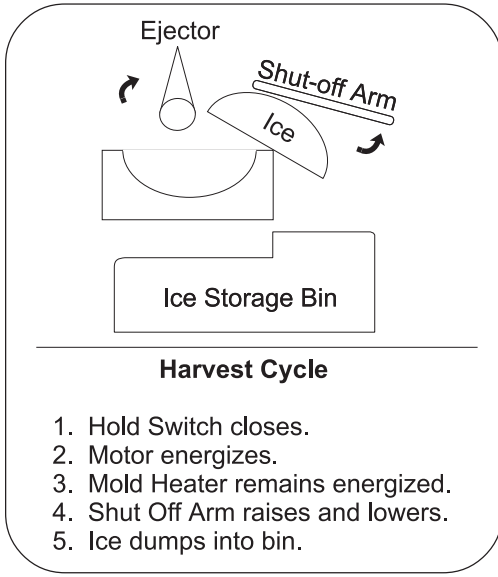
### Step 5



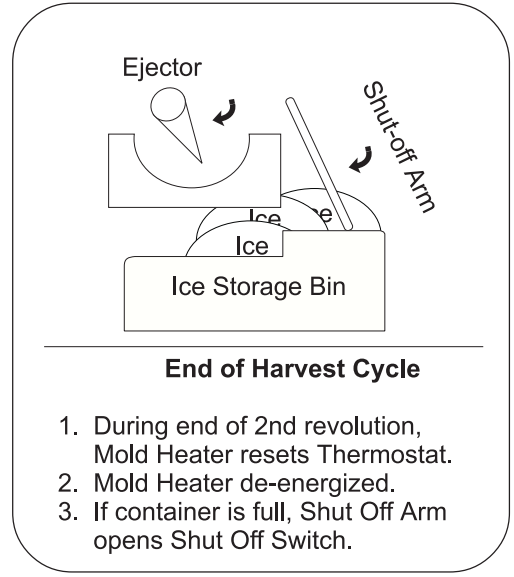
### Step 6



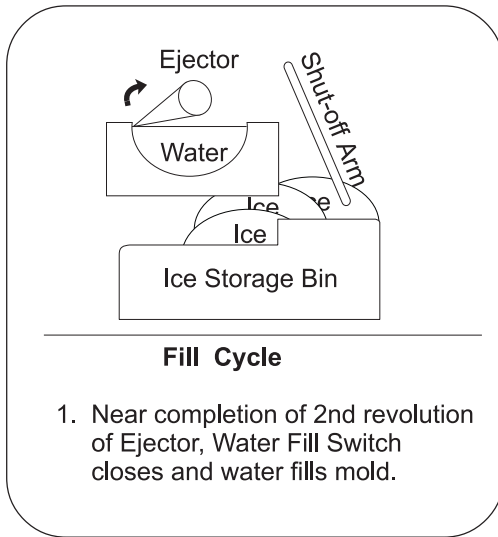
### Step 7



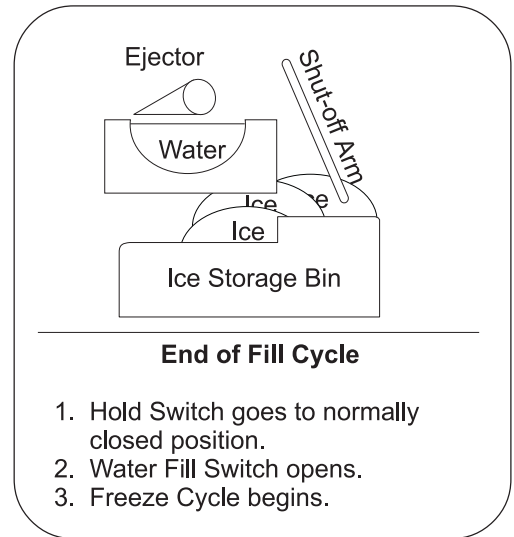
### Step 8



### Step 9



### Step 10



# SECTION G - ICE & WATER DISPENSER

## ICE DISPENSER CONTAINER & RAIL ASSEMBLY

The Ice Dispenser Container slides into the Rail Assembly mounted directly below the Ice Maker. Ice is ejected from the container by an Ice Auger connected to the Solenoid Assembly, and dispensed at the bottom front of the container where it enters through a Gate on the Crusher Housing. The Gate is opened and closed by a Control Rod that fits in the Actuator of the Solenoid Assembly. The ice is then directed into an ice chute mounted on the interior of the freezer door. The Ice Container must be properly placed on the rail assembly to assure proper dispensing. The container should be slid on top of the rails on the Rail Assembly up against the Motor Cover, with the Rotation Stop and Ice Auger protruding through the holes in the back of the Ice Container.

### Dispenser Auger Motor & Solenoid Assembly (Solenoid Assembly not on all models)

The dispenser Auger Motor, Solenoid Assembly, Light Socket and Bulb (40 Watt appliance bulb), and wiring disconnects are mounted on the back on the Rail Assembly Motor Cover. The motor and solenoid mounting screws are located on the front of the Motor Cover.

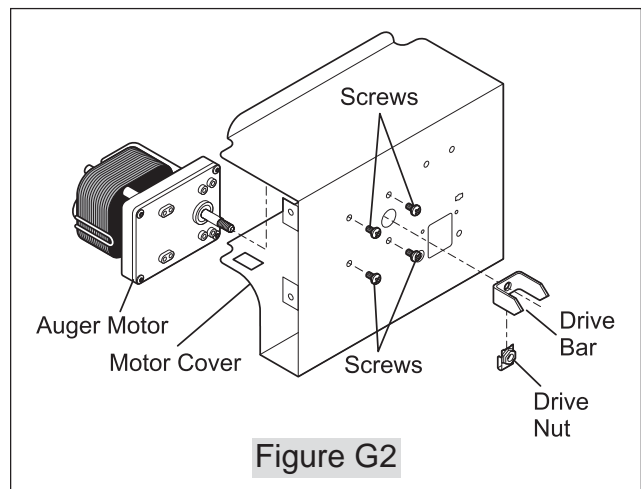
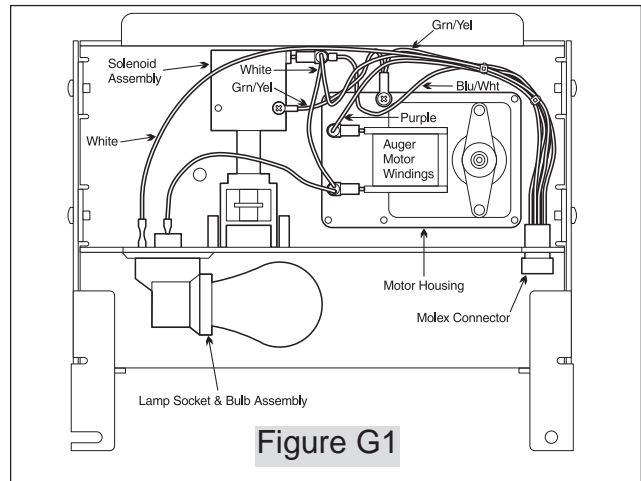
To Remove Auger Motor:

1. Disconnect refrigerator from electrical supply.
2. Slide Ice Container forward and off of Rail Assembly. Remove 2 screws holding Rail Assembly to Evaporator Cover.
3. Lift up on Rail Assembly and pull forward, freeing it from mounting brackets.
4. Disconnect Molex connector located at back of Rail Assembly and pull Rail Assembly free.
5. Remove screw securing green ground wire to motor housing on back of Motor Cover. (See Figure G1)
6. Disconnect two (2) leads hooked to Auger Motor windings (Leads are purple and white - See Figure G1).
7. Rotate Drive Bar and Nut (located on front of Motor Cover) in counterclockwise position until it comes free of Auger Motor shaft. (See Figure G2)
8. Remove four (4) motor mounting screws and pull Auger Motor free from Motor Cover.
9. Replace assembly in reverse order.

To Test Auger Motor:

1. Read ohmic value of motor windings using Multimeter on resistance scale. (Put test leads on terminals where purple and white wires were disconnected from Step 6 of procedure "To Remove Auger Motor").

2. Resistance reading should be low ohms. If you get anything else, replace motor.



To Remove Solenoid Assembly:

1. Disconnect refrigerator from electrical supply.
2. Slide Ice Container forward and off Rail Assembly.
3. Lift up on Rail Assembly and pull forward, freeing it from mounting brackets.
4. Disconnect Molex connector located at back of Rail Assembly and pull Rail Assembly free.
5. Remove screw securing green ground wire to Solenoid Assembly on the back of Motor Cover. (See Figure G1)
6. Disconnect two (2) leads hooked to solenoid coil (Leads are blue with a white stripe and white - See Figure G1).
7. Remove four (4) mounting screws on front of Motor Cover and pull Solenoid Assembly free. (See Figure G3)
8. Replace assembly in reverse order.

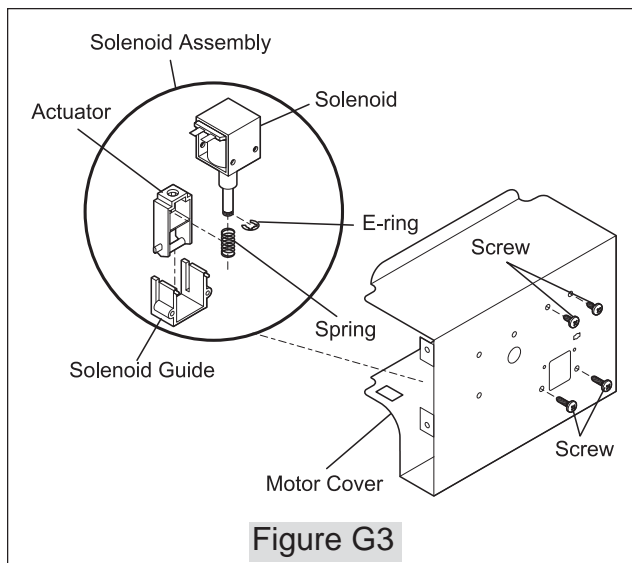


Figure G3

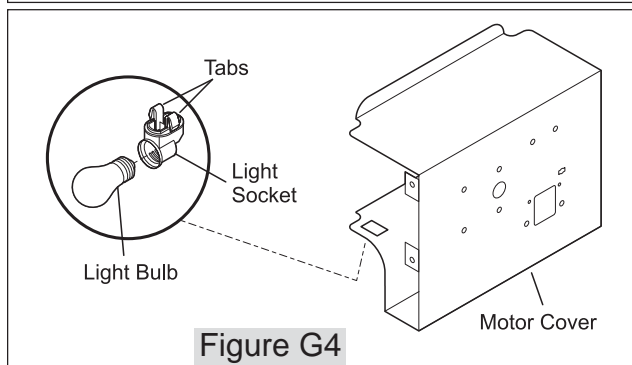


Figure G4

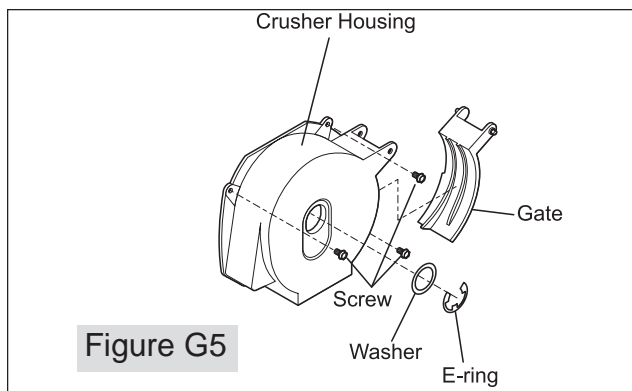


Figure G5

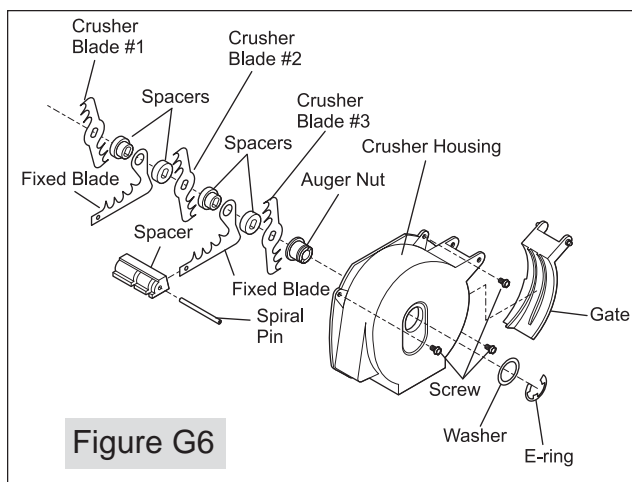


Figure G6

#### To Test Solenoid Assembly:

1. Read ohms value of solenoid coil using Multi meter on resistance scale. (Put test leads on terminals where blue with white stripe and white wires were disconnected from Step 6 of procedure "To Remove Solenoid Assembly").
2. If resistance reading is extremely high or low, replace solenoid coil.

#### To Remove Lamp Socket and Light Bulb:

1. Disconnect refrigerator from electrical supply.
2. Slide Ice Container forward and off of Rail Assembly. Remove two (2) screws mounting the rail assembly to the Evaporator Cover.
3. Lift up on Rail Assembly and pull forward, freeing it from mounting brackets.
4. Disconnect Molex connector located at back of Rail Assembly and pull Rail Assembly free.
5. Disconnect yellow and white wires connected to lamp socket located behind Motor Cover.
6. Press in on two tabs on bottom of lamp socket base and push through mounting hole. (See Figure G4)
7. Replace lamp socket in reverse order.

#### Ice Auger & Crusher Assembly

##### To remove Ice Auger & Crusher Assembly:

1. Remove four (4) screws holding Ice Container Front to Ice Container.
2. Remove two (2) screws on underside of Ice Container, holding Crusher Housing to container.
3. Remove screw holding Control Rod to container, located on underside of container.
4. Remove three (3) Hex head screws holding Crusher Housing to Front Plate. (See Figure G5)
5. Remove E-ring and washer on front of Crusher Housing. (See Figure G5)
6. Slide Control Rod free of Crusher Housing Gate.

**CAUTION: The Crusher Blades are very sharp. Use protective gloves when handling Crusher Blades.**

##### To replace Crusher Blades:

1. Remove Auger Nut to gain access to Crusher Blades. Each blade is separated by Spacer. (See Figure G6)
2. Remove Crusher Blades and Spacers until you get to one that needs replacement.
3. Replace assembly in reverse order.

## Water Systems

Water for the Ice Maker and Water Dispenser is controlled by a dual solenoid water valve located at the bottom back of the refrigerator on models without a PureSource filter system. On models built prior to March 1998, you have two dual coil water valves. The primary water valve is mounted beside the condenser fan motor. A secondary valve is mounted by compressor. On models built after March 1998, you have a single coil valve for the primary, mounted by condenser fan motor. A secondary dual coil valve is mounted by compressor. Plastic tubing connects the water valve/valves to the Ice Maker fill tube and the Water Dispenser and water filter on models so equipped. All sections of tubing may be replaced, if necessary.

## Water & Ice Dispensing

The Water & Ice Dispensers are located in the freezer door. There are two different types, a micro-switch actuated dispenser (Figure G7) or the new electronic type (Figure G8). Both dispensers are activated by pressing a glass into the actuator at the back of the dispenser and selecting either CHILLED WATER, CRUSHED ICE or ICE CUBES. When either CRUSHED ICE or ICE CUBES is selected, the ice door opens and a micro-switch closes the circuit to the dispenser motor. Once the actuator is released, the ice door will delay closing to allow all ice to clear the ice chute.

A Drip Tray is located at the bottom of the Dispenser Assembly to catch and evaporate minor water spills. There is a Door Housing Heater (10 watt module heater) located below the Drip Tray to aid in evaporation.

The Trim Plate surrounding the push buttons is removed by pulling straight out after removing the two (2) screws in the lower left and right corners.

Additionally, there is a selector switch for the light, that can be used by selecting either ON or OFF. Use only a 5 watt lamp for replacement.

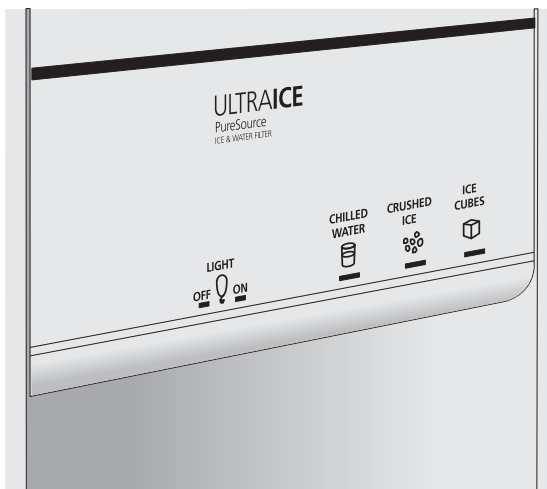


Figure G7



Figure G8

## PureSource Water Filter (on models so equipped)

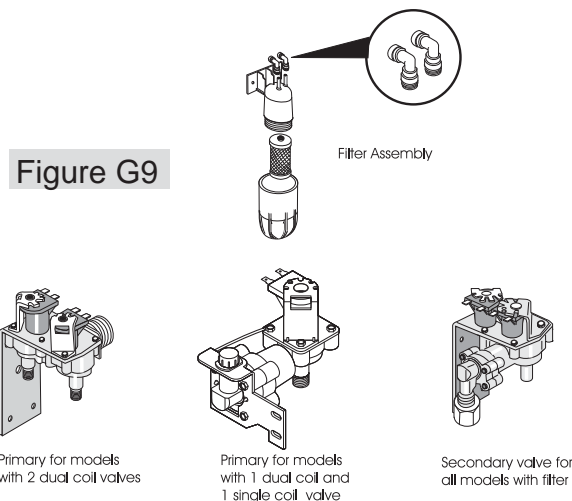


Figure G9

Models built prior to March, 1998, you have 2 dual coil valves (see figure G9). The green coil on each valve is for the Ice Maker and the yellow coil is for the Water Dispenser. Plastic tubing connects the primary water valve to the filter and the filter to the secondary valve.

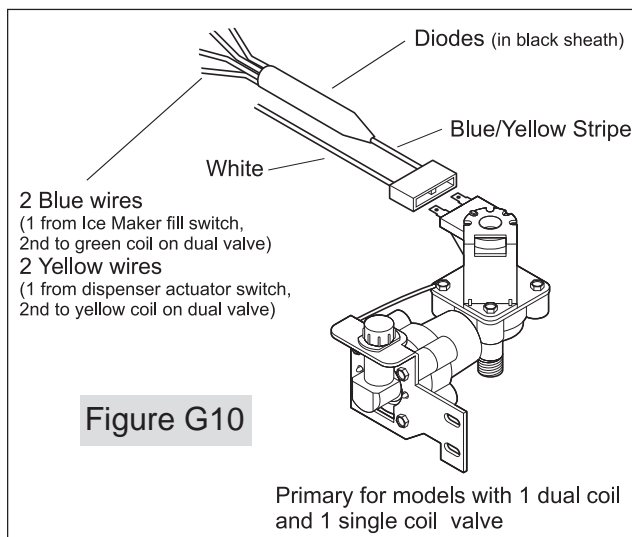
On models with 2 dual coil valves, the 2 plastic lines coming out of the primary valve connect to a single line by use of a (Y) to a single line going to the filter.

Models built after March, 1998 have 1 dual coil valve and 1 single coil valve (see figure G9). The green coil on dual coil valve is for the Ice Maker and the yellow coil is for the Water Dispenser. The green coil on the single coil valve is energized for both water for the Ice Maker and water for the dispenser. Plastic tubing connects the primary water valve to the filter and the filter to the secondary valve.

On models with a single coil valve for a primary, you have 2 diodes in the wiring harness connecting the coil of the single coil valve to the 2 coils of the dual coil valve. The diodes are used to prevent current leakage from opening both coils on the dual coil valve everytime the single coil valve is energized.

If a diode is shorted, when the single coil valve opens, current leakage through the shorted diode will cause both coils on the secondary valve to open and you'll have water going into the Ice Maker and coming out the door at the same time. If the the diode fails in the open position, the coil on your secondary valve will open, but the coil on the primary valve will not. As a result, you will not get water to the Ice Maker or Dispenser. Both doides can be checked with an ohmmeter to see if they are opened or shorted. (See Figure G10)

The coils on all water valves can be checked with an ohmmeter to see if the coils are opened or shorted. If the coil checks bad, replace the coil. If the coils check good and water pressure is between 20-120 psi, and the valve will not allow water to flow through, replace valve.



### Water Filter (on models so equipped)

The water filter must be changed at a minimum of twice a year. But, under certain water conditions such as large concentrations of calcium, alkali, or other particulate matter in the water, a filter may require changing more frequently. A good way to judge whether the filter needs to be replaced is when the water flow to the dispenser starts slowing down and there has been no change to the water pressure to the product. Operating water pressure should be a minimum of 30-120 psi.

### Ice Chute Door

The Ice Chute Door is located in the module assembly on the outer door panel of the freezer door. The door is attached to the door wire and spring assembly. The door is opened and closed by a heat motor located in the same housing. The spring aids in closing the door and holding the door tightly sealed to prevent air from leaking inside freezer.

### SERVICE INFORMATION (Non-electronic type)

#### To Remove Dispenser Module:

1. Disconnect refrigerator from electrical supply.
2. Shut off incoming water supply to Ice Maker.

3. Remove Upper and Lower Door Handle Trim.
4. Remove Door Handle.
5. Remove Drip Tray from Dispenser Housing.
6. Remove six (6) screws holding Dispenser Housing in place. (You may have to slide Selector Knobs out of place to remove two (2) upper screws.
7. Remove four (4) screws holding Dispenser Module in place.
8. Pry Dispenser Housing, using a putty knife, away from freezer door. (There is double-back tape holding housing to door, so it's not necessary to pry very hard)
9. Remove Dispenser Module from Dispenser Housing.
10. Disconnect Molex connector on top left of Dispenser Housing.
11. Disconnect two (2) orange leads going to Actuator Switch located at top left of Dispenser Housing. (Module Housing should be clear from Dispenser Housing now.)

#### To Inspect/Test/Replace Micro Switches inside Dispenser Module:

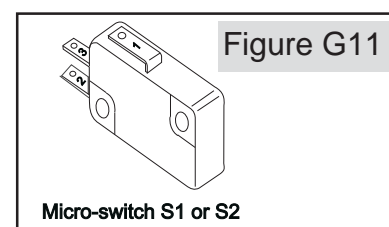
1. Remove single Phillips head screw holding Selector Switch Cover to Dispenser Module.
2. Gently pry with small flathead screwdriver the Selector Switch cover loose. (There are grooves on the front and right side of cover. Use these grooves to pry from.)
3. Lift Selector Switch Cover up and away from Dispenser Module. (The Slide Cam and Switch Rocker may fall free. Put them in a safe place until it's time to re-assemble the Dispenser Module.)
4. Remove two (2) screws holding micro-switch in place. (There are three (3) micro-switches; S1 and S2 are identical, SPDT, and S3 is a SPST.)
5. Remove wires connected to terminals on micro-switch.
6. Test for continuity, using Multimeter on Resistance scale, across switch terminals. Readings should be as follows, for S1 & S2, in Ohms:

With switch button up:

- Terminals 1 & 2 is Zero (0)  $\Omega$
- Terminals 1 & 3 is maximum  $\Omega$
- Terminals 2 & 3 is maximum  $\Omega$

With switch button depressed:

- Terminals 1 & 2 is maximum  $\Omega$
- Terminals 1 & 3 is zero (0)  $\Omega$
- Terminals 2 & 3 is maximum  $\Omega$



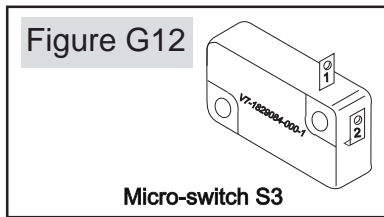
Readings should be as follows, for S3, in ohms:

With switch button up:

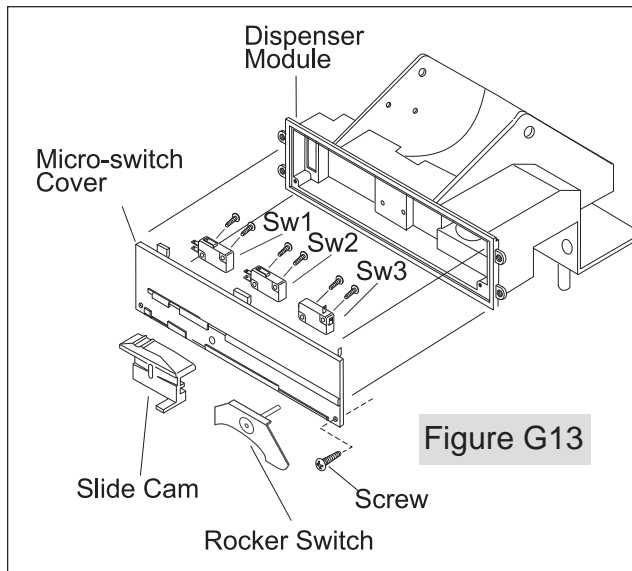
- Terminals 1 & 2 is maximum  $\Omega$

With switch button depressed:

- Terminals 1 & 2 is zero (0)  $\Omega$



7. Replace Micro-switches with faulty readings.
8. Reassemble in reverse order.

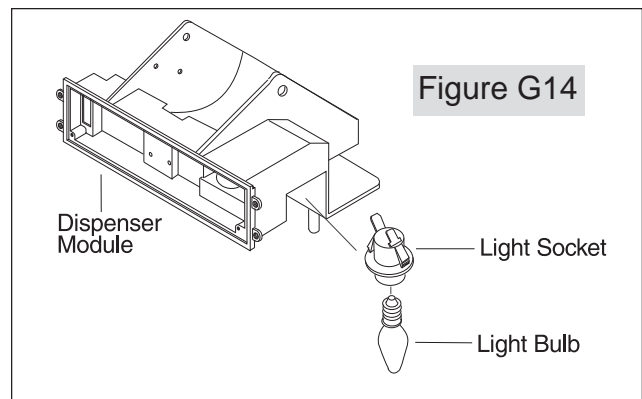


#### To Check/Replace Light Bulb:

1. Unscrew Light Bulb from Light Socket on right underside of Module Housing.
2. Visually check lamp filament to ensure it isn't broken. (You can normally see if filament is in tact. If you have doubts, check bulb with multimeter for continuity. You should have a very low resistance reading, less than 1  $\Omega$ )
3. Replace faulty bulb.

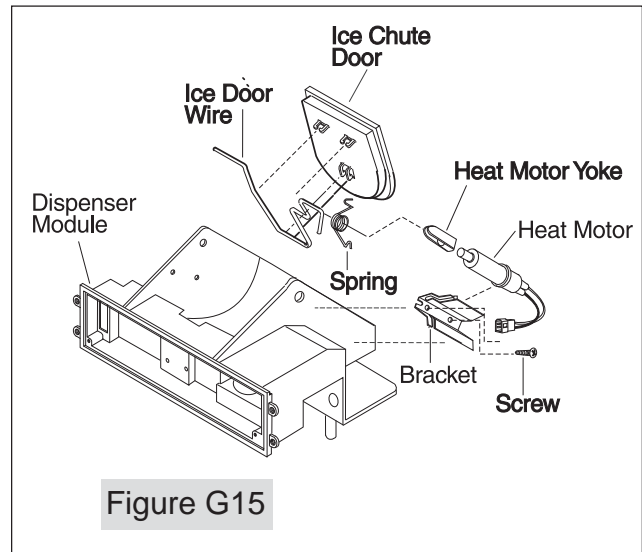
#### To Check/Replace Light Socket:

1. Squeeze two (2) tabs on underside of light socket and push socket through the hole. (There's not much space so you may have to use a flathead screwdriver to depress one of the tabs.)
2. Remove wires hooked to terminals of socket.
3. Check light socket for continuity, using multimeter. With bulb still in place, and you're sure it's good, you should have a very low resistance, less than 1  $\Omega$ .
4. Replace faulty light socket.
5. Re-assemble in reverse order.



#### To Check/Replace Heat Motor:

1. Disconnect lead from from Heat Motor to SPST micro-switch (SW3). This lead is piggybacked with a purple lead. The terminal lug will have to be replaced when you reconnect this lead.
2. Remove White lead from Heat Motor to Lamp Socket. Once again, this lead is piggybacked with another white lead. The lug will have to be replaced for reconnection.
3. Pull Heat Motor out of Heat Motor Bracket. Slide finger under the Heat Motor and pull forward. It will come loose fairly easy.





## NEW ELECTRONIC WATER DISPENSER (Operating Instruction & Service Information)

### Dispenser

The dispenser light will come on automatically when the actuator is pressed to deliver ice or water. For the light to remain on, press the pad that says "Light On/Off" one time. A second press will turn the light off. (See Figure G16)

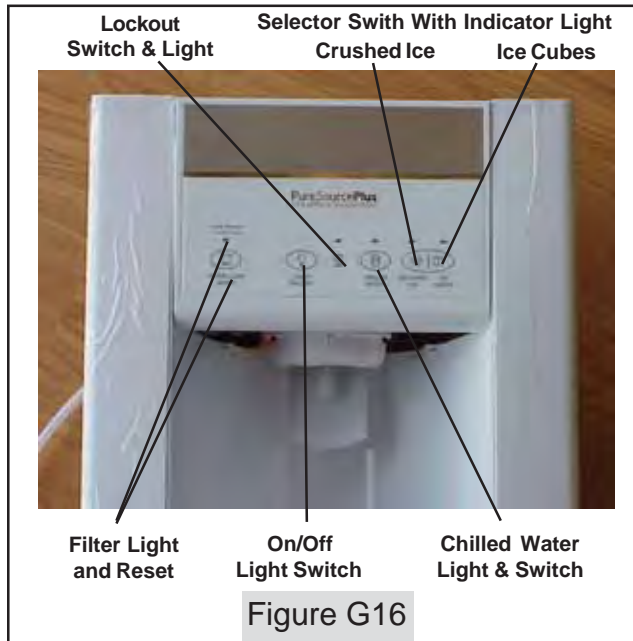


Figure G16

### Selecting Water or Ice

Press the pad that signifies your selection. A green light will appear above your selection. The water delivery system has a built in safety shut-off device that will stop the water flow after three (3) minutes of continuous use. Simply release actuator button to reset the dispensing mechanism. (See Figure G16)

### Lock Out Feature

The ice and water dispensing system can be locked out to prevent unwanted use. Press the picture of the padlock (See Figure G16) for 3-5 seconds to lock out the system. A small red light will appear over the padlock when the system is locked out. Press the padlock again, holding it for 3-5 seconds, to unlock the system. The red light will go out. The ice and water dispensing system is now ready to use again.

### Change Water Filter Indicator

The "Change Filter" indicator light will light up each time the dispenser is used. When the filter is still operating within specified life cycle, the filter indicator light will be green. When the filter has reached approximately 80% of it's useful life, the green light will become an amber light. This is the recommended time to purchase a replacement filter cartridge. When the filter is 100% used up, the amber light becomes a red light. The filter

should be changed as soon as possible. After the filter cartridge has been changed, press the words that say "Filter Light Reset". If the light was red or amber, you'll need to press for 3-5 seconds to reset to green (The green light will flash when reset is complete). If light was still green when the filter is replaced, you will need to press "Filter Light Reset" for 10-12 seconds to reset (You should see the green light flash when the reset is complete ... See Figure G16)

**CAUTION: Before servicing the dispenser system, you must discharge any static electricity from your body.**

The service technician should never remove the front cover of the dispenser assembly without being ESD (Discharge of Static Electricity) protected. A wrist strap with a ground wire attached to the upper hinge is the easiest way to accomplish this if the refrigerator is attached to a grounded outlet.

### To remove the Front Cover:

1. Disconnect refrigerator from electrical supply.
2. Shut off incoming water supply to Ice Maker.
3. Loosen two (2) screws in bottom of Front Cover under touch pads.
4. Push up on cover and pull straight out. This will give you access to the cover, ribbon connector, and the touch control board. (See Figure G17)

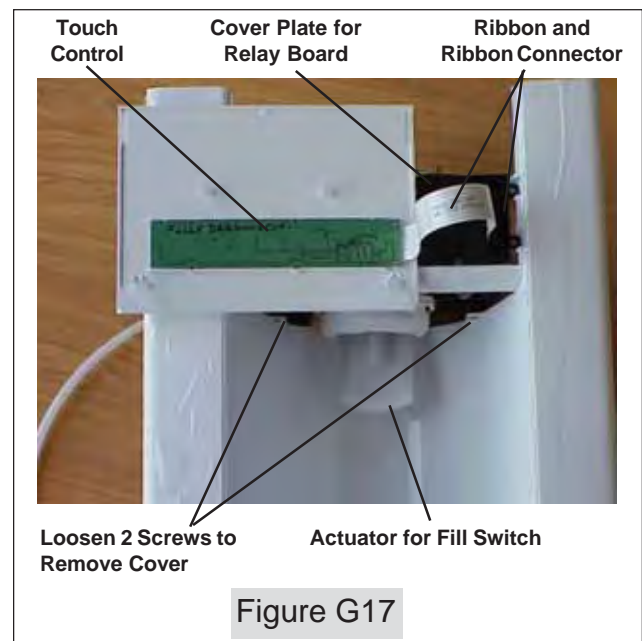
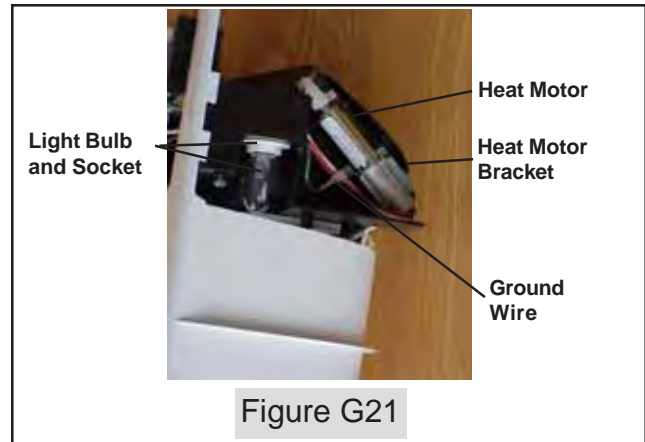
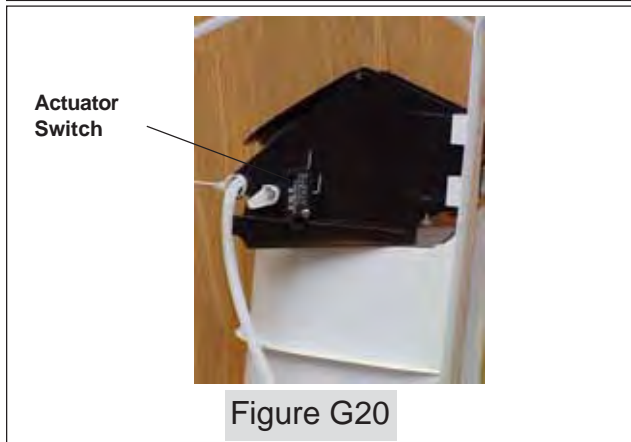
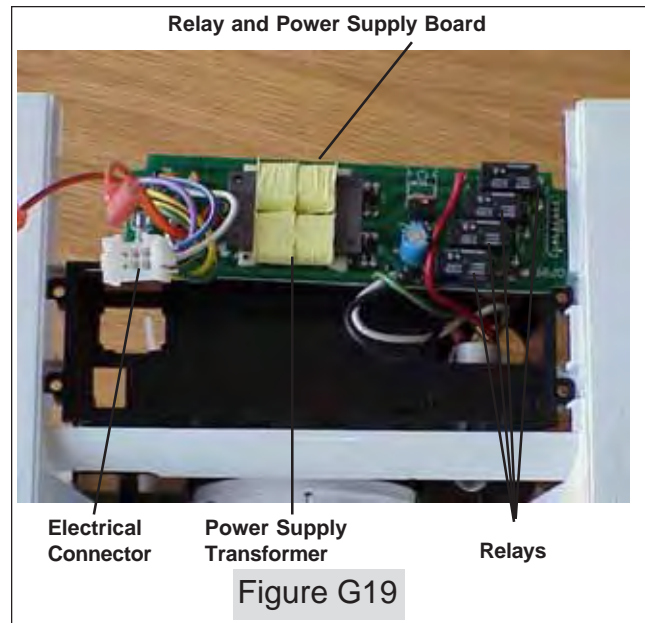
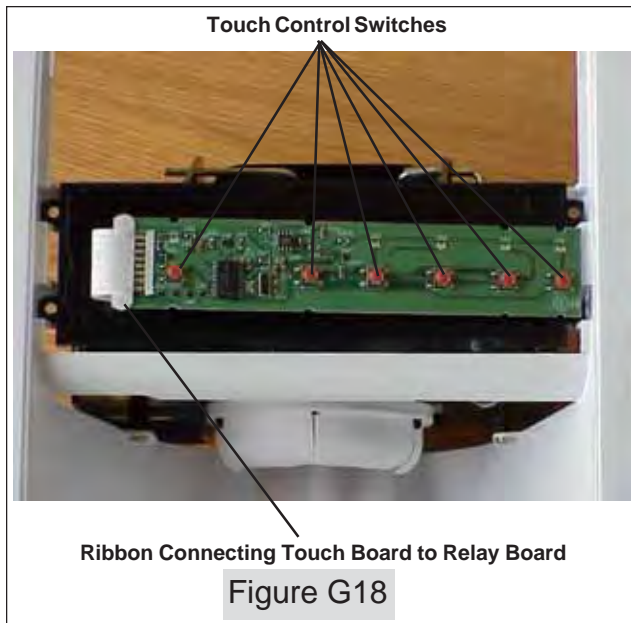


Figure G17

5. Remove three (3) screws on back of cover holding Touch Control Board to cover.
6. Pull ribbon straight out of connector to remove and replace Control Board. (See Figures G17 & G18)
7. Reassemble in reverse order.



**To Remove Relay & Power Supply Board**  
(located behind black cover plate)

1. Remove two (2) bottom screws on front of cover plate.
2. Place small flat screwdriver between cover plate and housing in the middle at the bottom.
3. Twist screwdriver and tip bottom of cover plate out of housing.
4. With cover plate removed, pull board straight out front of housing and tip it up.

**NOTE:** The relay board will come with the heat motor, ground wire, and the electrical connector attached. (See Figure G22)

5. Disconnect two (2) wires to Actuator Switch. (See Figure G20)
6. Press in on tabs on electrical plug and push it into housing.
7. Remove light bulb.
8. Press in on tabs of light socket and push socket down out of housing.
9. Remove wires from light socket and ground wire from heat motor bracket.

10. Remove heat motor from bracket. (See Figure G21)
11. Remove board by guiding wire and heat motor through housing.
12. Reverse order to reassemble relay and power supply board.

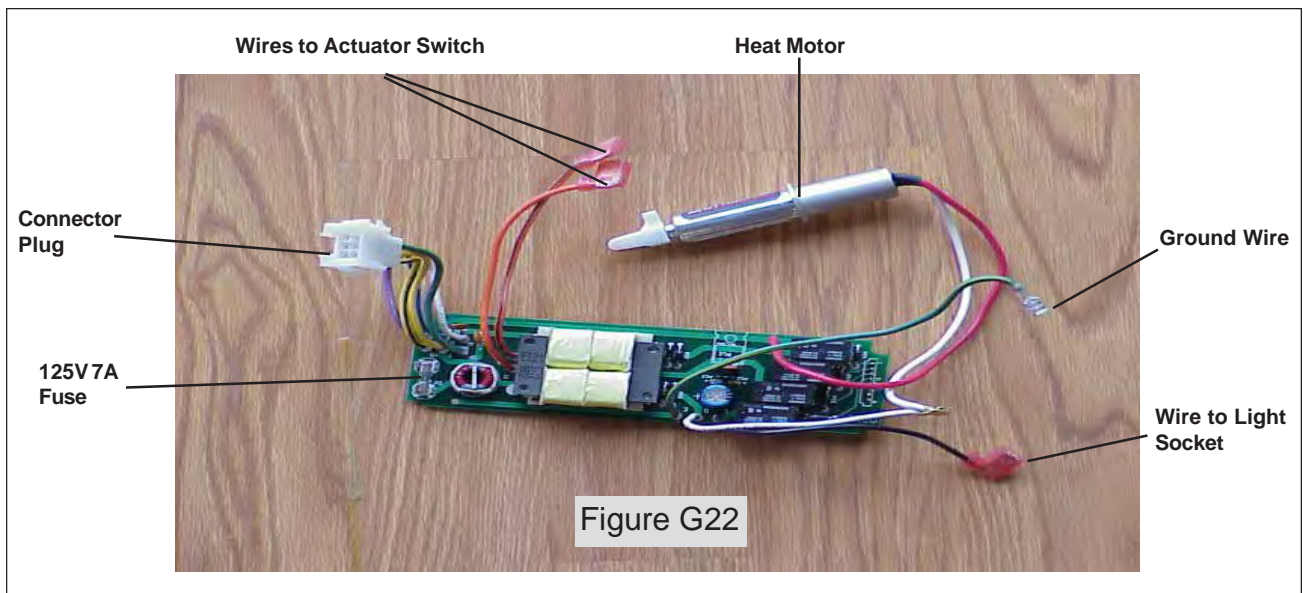


Figure G22

Wire Color Designations:

- Yellow/Black Incoming power to power supply transformer for operating both the relay and touch boards. It comes into the board to a 7 AMP glass fuse and then to the power supply transformer.
- White Neutral wire for the board power supply, and the heat motor.
- Yellow Connected to the chilled water side of the water valve and the common valve.
- Blue/White Connected to solenoid for cube ice.
- Purple Connected to the auger motor.
- Green/Yellow Ground wire.

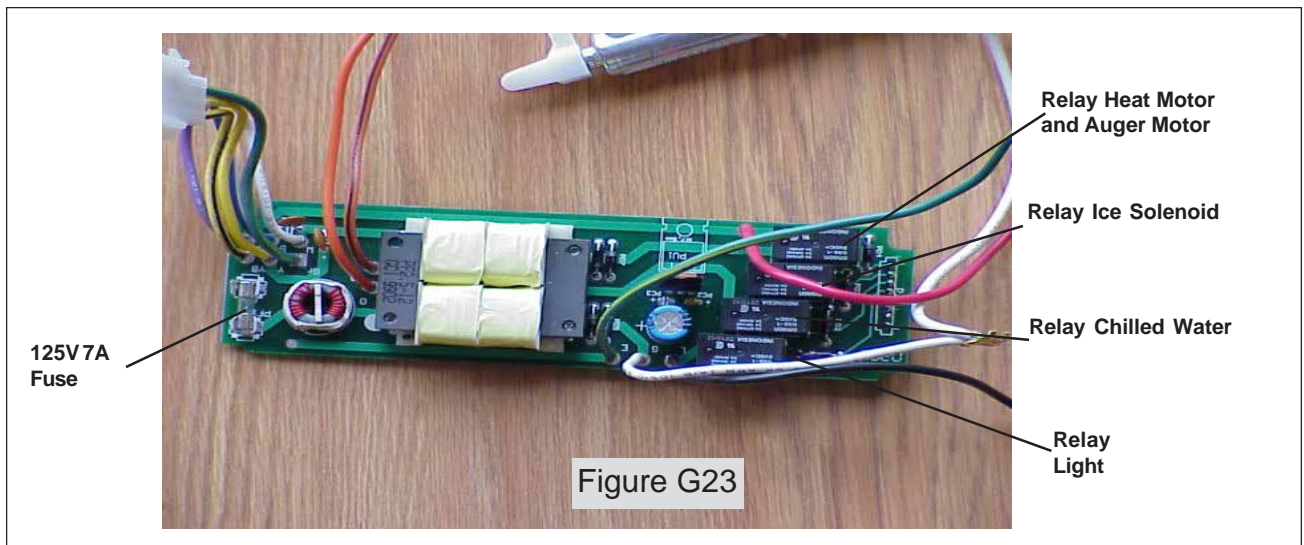
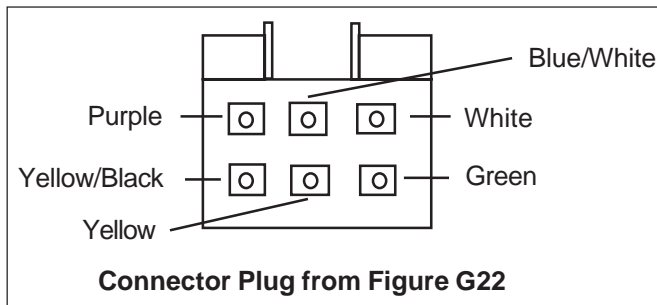
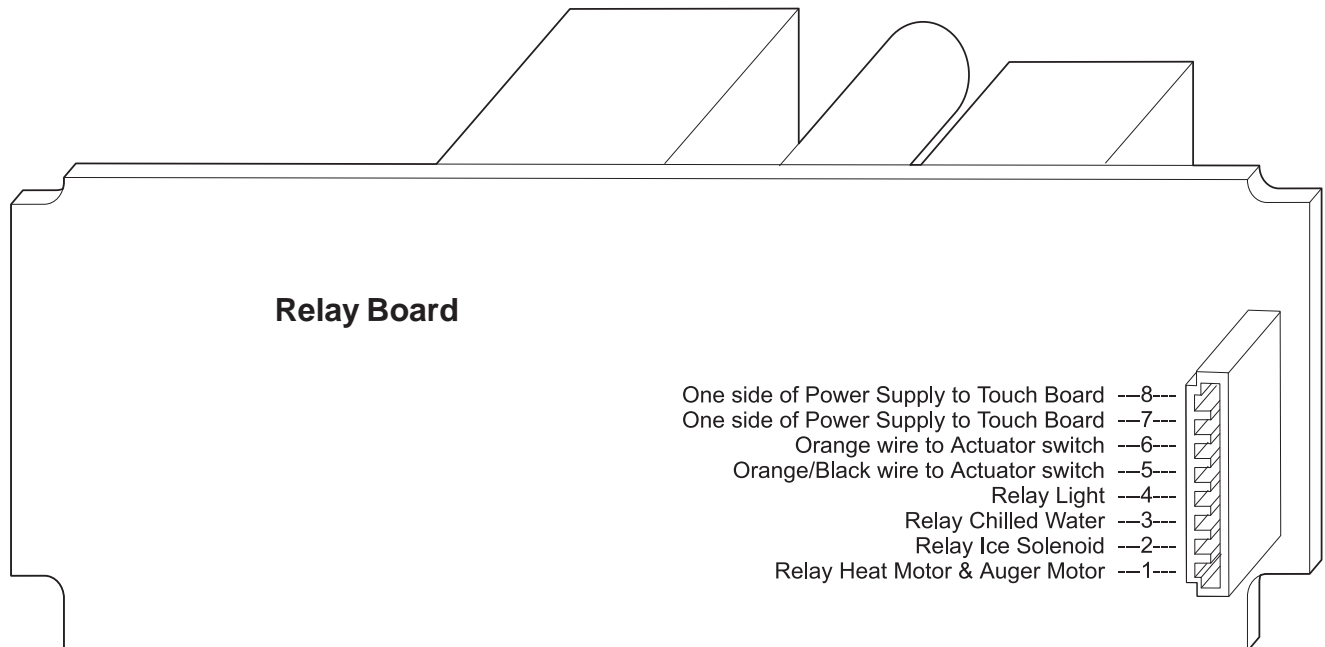


Figure G23

The ribbon from the Touch Board connects to the Relay Board and operates the components as listed below:



### TESTING PROCEDURE

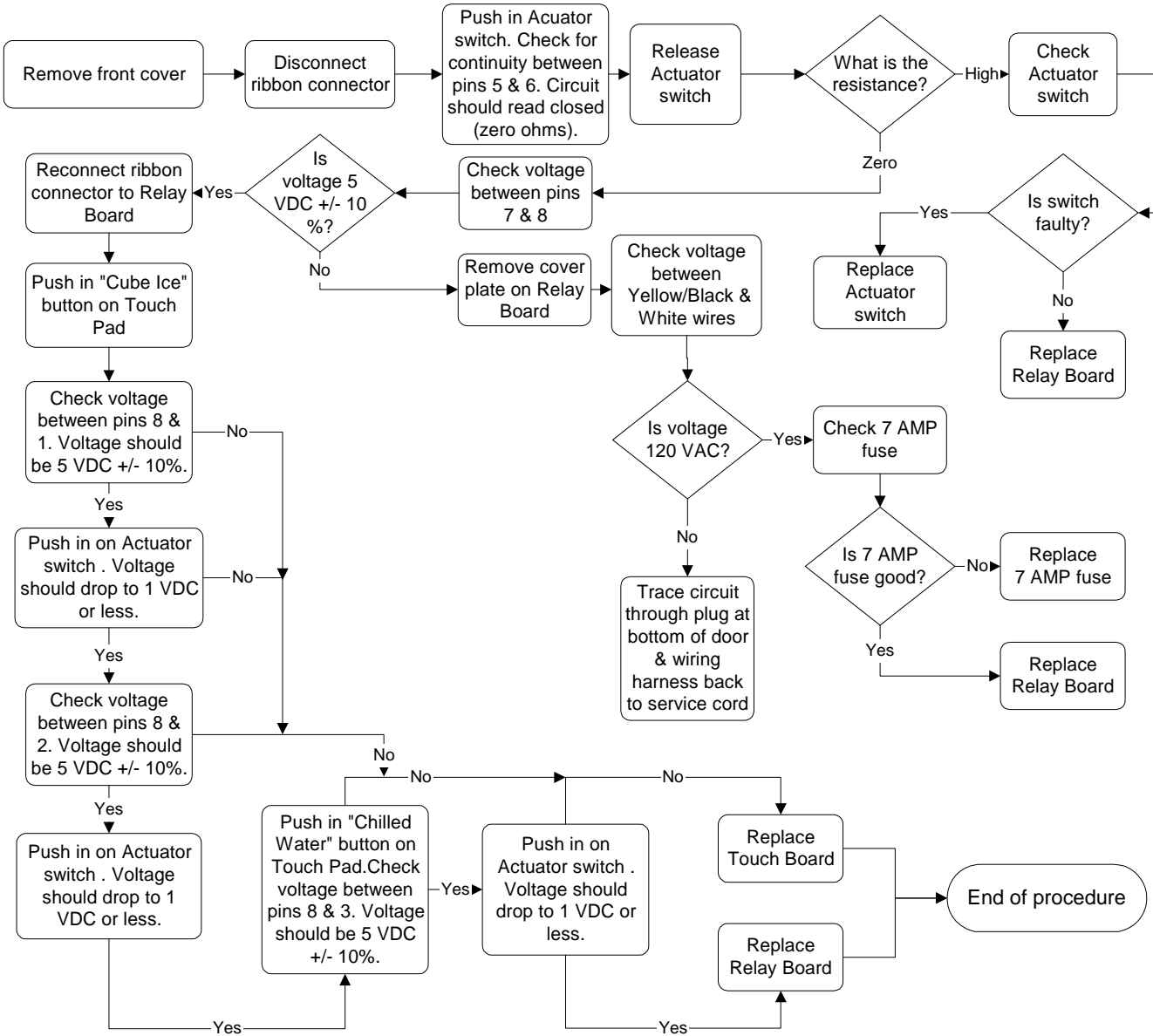
(Touch Board & Relay Board)

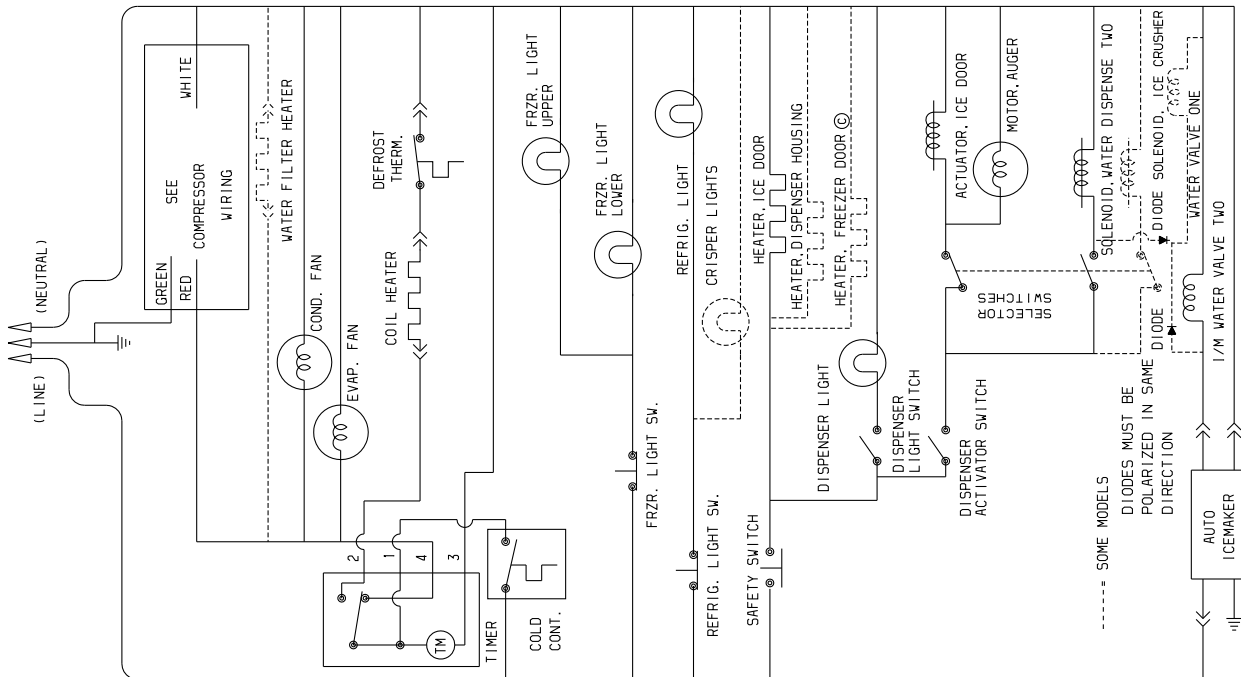
1. Remove front cover.
2. Disconnect ribbon connector and remove Touch Board.
3. Push in Actuator switch - Check for continuity between pins 5 & 6.
  - If meter reads zero, release Actuator switch (circuit should now read open, maximum resistance). Go to Step 4.
  - If meter reads high or maximum resistance (open), check Actuator switch. If switch is faulty, replace switch. If switch checked out good, replace Relay board.
4. Check voltage between pins 7 & 8. (Voltage should be 5 VDC +/- 10%)
  - If voltage is present, go to Step 5.
  - If voltage is present, remove the 2 screws holding the cover plate to the Relay Board. Use a small flathead screwdriver to pry the cover off. Check for voltage between the Yellow/Black and White wires. (Voltage should read 120VAC)
    - If voltage is correct, check the 7 AMP fuse on the Relay Board. If fuse is faulty, replace fuse. If fuse checked good, replace Relay Board.
    - If no voltage is present, trace circuit through plug at bottom of door and wiring harness back to service cord.
5. Reconnect Touch Board ribbon connector to Relay Board.
  - Push in on "Cube Ice" button on the Touch Pad.
    - Check for voltage between pins 8 & 1. (Voltage should be 5 VDC +/- 10%) Push in on Actuator switch and voltage should drop to 1 VDC or less.
    - Check for voltage between pins 8 & 2. (Voltage should be 5 VDC +/- 10%) Push in on Actuator switch and voltage should drop to 1 VDC or less.
  - Push in on the "Chilled Water" button on the Touch Pad.
    - Check for voltage between pins 8 & 3. (Voltage should be 5 VDC +/- 10%) Push in on Actuator switch and voltage should drop to 1 VDC or less.
    - If voltage is correct, replace Relay Board. If voltage is incorrect, replace Touch Board.

**For additional help in troubleshooting, see Flow Chart on next page.**

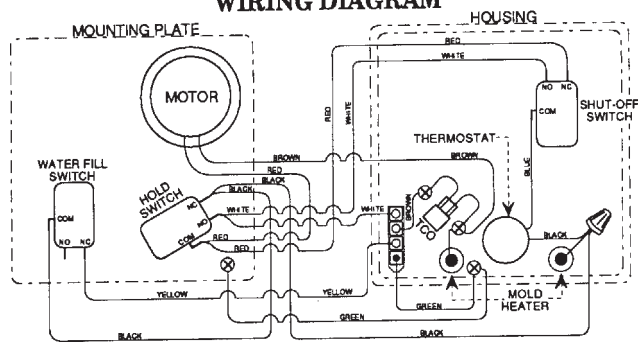
# TESTING PROCEDURE

(Touch Board & Relay Board)

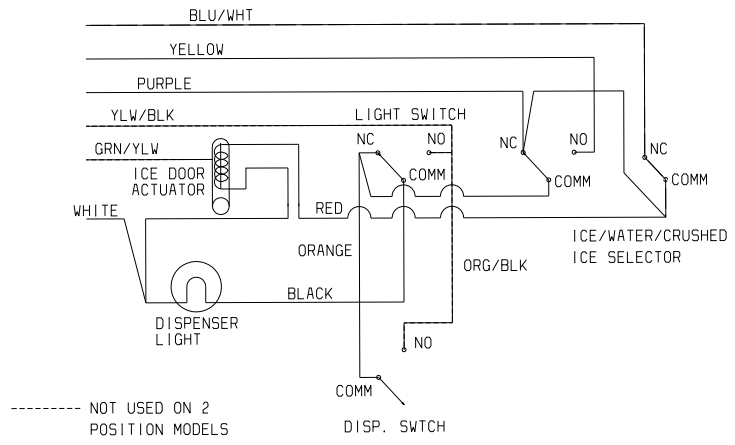
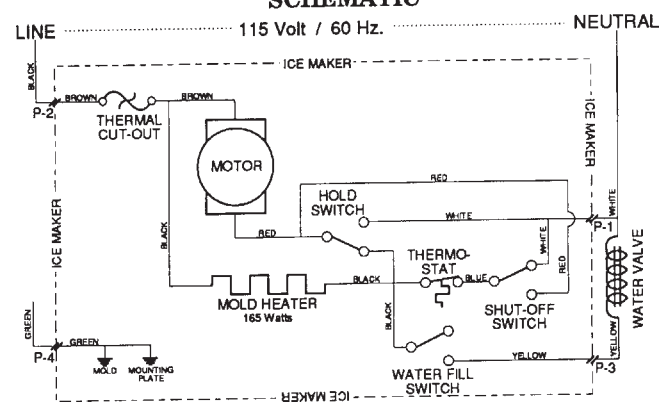




**WIRING DIAGRAM**



**SCHEMATIC**

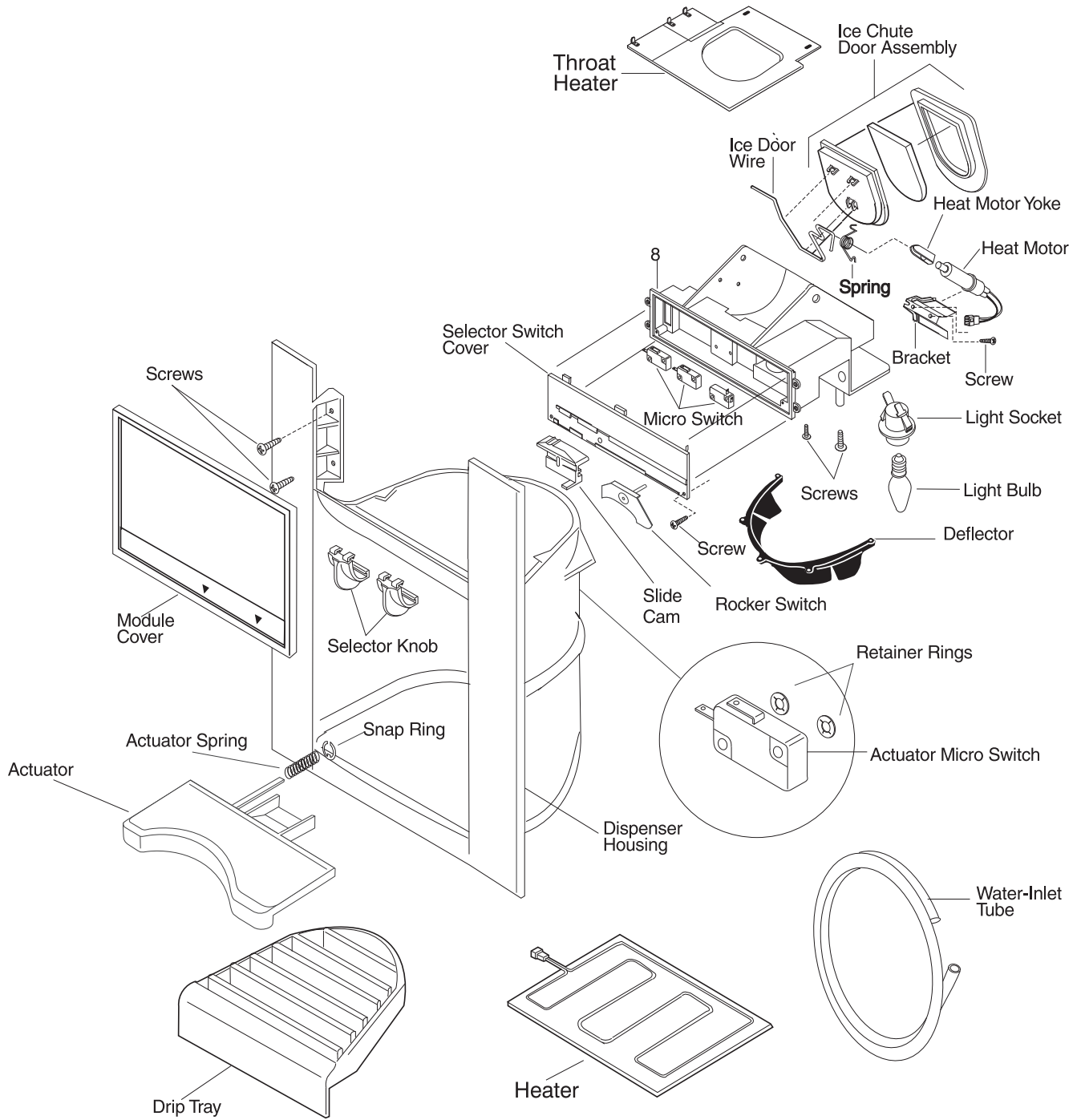




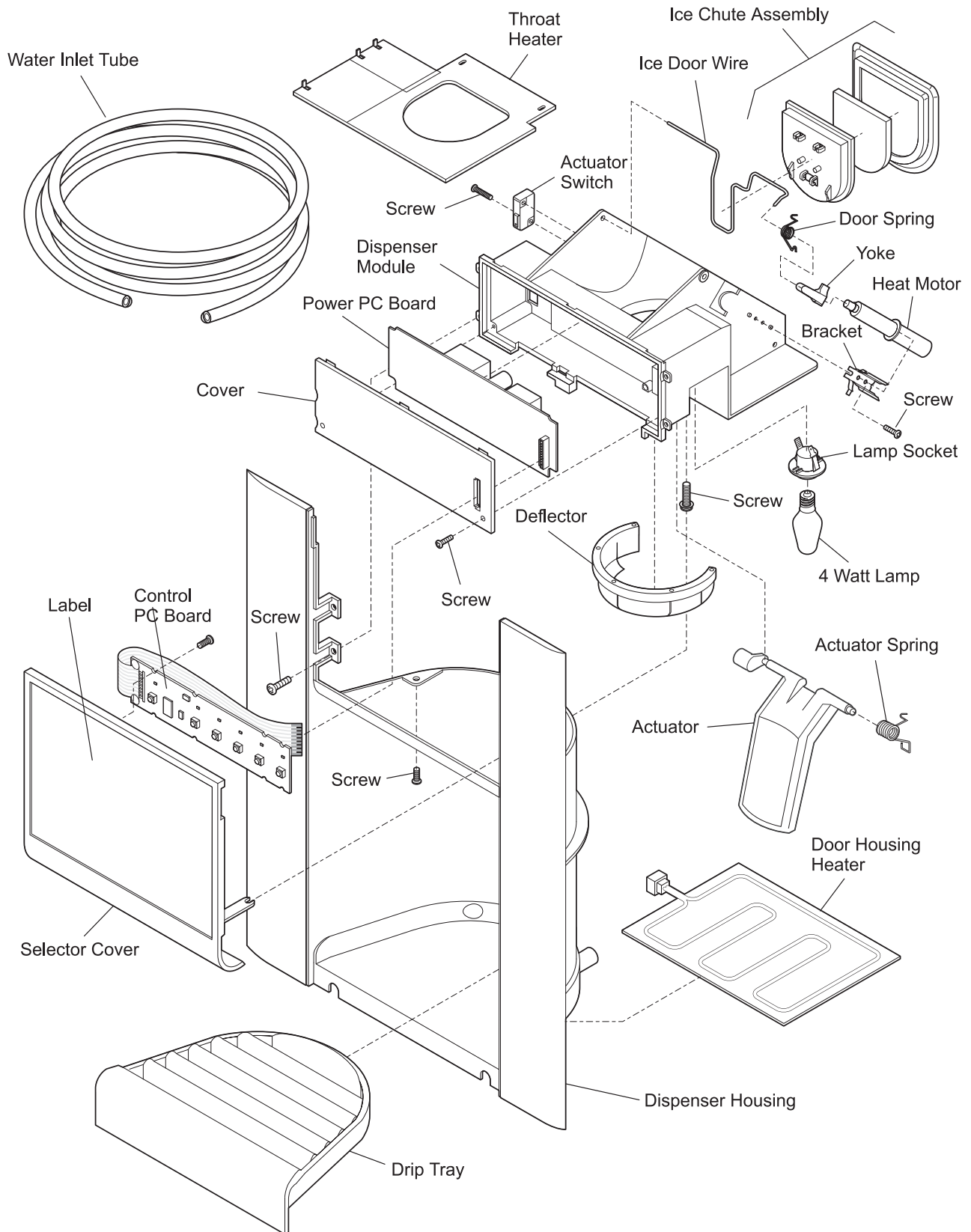




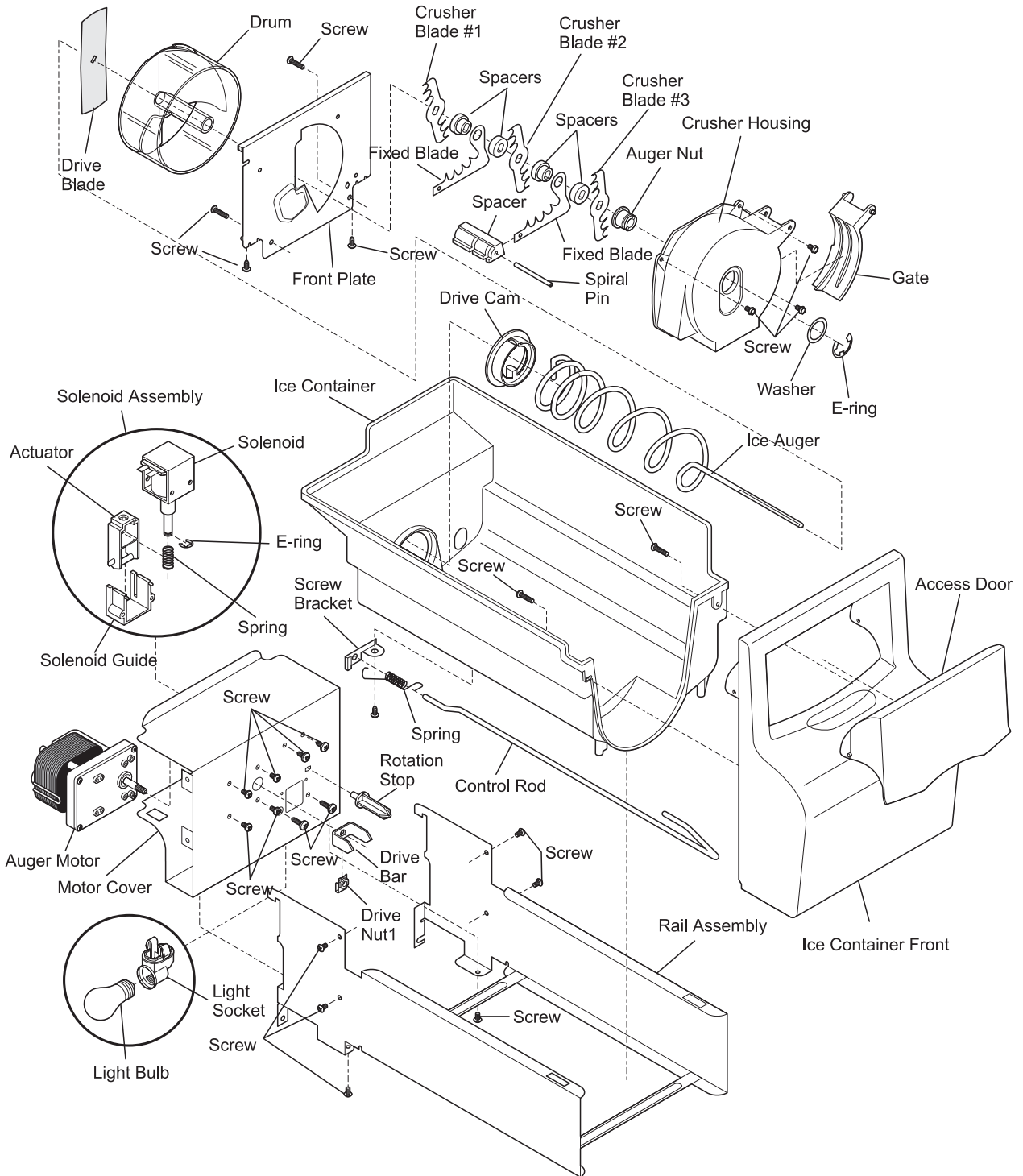
# Ice Dispenser (Exploded View)



# Electronic Ice Dispenser (Exploded View)



# Ice Container (Exploded View)



## IMPORTANT SAFETY NOTICE

The information provided herein is designed to assist qualified repair personnel only. Untrained persons should not attempt to make repairs due to the possibility of electrical shock. Disconnect power cord before servicing.

## IMPORTANT

If any green grounding wires are moved during servicing, they must be returned to their original position and properly secured.

## CAUTION

System parts must be removed from cabinet before brazing. All electrical parts and wiring must be shielded from torch flame. Do not allow torch to contact insulation; it will char at 200°F and flash ignite (burn) at 500°F. Excessive heat will distort the plastic liner.

## SERVICE DATA SHEET - 218877000

R134a

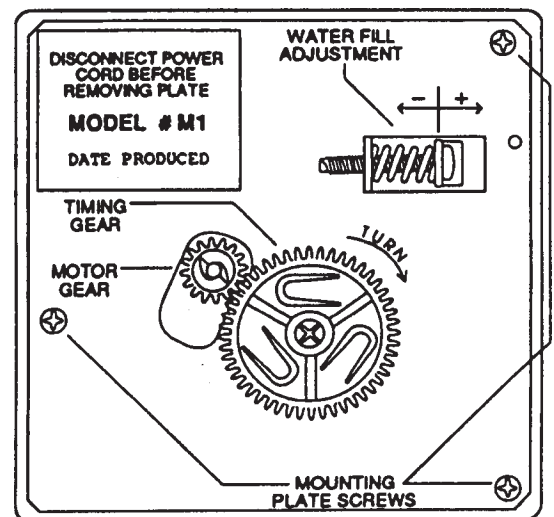
ICE & WATER - AUTOMATIC DEFROST

PERFORMANCE DATA NO LOAD AND NO DOOR OPENINGS AT MID-POINT CONTROL SETTING				
Type A With Run/Start Capacitor	65°F Ambient	90°F Ambient		
Operating Time	37 to 45%	60 to 68%		
Freezer Temperature	0° to 4°F	-2° to 3°F		
Refrigerature Temperature	34° to 39°F	34° to 39°F		
Low Side Pressure (cut-in)	5 to 12 psig	5 to 12 psig		
Low Side Pressure (cut-out))	-2 to 2 psig	-2 to 2 psig		
High Side Pressure (Last 1/3 of cycle)	110 to 130 psig	150 to 180 psig		
Wattage (Last 1/3 of cycle)	170 to 200	180 to 210		
Amps (Running)	1.5 to 1.8	1.5 to 1.8		
Base Voltage	115 VAC	115 VAC		
DEFROST SPECIFICATIONS				
Cabinet Size	Thermostat		Heater	
	Cut-in	Cut-out	Watts	Ohms
22' to 28'	+25°F	+47°F	600	22
Defrost 30 Minutes Every 8 Hours of Compressor Run Time				
CONDENSER FAN MOTOR				
Watts	RPM		Amps	
2.3	1300 CW Opposite Shaft		.15 Running	
THERMOSTATIC DAMPER				
	Full Open		Closed	
	33°F +/- 2°F		22°F +/- 2°F	
ICE MAKER SPECIFICATIONS				
Electrical	115 Volts		60 Hertz	
Thermostat	Opens at 48°F		Closes at 15°F	
Heater Wattage	165			

## ICE MAKER INFORMATION

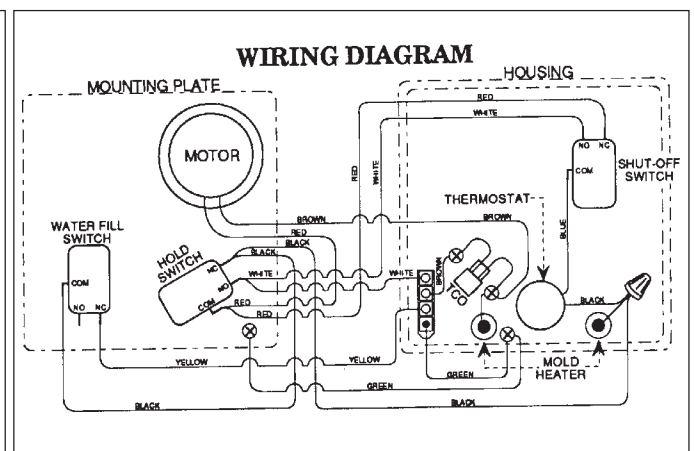
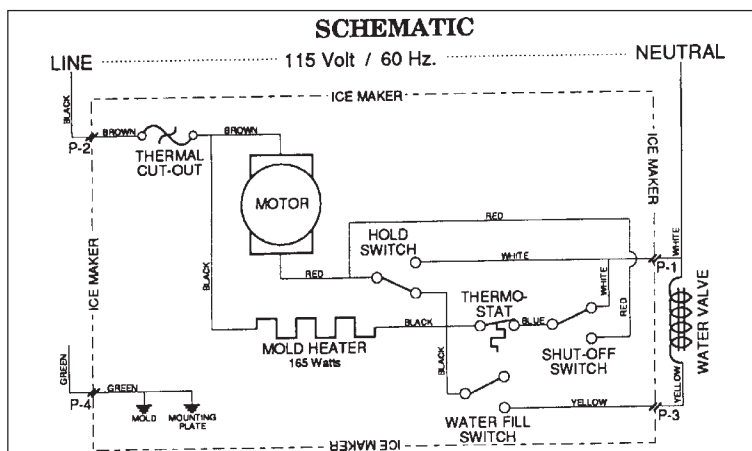
### Test Cycling

Remove cover by inserting screwdriver in notch at bottom and prying cover from housing. Use screwdriver to rotate motor gear counterclockwise until holding switch circuit is completed. All components of ice maker should function to



### Water Fill Volume

The water fill adjustment screw will change the fill time. One full turn is equal to 20cc (.68 oz.). The correct fill is 90 to 120cc (3.0 to 4.0 oz.). When a water valve is replaced, the fill volume must be



THIS INFORMATION IS DESIGNED TO ASSIST QUALIFIED PERSONNEL ONLY. UNTRAINED PERSONS SHOULD NOT ATTEMPT TO MAKE REPAIRS DUE TO THE POSSIBILITY OF

## SERVICE DATA SHEET

**218941700**

ICE ONLY OR ICE & WATER - SIDE BY SIDE

### ⚠️ WARNING

If the refrigerator is not properly grounded and a component shorts to ground, **TOUCHING THE APPLIANCE COULD RESULT IN A**

### ⚠️ CAUTION

System parts must be removed from cabinet before brazing. All electrical parts and wiring must be shielded from torch flame. Do not allow torch flame to contact insulation; it will char at 200°F and flash ignite (burn) at

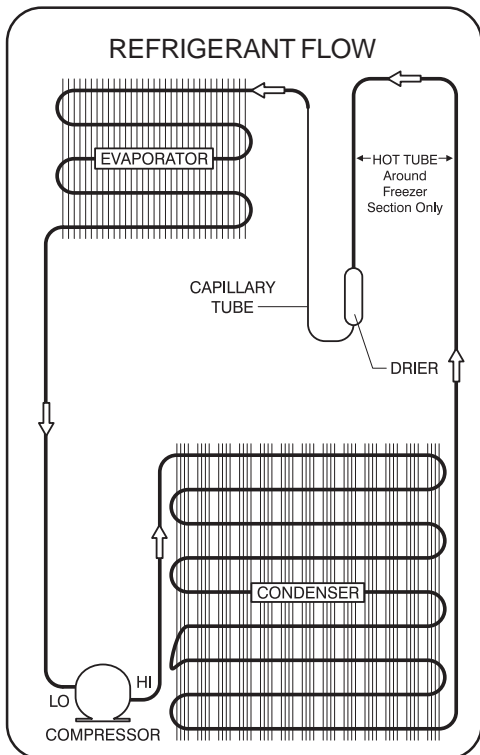
#### POLARIZED CIRCUITS AND PROPER GROUNDING

This appliance has polarized circuits and requires a three-prong grounded wall receptacle. Non-insulated electrical components are

See serial plate for electrical specifications

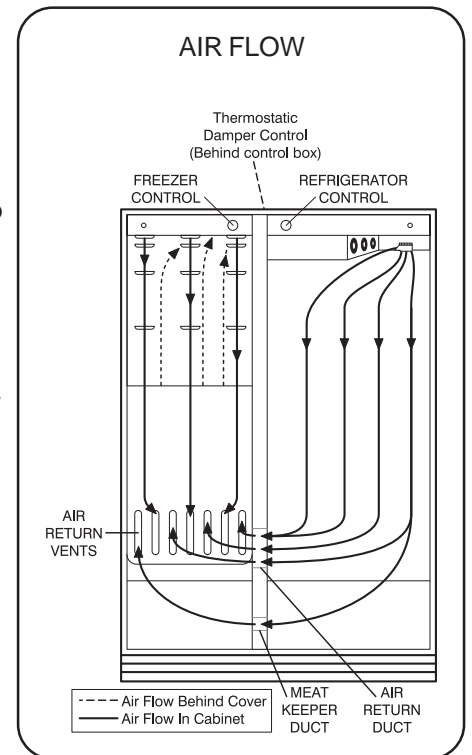
All electrical testing must be done with the appliance unplugged from the wall outlet.

**IMPORTANT!!!**



#### COMPONENT LOCATION

- Cold Control - in freezer control box
- Thermostatic Damper Control - accessible by removing air duct in top rear of refrigerator section.
- Defrost Timer - under kick plate - behind lower front panel - left side.
- Condenser Fan - behind access cover on bottom right rear side of refrigerator.
- Cabinet Lights - one behind the refrigerator control box, and one underneath the auger motor.
- Evaporator Fan - under bottom section of freezer coil cover.



PLEASE RETURN THIS SHEET TO IT'S ORIGINAL LOCATION

DEFROST SPECIFICATIONS @ 230V		OTHER SPECIFICATIONS @ 230V, 50 Hz.	
20' - 28' Defrost Thermostat	CUT-IN	CUT-OUT	CONDENSER FAN MOTOR 5.6 WATTS OUTPUT - 1180 RPM CW OPPOSITE SHAFT - .02 Amps running
	25°F	47°F	
20' Defrost Heater	WATTS - 630	OHMS - 21	THERMOSTATIC DAMPER @ Mid Setting 0.5 IN. OPENING = 37°F +/- 2% / Closed = 27°F = +/- 2%
22' - 28' Defrost Heater	WATTS - 690	OHMS - 19	
DEFROST 21 MINUTES EVERY 8 HOURS OF COMPRESSOR OPERATION			

**PERFORMANCE DATA  
NO LOAD - NO DOOR OPENINGS**

**Fahrenheit  
PSIG**

Ambient Temperature	65°F	90°F	110°F
Control Settings	Mid-point	Mid-point	Coldest
Electrical Frequency	50 Hz	50 Hz	50 Hz
Operating time • in %	40 - 50	65 - 75	100
Freezer temperature • °F	0 - 4	-2 to 3	-2 to 10
Refrigerator temperature • °F	34 - 39	34 - 39	39 - 42
Low Side Pressure: Cut-in • psig Cut-out • psig	6 - 10 1 - 4	6 - 10 1 - 4	6 - 10 1 - 4
High Side Pressure: (last 1/3 of cycle) • psig	125 - 145	145 - 165	170 - 190
Wattage (last 1/3 of cycle) 22' - 28'	130 - 150	140 - 160	190 - 210
Amps (running) 22' - 28"	0.6 - 0.9	0.7 - 1.0	0.8 - 1.1

**Centigrade  
Pascals**

Ambient Temperature	18°C	32°C	43°C
Control Settings	Mid-point	Mid-point	Coldest
Electrical Frequency	50 Hz	50 Hz	50 Hz
Operating time • in %	40 - 50	65 - 75	100
Freezer temperature • °C	-17 to -15.6	-18.9 to -16.1	-18.9 to -12.3
Refrigerator temperature • °C	1.1 to 3.9	1.1 to 3.9	3.9 to 5.4
Low Side Pressure: Cut-in • kPa Cut-out • kPa	41 - 69 7 - 28	41 - 69 7 - 28	41 - 69 7 - 28
High Side Pressure: (last 1/3 of cycle) • kPa	861 - 999	999 - 1137	1171 - 1310
Wattage (last 1/3 cycle) 22' - 28'	130 - 150	140 - 160	190 - 210
Amps (running) 22' - 28"	0.6 - 0.9	0.7 - 1.0	0.8 - 1.1

