

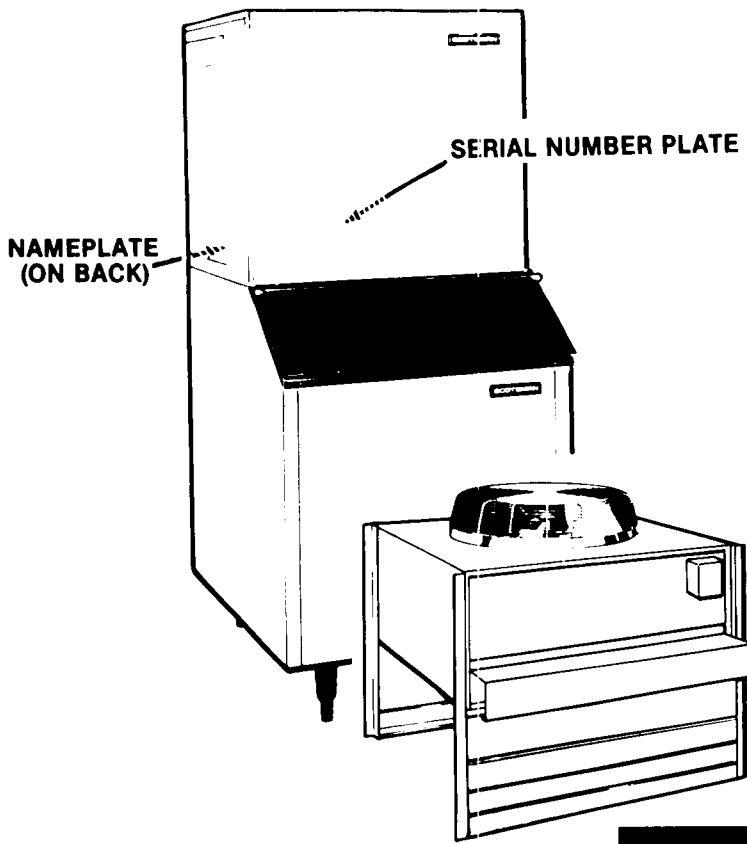
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***Parts Lists and Wiring Diagrams are located in the center of this manual, printed on yellow paper.***




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# CM650R FOR THE INSTALLER



## NAME PLATE

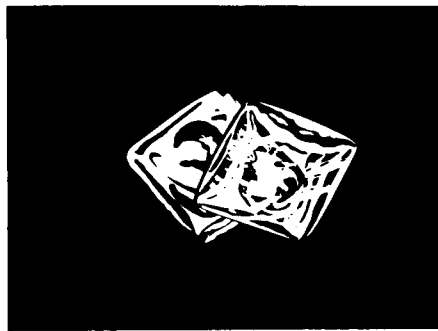
MODEL NUMBER			
SERIAL NUMBER			
A.C. SUPPLY VOLTAGE			
MINIMUM CIRCUIT AMPACITY		WIRES	
MAXIMUM FUSE SIZE *		HERTZ	
HEATER WATTS		PHASE	
REFRIGERANT		CHARGE	OZ.
MOTORS	VOLTS	R L A / F.L.A	W/H.P.
COMPRESSOR			L.R.A
FAN			
DRIVE			
OTHER			
DESIGN PRESSURE		LOW	HIGH
* OR HACR TYPE CIRCUIT BREAKER			

**SCOTSMAN**

## SERIAL NUMBER PLATE

MODEL NUMBER			
SERIAL NUMBER			
VOLTS/HERTZ/PHASE			
MAXIMUM FUSE SIZE		CHARGE	OZ.
REFRIGERANT			



This product qualifies for the following listings:

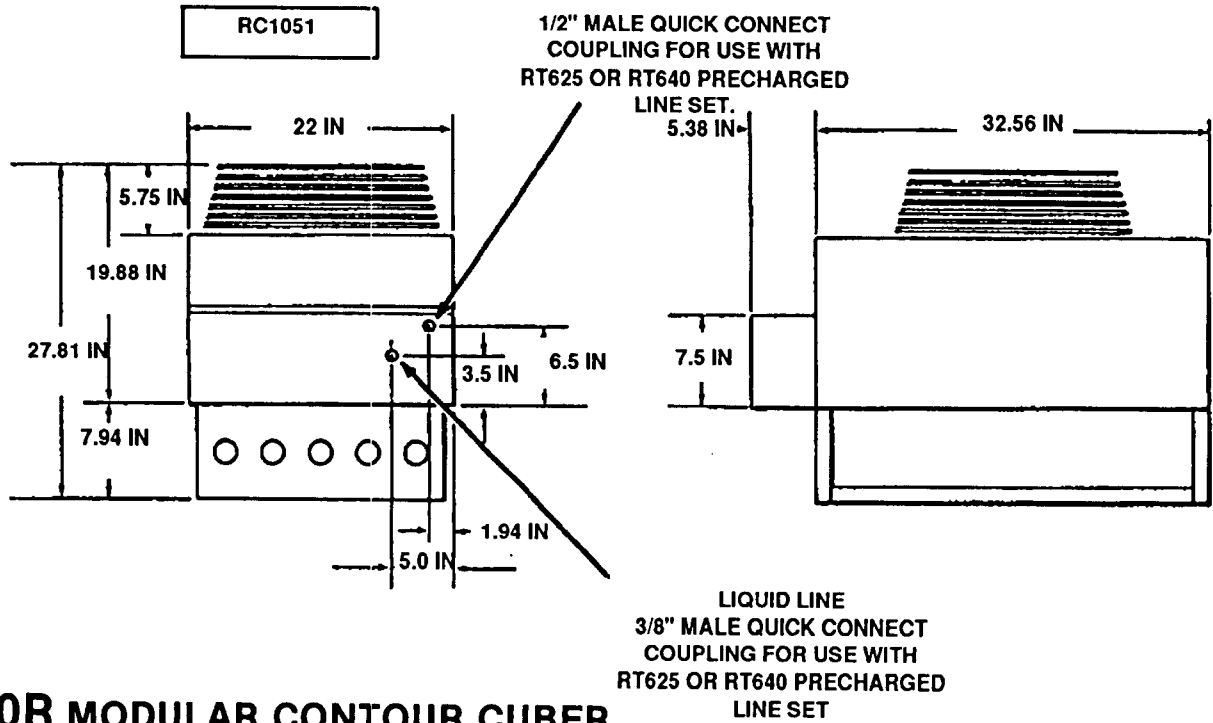


This icemaker has been engineered to our own rigid safety and performance standards. The National Sanitation Foundation (NSF) seal, signifies that it is listed with NSF and that it complies with the materials and construction standards of NSF. In addition, the Underwriters Laboratories, Inc., (UL) Listing Mark and the Canadian Standards Association (CSA) Monogram, both signify that its construction and design have been inspected and tested by them. NSF, UL and CSA inspectors also periodically examine production icemakers at the factory, to assure continued compliance.

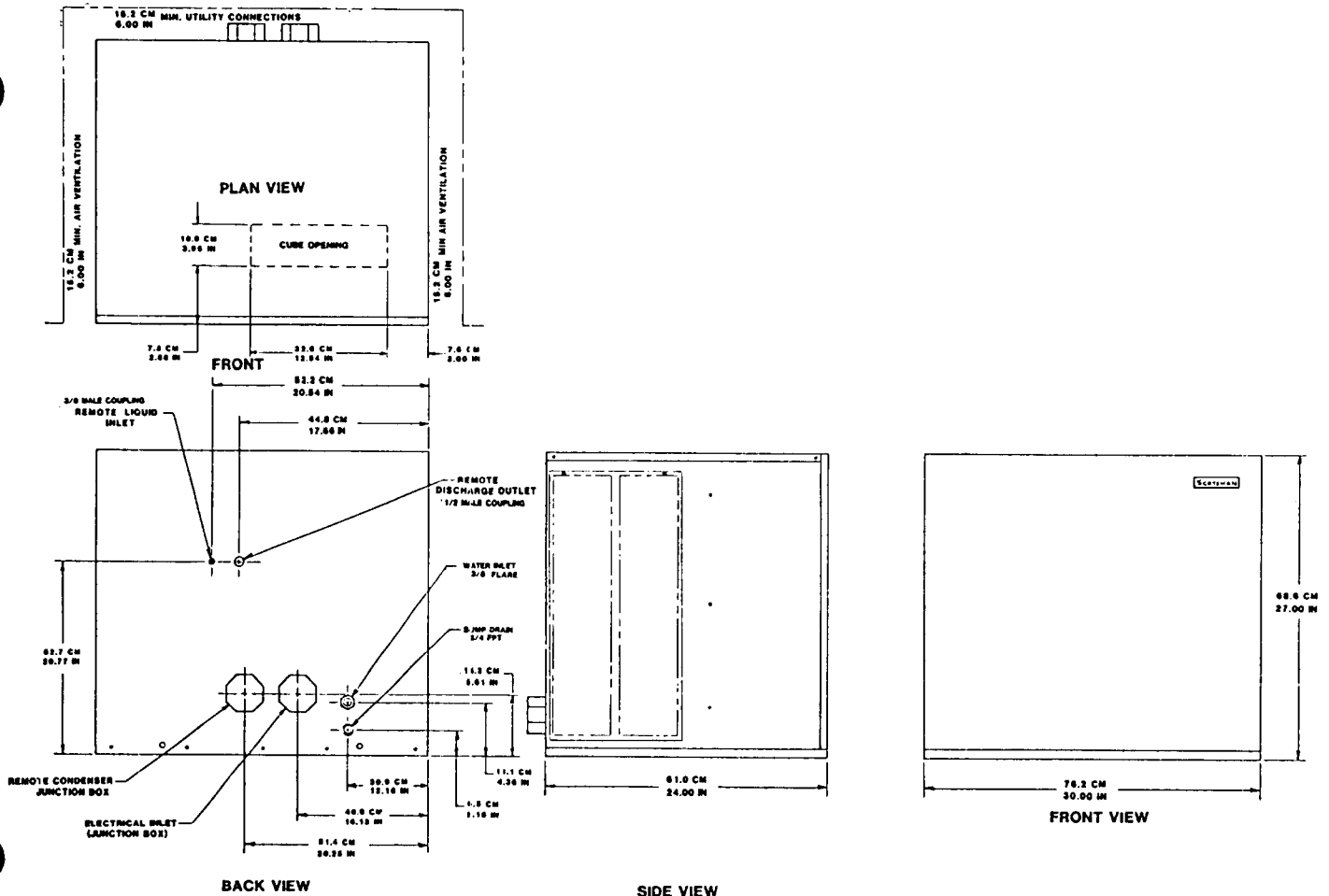
To retain the safety and performance built into this icemaker, it is important that installation and maintenance be conducted in the manner outlined in this manual.

# CM650R FOR THE INSTALLER

## REMOTE CONDENSER SPECIFICATIONS



## CM650R MODULAR CONTOUR CUBER



# CM650RE FOR THE INSTALLER

The CM650R is designed to fit the following Scotsman storage bins:

- HTB500 or BH550

When installing a new system, check to be sure that you have everything you need before beginning:

- Correct Bin
- Correct Ice Machine either CM650RE-32E or CM650RE-3E
- All kits, legs, and information required for the specific job.
- Pre-Charged Refrigerant Lines Kit either: RT625 - 25 ft. or RT640 - 40 ft.
- Scotsman Remote Condenser, either RC1051-32 or RC652-32.
- If two CM650RE icemakers are to be installed on one RC652-32 condenser, a relay kit KCMR230 must be used to operate the condenser fan.
- Optional Stainless Steel Panel Kit, SPKCMD1 contains the front, top, 2 ends, and 2 service panels.

## Installation Limitations:

This ice system is designed to be installed indoors, in a controlled environment:

	Min .....	Max
Air Temperature	50°F .....	100°F
Water Temperature	40°F .....	100°F
Water Pressure	20 .....	80
Voltage	-5% .....	+10%

(Compared to the nameplate)

Operating the machine outside of the limitations is misuse and can void the warranty.

## SPECIFICATIONS

Model Number	(Height - w/o Bin) Dimensions H" x W" x D"	Ice Type	Condenser Type	Basic Electrical	Comp. H.P.	No. of Wires	Min. Circ. Ampacity+	Max. Fuse Size
CM650RE-32E	27 x 30 x 24	Contour Cube same	Remote Air	208-230/60/1	1.5	2	20.8	35
CM650RE-3E	27 x 30 x 24		Remote Air	208-230/60/3	1.5	3	10.0	15

+Use this value to determine wire size and type per National Electric Code. Standard Finish is enamel sandalwood.

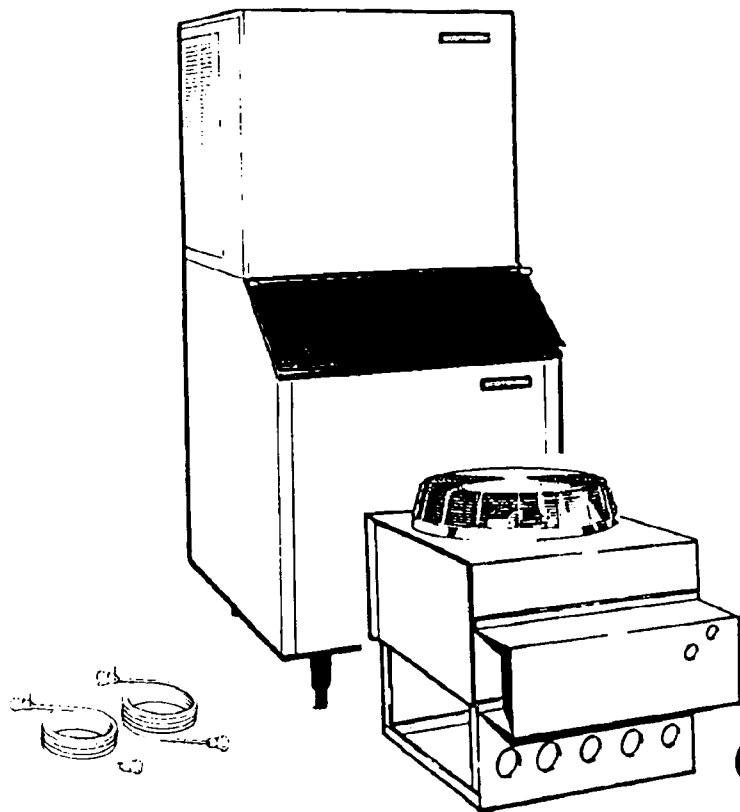
Model Number	Dimensions H" x W" x D"	For Use With	Finish	Basic Electrical	No. of Wires	*Min. Circ. Ampacity
RC1051-32	27 x 22 x 38	(1) CM650R	Galvanized	208-230/60/1	2	2
RC652-32B	29.5 X 30.25 X 33.75	(1 or 2) CM650R	Galvanized	208-230/60/1	2	2

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

Scotsman Ice Systems are designed and manufactured with the highest regard for safety and performance. They meet or exceed the standards of UL, NSF, and CSA.

Scotsman assumes no liability or responsibility of any kind for products manufactured by Scotsman that have been altered in any way, including the use of any part and/or other components not specifically approved by Scotsman.

Scotsman reserves the right to make design changes and/or improvements at any time. Specifications and design are subject to change without notice.

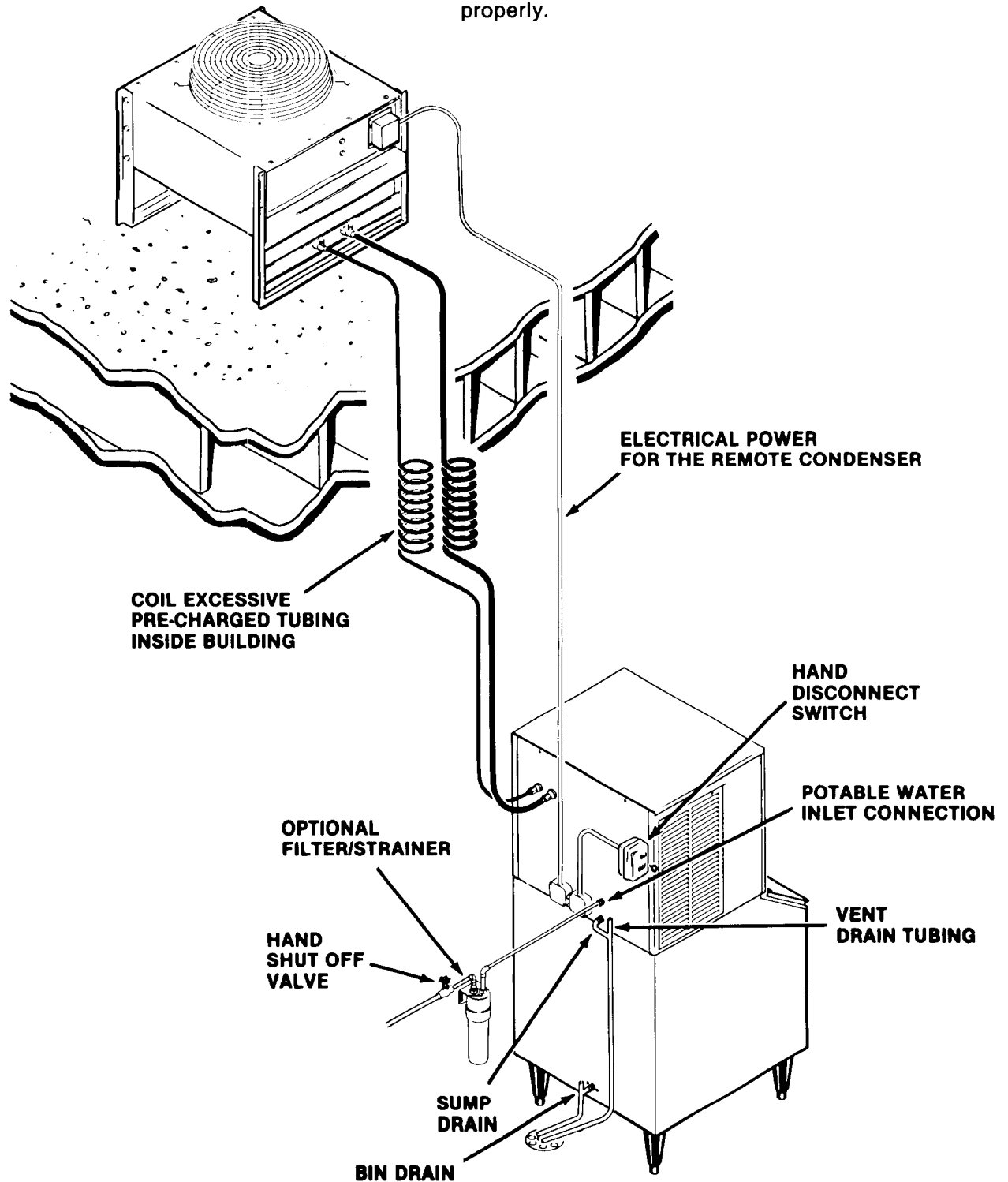


# CM650R FOR THE INSTALLER

A typical installation should generally appear as illustrated below. The remote condenser must be located above the icemaker and the pre-charged lines installed per instructions.

Refer to page 7 for the instructions for routing the pre-charged lines through the roof.

Refer to page 4 for the temperature limitations within which these machines will function properly.



# CM650R FOR THE INSTALLER

## LOCATION & LEVELING

1. Arrange for proper electric, water and drain. See instructions for the plumber and for the electrician.
2. Position the ice storage 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 rear and side to side directions. Select a well-ventilated location for the air-cooled condenser.
3. Inspect the bin top mounting gasket which should be flat, with no wrinkles, to provide a good water seal when the Cuber is installed on top of the bin.
4. Install the modular cuber on top of the bin using care to be sure a good seal is made between the two cabinets. Align the holes in the bottom rear of the cabinet to mate with the two mounting straps on the top rear of the bin.
5. Use the bolts from the hardware bag to secure the machine to the bin using holes at the back. When alignment and leveling are completed, tighten the bolts to secure the mounting straps.

## STACKING AND BIN THERMOSTAT INSTALLATION INSTRUCTIONS

**NOTE:** This model can only be stacked onto Scotsman units with the same size cabinet as itself. Earlier models are not compatible.

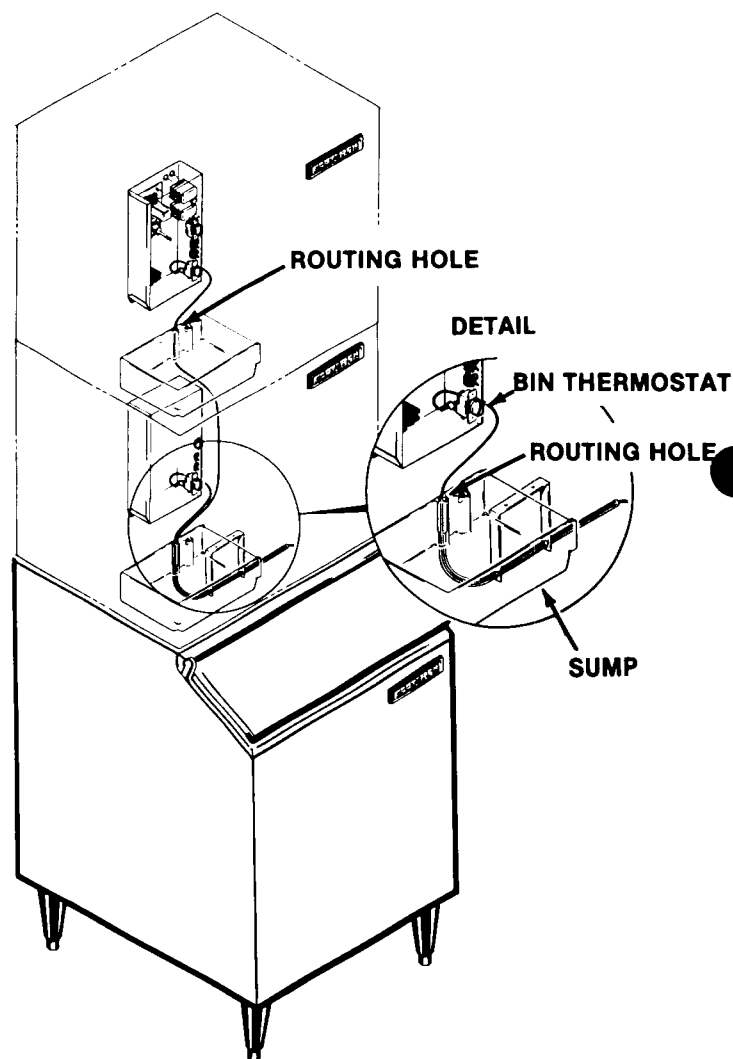
When stacking two units, remove the top panel from the lower icemaker. (The top removed from the lower icemaker will no longer have any function.)

Carefully lift the uncrated top unit onto the bottom one and align the two cabinets. Use of a mechanical lift is recommended for this step.

At the back of the two icemakers, bolt the upper icemaker cabinet to the lower icemaker cabinet using the mounting straps and bolts from the hardware package.

**NOTE:** When stacking, route the bin thermostat control from the upper machine inside the same bin thermostat control bracket as the lower one.

**NOTE:** Extend bin thermostat capillary tube through entire length of the tubular section of the bin thermostat bracket. When properly installed, the tip of the capillary tube should be flush with the tip of the bin thermostat bracket.



# CM650R FOR THE INSTALLER

## REMOTE CONDENSER INSTALLATION

### Location Considerations:

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 with consideration for routing. The condenser must be above or level with the highest (if stacked) icemaker.

Best available location, protected from the extremes of dirt, dust, and sun.

Must meet local building code installation requirements. Usually the services of a licensed electrician are required.

### 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. Have an electrician connect the remote condenser fan motor electrically to the CM650R at the junction box of the remote condenser and the junction box of the CM650R.

### PRE-CHARGED TUBING KIT ROUTING:

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

Do not connect pre-charged tubing until all routing and forming of tubing is complete. See Coupling Instructions, Pre-Charged Tubing Kit, page 8, for connecting instructions.

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

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 pre-charged refrigerant lines to pass, is 1-3/4 inch diameter.

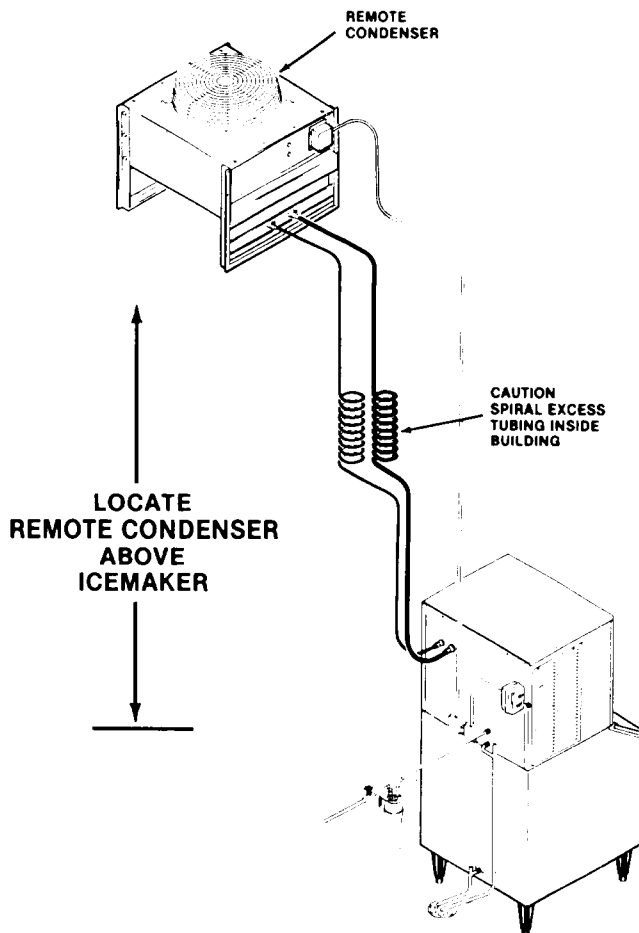
//////////////////// CAUTION //////////////////////  
**DO NOT KINK OR CRIMP REFRIGERANT LINES.**  
////////////////////////////////////

3. Route both refrigerant lines through the roof opening.

Follow straight line routing, when possible.

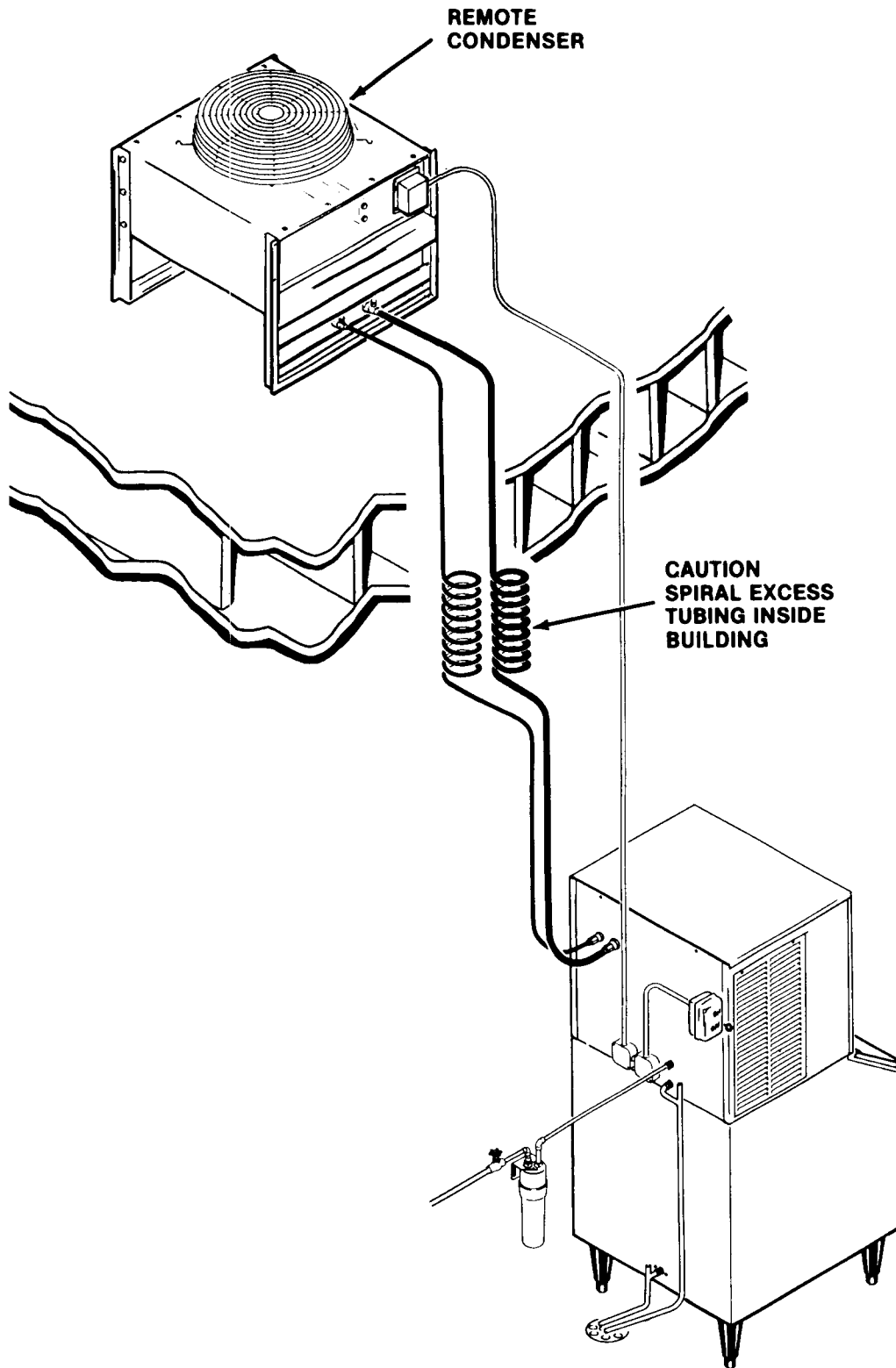
Retain excess pre-charged refrigerant line **INSIDE** the building.

4. **SPIRAL** the excess footage of the pre-charged refrigerant lines, in the best selected **INSIDE** location. See Pre-Charged Refrigerant Line Routing illustration for recommended methods of spiralling the excess refrigerant lines.





# CM650R FOR THE INSTALLER



*Pre-Charged Refrigerant Line Routing*

# CM650R FOR THE INSTALLER

## COUPLING INSTRUCTIONS, PRE-CHARGED TUBING KIT

### CAUTION

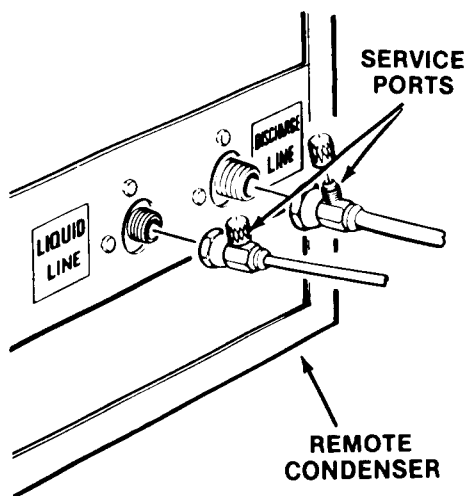
The couplings on the sets of pre-charged refrigerant lines, the refrigerant fittings on the Remote Condenser, and the rear of the Icemaker Chassis are SELF-SEALING and should be connected as follows:

1. Remove protector caps and plugs and if necessary, carefully wipe coupling seats at 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.

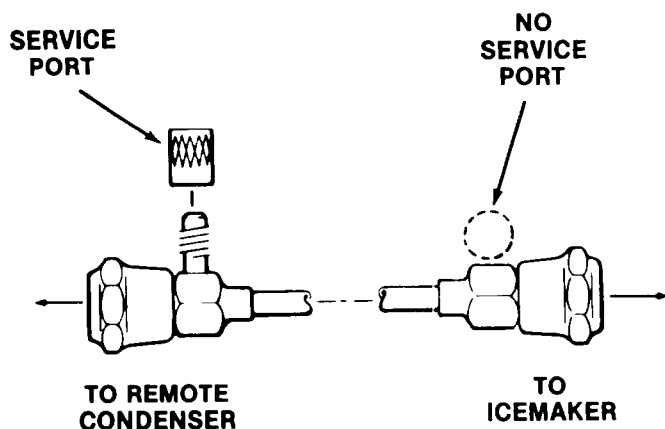
**ALWAYS USE TWO WRENCHES WHEN TIGHTENING THESE FITTINGS, ONE AS BACKUP WRENCH TO PREVENT TWISTING OF TUBING AND POSSIBLE KINKING OR LINE RUPTURE.**

**BE SURE to connect the ends of the pre-charged 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.**

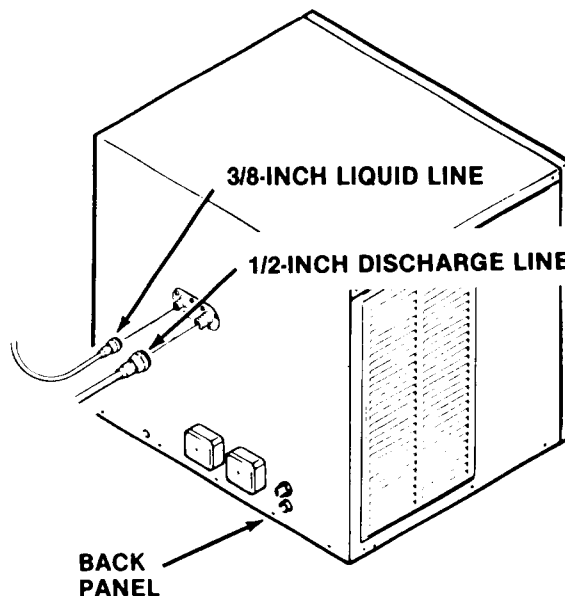
4. Connect the 3/8-inch diameter refrigerant line coupling, with the SERVICE PORT fitting, to the remote condenser refrigerant fitting labeled: LIQUID LINE as detailed in Coupling Instructions.
5. Connect the 1/2-inch diameter refrigerant line coupling, with the CHARGING PORT fitting, to the Remote Condenser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



*Pre-Charged Refrigerant Line Connections*



# CM650R 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-chassis earth ground wire. See Wiring Diagram.

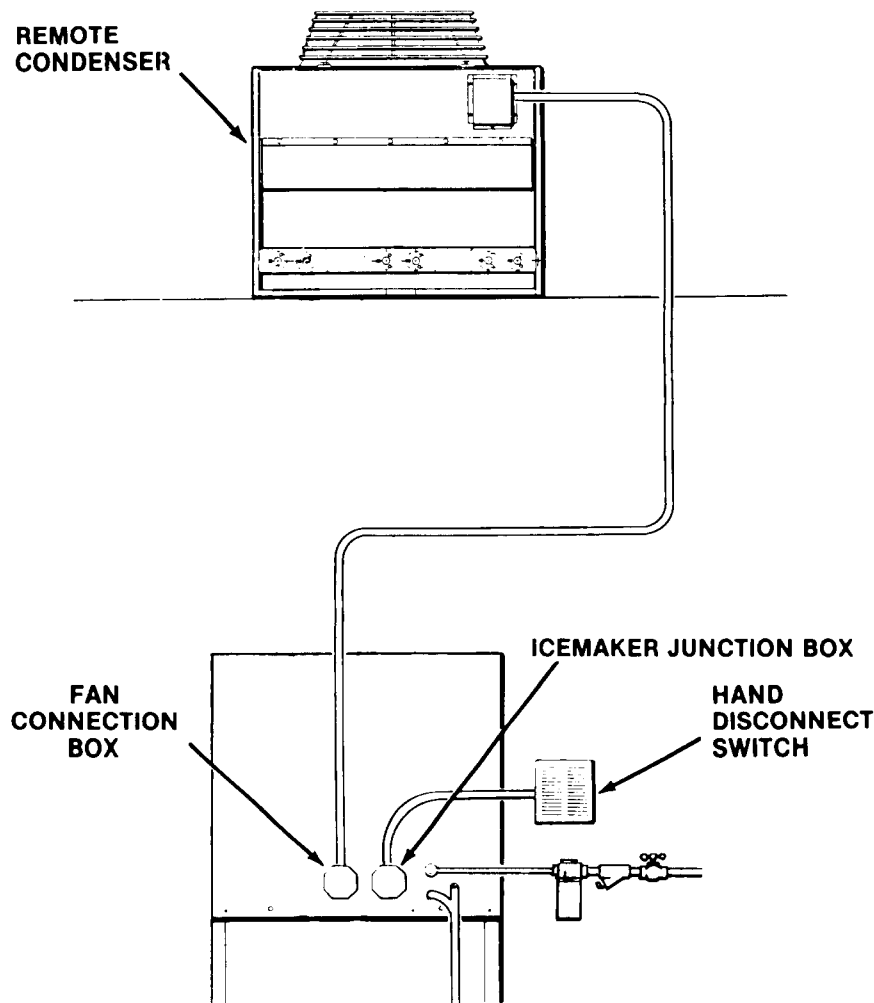
Be certain the cuber is connected to its own electrical circuit and individually fused. Voltage variation should not exceed ten percent of the nameplate rating, even under starting conditions. Low voltages can cause erratic operation and may be responsible for serious damage to the icemaker.

Electrical connections are made at the rear of the icemaker, inside the junction box.

The remote condenser must be wired to the CM650R 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 CM650R at the contactor terminals for the compressor and the fan motor operates whenever the compressor operates.



# CM650R FOR THE ELECTRICIAN

## INSTALLATION INSTRUCTIONS

Installation instructions for the KCMR230 Kit when using (2) CM650R Ice makers and the RC652-32B Model Condenser.

SEE NAMEPLATE for current requirements to determine wire size to be used for electrical hookup. Refer to wiring diagram.

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.

### FOR CONNECTION OF TWO ICEMAKERS:

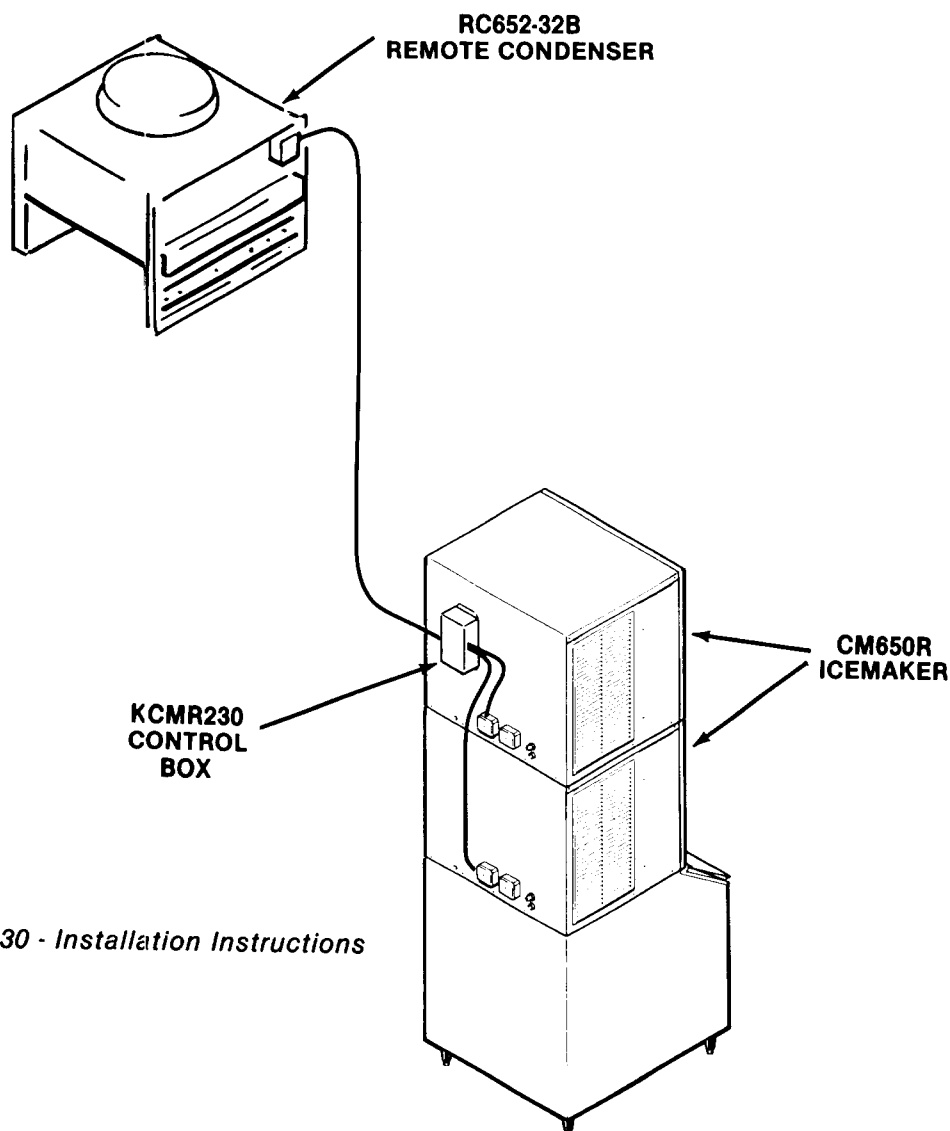
Refer to appropriate wiring diagrams and connect each icemaker to the KCMR230 terminal strip as follows:

1. Attach the KCMR230 to a permanent location, convenient for each icemaker hookup and future service. Attach a solid earth ground wire to the GROUND SCREW.

2. Route connecting wires from first ice machine lower junction box and connect to KCMR230 terminal strip connections marked: NO. 1 ICE MACHINE.
3. Route connecting wires from second ice machine lower junction box and connect to stacking kit terminal strip connections marked: NO. 2 ICE MACHINE.
4. Route connecting wires from KCMR230 terminal strip marked: TO REMOTE FAN and connect at the remote condenser junction.

### CAUTION

**IMPROPER VOLTAGE SUPPLIED TO THE ICEMAKER WILL VOID YOUR PARTS REPLACEMENT PROGRAM.**



*KCMR230 - Installation Instructions*

# CM650R FOR THE ELECTRICIAN

## KCMR230 INSTALLATION INSTRUCTIONS

**NOTE:** 3 phase machines. It is critical to have the same "leg" or line run to L3 on both ice makers' contactors and if **WILD LEG** current is used, hook the wild leg to **L3** on **BOTH** ice makers.

5. Check phasing of the electrical circuit as follows:

A. The phasing of the wiring **MUST** now be checked, as incorrect wiring will result in a failure of the kit relay.

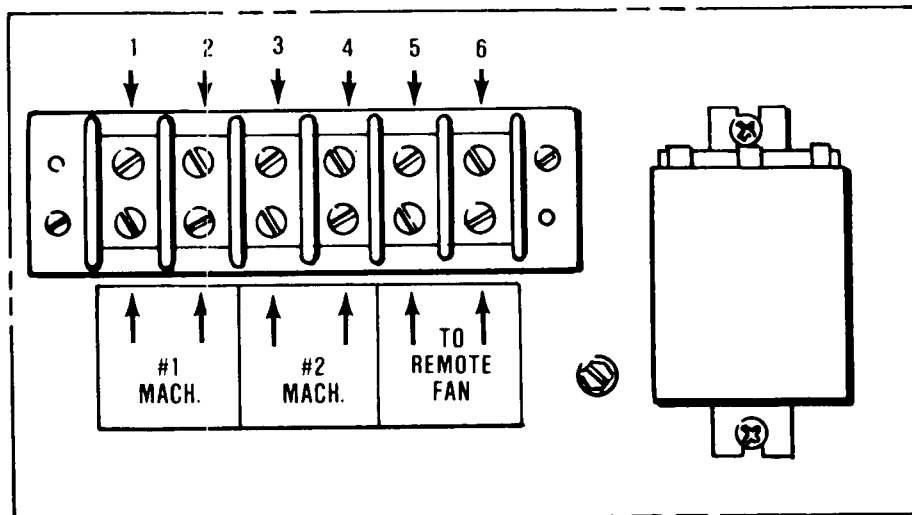
Below is an illustration of the KCMR230 terminal strip. Note that each terminal is marked: 1 - 2 - 3 - 4 - 5 - 6. For proper phasing:

Terminals #1 and #3 must be connected on the same side of the line (such as L1).

Terminals #2 and #4 must be connected on the same side of the line (such as L2).

B. Make the test with a volt meter as follows:

1. Switch on icemaker #1 first, then switch on icemaker #2. (The compressors must be operating for this test).
2. Test with a volt meter between terminals #2 and #4, then between terminals #1 and #3. Compare the readings obtained to the ones in the following list.



C.

### CORRECT VOLTAGE READINGS

Test terminals 1 - 2	Full voltage (208v-220v)
Test terminals 1 - 3	No voltage
Test terminals 2 - 3	Full voltage
Test terminals 2 - 4	No voltage
Test terminals 3 - 4	Full voltage
Test terminals 1 - 4	Full voltage

D. If there is full voltage where there should be no voltage, turn off icemaker #2, (both toggle switches). Then turn off icemaker #1 (both toggle switches). The connections at the KCMR230 terminal strip marked icemaker #1 must be **reversed** (put the wire that was on 1 on 2 and the wire that was on 2 on 1).

**Remember to do all wiring with the electrical power to both icemakers disconnected at the source.**

# CM650R FOR THE PLUMBER

## CONFORM TO ALL APPLICABLE CODES

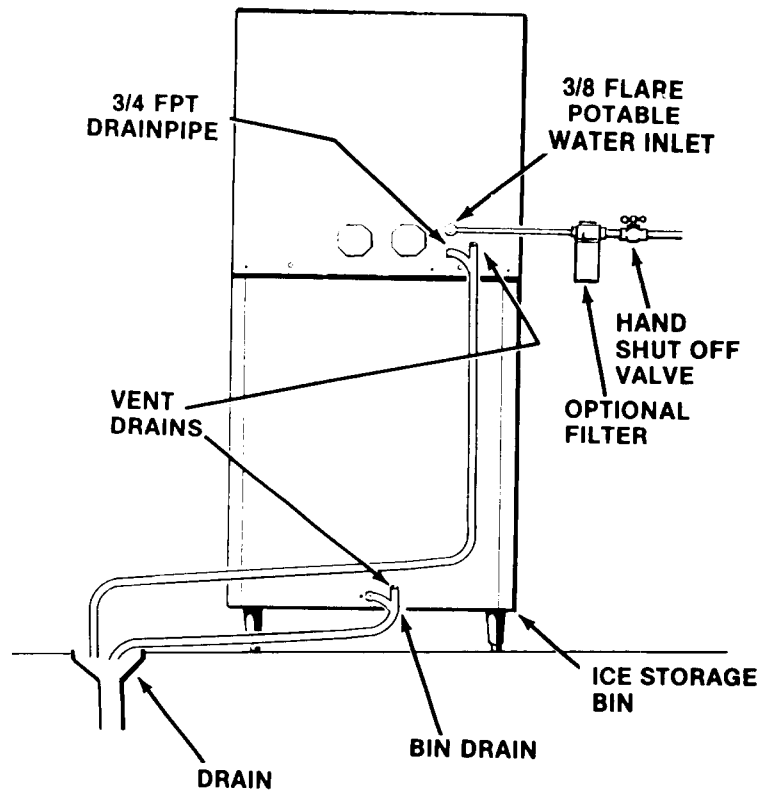
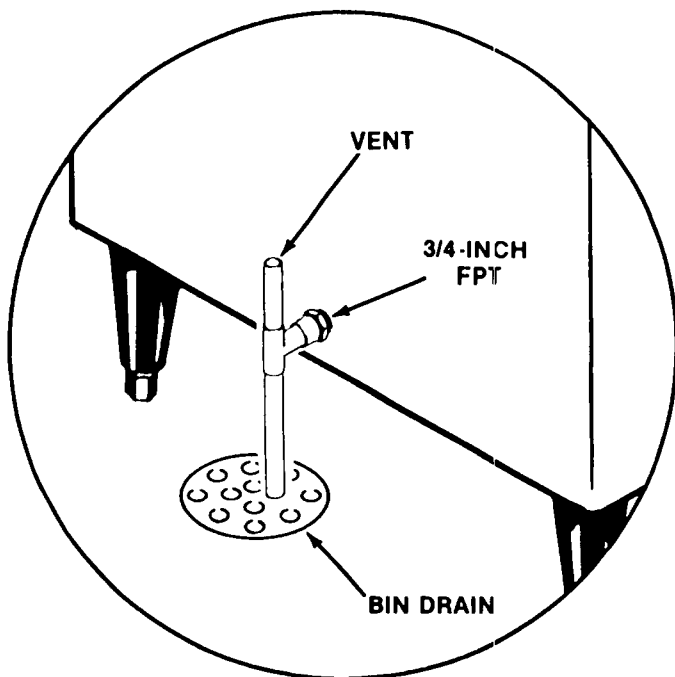
### WATER SUPPLY AND DRAIN CONNECTIONS

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 shutoff valve installed in an accessible place between the water supply and the cuber. In some cases a 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 to be installed to conform with the local plumbing code. Install a vertical open vent on drain line to ensure good venting. The drain receptacle should be an open, trapped or vented construction.

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

The ice machine sump drain is 3/4" FPT. There must be a vent at this connection for proper sump drainage.



**DO NOT SWEAT HTB DRAIN FITTINGS. EXCESSIVE HEAT WILL DAMAGE THE BIN.**

*Installation, Water Supply and Drain Connection*

# CM650R FOR THE INSTALLER

## FINAL CHECK LIST

1. Is the cabinet in a room where ambient temperatures are within the minimum and maximum temperatures specified?
2. Is there at least six inches clearance at both sides of the cabinet for proper air circulation?
3. Has water supply pressure been checked to insure a minimum of 20 PSIG and a maximum of 120 PSIG operating pressure?
4. Is the cabinet level?
5. Check that the shipping material and foam backing have been removed from inside the cabinet.
6. Has the bin thermostat bracket been properly installed?
7. Check that the drain troughs are properly secured to the bottom of the evaporator plates.
8. Have all electrical and piping connections been made?
9. Is the water supply line shut-off valve installed and electrical wiring properly connected?
10. Has the shipping block been removed from under the compressor. Have the compressor hold-down nuts 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 or rubbing and possible failure.
12. Have the bin and cabinet been wiped clean?
13. Have the remote condenser and pre-charged refrigerant lines been properly installed per instruction on page 6 and connections checked for leaks?
14. Has the remote condenser fan motor been connected electrically to the icemaker at the junction box of the remote condenser and the junction box of the icemaker?
15. Verify that the Master Switch and Compressor Switch are in the "OFF" position.
16. Has the Manufacturer's Registration Card been properly filled out? Check for correct model and serial numbers from Serial nameplate, then mail the completed card to the SCOTSMAN factory.
17. Has the owner/user been given the Service Manual and instructed how to operate and maintain the icemaker?
18. Has the owner been given the name and telephone number of the authorized SCOTSMAN Service Agency serving him?
19. **Refer to Pre-Start Instruction on page 13.**

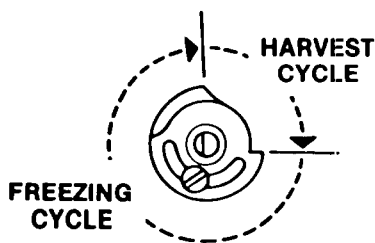
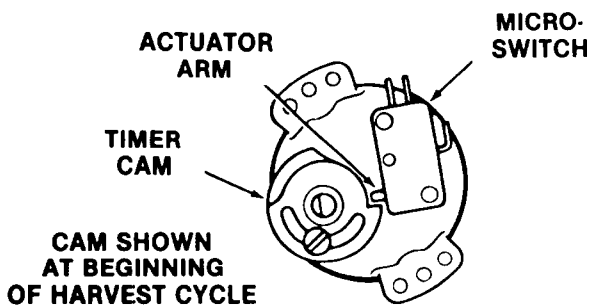
# CM650R START-UP

## PRE-START

1. Is the location of the equipment proper?
2. Is the electrical voltage correct?
3. Has power to the machine been on for at least 12 hours, and is the compressor dome warm? (Toggle switches on OFF?)
4. Has the water supply been turned on?
5. Is the icemaker level?
6. Are the refrigerant lines for the condenser properly connected and routed?
7. Are the bin thermostat controls mounted in the bracket and is the bracket in the proper mounting spot?

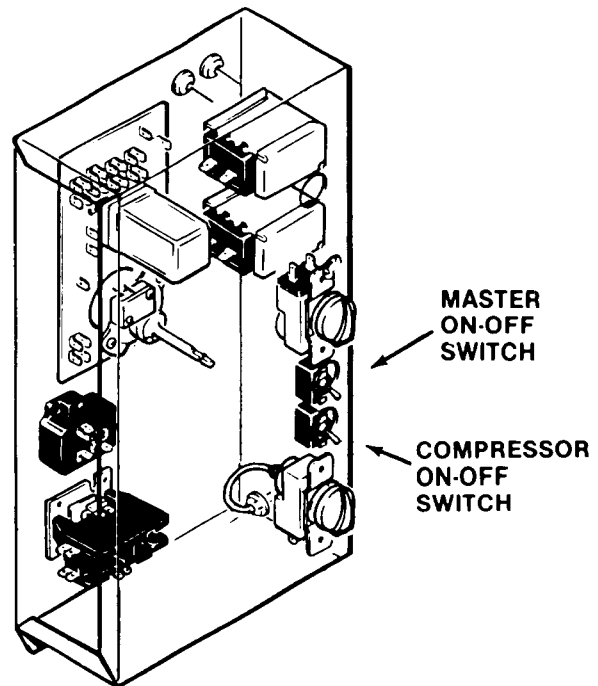
## START-UP

1. Go through the Pre-Start check list.
2. Remove front panel by pulling out at the bottom to unsnap and lift off.
3. Remove the control box cover.
4. Remove side service panels. Check that the King Valve is closed and the compressor is warm.
5. Rotate timer shaft clockwise until the timer cam appears the same as in the illustration.



**CAM SHOWN DIVIDED INTO TYPICAL FREEZING & HARVEST CYCLES**

*Timer Cam Positions*



6. Turn the master switch to ON and observe that the inlet water solenoid opens, and water begins to enter the sump, also observe that the timer does advance in a clockwise direction.
7. The timer will move to the end of the harvest position and stop. If the sump is still not full, repeat step 5. When the sump is full the water pump will be circulating water over the evaporator plates. This water is returning to the sump and any excess will be drained out through the overflow standpipe in the sump. When the timer stops, the inlet water stops coming in, but the pump stays on.
8. Open the King Valve located on the receiver.
9. Move the compressor toggle switch to ON. Observe that the sight glass begins to fill with liquid refrigerant and stays full.
10. On the roof, observe that the condenser fan is running.
11. Now the icemaking process begins. The evaporator plates will soon begin to feel cool, and ice begins to form where the water is flowing over the metal portions of the plate.
12. Let the machine function as shipped, but observe the first harvest of cubes.  
**ADJUSTMENTS MAY BE REQUIRED.**



# CM650R START-UP

13. Observe second and third cube harvest.

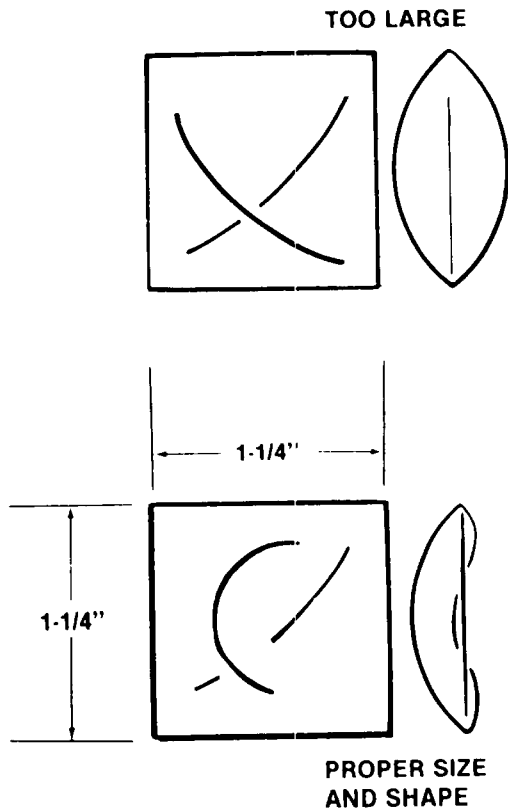
## Check size of SCOTSMAN CONTOUR CUBE

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.

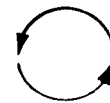
An under-charged refrigeration system produces smaller cubes at the top of the evaporator plate and large cubes at the bottom. Charge system per NAMEPLATE specifications.

## Charge Refrigeration System with REFRIGERANT 502 ONLY.

In areas where extreme problem water condition exists, filtering or purifying equipment is recommended. Contact SCOTSMAN ICE SYSTEMS, Service Department, Albert Lea, Minnesota 56007 for further details.



Too LARGE — may cause evaporator freeze ups. Adjust cube size control counter-clockwise to obtain smaller cubes



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. To obtain proper size cubes, adjust cube size control clockwise. May cause freeze up problems due to poor harvest.



# CM650R START-UP

14. 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:

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

## ADJUSTMENT OF CUBE SIZE

To produce SMALLER sized ice cubes:

Locate cube size control, in the top right section of the control box.

Rotate the adjusting knob 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 correct ice cube size is achieved.

To produce LARGER sized ice cubes:

Locate cube size control, in the top right section of the control box.

Rotate the adjusting knob 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 correct ice cube size is achieved.

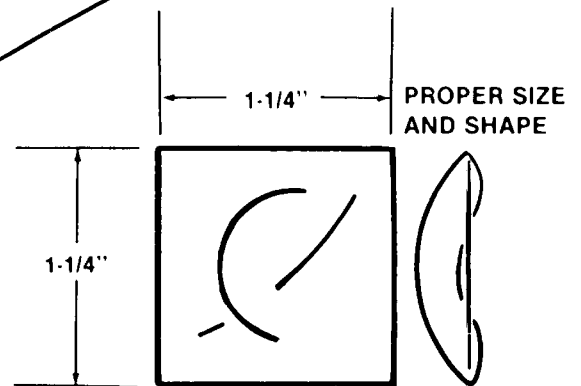
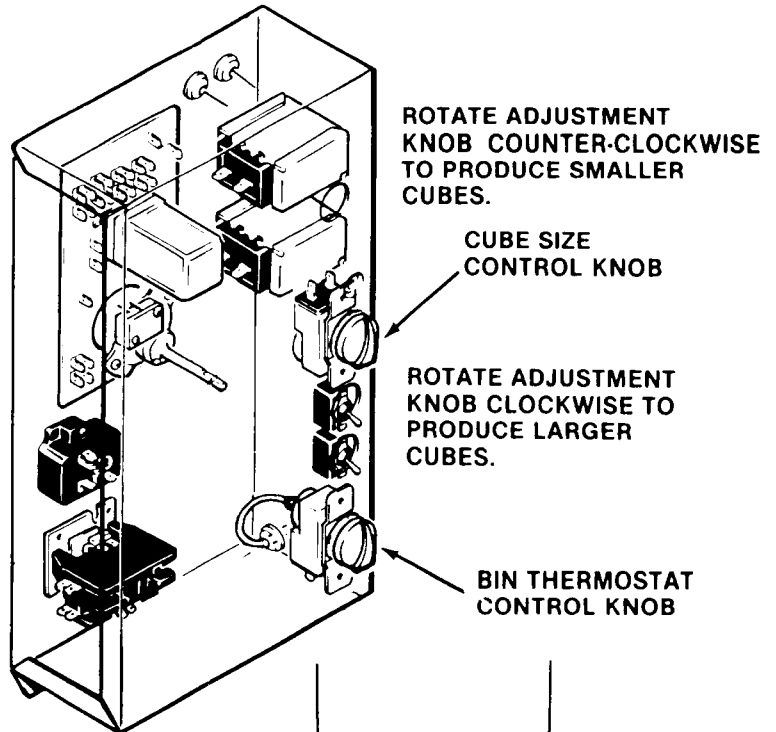
15. Check texture if ice cubes; when partially cloudy throughout, suggests icemaker is operating short of water; or, possibly an extreme problem water condition exists, wherein filtering or purifying equipment is recommended. Contact SCOTSMAN ICE SYSTEMS, Service Department, Albert Lea, Minnesota 56007 for further details.

## BIN THERMOSTAT OPERATION

With the icemaker in the harvest cycle, hold ice against the bin thermostat control bulb to test shutoff at the END OF THE HARVEST CYCLE. If the bin thermostat is OPEN, the liquid line solenoid valve will close, shutting off refrigeration 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.

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.



*Cube Size Control Adjustment*

16. Replace control box cover and all cabinet panels and screws.
17. Thoroughly explain to the owner/user the significant specifications of the icemaker, the start up and operation, going 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.

# CM650R 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 by 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.

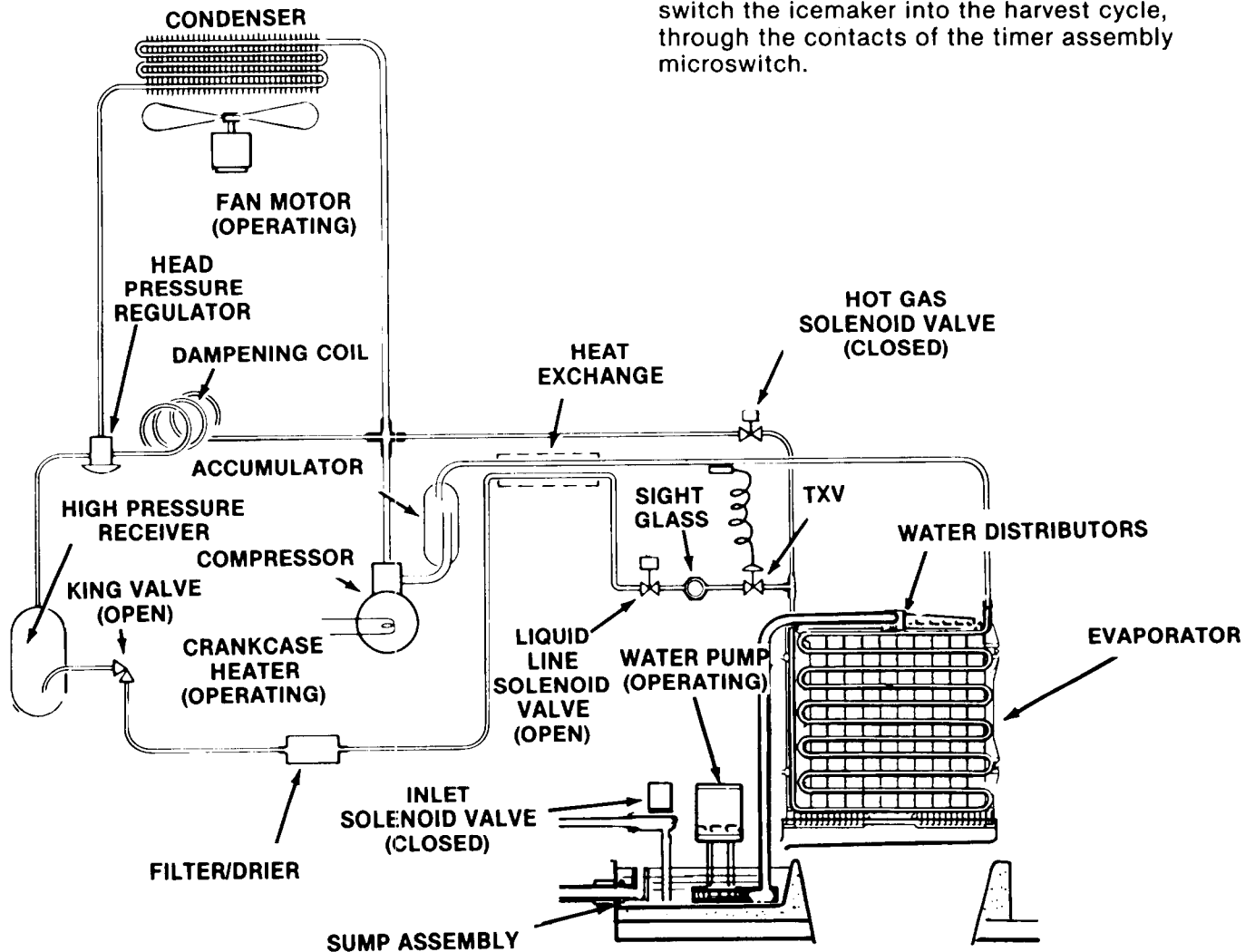
In the compressor, gaseous refrigerant is compressed and discharged into the condenser, as a high pressure, high temperature gas. The refrigerant is cooled by air and condenses into a high pressure liquid. The liquid refrigerant then passes through a receiver, which stores excess refrigerant not required 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 become 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*

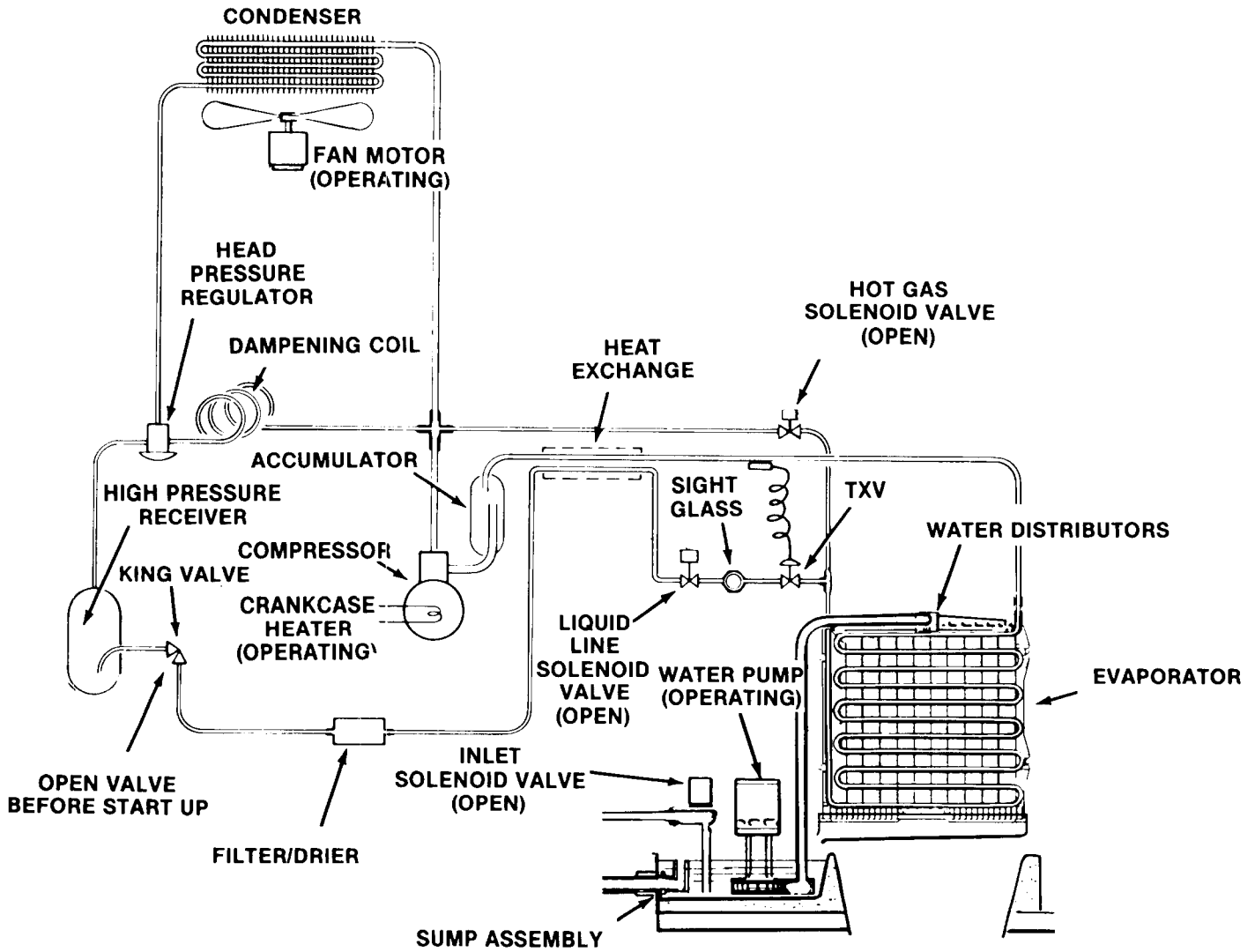
# CM650R OPERATION

## 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*

# CM650R 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 cycle, the timer is not turning, but the icemaker is refrigerating the water, starting to turn the water into ice.

# CM650R 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	

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	

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	

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	

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.

# CM650R 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.

# CM650R SERVICE SPECIFICATIONS

In servicing a machine, it is often useful to compare that individual unit's operating characteristics to those of a normally operating machine. The numbers and facts listed on this page 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. . . . .	3/4	
	Close	Open
Cube Size Thermostat, Reverse Acting, Temperature Range . . . . .	(+15 <sup>0</sup> F. to +2 <sup>0</sup> F.)	n/a
Bin Thermostat Temperature Range . . . . .	38.5 <sup>0</sup> - 43.5 <sup>0</sup>	33.5 <sup>0</sup> - 38.5 <sup>0</sup>
High Pressure Safety Switch, PSIG . . . . .	manual	450
Low Pressure Control Switch, PSIG . . . . .	23	3

## OPERATING CHARACTERISTICS

This model is remote air cooled and during the freezing cycle, the discharge pressure will slowly decline as the unit forms ice on the evaporators. At the same time the suction pressure is also dropping, reaching it's lowest point at the end of the freeze cycle. Compressor amps experience a similar decline.

During the harvest or defrost cycle, the suction pressure goes up dramatically with the opening of the hot gas by pass valve. The discharge pressure falls when this happens.

### Freeze Cycle:

For example, with conditions at 70<sup>0</sup>F. air, 55<sup>0</sup>F. water, and with the condenser air intake temperature at -5<sup>0</sup>F. the discharge pressure will be about 225 PSIG. Suction pressure at the end of freeze will be about 28 PSIG.

Freeze cycle time will be about 12-13 minutes.

Compressor amps 5 minutes into the freeze cycle will be about 7 for single phase.

At 110<sup>0</sup>/90<sup>0</sup>/80<sup>0</sup>, the discharge pressures will go from about 350 down to 290. Suction pressure will be about 33 PSIG at the end of the 19-20 minute freeze cycle.

### Harvest Cycle:

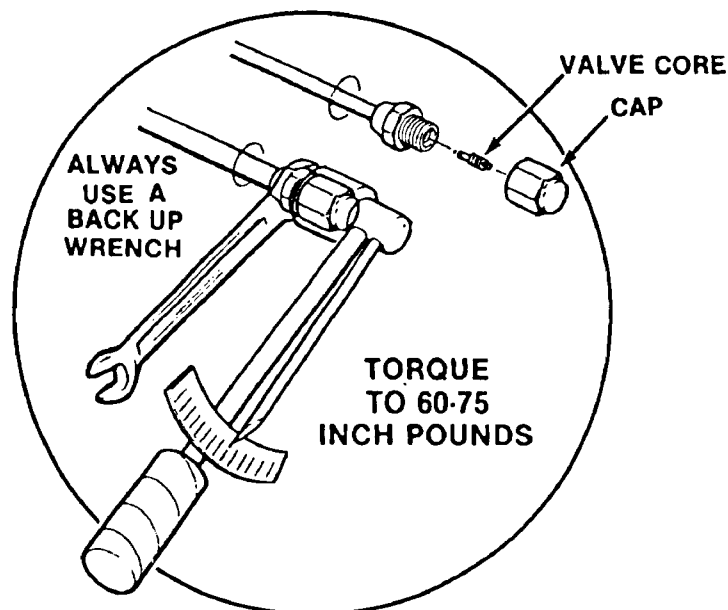
Discharge pressure at 70<sup>0</sup>/55<sup>0</sup>/-5<sup>0</sup> will be about 170, and suction pressure will be around 80 PSIG.

At 110<sup>0</sup>/90<sup>0</sup>/80<sup>0</sup>, discharge pressure will be about 260. Suction pressure will be about 120 PSIG.

The ice per cycle is 5.5 to 6 pounds.

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.

**After servicing refrigeration system, always torque the access valve caps to 60-75 Inch pounds.**





# CM650R MAINTENANCE & CLEANING INSTRUCTIONS

////////////////////////////////////  
A Scotsman Ice System represents a sizable investment of time and money in any company's business. In order to receive the best return for that investment, it MUST receive periodic maintenance.

It is the USER'S RESPONSIBILITY to see that the unit is properly maintained. It is always preferable, and less costly in the long run, to avoid possible down time by keeping it clean; adjusting it as needed; and by replacing worn parts before they can cause failure. The following is a list of recommended maintenance that will help keep the machine running with a minimum of problems.

Maintenance and Cleaning should be scheduled at a minimum of twice per year.

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

## 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.
  2. Clean the water strainer.
  3. Clean the remote air cooled condenser. Do not use a wire brush. Vacuum or blow out any dust in the fins of the condenser: the condenser is only clean when light can be seen through the fins.
  4. Check that the cabinet is level in the side to side and front to back directions.
  5. Clean the water system, evaporator plates and sump assembly, using a solution of Scotsman Ice Machine Cleaner. Refer to CLEANING - Ice maker.
- Cleaning requirements vary according to local water conditions and to how much the machine runs. Continuous check of the clarity and shape of the ice cubes, with a visual inspection of the water system parts, evaporator parts and the reservoir will indicate if more frequent cleaning is needed.
6. Check and tighten all bolts and screws.
  7. Check for water leaks and make corrections.
  8. Check that the bin thermostat operates correctly: holding ice on the thermostat control tube in the bin should cause the icemaker to shut off at the end of the harvest cycle. After the ice is removed, the icemaker should restart within a few minutes.
  9. Check cube size, adjust if required.
  10. Check harvest time, adjust if required.

## ICE STORAGE BIN

The interior liner of the bin is in contact with a **food** product: **ice**. The storage bin must be **cleaned** regularly to maintain a **sanitary** environment. Once a week cleaning with soap and water, a hot water rinse and an air dry is a basic procedure.

Every 90 days, the liner should be sanitized with a commercial ice machine sanitizer, according to the directions of the sanitizer, or with a solution of household bleach and water:

1. Mix the bleach and water using the ratio of two ounces of bleach to two gallons of water.
2. Wipe all interior surfaces of the ice storage bin with the bleach and water.
3. Allow to air dry.

## CLEANING: ICEMAKER

1. Remove front panel.
2. Switch the compressor switch to OFF. Switch the master switch to OFF.
3. Remove 4 thumbscrews and the front liner.
4. Twist forward and remove the front drain trough, and switch the master switch to CLEAN, pumping the water from the reservoir into the bin. Replace the drain trough.
5. Mix 8 ounces of Scotsman Ice Machine Cleaner with 1 gallon of warm (95°F. - 115°F.) water and pour into the reservoir until full.

////////////////////////////////////  
**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.

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

# CM650R MAINTENANCE & CLEANING INSTRUCTIONS

6. Let the unit operate for 30 minutes with the compressor off, then switch the unit off.
7. Remove the front drain trough again.
8. Switch the master switch to CLEAN to pump water from the sump into the bin. Continue to add fresh water to flush residual cleaner from the system. Switch the master switch off.
9. Wash the plastic and stainless liners of the freezer section with a solution of household bleach (1 ounce of bleach to 1 gallon of water) and warm (95<sup>0</sup>F.-115<sup>0</sup>F.) water. Allow to air dry.
10. Replace the drain trough and front liner.
11. Switch the master and compressor switches back on.

12. Replace the front panel

13. Check the next batch of cubes to make sure all of the acid taste is gone.

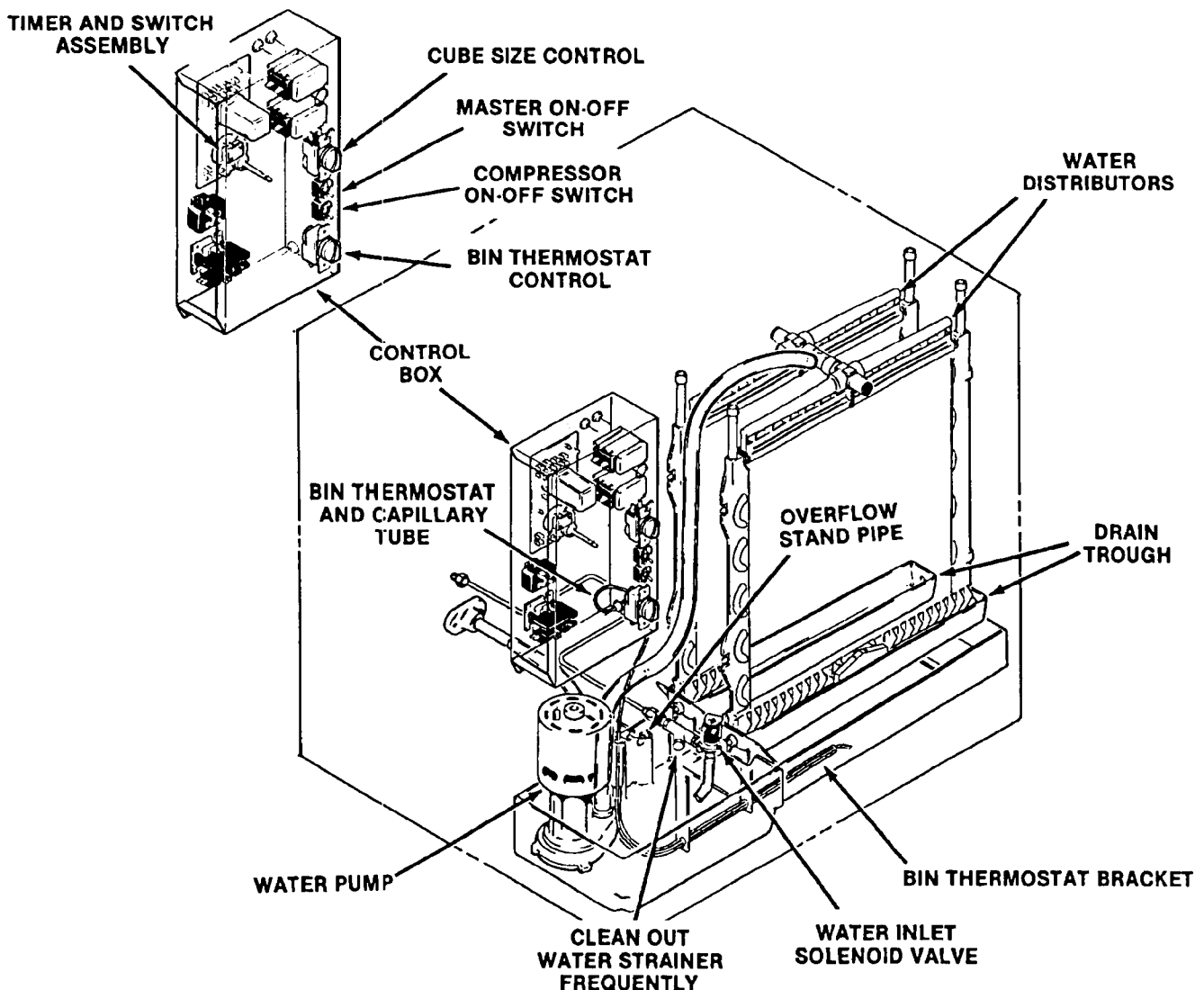
////////////////////CAUTION////////////////////////////////////

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

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

14. Pour hot water into the storage bin to melt the cubes and also clean out the bin drain.

15. The unit is now ready for continued automatic operation.



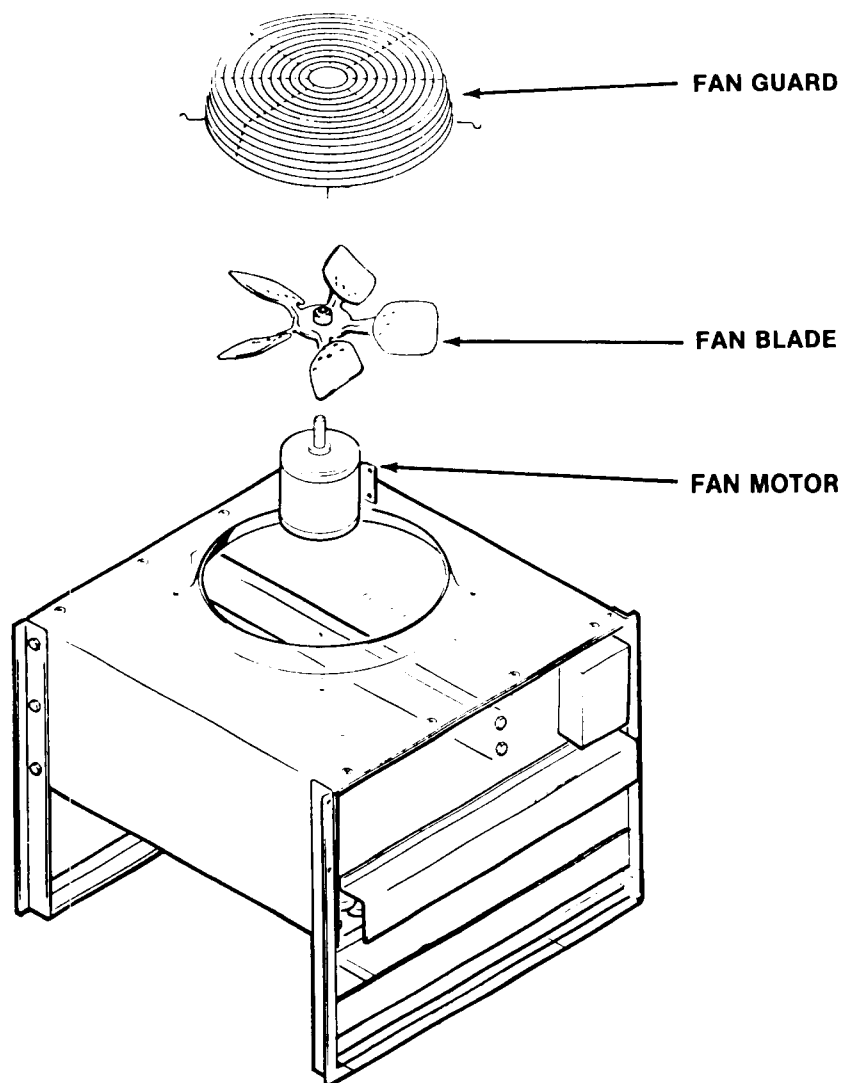
# CM650R MAINTENANCE & CLEANING INSTRUCTIONS

## 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.

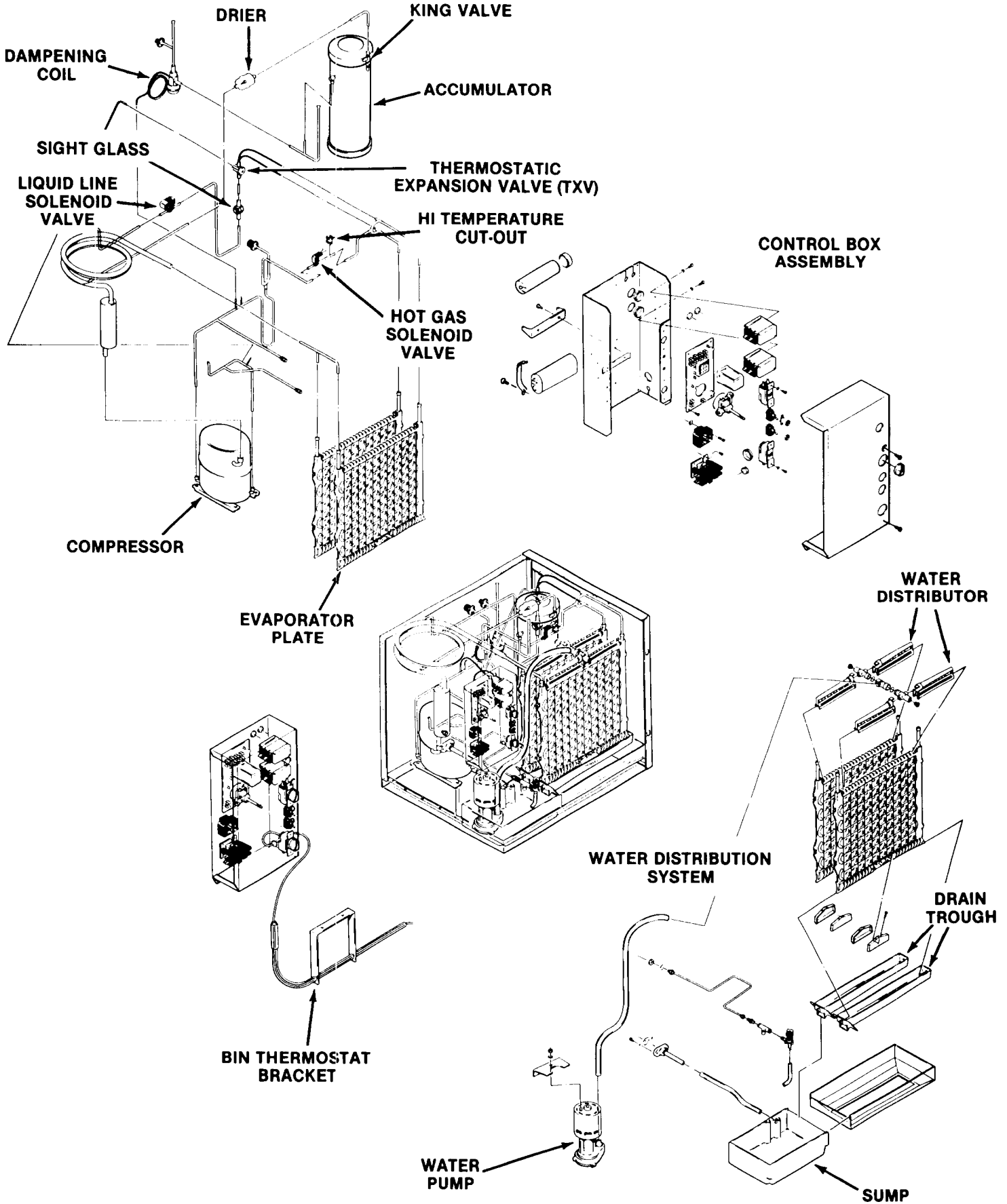
1. With building source electrical power OFF to the icemaker, clean the remote condenser fins, using a vacuum cleaner, whisk broom or brush. **DO NOT USE A WIRE BRUSH.** Instruct customer to clean frequently.

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*

# CM650R COMPONENT DESCRIPTION



# CM650R COMPONENT DESCRIPTION

## 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.

## 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.

## 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 time 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.

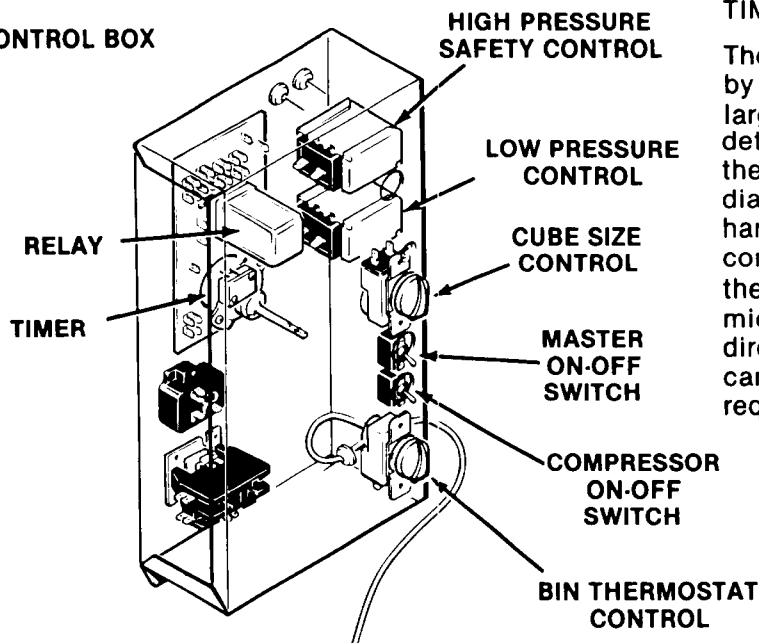
## RELAY

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.

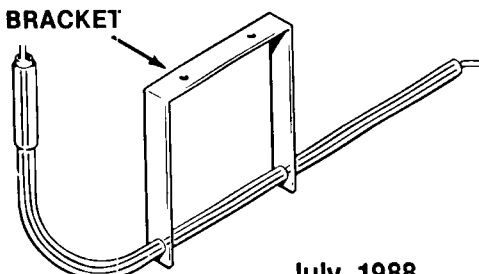
## TIMER — Timer & Switch Assembly.

The function of the 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 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.

## CONTROL BOX



## BIN THERMOSTAT BRACKET



# CM650R COMPONENT DESCRIPTION

## WATER INLET SOLENOID VALVE

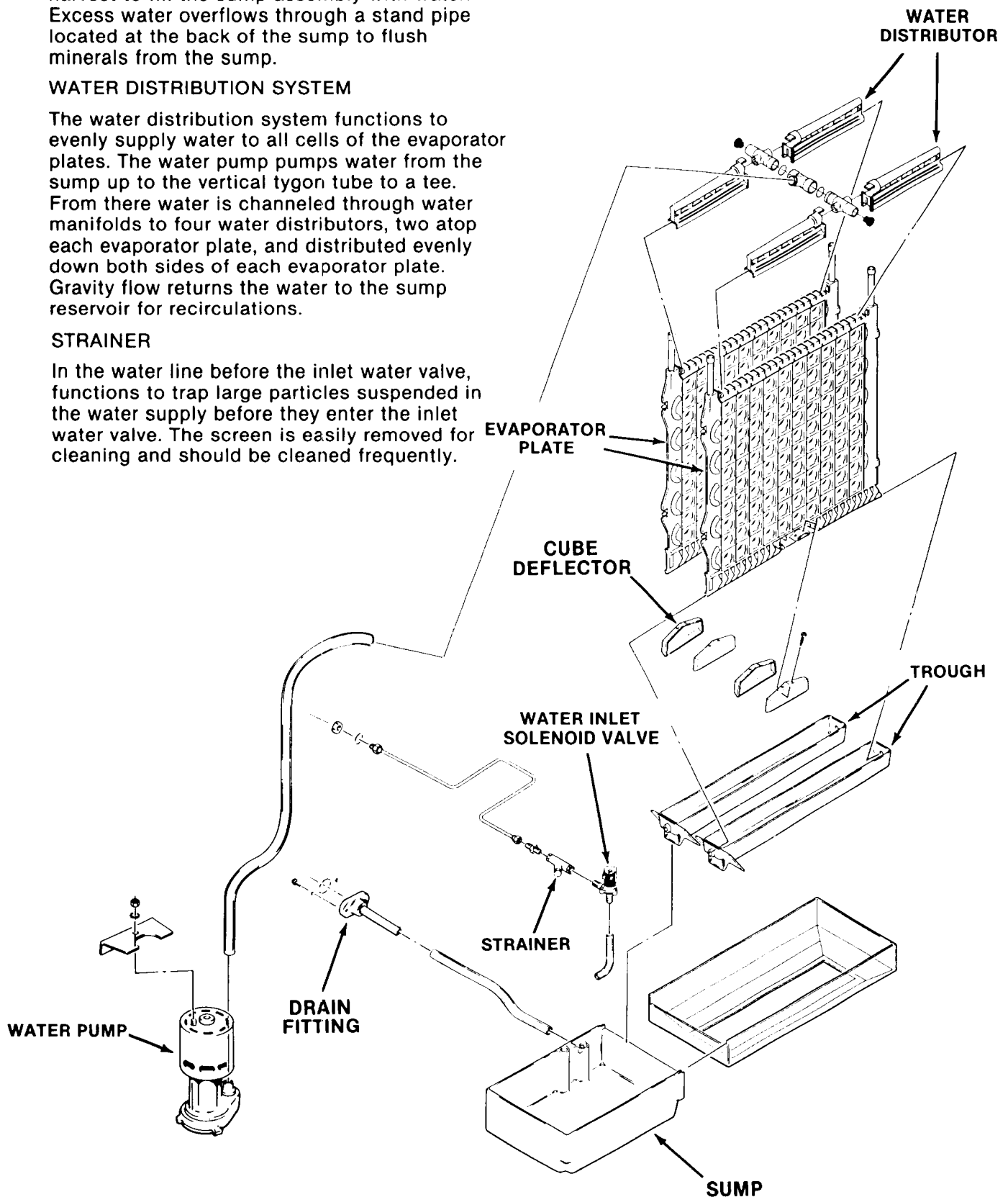
The water inlet solenoid valve opens during harvest to fill the sump assembly with water. Excess water overflows through a stand pipe located at the back of the sump to flush minerals from the sump.

## 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 recirculations.

## STRAINER

In the water line before the inlet water valve, functions to trap large particles suspended in the water supply before they enter the inlet water valve. The screen is easily removed for cleaning and should be cleaned frequently.



# CM650R COMPONENT DESCRIPTION

## 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.

## THERMOSTATIC EXPANSION VALVE (TXV)

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

## ACCUMULATOR

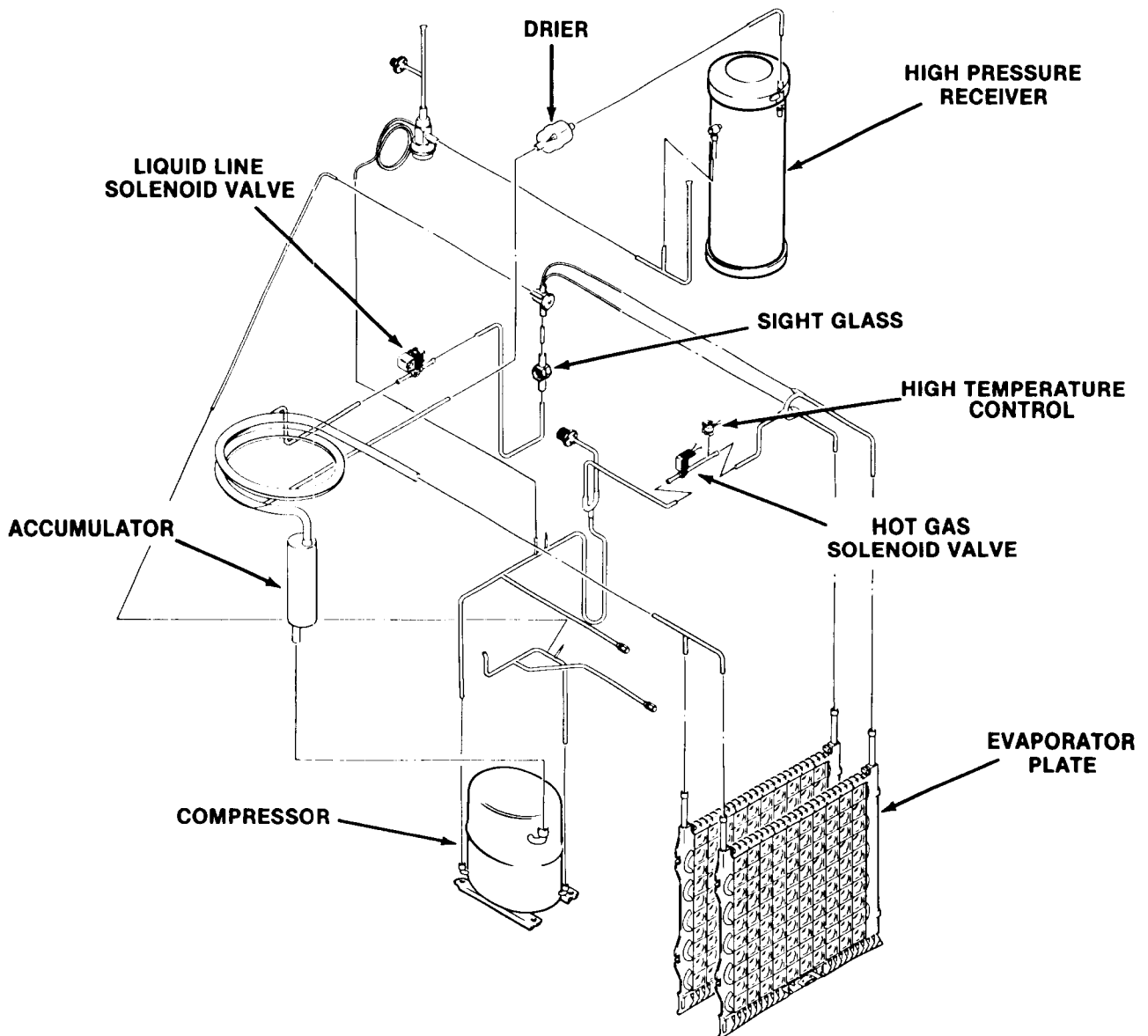
The accumulator traps liquid overfeed from the evaporator during harvest and meters it into the compressor at a controlled rate.

## LIQUID LINE SOLENOID VALVE

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

## 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.



# CM650R 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.

SYMPTOM	POSSIBLE CAUSE	CORRECTION
Irregular size cubes	Some distributor holes plugged.	Clean distributor holes. Clean water sump.
	Shortage of water.	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.



# CM650R 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.
Poor harvests. Icemaker does not harvest.	High ambient temperature for condenser	If possible, reduce condenser inlet air temperature.
	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
Compressor cycles intermittently.	Head pressure regulator valve - low head.	Replace valve.
	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 opens. 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 system and recharge per nameplate requirements.
Frost on compressor.	TXV metering too much refrigerant.	Superheat set too low. Adjust or replace valve.
Unit cycles on high-temp switch.	Hot gas valve leaks thru in freeze cycle or unit stuck in harvest.	Check hot gas valve and electrical controls for harvest cycle.

# CM650R 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 contactor 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.
	Liquid line solenoid valve not opening - keeps unit pumped down.	Repair or replace valve.
	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.

## CM650R 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.

# CM650R REMOVAL AND REPLACEMENT PROCEDURES

## ////////// 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.

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For installations having stacked cubers mounted on a bin, disregard steps to remove the top panel. Access to all areas and parts can still be gained through removal of the necessary front or side panels.

### REMOVAL AND REPLACEMENT OF THE BIN THERMOSTAT CONTROL

To remove the bin thermostat control:

1. Remove front panel.
2. Remove screws and the control box cover.
3. Remove wire leads from the bin thermostat control.
4. Unthread the capillary tube and remove from the bin thermostat control bracket at the bottom right side of the evaporator section.
5. Remove the two screws attaching the bin thermostat control to the side of the control box; then, carefully pull the capillary tube out of the evaporator section. Carefully remove the bin thermostat control and capillary tube from the control box.

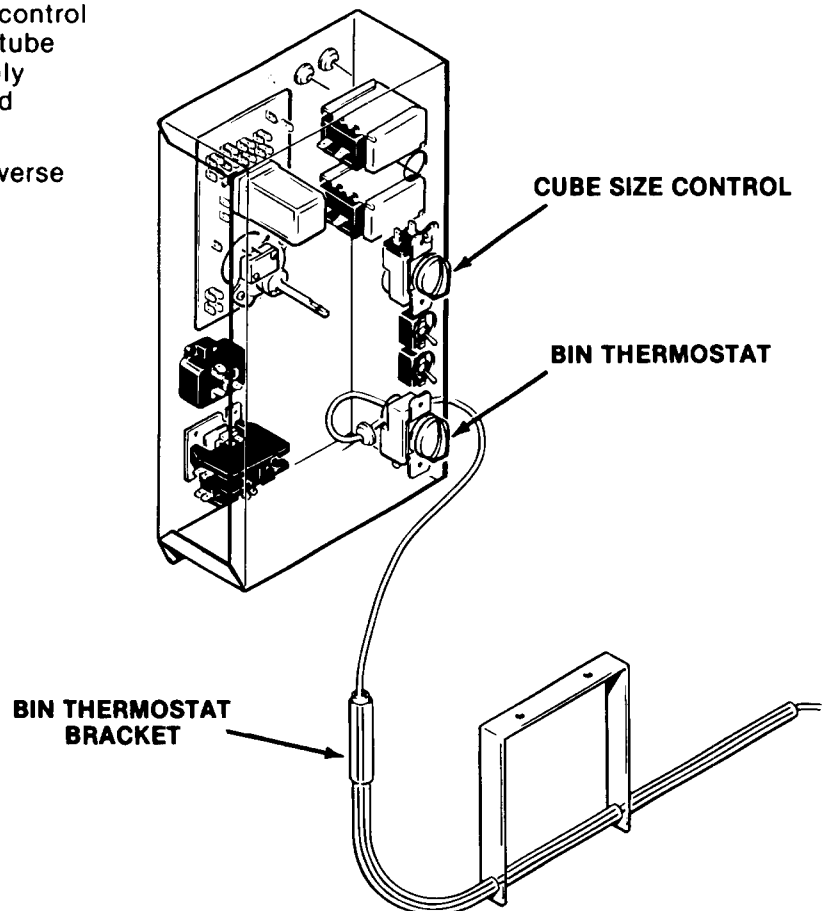
To replace the bin thermostat control, reverse the removal procedure.

### REMOVAL AND REPLACEMENT OF THE CUBE SIZE CONTROL

To remove the cube size control:

1. Remove front panel.
2. Remove cover from control box.
3. Trace capillary tube, from the cube size control to the refrigerant suction line.
4. Remove the coiled capillary tube bulb from the tube well on the suction line.
5. Remove electrical leads from the cube size control.
6. Remove screws and the cube size control.

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



# CM650R REMOVAL AND REPLACEMENT PROCEDURES

//////////////////// **WARNING** //////////////////////  
**Disconnect electrical power supply to icemaker  
whenever adjustment procedures are performed.**  
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## **REMOVAL AND REPLACEMENT OF THE WATER DISTRIBUTOR TUBES AND MANIFOLD TUBES**

To remove the water distributor tube and manifold tube:

1. Pull out to unsnap catches and remove the front panel.
2. Remove 4 thumb screws and remove the evaporator cover.
3. 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 to the right side.
4. Unsnap and disconnect water distributor tubes from the water manifold section.

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**

To remove the water pump assembly:

1. Pull out to unsnap catches and remove the front panel.
2. Remove the Tygon tube to the pump assembly.
3. Disconnect electrical leads from the water pump assembly.
4. Remove thumb screws and the water pump from the sump.
5. Remove one nut and mounting bracket from top of water pump.

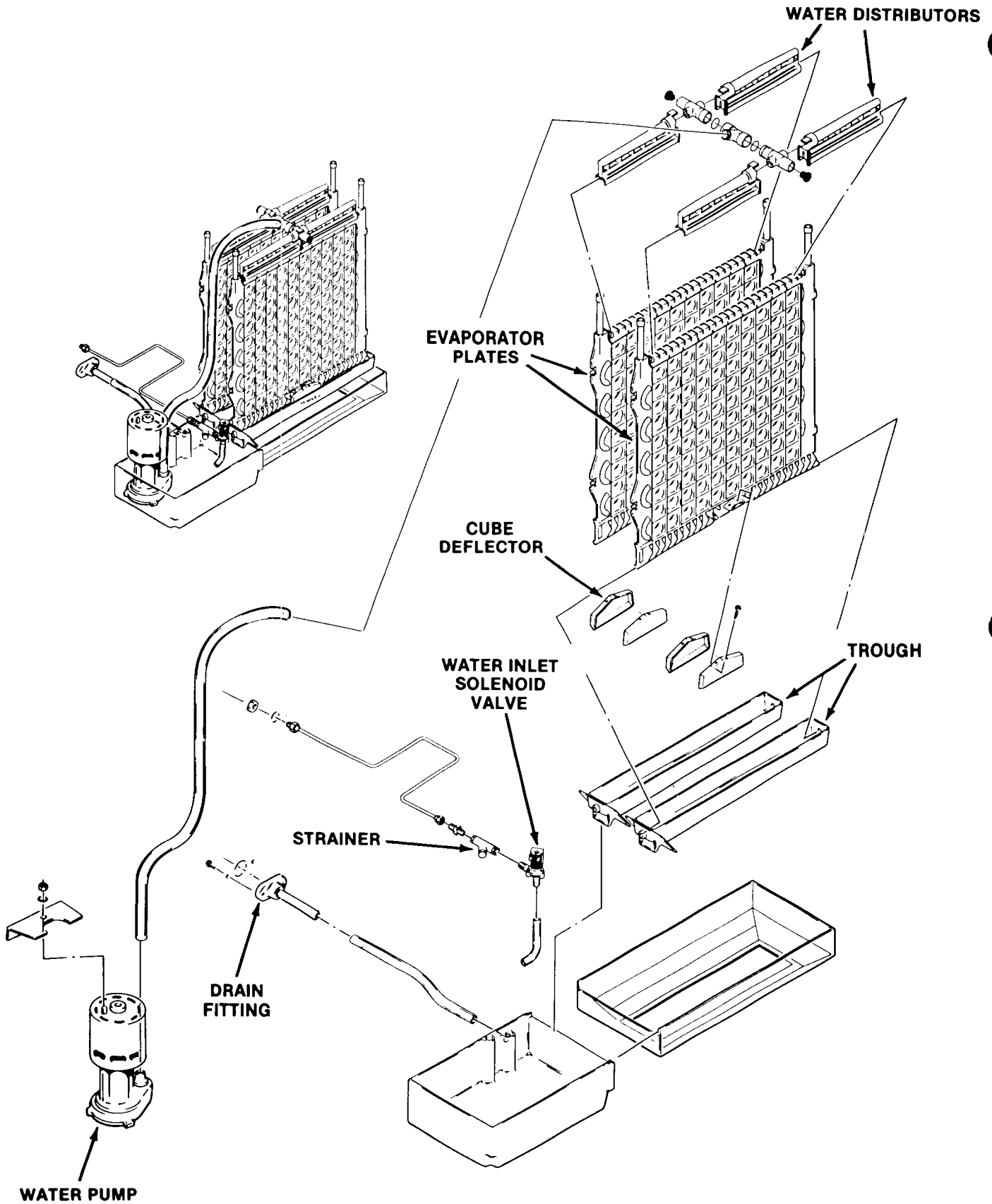
To replace the water pump assembly, reverse the removal procedure.

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

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

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

# CM650R REMOVAL AND REPLACEMENT PROCEDURES



# CM650R REMOVAL AND REPLACEMENT PROCEDURES

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

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

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### REMOVAL AND REPLACEMENT OF THE EVAPORATOR PLATE ASSEMBLY

1. Remove the front and top panels.
2. Bleed off or blow the refrigerant charge through the Schrader valve.
3. Disconnect Tygon water inlet tube(s), of the water manifold tee(s), above the evaporator plates.
4. Unsnap the sump assembly from the lower left and right attachment points on each evaporator plate.
5. Slide the water distributor tubes about 1/8-inch along the top of the evaporator plate to be removed, until the left water distributor tube can be lifted upward.
6. Lift the end of the water distributor tube and slide the distributors toward the left along the top of the evaporator plate, until the flexible right notch is cleared.
7. Unsnap and disconnect each left and right water distributor tube from the water manifold section.

8. Unsolder and remove the refrigerant lines at the top of the evaporator plate to be replaced.
9. Remove nuts at left of the evaporator then, loosen the braces just enough to remove the evaporator plate. Temporarily replace the braces, to support the remaining evaporator plate.

To replace the evaporator plate, reverse the removal procedures. See Nameplate. Weigh in proper charge of R-502.

Whenever a new charge of refrigerant is placed in the system, the compressor should NOT BE RUN until the crankcase heater has been on for 12 hours after re-charging.

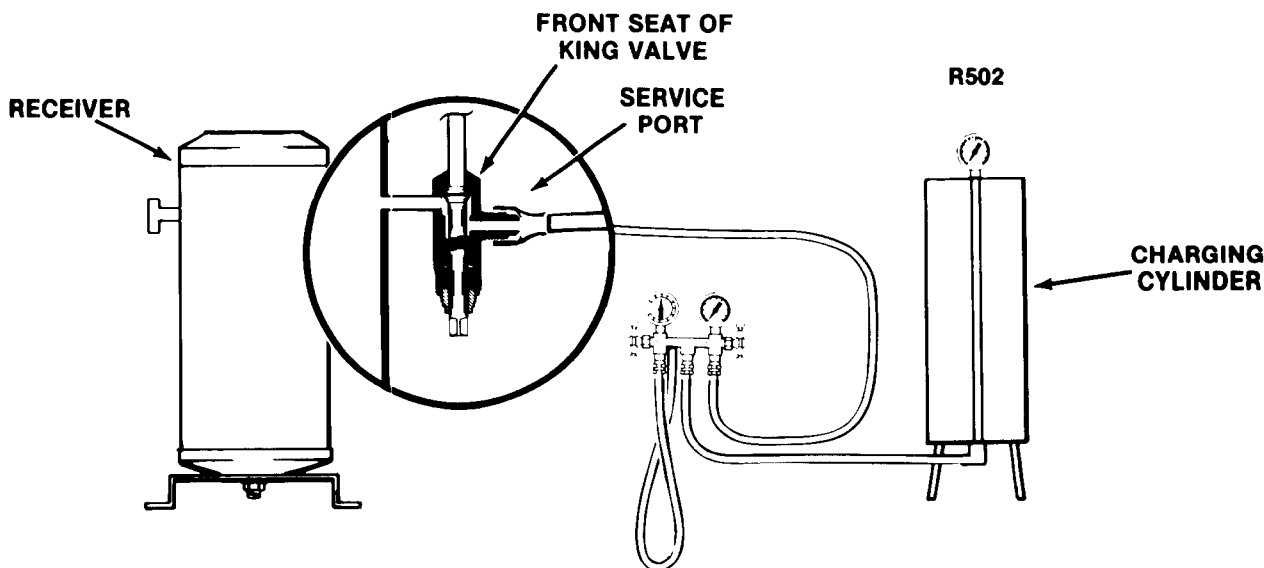
### CHARGING PROCEDURES

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.

## ////////// 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, or sides, to prevent accidental heat damage, or possible fire from torch flame.

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# CM650R REMOVAL AND REPLACEMENT PROCEDURES

