

To the Owner or User:

The Service Manual you are reading is intended to provide you, and the maintenance or service technician, with the information needed to install, start up, clean, maintain, and service the ice system.

Refer to this table of contents to locate the information you need.

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PARTS LIST AND WIRING DIAGRAMS

(Printed in Yellow)

PARTS LIST:

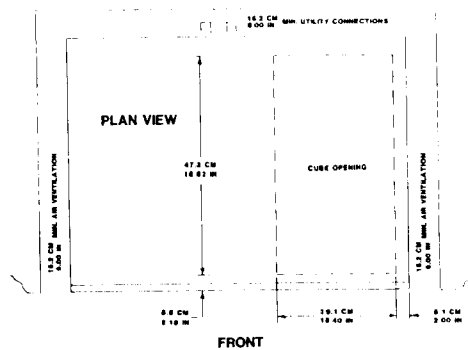
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THE WIRING DIAGRAMS ARE FOR MODELS:

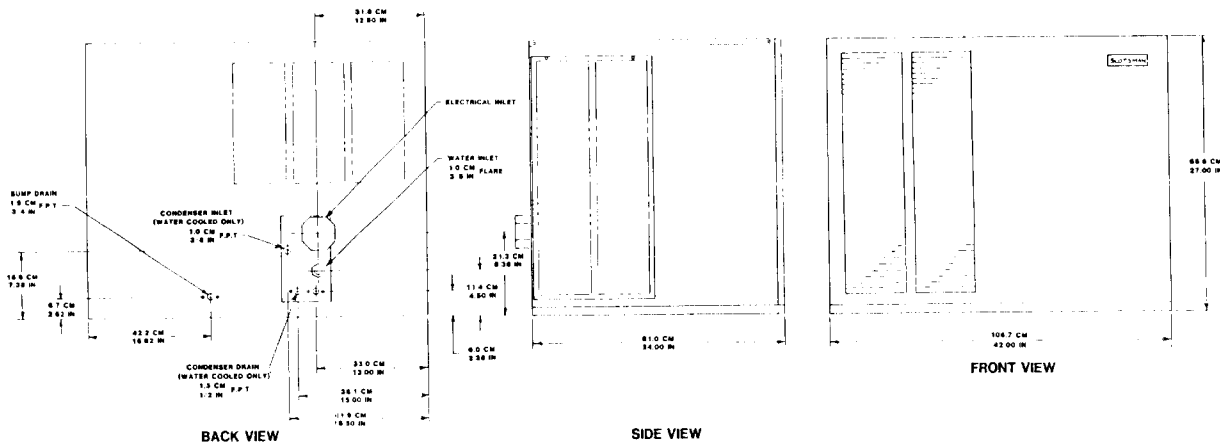
CM1000AE-32A (208-230/60/1) Air Cooled	9
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CM1000 FOR THE INSTALLER



CM1000 CABINET SIZE AND UTILITY CONNECTIONS



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

SPECIFICATIONS

Model Number	Dimensions H" x W" x D"	Ice Type	Cond. Type	Max. Fuse Size	Basic Electrical	Comp. H.P.	No. of Wires	Min. Circ. Ampacity*
CM1000AE-32A	27" X 42" X 24"	Contour Cube	Air	35	208-230/60/1	2.5	2	20.4
CM1000WE-32A	same		Water	35	208-230/60/1	2.5	2	19.7
CM1000AE-3A	same		Air	20	208-230/60/3	2.5	3	10.2
CM1000WE-3A	same		Water	20	208-230/60/3	2.5	3	9.3

The Standard Finish is Enamel Sandalwood.

* Minimum Circuit Ampacity is the figure used to determine wire size per National Electric Code.

IMPORTANT OPERATING REQUIREMENTS

	MINIMUM	MAXIMUM
Air Temperatures	50°F (10°C)	100°F (38°C)
Water Temperatures	40°F (4.4°C)	100°F (38°C)
Water Pressures	20 lbs. gauge	100 lbs. gauge

Electrical Voltage Variations

Voltage rating specified on nameplate	-5%	+ 10%
(when compared to voltage on nameplate)		

NOTICE: Extended periods of operation exceeding the above limitations constitute misuse under the terms of the Manufacturer's Limited Warranty, and will result in a loss of warranty coverage.

REFRIGERANT - R-502

OPTIONAL S.S. - PANEL KIT SPKCM1000

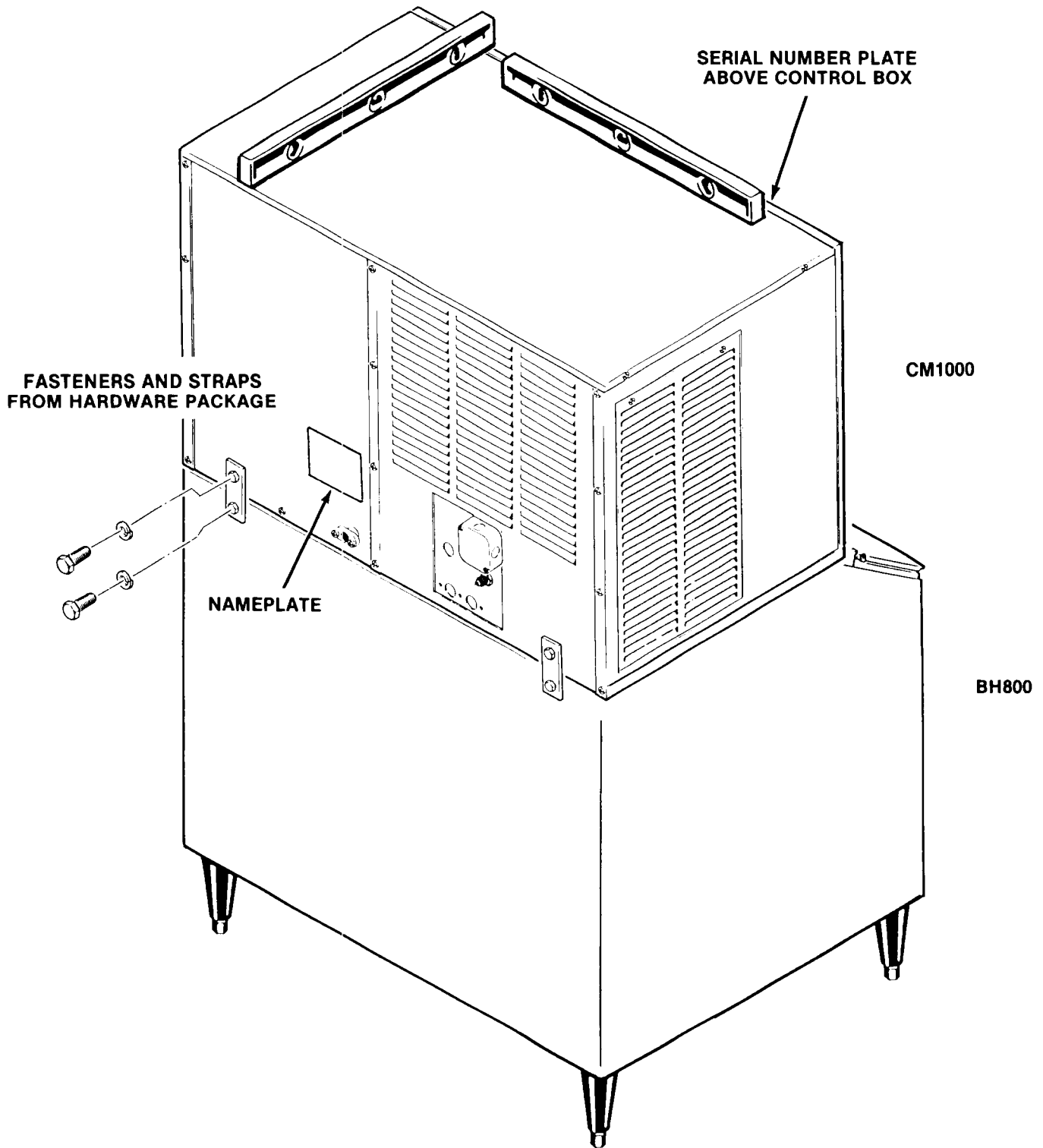
Includes top, front and side panels, must be field installed.

NAMEPLATE LOCATION

See illustration page 3.

STORAGE BIN: BH800

CM1000 FOR THE INSTALLER



CM1000 FOR THE INSTALLER

SELECT LOCATION

The first step in installing the equipment is to select the location. The purchaser of the unit will have a desired spot in mind, check out that spot to insure that it is:

- indoors, in an environment that does not exceed the air and water temperature limitations for the equipment.
- that the necessary utilities are available including the correct voltage electrical power.
- that there be space around the installed machine for service, 6 inches **minimum** left, right, and rear for air-cooled models.

STORAGE BIN

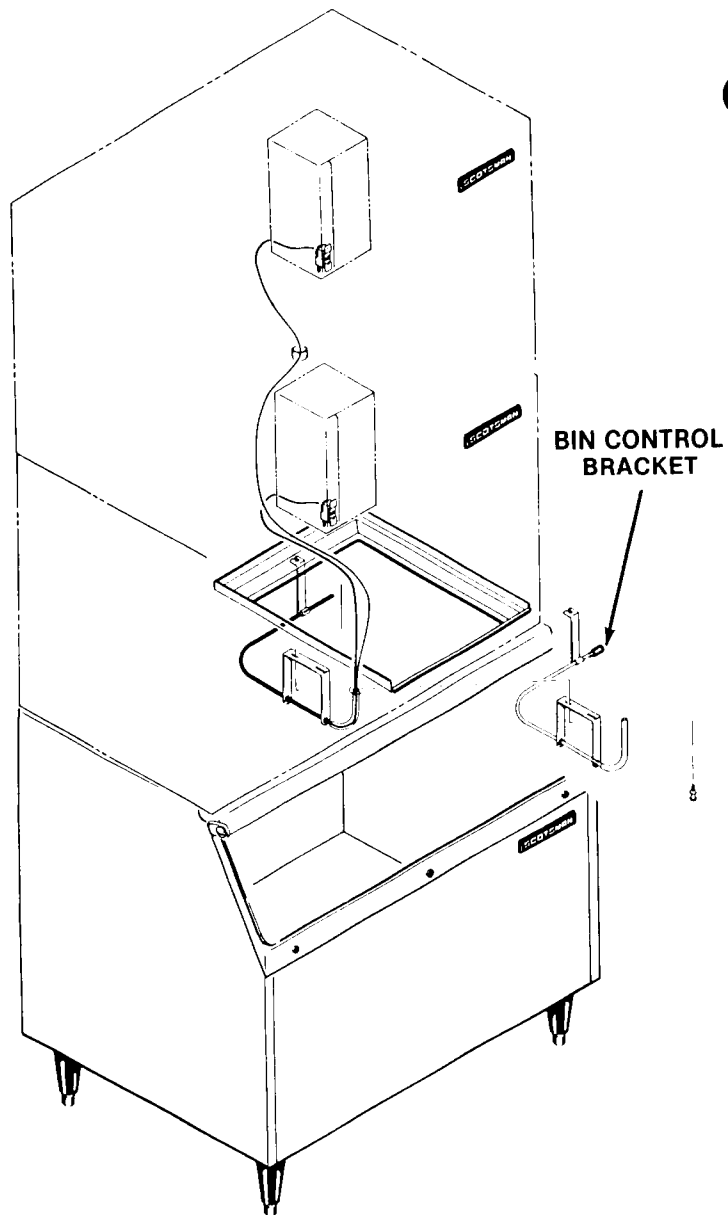
The Scotsman bin for this unit is the BH800. Other bins may be available with bin tops to vary the storage capacity. Check to be sure that they are correct for the CM1000. Lay the bin on its back, using cardboard from the carton to support it, screw in the legs.

Stand the bin upright, and correct any possible small tears in the machine mounting gasket with food grade silicone sealant.

ICE MACHINE

The use of a mechanical lift is recommended for lifting the uncrated icemaker onto the bin. Place the unit directly onto the bin, align the panels so that the unit is even with the back, left, and right sides of the bin. Locate hardware package, take out two metal straps, and 4 mounting screws, use them to secure the icemaker to the bin. See illustration page 5.

Remove all shipping material, note the locations of the control box, utility connection location, and the bin control bracket.



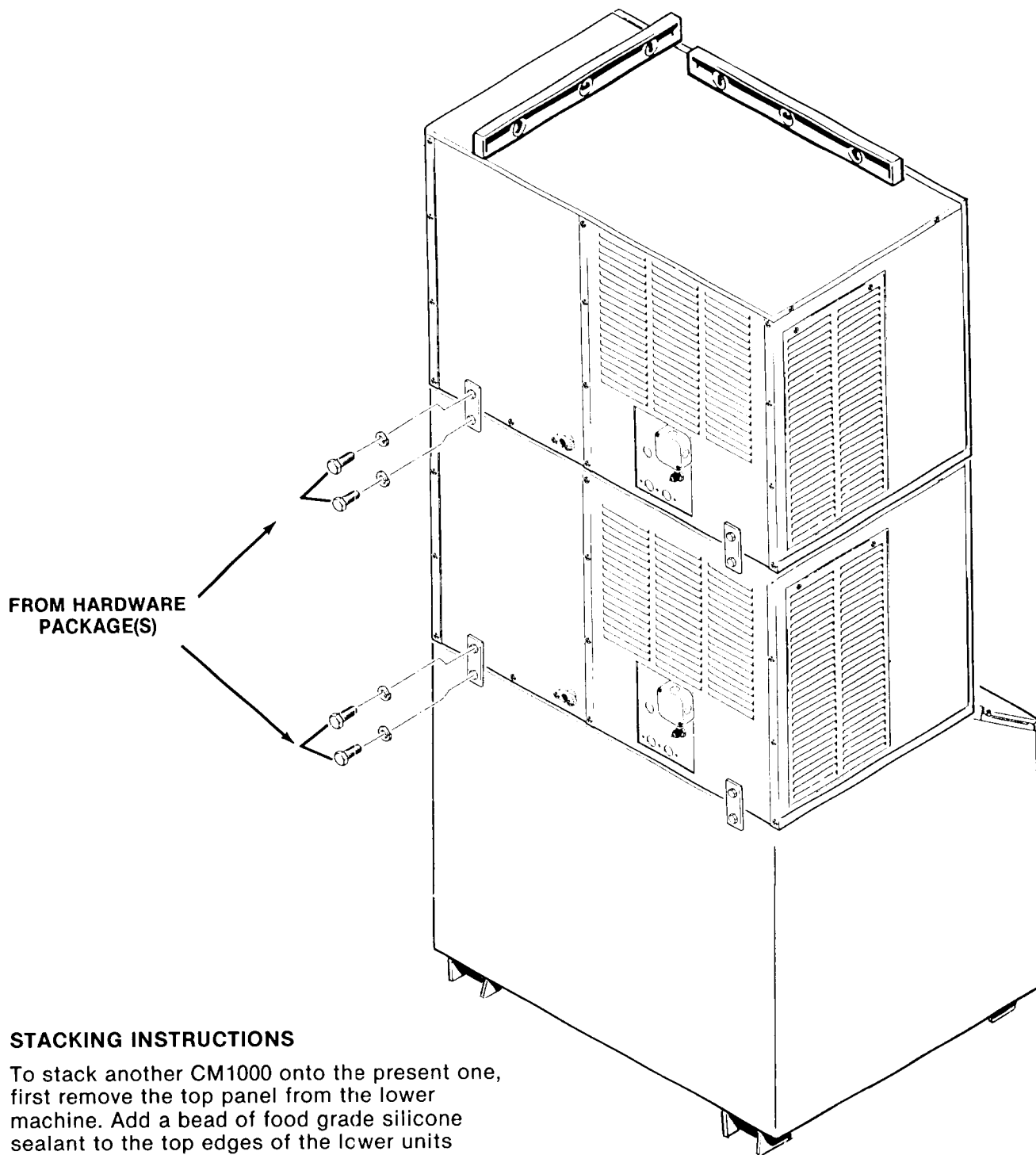
BIN CONTROL INSTALLATION

The bin control bracket is shipped in a cardboard retainer located in front of the freezing compartment. It is to be mounted to the bottom of the ice machine after it has been installed onto the bin.

Using 3 screws from the hardware package, mount the bracket to the machine. a) First install one screw at the back of the unit, and slip the bracket hanger over the head of that screw. Then b) use the remaining two screws to secure the bracket on the left of the freezing compartment.

Uncoil the bin thermostat capillary tube, and route it through the bin thermostat bracket tube, stopping at the end of the tube.

CM1000 FOR THE INSTALLER

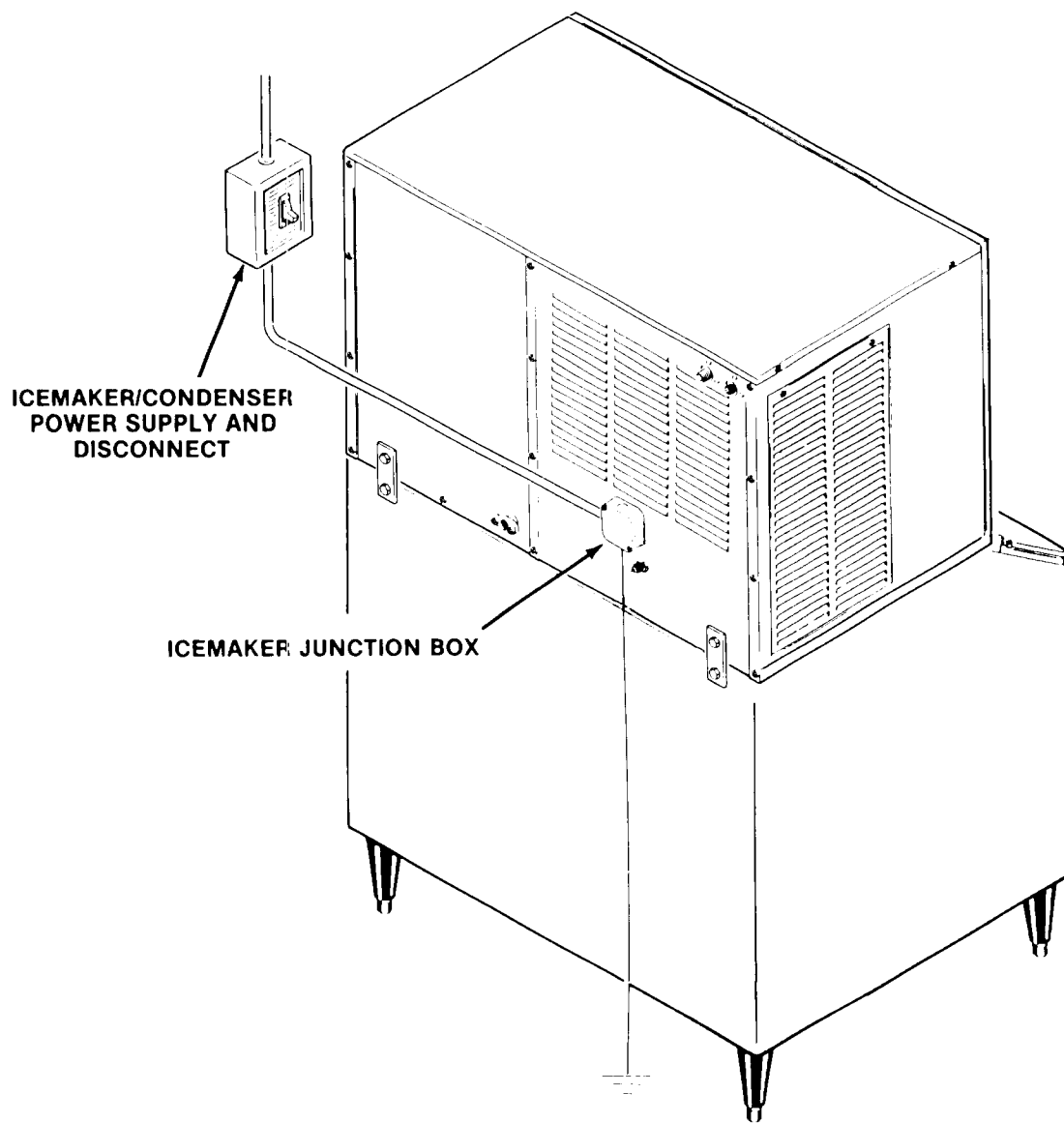


STACKING INSTRUCTIONS

To stack another CM1000 onto the present one, first remove the top panel from the lower machine. Add a bead of food grade silicone sealant to the top edges of the lower units freezing compartment. Lift the top machine onto the bottom machine, (the use of a mechanical lift is recommended for this step). Align the two machines cabinets, and using the 4 bolts and two straps from the top units hardware package, fasten the two units together at the back cabinets.

CM1000 FOR THE ELECTRICIAN

CONFORM TO ALL APPLICABLE CODES



The electrical power to the unit is supplied through the junction box at the rear of the machine.

Check the nameplate for the units voltage requirements, and for the minimum circuit ampacity. The machine requires a solid chassis to earth ground wire.

The machine should be connected to its own electrical circuit so it would be individually fused. Voltage variation must remain within design limitations, even under storing conditions.

All external wiring must conform to national, state, and local electrical codes. The use of a licensed electrician is required to perform the electrical installation.

CM1000 FOR THE PLUMBER

CONFORM TO ALL APPLICABLE CODES

WATER INLET

AIR-COOLED MODELS: The recommended water supply is **cold** water, 3/8" O.D. copper, connected to a 3/8" male flare at the back of the cabinet. Install a hand valve near the machine to control the water supply.

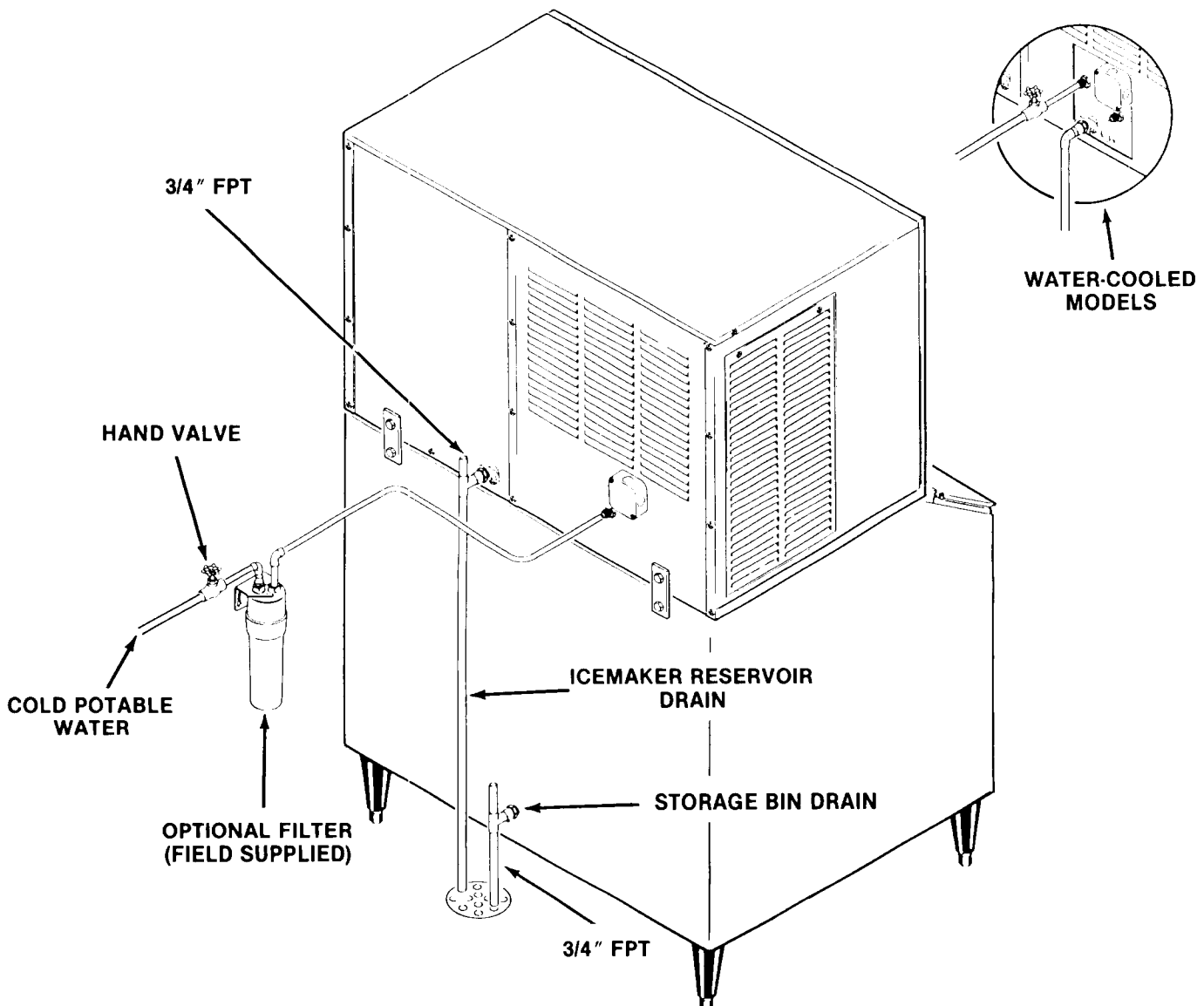
WATER-COOLED MODELS: A **seperate** 3/8" O.D. copper line is recommended, with a **seperate** hand valve to control it. It is connected to a 3/8" FPT condenser inlet at the back of the cabinet. The water pressure must remain above 20 PSIG, at a maximum flow rate of 4 g.p.m.

DRAINS

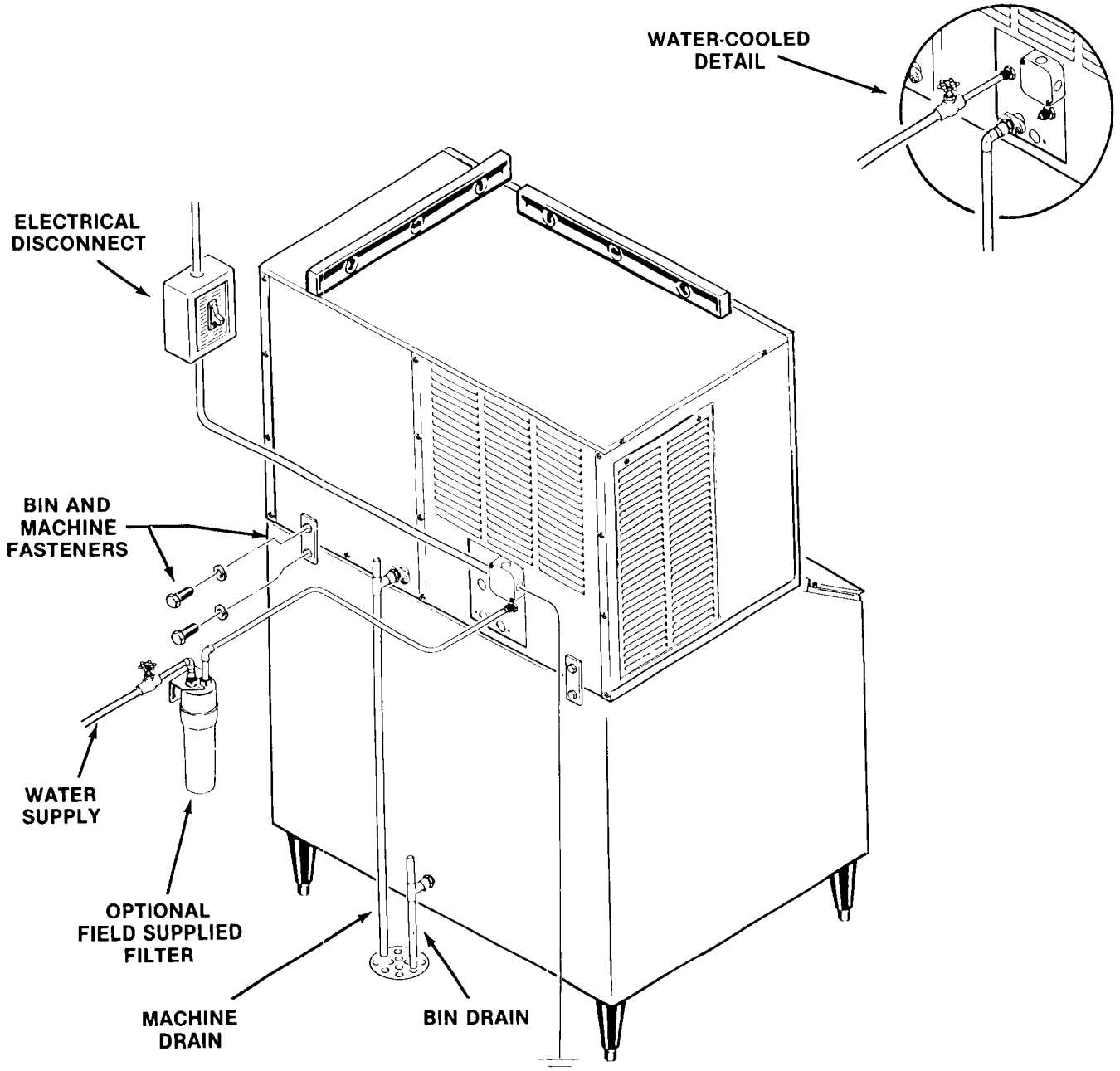
AIR-COOLED MODELS: There is one 3/4" FPT sump drain at the back of the cabinet, the drain lines are gravity type, and 1/4 inch per foot fall is recommended. Insulation in high humidity areas is recommended. There must be a vent at the highest point of the drain line, and the ideal drain receptacle would be a trapped and vented floor drain. **USE ONLY RIGID TUBING.**

WATER-COOLED MODELS: Besides the above drain, a **seperate** condenser drain must be run. Connect it to the 1/2" FPT condenser drain connection at the back of the cabinet.

STORAGE BIN: A **seperate** gravity type drain needs to be run, similar to the air-cooled sump drain. Insulation of this drain line is recommended.



CM1000 FOR THE INSTALLER



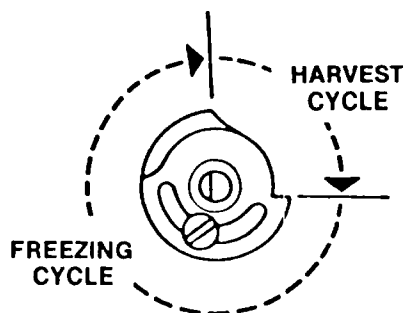
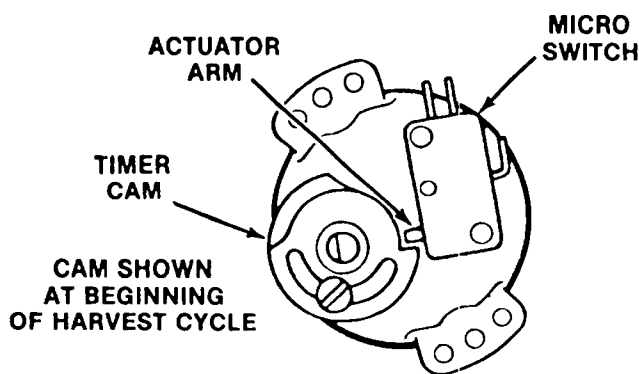
FINAL CHECKLIST

1. Is the unit in an area where the air and water temperatures will not exceed design limitations, including the heat produced by the air-cooled model?
2. Is there enough room around the unit for service, and at least 6 inches for the air-cooled model?
3. Water supply connected? Proper pressure? Drains?
4. Is the cabinet level?
5. Has all shipping material been removed?
6. Has the bin thermostat and bracket been installed?
7. Have all electrical connections been made?
8. Has the bin been cleaned and/or sanitized?
9. Has the warranty registration card been filled out and mailed in?
10. Has the owner/user been given the service manual, and instructed how to operate and maintain the equipment?
11. Has the owner/user been informed of the Scotsman Service Agency that can be contacted for service?

CM1000 START UP

START-UP

1. Remove front panel by pulling out to unsnap.
2. Remove two screws and the control box cover.
3. Remove the evaporator cover.
4. Check that the two toggle switches, the MASTER ON-OFF toggle switch and the COMPRESSOR ON-OFF toggle switch are in the OFF position, on the control box.
5. OPEN the water supply line shutoff valve.
6. Inside the control box is the shaft of the timer and the switch assembly. Rotate the shaft of the timer and switch assembly clockwise to start the timer. The timer starts when the actuator arm on the microswitch drops off outer cam into cam slot. See Timer Cam Positions. An audible click can be heard, but in a noisy area, look at the cam and switch to observe the event.



CAM SHOWN DIVIDED INTO TYPICAL FREEZING & HARVEST CYCLES

Timer Cam Positions

7. Move the master ON-OFF toggle switch, the top toggle switch, to the ON position.
8. Observe water fill cycle:

Water pump operates and 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 about three minutes. Timer will close the water inlet solenoid valve and the water fill cycle is complete.

Advancing the shaft of the timer and switch assembly into a new harvest cycle, restarts the timer and allows a check that: Water inlet solenoid valve OPENS and the reservoir overflows through the standpipe. Water inlet valve CLOSES, stopping water overflow.

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

9. Check that the water cascades down over each cube mold and into the sump.
10. When the second cycle is completed, move the compressor ON-OFF toggle switch, to the ON position.
11. Check operation of the freezing cycle:

The compressor is operating.

The icemaking process begins; feeling the metal parts of the evaporator plate reveals cold temperature, very shortly ice begins to form. Tubing will become frosted at the top of the evaporator plate.

Freezing time will range between 10 and 20 minutes. Longer time for temperatures above 70-degrees F. and shorter time required when temperatures are below 70-degrees F. Average complete cycle time is about 16 minutes.

CM1000 START UP

12. Observe second and third cube harvest.

Check size of SCOTSMAN CONTOUR CUBE

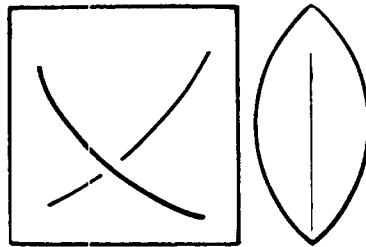
Unlike other SCOTSMAN cubes which are made in a definite molded shape, contour cubes are produced in indentations and many shapes and sizes of contour cubes may be produced — only ONE size and shape combination is correct.

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.

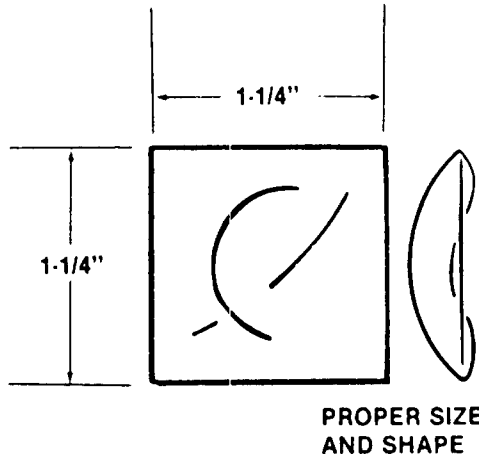
Charge Refrigeration System with **REFRIGERANT 502 ONLY.**

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

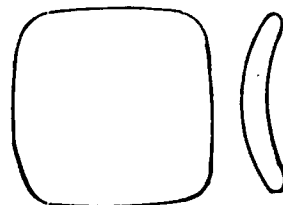


Too LARGE — may cause evaporator freeze ups. Adjust cube size control counter-clockwise to obtain smaller cubes

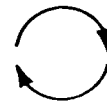


PROPER SIZE AND SHAPE of the contour cube. Icemaker operates at peak efficiency when a cube this size and shape is produced. A finely tuned system produces vertical strips of ice which easily break when they fall.

TOO SMALL



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



Ice Cube Size & Shape

CM1000 START UP

ADJUSTMENT OF CUBE SIZE CONTROL

To produce SMALLER sized ice cubes:

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

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

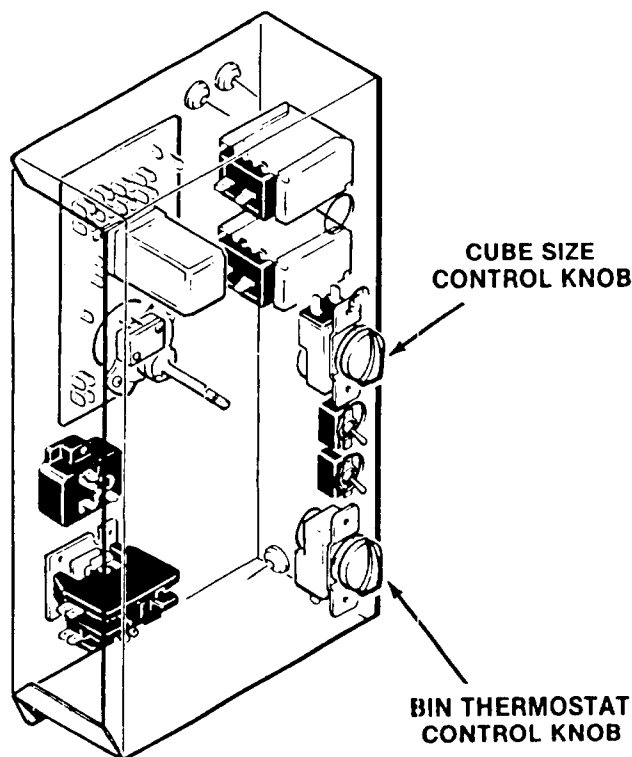
Observe size of the ice cubes in the next two ice cube harvests and adjust in one-eighth turn or less increments, until correct ice cube is achieved.

To produce LARGER 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 correct ice cube size is achieved.



ROTATE ADJUSTMENT KNOB COUNTER-CLOCKWISE TO PRODUCE SMALLER CUBES.

ROTATE ADJUSTMENT KNOB CLOCKWISE TO PRODUCE LARGER CUBES.

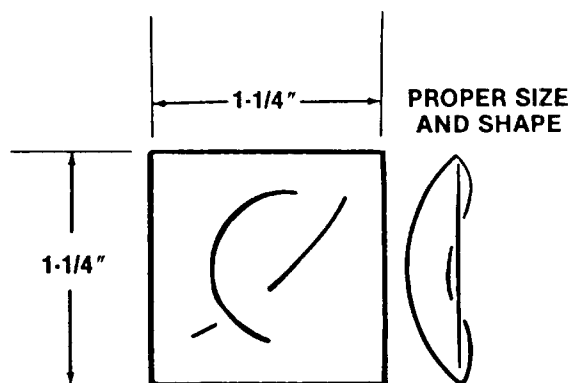
BIN THERMOSTAT OPERATION

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.

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.

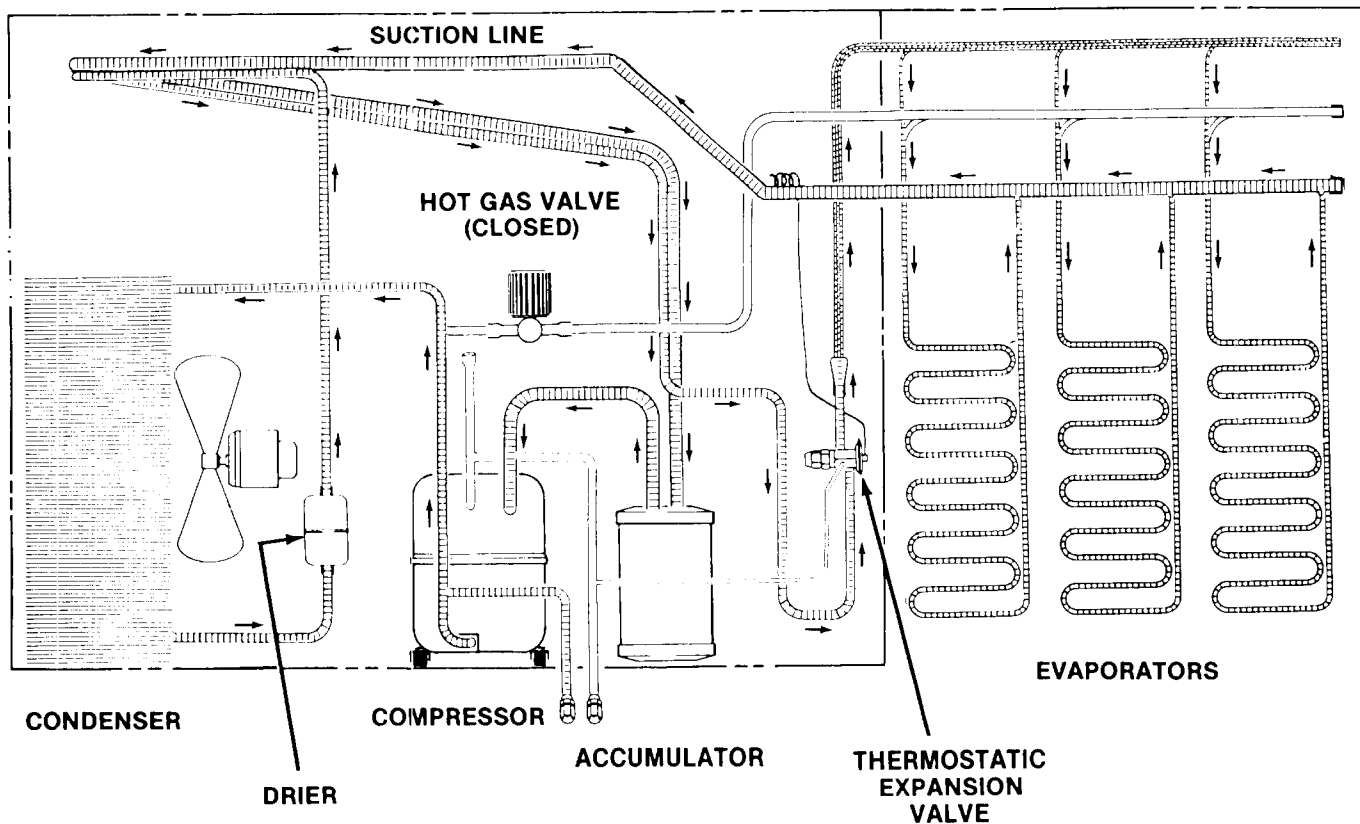
Within minutes after the ice is removed from the sensing bulb, the bulb will warm up and cause the icemaker to restart. This control is factory set and should not be reset until testing is performed.

14. Replace control box cover and all cabinet panels and screws.
15. Thoroughly explain to the owner/user the significant specifications of the icemaker, 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.



CM1000 OPERATION

FREEZE CYCLE



REFRIGERATION SYSTEM SCHEMATIC

REFRIGERATION DURING FREEZE:

This ice machine employs either air or water as a condensing media, the refrigeration system for either one is as follows:

At the hermetic compressor, Refrigerant 502 is compressed into a high temperature, high pressure gas. This gas contains the heat removed from the **evaporator**, as well as **compressor** motor heat. The gas moves through the **discharge** line into the **condenser**, air or water-cooled. If air-cooled, the discharge pressure will change with the heat load and the ambient air temperature. If water-cooled, the discharge pressure is controlled by the amount of water flowing through the **condenser** - which is determined by the water regulating valve. After the gas is cooled in the condenser, giving up much of its heat, the gas condenses into a high pressure liquid. This liquid travels through the **liquid** line to the metering device, a **thermostatic expansion valve**.

The thermostatic expansion valve meters how much liquid refrigerant is to be allowed into the

evaporator section of the refrigeration system. This is determined by the temperature of the TXV sensing bulb, located on the **suction line** manifold, at the outlet of the **evaporators**. If the bulb senses a warm suction line, more refrigerant is allowed into the evaporator, (common at the beginning of the freeze cycle) and when the temperature begins to fall, less refrigerant is allowed through. This is why the suction side gauge pressure will decline throughout the freeze cycle. At the evaporator, the liquid refrigerant released from high pressure, boils off in the low pressure environment and absorbs heat, thus cooling the evaporator surface and anything near it, such as water.

The low pressure refrigerant vapor then is forced through the **accumulator**, where any excess liquid refrigerant is trapped, allowing only refrigerant vapor to enter the compressor suction tube, where it is recompressed into high pressure, high temperature gas again and the cycle repeats.

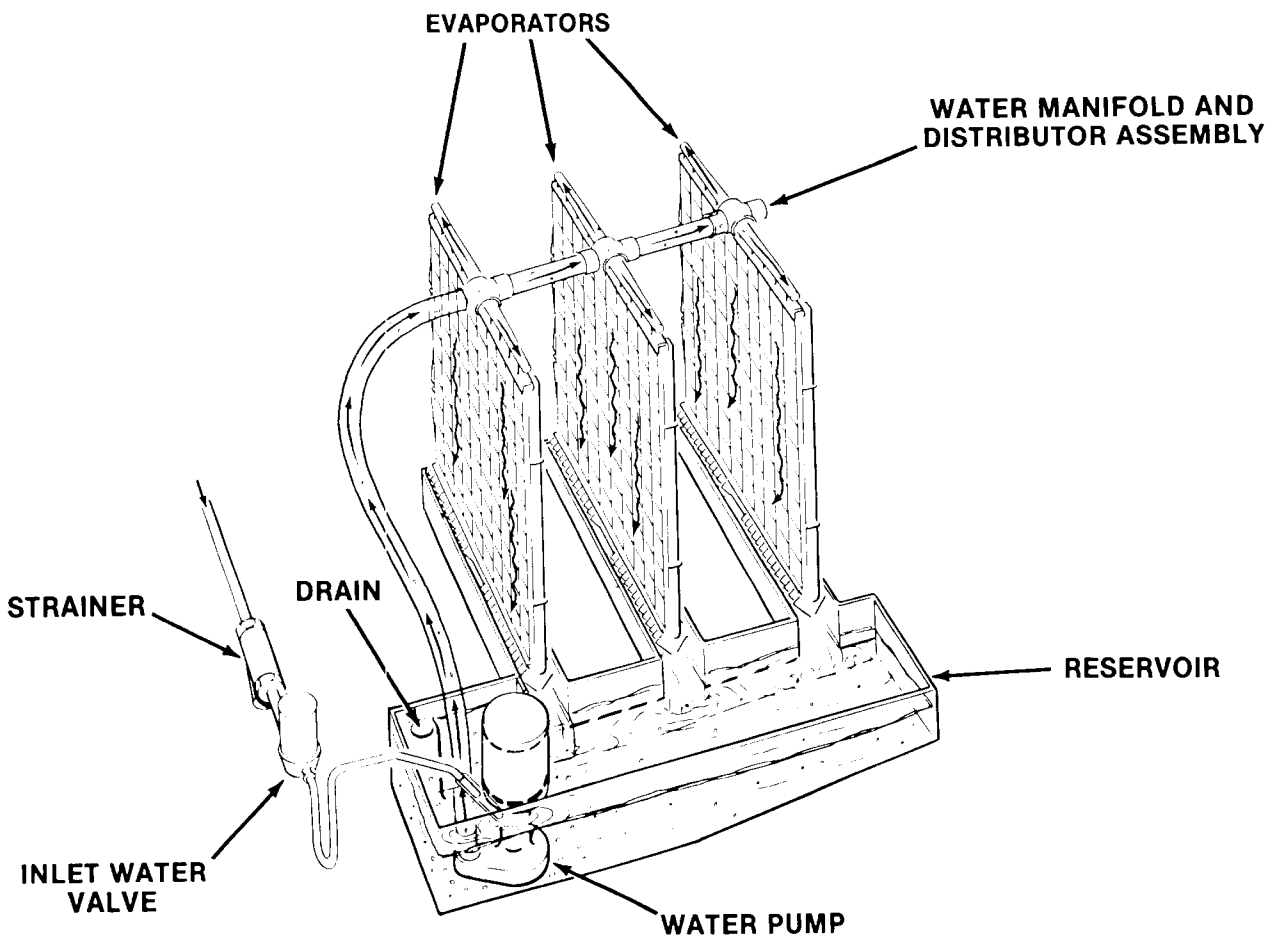
CM1000 OPERATION

FREEZE CYCLE

WATER SYSTEM

A fixed charge of water had been brought into the machine during the harvest or defrost cycle.

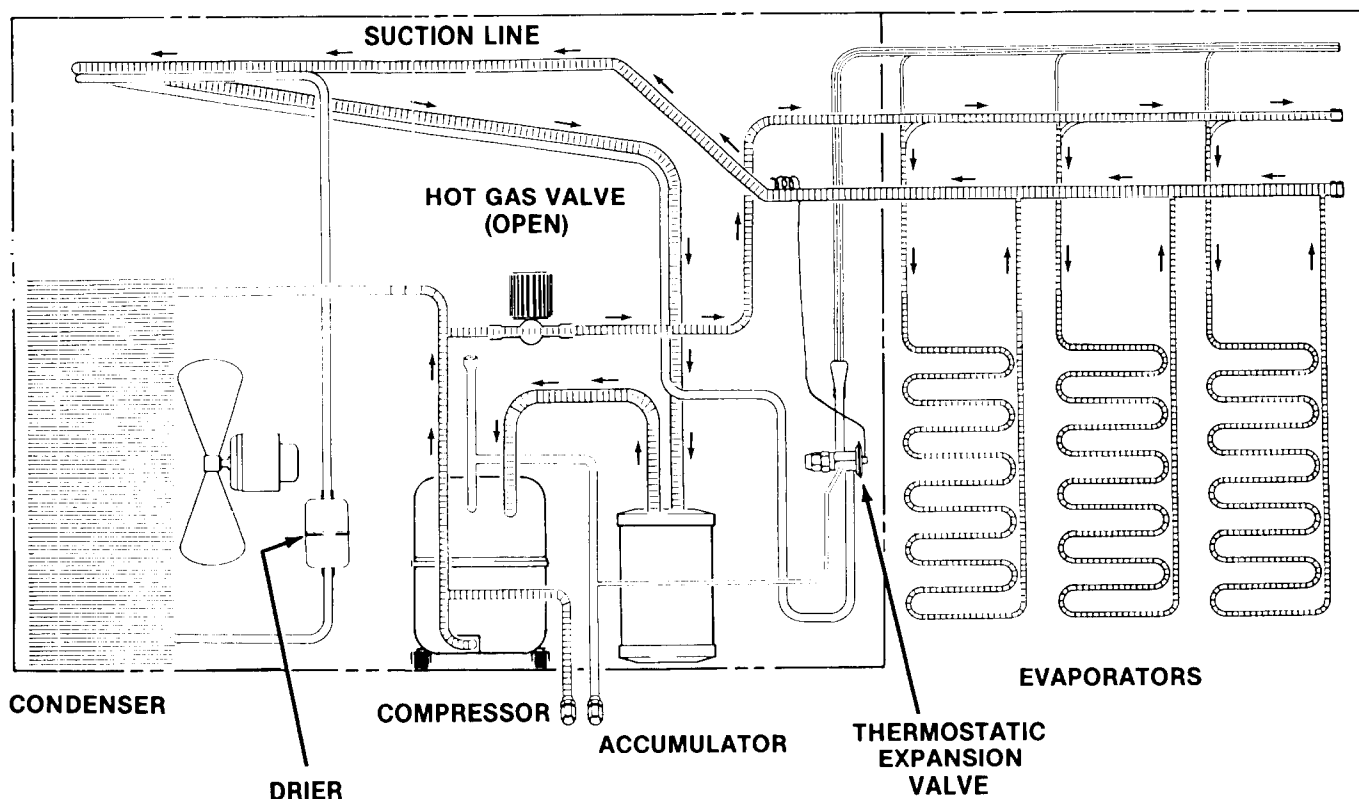
A pump, running continuously, forces the water to the top of the evaporators, where it is distributed through manifolds, and then cascades down the evaporator surface by gravity. As it flows across the refrigerated evaporators, some of the water will be chilled enough to change form, turn to ice, and stay frozen onto the evaporator. Most of the water returns to the reservoir, to be sucked back into the pump, and repumped over the evaporators.



WATER FLOW SCHEMATIC

CM1000 OPERATION

HARVEST (DEFROST) CYCLE



REFRIGERATION SYSTEM SCHEMATIC

REFRIGERATION SYSTEM DURING HARVEST

The refrigeration system performs the harvest of ice by use of a hot gas bypass valve. When the time comes to de-ice the evaporators, the hot gas valve is energized, and the high temperature, high pressure gas bypasses the condenser, and is allowed directly into the evaporators. The high temperature gas is cooled by the cold evaporators, so it condenses into a liquid, giving up its heat as it does so. This heat warms the evaporators, and the ice frozen onto the evaporator surface melts, releasing the frozen cubes. Ice then falls by gravity into the storage bin.

The liquid refrigerant goes through the suction line into the accumulator, where it is trapped, so that only refrigerant vapor is drawn off the top of the accumulator and back into the suction tube of the compressor.

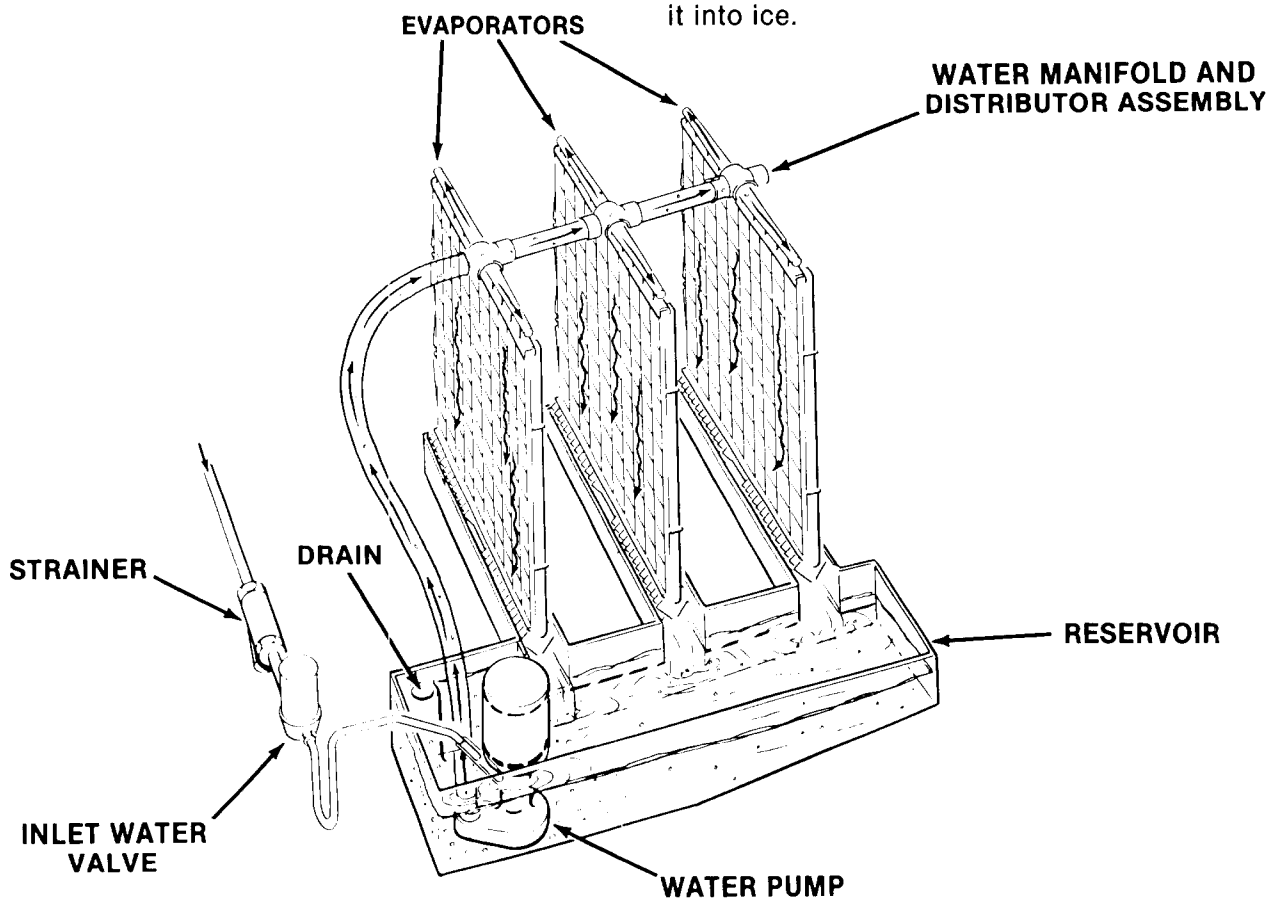
CM1000 OPERATION

HARVEST (DEFROST) CYCLE

WATER SYSTEM

The water in the reservoir has mostly been turned into ice during the freeze cycle, so the water level in the reservoir has gone down. During the harvest cycle, an electric water fill valve meters in a controlled amount of water into the reservoir. At the left side of the reservoir there is a stand pipe, and any excess water is drained off and out of the machine through it. The purpose of the extra water brought into the machine is to dilute the water remaining in the reservoir, and thus reduce the concentration of minerals.

The pump stays on, forcing the warm incoming water across the evaporators to a) Assist the de-icing by warming the evaporators from the outside (as well as the refrigeration system warming it from the inside) b) Cool off the warm incoming water so that it takes less time to turn it into ice.



WATER FLOW SCHEMATIC

CM1000 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

ELECTRICAL COMPONENTS (LOADS)	ON	OFF
Finish Relay Coil	X	
Timer Motor		X
Hot Gas Valve		X
Water Fill Valve		X
Fan Motor (Air-Cooled)	X	
Compressor Contactor Coil	X	
Pump	X	
Compressor	X	

CONTACTS (OR SWITCHES)	ON (CLOSED)	OFF (OPEN)
Finish Relay 4-7	X	
Finish Relay 8-5	X	
Finish Relay 8-2		X
Finish Relay 3-9		X
Timer NC		X
Timer NO	X	
Bin Thermostat	X	
Cube Size Control		X
High Pressure Safety	X	
High Temperature Cut-out	X	
Master Switch	X	
High Pressure Fan Control	X	
Compressor Switch	X	
Contactor Contacts	X	

At the beginning of the freeze cycle, the suction line is still warm, so the cube size control, a reverse acting thermostat, is open.

CM1000 OPERATION - ELECTRICAL SEQUENCE

TIMED FREEZE

ELECTRICAL COMPONENTS (LOADS)	ON	OFF
Finish Relay Coil	X	
Timer Motor	X	
Hot Gas Valve		X
Water Fill Valve		X
Fan Motor (Air-Cooled)	X	X
Compressor Contactor Coil	X	
Compressor	X	

CONTACTS (OR SWITCHES)	ON (CLOSED)	OFF (OPEN)
Finish Relay 4-7	X	
Finish Relay 8-5	X	
Finish Relay 8-2		X
Finish Relay 3-9		X
Timer NC		X
Timer NO	X	
Bin Thermostat	X	
Cube Size Control	X	
High Pressure Safety	X	
High Temperature Cut-out	X	
Master Switch	X	
High Pressure Fan Control	X	X
Compressor Switch	X	
Contactors Contacts	X	

The evaporator and suction line temperatures have gone down with the build up of ice of the evaporators. The cube size control has closed, starting the timer. The fan may be off and on in low air temperatures.

CM1000 OPERATION - ELECTRICAL SEQUENCE

HARVEST

ELECTRICAL COMPONENTS (LOADS)	ON	OFF
Finish Relay Coil		X
Timer Motor	X	
Hot Gas Valve	X	
Water Fill Valve	X	
Fan Motor (Air-Cooled)		X
Compressor Contactor Coil	X	
Compressor	X	

CONTACTS (OR SWITCHES)	ON (CLOSED)	OFF (OPEN)
Finish Relay 4-7		X
Finish Relay 8-5		X
Finish Relay 8-2	X	
Finish Relay 3-9	X	
Timer NC	X	
Timer NO		X
Bin Thermostat	X	
Cube Size Control		X
High Pressure Safety	X	
High Temperature Cut-out	X	
Master Switch	X	
High Pressure Fan Control		X
Compressor Switch	X	
Contactor Contacts	X	

The timer has advanced to the position where the microswitch plunger drops into the open area of the cam. The NO contacts open, de-energizing the relay, placing the machine in harvest: hot gas and inlet water valves on.

CM1000 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. On air cooled models, clean the 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 - Icemaker. 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.

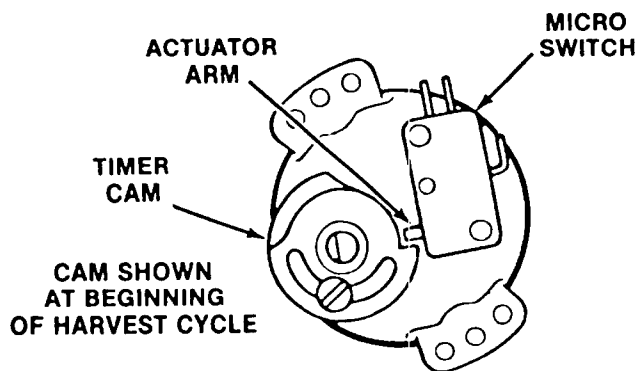
CM1000 MAINTENANCE & CLEANING INSTRUCTIONS

////////// 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.

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

1. Empty bin of ice.
2. Pull out and remove front panel.
3. Switch both the Master and Compressor switches OFF.
4. Remove evaporator cover by lifting up and pulling out.
5. Switch the Master switch ON. Pour 8 ounces of Scotsman Ice Machine Cleaner into the reservoir. Run unit this way for 30 minutes.
6. Switch the Master switch to OFF, remove the pump hose from the evaporator water manifold, point it into the bin and switch the Master switch back to ON. This pumps the cleaning solution out of the reservoir. Add fresh water to the reservoir to thoroughly rinse the reservoir.
7. Replace pump hose.
8. Remove the control box cover, turn timer shaft clockwise until it appears as illustrated (harvest cycle.) Replace cover.



9. Switch the Compressor and Master switches ON.
10. Replace the evaporator cover and front panel.
11. Check the next batch of cubes to be sure all the cleaner is gone (no sour taste).

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

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

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

12. Pour hot water into the storage bin to melt the cubes, and to also clean the bin drain.

If necessary, the reservoir can be removed for cleaning by:

- a) Removing front panel.
- b) Switching Master switches to OFF.
- c) Removing the evaporator cover.
- d) Removing thumb screw securing pump to lower evaporator brace, unplug pump, pull it up and out of the machine. Remove hose from pump.
- e) Disconnect drain hose from left rear of reservoir, lift reservoir up and pull out off machine.
- f) Reverse to reassemble.

CM1000 SERVICE 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	(+ 25°F. to 0°F.)	—	Water-Cooled
	(+ 12°F. to -6° F.)	—	Air-Cooled
Bin Thermostat, Temperature Range	38.5°-43.5°	33.5°-38.5°	
High Pressure Safety Switch, psig Air-cooled	Manual	450	
High Pressure Safety Switch, psig Water-cooled	Manual	350	
Fan Pressure Control, in psig	210	193	

OPERATING CHARACTERISTICS

On 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.

On water-cooled, the discharge pressure is constant, maintained during the freeze cycle by the water regulating valve at 220 PSIG. However, suction pressure and compressor amps will still decline as the machine freezes ice.

FREEZE CYCLE

Average Discharge Pressure A/C . . .	330-200 PSIG
Average Discharge Pressure W/C	220 PSIG
Suction Pressure at the end of the Freeze Cycle	22-30 PSIG
Freeze Time	10-20 Minutes
Ice Weight per cycle	9-9.5 lbs.
Compressor Amps, 5 min. into Freeze . . .	10.3-11.4
Compressor Amps, end of Harvest	12-12.8

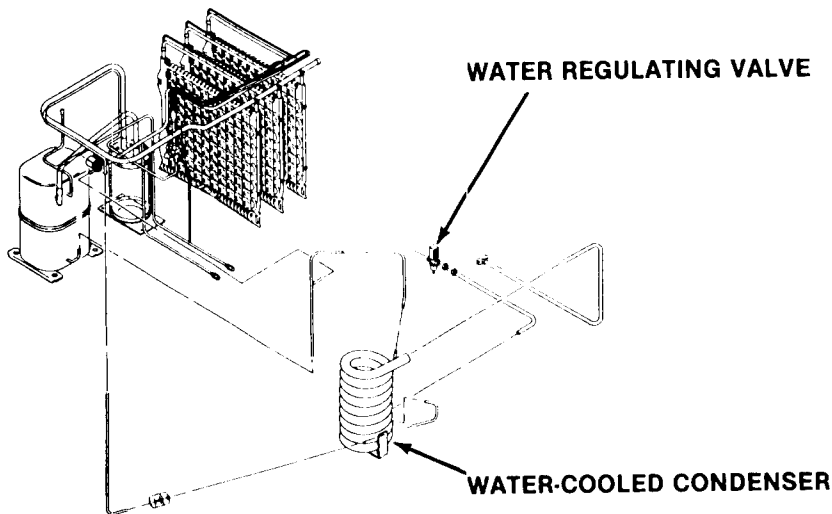
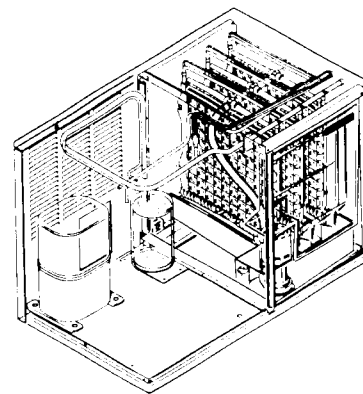
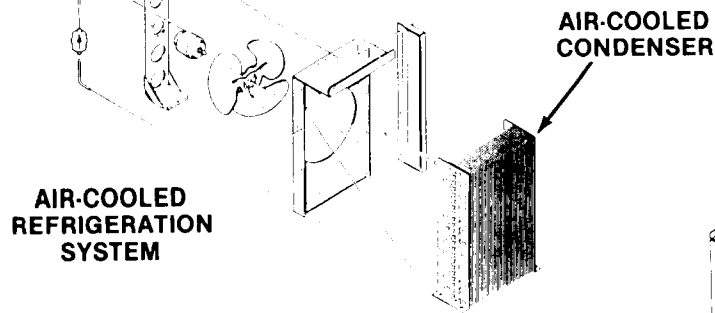
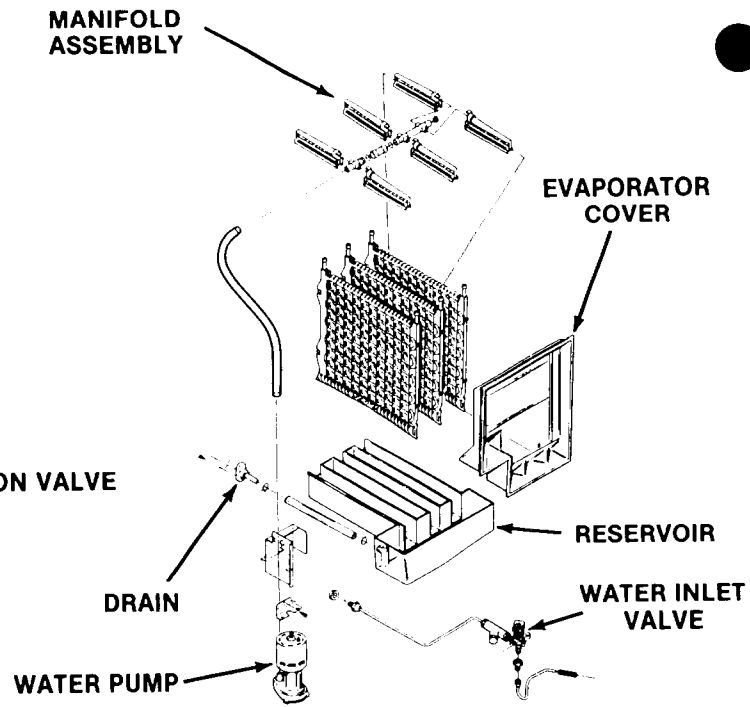
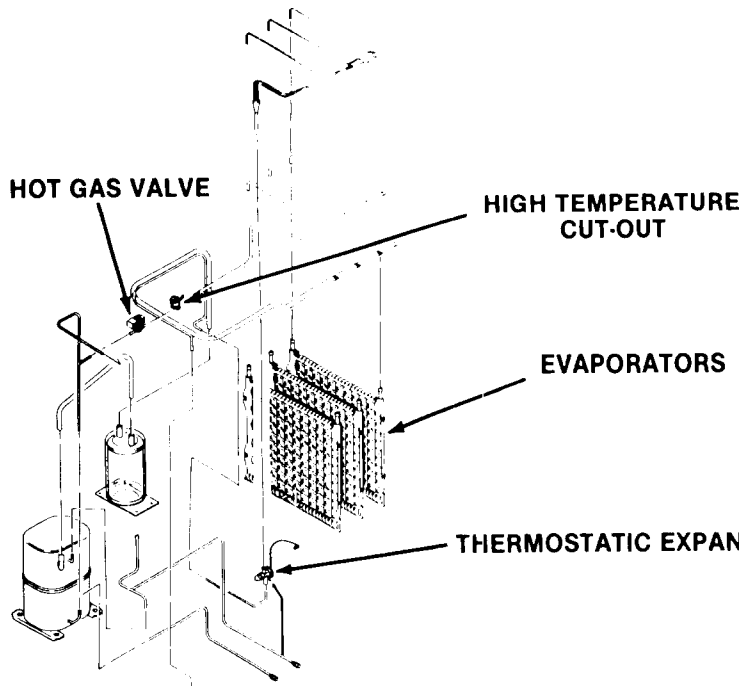
HARVEST CYCLE

Average Discharge Pressure	150-120 PSIG
Average Suction Pressure	115-80 PSIG
Harvest Time, assumed to be	2-1/4 minutes.
This can be adjusted to suit local conditions.	

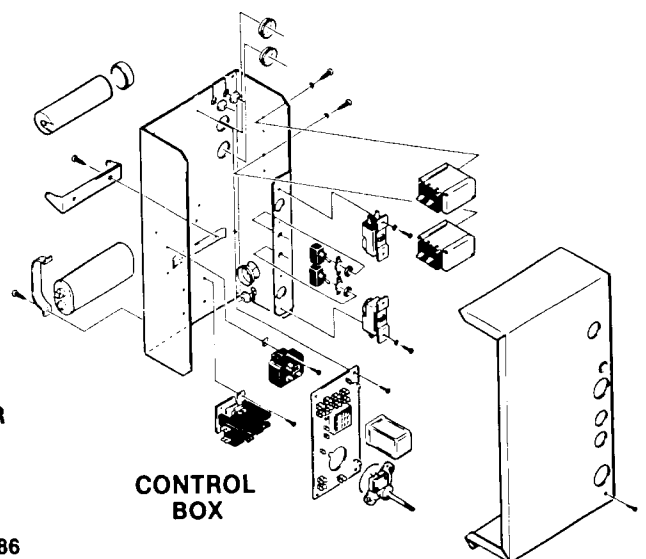
The values listed are representative of values seen at a wide range of air and water temperatures and are for a normal cube size.

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

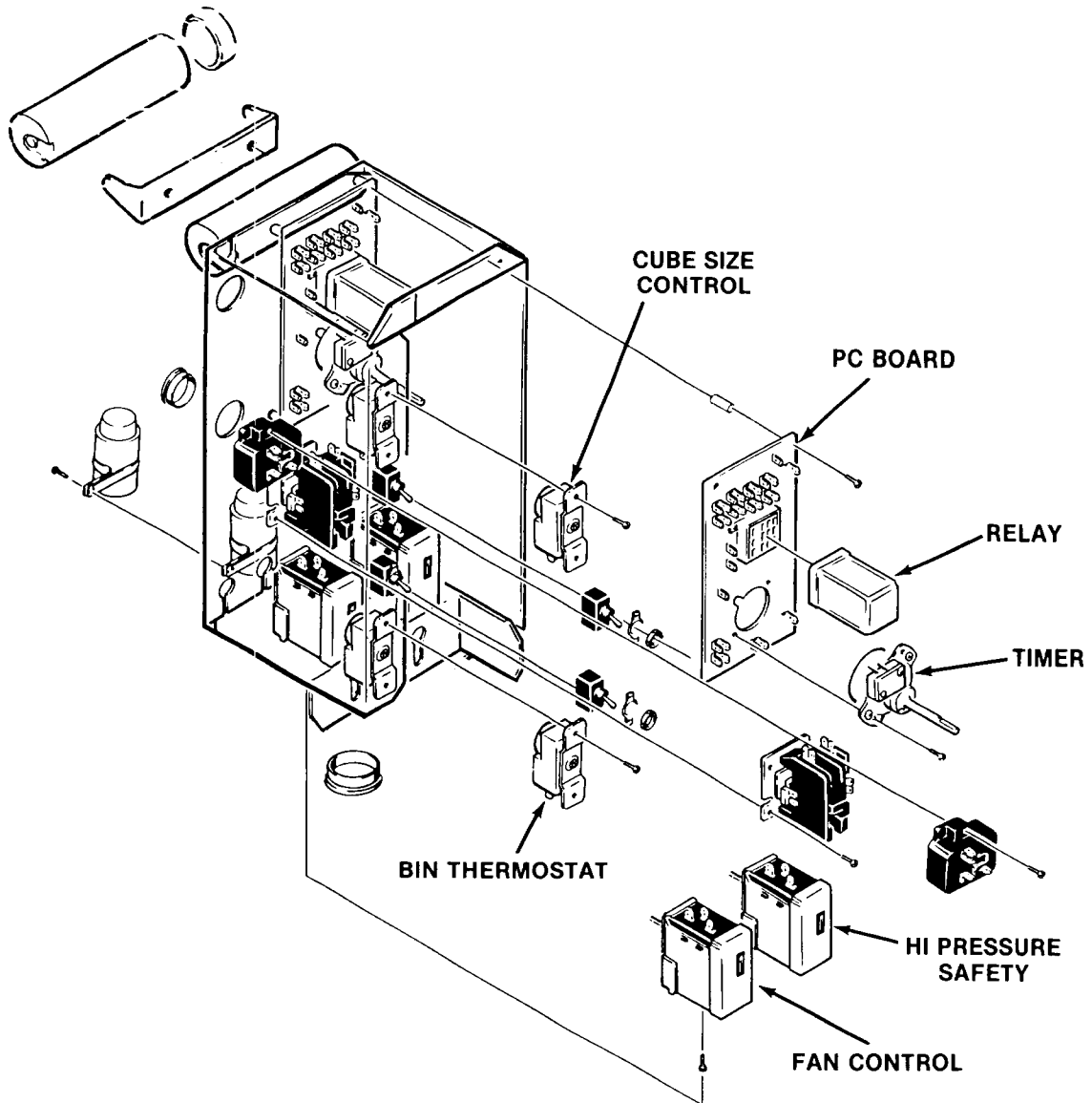
CM1000 COMPONENT LOCATION AND DESCRIPTION



WATER-COOLED REFRIGERATION SYSTEM



CM1000 COMPONENT LOCATION AND DESCRIPTION



CONTROL BOX

BIN THERMOSTAT

The main control of the ice machine, opens when cold (ice on it). The unit will only turn off at the end of the first harvest cycle, after the control opens.

PC BOARD

The junction point for all of the controls.

CUBE SIZE CONTROL

A reverse acting thermostat (closes on temperature fall). This control stabilizes the units during varying ambients. It only closes at the preset temperature the operator has it set for. The adjustment is to obtain the correct size cube.

RELAY

The machine is in FREEZE when the relay is energized, and on HARVEST when it is not energized. Plugs into the PC board.

TIMER

Harvest timer can be varied by adjusting the split cams.

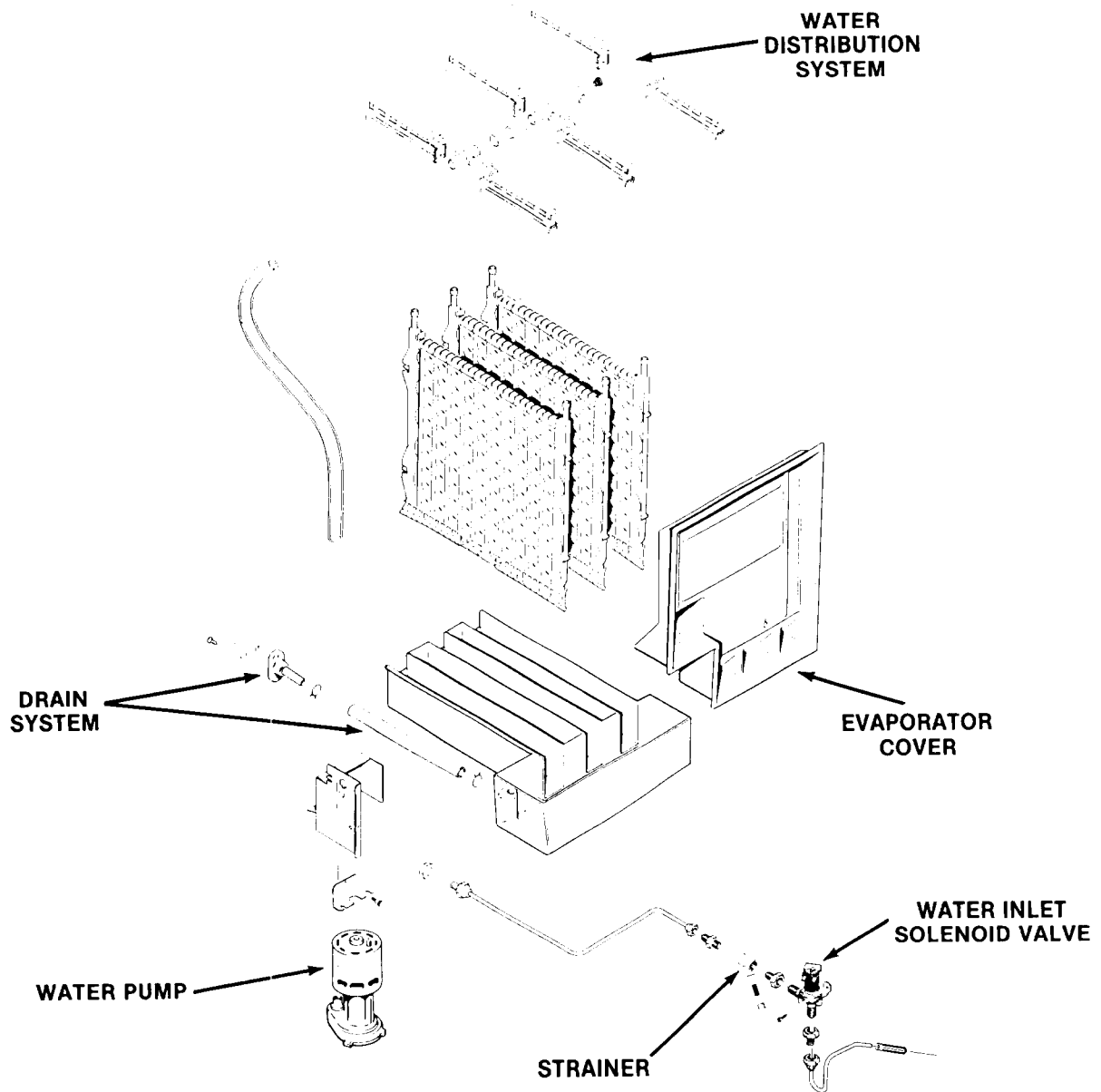
HI PRESSURE SAFETY

Shuts the machine off should the high side pressure become too great. Manual reset.

FAN CONTROL

On air-cooled models, only, directly controls the fan motor. Keeps head pressure up in very cold ambients.

CM1000 COMPONENT LOCATION AND 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 PUMP

The water pump picks up water from the base of the reservoir, and forces it up to the top of the evaporators. It remains on throughout the freeze and harvest cycles.

EVAPORATOR COVER

This cover, held in place by shoulder screws, covers the freezing compartment front, keeping any ice and water from splashing the front panel and the water pump.

DRAIN SYSTEM

The drain system functions to allow the excess water brought into the machine during the harvest cycle, to be easily drained away. A standpipe in the back of the reservoir maintains the water level, and is connected to the cabinet drain fitting by tygon tubing.

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 the 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.

CM1000 SERVICE DIAGNOSIS

The table below is intended as a quick reference to aid the Service Agent in determining the cause of a particular type of malfunction, as well as the recommended repair. It is not intended to be an exclusive list.

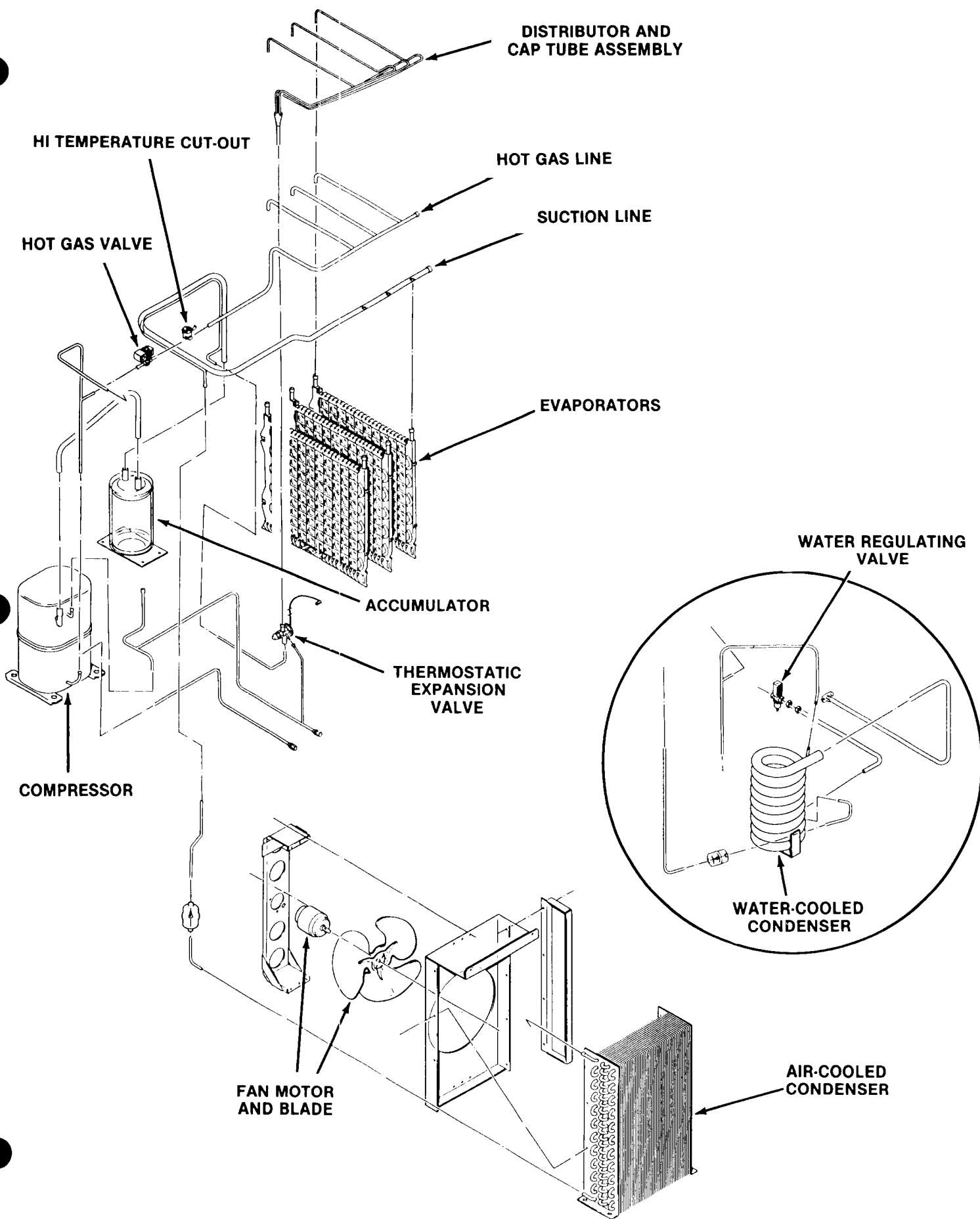
Reference to other portions of this manual, including wiring diagrams, installation, and operation are recommended to better determine the cause of a problem.

SYMPTOM	POSSIBLE CAUSE	CORRECTION
Machine does not run at all.	Master switch open, high pressure safety open.	Test and replace. Reset or replace.
	High temperature cut-out open.	Check temperature of hot gas line, check switch.
	P.C. board open.	Remove board and check.
	No power to unit.	Check electrical source.
	Bin control open.	Test and replace.
Machine runs, compressor does not.	Compressor switch open.	Test and replace.
	Compressor contactor open.	Test and replace.
	Compressor relay open.	Test and replace.
	Compressor open.	Test and replace.
Machine runs, makes no ice.	No water.	Check water supply and fill valve.
	Water, but not pumping	Check power to pump, replace pump.
	Water pumping but does not cool.	Check refrigeration system pressure, check fill valve for leak through, check condenser for clog, or poor air circulation, check compressor. Test and replace relay, must be energized to freeze.
Machine runs, makes ice, does not try to harvest (timer does not advance).	Cube size control open.	Test and replace control.
	Timer motor open.	Test and replace timer.
	Refrigerant charge	Test and add refrigerant. Check for leak, weigh in charge after repair.
	P.C. board open to timer.	Check and replace.
	Relay contacts 8/5 open during freeze.	Test and replace relay.

CM1000 SERVICE DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE	CORRECTION
Machine runs, makes and harvests ice, but very slowly; low ice capacity.	Low refrigerant charge.	Check system, repair leak weigh in charge.
	High discharge pressure due to non-condensable or over charge.	Evacuate and weigh in charge
	Extra water coming in during freeze.	Test and replace fill valve.
	Condenser dirty.	Clean.
	Low water pressure (water-cooled).	Check and repair.
Low ice capacity, machine runs fine.	High air temperature (air-cooled).	Check temperature of air entering condenser.
	Bin control shutting unit off prematurely.	Check bin control position and function.
	Water backing up into bin.	Check and clean bin drain.
Machine makes irregular ice - Makes ice on some evaporators, or the top only.	High temperature C.O. shuts unit off and on.	Check hot gas valve for leak through.
	Low water supply.	Check fill valve.
Machine runs, makes ice, timer advances, but does not harvest.	Plugged water manifolds.	Clean machine.
	TXV superheat wrong.	Adjust and replace.
	Refrigerant charge low.	Adjust - check for leak, recharge.
Machine runs, makes ice, timer advances, but does not harvest.	Relay contacts 3-9 open during harvest.	Test and replace relay.
	Timer microswitch N.O. CONTACTS DO NOT open.	Test and replace timer.
	Hot gas valve coil open.	Test and replace hot gas valve.
	Hot gas valve will not open.	Test and replace hot gas valve.
	Low refrigerant charge.	Add refrigerant. Check and perform test for leaks.

CM1000 REMOVAL AND REPLACEMENT PROCEDURES



CM1000 REMOVAL AND REPLACEMENT PROCEDURES

//////////////////// WARNING //////////////////////

Disconnect electric power supply to icemaker whenever replacement procedures are performed.



WATER PUMP

1. Remove front panel.
2. Lift up, and remove evaporator cover.
3. Unplug pump.
4. Remove one screw holding pump bracket to evaporator cross brace.
5. Pull pump forward and lift up.
6. Remove discharge hose from pump outlet.

Reverse to replace.

RESERVOIR

1. Perform above steps and remove water pump.
2. Use corbin clamp pliers, push hose clamp of drain hose away from reservoir fitting. Remove drain hose from reservoir.
3. Lift up, and pull forward to remove reservoir.

Reverse to replace.

DISTRIBUTORS/WATER MANIFOLDS

1. Remove front panel.
2. Remove evaporator cover.
3. Pull distributor forward and lift up in the back, after distributor comes up in back, push back and unsnap distributor from water manifolds.
4. Water manifolds can be pulled away from each other. Check "O" rings in connectors.

Reverse to replace.

INLET WATER VALVE

1. Remove front panel.
2. Unplug water valve.
3. Remove flare nut securing outlet tube to valve.
4. Remove flare nut from inlet fitting.
5. Remove two screws securing valve to bulkhead wall, and remove valve.
6. Remove brass water fitting from old valve to put on new valve.

Reverse to replace.

COMPRESSOR

1. Remove top panel (if possible), front panel, and left side service panel.
2. Disconnect electrical lines from compressor.
3. Purge system of refrigerant.
4. Remove compressor mounting bolts.
5. Cut or unsweat discharge, process, and suction lines.
6. Remove compressor from unit. Check or replace starting components.

Reverse to reassemble.

CONDENSER

AIR-COOLED

1. Remove front and top panel.
2. Disconnect fan motor from condenser.
3. Purge system of refrigerant.
4. Cut or unsweat liquid and discharge lines.
5. Unbolt and remove condenser.
6. Dismount fan shroud from condenser.

Reverse to reassemble.

WATER-COOLED

1. Shut off water.
2. Remove front panel.
3. Purge system of refrigerant.
4. Unsweat water and refrigerant lines.
5. Unbolt and remove condenser.

Reverse to reassemble.

HOT GAS VALVE

1. Remove front, left side, and top panel (if possible).
2. Unplug hot gas valve.
3. Purge system of refrigerant.
4. Cut or unsweat valve, remove from machine.
5. To replace, heat sinking the valve is **CRITICAL**. Wrap the replacement valve in wet rags, and sweat into place. Leave rags on until joints cool.

Reverse steps 3-1 to reassemble.

CM1000 REMOVAL AND REPLACEMENT PROCEDURES

//////////////////// WARNING //////////////////////

Disconnect electric power supply to icemaker whenever replacement procedures are performed.

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

WATER REGULATING VALVE

1. Shut off water.
2. Remove front panel.
3. At the rear of the unit, unscrew water inlet connection and screws holding water regulator valve to cabinet back.
4. Purge system of refrigerant.
5. Unscrew fitting at outlet of valve.
6. Unsweat valve connection from "T" drilled hole.
7. Remove valve from machine.

Reverse to reassemble.

THERMOSTATIC EXPANSION VALVE

1. Remove front and top panel (if possible).
2. Purge system of refrigerant.
3. Cut or unsweat valve at inlet, equalizer, and outlet.
4. Remove insulation from valve bulb, remove mounting straps and valve from cabinet.
5. Place new valve bulb in same place as old valve, secure with straps, and reinsulate.
6. To replace, heat sinking the valve is **CRITICAL**. Wrap the body of the valve in wet rags and sweat into place. Leave rags on until joints cool.

Reverse to reassemble.

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

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.

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

//////////////////// NOTE //////////////////////

Thoroughly evacuate the system to remove moisture and non-condensables.

FAN MOTOR OR BLADE

1. Remove left side service panel.
2. Unplug fan motor.
3. Remove fan motor bracket.
4. Remove fan blade from motor. Note location on motor shaft, and hub position.
5. To replace fan motor also, remove it from bracket.

Reverse to reassemble.

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

//////////////////// NOTE //////////////////////

*When replacing a refrigeration component, the exact refrigerant charge must be **weighed** or metered into a completely evacuated system,*

*because the CM1000 is a **critically** charged system.*

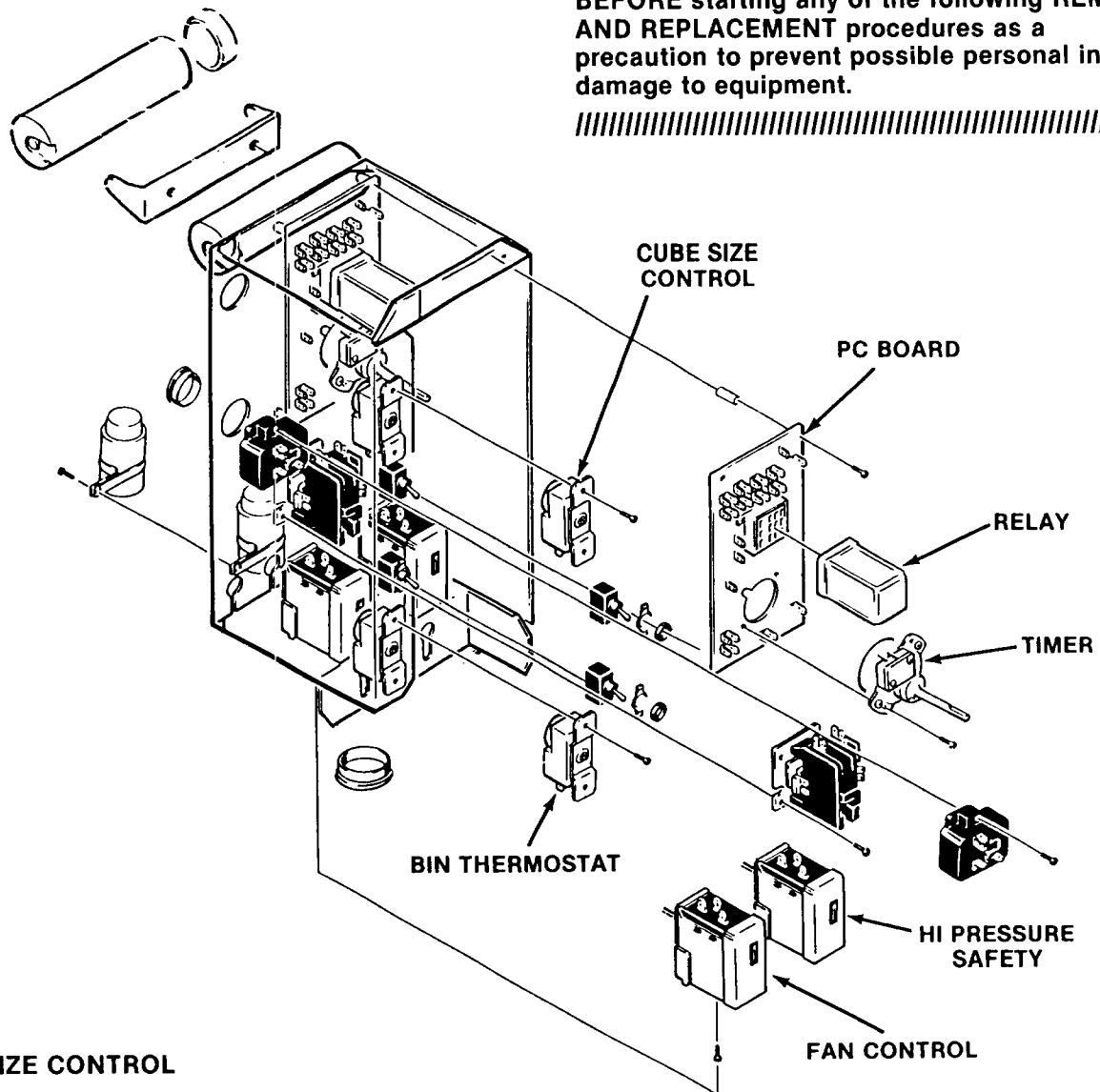
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CM1000 REMOVAL AND REPLACEMENT PROCEDURES

////////////////////// 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.

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



CUBE SIZE CONTROL

1. Remove front panel.
2. Remove control box cover.
3. Above control box, locate bulb well for cube size control, remove insulation and bulb from well.
4. Disconnect wires, remove knob and body of control from control box.

Reverse to reassemble.

TIMER

1. Remove front panel.
2. Remove control box cover.
3. Remove quick connects from P.C. board at posts marked "timer".
4. Unscrew timer from stand offs and remove.

Reverse to reassemble.

BIN THERMOSTAT

1. Remove front panel.
2. Pull bin control capillary out of bracket.
3. Remove control box cover
4. Disconnect wires from thermostat body, remove body from control box.

Reverse to reassemble.

RELAY

1. Relay is plugged into P.C. board.