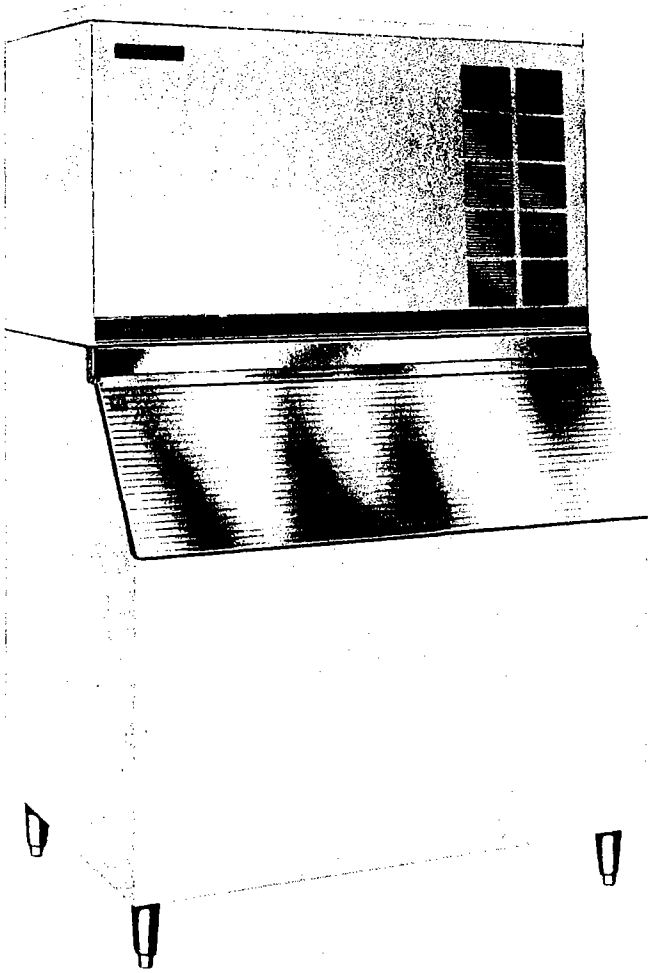
Manitowoc

A "1100" SERIES

ICE CUBERS SERVICE MANUAL



Manitowoc equipment works
Division of The Manitowoc Company, Inc.,

MANITOWOC
WISCONSIN

This manual covers the 1100 Series Cubers
starting with Serial Number 11693

80-0063-3
5-1-78

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FORWARD

Manitowoc Equipment Works, Division of the Manitowoc Company, Inc., Manitowoc, Wisconsin, presents this Service Manual to assist the serviceman with information concerning CONSTRUCTION, INSTALLATION, and MAINTENANCE of the MANITOWOC ICE MAKER.

The problems of the user and the serviceman have been given special emphasis in the development of the latest MANITOWOC Ice Machines.

If you encounter a problem which is not answered by this manual, please feel free to write or call the Service Department of the Manitowoc Equipment Works, Division of The Manitowoc Company, Inc., Manitowoc, Wisconsin, describing the problem you have encountered. The Service Department will be happy to give you particularized advice and assistance. Whenever calling or writing, please state the complete model and serial number of the ice making equipment.

MANITOWOC EQUIPMENT WORKS
Div. of THE MANITOWOC CO., INC.
Manitowoc, Wisconsin 54220
(414) 684-6621

MODELS

This manual includes the following models:

AR1100A	Regular Cube, Air Cooled
AR1101W	Regular Cube, Water Cooled
AD1102A	Dice Cube, Air Cooled
AD1103W	Dice Cube, Water Cooled
AY1104A	Half Dice Air Cooled
AY1105W	Half Dice Water Cooled

This manual covers the above cuber models starting with serial number 11693.

WARRANTY

Parts and Material	One year — parts only
Compressor	Five years — parts only

Defective parts must be returned transportation prepaid.

(See "Ice Machine and Bin Warranty" page 38 and registration card shipped with the unit for warranty conditions.)

FOR YOUR PROTECTION

The carrier who delivers this merchandise to your door is responsible for loss and damages. Acceptance of this shipment by the transportation company is acknowledgment that the articles delivered to them were in good condition and properly packed. It is your responsibility to file a claim with the carrier if any of the following condition exist.

A. VISIBLE DAMAGE

1. If cartons appear damaged in any form, please open at once in presence of driver.
2. Have deliveryman note on freight bill the nature and extent of damages.
3. Notify the transportation company's office to inspect the merchandise.
4. File claim for damages at once. In filing a claim with the transportation company, you may elect to:
   (A) Make a cash adjustment for full value,
   (B) Arrange to have repairs made, or
   (C) Replace the merchandise.

B. CONCEALED DAMAGE

1. If damage is noticed when merchandise is unpacked, notify the transportation company's office immediately and ask to have it inspected.
2. Do not destroy packing materials until shipment is inspected.
3. Unless these conditions are met, it is very difficult to file claim against a transportation company.

C. SHORTAGES

1. Check number of cartons delivered with the quantity shown on your receipt.
2. If quantities do not tally, have driver note shortage and file your claim with them.

IMPORTANT

All claims for loss and damage should be filed immediately with the transportation company making delivery to your door.

We are willing to assist you in every possible manner in collecting claims for loss or damage on this shipment, but this willingness on our part does not make us responsible for filing or collecting claims, or replacing merchandise.

Under no circumstances will we accept the return of any merchandise unless written permission has been given by our service department.

INSTALLATION OF 1100 SERIES CUBER

LOCATION

For maximum efficiency, pick a location away from sources of heat such as radiators, ovens, other refrigeration condensing units, direct sunlight, etc. All model 1100 series cubers require a minimum of 5 inches at the back, top and sides of the cuber for adequate air circulation. Cubers located in unheated areas must be protected from freezing or shut down and drained.

UNCRATING AND INSPECTION OF THE CUBER

All 1100 series cubers are bolted to skids and packed in corrugated boxes. To uncrate remove the staples from around the lower edge of the carton. Lift the carton upwards and off the cuber. There are four wooden corner pieces that may fall off the cuber as the carton is removed. Then remove the corrugated sleeve from around the cuber. Inspect the cuber for any damage. Remove the four skids bolts from the bottom side of the skid. Be sure there is insulation tape on the top edge of the bin and set the cuber in place. Check the cuber to be sure it is level and adjust bin legs if needed.

REMOVAL OF PANELS FOR UNPACKING & ELECTRICAL CONNECTIONS

To remove front and back panels, remove the two machine screws, one on each end of the panel. Then slide the panel up slightly, pull the bottom out, and slide the panel down from under the cover. Fig. 1. Remove the two screws from each end of the top panel and lift the panel up and off the cuber. Fig. 1.

REMOVAL OF INTERNAL PACKING

Remove the following:

1. The tape securing the splash curtains, water pump & ice chutes.
2. Remove the ice chutes and the corrugated board from around the chute and the plastic sheet from over the chute. Then replace the ice chutes and damper doors and secure the chutes with the brackets and thumb screws provided.
3. Remove the packing from under the water pump.
4. Remove the wooden wedges from under the compressor.
5. The box taped in the evaporator section contains the strainer for the ice making water supply line.

GENERAL REQUIREMENTS

All **electrical, water** supply and **drain** connections must conform to all local and national codes.

ELECTRICAL AND SERIAL PLATE

The combined electrical and serial plate is located outside the cabinet on the right end panel. Be sure to send the complete serial plate number (16 numbers) and the model number when calling for service or parts. See Fig. 2.

ELECTRICAL RATING

			Min. Circuit Amps	Max. Circuit Fuse
Air Cooled	208/230V	3PH 60cy.	12.4A	30A
Water Cooled	208/230V	3PH 60cy.	11.0A	30A
Air Cooled	208/230V	1PH 60cy.	19.0A	20A
Water Cooled	208/230V	1PH 60cy.	17.6A	20A

CONNECTING POWER SUPPLY

The cuber should be connected to a separately fused circuit. Fuse size must not exceed maximum fuse size shown on the electrical plate.

All electrical wiring connected to the cuber must be rated equal to or greater than the minimum ampacity shown on the electrical plate.

With the top panel removed, remove the electrical box cover at the backside of the cuber. Fig. 3 & 4. Run the supply wires through the supply hole connecting the power supply leads to L1 and L2. Fasten ground wire to the green screw provided in the base of the junction box.

WATER SUPPLY

Quality and ice making capacity are affected more by chemistry, temperature, and foreign matter in supply water than any other factor. A survey made of water departments of large cities all over the country made it obvious that external filters or strainers should be installed. Such equipment is very effective in improving ice quality and reducing the frequency of cleaning out the ice making sections. Any questions as to the type of water filter or strainer to be used can be answered by your local water treatment company or water department.

CONNECTING WATER SUPPLY

All the water connections are located on the rear of the ice machine and are ½ inch F.P.T. pipe fittings. All connections are labeled. Make sure you install the water screen provided with the cuber in the ice making supply line. Recommended minimum line size is ⅜ inch OD tubing. See Fig. 3.

DRAIN CONNECTIONS

It is essential that drain connections be made, so waste water cannot back up into the head unit or bin. On water cooled models, a separate connection is provided for discharging condenser water. All connections are labeled. We recommend covering all incoming water and drain lines with a plumbing insulation material to prevent condensation.

If the head unit and bin drains are tied together through a "T" connection, we recommend using a ¾" pipe and a stand pipe vented to the atmosphere to prevent water traps. Drains must be at least ½" inside diameter and have 1½" drop per 5 feet of run. If drains are not close enough to allow drop for proper drainage, or water is to be drained in a stationary sink higher than the ice machine drains, use an automatic condensate disposal pump. (Check and follow local plumbing codes.)

CHECK LIST FOR START-UP

1. Be sure the cuber is **level!** This is to insure proper water flow in the cuber.
2. Turn the supply water on for the sump and the condenser (if water cooled).
3. Turn the toggle switch Fig. 5 to "water pump", bottom position. This will start the water pump, only pumping water to the water distributor and over the evaporators. Check the position of water distributor to see that it is distributing water properly and evenly over the evaporators. See Fig. 10 for proper distributor location. Set the float in the sump to maintain a level of ¼" below the top of the overflow tube, while the cuber is running. Should the float valve require adjustment, bend the float rod carefully until desired water level is achieved.
4. Turn the water pump on and off (at approx. 1 minute intervals) several times to flush clean water through the system, and to observe that the flush water drains properly.
5. Check all the refrigerant lines and conduit to guard against vibrations and possible failure.
6. Check all the water connections for leaks.

START UP AND FINAL CHECK LIST AFTER START UP

1. Place the toggle switch in "Ice" position.
2. With the cuber operating, reach in and push the damper door open about 1-1½ inches. This will open the damper (bin) door switch. With the damper door held open the entire cuber should stop and remain off until the damper door is released. If the damper door switch needs adjustment, bend the bin switch arm until proper operation is achieved.
3. On air cooled cubers, there are two condenser fans. The bottom condenser fan always runs during the freeze cycle, while the top fan cycles on a Ranco thermostat control. Check the fan to be sure it runs when the condenser temperature is approx. 97° F and above.
4. The ice cube bridging should be checked by the installer. Replace all panels on the cuber. Allow the cuber to go through several complete freeze and harvest cycles. Adjust bridge thickness as per instructions on page 30.
5. Be sure the owner has been instructed on how to operate and clean the cuber.
6. Be sure the installation and warranty registration card has been filled out. This is for the owners protection.

SYSTEM CONTROL AND SEQUENCE OF OPERATION

The 1100 Series cuber main On-Off switch is a toggle switch located on the upper right side of the control compartment. Figure 4. The toggle switch has 3 positions. "Ice," "off", and "water pump" — (water pump runs only).

Placing the toggle switch in the "Ice" position will start the cuber by energizing the contactor through the high pressure cut-out (water units only) and the bin switch. In-turn the contactor energizes the compressor, water pump, and condenser fans (air units only). The cuber is now running in the freeze cycle with water running over the evaporator and freezing to the grids.

The top condenser fan motor (air units only) is cycled by a temperature actuated switch. This switch is opened and closed by the rise and fall in condensing temperature. (Opening 87° F, Closing 97° F)

As the cuber continues to run, producing ice, the suction pressure will continually decrease. When the suction pressure reaches a preset point, 11 PSIG dice and regular, and 12 PSIG half dice, the reverse acting low pressure cut-in control will close its contacts. This in turn energizes the time delay circuit of the solid state timer.

At the end of the timing sequence the relay of the solid state timer will energize. The relay's normally closed contacts, between terminals 4 & 5, will open shutting off the water pump and condenser fans, and closes its normally open contacts, between terminals 3 & 4, energizing the front or advanced hot gas solenoid and the time delay relay.

The time delay relay delays the opening of the back or delayed hot gas solenoid valve by 35 or 70 seconds. This gives the front evaporator an advantage so it will harvest first.

With the cuber in the harvest cycle the suction pressure will rise above 30 PSIG opening the low pressure control contacts. The timer relay remains energized through the timer interlock circuit.

The hot gas will warm the evaporators releasing the ice, allowing the ice sheets to fall through the ice chute with the front or advanced evaporator harvesting first and shortly after the back or delayed evaporator harvesting last. As the back ice sheet falls through the ice chute, the ice will open the damper door, momentarily tripping the bin switch, de-energizing the entire cuber. The solid state timer relay will return to its normal position, de-energizing the hot gas solenoid valves and energizing the water pump and condenser fans (air units). The cuber is now in a new freeze cycle.

If for some reason the bin switch failed to open when the ice harvested the hot gas would continue to warm the evaporators and suction line. At a fixed temperature setting the safety thermo disc would open de-energizing the timer relay and hot gas solenoids only, placing the cuber in a new freeze cycle. The thermo disc will reclose as the suction temperature drops.

The ice cuber will continue to cycle until the storage compartment is full. The ice cuber automatically discontinues ice production as the ice fills the chute, holding the bin damper door and bin door switch open.

Bin Thermostat Control (Used On BY 1100 Series Only)

The bin thermostat is used to control the ice level in the bin by stopping and starting the cuber. The location of the sensing bulb will determine the ice level.

The toggle switch on the thermostat housing can jumper out the thermostat.

REFRIGERATION CYCLE —

(Assume operating conditions are 90° F air & 70° water)*

FREEZE CYCLE

During the freeze cycle the high pressure discharge gas is pumped into the condenser — (air cooled — ave. head 155 PSIG, water cooled 125 PSIG)*. The gas is condensed to a high pressure liquid. The liquid leaves the condenser, goes through the filter — drier and into the heat exchanger. On water cooled cubers the liquid would go from the condenser and into the receiver. The receiver stores extra refrigerant when it is not used, this depends on operating conditions.

The high pressure liquid leaves the heat exchanger at a reduced temperature making the system more efficient. The high pressure liquid is then metered into the evaporators by two thermostatis expansion valves, one expansion valve for each evaporator. The expansion valves regulate the rate of refrigerant liquid flow into the evaporator in the exact proportion to the rate of evaporation of the refrigerant liquid in the evaporator. The expansion valve does this by responding to (1) the pressure in the evaporator (2) the temperature of the refrigerant gas leaving the evaporator using the expansion valve feeler bulb to sense the gas temperature.

After the low pressure liquid evaporates to a low pressure gas it will tee into a common suction line and pass through the heat exchanger. The low-pressure low-temperature gas will reduce the high pressure liquid temperature as both pass through the heat exchanger. The ave. suction pressure will start at 20 PSIG and drop to approx. 9-10 PSIG at the time the cuber goes into harvest.

HARVEST CYCLE

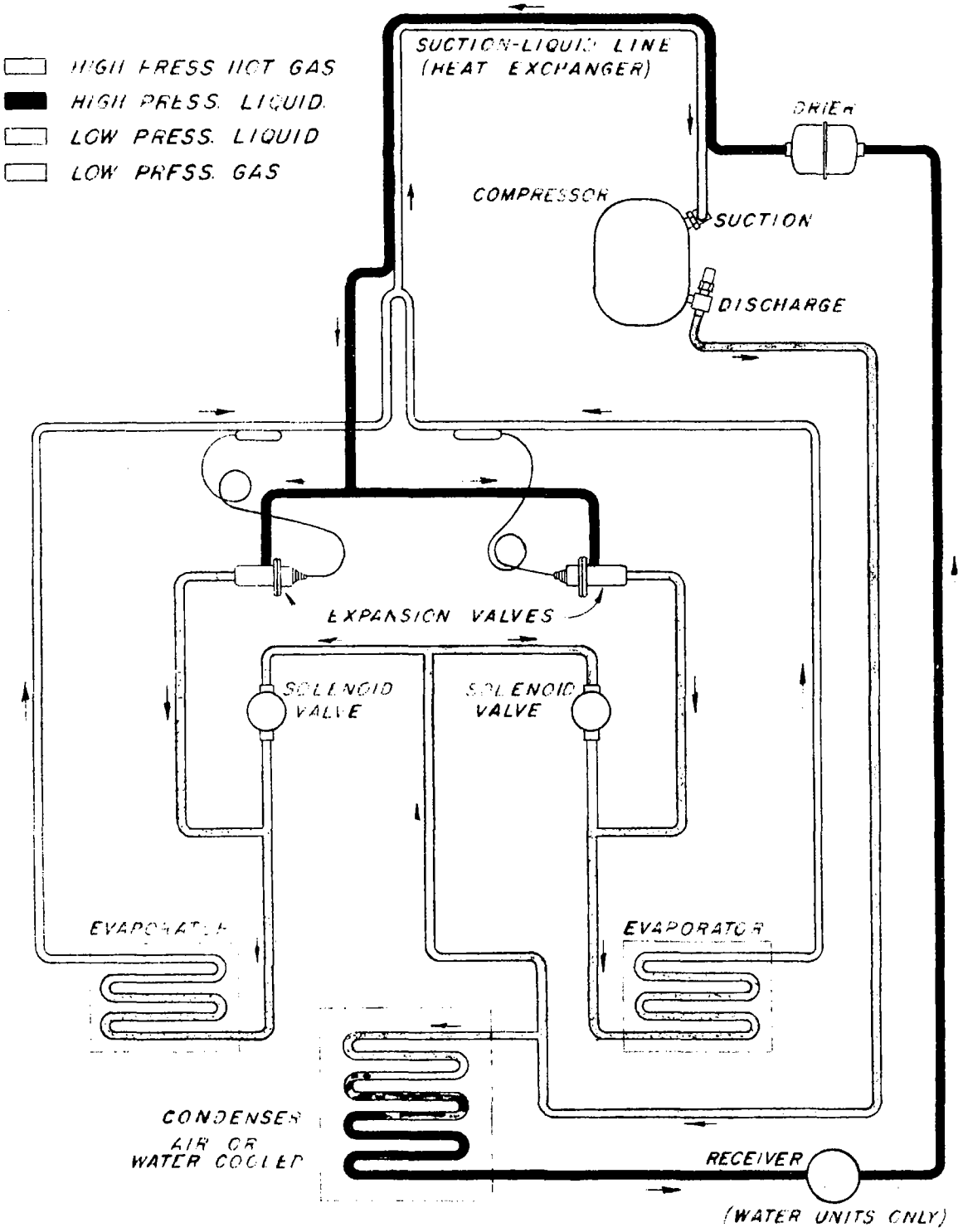
The harvest is initiated by the solid state timer, energizing the hot gas solenoid valves, allowing the high pressure hot gas to flow through the evaporator and harvest the ice. The suction pressure at this time is about 50-60 PSIG, air cooled, 30-40 PSIG water cooled.* The cuber goes back into the freezer cycle automatically when the solenoid valves are closed by the harvesting ice tripping the bin switch.

A1100 OPERATING CHARACTERISTICS*

		AIR COOLED		WATER COOLED	
	AIR TEMP.	FREEZE CYCLE	HARVEST CYCLE	FREEZE CYCLE	HARVEST CYCLE
HEAD PSIG	70	145-110	85-90	130-125	80-90
	80	150-125	90-100	130-125	80-90
	90	180-145	100-115	130-125	80-90
	105	210-180	115-120	130-125	80-90
SUCTION PSIG	70	18-9	40-45	19-9	35-45
	80	20-10	45-55	20-9	35-45
	90	22-10	50-60	21-10	35-45
	105	23-11	55-65	22-11	35-45

*These characteristics can vary depending on the operating conditions.

1100 SERIES TUBING SCHEMATIC REFRIGERATION CYCLE



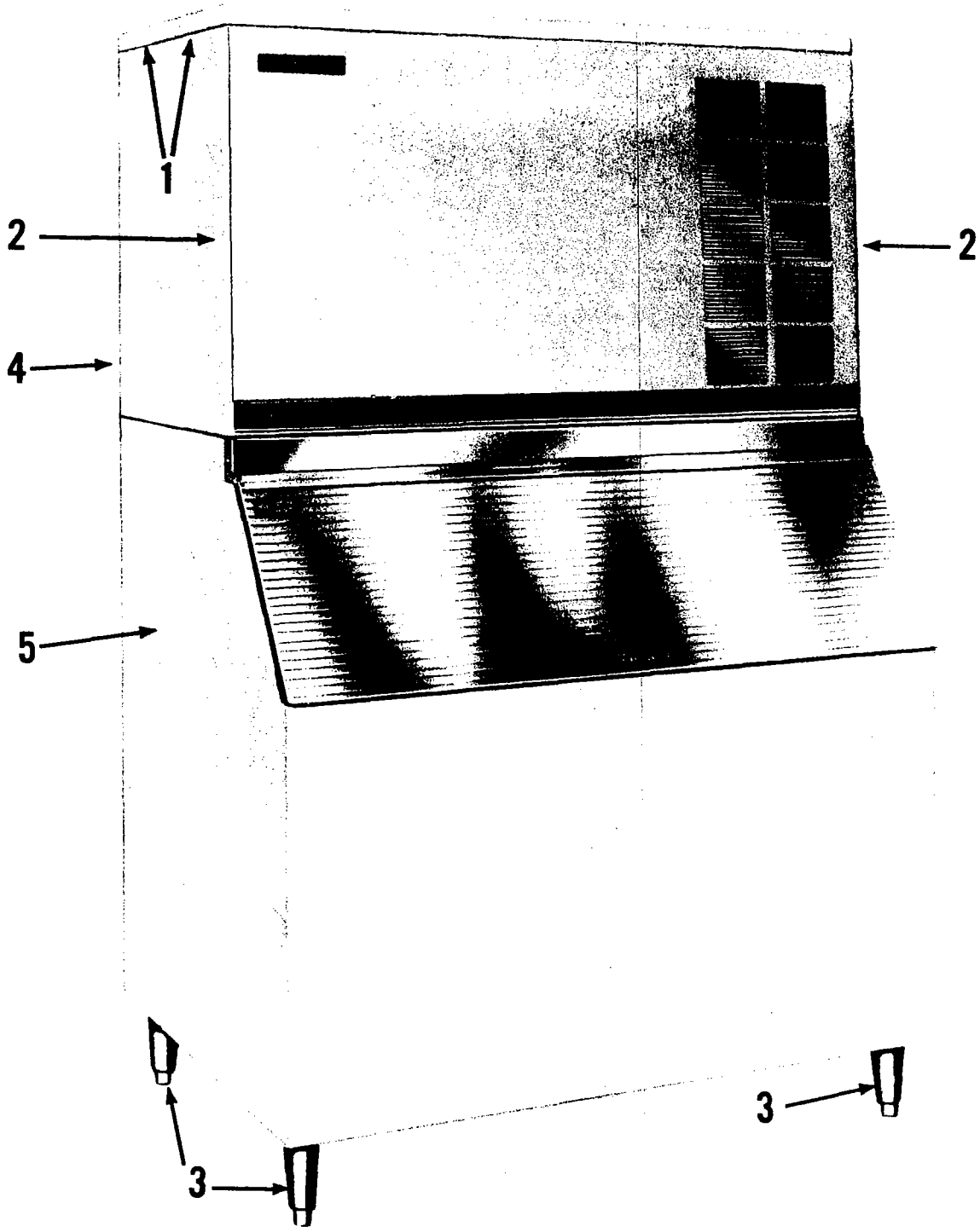


FIG. 1

1. Top cover mtg. screws.
2. Front panel mtg. screws.
3. Leveling legs.
4. 1100 series cuber.
5. C-900 storage bin.

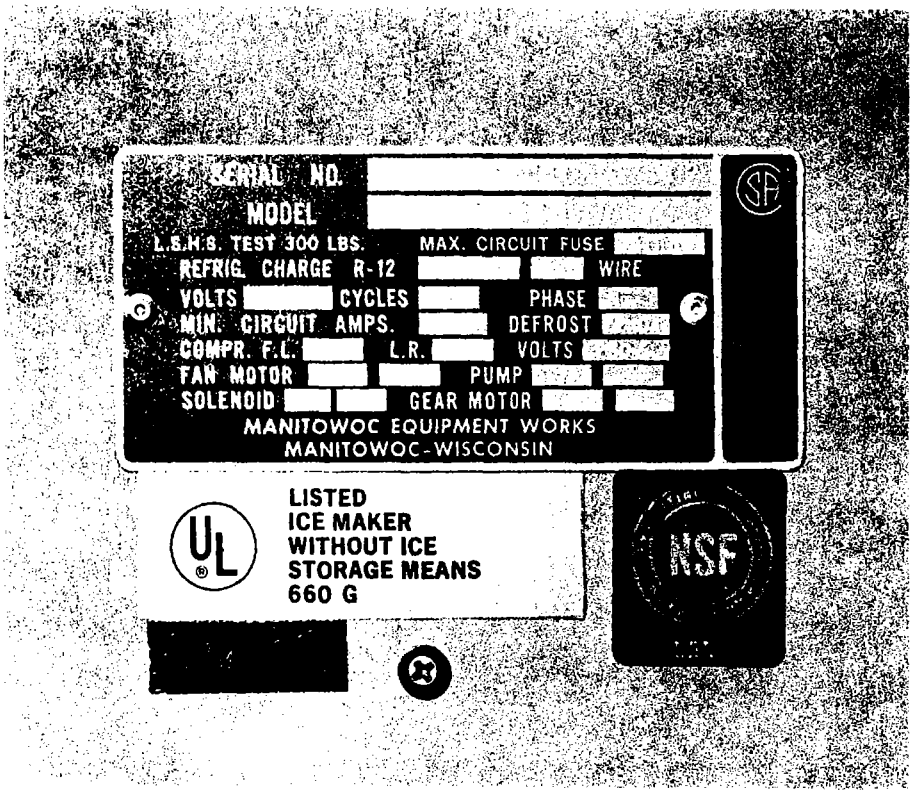


FIG. 2 ELECTRICAL & SERIAL PLATE

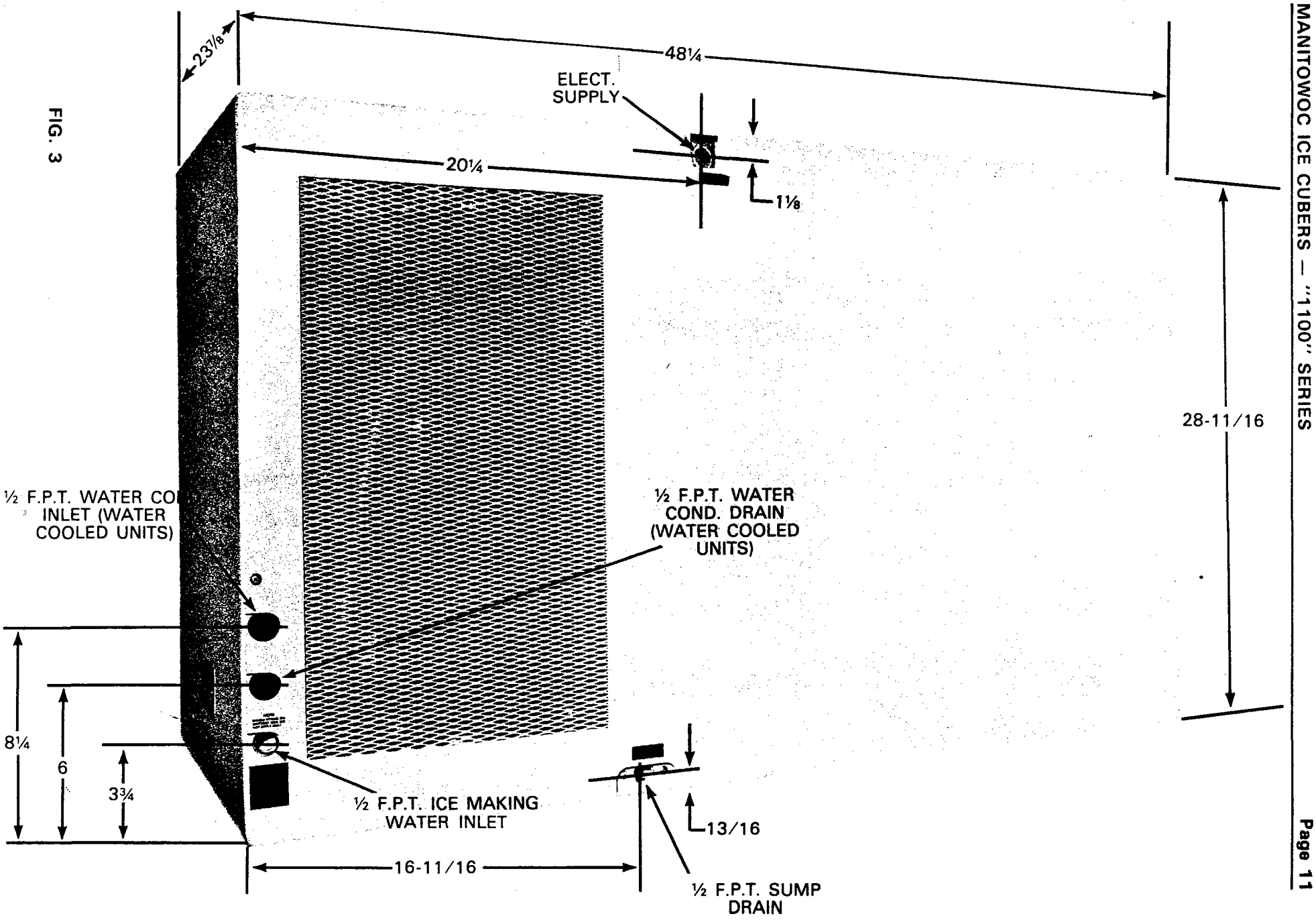

23⅛
48¼
ELECT. SUPPLY
20¼
1⅛
28-11/16
½ F.P.T. WATER CO
INLET (WATER
COOLED UNITS)
½ F.P.T. WATER
COND. DRAIN
(WATER COOLED
UNITS)
8¼
6
3¾
½ F.P.T. ICE MAKING
WATER INLET
13/16
16-11/16
½ F.P.T. SUMP
DRAIN

FIG. 3

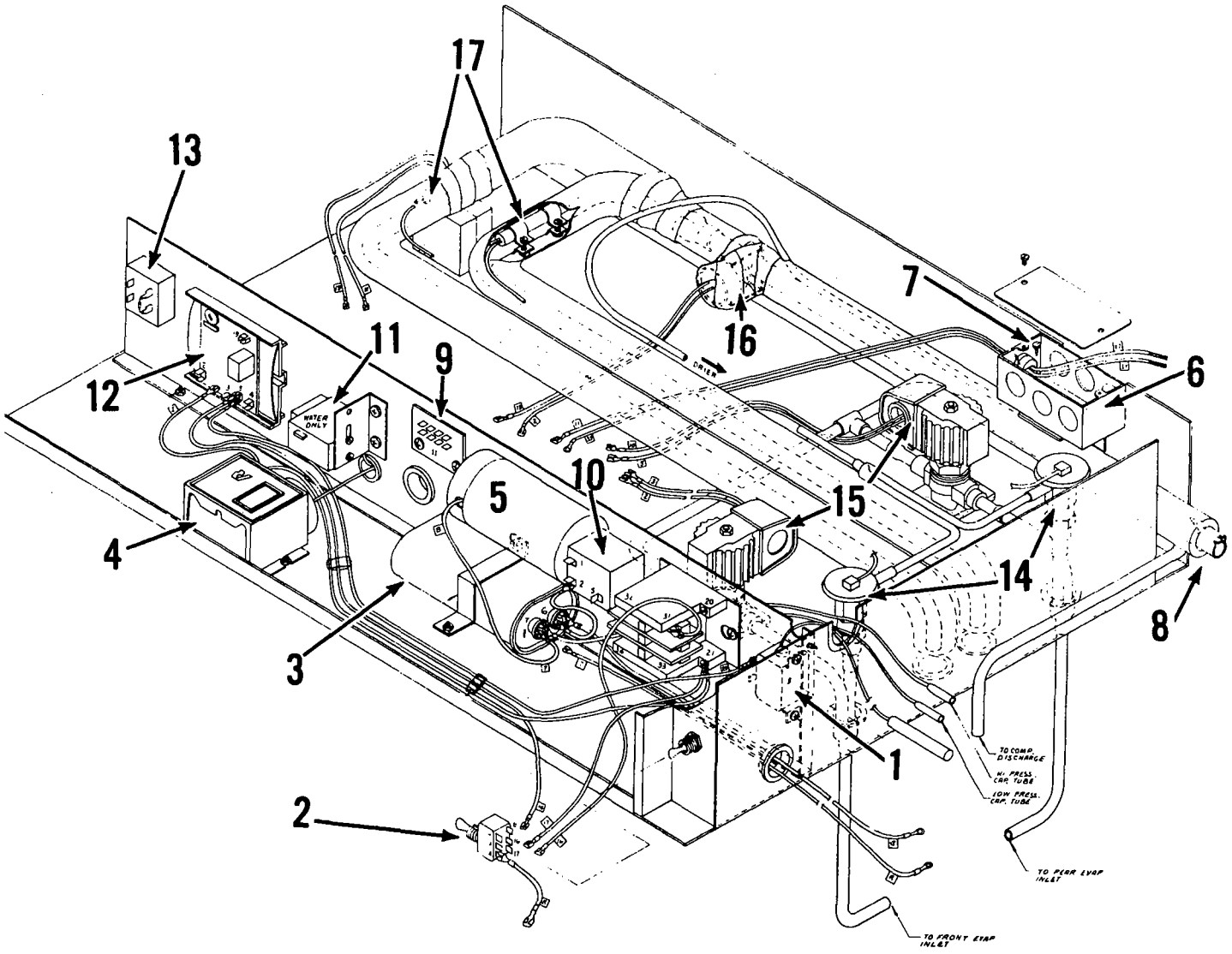


FIG. 4
CONTROL BASE ASSEMBLY SINGLE PHASE

1. Fan cycle switch.
2. Toggle switch.
3. Run capacitor.
4. Low press. control.
5. Start capacitor.
6. Handy box.
7. Ground screw #10-32.
8. Suction tube assy.
9. Terminal board.
10. Start relay.
11. High pressure cut-out.
12. Solid state timer.
13. Time delay relay.
14. Expansion valves.
15. Hot gas solenoid valves.
16 Thermodisc.
17. Expansion valve bulbs.

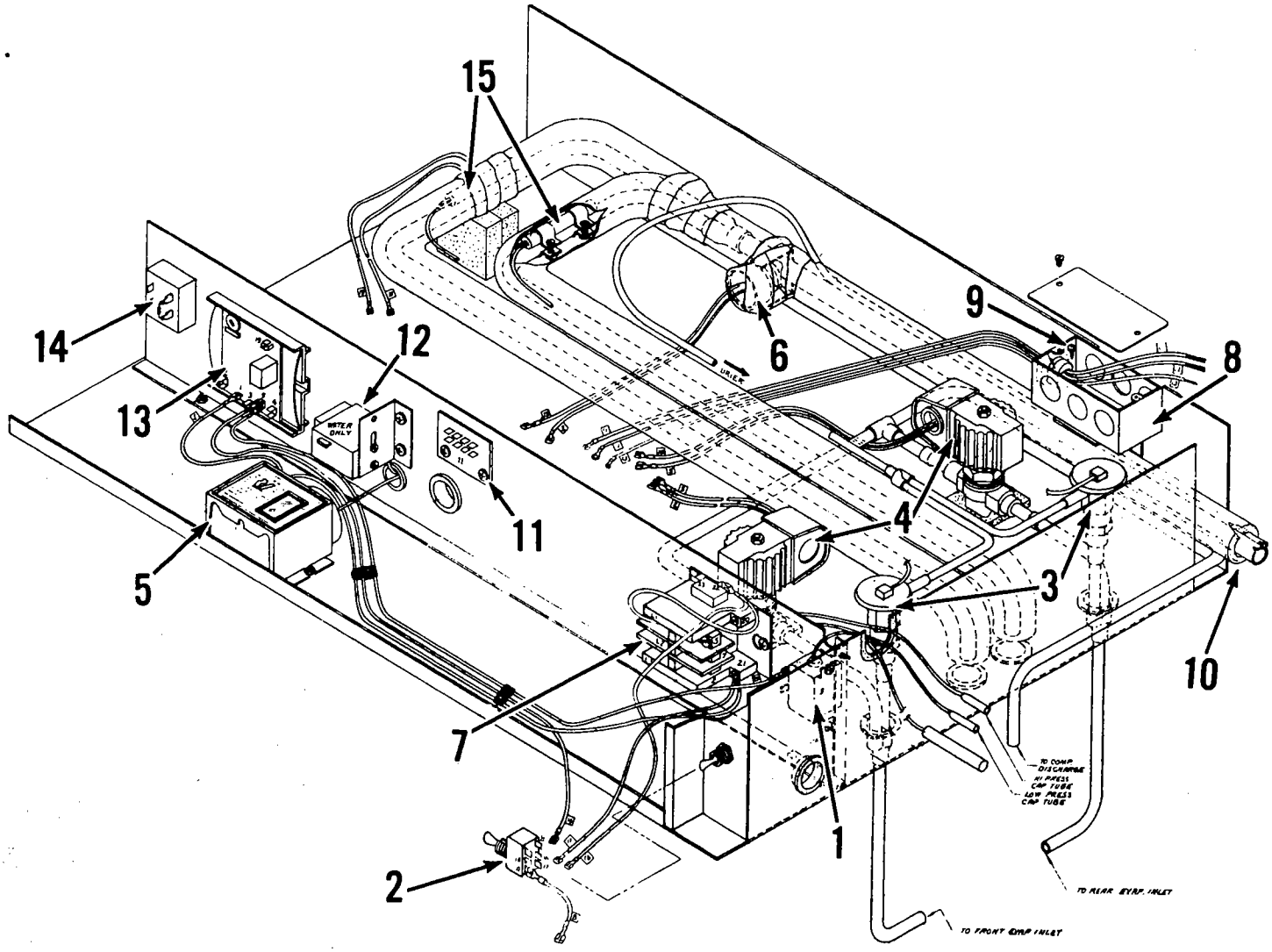


FIG. 5

CONTROL BASE ASSEMBLY 3 PHASE

1. Fan cycle switch.
2. Toggle switch.
3. Expansion valves.
4. Hot gas solenoid valves.
5. Low press. control
6. Thermodisc.
7. 3 pole contactor.
8. Handy box.
9. Ground screw #10-32
10. Suction tube assy.
11. Terminal board.
12. High pressure cut-out.
13. Solid state timer.
14. Time delay relay.
15. Expansion valve bulbs.

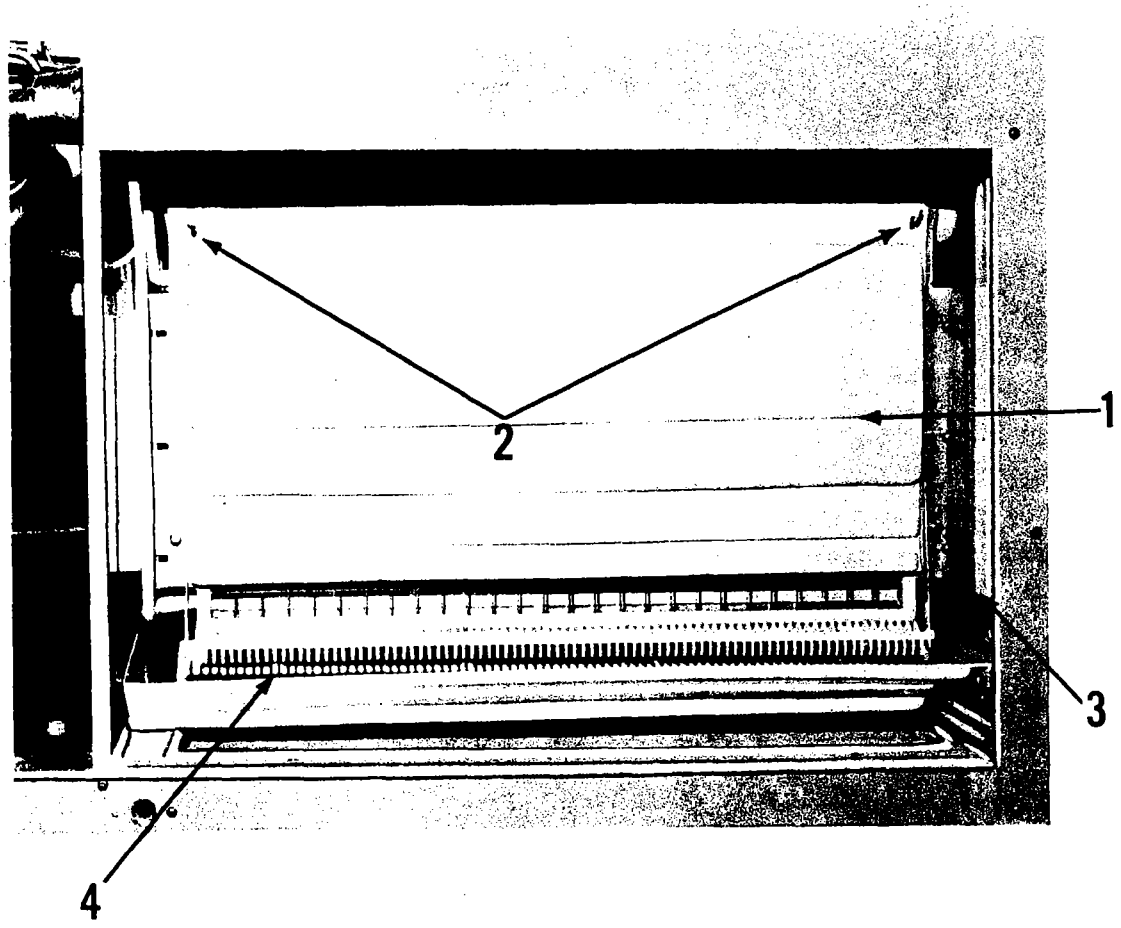


FIG. 6

1. Water curtain (rear evaporator).
2. Water curtain mounting hooks.
3. Bin damper door switch.
4. Harvest rack.

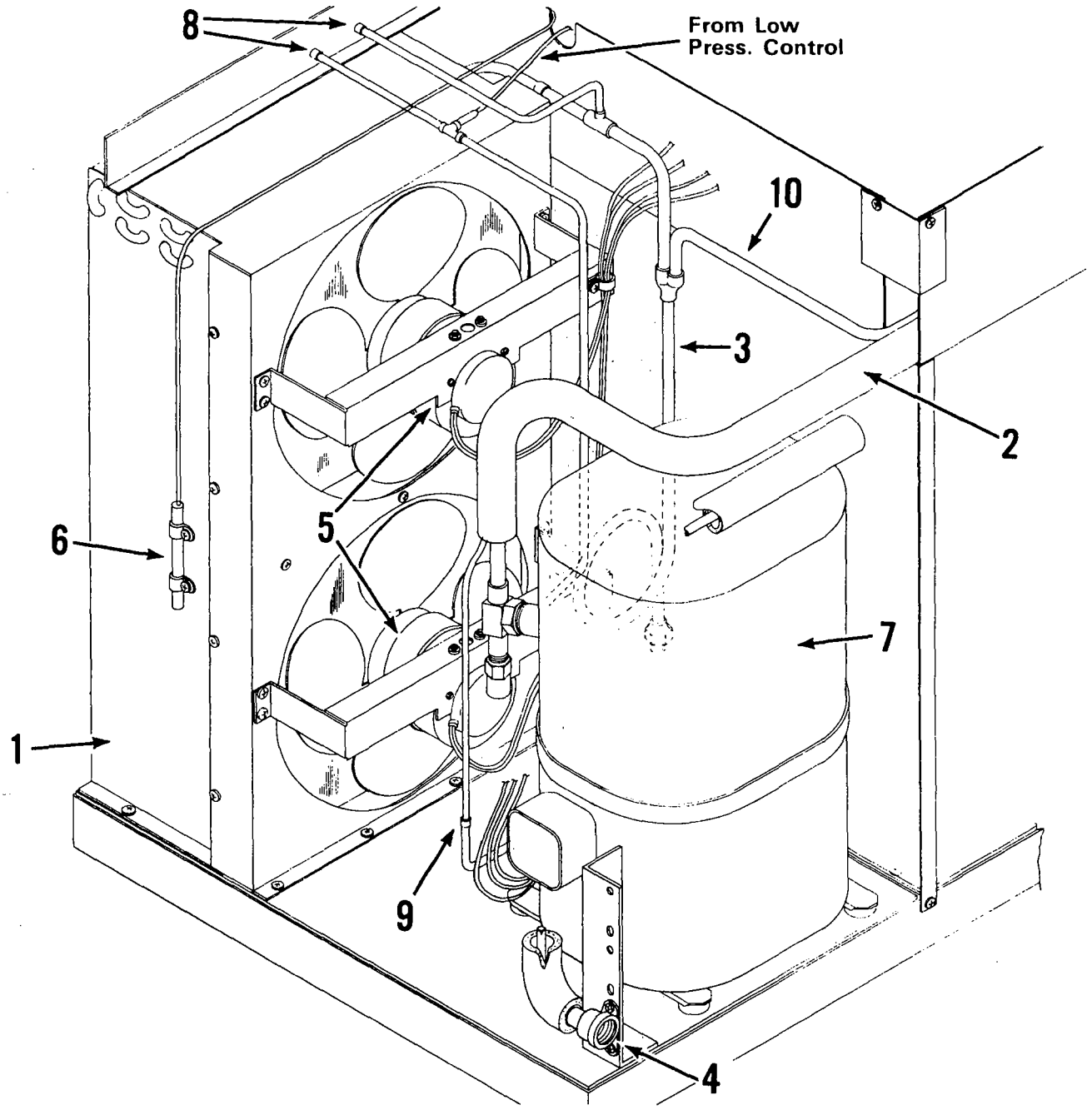


FIG. 7
COMPRESSOR COMPARTMENT
AIR COOLED

1. Air cond. assy.
2. Suction line assy.
3. Comp. disch. tube assy.
4. Water inlet assy.
5. Condenser fan motor assy.
6. Fan cycle switch bulb mounting.
7. Compressor.
8. High & low side service ports.
9. Liquid line.
10. Harvest — hot gas line.

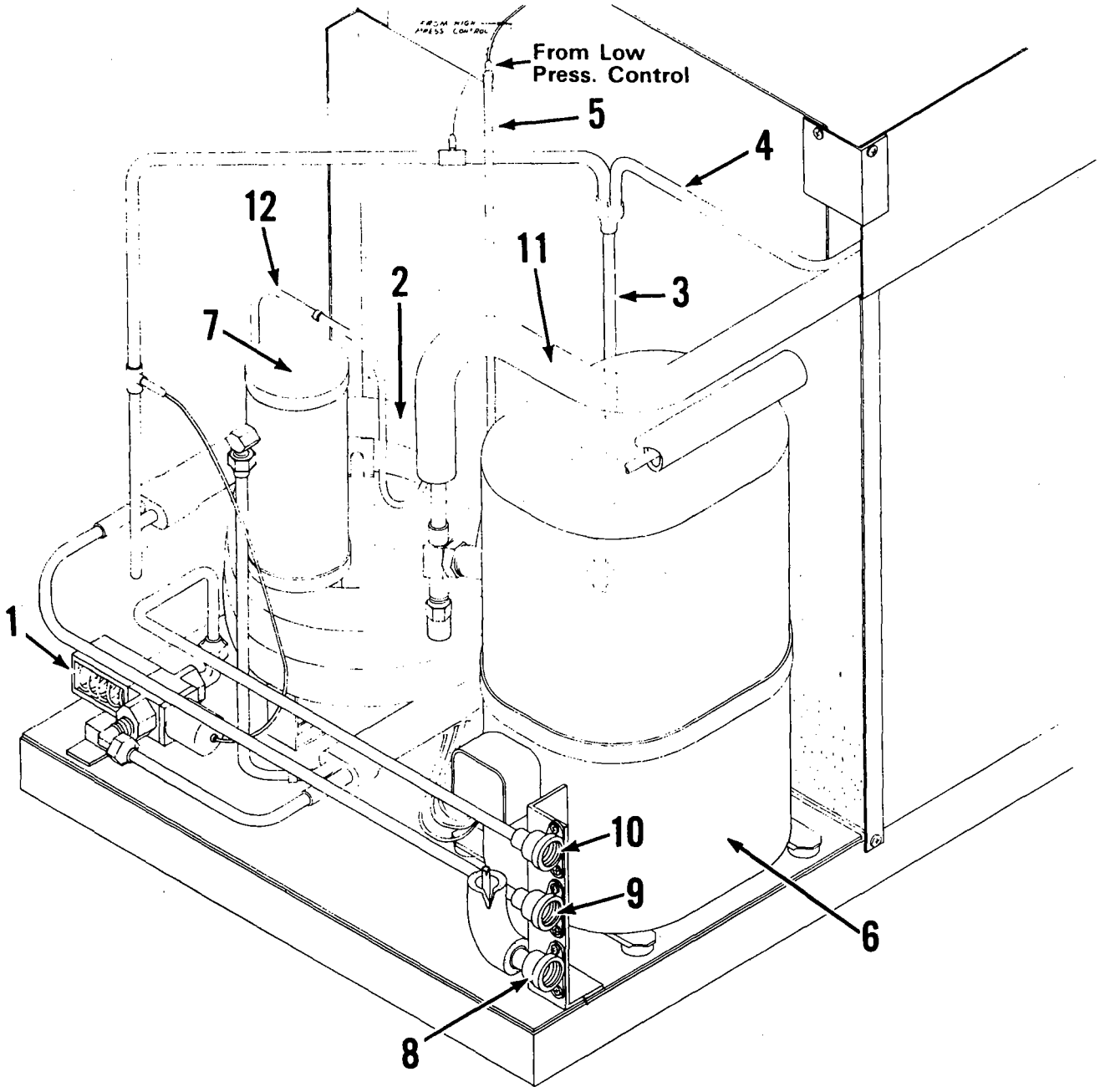
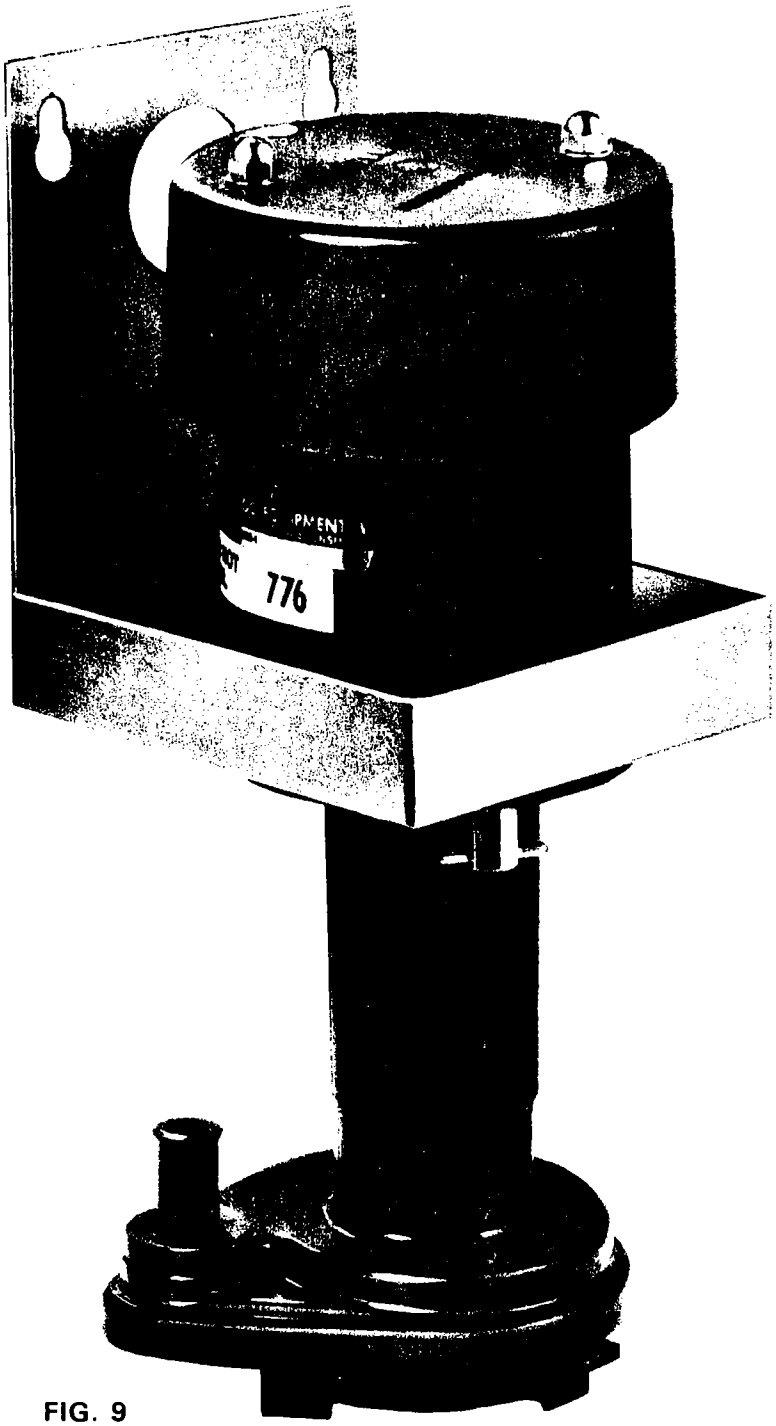


FIG. 8
COMPRESSOR COMPARTMENT
WATER COOLED

1. Water reg. valve.
2. Water cond. assy.
3. Comp. disch. line assy.
4. Harvest hot gas line.
5. Tub assy. suction port.
6. compressor.
7. Receiver.
8. Ice water supply.
9. Condenser water drain.
10. Condenser water supply.
11. Suction line.
12. Liquid line.



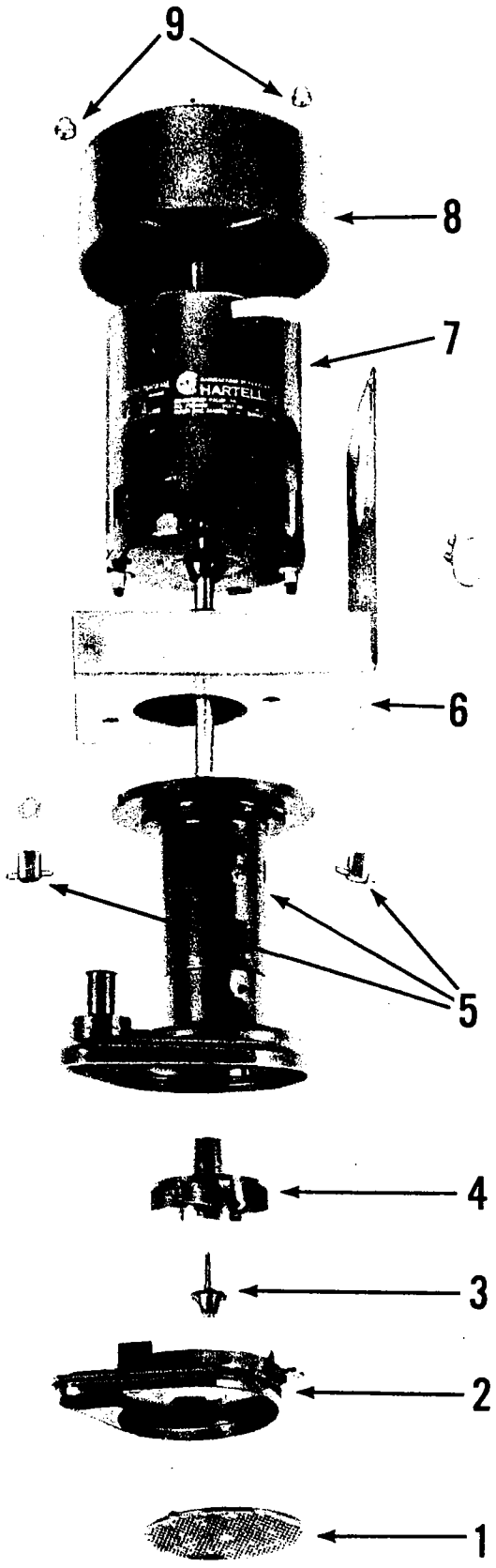


FIG. 9

1. Inlet screen.
2. Impeller housing.
3. Impeller thumb nut.
4. Impeller.
5. Motor shaft housing & mounting nuts.
6. Pump bracket.
7. Pump motor.
8. Pump cover.
9. Cover mounting nuts.

Water pump is available as a complete pump assembly less cover & bracket.
Motor not available separately.

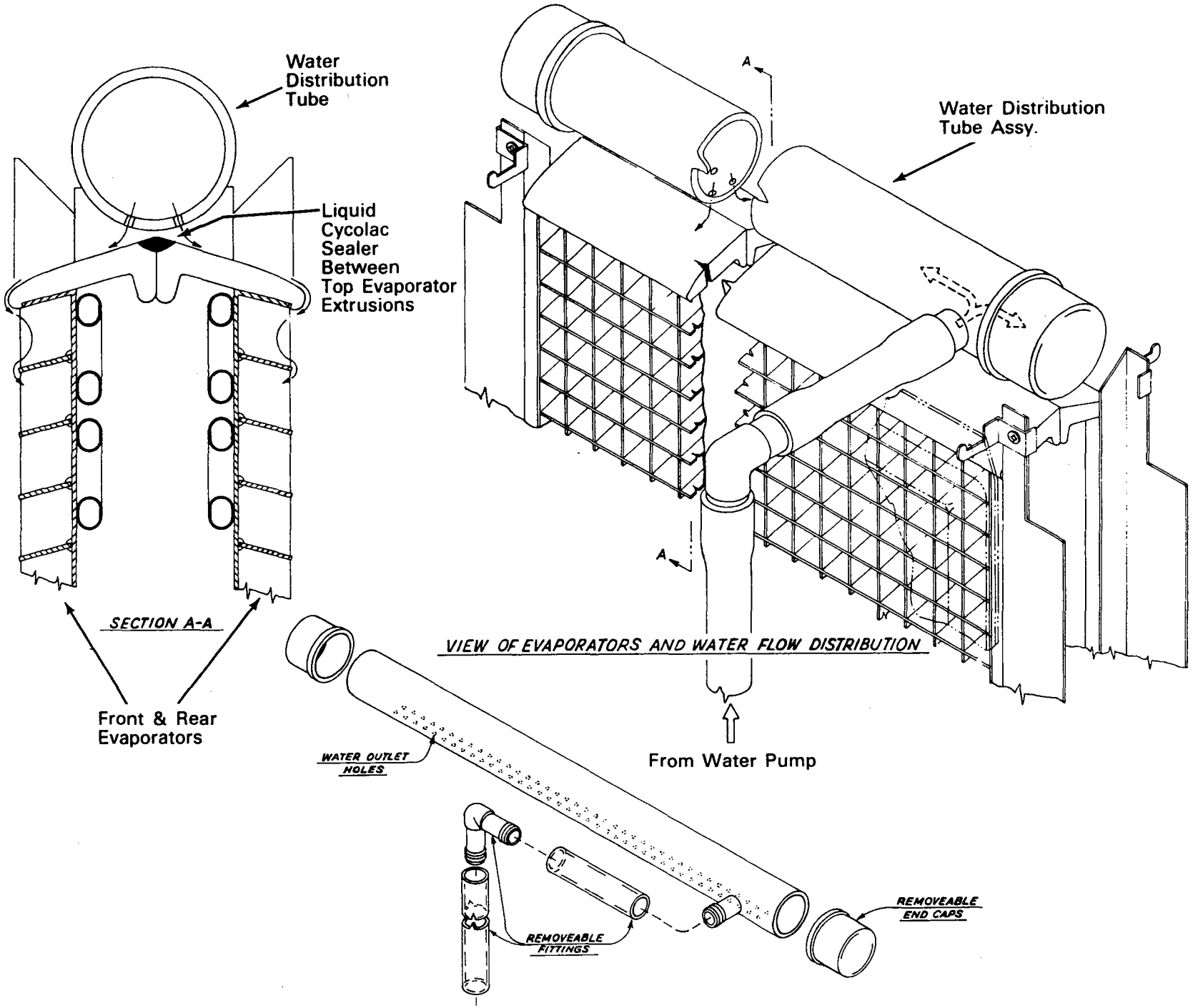


FIG. 10 WATER DISTRIBUTION ASSEMBLY

CUBER SPECIFICATIONS

"1100" SERIES ICE PRODUCTION (Pounds Per 24 Hours) **	Incoming Water Temp. (F)		Room Temperature (F) 70°	80°	90°
	Air Cooled Models	50°	1030	900	820
		70°	920	790	730
		90°	830	710	650
	Water Cooled Models	50°	1030	990	970
		70°	910	870	850
		90°	790	750	730

**Approximate production for Dice Cube and Half Dice Cube (Regular Cube production slightly lower).

Ice capacity based on water consumption of 1.4 times ice weight.

	Regular Cube — 1⅛"		Dice Cube — ⅞"		Half Dice ⅜"	
MODELS	AR-1100A	AR-1101W	AD-1102A	AD-1103W	AY-1104	AY-1105
Height	28-11/16"	28-11/16"	28-11/16"	28-11/16"	28-11/16"	28-11/16"
Width	48¼"	48¼"	48¼"	48¼"	48¼"	48¼"
Depth	23⅞"	23⅞"	23⅞"	23⅞"	23⅞"	23⅞"
Approximate Shipping Weight	475	450	470	445	485	460
Electrical Characteristics (Other Voltages Available on special order)	208/230 Single Phase (AC)	208/230 Single Phase (AC)	208/230 Single Phase (AC)	208/230 Single Phase (AC)	208/230 Single Phase (AC)	208/230 Single Phase (AC)
Compressor Size	1½H.P.	1½H.P.	1½H.P.	1½H.P.	1½H.P.	1½H.P.

CUBER MODEL	AR, AD, AY 1100 WATER COOLED	AR, AD, AY 1100 AIR COOLED
Compressor Models		
Coplaweld — Single Phase	YSB4-0150-CFV	YSB4-0150-CFV
3 Phase	YSB4-0150-TFC	YSB4-0150-TFC
Voltage	208/230 60cy	208/230 60cy
Oil Charge	46 Fl. Oz.	46 Fl. Oz.
Run Capacitor MFD/Volts	25/370V	25/370V
Start Capacitor MFD/Volts	135-155/320V	135-155/320V
Tecumseh — Single Phase	AH7514A	AH7514A
Voltage	208/230 60cy	208/230 60cy
Oil Charge	45 Fl. Oz.	45 Fl. Oz.
Run Capacitor MFD/Volts	35/370V	35/370V
Start Capacitor MFD/Volts	88-106/250V	88-106/250V
Fan Motor Volts		208/230 Volt
Fan Motor Winding Resistance		55 OHMS
Solenoid Coil Volts	208/230V	208/230V
Refrigerant Charge R-12	45 oz.	650Z

* 1100 CONDENSER WATER CONSUMPTION			
Incoming Water Temperature °F	50°	70°	90°
Gals./24 Hr. Running Time	720	1350	3500

* These figures are based on a head pressure setting of 125 PSIG. The consumption rate can vary depending on the condenser operating conditions.

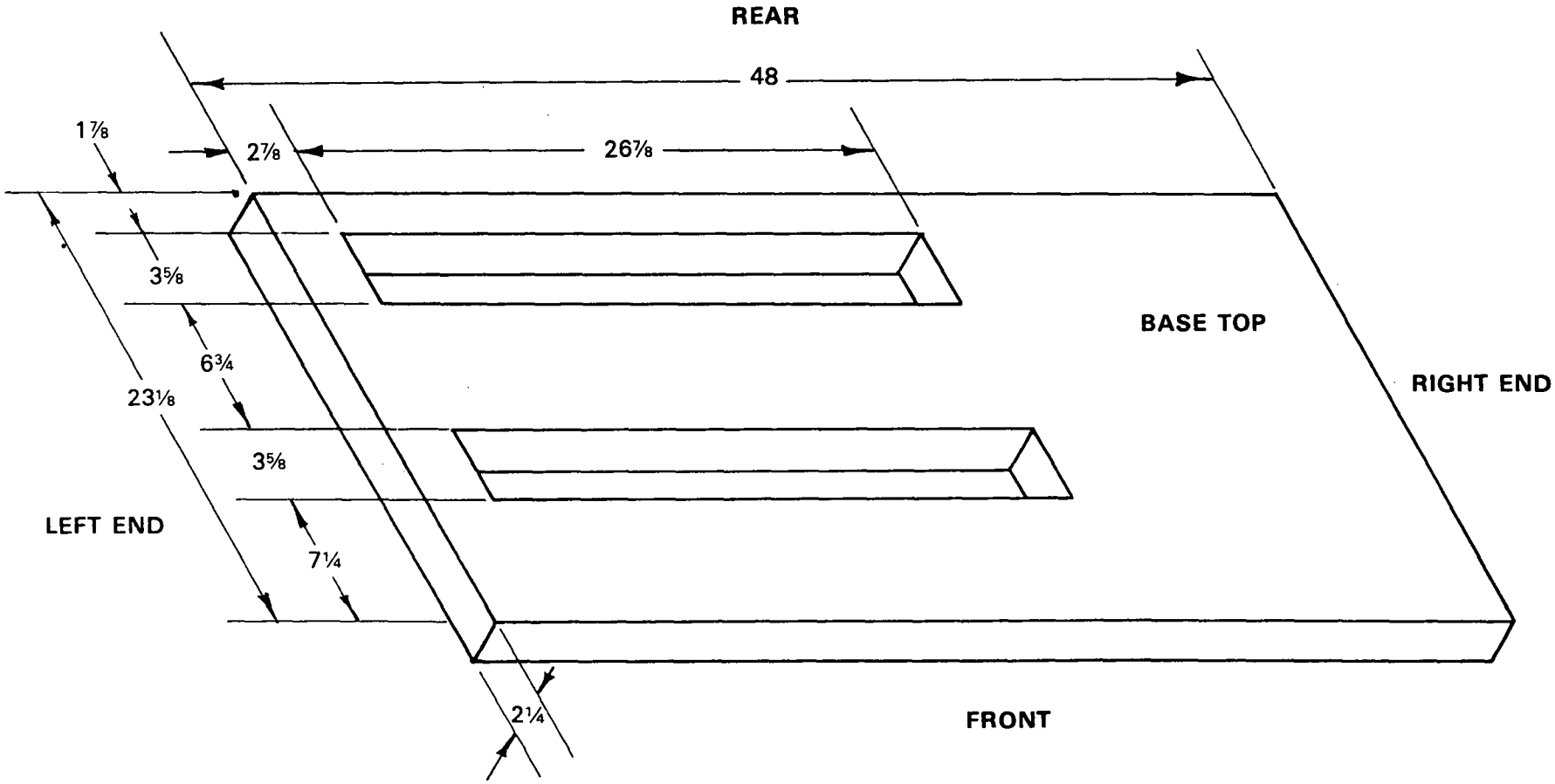
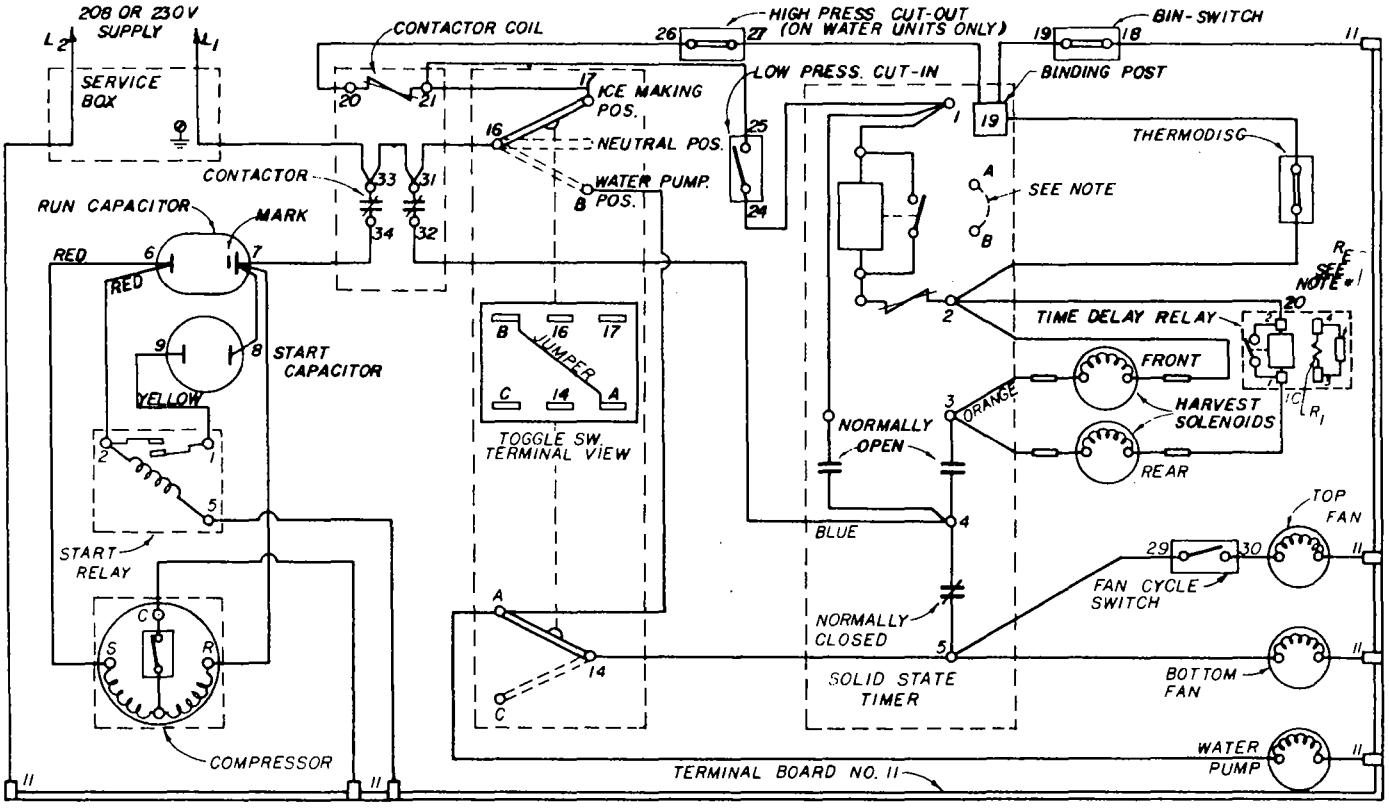


FIG. 11 DIMENSIONAL DIAGRAM OF 1100-SERIES BASE WITH LOCATIONS OF ICE CHUTE OPENINGS FOR ALL MODELS — THIS TYPE



WIRING DIAGRAM A1100 SERIES CUBER 208/230 V, 60 HZ
WIRING DIAGRAM A1100 SERIES CUBER 230 V, 50 HZ

1 PHASE SHOWN AT BEGINNING OF FREEZE CYCLE, FANS ON AIR MODELS ONLY

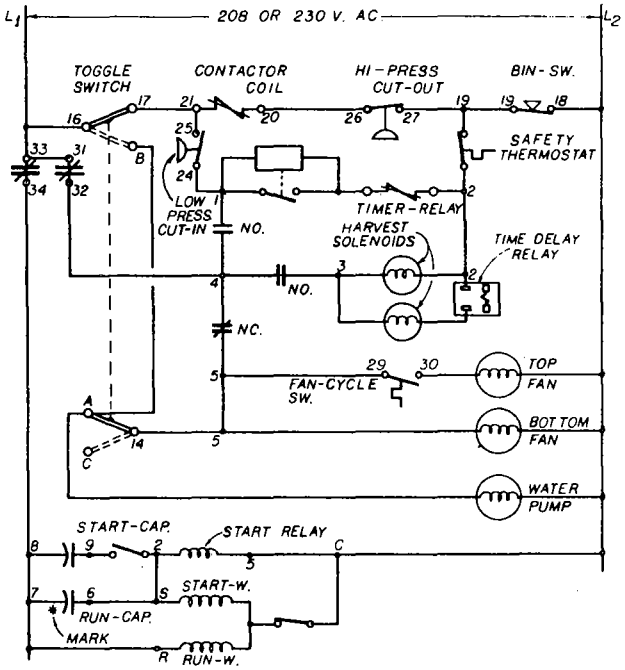
SEQUENCE OF ICE MAKING AND HARVEST CYCLE

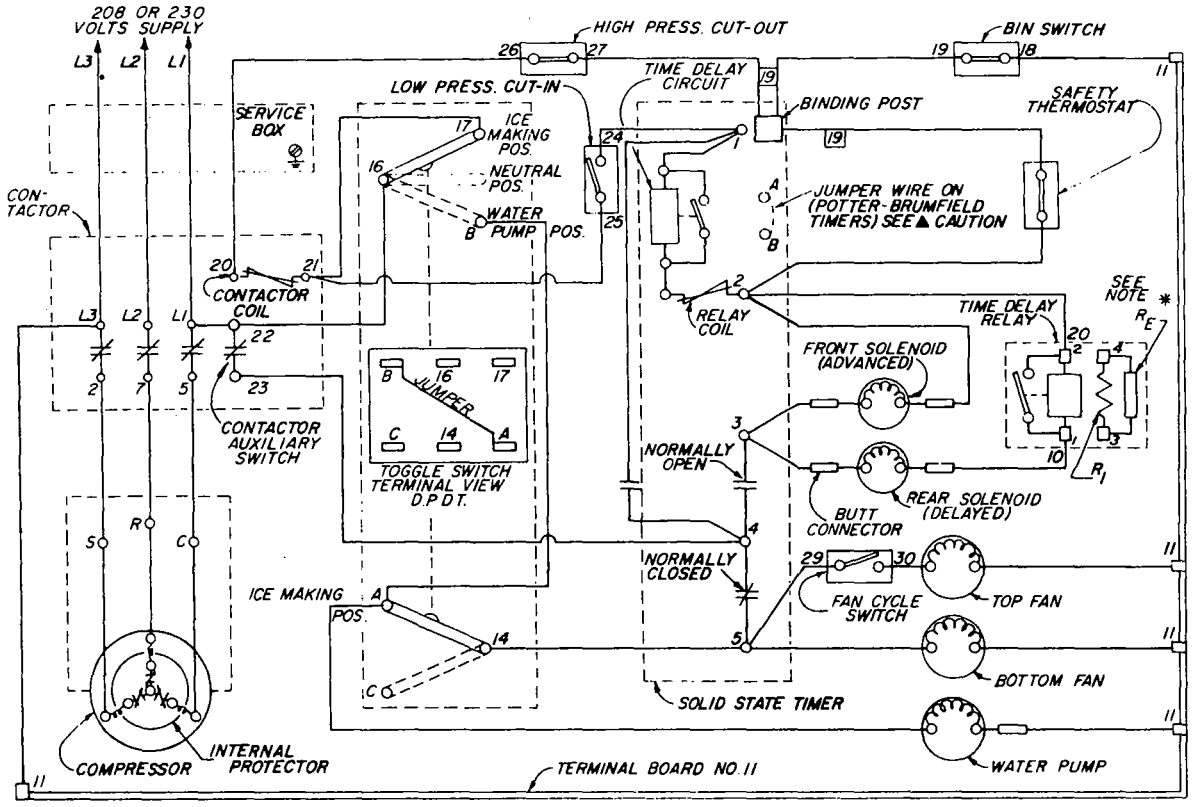
1. SET TOGGLE SWITCH TO ICE MAKING POSITION TO ENERGIZE CONTACTOR-COIL.
2. IN TURN THE CONTACTOR, COMPRESSOR, WATER-PUMP AND FANS ARE ACTUATED.
3. AS GAS PRESSURE DECREASES TO SET POINT, (DUE TO SUFFICIENT ICE BUILD-UP) LOW PRESSURE CONTR. CUTS IN AND INITIATES THE SOLID STATE TIMER.
4. AFTER A SET TIME INTERVAL, THE RELAY OF THE SOLID STATE TIMER MAKES A TRANSFER FROM NORMALLY CLOSED TO NORMALLY OPEN CONDITION. FRONT DEFROST SOLENOID AND TIME DELAY RELAY ARE ENERGIZED - WATER PUMP, TOP AND BOTTOM FAN ARE DE-ENERGIZED
5. TIME DELAY RELAY IS TIMING OUT A SET DELAY TIME. AFTER APPROX. 35 TO 40 SECONDS, CONTACT IS MADE, WHEREBY REAR DEFROST SOLENOID IS ACTUATED. (LOW PRESSURE CUT-IN TRANSFERS TO NORMALLY OPEN POSITION)
6. HARVEST OF DELAYED ICE SLAB OPENS BIN SWITCH. THIS IN TURN, DE-ENERGIZES RELAY OF SOLID STATE TIMER AND BOTH DEFROST SOLENOIDS, AND CONTACTOR MOMENTARILY OPENS.
7. THE CUBER IS NOW READY FOR A NEW ICE MAKING CYCLE.

CAUTION: ▲ THIS UNIT IS 208 OR 230 V., CHECK FOR JUMPER WIRE ACROSS TIMER TERMINALS A AND B (POTTER - BRUMFIELD ONLY) JUMPER MUST BE REMOVED TO PREVENT TIMER DAMAGE.

CAUTION DISCONNECT POWER BEFORE WORKING ON ELECTRICAL CIRCUITRY.

* NOTE: DELAY TIME CAN BE CHANGED FROM 35 TO 70 SECONDS, BY REMOVING R_E (EXTERNAL RESISTOR, R_I - INTERNAL RESISTOR)





WIRING DIAGRAM A1100 SERIES CUBER 208/230 VOLT, 60HZ., 3 PHASE

SHOWN AT BEGINNING OF FREEZE CYCLE, FANS ON AIR MODELS ONLY

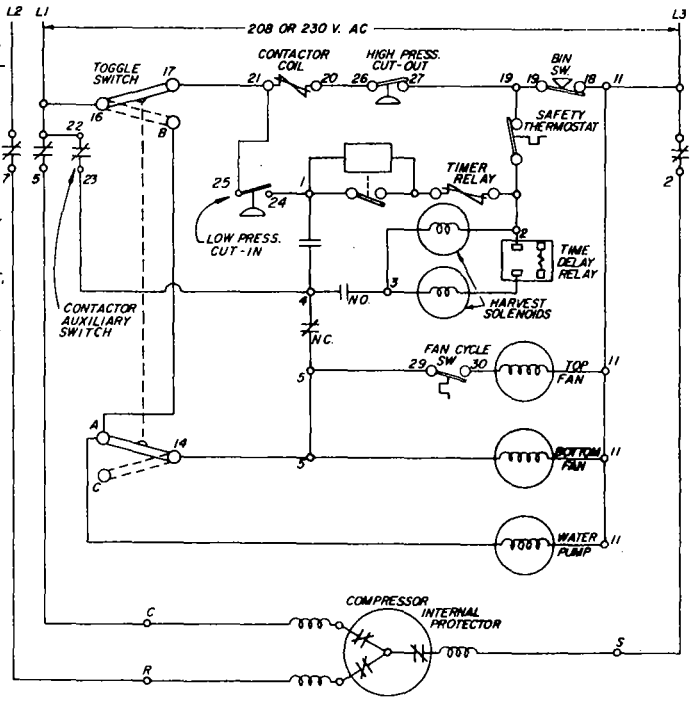
SEQUENCE OF ICE MAKING AND HARVEST CYCLE:

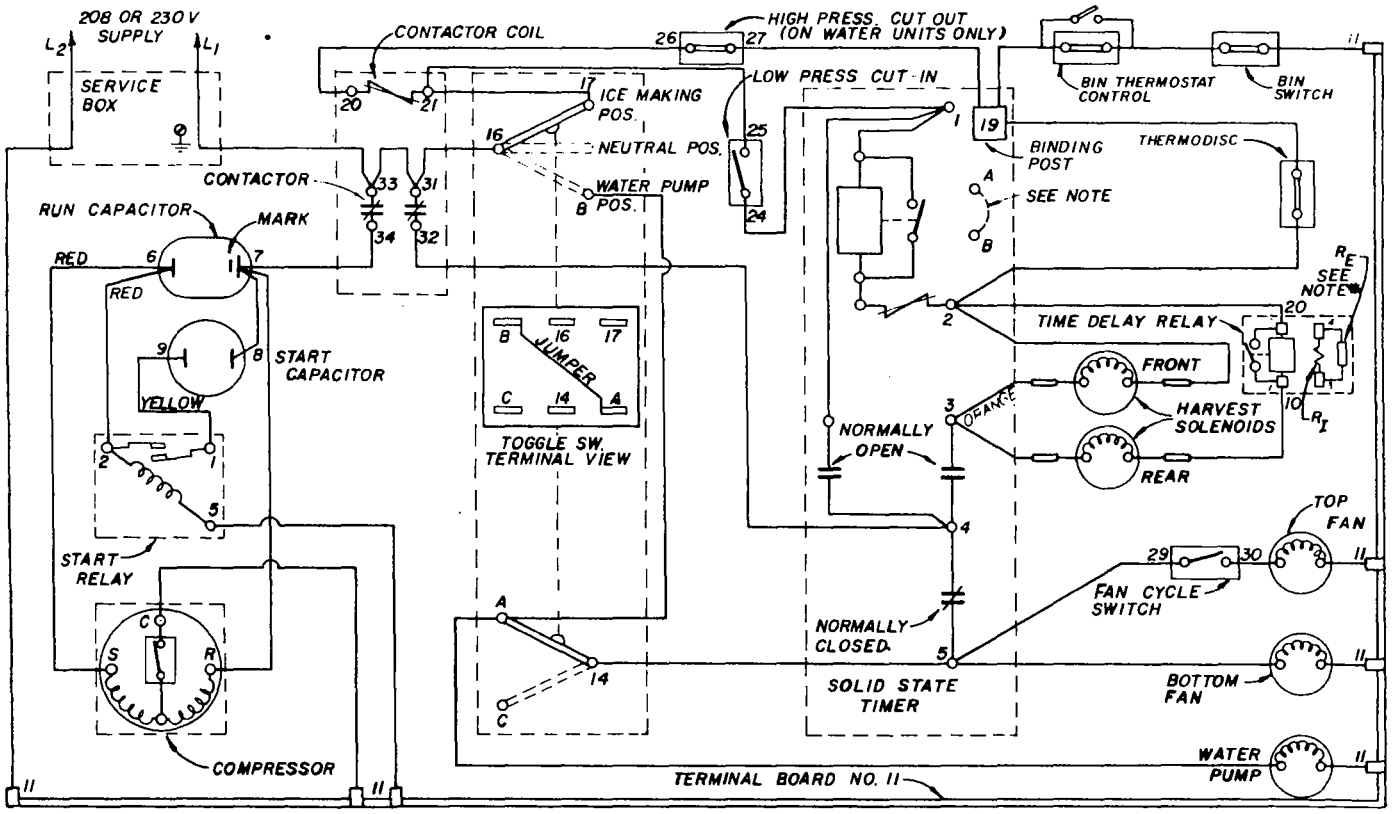
1. SET TOGGLE SWITCH TO ICE MAKING POSITION TO ENERGIZE CONTACTOR-COIL
2. IN TURN THE CONTACTOR, COMPRESSOR, WATER-PUMP AND FANS ARE ACTUATED
3. AS GAS PRESSURE DECREASES TO SET POINT, (DUE TO SUFFICIENT ICE BUILD-UP) LOW PRESSURE CONTR 7 CUTS IN AND INITIATES THE SOLID STATE TIMER
4. AFTER A SET TIME INTERVAL, THE RELAY OF THE SOLID STATE TIMER MAKES A TRANSFER FROM NORMALLY CLOSED TO NORMALLY OPEN CONDITION. FRONT DEFROST SOLENOID AND TIME DELAY ARE ENERGIZED-WATER PUMP, TOP AND BOTTOM FAN ARE DE-ENERGIZED.
5. TIME DELAY RELAY IS TIMING OUT A SET DELAY TIME AFTER APPROX 35 TO 40 SECONDS, CONTACT IS MADE, WHEREBY REAR DEFROST SOLENOID IS ACTUATED (LOW PRESSURE CUT-IN TRANSFERS TO NORMALLY OPEN POSITION)
6. HARVEST OF DELAYED ICE SLAB OPENS BIN SWITCH THIS IN TURN, DE-ENERGIZES RELAY OF SOLID STATE TIMER AND BOTH DEFROST SOLENOIDS, AND CONTACTOR MOMENTARILY OPENS.
7. THE CUBER IS NOW READY FOR A NEW ICE MAKING CYCLE

▲ CAUTION THIS UNIT IS 208 OR 230 V. CHECK FOR JUMPER WIRE ACROSS TIMER TERMINALS A AND B (POTTER-BRUMFIELD ONLY) JUMPER MUST BE REMOVED TO PREVENT TIMER DAMAGE

CAUTION DISCONNECT POWER BEFORE WORKING ON ELECTRICAL CIRCUITRY

* NOTE DELAY TIME CAN BE CHANGED FROM 35 TO 70 SECONDS, BY REMOVING R_E (EXTERNAL RESISTOR, INTERNAL RESISTOR)





WIRING DIAGRAM BY-1100 SERIES CUBER 208 or 230 V. 60Hz 1 PHASE AND 230V. 50Hz.

SHOWN AT BEGINNING OF FREEZE CYCLE, FANS ON AIR MODELS ONLY

SEQUENCE OF ICE MAKING AND HARVEST CYCLE

1. SET TOGGLE SWITCH TO ICE MAKING POSITION TO ENERGIZE CONTACTOR-COIL.
2. IN TURN THE CONTACTOR, COMPRESSOR, WATER-PUMP AND FANS ARE ACTUATED.
3. AS GAS PRESSURE DECREASES TO SET POINT, (DUE TO SUFFICIENT ICE BUILD-UP) LOW PRESSURE CONTR. CUTS IN AND INITIATES THE SOLID STATE TIMER,
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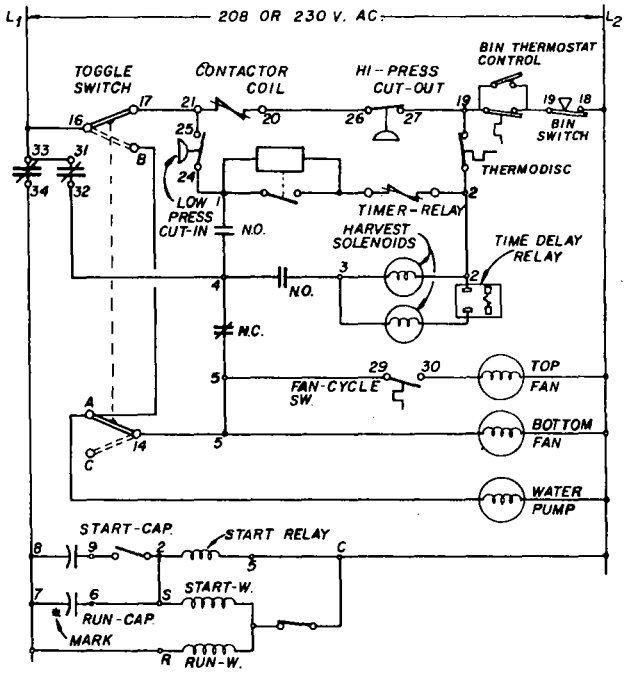
CAUTION ▲ THIS UNIT IS 208 OR 230 V. CHECK FOR JUMPER WIRE ACROSS TIMER TERMINALS A AND B (POTTER - BRUMFIELD ONLY) JUMPER MUST BE REMOVED TO PREVENT TIMER DAMAGE.

CAUTION: DISCONNECT POWER BEFORE WORKING ON ELECTRICAL CIRCUITRY.

■ NOTE: DELAY TIME CAN BE CHANGED FROM 35 TO 70 SECONDS, BY REMOVING R_E (EXTERNAL RESISTOR) R_I = INTERNAL RESISTOR)



GENERAL SYSTEM SERVICE ANALYSIS

COMPLAINT	CAUSE	CORRECTIVE MESSURE
Cuber will not run	Switch in neutral position	Turn switch to Ice-making position.
	Compressor or starting components defective	See compressor check procedure.
	Contactor not energizing	See contactor check procedure.
	Toggle switch defective	See toggle switch check procedure.
	High pressure cut-out tripped	Reset & check system.
	Blown fuse or power off	Replace fuse, check main switch.
	Bin switch open	Bend switch arm for proper action. Check free movement of damper door. See bin Switch check procedure.
Cuber does not harvest	Low pressure control not closing	See low pressure control Check procedure.
	Leaking cond. Water valve (water cooled)	Replace water valve.
	Solid state timer defective, not energizing	See S.S. timer check procedure.
	Safety thermodisc defective or loose on suction line	See safety thermodisc check procedure.
	Leaky hot gas valve	Replace valve.
	Harvest rack bent up into ice sheet	Bend back into place.
	Ice bridge too thin, cubes should fall as sheet	Adjust time up to increase bridge thickness.
	Defrost solenoid defective	Replace solenoid coil or valve.
	Dirty evaporator	Clean evaporator.
Slow harvest	Suction pressure doesn't come down properly	
	a. Defective expansion valve	Replace expansion valve.
	b. Leaky hot gas solonoid valve	Replace valve.
	c. Expansion valve bulb loose	Tighten & insulate to suction line
	Harvest rack bent-up restricting harvest	Bend center of rack down
	Contaminated or limed water system	Clean evaporator and water system.
	Low ambient (air cooled cubers)	Ambient temperature must be above 50°.
	Cond. water valve set too low (water cooled)	Set water valve to 125 PSIG.

COMPLAINT	CAUSE	CORRECTIVE MEASURE
Front or rear evaporator not harvesting	Solenoid defective	See solenoid check procedure.
	Delay period of delay relay too short, or relay defective rear evaporator	Increase delay period from 35 to 70 sec. by removing resistor across terminals 3 & 4. See check procedure.
Ice shells instead of cubes	Low pressure cut-in control not opening.	Check control, replace if defective.
	Low refr. charge, leak in system	Locate leak, repair, evacuate & recharge if necessary. See Major maintenance.
Irregular size cubes & some cubes cloudy	Holes in water distributor plugged.	Clean distributor.
	Shortage of water	Check pump & water level in sump.
	Distributor not adjusted properly	Adjust as shown in Fig. 10.
Large cube bridge	Timer set too high — Low pressure cut-in set too low	See timer check procedure. See L.P. cut-in check procedure.
Low ice capacity	Sump flush-elbow out of position	Adjust elbow.
	Defective Expansion Valve	Replace.
	Sump water over flowing elbow during freeze	Adjust float to maintain water level approx. ¼" of flush elbow.
	Float stuck in nearly closed position	Adjust until float moves freely.
	Water strainer dirty	Remove & clean mesh screen.
	Leaky hot gas valve	Check and replace if necessary.
	Inefficient compressor	Check & replace if necessary.
	High head pressure	See high head pressure.
High head pressure	Fan motor or fan cycle switch defective	Replace, see check procedure.
	Water valve defective or not adjusted properly	Replace water valve or adjust to 125 PSIG head.
	Dirty condenser	Clean condenser, see cleaning instructions.
	Inadequate water supply (water cooled)	Check supply line & water valve.
	Defective exp. valve	Replace if considered necessary.
	Too hot cuber location with poor air circulation	Relocate or provide ventilation to area.
	Air in refrig. system	Evacuate and recharge, see major maintenance.
	Overcharge of refrigerant	Correct charge.

COMPLAINT	CAUSE	CORRECTIVE MEASURE
High suction pressure	High head pressure	See complaint.
	Moisture in system	Evacuate and recharge, see major maintenance.
	Inefficient compressor	Check & replace if necessary.
Low suction pressure	Defective expansion valve	Replace expansion valve.
	Shortage of refrigerant	Leak check recharge.
	Ambient temperature too low for operation	Ambient temperature must be above 55° F.
Cuber does not stop when bin is full	Bin damper does not open, defective switch	Check bin switch, damper door for adjustment & free movement. See bin switch check procedure.
	Contactor contacts are welded close	Replace contactor.
Unit noisy	Tubing touching each other	Separate tubing, so it does not touch
	Fan shroud touching fan blades	Adjust fan mounting brackets
	Loose fan blade	Tighten fan blade
Compressor cycles intermittently	Low voltage	Check circuit for over-loading. Check building supply voltage. If low contact power company.
	Dirty condenser	Clean with vaccuum cleaner, stiff brush or air (Do not use wire brush)
	Air circulation blocked	Allow sufficient air space all around unit.
	Inoperative fan motor	See fan motor check procedure
	Non-condensable gases in system	Pull vacuum & recharge
	Weak compressor Overload	Replace

CHECK POINT PROCEDURE for Compresser and Starting Components.

If the compressor does not start or continue to run the following check procedure is recommended. Initially check the wiring against the diagram and whether there is power across terminals 11 and 33 on the contactor. Then proceed to test components.

(A) Compressor will not run —
If the compressor fails to start and run properly, it is possible that the external electrical components may be defective, the protector may be open, a safety device may be tripped, or other conditions may be preventing compressor operation.

1. Check the voltage at compressor terminals. If there is no voltage check back from the compressor to the power supply to find where the circuit is interrupted.

   Check the bin switch, high pressure cut-out (water cooled units only — has a manual reset on the control), the toggle switch for proper operation, and the two pole contactor-single phase, 3 pole contactor — 3 phase.

2. If power is available at the compressor terminals and the compressor does not run, check the voltage at the compressor while attempting to start the compressor. If the voltage is below 90% of the nameplate voltage, it is possible the motor may not develop sufficient torque to start. Check to determine if the power supply is adequate, electrical connections are loose, the circuit is overloaded, or if supply wire sizes are adequate.

3. A defective capacitor or relay may prevent the compressor starting. If the compressor attempts to start, but is unable to do so, or if the compressor hums or trips out on the overload protector, check:

   Relay — Potential type.

   The relay contacts should open as the compressor comes up to speed.

   Remove the wire leads from the relay terminals. Use an ohmmeter to check for continuity through the relay coil. Replace the relay if there is no continuity.

   Use an ohmmeter to check across the relay contacts. Potential relay contacts are normally closed when the relay is not energized. Replace the relay if there is no continuity.

Capacitors

Any capacitor found to be bulging, leaking, or damaged should be replaced.

Caution: Before removing leads for testing purposes, short across capacitor terminals to discharge capacitor.

A quick check is to replace suspected capacitors with a known good capacitor. Be sure only specified capacitors are used.

If a capacitor tester is not available, an ohmmeter may be used to check run and start capacitors for shorts or open circuits. Set the ohmmeter to its highest scale, and connect prods to capacitor terminals.

A. With a good capacitor, the indicator should first move to zero, and then gradually increase to infinity.
B. If there is no movement of the ohmmeter indicator, an open circuit is indicated.
C. If the ohmmeter indicator moves to zero and remains there or on a low resistance reading, a short circuit is indicated.

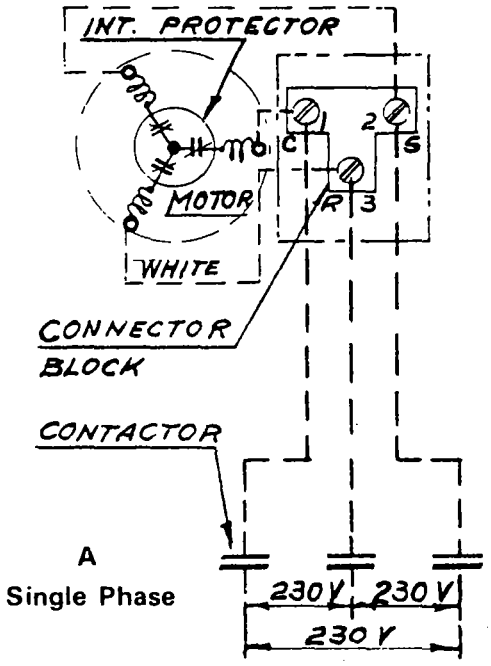
Compressor — Single or three phase — Fig. A & B

(B) If compressor fails to start or blows fuses (start relay and capacitors are functional proceed to check compressor as follows:

Caution: Turn power off. Before removing supply leads to compressor, short across both capacity terminals to discharge capacitors.

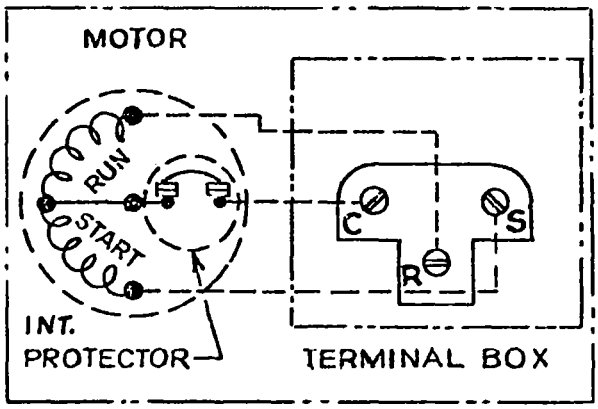
1. Using an ohmmeter check for continuity from terminals C to R, and C to S. If the compressor is warm, wait one hour for compressor to cool and recheck. The internal overload protector can cause a lack of continuity. If continuity cannot be established through all motor windings, the compressor should be replaced.

2. Check the compressor motor for ground by means of a continuity check between terminal C, R, and S to the compressor shell. If there is a continuity reading, the compressor is grounded and should be replaced.



A
Single Phase

B
Single Phase



(C) If compressor starts but trips repeatedly on the overload protector check:

1. Operating pressures should be within limitations of normal operating conditions shown on Page 7.

2. Check the line voltage at the motor terminals while the compressor is operating. The voltage should be within minimum of 5% of 208 voltage and maximum of 10% of 230 voltage. If ouside those limits, the voltage supply must be brought within the proper range.

3. Check the amperage drawn while the compressor is operating. Under normal operating conditions, the continuous amperage drawn will seldom exceed 100% of compressor nameplate amperage and should never exceed 120% of nameplate amperage. High amperage can be caused by:

   Low voltage
   High head pressure
   High suction pressure
   Defective running capacitors or starting relay
   Compressor mechanical damage

On three phase compressors, check amperage in each line. One or two high amperage legs on a three phase motor indicates a possible unbalanced voltage supply. A high unbalance can cause the protector to trip. Check with power company to see if the unbalance can be corrected.

CONTROLS DESCRIPTION AND CHECK-OUT PROCEDURE

Contactor

Placing the toggle switch in the ice position will energize the contactor which in turn starts the compressor, water pump, and condenser fans.

In Place Check Procedure — Contactor.

1. If not energizing, make a continuity check across the contactor coil, remove one lead. If no reading replace contactor.
2. Examine contacts. If pitted or welded together replace.

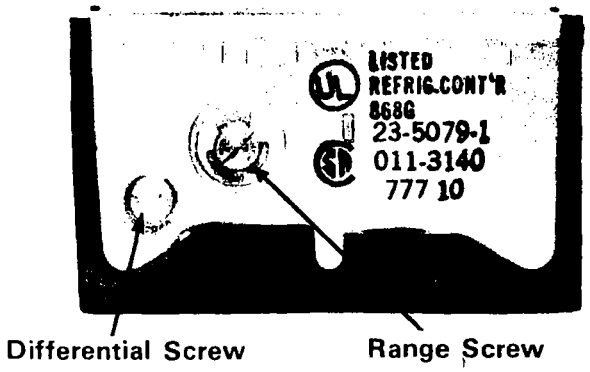
Low Pressure Cut-in Control

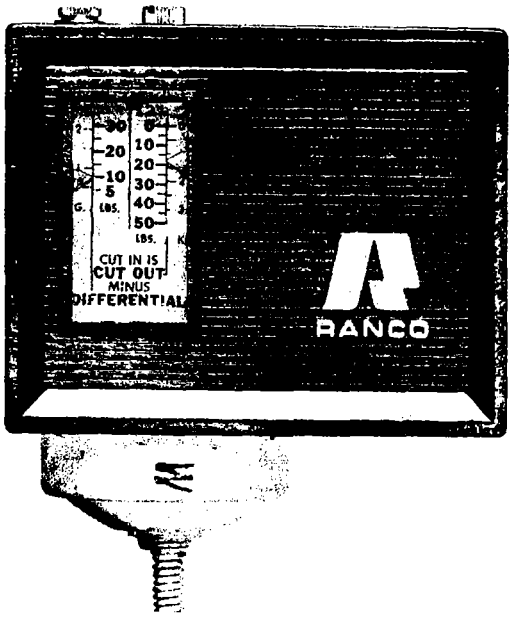
This is a Ranco pressure control that closes its contacts on a fall in pressure and opens them on a rise in pressure. The low pressure control is set to close at 11 PSIG, for regular and dice cubes, and 12 PSIG for half dice cubes. With a differential of about 10 PSIG the control opens at approximately 22 PSIG.

The low pressure control is used to initiate the timing sequence of the solid state timer. If the timer setting is at the minimum or maximum and the proper bridge thickness cannot be obtained, the low pressure control cut-in point can be recalibrated.

Check Procedure — Low Pressure Control

To increase the bridge-thickness turn the range screw clockwise to decrease the cut-in point. To decrease bridge thickness turn range screw counter-clockwise to increase the cut-in point. A 45° turn of range screw equals about 1-2 PSIG (see figure below). Differential setting should be set at 10 PSIG and not changed. It is a good practice to install a suction side gauge anytime the low pressure control is readjusted to be sure the suction pressure is normal.

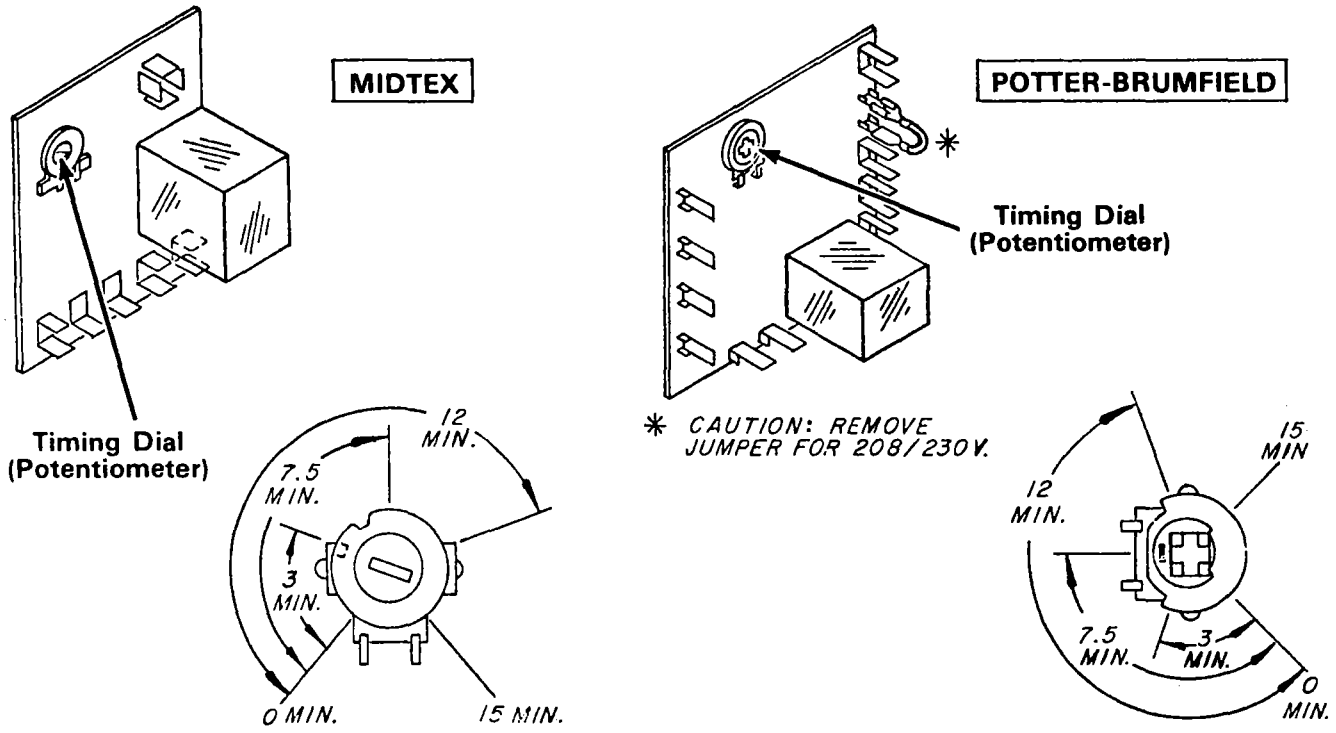




To check cut-in, cut-out positions and proper transfer of contacts, install a service gauge to low side service valve and fasten voltmeter probs to terminal 1 of timer and 11 of terminal board. Turn the toggle switch to ice making position. As the cuber runs slowly close the suction service valve (front seat) so the suction pressure will fall. The low pressure control contacts should close at 11-12 PSIG giving you a 230V reading. Allow the timer to time out and place the cuber in harvest. The suction pressure will rise as the harvest cycle progresses. When the suction reaches approximately 22 PSIG the low pressure control contacts should open.

Solid State Timer

The solid state timer can be one of the following makes: Potter-Brumfield or Midtex, see fig. below.



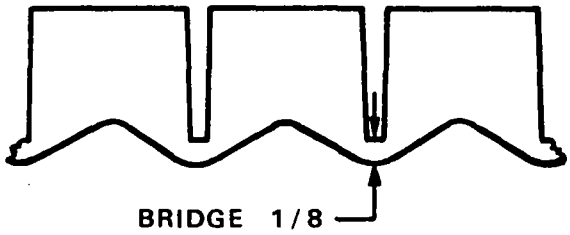
ICE BRIDGE ROTATE DIAL CLOCKWISE.

The primary function of the timer is to control the length of the freeze cycle (ice bridge thickness) and to initiate the harvest cycle by energizing the front defrost solenoid & the delay relay, and de-energizing the fan motors and water pump

The Potter-Brumfield timer is dual voltage 115/208-230. The jumper wire is needed across terminals A & B for 115 volt and is removed for 208-230 volt.

Adjustment of ice Bridge Thickness

For optimum ice production and maximum cube separation, the ice connecting the individual cubes should be ⅛" thick at the center of the ice "waffle" (Note: Bridging will vary in the thickness from the top to the bottom of evaporator).



To adjust the ice bridge thickness, turn the timer dial either clockwise to increase time and bridge-thickness or counter-clockwise to decrease time and bridge-thickness. A 45° turn equals approx. 5 min.

In Place Check Procedure — Solid State Timer

1. Check wiring of timer to wiring diagram.
2. Set toggle switch to OFF position. Place a jumper wire across terminals 24 and 25 of the low pressure control.
3. Mark approximate position of timing dial and turn fully counter-clockwise to get a short time delay period (30 to 60 sec.)
4. Place the toggle switch into ice making position. The timer, fan motor water pump and compressor should be energized. With the low pressure control jumpered, check for a 230 voltage reading at terminal 1 and 11 with a voltmeter.
5. At the end of a predetermined timing period, the timer relay contacts should transfer, turning the fan motor and water pump OFF, and energizing the front solenoid and time delay relay. Using a voltmeter there should be a 203 voltage reading at terminal 3 and 11 confirming proper operations.
6. If the relay contacts fail to transfer after 2-3 minutes with the timer set at minimum setting check to see if the thermo-disc and bin switch are in normally closed position. If the bin switch and thermo-disc are closed, replace timer.
7. With the cuber in the harvest sequence trip the bin switch or place the toggle switch in the "OFF" position and back into "ICE" position. Either of these actions should deactivate the timer relay placing the cuber back in freeze. If proper sequence of all operations is accomplished the timer is in working order. If not, replace timer.
8. Place toggle switch in "OFF" position. Remove jumper wire from low pressure control. Reset timer dial to previous position. Test cuber for proper operation.

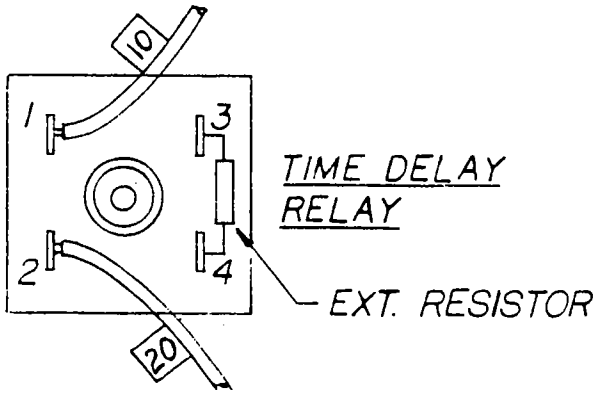
NOTE: If needed the solid state timers can be jumpered to place the cuber in harvest.

Timers with H & Hi terminals can be placed in harvest by momentarily jumpering across H & Hi terminals. This will override the timing sequence and energize the timer relay, placing the cuber in harvest.

Timers without H & Hi terminals can be placed in harvest by placing a jumper between terminals 3 & 4 on the timer. This by-passes the entire timer, energizing the hot gas solenoids.

Time Delay Relay

The time delay relay function is to delay the opening of the delayed defrost solenoid valve. The delay relay has two fixed timing periods. As shipped, the relay has a 35 ± 10% second delay period. By removing the external resistor from acorss terminals 3 & 4, the delay period will increase to 70 Sec. (Caution: Do not replace the resistor with a jumper wire.) This delay period need only be increased if the delayed (rear) ice sheet is harvesting ahead of the advanced (front) evaporator.

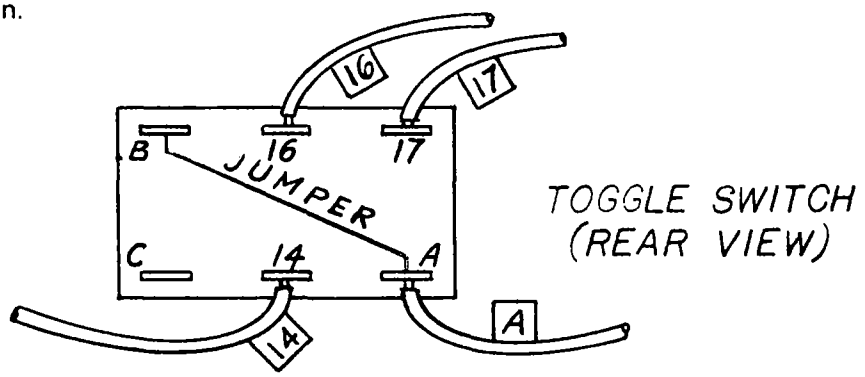


In Place Check Procedure — Time Delay Relay

1. Place timer into defrost by jumping terminals H-H, on Potter-Brumfield and terminals 3 & 4 on Midtex timers. This initiates the time delay relay.
2. Check relay delay period by placing hand on rear defrost solenoid. The solenoid should open after 35 or 70 seconds. If solenoid does not open, remove lead 20 on delay relay and touch to lead 10. If solenoid opens, replace delay relay.
3. If solenoid remains closed, check for defective solenoid coil. Replace if necessary.

Toggle Switch

The main ON and OFF toggle switch is a double-pole, double-throw switch. In the OFF or center (neutral) position, the cuber will not run. With the toggle switch in the water pump position, the pump only operates. With the toggle switch in the ice making position, the cuber will run as long as the ice bin is not full and the bin switch is not open.



In Place Check Procedure

1. Turn cuber off. Check toggle switch by removing all wires on one side (terminals B, 16 & 17) and make a continuity check with ohmmeter. If the results are positive, rewire leads to assigned terminals. Likewise examine the opposite side of the toggle switch (terminals A, C, & 14.)
2. Check also the jumper for proper position and continuity.

Safety Thermo-disc

The thermo-disc is a safety control located on the suction line. The control is temperature sensitive and opens at 65° F ± 5° and closes at 40° F ± 5° F. The thermo-disc prevents the cuber from overheating. If the bin damper door switch should fail at the end of the harvest, the unit would stay in the harvest cycle. The suction temperature would rise and the thermo-disc would open at 65° F. This in turn places the cuber back into the freezing cycle by de-energizing the timer and hot gas solenoids.

In Place Check Procedure — Therm-disc.

1. The thermo-disc is a normally open control at 65° F and above, and recloses at 40° F. Closing is accomplished by operating the cuber on for apporx. 5 minutes. The thermo-disc will open only if cuber sets idle in room temperature for a period of time or the cuber bin switch fails in harvest.
2. Disconnect the thermo-disc leads at terminals 2 and 19 of timer. Check continuity with ohmmeter. If there is no reading, check for contact between the suction-line and the thermo-disc. If contact is adequate, replace thermo-disc.
3. To check the cut-out temperature of the thermo-disc, remove the damper door from the ice chute. Start the cuber and wait for front and rear evaporators in harvest. With the door removed, the unit will remain in its harvest cycle. This will increase the suction line temperature sharply until the thermo-disc reaches its calibrated opening point (65° ± 5° F). From the time the rear evaporator has harvested to the point the thermo-disc opens, under normal ambient temperatures, should take no longer than 2-3 minutes.

Condenser Fan Cycle Switch

The fan cycle switch is a non-adjustable thermostatic control. The purpose of this control is to monitor the condensing temperature. As the temperature rises to about 97° F the cycling switch **cuts in** and energizes the upper condenser fan motor. As the temperature drops inside the condenser to about 87° F the cycling switch **cuts out,** thereby de-energizing the fan motor. The sensing bulb is located on the side of the condenser.

In Place Check Procedure

1. Place a jumper across terminal 29 & 30 of fan-cycle switch to check working condition of upper fan motor. Remove jumper, if the fan motor is running.
2. Check for a loose fan cycle switch bulb, which may not sense temperatures properly. Be sure it is tightly secured before preceeding with above testing.
3. Disconnect lower fan motor leads from timer terminal 5 and terminal board 11. Turn unit to ice-making position. Without the lower fan the upper fan motor does not start, the fan cycle switch is defective. Replace.
4. If it is desirable to establish the exact cut-in point of the fan cycle switch, tape a thermometer to the condenser end plate in the vicinity of the fan switch bulb. Should the cut-in temperature check out to be approx. 8-10° F above or below the specified 97° F, replace the fan cycle switch.

Bin Damper Door Switch

The bin switch is activated by the ice sheet harvested from the rear evaporator. This terminates the harvest cycle, resets the solid state timer and initiates a new freeze cycle.

Check Procedure

1. Check free movement of damper door.
2. Check bin switch lever for ON & OFF action, by opening or closing damper door. The bin switch should open when the damper door is open 1-1½ inches.
3. Place toggle switch into neutral position. Make a continuity check between terminals 11 & 19. Be sure to isolate one side. To varify switch action open & close damper door. Replace switch, if defective.

Fan Motor

The fan motor is a shaded (4) pole, impedance protected fractional horsepower motor; normal speed approx. 1610 RPM.

In Place Check Procedure — Fan Motor

1. Check wiring and voltage across terminals 5 &11.
2. If there is power, place toggle switch into neutral position. Remove lead from lower fan motor at timer terminal 5 and lead from upper fan motor at fan cycle switch terminal 30, check fan motors for resistance.
3. If the windings appear to be open and fan motors are hot, allow 30 minutes for overload to close and recheck. If there is still no reading, the motor is defective. Replace.
4. If a motor appears hot and fan shaft is tight, remove oil plug and lubricate bearings. A good refrigeration oil can be used. If motor remains tight, replace.

Hot Gas Solenoids (front & rear)

The hot gas solenoid is normally closed valve that is opened to permit hot gas flow thru the vaporators to harvest the ice sheet.

Check Procedure — Hot Gas Solenoids

Check coil resistance at timer terminals 2 & 3 for rear or advanced solenoid and timer terminal 3 and delay relay terminal 10 for front or delayed solenoid. Make sure to isolate one side of the solenoid. If a coil is open, replace.

Component Change Out

If it becomes necessary to replace any components of the cuber, good refrigeration practices should be followed to avoid contaminating the system in any way.

1. Always install a new filter drier any time the system has been opened.
2. Keep all open tubing capped and do not leave the system open any longer than necessary.
3. Be sure to pull a deep vacuum after repairs are completed. If any amount of moisture is suspected in the system, allow sufficient time for dehydration.

Evaporator Replacement —

The 1100 Series cuber has two separate evaporators. One or both can be removed.

1. Remove all internal water system parts.
2. Place wood block under the evaporator or evaporators to be removed.
3. Unsolder and cap refrigeration lines.
4. Tap the two end plastic pieces loose.
5. With sharp razor edge cut the cycolac seal between the top extrusions holding the evaporators together.
6. Remove evaporator mounting screws, three on each side of the evaporator.
7. Cut inlet and outlet lines of replacement evaporator to the correct length.
8. Place the new evaporator(s) into position. Level front and rear evaporator(s) being sure the top extrusions are even. Tighten mounting screws.
9. Resolder the evaporator refrigerant lines and install new drier.
10. Apply liquid cycolac between evaporator top extrusions.
11. Leak check solder joints, evacuate system and re-charge.
12. Replace water system parts and run water pump to check for proper water flow.
13. Start system and adjust bridge thickness.

Compressor Replacement

Mechanical Failure

1. Turn power off to cuber and blow charge.
2. Remove the compressor and drier.
3. Install the new compressor, using a new gasket in each rotolock valve, and a new drier.
4. Evacuate system and charge — 45 oz. water cooled
   65 oz. air cooled

Note: Evacuate from both the high and low sides using the suction service valve and the Schroeder port for the high side connection.

Cleaning contaminated system — Severe compressor burn out or water in system.

In the event the refrigeration system is badly contaminated due to a compressor burn-out or a water line rupture in a water cooled condenser, the following steps are to be taken. Note: It is recommended that all service operations are done at room temperature.

1. Turn power OFF, purge the entire refrigerant charge, and remove the drier and compressor. Systems with water contamination also remove expansion valves, low pressure control.
2. Flush the system out with dry nitrogen or refrigerant.
3. Install new oversize drier and new compressor. For water contaminated compressor see Step 4.

4. If the contaminated compressor is to be reused, dump the oil charge out through the suction side. Flush the compressor with refrigerant and pull a deep vacuum on the compressor only. Allow sufficient time for dehydration. Break the vacuum with refrigerant 12 and add new oil, 46 fl. oz. of Suniso (3GS) oil.
5. Install new or recharged compressor back into the refrigeration system, along with new expansion valves and low pressure control if needed. Be sure to remove old gasket from the roto-lock valve and install new gaskets. Mount compressor firmly and assemble suction and discharge lines.
6. Leak check with R-12, then purge the charge. Draw a deep vacuum on the entire system. Evacuate from both the high and low side. Charge this system with R-12
7. Run the compressor for approximately 20-30 seconds and purge entire charge. Replace the drier with a standard size filter drier.
8. Draw a deep vacuum from both the low and high sides of the system. NOTE: A final evacuation to 100 microds is recommended. To insure proper evacuation allow sufficient time for dehydration once the 100 micron point is reached.
9. Charge the system with refrigerant 12. 45 oz. water cooled and 65 oz. air cooled.
10. Test run and adjust bridge thickness.

CLEANING INSTRUCTIONS

The only real maintenance the customer need perform is cleaning of the cuber. Keeping the cuber and bin clean will help insure sanitary ice and maximum ice production. Depending on local water conditions, the cuber should be cleaned in place at least once every three months.

Type of Cleaners

Scrub all parts removed with a nylon scouring pad, brushes and a cleaning solution such as Lime-a-way from Economics Laboratory, Inc., or Boss Brand milk stone cleaner from Northern Laboratories.

After using cleaner, rinse all parts with clear water.

In Place Cleaning

To clean the ice cuber water system without removing the components proceed as follows. Note — this is only recommended in locations where impurity build-up is not too heavy.

1. Remove ice cuber front panel.
2. Place toggle switch in center position to shut off cuber.
3. Remove ice from bin.
4. Shut off water supply & remove water from water sump.
5. Pour ice machine cleaner into sump and turn on water supply. (Use ice machine cleaner concentrate as directed by manufacturer.)
6. Place toggle switch to water pump position and circulate cleaner for about 30 minutes.
7. After cleaning shut machine off and remove cleaner. Flush water system thoroughly.
8. Clean ice storage bin with ice machine cleaner also, and rinse with clear water.

Disassembling Water System for Cleaning

1. Place toggle switch in center position to shut off cuber.
2. Remove splash curtains, water pump, water distributor tubes, and ice chutes.
3. Disassemble distributor tube. Fig. 10.
4. Disassemble water pump as follows: Fig. 9.
   A. Lift pump out & disconnect supply hose & plug.
   B. Turn pump over and remove the water inlet screen.
   C. Hold and depress impeller. Rotate plastic thumbnut counter-clockwise.
   D. Remove screws from pump housing; pump is now ready for cleaning.
   E. To reassemble water pump, reverse disassembly instructions.
5. Inspect vacuum release holes located in the corners of each cube section. Using a brush remove any scale build-up.

Base and Evaporator Cleaning

1. Remove all ice from bin.
2. Scub the base and evaporator.
3. Rinse with clear water.
4. Check that drain hole in base is clear and that water drains freely.

To Sanitize Unit

1. Reassemble unit.
2. To sanitize, mix one teaspoon of chlorine bleach in one gallon of water.
3. Pour solution into sump, then turn toggle switch to the left to start water pump. Keep pouring solution into sump until system has enough to keep pump primed.
4. After one minute, turn off pump & remove solution from water sump.
5. Repeat steps 3 & 4, except, use clear water before turning switch back to ice making position.
6. Make visual inspection for leaks and operation before replacing front panel.

Cleaning of Condenser-Air Cooled

Whenever the front panel is removed for system cleaning, the condenser coils should be inspected for dirt. Clean the condenser with a stiff brush and a vacuum cleaner (never use a wire brush).

SERVICE AND PARTS PROCEDURES

Ordering Procedure

Replacement parts for Manitowoc ice machine equipment should be ordered directly from your local Manitowoc Ice Machine distributor. Parts are stocked by the distributor in order to provide prompt and efficient service for ice machines sold in their areas.

Should you encounter difficulty in locating a Manitowoc distributor in your area, contact Manitowoc Service Parts Dept. for the name or names of distributors in your area.

When placing your order, be sure to do as follows:

1. Print name and address plainly.
2. If special routing is requested, please show the name of the carrier.
3. Indicate quantity desired, print catalogue part number plainly and print name as shown in the catalogue.
4. **Indicate model and serial number of the unit.** The complete serial number is needed.
5. If uncertain as to the proper part number, please give a complete discription or sketch of the part and the location of the part which is needed.
6. Check to see that all required information is contained in your order to facilitate prompt shipment. All replacement parts shipped from the factory on a f.o.b. Manitowoc basis. It is company policy to bill for all field replacement parts, according to terms as specified by our Credit Department.

Parts ordered will be honored by the factory and will be billed according to our parts list schedules.

Transportation companies are responsible for damage in transit as all shipments are tendered to them in good condition; and our responsibility ceases upon receipt of a signed bill of lading from the carrier. If the shipment arrives in a damaged condition or is short, the delivery carrier should be notified immediately.

Return of Defective Parts

All defective parts returned to the factory, transportation prepaid, must be properly packaged to prevent further damage and tagged with a return material tag properly filled in. It is especially important that the cabinet serial number be secured and recorded on the tag, securing as much information as possible about the nature of the defect to prevent any delays in issuing credit. All parts should be returned as they are removed from the cabinet and not mutiliated or tampered with. The return material tags are provided on a no-charge basis by the factory upon receipt of your request. Upon receipt of these parts here at the factory, they will be inspected; and if they are found to be defective, in material and workmanship, under normal use and service, credit will be issued. Any part not properly packaged will be returned to the sender freight collect and no credit will be issued.

IMPORTANT: All warranty parts must be returned to the dealer from whom the replacement part was purchased. The dealer will return the part to the factory.

Our warranty and protection plan does not apply to cabinets that are not registered; therefore, it is necessary that, upon completion of the installation of the cabinet, the registration card be signed on the date of installation and mailed promptly to the factory Service Department in order for the cuber to be registered.

Return of Hermetically-sealed Units

Extreme care should be used in servicing the hermetically-sealed mechanism. It is important that the trouble be correctly determined before the unit is changed. Be sure it is not the control, relay, or overload causing the trouble. The defect must be listed on the return material tag. Hermetically-sealed units must be returned with service valves closed and capped. All lines must be pinched and soldered shut.

Return of Complete Machines

Complete machines may not be shipped back to the factory for repairs without first securing prior permission from the factory. If an unauthorized missing shipment is received at the factory it will be refused by our warehouse and immediately returned to the sender. Upon receipt of your request to return a cabinet, if we feel that your request is legitimate, you will be sent an authorized return label authorizing you to return this cabinet to the factory freight prepaid.

When returning water cooled models, make sure all water lines are blown out before returning ice cuber to prevent lines from freezing during cold weather.

Ice Machine and Bin Warranty

From the date of original installation, we do hereby warrant each new Ice Machine and Bin to be free from defects in material and workmanship, under normal use and service, for a period of one year, and four additional years on the hermetic motor compressor in the Ice Machine.

Our obligation under this warranty is limited solely to correcting or replacing without charge at the factory in Manitowoc, Wisconsin any part or parts of this equipment which shall have been returned, transportation prepaid, and which our examination discloses to our satisfaction to be defective.

This warranty does not apply to any equipment that has been damaged by flood, fire, or suffered abuse, misuse, neglect or accident, or to any Ice Machine which has been altered so as to affect performance or reliability, except where such alteration has been accomplished with our prior written consent.

We further limit this warranty in that we shall not be held liable under this contract for any special, indirect, or consequential damages whatsoever resulting from any defect in material and workmanship which interferes with the normal use and service of such Ice Machine and Bin.

This warranty is a complete and exclusive statement of all terms of the agreement between the Manitowoc Equipment Works and the owner of the equipment, and all representations of the parties. This agreement shall not be varied, supplemented, qualified or interpreted by any prior course of dealing between the parties or by any usage of the trade.

Sales are made on the express understanding that there are no express or implied warranties other than the express warranty herein contained and that there are no implied warranties that the goods shall be merchantable or fit for a particular purpose other than the expressed one year and five year warranty set forth above.

To validate this warranty, the registration card must be signed on the date of installation and mailed promptly to the Manitowoc Equipment Works, Manitowoc, Wisconsin.

DEALER _____

_____

_____

INSTALLATION DATE _____

MANITOWOC EQUIPMENT WORKS
Div. of THE MANITOWOC COMPANY
500 South 16th Street
Manitowoc, Wisconsin 54220

Form 80-0055-3
ALL

a. SEQUENCE OF ICE MAKING AND HARVEST CYCLE

1. Set toggle switch to ice making position to energize contactor-coil.
2. In turn the contactor, compressor, water-pump and fans are actuated.
3. As back pressure decreases to set point (due to sufficient ice build-up), low pressure control cuts in and initiates the solid state timer.
4. After a set time interval, the relay of the solid state timer makes a transfer from normally closed to normally open condition. Front defrost solenoid and time delay are energized — water pump, top and bottom fan are de-energized.
5. Time delay relay is timing out a set delay time. After approximately 35 to 40 seconds, contact is made, whereby rear defrost solenoid is actuated. (Low pressure cut-in transfers to normally open position.)
6. Harvest of delayed ice slab opens bin switch. This, in turn, de-energizes relay of solid state timer and both defrost solenoids, and contactor momentarily opens.
7. The cuber is now ready for a new ice making cycle.

CAUTION

This unit is 208 or 230V. Check for jumper wire across timer terminals A and B (Potter-Brumfield only). Jumper must be removed to prevent timer damage.

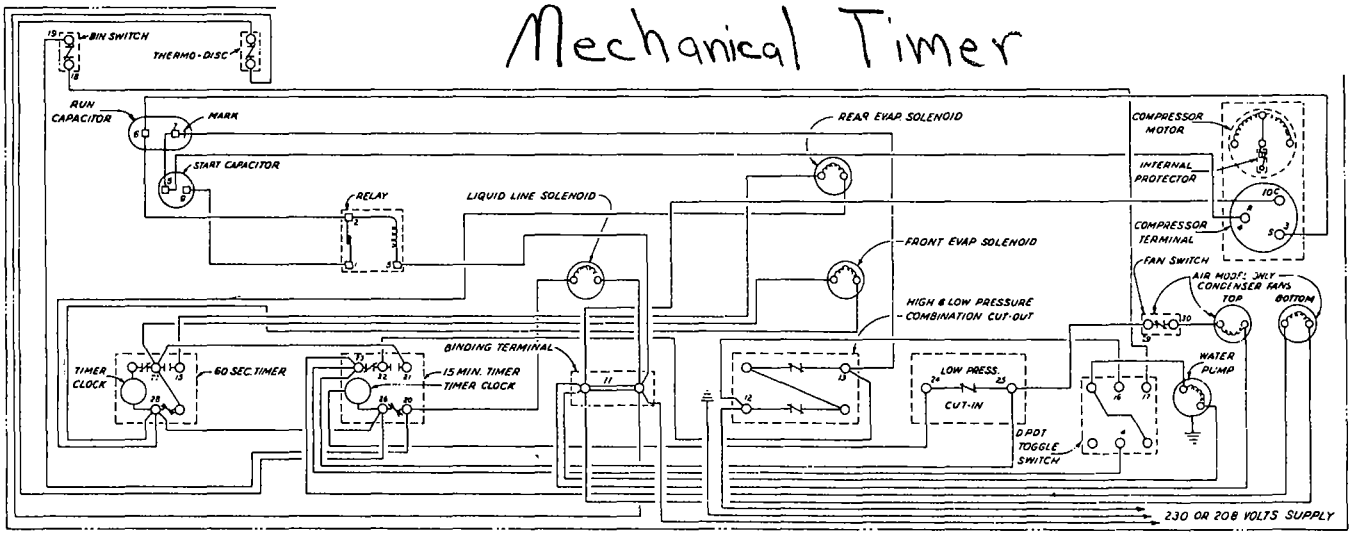
NOTE

Delay time can be changed from 35 to 70 seconds by removing RE (external resistor, RI, internal resistor).

CAUTION

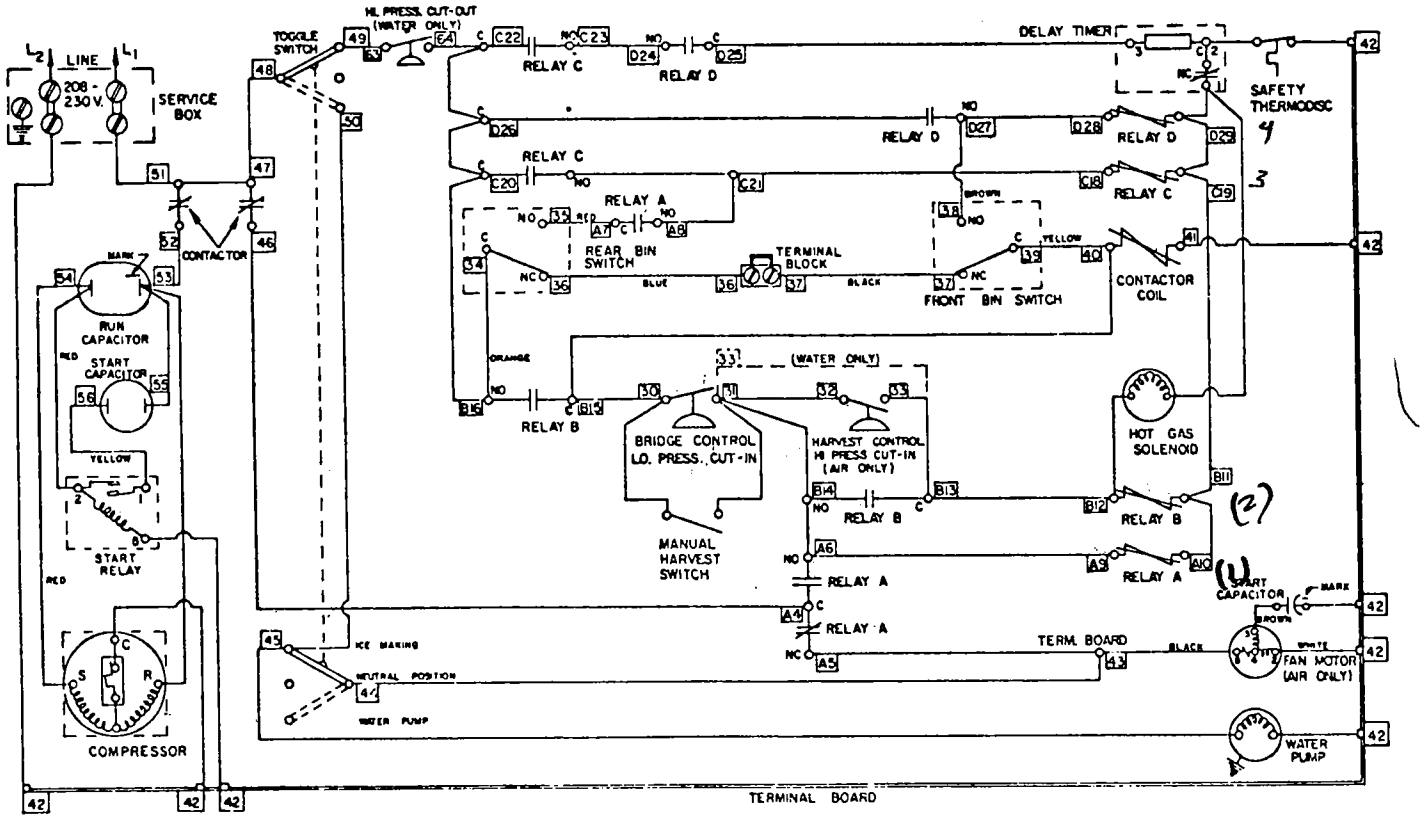
Disconnect power before working on electrical circuitry.

AD AND AR-1100



WIRING DIAGRAM A-1100 SERIES CUBER

SHOWN AT BEGINNING OF FREEZE CYCLE — 208 and 230 VOLTS, 60 CYCLE
FANS AND FAN CYCLING SWITCH ON AIR MODELS ONLY



C-1100 WIRING DIAGRAM, AIR AND WATER 208/230 VOLT, 60 HZ, 1 PHASE