Cornelius®

Service Manual

SERIES 300

MODULAR CUBED ICE MAKER

6/90
161951801

INTRODUCTION

We have strived to produce a quality product. The design has been kept simple, thus insuring trouble-free operation.

This manual has been prepared to assist servicemen and users with information concerning installation, construction and maintenance of the ice making equipment. The problems of the serviceman and user have been given special attention in the development and engineering of our icemakers.

If you encounter a problem which is not covered in this manual, please feel free to write or call. We will be happy to assist you in any way we can.

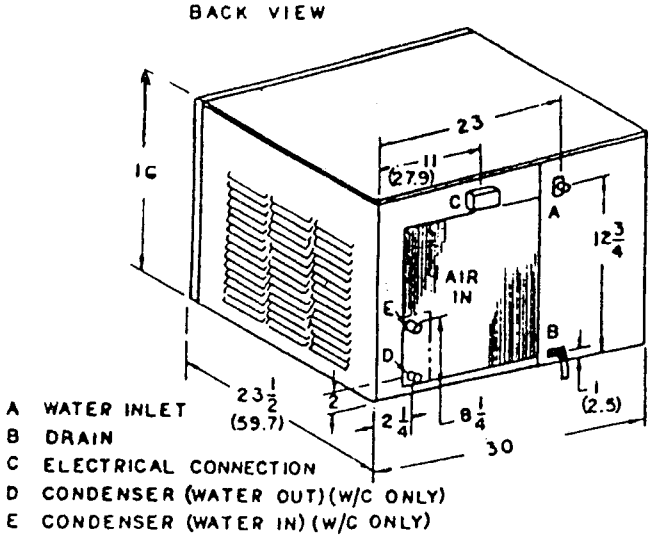
When writing, please state the model and serial number of the machine.

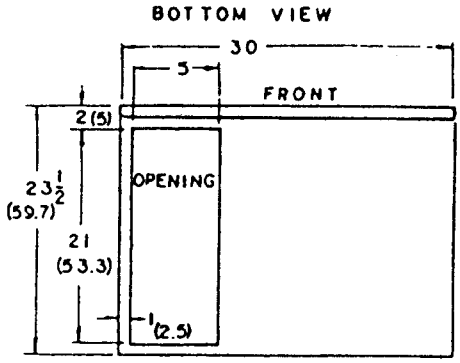
Address all correspondence to:

A Product of IMI Cornelius Americas Inc.
2421 - 15th St. S.W. P.O. Box 1527
Mason City, IA 50401
Phone 515-424-6150 / 1-800-383-0385
FAX 515-424-4305

TABLE OF CONTENTS

SPECIFICATIONS





METRIC DIMENSIONS
SHOWN IN PARENTHESES

ICE PRODUCTION CAPACITY (approximate):

Model Number (Condenser)	Ambient Temp F	Incoming Water Temp F 50	70	80
AC-300 (Air Cooled)	70	243	227	216
	80	224	209	198
	90	205	191	182
WC-300 (Water Cooled)	70	225	206	193
	80	212	191	179
	90	198	176	164

COMPRESSOR ELECTRICAL RATING.	1/3 H.P.
COMPRESSOR MODEL.	Tecumseh AK 9434A
CONDENSER	Air or water cooled
REFRIGERANT CHARGE.	Air cooled - 15 oz. R-12
	Water cooled - 15 oz. R-12
REFRIGERATION CONTROL	TXV
TXV SUPERHEAT SETTING	6°
INLET WATER SUPPLY.	3/8" SAE male flare
VOLTAGE	115V 60 hz. 1 ph.
TOTAL AMP DRAW.	15.0

INSTALLATION INSTRUCTIONS

A. UNPACKING

1. Uncrate machine and/or bin by removing the staples from around the bottom of cardboard crate and lift off.

2. Remove bolts fastening the crate skid to the bottom of the unit. If auxiliary legs have been purchased for the bin, they should be installed at this time.

B. LEVELING

If legs are used, adjust the leveling legs of the storage bin until the unit is level and all four (4) legs are in solid contact with the floor. Leveling is very important to obtain proper draining and to maintain the proper level in the water pan of the ice cuber.

NOTE: If the bin is to be installed flush to the floor, the machine must be sealed to the floor with an approved mastic such as Sears #3803-0 Caulk, Dow R.T.V. 101, 102 or G. E. 731, 732. This is an N.S.F. requirement and is the responsibility of the installer.

C. UNIT LOCATION

1. Allow at least a minimum of six (6) inches at the rear and side of the ice machine for proper air circulation.

2. This unit has been designed to be installed in an indoor location which is clean and which can be adequately ventilated; the air and water temperatures should never exceed 100 degrees nor fall below 50 degrees. (Temperatures above 100 degrees will cut the ice making capacity below an economical level; temperatures below 50 degrees will cause a malfunction of thermostatic sensors.

3. The unit should be located where air circulation is not restricted. The unit should not be located near a kitchen grill. Air which contains grease vapors will deposit grease on the condenser. The condenser should always be kept clean.

D. UNIT SET-UP

1. Take off front panel of machine and remove hardware bag or service manual envelope with the water strainer enclosed.

2. Mount the ice maker to the top of the ice storage bin or adapter in the proper position over the ice drop opening. The ice maker must then be sealed both on the outside and the inside bottom edges with an approved N.S.F. mastic such as Dow Silastic #732, 734 or General Electric RTV #101, 102. This is an N.S.F. requirement and the responsibility of the installer.

3. Remove shipping tape from evaporator curtains.

E. REMOTE CONDENSERS

Not Applicable

F. MAKE ELECTRICAL POWER SUPPLY CONNECTION

Requirements: 115V /60hz. 1 ph. or 220V 50hz. 1 ph. when used

REFER TO SERIAL PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM TIME DELAY FUSE SIZE.

ALL WIRING MUST CONFORM TO NATIONAL AND LOCAL ELECTRICAL CODES.

G. MAKE PLUMBING CONNECTIONS

Water supply - (Install per local codes)

The water inlet connection to the unit is a 3/8" flare male connections located at the rear of the ice machine.

NOTE: If the water pressure exceeds 50 pounds, a water pressure regulator should be installed in the water inlet line between the water shut-off valve and the strainer.

Install a reducer fitting on the shut-off valve to accomodate the water strainer, which is supplied with each ice machine and MUST be used. Install the water strainer with the arrow in the proper direction of flow and with the clean out plug down. This is very important for cleaning. Connect either 3/8" or 1/2" copper tubing between the water inlet fitting of the ice machine and the water strainer.

For water cooled units, two water inlet connections are provided; one for the ice making (evaporator) section which is located on the back of the machine and is a 3/8" flared connection. The other is for the water cooled condenser. The reason for the separate water inlet connections is that some installations use a water tower for cooling the water used in the water-cooled condenser and some installations use treated water (filtered) for the ice making inlet water connection. Be sure to install water line (incoming) to the 3/8" male flare connection on the back of the unit that supplies water to the water regulating valve inside.
The setting of the water regulating valve from the factory should be 120 pounds for R-12 units and 250 pounds for R-502 units. NOTE: Always flush out water lines before starting unit. Adjustments, if necessary, should be done at installation.

H. DRAINS

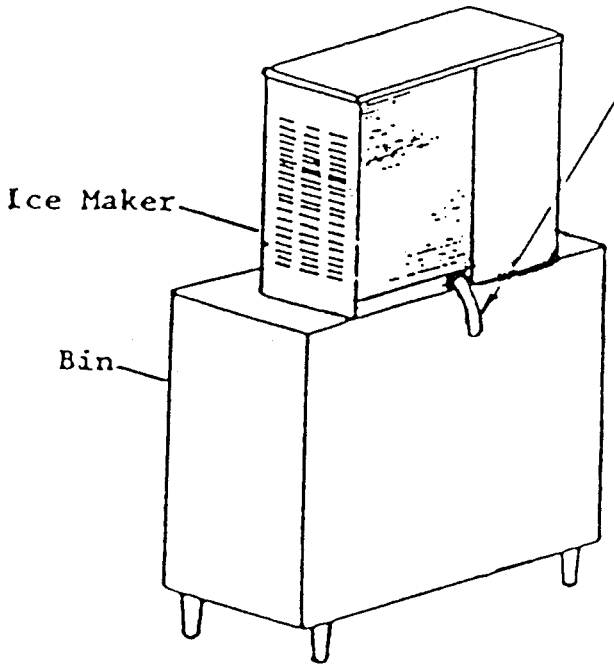
Provide a suitable trapped open drain as close as possible to the area where the ice maker is going to be installed. This may be an existing floor or a 1-1/4" trapped open drain. Two separate drain lines are required for air cooled units, one for the storage bin and one for the Dump Valve drain hose.

An additional separate drain line will be required for water cooled units from the outlet of the condenser coil to the drain. Run all gravity drain lines with a good fall to the open drain.

ALL PLUMBING MUST BE INSTALLED IN ACCORDANCE WITH LOCAL CODES.

NOTE: IN SOME CASES IT MAY BE NECESSARY TO INSULATE THE WATER SUPPLY LINE AND DRAIN LINE. CONDENSATE DRIPPING TO THE FLOOR CAN CAUSE SERIOUS STAINING OF CARPETS OR HARDWOODS.

DRAIN CONNECTION INSTALLATION INSTRUCTIONS

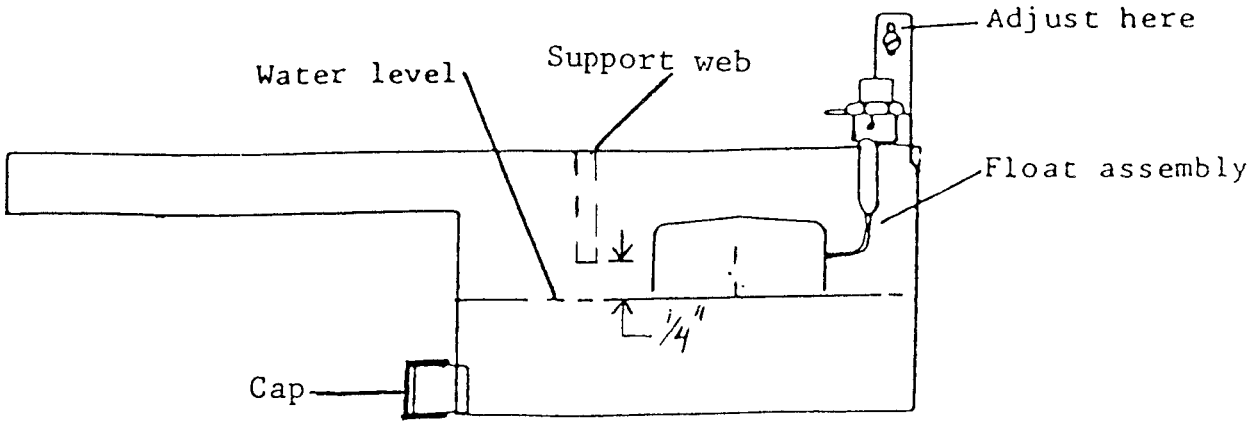


Taking care not to kink or collapse vinyl tubing at any point, route tubes to any open, trapped or vented floor drain. Run tubing to drain separately. Do not tee any drain hoses together. Add drain tubing required to reach floor drain.

I. ADJUSTMENT OF WATER LEVEL IN RESERVOIR

With the water supply turned ON and the power supply OFF'adjust float to maintain water level¼" below the support web insidereservoir

(See Illustration Below)



WARNING: Ice Maker will not operate properly when water supply temperature is below 50°F or above 100°F. Water supply pressure must not exceed 50 PSI.

J. STARTING THE UNIT

After the ice cuber has been unpacked and leveled and all plumbing and electrical connections have been made, start the unit and check for proper operation.

A cuber has three separate circuits:

A. The water circuit
B. The refrigerant circuit
C. The electrical circuit

1. Start checking the water circuit by making sure that there are no thread or flare joint leaks, either outside the unit or in the compressor section. Next check the water flow over the evaporator and make sure that all holes in the water distributor are open, and that there is no undue splash or loss of water into the ice bin.

   Also check to see if the float valve is functioning properly and the correct water level is being maintained. Re-adjust if necessary.

2. Check the refrigerant circuit by making sure that the condenser fan is running. (This will be evident by air noise.) Is the compressor running? (Feel the casing for vibration.) Is the evaporator getting cold?

3. Check bin-harvest switch operation. (See proceedure in manual)

ELECTRICAL CIRCUIT SEQUENCE OF OPERATION

Three colors of L.E.D. lights are mounted on the control board to indicate what is happening in the operation of the unit.

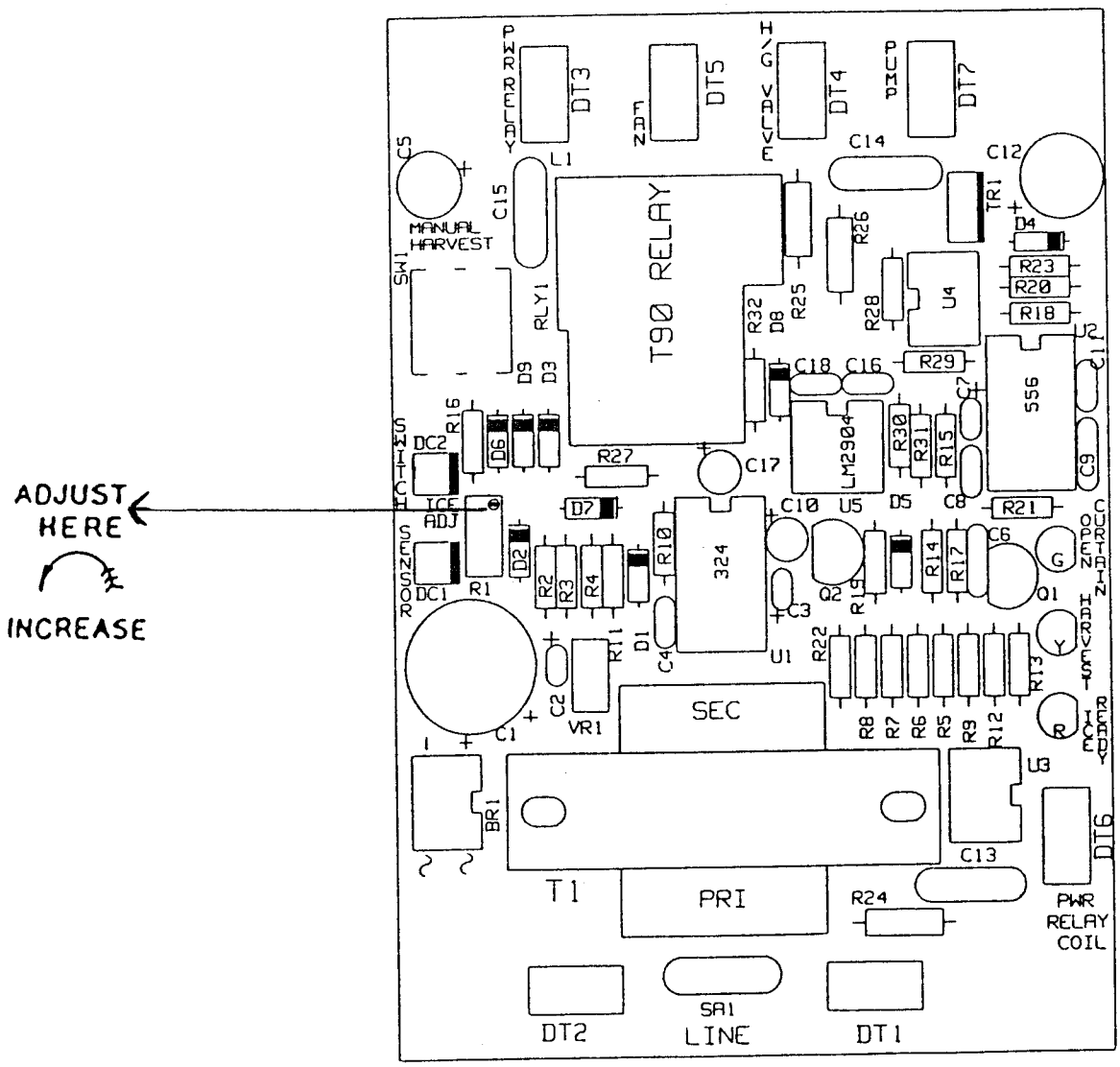
The electrical sequence of operation seen for a normal ice making cycle will be as follows:

NO LIGHTS: Will indicate the unit is in the freeze cycle (compressor, fan motor and water pump "on"; hot gas valve and water dump solenoid "off"). The control board will DELAY the start of the water pump until the evaporator temperature is pulled down to a pre-set point and allows the water pump to start (can be a several minute delay). The control board will then lock the water pump "on", no matter what temperature the evaporator warms up to, when water starts flowing over the evaporator. BUT, if the water curtain is opened the pump "lock" is lost, the pump will stop and the evaporator temperature will have to pull down to the pre-set point again. A second adjustable evaporator temperature setting (Bridge Thickness Setting) determines the length of the freeze cycle. After the evaporator temperature has pulled down low enough for the correct amount of ice to be on the evaporator, the RED L.E.D. will begin to flash on and off. If the evaporator temperature stays at or below this temperature for approximately 30 seconds the control board will start the harvest cycle. The YELLOW L.E.D. will light, hot gas valve will open, fan motor will stop, water dump solenoid will open and the water pump will continue to run for approximately 10 seconds and allow all the water in the water pan to be pumped down the drain. The RED L.E.D. will flash until the evaporator temperature rises above the bridge thickness setting (one to five flashes). The hot gas valve and the water dump solenoid will remain open until either the ice slab falls and moves the evaporator curtain away from the proximity switch or if approximately five minutes elapses and the control board automatically switches back into the freeze cycle. When the evaporator curtain opens and allows the proximity switch to work, the GREEN L.E.D. will light and the YELLOW L.E.D. will go out switching the unit from harvest to the freeze cycle. If the evaporator curtain is held open, the GREEN L.E.D. will stay on and after approximately 8 seconds have elapsed the unit will shut down.

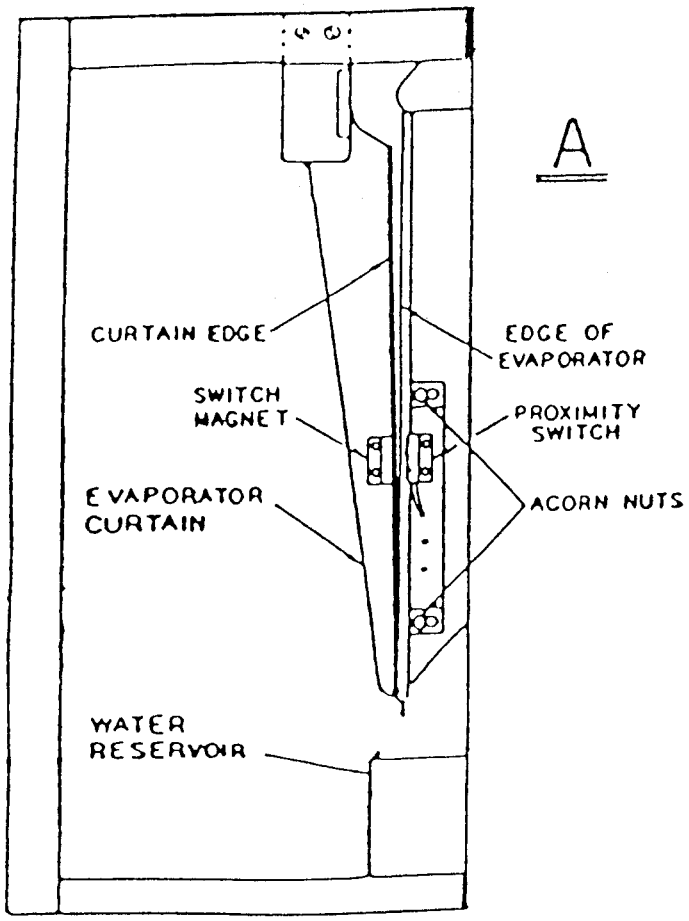
ADJUSTMENT FOR ICE BRIDGE THICKNESS

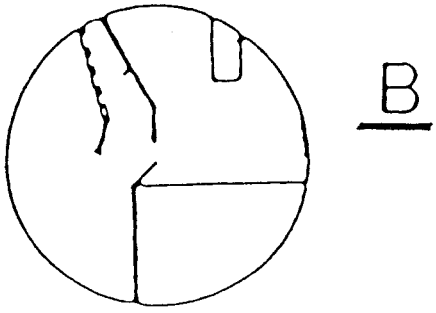
An ice bridge connecting all cubes is necessary for a proper harvest or discharge of cubes from the evaporator.

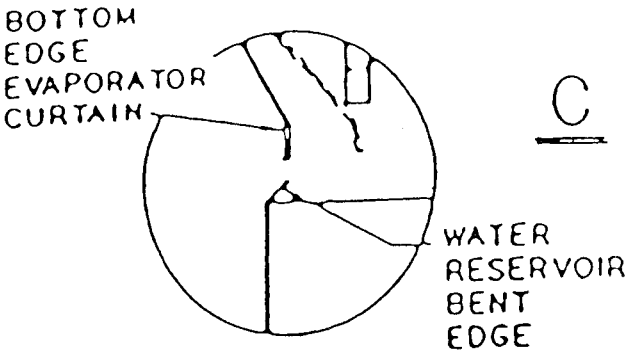
To increase ice "bridge" thickness carefully turn adjustment screw counter clockwise no more than one turn at a time. Wait and check thickness before re-adjusting.



ADJUSTMENT AND CHECK-OUT FOR HARVEST-BIN SWITCHES







CHECKOUT PROCEUDRE

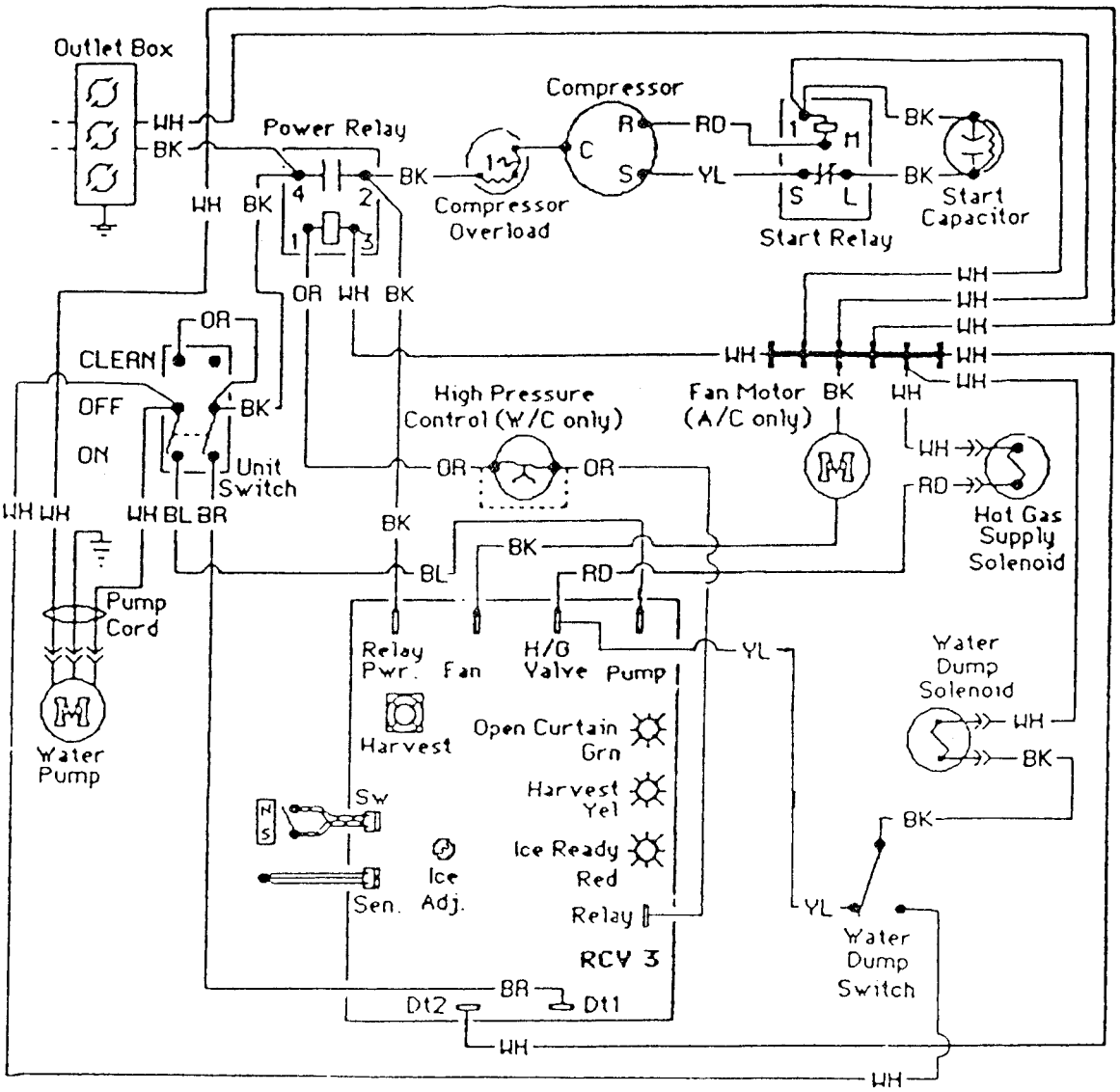
Turn on the ice machine and move the evaporator curtain(s)away from the evaporator(s). The ice machine should then shutoff in approximitly 8 seconds.(See detail A&B)

Slowly let the evaporator curtain(s) move back toward the evaporator(s) until the bottom edge of the curtain(s) is at least at the bent edge of the water reservoir or closer to the evaporator. With the curtain(s) at that position, the machineshould start.(See detail C)

ADJUSTMENT PROCEDURE

If adjustment is necessary,loosen acorn nutsand move proximity switch closer to the curtain(s)and make sure the curtain is properly mounted. (See detail A)

Re-check per above proceedure.



AC&WC-300-MH

115 VOLTS 60 HZ

Cornelius

Hale

The solid state control *DELAYS* the start of the water pump until the evaporator temperature reaches 20° F.

SANITIZING AND CLEANING PROCEDURE

1. Remove front panel to gain access to the on-off-clean switch.

2. Push switch to "clean" and allow the ice on the evaporator to release or melt away.

3. Remove all ice from storage bin.

4. Mix a sanitizing solution of 1/4 oz. "Calgon Ice Machine Sanitizer" to one gallon of water. Using a non-metallic bristle brush scrub the following:

   a. Inside surfaces of ice bin including top and door.
   b. Inside surfaces of the icemaker to include evaporator section in the ice machine including the top, front panel and evaporator splash curtain.
   c. Make sure splash curtain is correctly positioned.

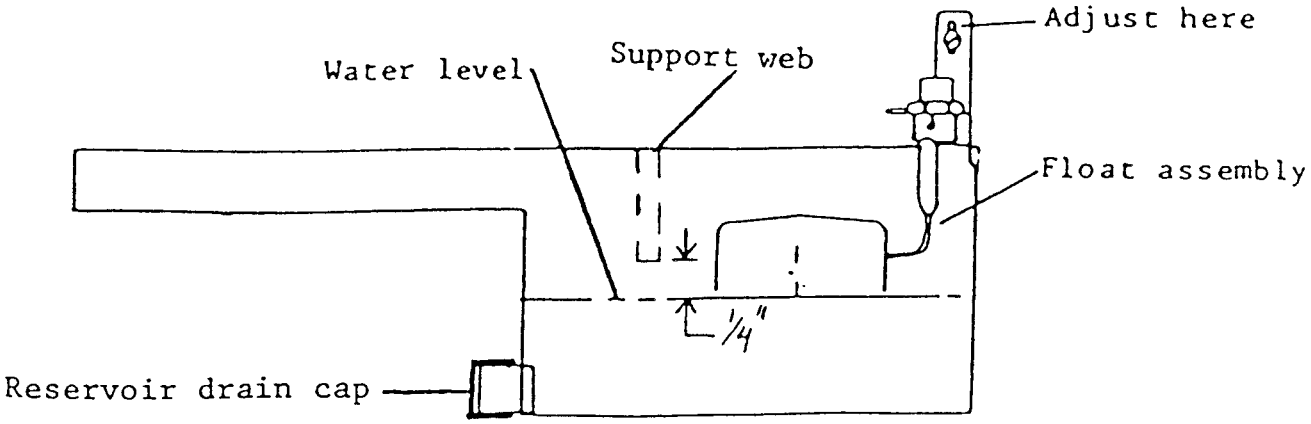
5. Add 2 oz. of "Calgon Nickel-Safe Ice Machine Cleaner" directly into water reservoir. Circulate for approximately 45 minutes.

6. Depress dump valve switch on top of control box and allow cleaner to drain away.

7. Fill reservoir with clean fresh water, circulate for approximately 1 minute. Depress dump valve switch and allow water to drain away. Repeat 3 times.

8. Push switch from "clean" to "on" position.

9. Replace front panel.



WATER TREATMENT

Automatic ice-making machines can quit working for any number of reasons, mechanical, electrical or faulty refrigeration, but water problems foul them up faster than almost anything else. While ice machines vary in design, you can apply these water treatment tips to all of them.

1. START WITH THE WATER

The mineral content of water varies in different areas and as the chart shows, high hardness and alkalinity counts combine to form insoluble calcium carbonate or lime scale. If this condition is constant, the intake water must be treated constantly to prevent scale formation in the ice machine.

2. PREVENT LIME SCALE FORMATION

We recommend the installation of a Calgon Micromet Feeder on the incoming water line. No. X-8B Feeder is recommended for ice machines with a capacity of 400-450 lbs. per day. Fill the feeder with 6R Micromet, the slowly soluble poly-phosphate which lasts six months before renewing the 8-oz. charge.

Constant treatment with 6R Micromet will control lime scale and prevent minerals from sticking to the freezing surfaces in ice machines. Result - smooth movement of ice slabs, good harvest of ice cubes, efficient, automatic production.

3. REMOVE OBJECTIONABLE TASTE OR ODOR

If the bad taste or odor is traceable to the water source, install a Calgon Fine Carbon Filter to the incoming water line. The No. 1-1/2B Fine Carbon Filter is ideal for machines making up to 500 pounds of ice per day and will remove bad taste, odors, and problems caused by chlorine in the water supply. In some instances, slime growths may cause odor problems and these growths can be removed by the use of liquid ice machine cleaner.

4. SERVICE REGULARLY

A service program to clean the ice machine at regular intervals and check on filter and feeder charges is important. In the long run, it will assure adequate water treatment, reduce emergency calls and aid in the trouble-free performance of automatic ice making machines.

WINTER STORAGE

If the unit is to be stored in an area where the temperature will drop below freezing, it is most important that all water lines be drained to prevent them from freezing and possible rupture.

To blow out the water line, disconnect the water supply at the cabinet inlet and use air pressure to force the water into the water reservoir pan. This can then be removed from the water pan.

CLEANING THE CONDENSER

In order to produce at full capacity, the refrigeration condenser must be kept clean. The frequency of cleaning will be determined by surrounding condition. A good maintenance plan calls for an inspection at least every two months.

Remove the lower front panel of the machine. With a vacuum cleaner, remove all accumulated dust and lint that has adhered to the finned condenser.

CAUTION: CONDENSER COOLING FINS ARE SHARP. USE CARE WHEN CLEANING.

1. If the condenser is being cleaned from the back of the machine, remove all accumulated dust, dirt etc., that has adhered to the finned surface with a vacuum cleaner.

2. If the unit is being cleaned from the front, remove lower panel, turn the power switch off and blow through the finned surface of the condenser past the fan blade to remove accumulated dust, etc.

STATUS INDICATOR

STATUS	EXPLANATION
No Lights	Unit is in freeze cycle, making ice. At the beginning of freeze cycle the water pump has a delayed start up, possibly as long as 3 minutes.
Flashing Red L.E.D.	Evaporator sensor ice bridge thickness set point temperature has been reached. If the evaporator temperature stays at or below this temperature for approximately 30 seconds, unit will harvest ice.
Yellow L.E.D.	Unit is in Harvest cycle. Ice should fall shortly, or after an approximate 5 minute time delay the unit is forced to switch back to the freeze cycle.
Green L.E.D.	Indicates a full bin condition. The unit is off, the water curtain is being held open with ice.

TROUBLESHOOTING THE SENSORS

1. Turn off power to machine.
2. Remove the front panel and electrical box cover of the machine.
3. Cut the suspected sensor wire at least six inches from the thermowell in which it is located.
4. Remove the sensor from the thermowell.
5. Carefully separate the wires and strip the insulation off the end.
6. Pack a glass or container with ice and add some water to make an ice-water solution. Check the temperature of the ice water with an accurate thermometer. Ice water must be 32^{o} F.
7. Insert the sensor into the ice water and soak for a minimum of two minutes.
8. With a zerod ohmmeter measure the resistance across the two wires of the sensor lead. It should read 2815 ohms + or -10% (281 ohms).

NOTE: If the above ohm reading is not within the range stated, the sensor is bad and should be replaced.

RECONNECTION OF A GOOD OR REPLACEMENT SENSOR AFTER TROUBLESHOOTING

1. Carefully separate the wires of the sensor leads coming from the solid state control and strip the insulation off the end of each wire.
2. Reconnect the sensor leads and twist the stripped ends tightly. Secure with the proper sized wire nuts.
3. Tape all the wire nut connections to insulate connections from each other.

REMOVAL OF SOLID STATE CONTROL FROM MACHINE

CAUTION: THE CIRCUIT BOARD IS FRAGILE, HANDLE WITH CARE.

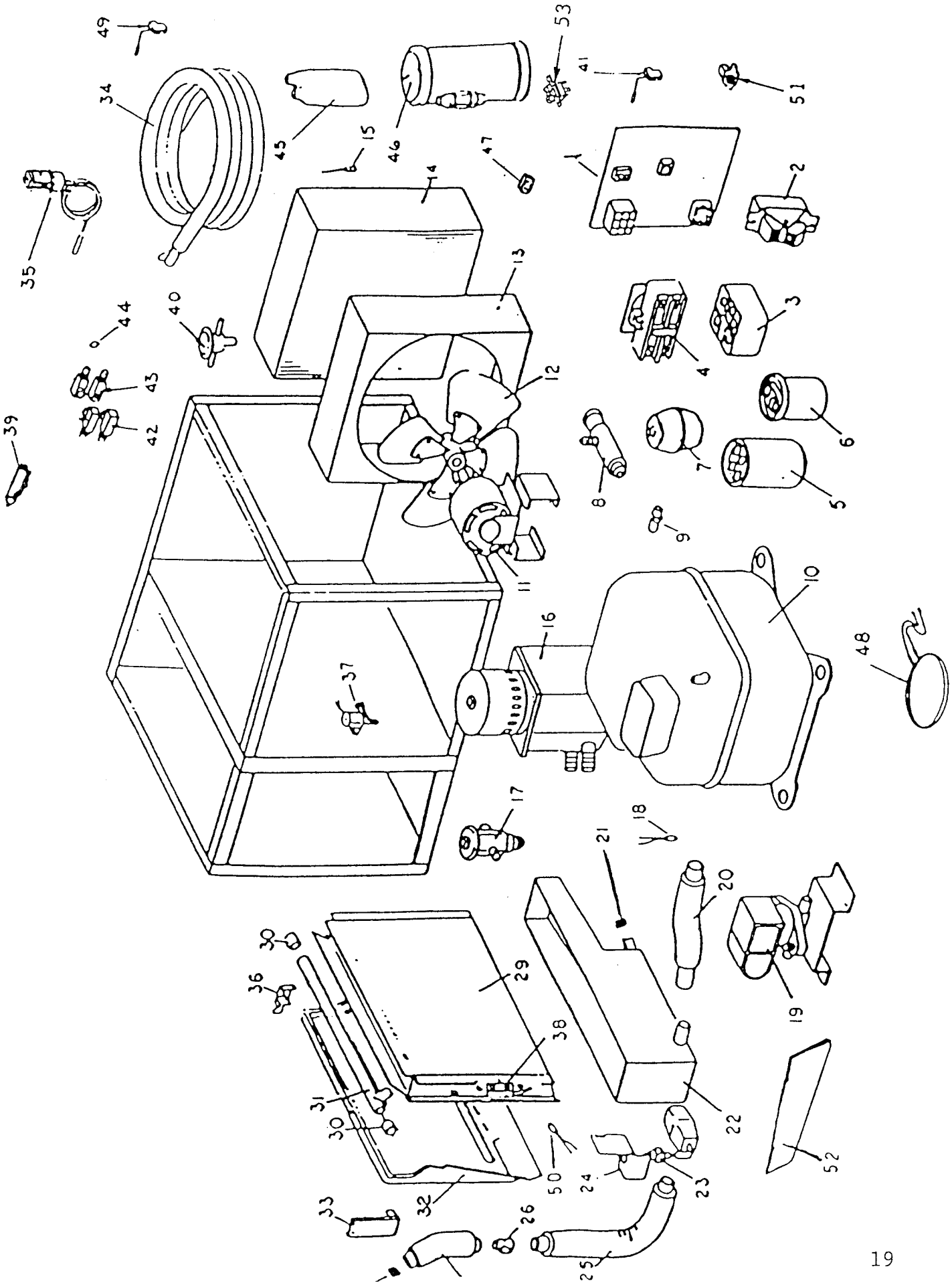
1. Turn off power to machine.
2. Remove front panel.
3. Remove electrical box left front cover.
4. Disconnect the through wire plug connections from circuit board.
5. Carefully lift any corner of the circuit board while pinching closed the top part of the plastic "stand off" support with needle nose pliers. The circuit board has to be gradually worked up over all five of the "stand off" supports. The circuit board will not "pop off" until all supports have been pinched closed and the board is then holding them in that position.

REINSTALLATION OF SOLID STATE CONTROL

1. Align all holes in the circuit board over the plastic stand-off supports.
2. Carefully push downward at all hole locations until board seats on all the stand-off supports. (Sometimes a snap will be heard as this seating takes place.)
3. After the circuit board is seated, carefully connect the three plugs to the circuit board. Note: Plug connects are polarized, make sure the plug is inserted correctly.

PARTS LIST

ILLUS. NO.	DESCRIPTION	PART NO. SERIES 300
1	Control, circuit board	43641
2	Switch, on-off-clean	23836
3	Relay, compressor start	43423
4	Relay, power	40980
5	Capacitor, compressor start	43424
6	N/A	N/A
7	Drier	36335
8	N/A	N/A
9	Valve, Schrader	20654
	Core, Schrader valve	21214
	Cap, Schrader valve	23988
10	Compressor	43422
11	Motor, condenser fan	23526
12	Blade, condenser fan	25578
13	N/A	N/A
14	Condenser	25446
15	N/A	N/A
16	Pump, water	41011
17	Valve, thermostatic expansion	41415
18	N/A	N/A
19	Valve, hot gas	28023
	Coil, hot gas valve	28024
20	Tube, water pan to pump inlet	38790
21	Cap, reservoir drain	45681
22	Reservoir, water	41448
23	Float and valve	21924
24	Bracket, float & valve	45922
25	Hose, pump	45680
26	Tee	987
27	Hose	43412
28	Orifice, restrictor	22176
29	Evaporator	45500
30	End cap	42493
31	Distributor, water	43056
32	Cover, evaporator	45539
33	Bracket, front cover mount	45536
34	Condenser coil, water cooled	8646
35	Valve, water regulating	1211
36	Bracket, back cover mount	38743
37	Valve, water dump solenoid	42297
38	Switch, harvest-bin proximity	45537
39	N/A	N/A
40	N/A	N/A
41	N/A	N/A
42	N/A	N/A
43	N/A	N/A
44	N/A	N/A
45	N/A	N/A
46	N/A	N/A
47	N/A	N/A
48	N/A	N/A
49	Control, high pressure (water cooled)	7024
50	Sensor, evaporator	38703
51	N/A	N/A
52	Splash guard	45541
53	Switch, water dump valve	45866


49
34
35
45
15
46
53
41
51
47
1
2
4
13
40
44
43
42
39
12
3
4
6
7
8
5
9
10
11
16
48
37
17
18
21
20
19
29
36
38
31
30
22
50
24
23
52
32
33
26
25