

# CM1400R

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# CM1400R FOR THE INSTALLER

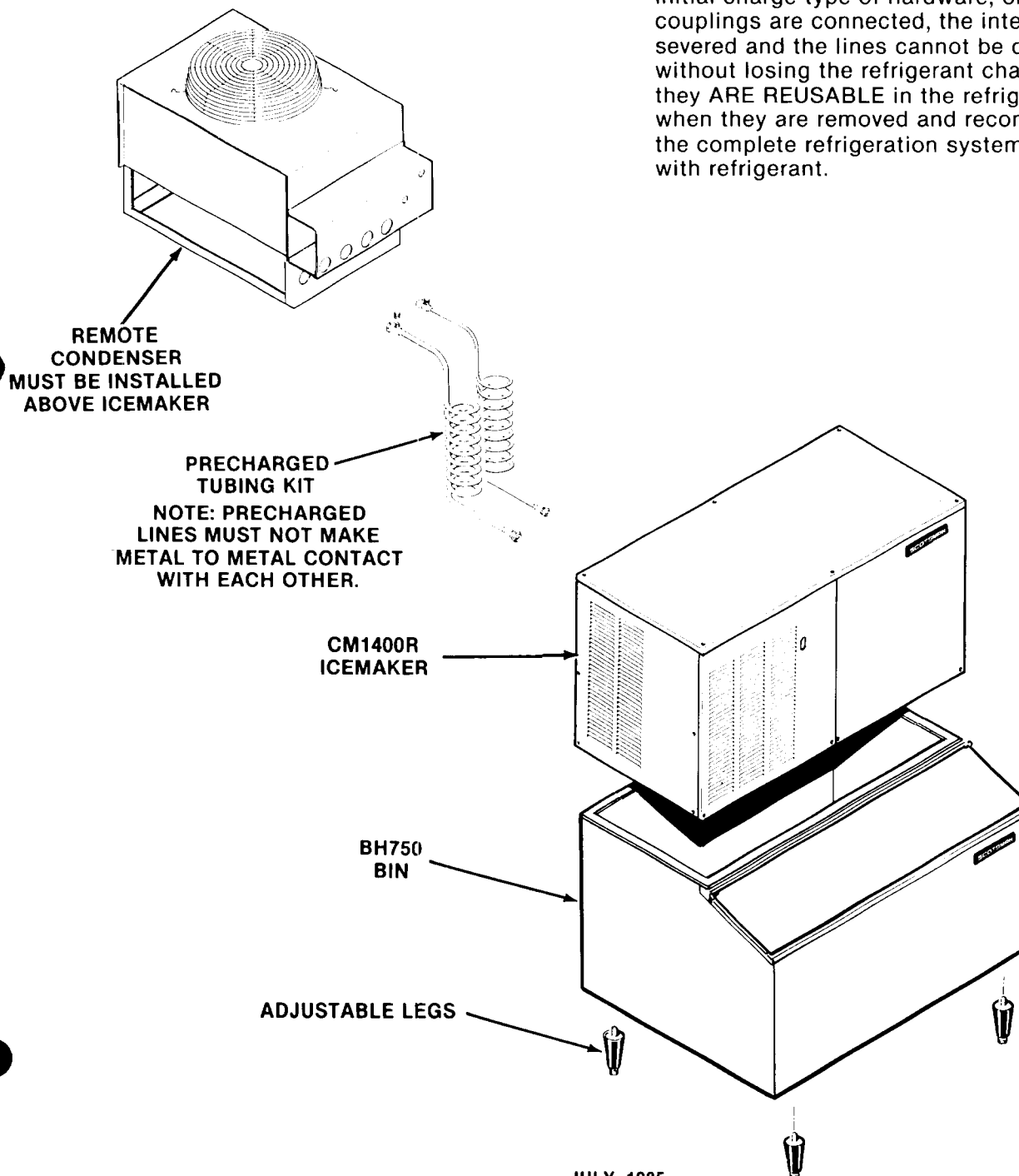
## INTRODUCTION

These instructions provide the specifications and the step-by-step procedures for the installation, start up and operation for the Scotsman Model CM1400R Modular Cuber with Remote Condenser.

The Model CM1400R Modular Cubers are quality designed, engineered, constructed and thoroughly tested icemaking systems providing the utmost in flexibility to fit the needs of a particular user.

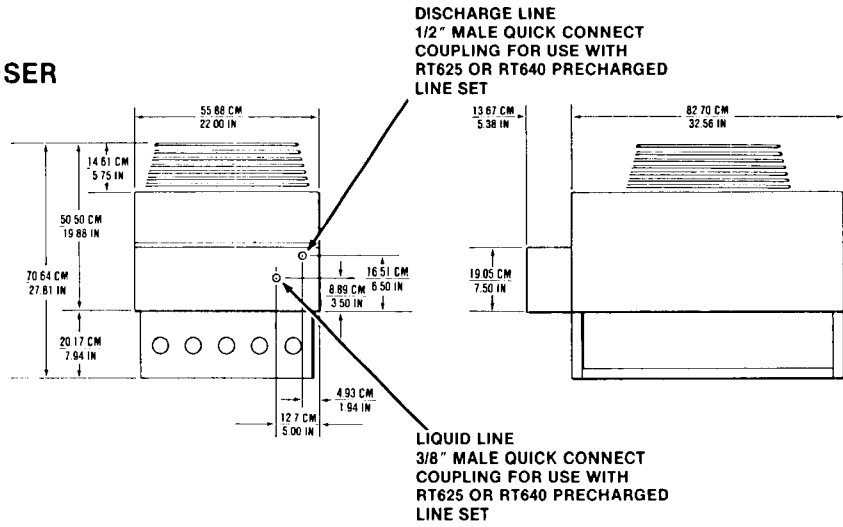
Available in the single-circuit condenser only. The single-circuit condenser can accommodate a single CM1400R cuber and one set of two pre-charged refrigerant lines.

In the above installations the sets of two pre-charged refrigerant lines to be used are the 25-foot line kits or the 40-foot line kits. These pre-charged refrigerant line kits are a one-time initial charge type of hardware; once the sealed couplings are connected, the internal seal is severed and the lines cannot be disconnected without losing the refrigerant charge. However, they ARE REUSABLE in the refrigerant system when they are removed and reconnected and the complete refrigeration system is re-charged with refrigerant.

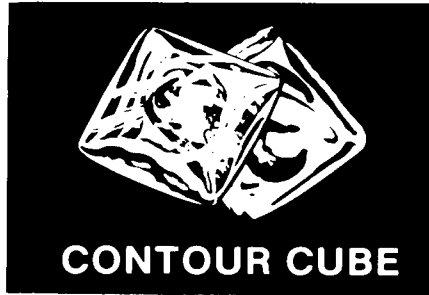
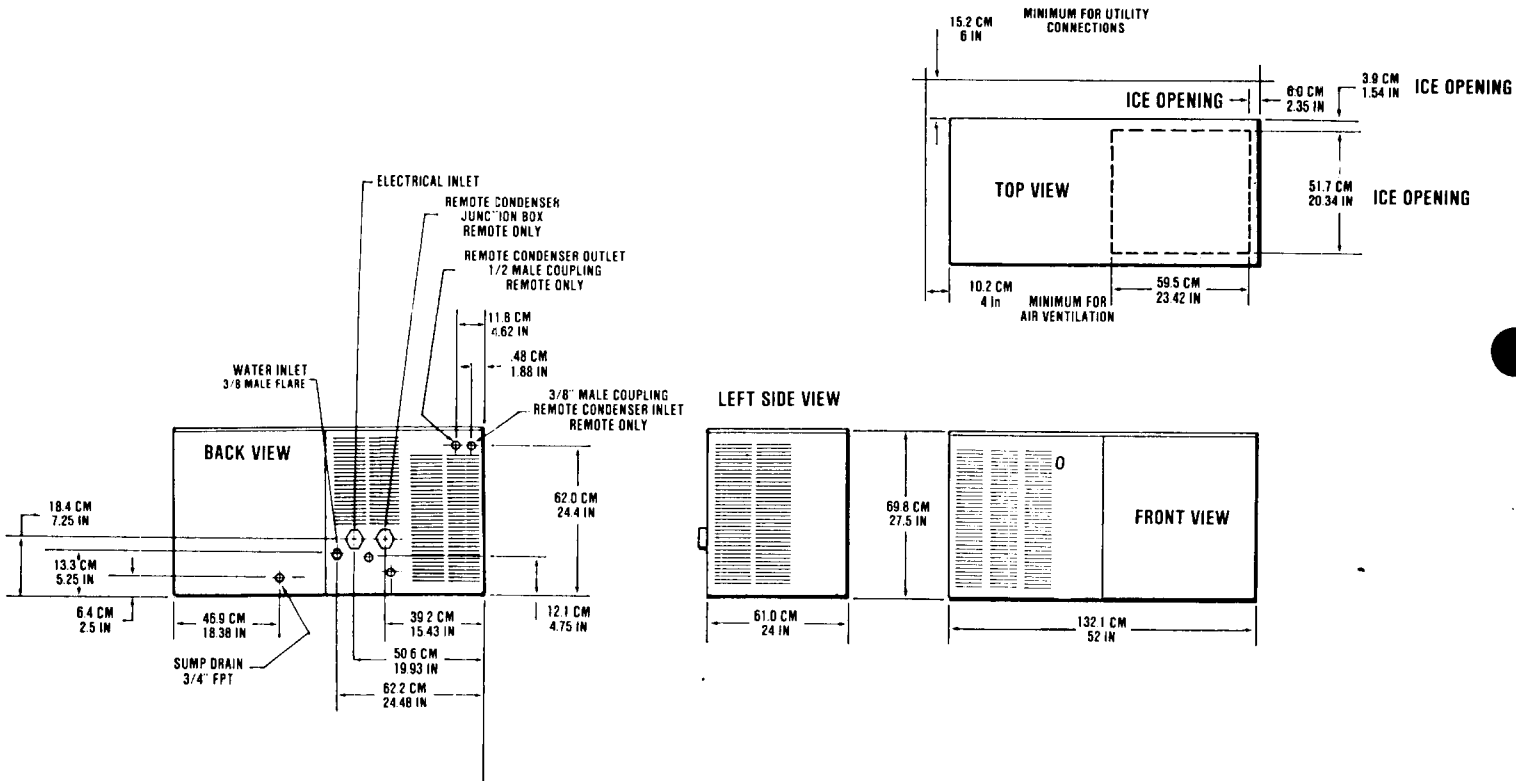


# CM1400R SYSTEM SPECIFICATIONS

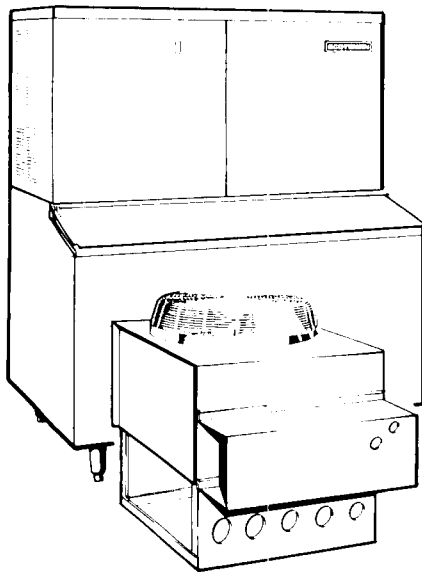
## RC1451-32B REMOTE CONDENSER



## CM1400R MODULAR CONTOUR CUBER



# CM1400R FOR THE INSTALLER



## EQUIPMENT LIST/CM1400R ICE SYSTEM

All of the following components must be available before assembly.

- Icemaker - CM1400RE-3A or CM1400RE-32A
- Ice Storage Bin - BH750E or BH750S  
BH1000E or BH1000S
- Leg Kit for the bin - KLP2E - Black or KLP2S - Nickel plated
- Pre-Charged Refrigerant Line Kit - RT625 - 25 foot or RT640 - 40 foot
- Remote Condenser - RT1451-32B Single

We reserve the right to make product improvements at any time. Specifications and design are subject to change without notice.

## SPECIFICATIONS

Model Number	(Height - w/o Legs)	Bin Cap.	Cube Size	Cond. Unit	Finish **	Basic Electrical	Comp. H.P.	No. of Wires	Min. Circuit Ampacity †	Max. Fuse Size	Ship. Wt. lbs./kg.
	Dimensions H" x W" x D"										
CM1400RE-3A	28 x 52 x 24	—	Contour	Air	ES	208-230/60/3	3.25	3	17.5	25	360/163
CM1400RE-32A	28 x 52 x 24	—	Contour	Air	ES	208-230/60/1	3.25	2	28.5	45	360/163

## SPECIFICATIONS

Model Number	Dimensions H" x W" x D"	For Use With	Cond. Unit	Basic Electrical	Comp. H.P.	Min. No. of Wires	Circuit Ampacity †	Max. Fuse Size	Ship. Wt. lbs./kg.
RC1451-32B	29 1/4 x 30 1/4 x 33 3/4	(1) CM1400R	R-Air	208-230/60/1	—	2	2.0*	—	115/52

## MODULAR ICE STORAGE BINS

Model Number	(Height - w/o Legs)	Bin Cap.	Finish	Ship. Wt. lbs./kg.
	Dimensions H" x W" x D"			
BH750E	29 1/4 x 52 x 36	734 lbs	ES	171/100
BH750S	29 1/4 x 52 x 36	734 lbs	SS	166/100
BH1000E	44 x 52 x 31 1/2	1000 lbs	ES	231/105
BH1000S	44 x 52 x 31 1/2	1000 lbs	SS	231/105

\*Ampacity for remote condenser fan motor is included in icemaker ampacity. Use this figure to determine wire size between icemaker and fan motor.

These products qualify for these listings.



\*\* (ES) Sandalwood. Leathergrain embossed steel with high gloss baked enamel finish.

† Use this value to determine minimum wire size as per National Electric Code Standards

\*\*\* Maximum storage capacity for bins is based on 90% of total volume in cubic feet x 34 lb. average density of ice (A.R.I. Standard)

## IMPORTANT OPERATING REQUIREMENTS

	MINIMUM	MAXIMUM
Air Temperatures . . . . .	50°F (10.0°C)	100°F (38°C)
Water Temperatures . . . . .	40°F (4.4°C)	100°F (38°C)
Water Pressures . . . . .	20 lbs. gauge	120 lbs. gauge

Electrical Voltage Variation

Voltage rating specified on nameplate . . . . . -10% 10%

This does not include the Remote Condenser. Remote Condensers are designed to operate in outdoor installations in a temperature range of -20° to 120° F.

Extended periods of operation at temperatures exceeding these limitations constitutes misuse under the terms of Scotsman Manufacturer's Limited Warranty, resulting in a loss of warranty coverage.

## PRE-CHARGED REFRIGERANT TUBE KITS:

RT625 — 25 foot pre-charged with R502 Refrigerant tubing with connectors.

RT640 — 40 foot pre-charged with R502 Refrigerant tubing with connectors.

SEE NAMEPLATE for electrical and refrigeration specifications. Locate the NAMEPLATE on the lower, left part of the Rear Panel.

NOTE: This system uses R502 Refrigerant.

## OPTIONAL STAINLESS STEEL

### PANEL KITS:

SPKCM1400 contains top, 2 front and 2 end panels. Not factory installed.

### OPTIONAL BH750 STORAGE BIN

For use with one or two CM1400 icemakers.

### OPTIONAL BH1000 STORAGE BIN

For use with one or two CM1400 icemakers.

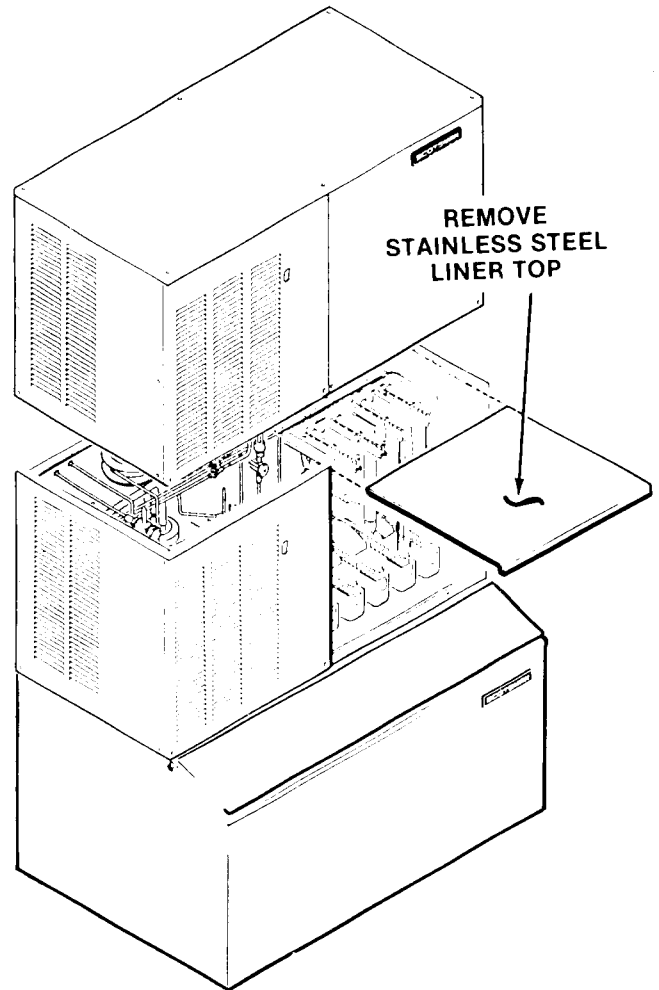
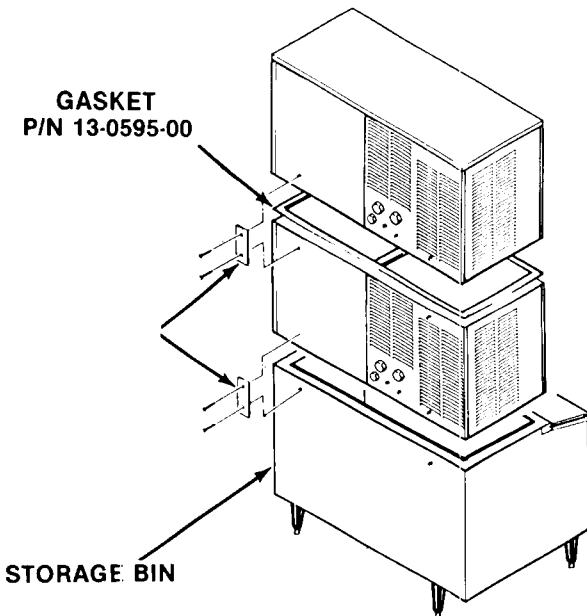
# CM1400R FOR THE INSTALLER

## LOCATION & LEVELING

*Component location determines the length of pre-charged refrigerant lines, 25-foot kit or 40-foot kit.*

1. Position the Model BH750 or BH1000 Bin in the selected location, which should have a minimum room temperature of 50-degrees F. and maximum room temperature of 100-degrees F. Level the bin, adjusting the leg levelers in both the front-to-back and side-to-side directions.
2. Inspect the bin top mounting gasket which should be flat with no wrinkles to provide a good water seal when the CM1400 Cuber is installed on top of the bin.
3. Install the CM1400 Modular Cuber on top of the BH750 or BH1000 Bin using care to be sure a good seal is made between the two cabinets. Align the holes in the bottom rear of the CM1400 cabinet to mate with the two mounting straps on the top rear of the BH750.
4. Bolt icemaker to bin with mounting straps and bolt from shipping skid. When alignment and leveling are completed, tighten the bolts to secure the mounting straps.

5. **STACKING INSTRUCTIONS, CM1400R**  
When stacking two units, first remove the top panel from the bottom CM1400R, and then remove the stainless steel liner top from that same unit. They will no longer have any function. Then either use gasket material 13-0595-00 (you will need about 15 feet) or food grade silicone rubber to make a seal on the top of the bottom unit. Carefully lift the uncrated top unit on to the bottom one, (use of a mechanical lift is recommended for this step) aligning the two so that the cabinets line up. Mount the upper unit bin control into the lower units bracket. The lower units two front panels require four sheet metal screws to be added to the top of the panels to secure them to the icemaker. Fasten the two units together using mounting straps as illustrated.



*Location & Leveling*

# CM1400R FOR THE INSTALLER

6. Remove bin thermostat bracket from shipping location on the evaporator supports.

Turn the three installed mounting brackets down to 6 o'clock position as illustrated.

Remove screw #1 shown and retain for use in attaching bracket.

Using screw #1, attach the bracket and tube assembly as shown and snap into the remaining three brackets.

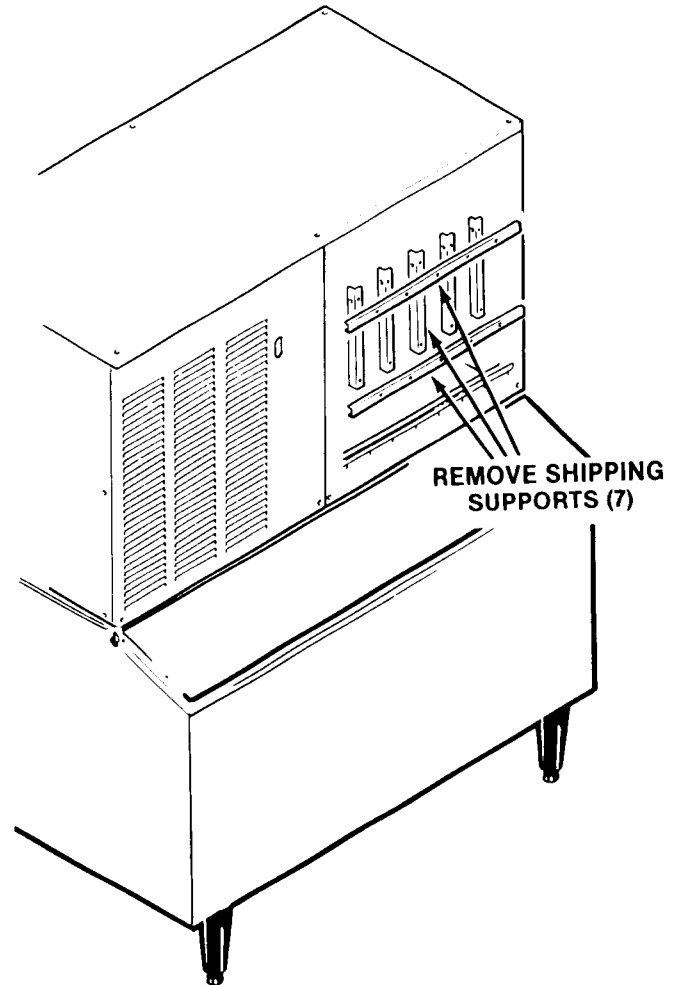
Route the plastic tube thru the hole in the base (do not install on SS tube).

Insert approximately 28 inches of bin thermostat cap tube thru the plastic tube and then thru the stainless steel tube. The cap tube should extend the entire length of the stainless steel tube.

Install the plastic tube approximately 1 inch onto the stainless tube.

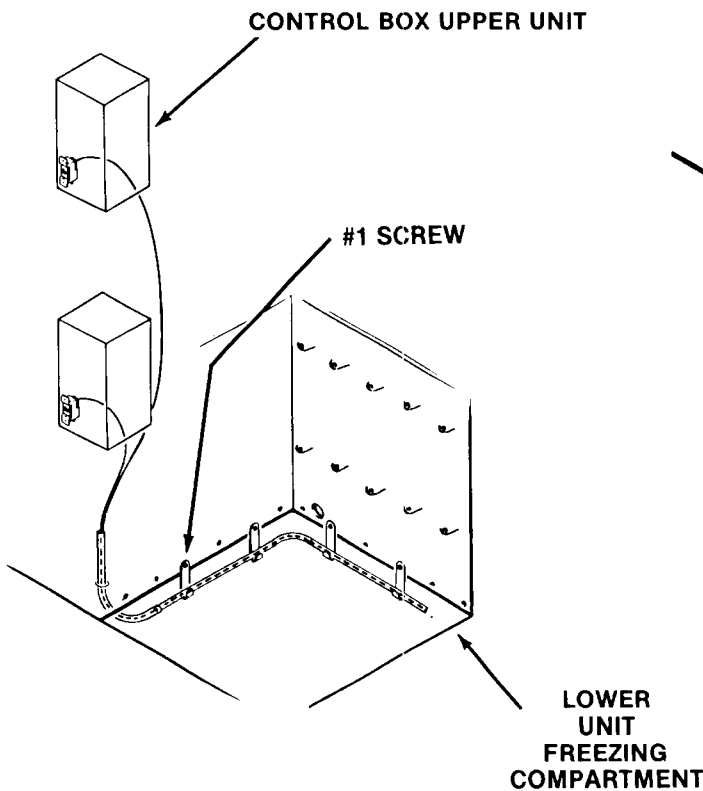
In stacking applications, run the cap tube through the top unit base and the lower unit control box as shown, using grommets provided. Then route both bin stat cap tubes through the same bracket.

7. Remove seven shipping supports from the evaporator supports.



REMOVE SHIPPING SUPPORTS (7)

*Remove Shipping Supports*



CONTROL BOX UPPER UNIT

#1 SCREW

LOWER UNIT FREEZING COMPARTMENT

*Install Bin Thermostat Bracket*



# CM1400R FOR THE INSTALLER

## REMOTE CONDENSER AND PRE-CHARGED LINES — INSTALLATION

### Location Considerations:

Remote Condenser - Must be above icemaker. Limited to a 40-foot length or a 25-foot length of pre-charged refrigerant line from the rear of the icemaker Chassis to the Remote Condenser.

Best available location, protected from the extremes of dirt, dust, and sun. The Condenser location is very important for optimum performance, as reflected roof heat, or stagnant air will adversely affect ice production.

Must meet local building code installation requirements.

### Remote Condenser - Roof Attachment:

1. Install and attach the remote condenser to the roof of the building using the methods and practices of building standards that conforms to and meets the local building code requirements in your area.
2. Refer to Electrical Installation Instructions to connect the remote condenser fan motor electrically to the CM1400R.

### Pre-Charged Refrigerant Lines:

1. Each set of pre-charged refrigerant lines in the 25-foot length or 40-foot length kits consists of a 3/8-inch diameter self-sealing LIQUID line and a 1/2-inch diameter self-sealing DISCHARGE line. One coupling on each line is fitted with a charging port which provides the service man with access for service gauges at the REMOTE CONDENSER location when necessary.

### NOTE

*The openings in the building ceiling or wall, listed in the next step, are minimum sizes recommended through which the pre-charged refrigerant lines may pass; and, are to be considered only if they conform to and meet the local building code requirements in your area.*

2. Minimum recommended sizes for openings required in a ceiling or wall, for the precharged refrigerant lines to pass, is 1-3/4 diameter.

3. Whenever possible, route the maximum length of the pre-charged refrigerant lines **INSIDE** the building with the minimum length on the roof to prevent vandalism and to minimize the condenser effect that exposed lines can produce in cold weather. **INSULATE** refrigerant lines exposed to outside temperatures that will be below freezing for extended periods of time. This is done because the liquid line will normally be at the outside ambient temperature, and in cold weather, this line would develop condensation on it.

### PRE-CHARGED TUBING KIT ROUTING:

//////////////////// **CAUTION** //////////////////////

**Do not connect pre-charged tubing until all routing and forming of tubing is complete. See Page 7 for connecting instructions.**

////////////////////////////////////

### Excess Length of Pre-Charged Refrigerant Lines:

At installations where the icemaker Chassis-to-Remote Condenser refrigerant line path is substantially **LESS** than the 25-foot length or 40-foot length of pre-charged refrigerant line kit to be installed, route and dress the excess refrigerant line as follows:

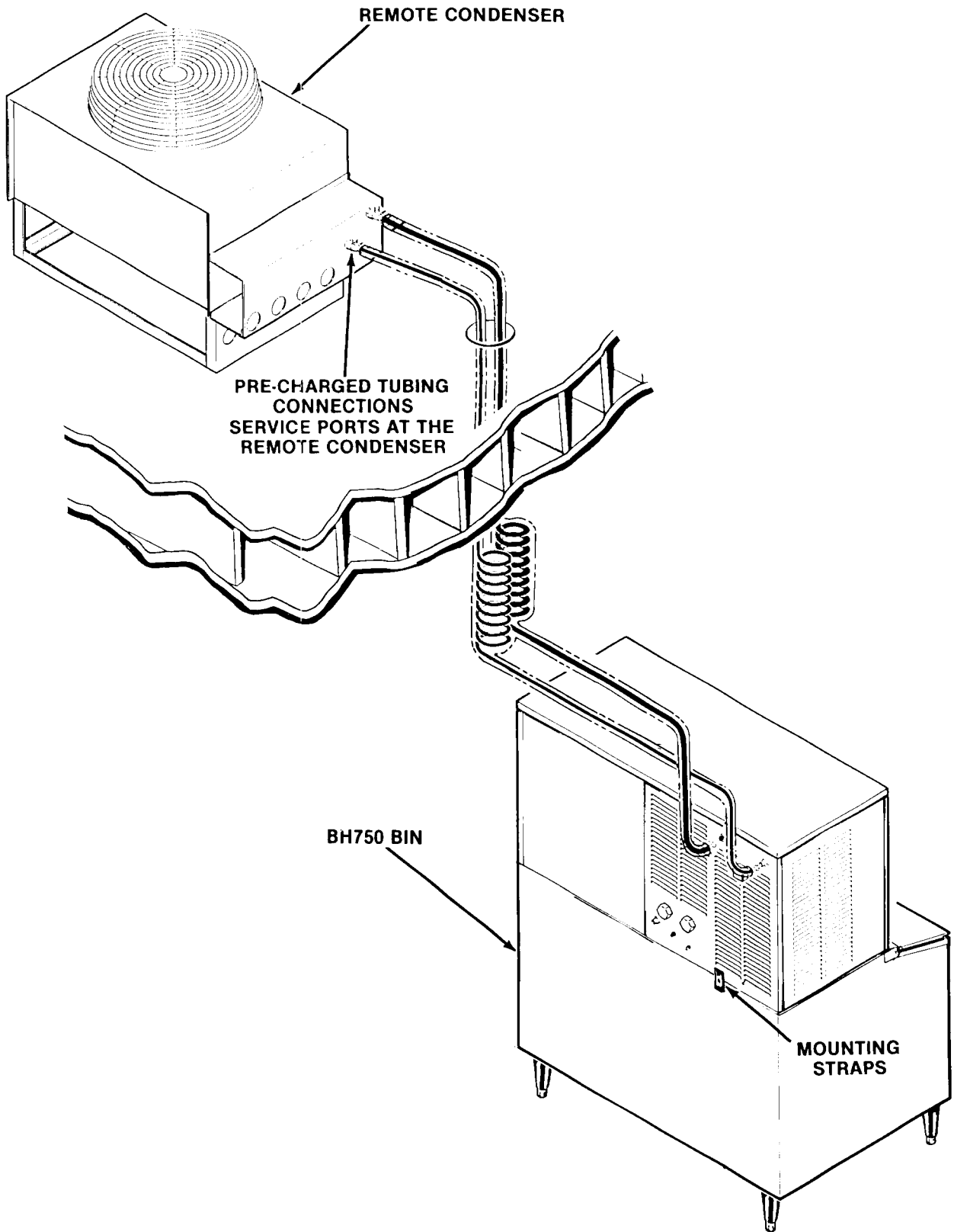
1. Follow straight line routing when possible.
2. Retain excess pre-charged refrigerant line **INSIDE** the building.
3. **SPIRAL** the excess footage of the pre-charged refrigerant line(s), in the best selected **INSIDE** location and in a manner that **PREVENTS** refrigerant **TRAPPING**. See *Pre-Charged Refrigerant Line Routing* illustration for recommended methods of spiralling the excess refrigerant lines.

### CAUTION

**DO NOT kink or crimp the refrigerant lines. DO NOT bend the excess refrigerant lines in a vertical LOOP(s) which allow trapping of refrigerant in LOW sections during OFF time. Bend and shape the excess refrigerant lines in VERTICAL spirals, not HORIZONTAL spirals. See Pre-Charged Refrigerant Line Hook-Up.**

4. Insulate the pre-charged tubing lines individually, if not insulated from the factory.

# CM1400R FOR THE INSTALLER



# CM1400R FOR THE INSTALLER

## COUPLING INSTRUCTIONS, PRE-CHARGED TUBING KIT

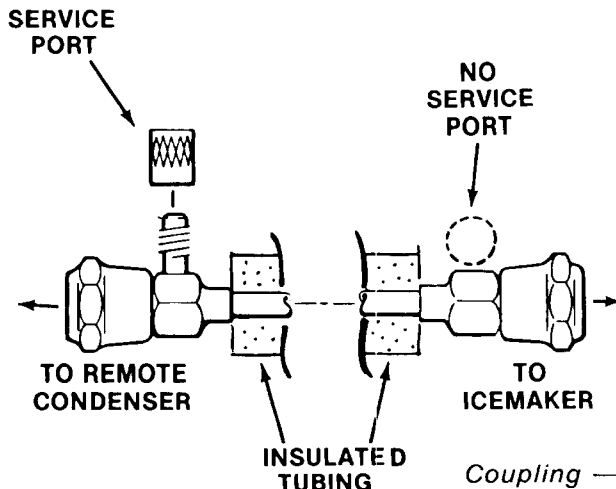
### CAUTION

The couplings on the sets of pre-charged refrigerant lines, the refrigerant fittings on the Remote Condenser, and the rear of the Icemaker Chassis are SELF-SEALING and should be connected as follows:

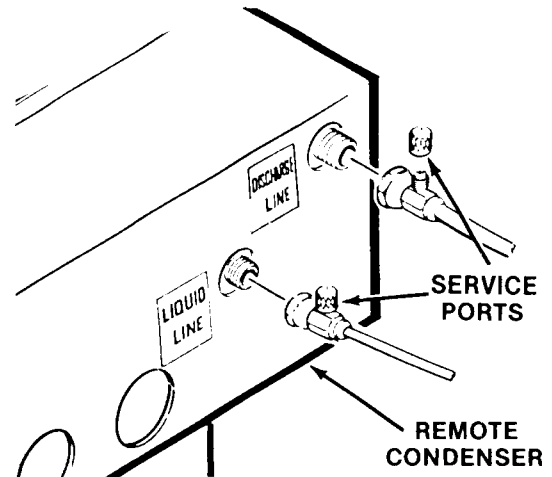
1. Remove protector caps and plugs and, if necessary, carefully wipe coupling seats and threaded surfaces with a clean cloth to prevent the inclusion of dirt or any foreign material in the system.
2. LUBRICATE male half diaphragm and synthetic rubber seal with refrigerant oil. Thread coupling halves together by hand to insure proper mating of threads. Use proper size wrenches (on coupling body hex and on union nut) and tighten until coupling bodies "bottom" or a definite resistance is felt.
3. Using a marker or ink pen, mark a line lengthwise from the coupling union nut to the bulkhead. Then tighten an additional 1/4 turn; the misalignment of the line will show the amount the coupling has been tightened. This final 1/4 turn is necessary to insure the formation of leakproof joint.

**ALWAYS USE TWO WRENCHES WHEN TIGHTENING THESE FITTINGS, ONE AS BACKUP WRENCH TO PREVENT TWISTING OF TUBING AND POSSIBLE KINKING OR LINE RUPTURE.**

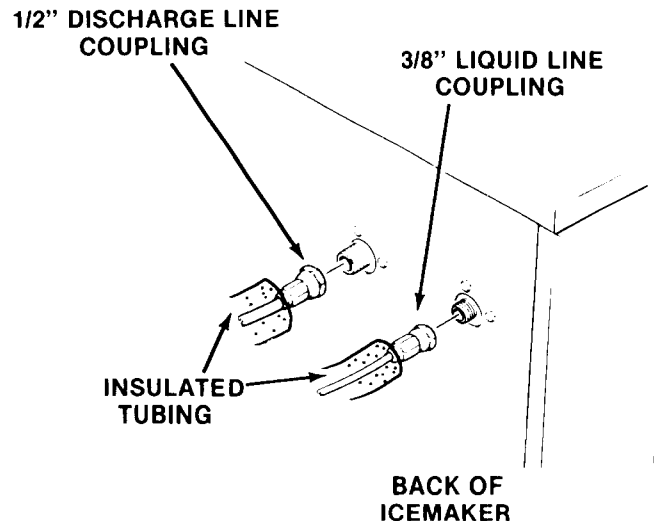
BE SURE to connect the ends of the precharged refrigerant lines that have the charging port fittings TO THE REMOTE CONDENSER FITTINGS. This gives the serviceman access for service gauges at the REMOTE CONDENSER location, when necessary.



4. Connect the 3/8-inch diameter refrigerant line coupling with the SERVICE PORT fitting to the remote condenser refrigerant fitting labeled: LIQUID LINE as detailed in Coupling Instructions.
5. Connect the 1/2-inch diameter refrigerant line coupling with the CHARGING PORT fitting to the Remote Condenser refrigerant fitting labeled: DISCHARGE LINE. Tighten as detailed in Coupling Instructions.



6. Connect the 3/8-inch diameter refrigerant line coupling to the refrigerant fitting on the upper right rear of the icemaker chassis labeled: LIQUID LINE. Tighten as detailed in Coupling Instructions.
7. Connect the 1/2-inch diameter refrigerant line coupling to the refrigerant fitting on the upper, right rear of the icemaker Chassis labeled: DISCHARGE LINE. Tighten as detailed in Coupling Instructions.



Coupling — Pre-Charged Tubing

JULY, 1985

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# CM1400R FOR THE ELECTRICIAN

## CONFORM TO ALL APPLICABLE CODES

### ELECTRICAL CONNECTIONS

SEE NAMEPLATE for current requirements to determine wire size to be used for electrical hookup. The cuber requires a solid chassis-to-earth ground wire. See Wiring Diagram.

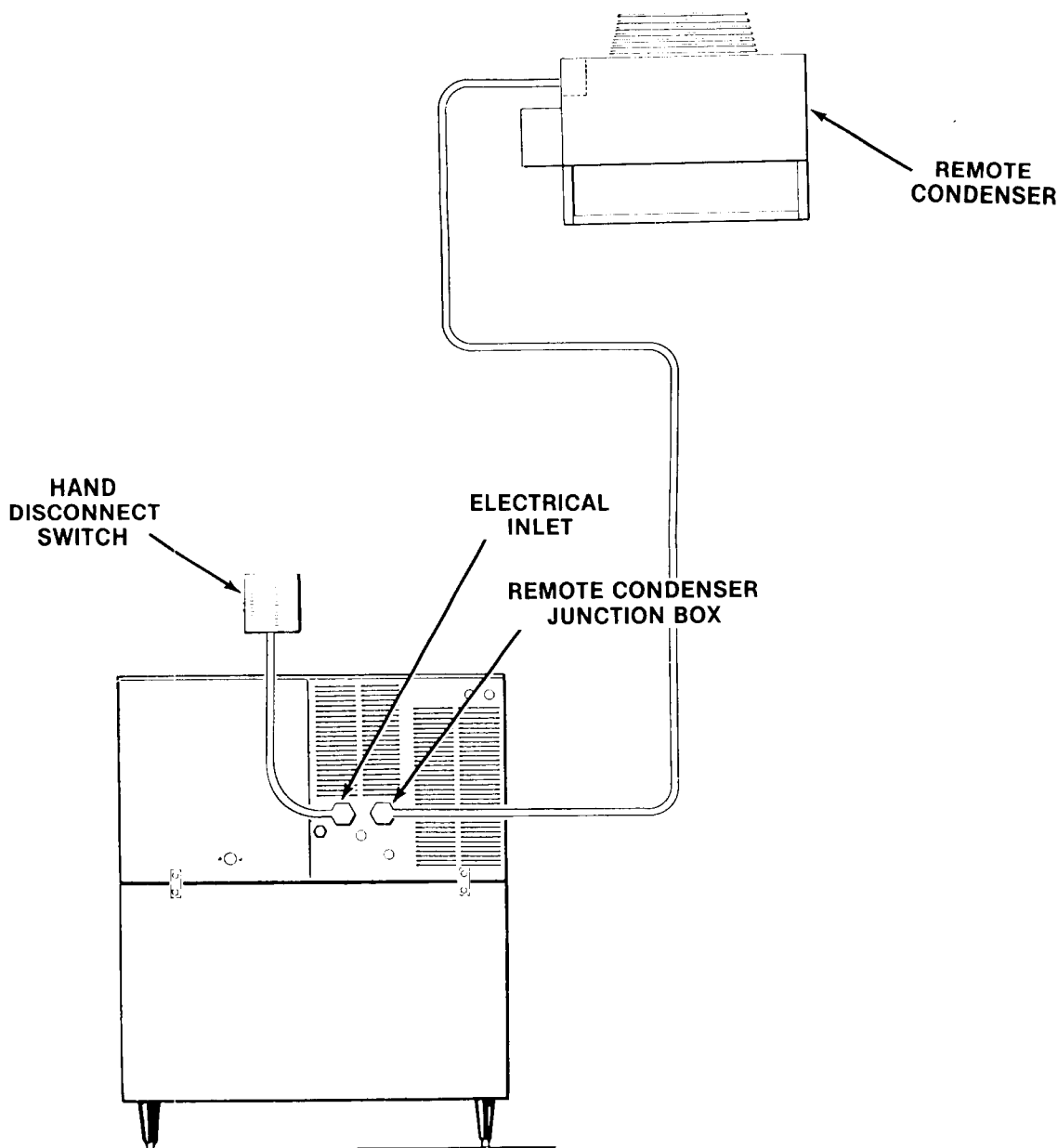
Be certain the cuber is connected to its own electrical circuit and individually fused. Voltage variation should not exceed  $\pm$  ten percent of the nameplate rating, even under starting conditions. Low voltages can cause erratic operation and may be responsible for serious damage to the icemaker.

Electrical connections are made at the rear of the CM1400R for both power supply and to electrically connect the icemaker to the condenser.

The remote condenser must be wired to the CM1400R icemaker in accordance with local and national electrical codes with a minimum of 18 Awg wire with a ground bonding wire connected to the ground screws provided in both the condenser and machine field wiring boxes. All outdoor wiring must be in rainproof conduit.

**All external wiring should conform to the national, state and local electrical code requirements. Usually an electrical permit and services of a licensed electrician will be required.**

Electrically, the remote condenser fan motor is connected to the CM1400R at the contactor terminals for the compressor and the fan motor operates whenever the compressor operates.



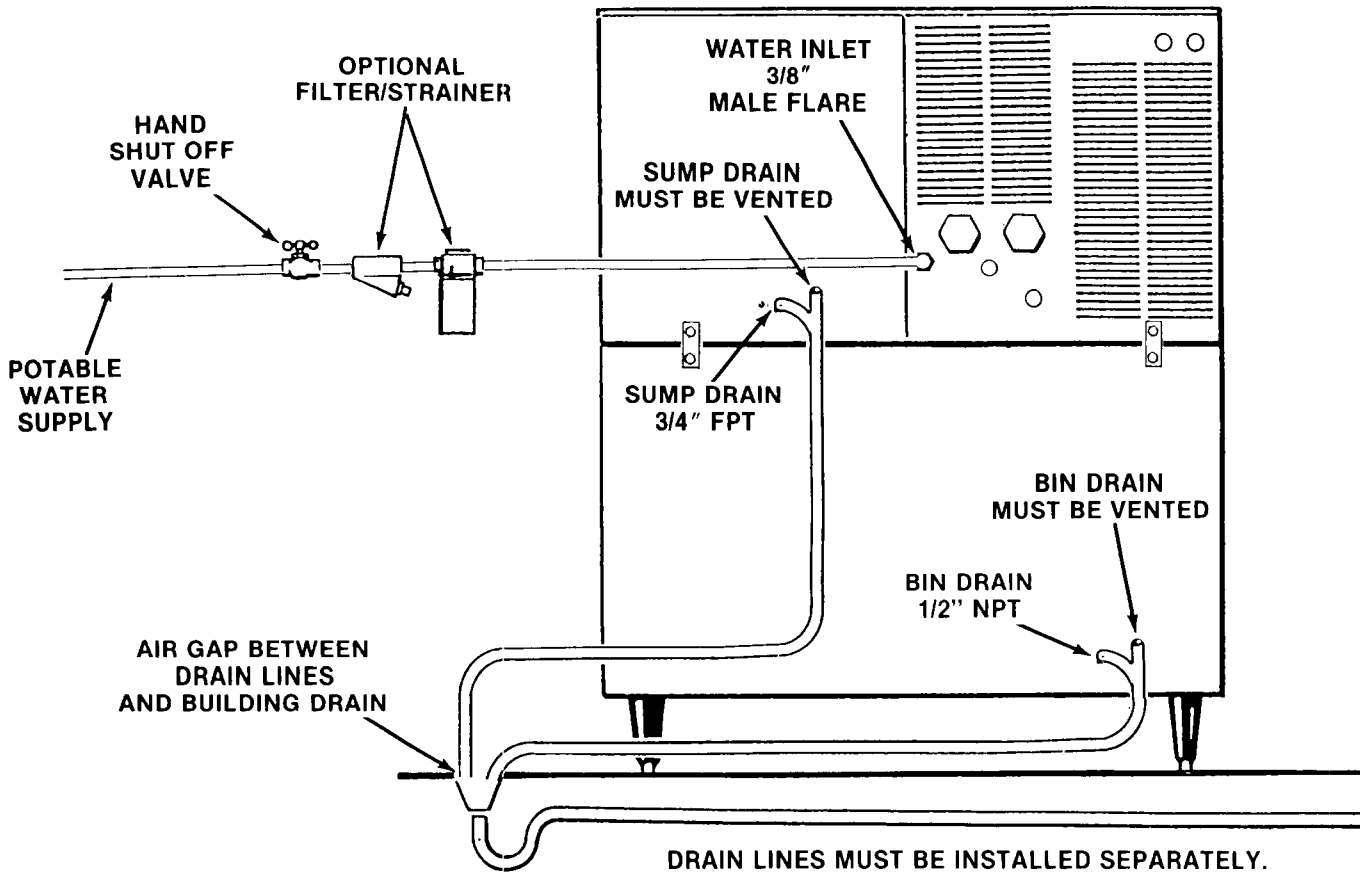
# CM1400R FOR THE PLUMBER

## WATER SUPPLY AND DRAIN CONNECTIONS

The recommended water supply line is a 3/8-inch O.D. copper tubing with a minimum operating pressure of 20 PSIG and a maximum of 120 PSIG. Connect to cold water supply line with standard plumbing fittings, with a shutoff valve installed in an accessible place between the water supply and the cuber. In some cases a plumbing permit and services of a licensed plumber will be required.

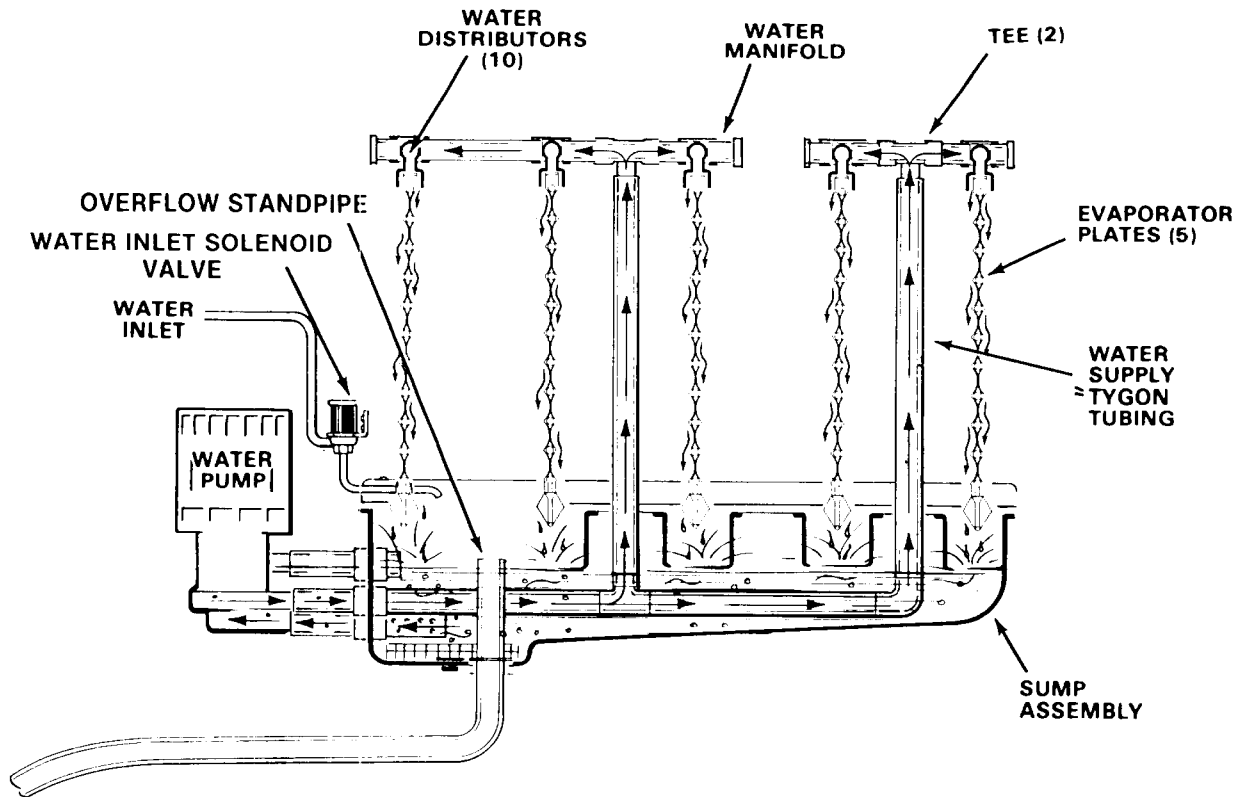
**DRAIN CONNECTIONS:** All drains are gravity type and must have a minimum of 1/4-inch fall per foot on horizontal runs. The drains are to be installed to conform with the local plumbing code. Install a vertical open vent on drain line to insure good venting. The drain receptacle must be either trapped or vented.

Recommended bin drain is 5/8-inch O.D. copper tubing and should be vented and run separately.

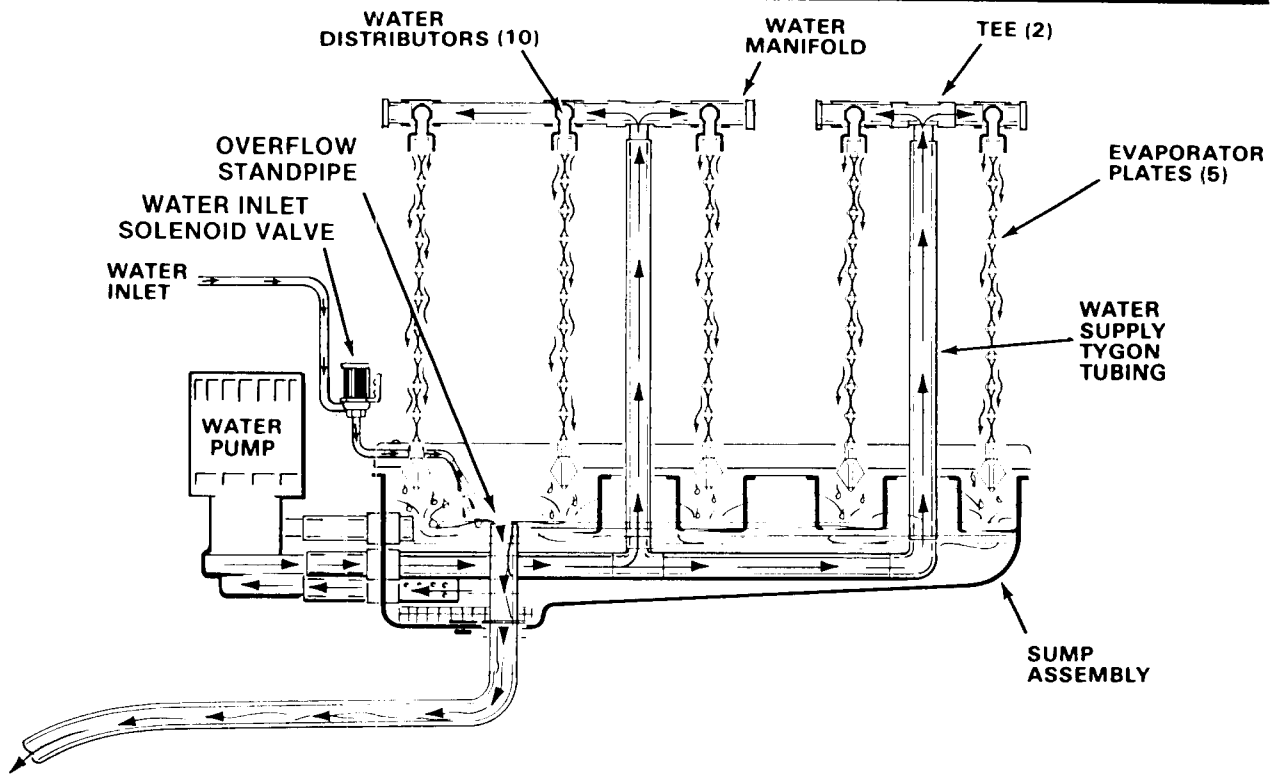


*Water Supply and Drain Connection*

# CM1400R FOR THE PLUMBER



**FREEZING CYCLE**



**HARVEST CYCLE**

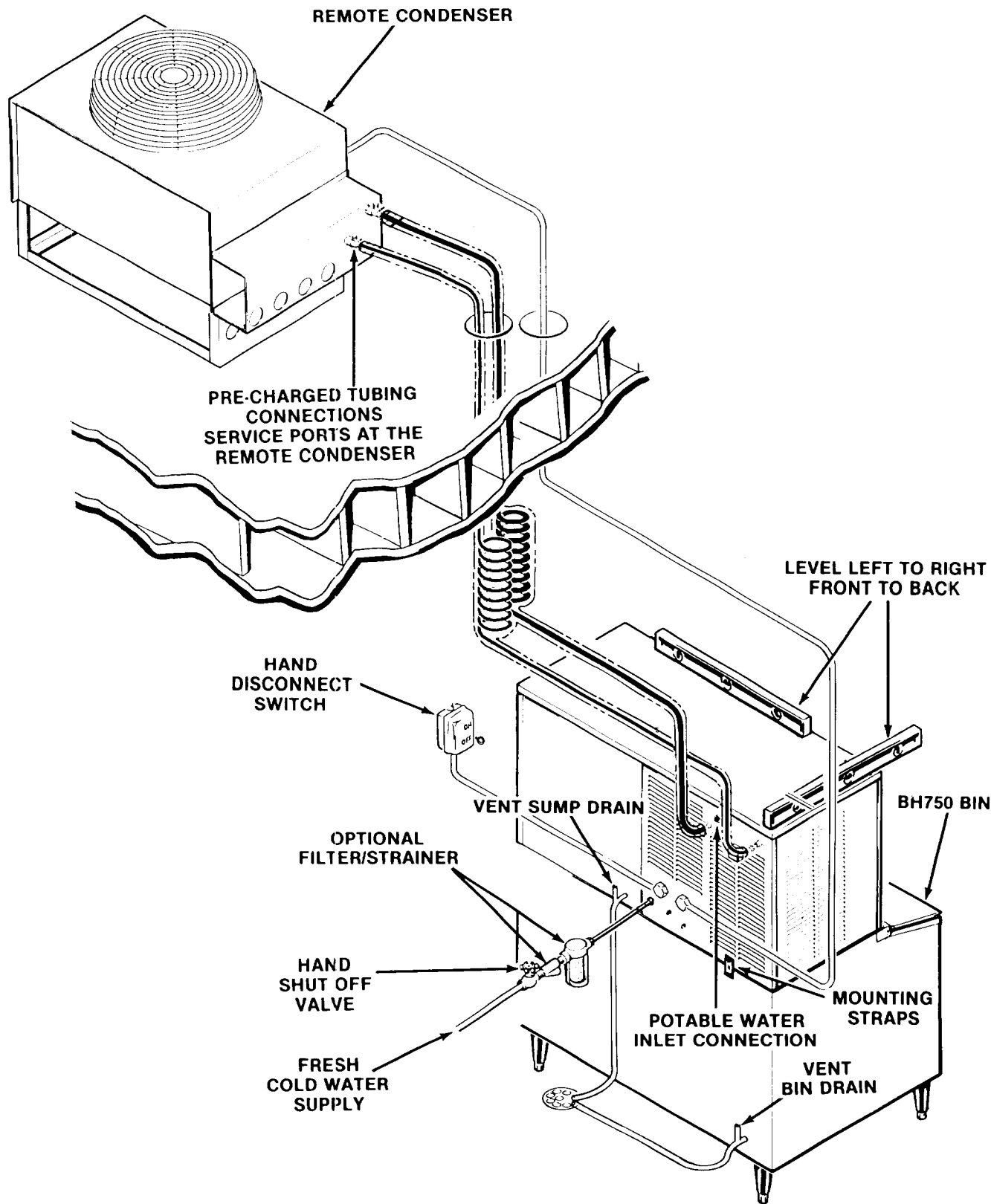
*Freezing Compartment — Water Schematic*

# CM1400R FOR THE INSTALLER

## FINAL CHECK LIST

1. Is the cabinet/bin level?
2. Is the cuber in a location where ambient temperatures are a minimum of 50-degrees F. all year around and do not exceed a maximum of 100° F?
3. Is there at least a six-inch clearance behind and around the cabinet for all connections and for proper air circulation?
4. Have all plumbing connections been made and checked for leaks?
5. Has the electrical power supply wiring been properly connected and the voltage tested and checked against the nameplate rating? Has proper chassis-to-earth ground been installed?
6. Is the water supply line shutoff valve installed and opened and has the inlet water supply pressure been checked to insure a minimum of 20 PSIG and a maximum of 120 PSIG?
7. Check that the wood blocks, foam backing and front brace supports have been removed from the evaporator plates.
8. Check that the reservoir is properly secured to the bottom of the evaporator plates.
9. Check that the sump covers are properly secured to the bottom of the evaporator plates.
10. Have the compressor holddown bolts been checked to be sure the compressor is snug on the mounting pads?
11. Check all refrigerant lines and conduit lines to guard against vibration and possible failure.
12. Has the bin thermostat bracket been properly installed?
13. Have the cuber and the bin been wiped clean with clean damp cloths?
14. Have the remote condenser and pre-charged refrigerant lines been properly installed per instruction on page 6 and connections checked for leaks?
15. Has the remote condenser fan motor been connected electrically to the CM1400R at the junction box of the remote condenser and the junction box of the CM1400R?
16. Verify that the Master Switch and Compressor Switch are in the "OFF" position.
17. Has the owner/user been given the User Manual and instructed on how to operate the icemaker and the importance of periodic maintenance?
18. Has the owner/user been given the name and telephone number of the Authorized Scotsman Distributor or Service Agency serving him?
19. Has the Manufacturer's Registration Card been properly filled out? Check for correct Model and Serial Numbers from nameplate, then mail the completed card to the SCOTSMAN factory.
20. **Refer to Pre-Start Instructions on page 16.**

# CM1400R FOR THE INSTALLER





# CM1400R START-UP CHECK LIST

## ////////// WARNING //////////

**BE SURE** the icemaker is properly grounded and connected to the proper voltage at the location power source to begin the 12-hour PRE-START heating of the Compressor Crankcase.

### PRE-START

1. Verify that the MASTER SWITCH and the COMPRESSOR SWITCH are both in the OFF position.
2. Operate the switch at the building source to supply electrical power to the icemaker a minimum of 12 hours BEFORE start up.

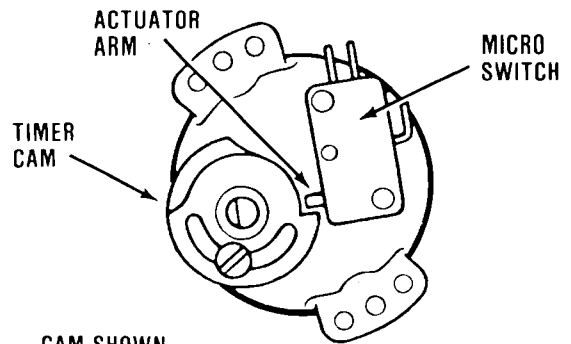
### START-UP

## ////////// WARNING //////////

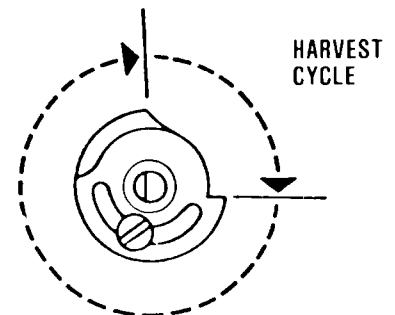
**DO NOT** start Icemaker until the 12-hour pre-start Heating of the compressor has been completed. The dome of the compressor must be warm before start up.

1. Remove screws and remove both front panels.
2. Check that the MASTER ON-OFF toggle switch and the COMPRESSOR ON-OFF toggle switch are in the OFF position on the control box.
3. Remove four screws on the control box and remove the cover.
4. OPEN the water supply line shutoff valve.
5. Inside the control box is the shaft of the timer and the switch assembly. Rotate the shaft of the timer and switch assembly clockwise until the actuator arm on the microswitch drops off the outer cam into cam slot. See Timer Cam Position. An audible click can be heard, but in a noisy area, look at the cam and switch to observe the event.
6. Move the MASTER ON-OFF toggle switch to the ON position.
7. Observe water fill cycle: Water inlet solenoid valve OPENS, incoming water flows from the valve through the tubing, the reservoir fills and excess water is overflowed through the stand pipe. This cycle will take approximately three and one-half minutes. Timer will close the water inlet solenoid valve and the water fill cycle is complete.

**NOTE:** When the sump is full, some water will be seen seeping through the sump mounting holes where the sump is hanging from the evaporators. This is normal.



CAM SHOWN AT BEGINNING OF HARVEST CYCLE



CAM SHOWN DIVIDED INTO TYPICAL FREEZING & HARVEST CYCLES

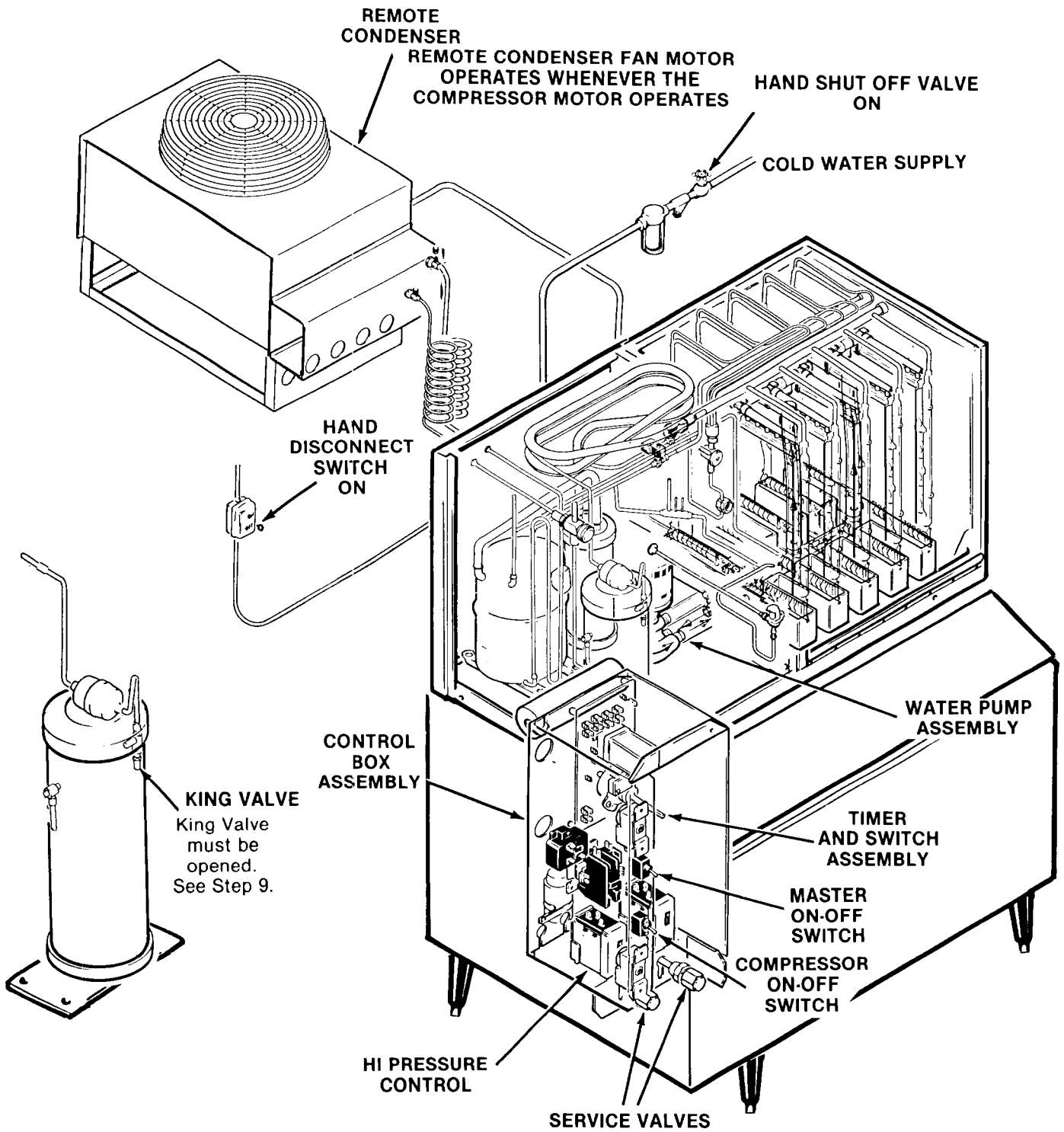
Advance the shaft of the timer and switch assembly through the remaining cycle into a new harvest cycle to restart the timer and check that: Water inlet solenoid valve OPENS and the reservoir overflows through the stand pipe.

8. Check that the water cascades down over each cube mold into the sump and does not drip into the bin.
9. When the second harvest cycle is completed, **remove the stem cap from the receiver outlet (King) valve and fully open the valve. Replace the cap. Check for leaks at the Stem Cap.** Move the COMPRESSOR ON-OFF toggle switch to the ON position. The compressor operates and the remote condenser fan operates.
10. Check operation of the freezing cycle.

The water pump is operating, as seen by water moving through the two tygon tubes between evaporator plates, up to the water manifold at the top of the evaporator plates where water is uniformly dispensed and cascades down both sides of each evaporator plate and drains back into the sump assembly for recirculation.

The icemaking process begins. The evaporator plates become cold and ice begins to form.

# CM1400R START-UP



# CM1400R START-UP

Freezing time will range between 12 and 20 minutes in a 70-degree F. ambient temperature. Longer time for temperatures above 70-degrees F., and shorter time required when temperatures are below 70-degrees F. Average complete cycle range is about 15 to 25 minutes. There is just enough water in the sump to complete one batch of ice. It is not unusual for the pump to pump some air at the end of the freeze cycle.

11. Check the dome of the compressor, there must not be any frost on the compressor at any time. If frost does form, do not adjust refrigerant charge. The thermostatic expansion valve superheat must be increased. If the TXV is adjustable, increase the superheat. Too much superheat will starve one or more evaporators during freeze, and the starved evaporator will produce much smaller cubes than normal.

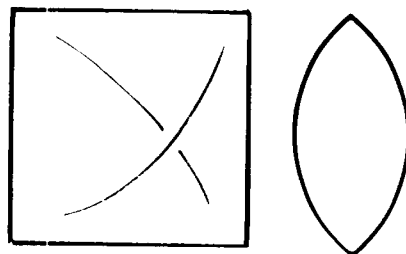
12. Observe ice cube harvest:

## Check size of SCOTSMAN CONTOUR CUBE

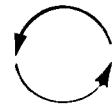
Unlike other SCOTSMAN cubes which are made in a definite molded shape, contour cubes are produced in indentations and many shapes and sizes of contour cubes may be produced — only ONE size and shape combination is correct.

An under-charged refrigeration system produces smaller cubes at the bottom of the evaporator plate and large cubes at the top. Charge system per NAMEPLATE specifications.

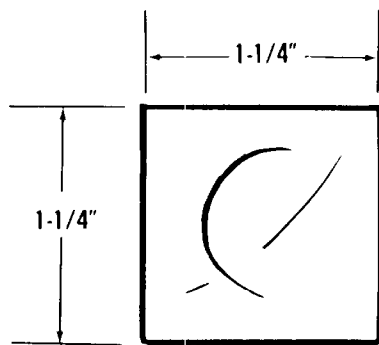
### TOO LARGE



Too LARGE requires longer freezing cycle — may cause evaporator freeze ups. Adjust cube size control to obtain smaller cube.

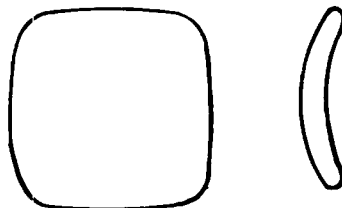


### PROPER SIZE AND SHAPE



PROPER SIZE AND SHAPE of the contour cube. Icemaker operates at peak efficiency when a cube this size and shape is produced. A finely tuned system produces vertical strips of ice which easily break when they fall.

### TOO SMALL



TOO SMALL. Adjust cube size control. Any cubes this size or shape are too small and cause excessive cycling to produce a equal quality of production. Can also lead to freeze up problems due to poor harvest.



# CM1400R START-UP

## ADJUSTMENT OF CUBE SIZE

To produce SMALLER sized ice cubes:

Locate cube size control knob in the front of the control box.

Rotate the adjusting screw one-eighth of a turn COUNTERCLOCKWISE to WARMER.

Observe size of the ice cubes in the next two ice cube harvests and adjust in one-eighth turn or less increments until desired ice cube is achieved.

To produce LARGER sized ice cubes:

Locate cube size control on the front of the control box.

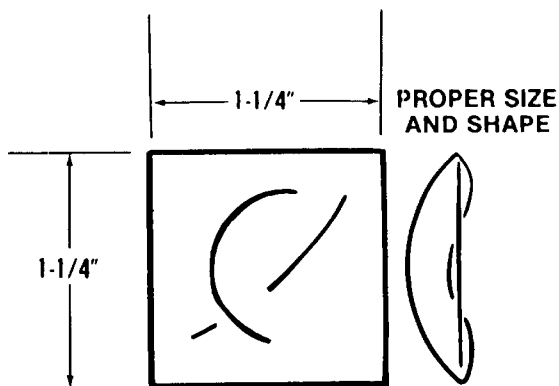
Rotate the adjusting screw one-eighth of a turn CLOCKWISE to COLDER.

Observe size of ice cubes in the next two cube harvests and adjust in one-eighth turn or less increments until desired ice cube size is achieved.

Check texture of ice cubes; when partially cloudy throughout, suggests icemaker is operating short of water; or, possibly an extreme problem water condition exists where filtering or purifying equipment is recommended. Contact SCOTSMAN ICE SYSTEMS, Service Department, Albert Lea, Minnesota 56007 for further details. See SERVICE DIAGNOSIS chart for shortage of water symptoms and corrections.

**ROTATE ADJUSTMENT KNOB COUNTER-CLOCKWISE TO PRODUCE SMALLER CUBES**

**ROTATE ADJUSTMENT KNOB CLOCKWISE TO PRODUCE LARGER CUBES**

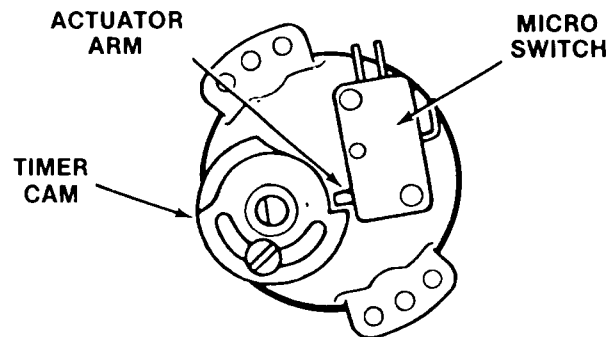


## ADJUSTMENT OF HARVEST TIME

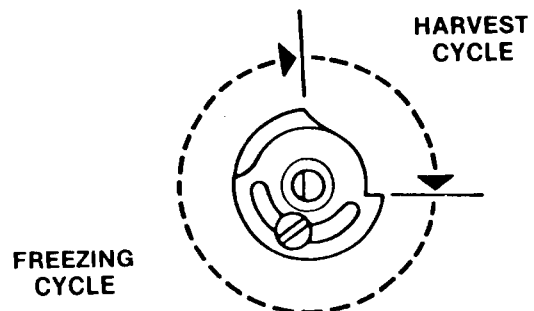
Check the Harvest time. The correct setting is one that allows enough time for all of the ice to fall from the evaporators and to fill the sump with water to the overflow point, plus 15-30 seconds extra time.

To adjust the timer:

- Disconnect electrical power supply to the icemaker.
- Loosen the screw on the timer that locks the two cams together.
- To decrease Harvest time, rotate the shaft of the timer counter-clockwise. To increase, turn the shaft clockwise.
- Retighten the screw to lock the two cams together again.
- Return power to icemaker. Check cube size and Harvest time.



CAM SHOWN AT BEGINNING OF HARVEST CYCLE



CAM SHOWN DIVIDED INTO TYPICAL FREEZING & HARVEST CYCLES

*Cube Size Control Adjustment*

# CM1400R START-UP

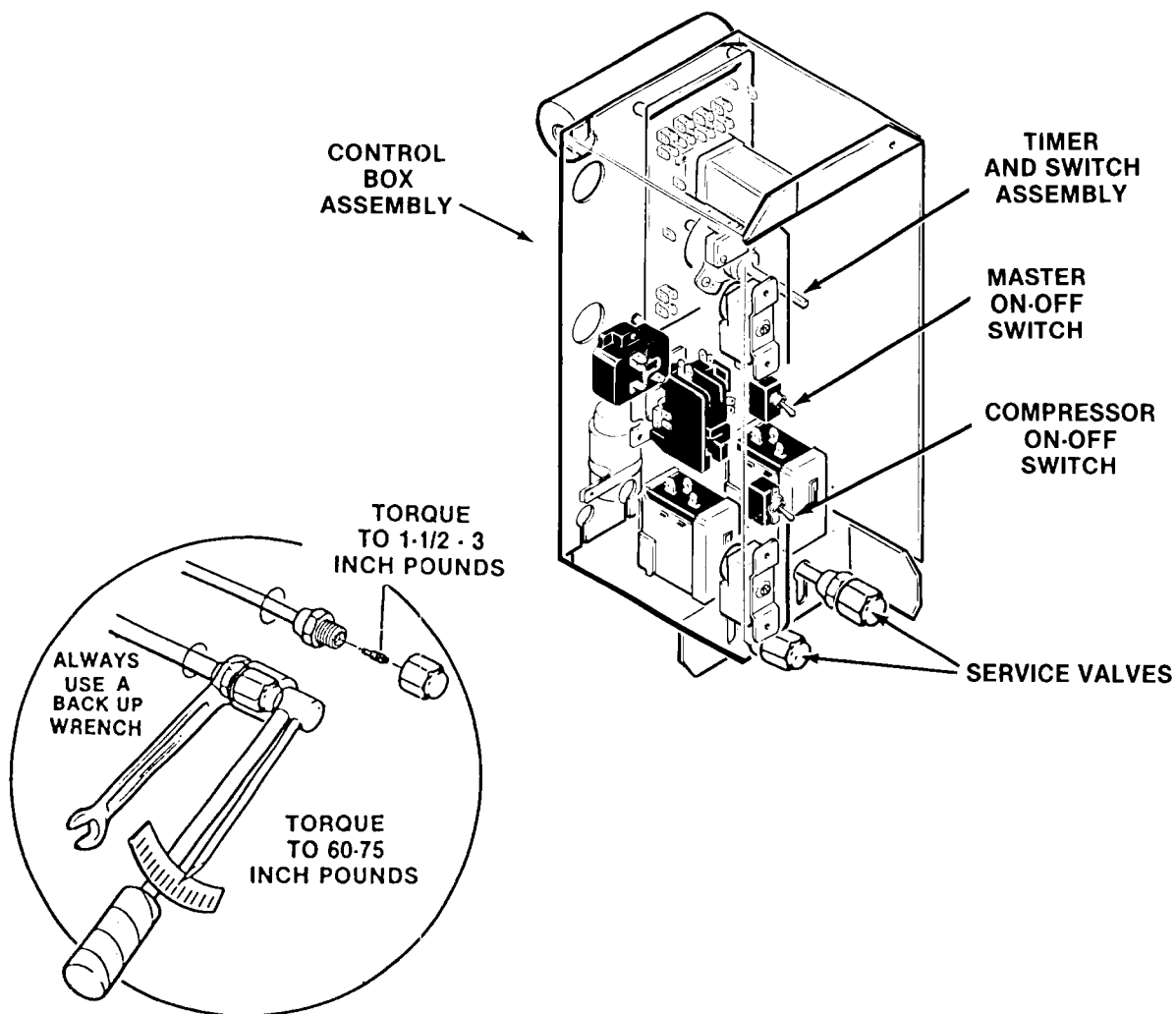
## BIN THERMOSTAT OPERATION

13. With the icemaker in the harvest cycle, hold ice against the bin thermostat control bulb to test shutoff which should cause the icemaker to shut OFF at the END OF THE HARVEST CYCLE.

Within minutes after the ice is removed from the sensing bulb, the bulb will warm up and cause the icemaker to restart. This control is factory set and should not be reset until testing is performed.

14. Replace control box cover and all cabinet panels and screws.

15. Thoroughly explain to the owner/user the significant specifications of the icemaker, start up and operation and go through the procedures in the operating instructions. Answer all questions about the icemaker by the owner and inform the owner of the name and telephone number of the authorized SCOTSMAN Distributor or service agency serving him.



# CM1400R MAINTENANCE & CLEANING INSTRUCTIONS

The periods and procedures for maintenance and cleaning are given as guides and are not to be construed as absolute or invariable. Cleaning especially will vary depending upon local water conditions and the ice volume produced and each icemaker must be maintained individually in accordance with its own particular location requirements.

## ICEMAKER

THE FOLLOWING MAINTENANCE SHOULD BE SCHEDULED AT LEAST TWO TIMES PER YEAR ON THIS ICEMAKER. CALL YOUR AUTHORIZED SCOTSMAN SERVICE AGENCY.

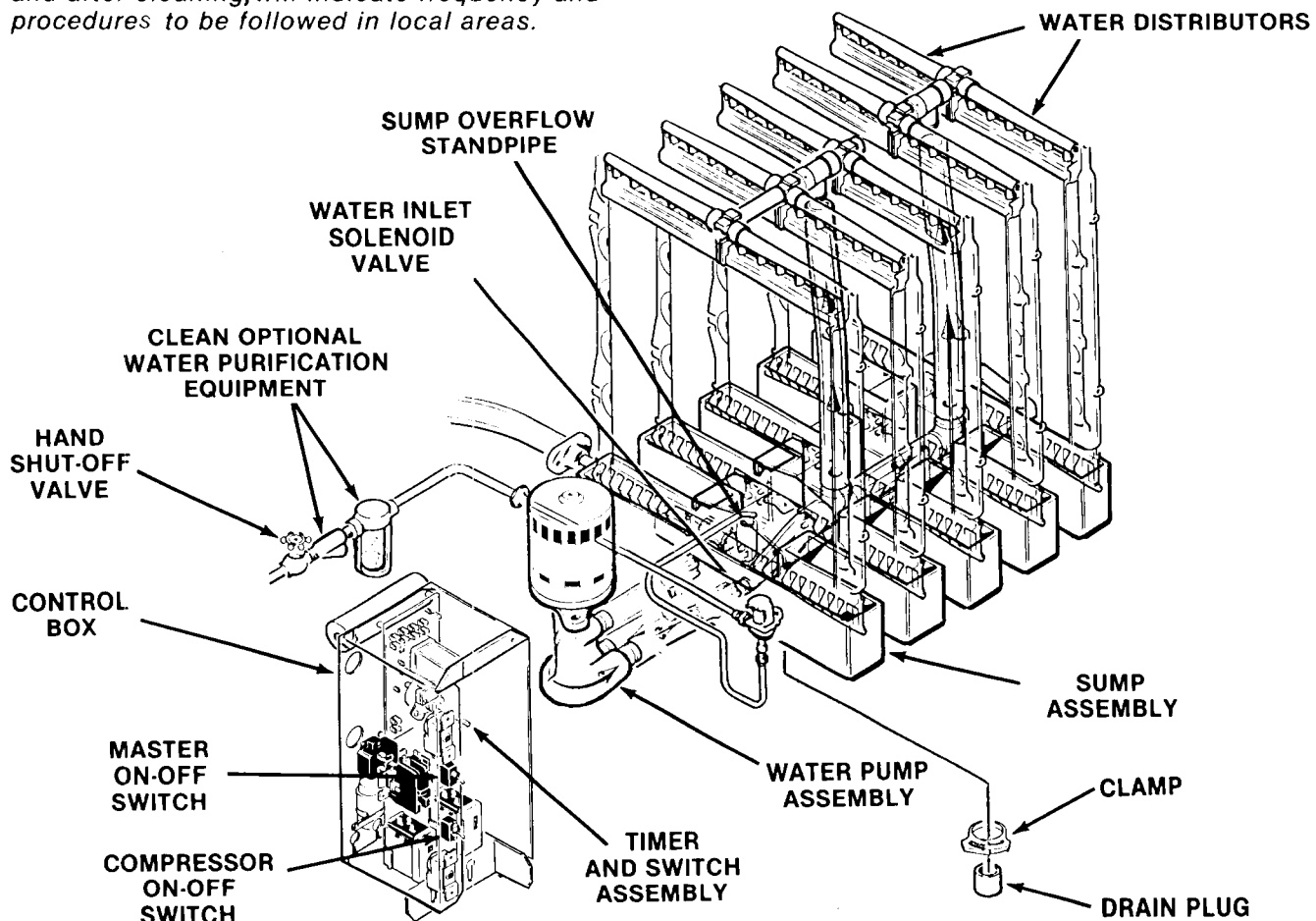
1. Check and clean or service any optional water treatment devices if any installed.
2. Check the CM1400 cabinet is level in the side-to-side and front-to-back directions.
3. Clean the water system, evaporator plates and sump assembly, using a solution of SCOTSMAN Ice Machine Cleaner. Refer to CLEANING - Icemaker.

*Cleaning requirements vary according to local water conditions and individual user operation. Continuous check of the clarity of ice cubes and visual inspection of the water system parts, evaporator plates and the sump assembly, before and after cleaning, will indicate frequency and procedures to be followed in local areas.*

4. Check that each evaporator plate assembly is snug and secure on each wall support on the bin rear wall, in the holes of the front brace, and in each indent recessed in each arm of the sump assembly below the bottom corners of the evaporator plates.
5. Check and tighten all bolts and screws.
6. Check and tighten all electrical connections.
7. Check cube size.
8. Check defrost cycle for preset time. Adjust as required.
9. Check for water leaks and make corrections.
10. Check the bin thermostat control bulb to test shut off. Holding ice against bin thermostat control bulb should cause the icemaker and the remote condenser fan motor to shut off at the end of the harvest cycle.

Within minutes after ice is removed from the bin thermostat control bulb, the icemaker will restart.

11. Check reservoir water level at the beginning of the freeze cycle.
12. Check drain system.
13. Check sight glass for refrigerant charge and moisture.

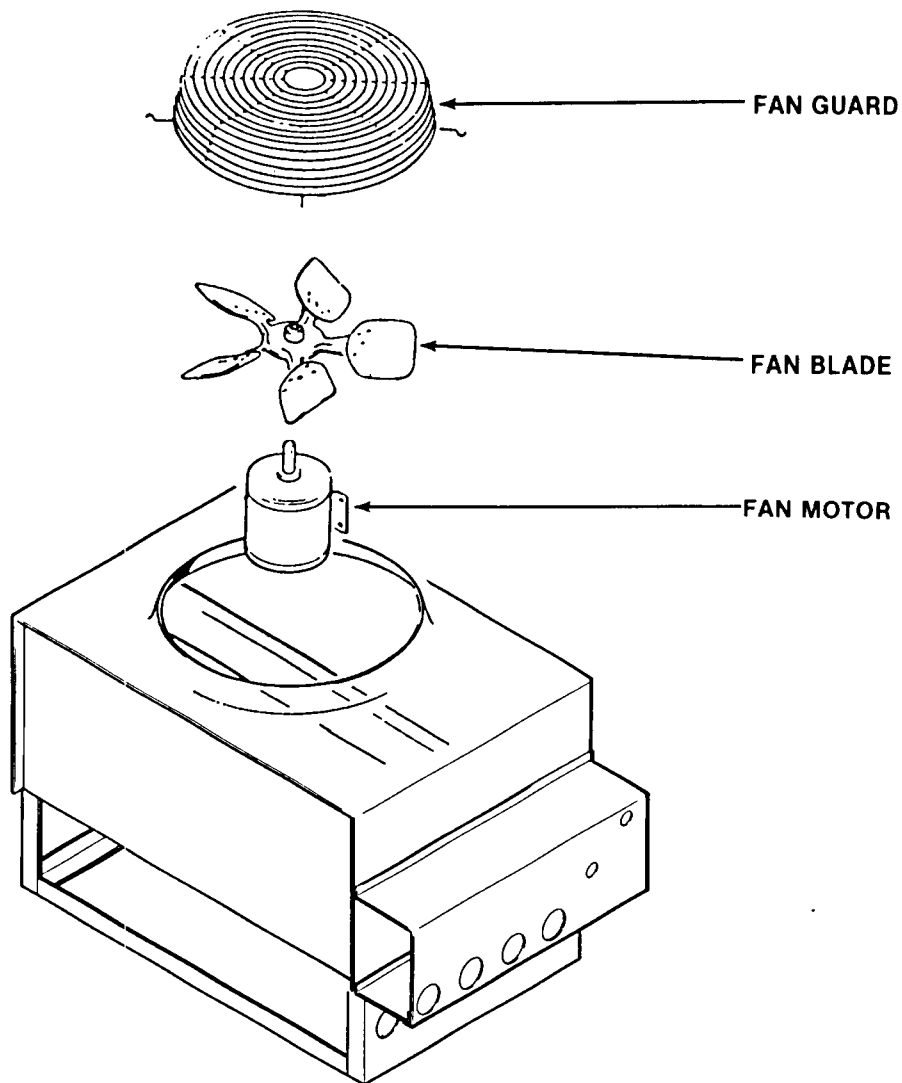


# CM1400R MAINTENANCE & CLEANING INSTRUCTIONS

## REMOTE CONDENSER

Frequent cleaning and inspection of the Condenser should be performed to maintain maximum efficiency of Icemaker. A dirty Condenser or blocked air flow will greatly decrease icemaking efficiency.

1. With building source electrical power OFF to the icemaker, clean the Remote Condenser fins using a vacuum cleaner, whisk broom or brush. DO NOT USE A WIRE BRUSH. Instruct customer to clean frequently.
2. Check that Fan Blade moves freely, is not touching any surfaces, is not bent or out of balance and the wire guard is properly installed and securely attached.
3. Check that the roof area immediately surrounding the Remote Condenser is free and clear of any debris that may collect such as leaves, paper, trash, etc.



*Cleaning Remote Condenser*

# CM1400R MAINTENANCE & CLEANING INSTRUCTIONS

## CLEANING - Icemaker

1. Remove screws and the front panels.
2. Move the master switch to the CENTER position, leave the compressor switch in the ON position.
3. Rotate the shaft of the timer and switch assembly located in the control box CLOCKWISE, until the actuator arm on the microswitch rides up out of the cam slot to the outer surface of the cam, then stop. This is the start position for the freezing cycle. See START Positions for the Freeze/Harvest Cycles.
4. Position a container for catching drain water under the rubber plug at the bottom of the sump assembly.
5. Remove hose clamp, the rubber plug, and drain all water from the sump assembly into the container. Replace rubber plug and hose clamp.
6. Prepare cleaning solution: Mix twenty-four ounces of SCOTSMAN Ice Machine Cleaner with two gallons of fresh, potable warm water.

### ////////////////////// WARNING ////////////////////////

**SCOTSMAN Ice Machine Cleaner contains Phosphoric and Hydroxyacetic acids. These compounds are corrosive and may cause burns. If swallowed, DO NOT induce vomiting. Give large amounts of water or milk. Call physician immediately. In case of external contact, flush with water. KEEP OUT OF THE REACH OF CHILDREN.**

### //////////////////////

7. Carefully pour the cleaning solution into the sump assembly.
8. Immediately move the MASTER ON-OFF toggle switch on the control box to the CLEAN position.
9. Allow the system to operate for about thirty minutes.
10. At the end of thirty minutes, move the master switch to the CENTER position. Remove the plug and drain the cleaning solution from the sump and rinse. Replace the drain plug.

11. Add two gallons of fresh water to the sump. Move the master switch to the clean position. Operate for 5 minutes and drain. Repeat this procedure two more times.
12. Rotate the shaft of the timer and switch assembly, located in the control box, CLOCKWISE until the actuator arm on the microswitch drops off the outer cam into the cam slot, then stop. This is the start position for the harvest cycle. See START positions for the Freeze/Harvest Cycles. The water inlet solenoid valve opens and a supply of water enters the sump.

If, after completing the cleaning and flushing procedure, inspection of the water flow reveals that one or more evaporator plates does not have a full flow of water for each vertical row of cubes, shut down the operation and remove and clean all water distributor tubes. Then reinstall the water distribution system.

13. Move the master switch to the ON position to start the icemaking process. Check each ice cube harvest until the ice cubes are clear and the acid taste is eliminated.

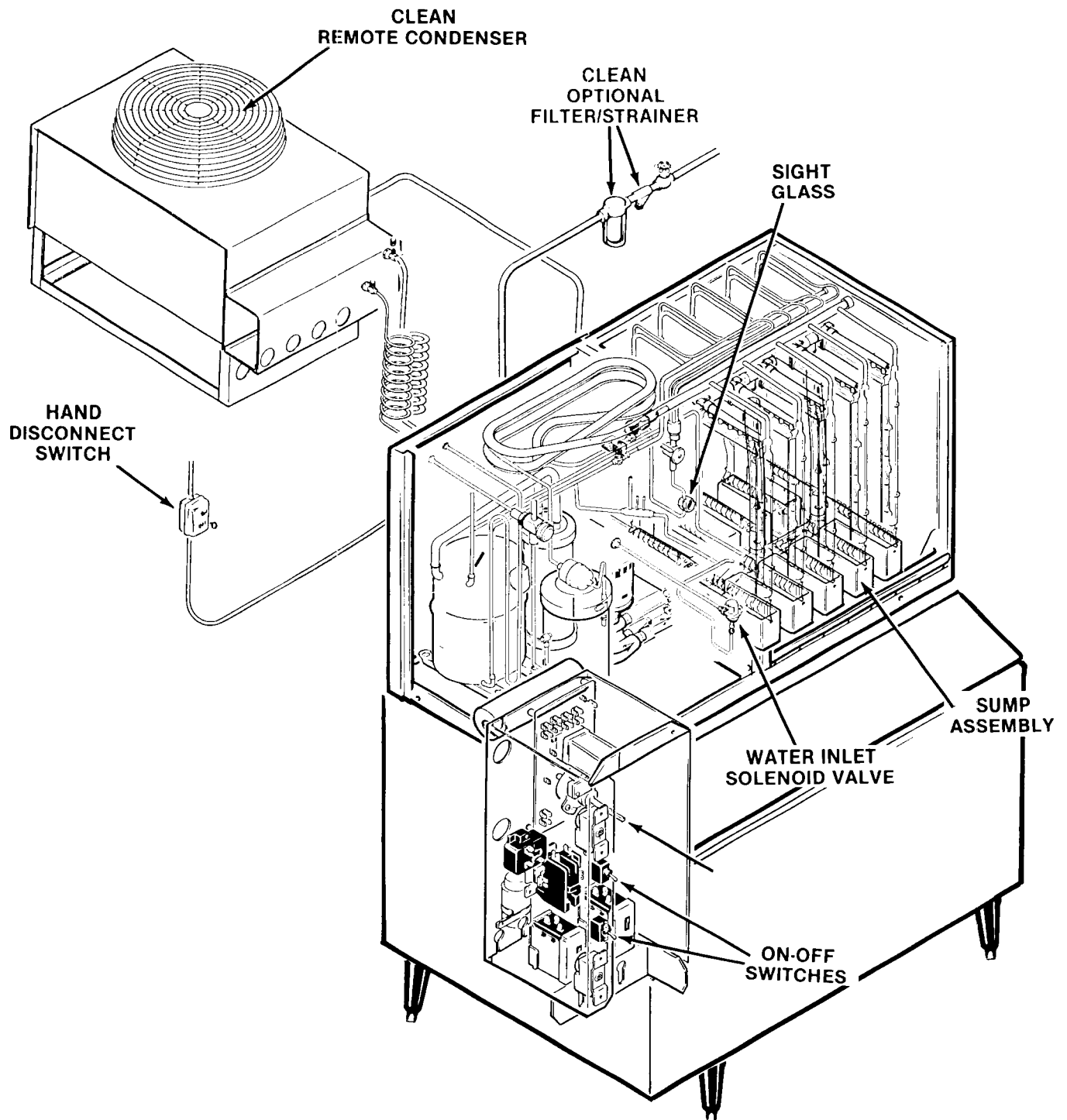
### CAUTION

**DO NOT use ice cubes produced from the cleaning solution. Be sure none remains in the bin.**

14. Add hot water to the bin to melt the ice cubes and thoroughly wash and rinse inner surfaces of the bin.
15. Check each ice cube harvest until the ice cubes are clear and the acid taste is eliminated.
16. Wash and wipe down all interior surfaces of the evaporator section of the cabinet with a clean cloth or disposable paper wipers soaked in the cleaning solution.
17. Replace all panels.
18. Clean and sanitize the interior bin surfaces each week.



# CM1400R MAINTENANCE & CLEANING INSTRUCTIONS



*Maintenance & Cleaning*

# CM1400R OPERATION

## FREEZING CYCLE

Water from the sump assembly is pumped to the water distributor system at the top of the evaporator plates. From the water distributors at the top of each evaporator plate, the water cascades as gravity over all cells of the plates and to the sump assembly below for recirculation. At the beginning of the freezing cycle, the electrical circuit is completed to the compressor and the water pump. The water pump and the remote fan motor operate continuously through both the freezing cycle and the harvest cycle.

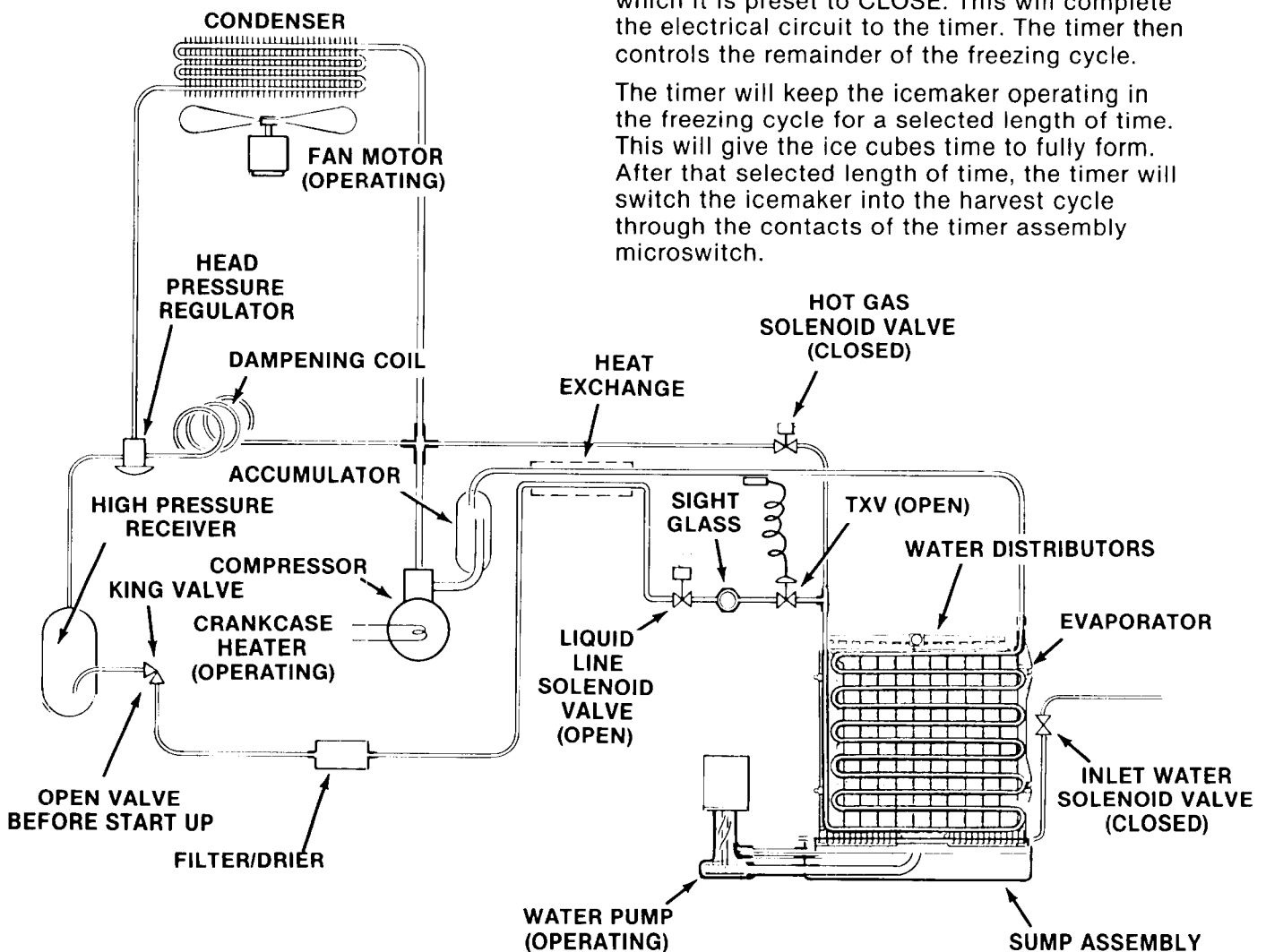
In the compressor, gaseous refrigerant is compressed and discharged into the condenser as a high pressure, high temperature gas. The refrigerant is cooled by air and condenses into a

high pressure, high temperature liquid. The liquid refrigerant then passes through a receiver, which stores excess refrigerant not required at high condensing temperatures; then, on to the liquid line solenoid valve and thermostatic expansion valve where the temperature and pressure of the liquid refrigerant are lowered. This liquid refrigerant is then distributed through capillary tubes to the evaporator plates. The refrigerant is warmed by the water cascading over the evaporator plates and begins to boil off and becomes a gas. The refrigerant travels through the heat exchange area of the suction line where any remaining liquid refrigerant boils off and returns to the compressor as a low pressure, low temperature gas and the cycle starts again.

During the freezing cycle, the hot gas solenoid valve is CLOSED and the water inlet solenoid valve is CLOSED.

When the ice cubes are partially formed, the cube size control will sense the temperature at which it is preset to CLOSE. This will complete the electrical circuit to the timer. The timer then controls the remainder of the freezing cycle.

The timer will keep the icemaker operating in the freezing cycle for a selected length of time. This will give the ice cubes time to fully form. After that selected length of time, the timer will switch the icemaker into the harvest cycle through the contacts of the timer assembly microswitch.



Freezing Cycle — Refrigeration Schematic

JULY, 1985

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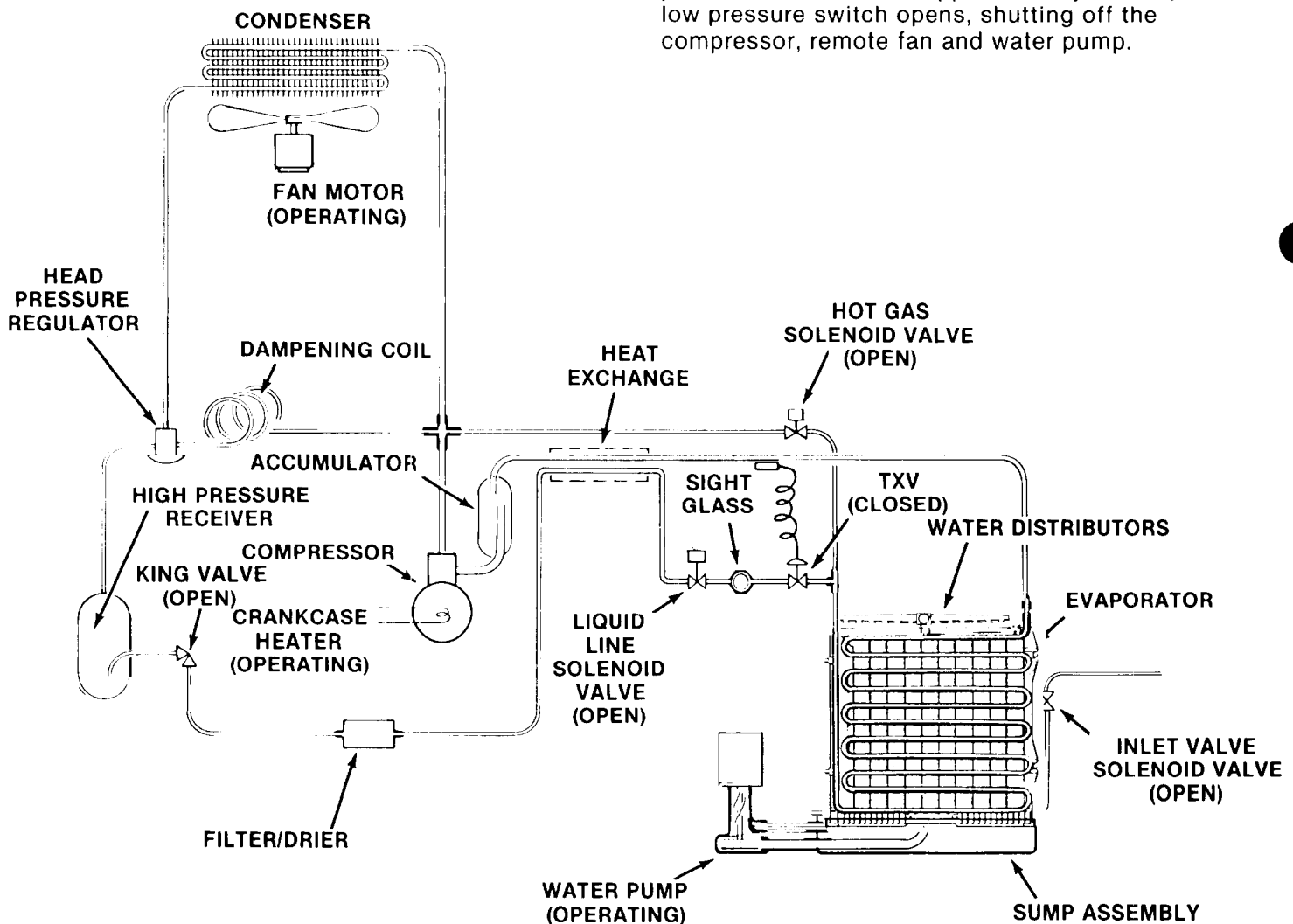
# CM1400R OPERATION

## HARVEST CYCLE

When the timer switches the icemaker into the harvest cycle, high pressure, high temperature gaseous refrigerant being discharged from the compressor is diverted from the condenser through the hot gas solenoid valve into the evaporator plates. During this cycle, the gaseous high pressure, high temperature refrigerant circulates from the compressor through the evaporator plates and back again bypassing the condenser and the thermostatic expansion valve. In the electrical circuit, both the compressor and the water pump are operating and the hot gas solenoid valve is energized and OPEN and the water inlet solenoid valve is OPEN.

The finished ice cubes are released from the sides of the evaporator plates by the warming effect of the hot gas flowing through the evaporator plates and the water cascading over the ice cubes. The released ice cubes drop into the ice storage bin below.

At the end of the harvest cycle, the timer cam will push the actuator arm of the microswitch IN. If the bin thermostat is still CLOSED, a whole new cycle will begin. If the bin thermostat is OPEN, the liquid line solenoid valve will close, shutting off refrigerant flow to the evaporator and allowing the compressor to pump any refrigerant left in the evaporators into the high pressure receiver. When the evaporator pressure is lowered to approximately 3 PSIG, the low pressure switch opens, shutting off the compressor, remote fan and water pump.



Harvest Cycle — Refrigeration Schematic

# CM1400R OPERATION - ELECTRICAL SEQUENCE

The following charts illustrate which switches and which components are ON or OFF during a particular phase of the icemaking cycle.

Refer to the wiring diagram for a reference. Remember, the wiring diagram shows the unit as it is in the Timed Freeze Cycle.

## BEGINNING FREEZE

<b>ELECTRICAL COMPONENTS (LOADS)</b>	<b>ON</b>	<b>OFF</b>
Crankcase Heater	X	
Compressor	X	
Fan Motor	X	
Hot Gas Valve		X
Inlet Water Valve		X
Liquid Line Valve	X	
P.C. Board Relay Coil	X	
Timer		X
Water Pump	X	

<b>SWITCHES</b>	<b>ON</b>	<b>OFF</b>
Bin Thermostat	X	
Cube Size Thermostat		X
Toggle	X	
L.P. Control	X	
H.P. Control	X	
Timer Micro Switch N.C.		X
Timer Micro Switch N.O.	X	
High Temp Switch	X	

At the beginning of the freeze cycle, the timer is not turning, but the icemaker is refrigerating the water, starting to turn the water into ice.

# CM1400R OPERATION - ELECTRICAL SEQUENCE

## TIMED FREEZE

ELECTRICAL COMPONENTS (LOADS)	ON	OFF
Crankcase Heater	X	
Compressor	X	
Fan Motor	X	
Hot Gas Valve		X
Inlet Water Valve		X
Liquid Line Valve	X	
P.C. Board Relay Coil	X	
Timer	X	
Water Pump	X	
<b>SWITCHES</b>	<b>ON</b>	<b>OFF</b>
Bin Thermostat	X	
Cube Size Thermostat	X	
Toggle Switch	X	
L.P. Control	X	
H.P. Control	X	
Timer Micro Switch N.C.		X
Timer Micro Switch N.O.	X	
High Temp Switch	X	

After the icemaker has cooled the water and formed some ice on the evaporator, the evaporator will have gotten cold enough to have the cube size control close. All this does is start and run the timer.

## HARVEST

ELECTRICAL COMPONENTS (LOADS)	ON	OFF
Crankcase Heater	X	
Compressor	X	
Fan Motor	X	
Hot Gas Valve	X	
Inlet Water Valve	X	
Liquid Line Valve	X	
P.C. Board Relay Coil		X
Timer	X	
Water Pump	X	
<b>SWITCHES</b>	<b>ON</b>	<b>OFF</b>
Bin Thermostat	X	
Cube Size Thermostat		X
Toggle Switch	X	
L.P. Control	X	
H.P. Control	X	
Timer Micro Switch N.C.	X	
Timer Micro Switch N.O.		X
High Temp Switch	X	

The timer has now turned far enough so that the micro-switch plunger has dropped into the gap in the cam. This breaks the circuit to the relay in the P.C. Board - and that puts the machine into the Harvest cycle, where the hot gas valve and inlet water valve have opened to harvest the ice.

# CM1400R OPERATION - ELECTRICAL SEQUENCE

## PUMP DOWN - STAGE ONE

ELECTRICAL COMPONENTS (LOADS)	ON	OFF
Crankcase Heater	X	
Compressor	X	
Fan Motor	X	
Hot Gas Valve		X
Inlet Water Valve		X
Liquid Line Valve		X
P.C. Board Relay Coil		X
Timer		X
Water Pump	X	
SWITCHES	ON	OFF
Bin Thermostat		X
Cube Size Thermostat		X
Toggle Switch	X	
L.P. Control	X	
H.P. Control	X	
Timer Micro Switch N.C.	X	
Timer Micro Switch N.O.		X
High Temp Switch	X	

When ice is on the bin control, it will OPEN and at the end of the Harvest Cycle, this will initiate a pump down cycle. The liquid line valve (normally closed) will close and the compressor will pump refrigerant into the receiver.

## PUMP DOWN - STAGE TWO

ELECTRICAL COMPONENTS (LOADS)	ON	OFF
Crankcase Heater	X	
Compressor		X
Fan Motor		X
Hot Gas Valve		X
Inlet Water Valve		X
Liquid Line Valve		X
P.C. Board Relay Coil		X
Timer		X
Water Pump		X
SWITCHES	ON	OFF
Bin Thermostat		X
Cube Size Thermostat		X
Toggle (Master and Compressor)	X	
L.P. Control		X
H.P. Control	X	
Timer Micro Switch N.C.	X	
Timer Micro Switch N.O.		X
High Temp Switch	X	

After the low side pressure has dropped under 3 psig, the compressor will be turned off by the low pressure control and the unit will be pumped down, OFF and in a standby mode.

# CM1400R SYSTEM SPECIFICATIONS

In servicing a machine, it is often useful to compare that individual units operating characteristics to those of a normally operating machine. The data that follows gives those characteristics, however; be aware that these values are for NEW, CLEAN machines. USE THESE NUMBERS AS A GUIDELINE ONLY.

## COMPONENT

Timer - 1 revolution of the cam, in minutes .....	8
Harvest Time, preset, in minutes .....	2-1/4
Inlet Water Valve, water flow in g.p.m. ....	1

	CI	CO
Cube Size Control, Reverse Acting, Temperature range (+ 15°F. to + 44°F.)	—	—
Bin Thermostat, Temperature Range	38.5°-43.5°	33.5°-38.5°
High Pressure Safety Switch, PSIG	Manual	450
Low Pressure Control, PSIG	40	20

## OPERATING CHARACTERISTICS

On remote air-cooled models during the freezing cycle, the discharge pressure will slowly decline as the unit freezes ice and at the same time the suction pressure will also decline, reaching it's lowest point just before freeze. Compressor amps experience a similar drop.

### FREEZE CYCLE

Average Discharge Pressure A/C ...	350-200 PSIG
Suction Pressure at the end of the Freeze Cycle .....	22-40 PSIG
Freeze Time .....	12-20 Minutes

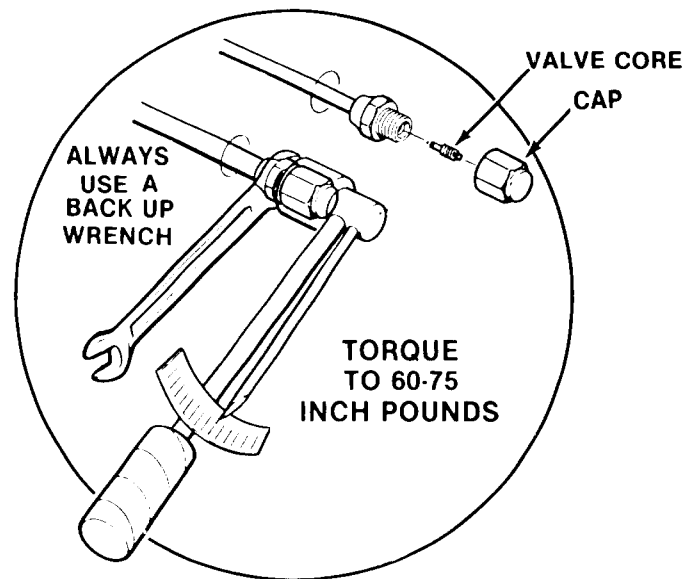
### HARVEST CYCLE

Average Discharge Pressure .....	250-100 PSIG
Average Suction Pressure .....	130-65 PSIG
Harvest Time, assumed to be 2-1/4 minutes.	
This can be adjusted to suit local conditions.	

The values listed are representative of values seen at a wide range of air and water temperatures and are for a normal cube size.

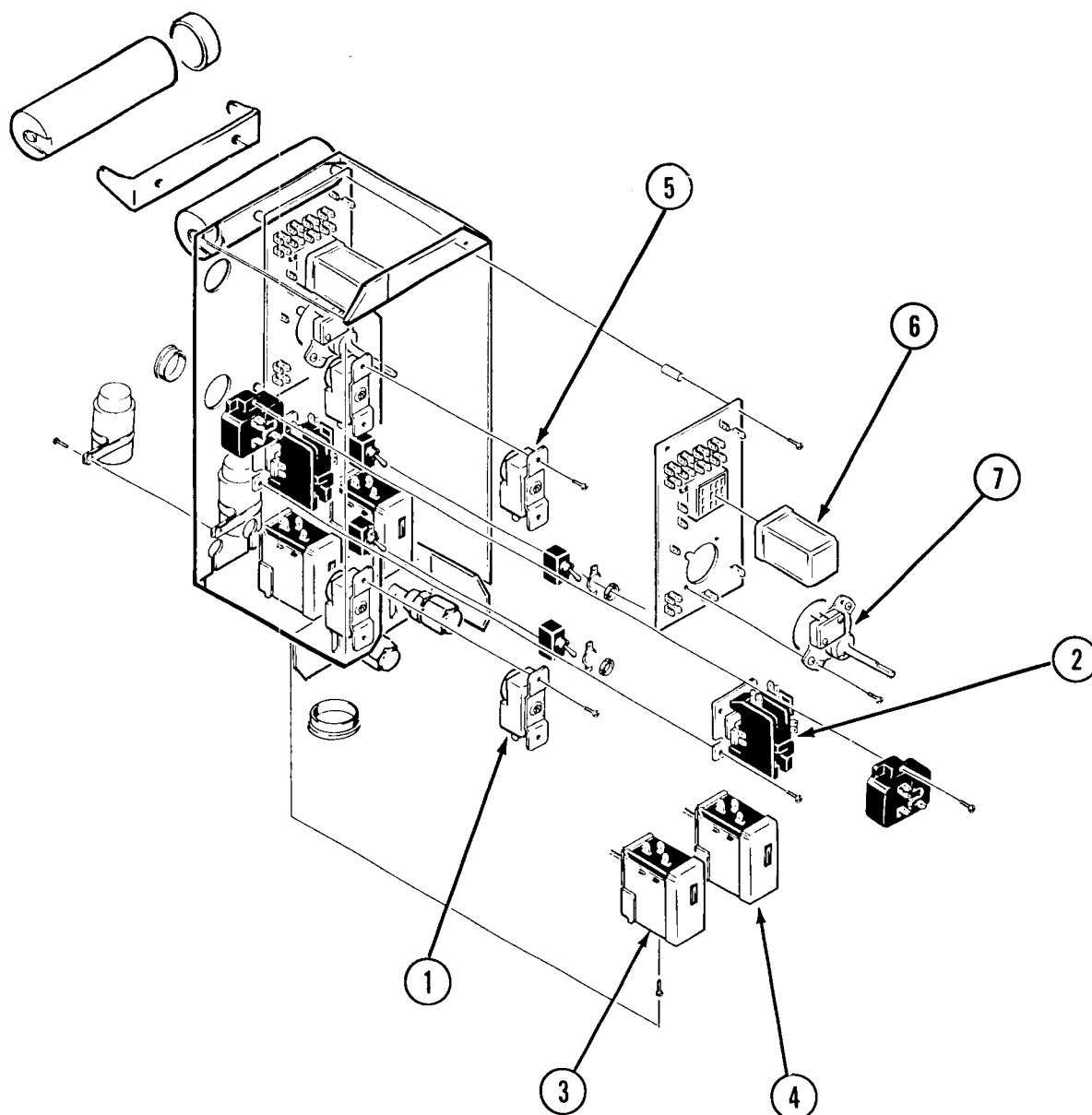
When comparing these figures to field data, allow a variation from each end of the range given.

**TO SERVICE REFRIGERATION SYSTEM:  
TORQUE REFRIGERATION ACCESS VALVE  
CAPS TO 60-75 INCH POUNDS.**



**ALWAYS USE A BACK-UP  
WRENCH TO AVOID DAMAGE  
TO THE REFRIGERANT TUBING.**

# CM1400R COMPONENT DESCRIPTION





# CM1400R COMPONENT DESCRIPTION

## ① BIN THERMOSTAT CONTROL

The bin thermostat control is located in the bottom of the control box. The sensing capillary tube of the control is routed from the control box through the inner left wall in the evaporator section to the bin thermostat control bracket hanging in the ice storage bin. The bin thermostat control functions to automatically shut OFF the icemaker when the ice storage bin is filled and ice contacts the capillary tube. It also signals the RESTART of the icemaker when the capillary tube starts to warm up after ice has been removed from the bin.

Bin thermostat control adjustment should ONLY be performed if premature shut off occurs or ice backs up into the freezing section of the cabinet. Adjust only in increments of one eighth turn of a screw at a time.

## ② COMPRESSOR CONTACTOR

The compressor contactor functions to carry the compressor line current. The contactor is wired so any control in the pilot circuit such as the bin thermostat, low pressure and high pressure controls, etc., will cause the contactor holding coil to be de-energized when the control contact OPENS; thereby, breaking the circuit to the compressor through the contactor points.

## ③ REFRIGERANT HIGH PRESSURE CONTROL

The purpose of this safety control is to protect the unit from damage due to high refrigerant pressure. It also provides additional protection for the unit in high ambient temperatures. This is a manual reset control connected to the refrigeration system high-side. It is set to stop the unit completely when the high-side pressure reaches the preset limit.

## ④ REFRIGERANT LOW PRESSURE PUMP DOWN CONTROL

The purpose of this switch is to control the compressor. It keeps the compressor on, to pump the refrigerant into the receiver, after the liquid line solenoid has closed. It also provides additional protection for the unit in case low ambient temperatures exist. This is an automatic reset control connected to the refrigeration system low side. It is set to stop the compressor when the low side pressure drops to less than 20 psig.

## ⑤ CUBE SIZE CONTROL

The temperature sensing cube size control affects the length of the freezing cycle prior to initiating the finishing timer. The cube size control closes its contacts when the evaporator reaches a preset temperature starting the finishing timer. A variation in either ambient air or incoming water temperature will affect the efficiency of the refrigeration system. This will vary the length of timer it takes the evaporator to reach the temperature at which the cube size control is preset to CLOSE which, in turn, will affect the overall cycle time.

See *Cube Size Adjustment* BEFORE attempting to adjust the control.

## ⑥ FINISH RELAY

The multi-function, three pole, double-throw plug-in relay is installed directly into a receptacle on the printed circuit board in the control box. The relay functions, in part, to by-pass the bin thermostat control to prevent the icemaker from shutting OFF when a filled-bin condition occurs during the freezing cycle. The by-pass action serves to ensure full-sized cubes with each harvest cycle and to prevent short cycling on the bin thermostat control.

## ⑦ FINISHING TIMER — Timer & Switch Assembly.

The function of the finishing timer begins when activated by the cube size control. The outer surface, or large diameter lobe of the timer cam, determines the timer cycle for finish freezing of the ice cubes while the inner surface or small diameter lobe determines the time cycle for the harvest sequence. All electrical circuitry is connected through the printed circuit board and the finishing timer and double-throw microswitch. The microswitch is actuated by a cam assembly directly connected to the timer motor. The timer cam can be adjusted to vary the defrost time required.

# CM1400R COMPONENT DESCRIPTION

## 8 HIGH PRESSURE RECEIVER

Provides storage volume for refrigerant during cross ambient operation. The high pressure receiver is sized large enough to hold the entire refrigerant charge. During cold operation there is enough liquid in the receiver to maintain a liquid seal to the liquid line.

## 9 LIQUID LINE SOLENOID VALVE

The liquid line solenoid valve provides positive shutoff of refrigerant flow for off cycle evaporator pump down.

## 10 HOT GAS SOLENOID VALVE

The hot gas solenoid valve opens during the harvest cycle to divert the hot discharge gas from the compressor directly into the evaporator plates assembly to release ice cubes from the ice cube molds. The hot gas solenoid valve is comprised of two parts: the body and plunger and the coil and frame assemblies. Installed in the discharge line of the compressor, the energized solenoid coil lifts the valve stem within the valve body to cause the hot discharge gas to be diverted when the finishing timer has advanced to the start of the harvest cycle.

## 11 WATER INLET SOLENOID VALVE

The water inlet solenoid valve opens during harvest to fill the sump assembly with water. Excess water overflows through a stand pipe located at the back of the sump to flush minerals from the sump.

## 12 WATER DISTRIBUTION SYSTEM

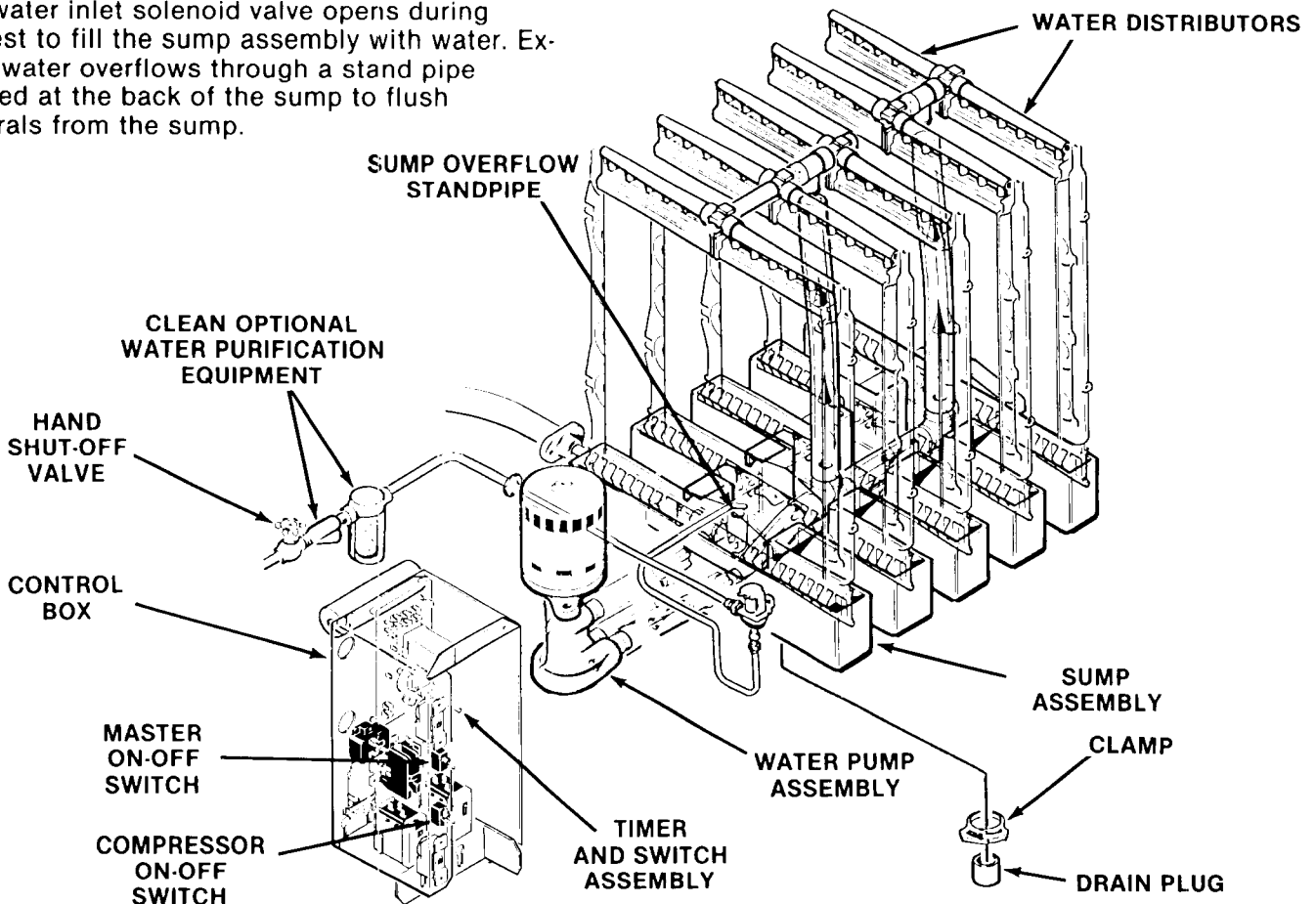
The water distribution system functions to evenly supply water to all cells of the evaporator plates. The water pump pumps water from the sump up to the vertical tygon tube to a tee. From there, water is channeled through water manifolds to four water distributors, two atop each evaporator plate, and distributed evenly down both sides of each evaporator plate. Gravity flow returns the water to the sump reservoir for recirculation.

## 13 THERMOSTATIC EXPANSION VALVE (TXV) (FBRE 1-1/2L)

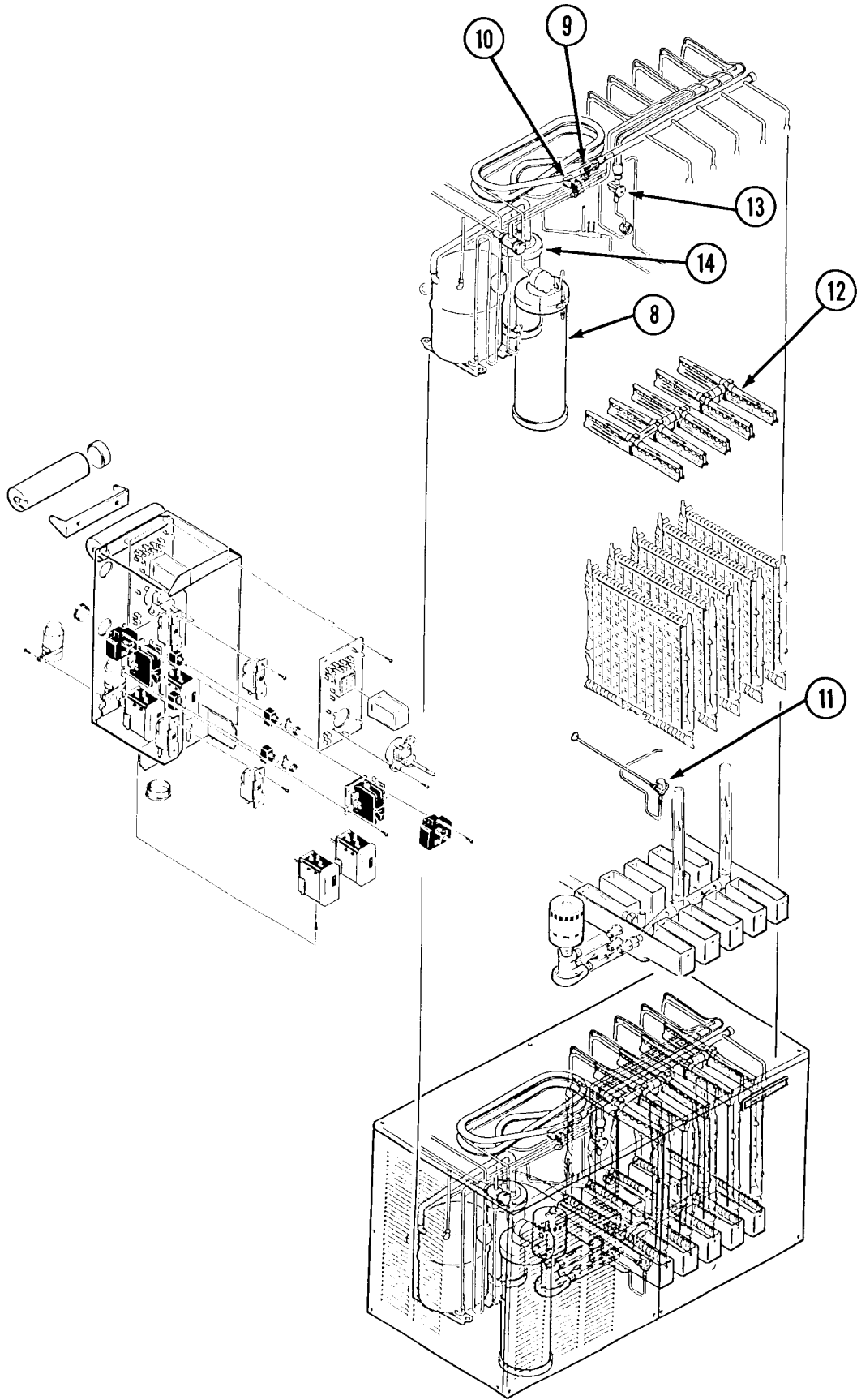
The thermostatic expansion valve regulates the flow of refrigerant to the evaporator and reduces pressure of liquid refrigerant from condensing pressure to evaporating pressure.

## 14 ACCUMULATOR

The accumulator traps liquid overfeed from the evaporator during harvest and meters it into the compressor at a controlled rate.



# CM1400R COMPONENT DESCRIPTION



# CM1400R SERVICE DIAGNOSIS

The service diagnosis section is for use in aiding the serviceman in diagnosing a particular problem for pin-pointing the area in which the problem lies, thus, an ever available reference for proper corrective action.

The following chart lists corrective actions for the causes of known symptoms of certain problems that can occur in the icemaking-refrigeration system.

## ICEMAKING - REFRIGERATION SYSTEM

SYMPTOM	POSSIBLE CAUSE	CORRECTION
Irregular size cubes	Some distributor holes plugged.	Clean distributor holes.
	Shortage of water.	Clean water sump. See Shortage of water CORRECTION.
	Unit not level.	Level cabinet, as required.
Cubes too large.	Dirty air-cooled condenser.	Clean remote condenser.
	Cube Size Control set too cold.	Rotate Cube Size Control dial toward WARMER.
	Loss of refrigerant.	Check for refrigerant leaks, correct leaks; recharge system.
Cubes too small.	Cube Size Control set too warm.	Rotate Cube Size Control dial toward COLDER.
	Moisture in refrigeration system.	Blow refrigerant charge; replace drier; evacuate system; add proper refrigerant charge.
	Shortage of water.	See shortage of water CORRECTION.
	TXV valve super heat too high.	Replace valve.
Cloudy Cubes.	Shortage of water.	See Shortage of water SYMPTOM.
	Dirty water supply.	Install water filter or treatment system.
	Accumulated impurities.	Use SCOTSMAN Ice Machine Cleaner. See Cleaning Instructions.
Shortage of water.	Short harvest cycle.	Adjust cam of timer and switch assembly.
	Water leak in sump area.	Locate leak and correct condition.
	Partial restrictions in water strainer.	Clean or replace strainer.
	Low water pressure.	Check for incorrect supply line size or blockage. Check for low main pressure. If low, contact water company.

# CM1400R SERVICE DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE	CORRECTION
Decreased Ice capacity.	High head pressure, result of dirty Condenser or faulty Fan Motor.	Clean Remote Condenser Fins. Repair or replace Fan Motor.
	Non-condensable gas in the system.	Purge the system and recharge per nameplate requirements.
	Overcharge of refrigerant.	Slowly purge off to correct charge.
	Hot gas solenoid valve leaking.	Replace valve.
	Defective Compressor. Check amp draw of Compressor.	Replace Compressor.
	Leaky inlet water valve.	Replace valve.
	High Ambient temperature for condenser	If possible, reduce condenser inlet air temperature.
Poor harvests. Icemaker does not harvest.	Too short defrost time.	Check and adjust harvest cycle.
	Restriction in water inlet line.	Check strainer and inlet water valve.
	Hot gas solenoid does not open. Binds or burned out.	Replace solenoid.
	Undercharge of refrigerant.	Charge to nameplate requirements.
	Water pressure too low.	Check for 20 PSI flowing water
	Head Pressure Regulator valve - low head.	Replace valve.
Compressor cycles intermittently.	Low voltage.	Check for circuit overload. Check building supply voltage, if low, contact power company.
	Cycling on Low Pressure Control.	Cold Ambient at Condenser. Pump down Solenoid Coil Open. Replace it.
Unit Trips on Hi Pressure Cut Out.	Dirty Condenser.	Clean Condenser with vacuum cleaner or brush. DO NOT USE A WIRE BRUSH.
	Defective Fan Motor.	Replace Fan Motor.
	Non-condensable gases in system.	Purge the system and recharge per nameplate requirements.
Frost on Compressor.	TXV Metering too much Refrigerant.	Superheat set too low. Adjust or replace valve.

## CM1400R SERVICE DIAGNOSIS

SYMPTOMS	POSSIBLE CAUSE	CORRECTION
Icemaker will not operate.	Blown fuse in line.	Replace fuse and check for cause.
	Master switch in OFF position.	Set switch to ON position.
	Faulty Master switch.	Replace switch.
	Timer contacts open.	Replace Timer.
	Improperly wired.	Contact electrical contractor for correction.
	Out of refrigerant, off on Low Pressure control.	Correct leak, recharge system
	High Pressure control tripped	Reset, check condenser.
Icemaker will not go into the Harvest Cycle automatically.	Bin control open.	Check Bin Control Unit in coldroom or bin control defective. Repair or replace valve.
	Liquid Line Solenoid valve not opening - keeps unit pumped down.	
	High Temp Switch open.	Check why Hot Gas Line too hot.
	Cube size Control will not close.	Replace Cube Size Control.
Water overflows from the sump into the bin.	Timer motor open.	Replace timer.
	Plug in relay contacts open.	Replace relay.
	Cube Size Control may not close if condensing pressure is too high.	Check condenser and discharge pressure.
Icemaker stays in the Harvest Cycle.	Restricted sump drain.	Repair drain.
	Inlet water valve lets in too much water.	Replace inlet valve.
Icemaker stays in the Harvest Cycle.	Plug in Relay Coil open.	Replace Relay.
	Timer Motor open or stuck.	Replace Timer.
	Timer Microswitch N.O. contacts. Will not close.	Replace Timer

### REFRIGERANT CHARGE DIAGNOSIS

On this model, the refrigerant charge is adequate whenever the sight glass remains full of liquid refrigerant throughout the Freeze Cycle. HOWEVER, the condensing temperature will have a direct bearing on this. A unit with a marginal charge in summer will be undercharged when the outside air temperature drops. The only correct and accurate way to charge this unit is to weigh in the nameplate charge.

# CM1400R ADJUSTMENT PROCEDURES

The procedures provided in this section are arranged in alphabetical order to make specific adjustment, removal and replacement information easy to locate.

Read the instructions thoroughly before performing any adjustment or removal and replacement procedures.

## ADJUSTMENT OF THE CUBE SIZE CONTROL

### CAUTION

**BEFORE** performing actual adjustment to the cube size control, check other possible causes for cube size problems. Refer to **SERVICE DIAGNOSIS** for problem review and analysis. **DO NOT** perform adjustment when a new cube size control is installed until the control bulb has been properly installed in the tube well on the refrigerant tube of the platen assembly and the icemaker has progressed through several complete freezing and harvest cycles. Observe size and quality of ice cubes and whether or not a cube size problem exists.

Adjustment on the cube size control is performed to cause either larger sized ice cubes or smaller sized ice cubes to be produced.

To produce **LARGER** sized ice cubes:

1. Locate the cube size control in the left end of the control box.
2. Rotate the adjusting screw one-eighth of a turn **CLOCKWISE** toward **COLDER**.
3. Observe size of ice cubes in next two ice cube harvests and repeat step 2 above, in one-eighth turn increments, until desired ice cube size is achieved.

To produce **SMALLER** sized ice cubes:

1. Locate the cube size control in the left end of the control box.
2. Rotate the adjusting screw one-eighth of a turn **COUNTERCLOCKWISE** toward **WARMER**.
3. Observe size of ice cubes in next two ice cube harvests and adjust in one-eighth turn increments, until desired ice cube size is achieved.

## ADJUSTMENT OF THE TIMER & SWITCH ASSEMBLY

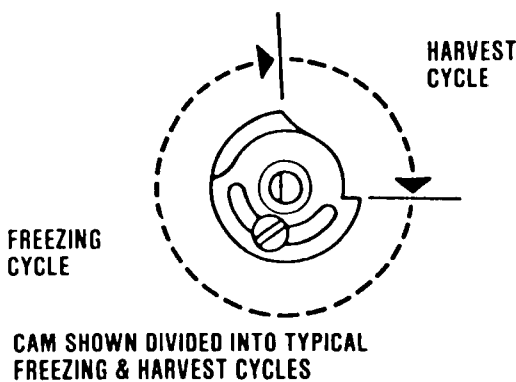
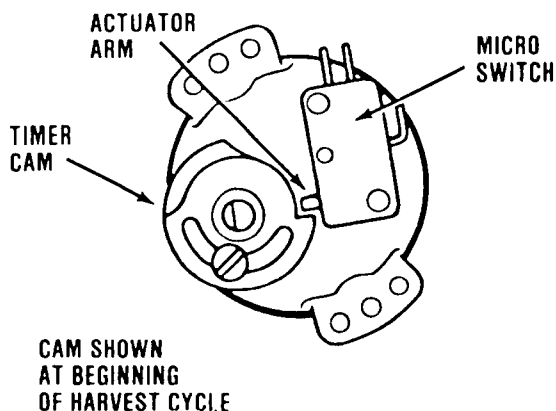
The timer and switch assembly is factory set, so one complete revolution of the cam on the timer represents 8 minutes. 5-1/2 minutes comprise the freezing cycle event during cam rotation and the final two and one-half minutes program the defrost and harvest cycle.

### WARNING

**Disconnect electrical power supply to icemaker whenever adjustment procedures are performed.**

TO ADJUST THE TIMER & SWITCH ASSEMBLY:

- A. **HARVEST CYCLE:** Slowly rotate the shaft of the timer and switch assembly located in the control box **CLOCKWISE** until the actuator arm on the microswitch initiates the harvest cycle. An audible click can be heard but in a noisy area, look at the cam and switch to observe the event.



# CM1400R ADJUSTMENT PROCEDURES

- B. FREEZING CYCLE: Slowly rotate the shaft of the timer and switch assembly located in the control box **CLOCKWISE** until the actuator arm on the microswitch initiates the freezing cycle.
- C. The length of the harvest cycle can be changed by loosening the adjustment screw on the cam. The minimum harvest setting is two minutes, the maximum is four minutes. It is important that the length of the harvest cycle allow enough time for all the ice cubes to fall from the evaporator. Too short of a time will cause the evaporator to freeze up and stop ejecting ice into the bin. Too much time

wastes icemaking capacity, energy and water. Adjustment of the harvest cycle may require a corresponding adjustment of the cube size control.

//////////////////// **WARNING** //////////////////////

**Be sure the electrical power supply and the water supply to the icemaker are OFF BEFORE starting any of the following REMOVAL AND REPLACEMENT procedures as a precaution to prevent possible personal injury or damage to equipment.**

////////////////////////////////////



# CM1400R

## REMOVAL AND REPLACEMENT PROCEDURES

### //////////////////// WARNING //////////////////////

Be sure the electrical power supply circuit breaker and the inlet water supply are OFF BEFORE starting any of the following REMOVAL AND REPLACEMENT procedures as a precaution to prevent possible personal injury or damage to equipment.

### ////////////////////////////////////

#### REMOVAL AND REPLACEMENT OF THE BIN THERMOSTAT CONTROL

To remove the bin thermostat control:

1. Remove screws and remove the front panel.
2. Remove screws and the control box cover.
3. Remove the bin thermostat capillary tube from the bin thermostat bracket and from the capillary clips.
4. Remove screws and the bin thermostat control.
5. Remove electrical leads.

To replace the bin thermostat control, reverse the removal procedure.

#### REMOVAL AND REPLACEMENT OF THE COMPRESSOR ASSEMBLY

To remove the compressor assembly:

1. Remove screws and remove the front panel.
2. Remove screws and remove left side panel.
3. Bleed off or blow the refrigerant charge through the Schrader valve.
4. Remove the cover from the terminal box on the compressor, then, remove electrical leads from the compressor.
5. Unsolder suction, discharge and process header from compressor.
6. Remove four bolts and washers which secure the compressor to the chassis mounting base.
7. Remove the compressor from the cabinet.

Always install a replacement drier anytime the sealed refrigeration system is opened. Do not replace the drier until all other repair or replacement has been completed.

# CM1400R REMOVAL AND REPLACEMENT PROCEDURES

## REMOVAL AND REPLACEMENT OF THE CUBE SIZE CONTROL

To remove the cube size control:

1. Remove screws and remove the front panel.
2. Remove screws and control box cover.
3. Remove the coiled capillary tube bulb from sensing well on the evaporator outlet line.
4. Remove electrical leads from the cube size control.
5. Remove screws and the cube size control.

To replace the cube size control, reverse the removal procedure.

## REMOVAL AND REPLACEMENT OF THE DRIER

To remove the drier:

1. Remove screws and remove the front panels.
2. Bleed off or blow the refrigerant charge through the Schrader valve.
3. Unsolder refrigeration lines at both ends of the drier and remove the drier.

Always install a replacement drier anytime the sealed refrigeration system is opened. Do not replace the drier until all other repair or replacement has been completed.

To replace the drier:

//////////////////// CAUTION //////////////////////

**If the factory seal is broken on the replacement drier exposing it to the atmosphere more than a few minutes, the drier will absorb moisture from the atmosphere and lose substantial ability for moisture removal.**

**Be sure the replacement drier is installed with the arrow positioned in the direction of the refrigerant flow.**

////////////////////////////////////

1. Remove the factory seals from the replacement drier and install the drier in the refrigerant lines with the arrow positioned in the direction of the refrigerant flow.
2. Solder the drier into the lines, two places, taking precautions to NOT OVERHEAT the drier body during installation soldering.
3. Purge the system and check for leaks.
4. Thoroughly evacuate the system to remove moisture and non-condensables.
5. Charge the system with refrigerant by weight. SEE NAMEPLATE.
6. Replace and attach the left side panel.

# CM1400R REMOVAL AND REPLACEMENT PROCEDURES

## REMOVAL AND REPLACEMENT OF THE EVAPORATOR PLATE ASSEMBLY

To remove an evaporator plate:

1. Remove screws and remove the right front panel.
2. Remove screws and remove cabinet top panel.
3. Remove screws and remove front braces from the cabinet assembly.
4. Bleed off or blow the refrigerant charge through the Schrader valve.
5. Unsnap from the evaporator and remove the water reservoir.
6. Disconnect Tygon water inlet tube at the water manifold tee above the evaporator plate.
7. Slide the water distributor tube on the left about 1/8-inch along the top of the evaporator plate until the water distributor tube can be unsnapped from the flexible notch.

### ////////// CAUTION //////////

Use **EXTRA PRECAUTION** to protect the plastic parts during the next step to unsolder the refrigerant lines, two places, at the top of the evaporator plate. Position wet cloths over top of plates, as well as over the plastic liner at the rear, to prevent accidental head damage or possible fire from torch flame.

### ////////////////////////////////////

8. Unsolder and remove the refrigerant lines at the top of the evaporator plate.
9. Remove screws and remove sump covers.

Always install a replacement drier anytime the sealed refrigeration system is opened. Do not replace the Drier until all other repair or replacement has been completed.

To replace the Evaporator Plate, reverse the removal procedure.

## REMOVAL AND REPLACEMENT OF THE INLET WATER SOLENOID VALVE ASSEMBLY

To remove the inlet water valve assembly:

1. Shut OFF water supply to machine.
2. Remove screws and remove front left panel.
3. Loosen and remove inlet water line fitting from the inlet water solenoid valve assembly.
4. Remove screws and pull the water solenoid valve out.
5. Remove inlet water Tygon tubing from the water solenoid valve.

To replace the inlet water valve assembly, reverse the removal procedure.

# CM1400R REMOVAL AND REPLACEMENT PROCEDURES

## REMOVAL AND REPLACEMENT OF THE WATER DISTRIBUTOR TUBES AND MANIFOLD TUBES

To remove the water distributor tube and manifold tube:

1. Remove screws and remove the right front panel.
2. Slide the water distributor tube to the left about 1/8-inch along the top of the evaporator plate until the water distributor tube can be unsnapped from the flexible notch and lifted upward at the right side.
3. Unsnap and disconnect water distributor tubes from the water manifold section.
4. To replace the water distributor tubes and manifold tubes, reverse the removal procedure. **BE SURE** the notches in the water manifold tubes properly engage the alignment keys in the tee.

**BE SURE** the water distributor tube is securely fastened at the notch at both sides of the evaporator plate.

Check identical attachment for the left water distributor tube and notch, also, that the distributor/manifold connections at the top

center of each evaporator plate is snug against the top of the plate.

## REMOVAL AND REPLACEMENT OF THE WATER PUMP ASSEMBLY

**WARNING**  
**Disconnect electrical power supply to icemaker whenever adjustment procedures are performed.**

To remove the water pump assembly:

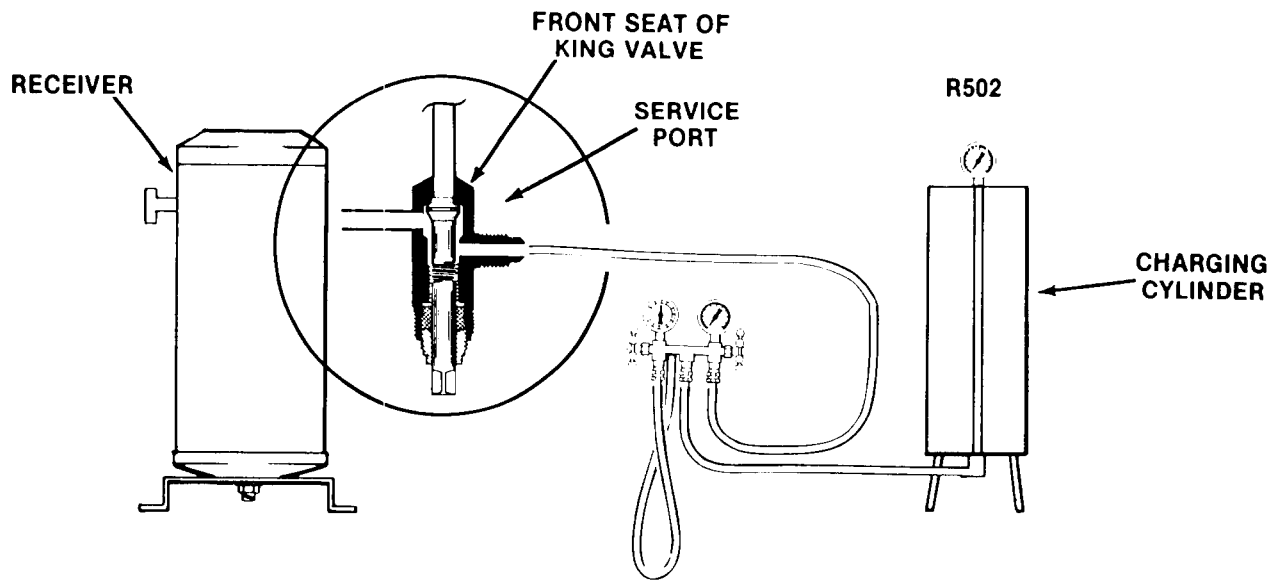
1. Remove screws and remove the front left panel.
2. Remove the Tygon tube clamps to the pump assembly.
3. Disconnect electrical leads from the water pump assembly.
4. Remove screws and the water pump from the machine.

To replace the water pump assembly, reverse the removal procedure.

# CM1400R REMOVAL AND REPLACEMENT PROCEDURES

## CHARGING PROCEDURES

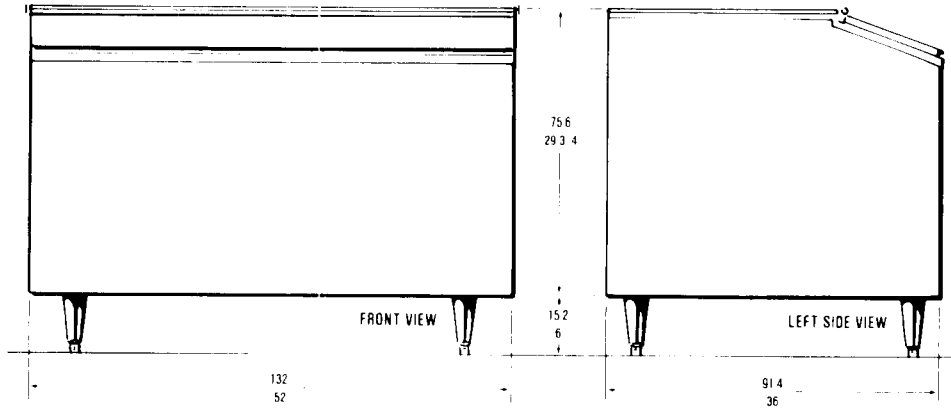
Particular care must be taken when recharging this remote system. No liquid refrigerant may be placed in the system at the compressor. DO NOT use the Schrader valves at the front of the machine for weighing in the charge. All liquid R-502 must be weighed into the receiver through the "front seated" King Valve.



# BH750/1000 BIN

## BH750 MODULAR BIN

BH750 BIN



## BH1000 STORAGE BIN

