Ice-O-Matic®

A Welbilt Company

Certified Technician Network

Diagnostic Cubers (50 & 60 hertz)
Models C-66, 106, 136, 186, EC-606

- Specifications
- Operations
- Troubleshooting

Mile High Equipment Company

P/N 9081149-01

Table of Contents

General Information

How To Use This Manual

Ice-O-Matic provides this manual as an aid to the service technician in installation, operation, and maintenance of C-series (computerized) cube ice machines. If used properly this manual can also help the service technician troubleshoot and diagnose most of the problems that may occur with the machine.

The first two sections of this manual provide general and maintenance information. The remainder of the manual beginning with section C provides troubleshooting and service information. Section C contains flow charts called troubleshooting trees. Page C-1 provides instructions on using the troubleshooting trees. Each troubleshooting tree is named to describe a particular problem with the operation of the machine. When following the troubleshooting trees the service technician will be led through questions and checks and end up at a probable solution. When using the troubleshooting trees it is important that the service technician understand the operation and adjustments of the components being checked and the component suspected of being defective. A detailed description of the operation and adjustments of each component as well as other service information is laid out in the service information pages that follow section C.

Each section, after section C, focuses on a particular system in the ice machine, e.g. water distribution system, refrigeration system, etc. Each of these sections are laid out the same way. The first 1 or 2 pages of each section lists each component in that system in alphabetical order and contains a brief description of each component. After the component description page(s) some sections may contain diagnoses or operation information for that particular system. The pages that follow contain detailed service information for each component in the system. The components are again in alphabetical order and each component is on a separate page. Each service information page includes problem, possible cause and remedy charts that in most cases apply only to the component on the respective page.

We believe that most aspects of the C-series (computerized) cuber are covered in this manual, however, should you encounter any conditions not addressed herein, please contact your local Ice-O-Matic distributor for assistance. You may also call or write the Ice-O-Matic Service Department:

Ice-O-Matic
P.O. Box 39487
Denver, CO 80239-0487
Attn: Service Department

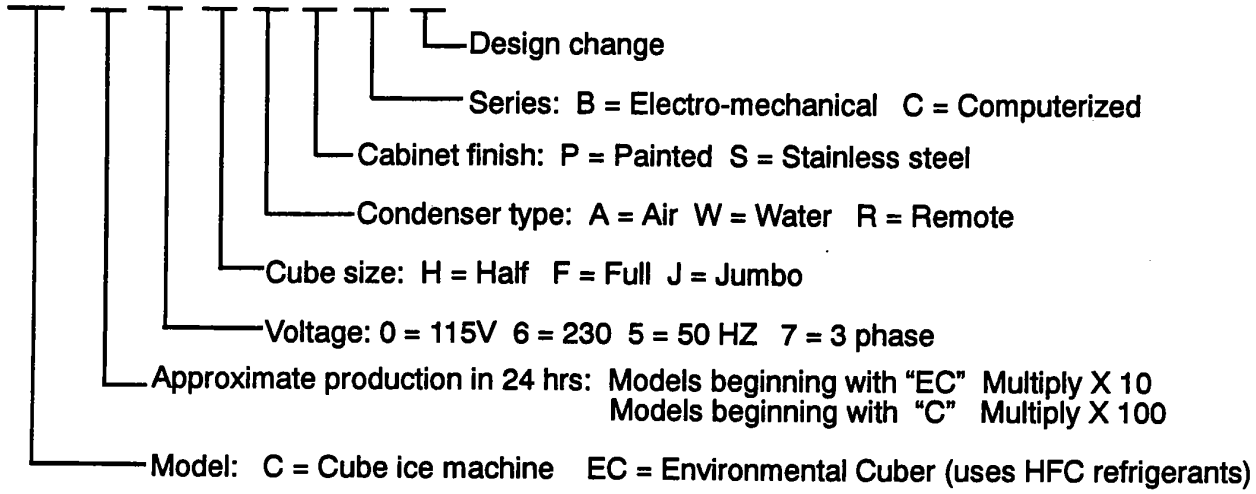
Phone: 1-800-423-3367 SERVICE ONLY
(303) 371-3737
Fax: (303) 371-4153

Any service communication must include:
>Model Number
>Serial Number
>A detailed explanation of the problem

Model And Serial Number Format

How To Read Model Numbers

C 13 6 H A P C 1



Serial Number Date Code

First letter in the serial number indicates the month and decade of manufacture.
First digit in the serial number indicates the year of manufacture.

Example: A 5 was manufactured January 1985. M 5 will be manufactured in January 1995.

1980-1989	MONTH	1990-1999
A	JANUARY	M
B	FEBRUARY	N
C	MARCH	P
D	APRIL	Q
E	MAY	R
F	JUNE	S
G	JULY	T
H	AUGUST	U
I	SEPTEMBER	V
J	OCTOBER	W
K	NOVEMBER	Y
L	DECEMBER	Z

Note: O and X have been eliminated.

General Information

Electrical & Mechanical Specifications

SINGLE PHASE UNITS

Model Number	Ice Prod. Lbs./24 hrs. @ 90 Air 70 Water	Condensing Unit	Comp. H.P.	Voltage Characteristics	No. of Wires (incl. grd.)	Circuit Ampacity	Fuse Size	Refrigerant Type
EC606#-A-#-C	477	Air	1-1/4	208-230/60/1	3	10.7	15	R404a
EC606#-W-#-C	556	Water	1-1/4	208-230/60/1	3	7.5	15	R404a
EC606#-R-#-C	489	Remote	1-1/4	208-230/60/1	3	11.5	15	R404a
C-66#-A-#-C	477	Air	1-1/4	208-230/60/1	3	7.3	15	R-502
C-66#-W-#-C	556	Water	1-1/4	208-230/60/1	3	6.7	15	R-502
C-66#-R-#-C	489	Remote	1-1/4	208-230/60/1	3	11.6	15	R-502
C-106#-A-#-C	758	Air	1-3/4	208-230/60/1	3	12.9	20	R-22
C-106#-W-#-C	880	Water	1-3/4	208-230/60/1	3	12.0	20	R-22
C-106#-R-#-C	750	Remote	1-3/4	208-230/60/1	3	13.8	20	R-22
C-126#-A-#-C	881	Air	2-1/4	208-230/60/1	3	19.6	25	R-502
C-126#-W-#-C	1071	Water	2-1/4	208-230/60/1	3	18.0	25	R-502
C-126#-R-#-C	917	Remote	2-1/4	208-230/60/1	3	20.5	25	R-502
C-136#-A-#-C	1125	Air	3	208-230/60/1	3	19.2	30	R-502
C-136#-W-#-C	1180	Water	3	208-230/60/1	3	16.9	25	R-502
C-136#-R-#-C	1119	Remote	3	208-230/60/1	3	16.6	25	R-502
C-186#-W-#-C	1650	Water	3-1/4	208-230/60/1	3	17.7	30	R-502
C-186#-R-#-C	1575	Remote	3-1/4	208-230/60/1	3	20.6	30	R-502

= H (half cube), F (full cube), P (painted finish) and S (stainless steel finish)

NOTE: See Serial/Specification plate at rear of machine for refrigerant charge

Electrical & Mechanical Specifications

3 PHASE UNITS

Model Number	Ice Prod. Lbs./24 hrs @ 90 Air 70 Water	Condensing Unit	Comp. HP	Voltage Characteristics	No. Of Wires	Minimum Circuit Ampacity	Max. Fuse Size	Refrigerant Type
C-107F-A-P-C	758	Air	1-3/4	208-230/60/3	4	12.3	20	R-22
C-107H-A-P-C	758	Air	1-3/4	208-230/60/3	4	12.3	20	R-22
C-107F-W-P-C	880	Water	1-3/4	208-230/60/3	4	11.7	20	R-22
C-107H-W-P-C	880	Water	1-3/4	208-230/60/3	4	11.7	20	R-22
C-107F-R-P-C	750	Remote	1-3/4	208-230/60/3	4	13.4	20	R-22
C-107H-R-P-C	750	Remote	1-3/4	208-230/60/3	4	13.4	20	R-22
C-127F-A-P-C	881	Air	2-1/4	208-230/60/3	4	12.4	15	R-502
C-127H-A-P-C	881	Air	2-1/4	208-230/60/3	4	12.4	15	R-502
C-127F-W-P-C	1071	Water	2-1/4	208-230/60/3	4	10.8	15	R-502
C-127H-W-P-C	1071	Water	2-1/4	208-230/60/3	4	10.8	15	R-502
C-127F-R-P-C	917	Remote	2-1/4	208-230/60/3	4	15.8	20	R-502
C-127H-R-P-C	917	Remote	2-1/4	208-230/60/3	4	15.8	20	R-502
C-137F-A-P-C	1110	Air	3	208-230/60/3	4	12.8	20	R-502
C-137H-A-P-C	1110	Air	3	208-230/60/3	4	12.8	20	R-502
C-137F-W-P-C	1110	Water	3	208-230/60/3	4	11.6	20	R-502
C-137H-W-P-C	1110	Water	3	208-230/60/3	4	11.6	20	R-502
C-137F-R-P-C	1050	Remote	3	208-230/60/3	4	12.5	20	R-502
C-137H-R-P-C	1050	Remote	3	208-230/60/3	4	12.5	20	R-502
C-187F-W-P-C	1655	Water	3-1/4	208-230/60/3	4	14.5	25	R-502
C-187H-W-P-C	1655	Water	3-1/4	208-230/60/3	4	14.5	25	R-502
C-187F-R-P-C	1532	Remote	3-1/4	208-230/60/3	4	14.1	25	R-502
C-187H-R-P-C	1532	Remote	3-1/4	208-230/60/3	4	14.1	25	R-502

NOTE: See Serial/Specification Plate at rear of machine for refrigerant charge.

General Information

Electrical & Mechanical Specifications

50 CYCLE UNITS

Model Number	Ice Prod. Kg./24 hrs @ 32C Air 27C Water	Condensing Unit	Comp. HP	Voltage Characteristics	No. Of Wires	Minimum Circuit Ampacity	Max. Fuse Size	Refrigerant Type
C-65F-A-P	199	Air	3/4	230/50/1	3	9.1	15	R-502
C-65H-A-P	199	Air	3/4	230/50/1	3	9.1	15	R-502
C-65F-W-P	237	Water	3/4	230/50/1	3	6.0	15	R-502
C-65H-W-P	237	Water	3/4	230/50/1	3	6.0	15	R-502
C-65F-R-P	213	Remote	3/4	230/50/1	3	8.9	15	R-502
C-65H-R-P	213	Remote	3/4	230/50/1	3	8.9	15	R-502
C-105F-A-P	279	Air	2-1/2	230/50/1	3	17.0	30	R-22
C-105H-A-P	279	Air	2-1/2	230/50/1	3	17.0	30	R-22
C-105F-W-P	374	Water	2-1/2	230/50/1	3	16.0	30	R-22
C-105H-W-P	374	Water	2-1/2	230/50/1	3	16.0	30	R-22
C-105F-R-P	338	Remote	2-1/2	230/50/1	3	17.7	30	R-22
C-105H-R-P	338	Remote	2-1/2	230/50/1	3	17.7	30	R-22
C-135F-A-P	474	Air	3-3/4	230/50/1	3	20.8	30	R-502
C-135H-A-P	474	Air	3-3/4	230/50/1	3	20.8	30	R-502
C-135F-W-P	458	Water	3-3/4	230/50/1	3	17.3	30	R-502
C-135H-W-P	458	Water	3-3/4	230/50/1	3	17.3	30	R-502
C-135F-R-P	492	Remote	3-3/4	230/50/1	3	20.0	30	R-502
C-135H-R-P	492	Remote	3-3/4	230/50/1	3	20.0	30	R-502
C-185F-W-P	655	Water	4	230/50/1	3	18.3	30	R-502
C-185H-W-P	655	Water	4	230/50/1	3	23.7	30	R-502
C-185H-R-P	694	Remote	4	230/50/1	3	23.7	30	R-502

Note: Ice production on 50 cycle machines is figured at 32C air & 27C water and shown in Kilograms per 24 hrs. See Serial/Specification Plate at rear of machine for refrigerant charge.

Installation Guidelines

For proper operation of the ICE-O-MATIC ice machine the following installation guidelines must be followed. Failure to do so may result in loss of production capacity, premature part failures, and may void all warranty.

Ambient Operating Temperatures

Minimum operating temperature: 50 F (10 C)
Maximum operating temperature: 100 F (38 C)

Incoming Water Supply

Minimum water temperature: 40 F (4.5 C)
Maximum water temperature: 100 F (38 C)
Minimum water pressure: 20 psi (1.4 bar)
Maximum water pressure: 60 psi (6.9 bar)

See Plumbing Diagram for line sizing, page A-6.

Clearance Requirements

6 inches clearance at rear and sides

Adjustments

Level machine.
Check bin switch for proper adjustment, page G-5.
Check water in trough for proper level, page D-2.
Check ice bridge for proper thickness, page H-20.
Check cam switch adjustment, page F-3.
Check water valve adjustment if water cooled, page E-10.

General Information

Installation Guidelines

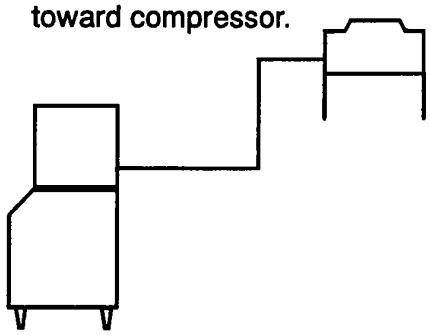
For proper operation of the ICE-O-MATIC ice machine the following installation guidelines must be followed. Failure to do so may result in loss of production capacity, premature part failures, and may void all warranty.

Remote Condensers

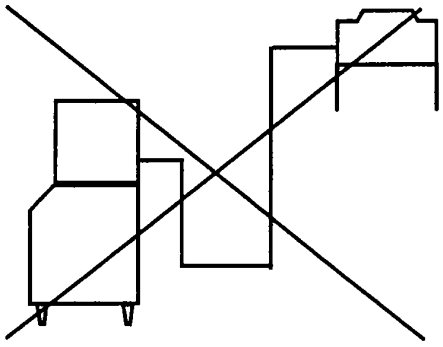
- Ambient operating temperatures: -20 F (-28 C) to 110 F (43 C)
- Maximum refrigerant line length: 40 ft. (12.2 m)
- Maximum vertical rise: 15ft. (4.6 m)
- Minimum condenser height: C105/106 condensers must be installed above quick connect fittings at rear of machine. 600 series, , 1300 series and 1800 series condensers must not be installed more than 6' (1.83 meters) below the refrigerant line quick connects at rear of ice machine. No part of the refrigerant lines, between the machine and the condenser, should fall below this point.

WHEN INSTALLING CONDENSER ABOVE ICE MACHINE

DO Slope refrigerant lines downward toward compressor.



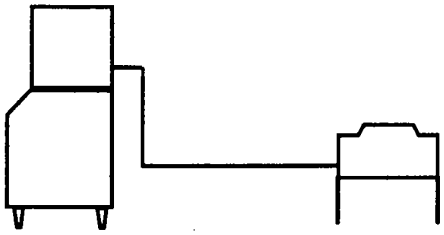
DO NOT Install any part of the refrigerant lines below the quick connect fittings at rear of machine.



WHEN INSTALLING CONDENSER BELOW ICE MACHINE (All models except C105/106)

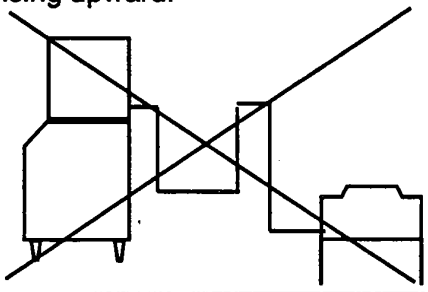
DO Add 3 lbs (85 grams) of refrigerant to system.

DO Slope refrigerant lines downward toward condenser

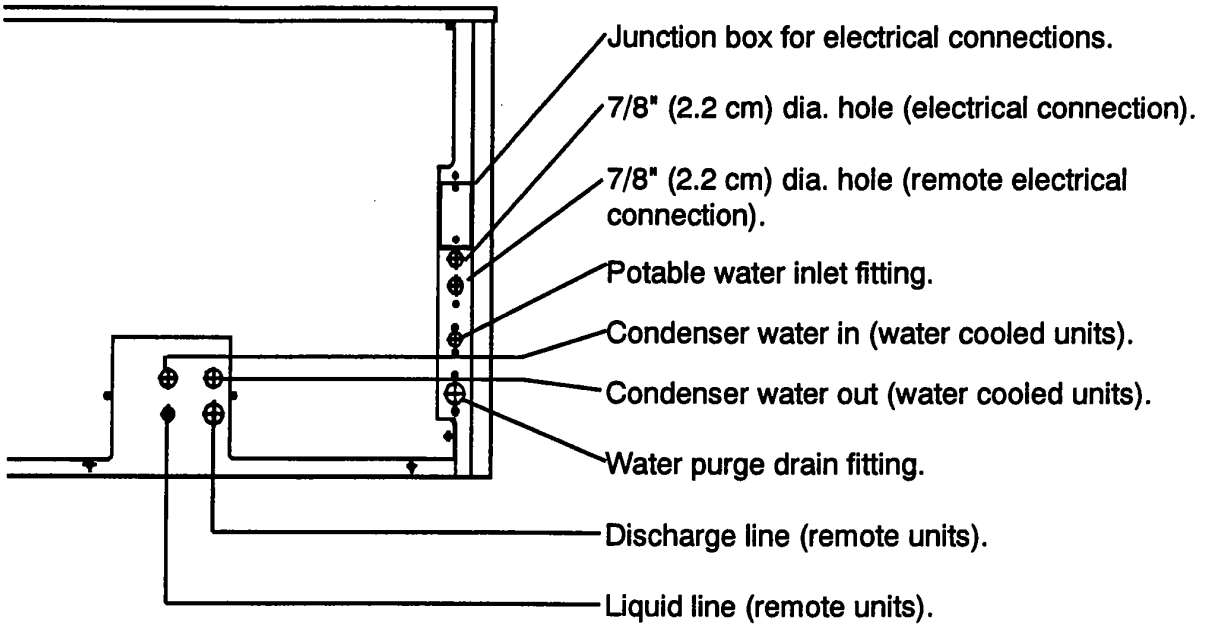


DO NOT Install the condenser lower than 6' (1.83 meters) below the quick connect fittings at rear of machine.

DO NOT Create oil traps in refrigerant lines by sloping lines downward then rising upward.



Plumbing Diagram



PLUMBING REQUIREMENTS

Water Inlet Fitting: 3/8 inch FPT
Purge Drain Fitting: 3/4 inch FPT
Water-Cooled Condenser Inlet Fitting: 3/8 inch FPT, 1/2 inch FPT on C-185/186/187
Water-Cooled Condenser Drain Fitting: 1/2 inch FPT
Remote Condenser Discharge Line Fitting: 1/2 inch quick-connect
Remote Condenser Liquid Line Fitting: 3/8 inch quick-connect

General Information

How The C-Series Cuber Works

A general description of how the C-Series cuber works is given below. The remainder of the manual provides more detail about the components and systems.

The Ice-O-Matic C-Series Cubers contain an electronic controller which is microcomputer based. It is designed to control the motors, compressor, solenoid valves, and pumps used for ice-making. The automatic control decisions made throughout the ice-making process are based on information continuously received by temperature sensors (thermistors), pressure controls, switches, time, and control program itself.

During the freezing mode, water is circulated over the evaporator plate where the ice cubes are formed. When the evaporator reaches 14F (-10C), the electronic controller initiates the timing sequence of the freeze mode. The timer is preset at the factory to achieve a 1/8", (3mm) bridge thickness. It may be necessary to readjust the timer at start-up for proper thickness, see page .

There are three steps to the freeze mode: The time it takes to for the evaporator to reach 14F (-10C), the time delay setting to build the ice bridge, and the water purge sequence.

Once the time delay of the electronic controller has reached the last 15 seconds of the freeze mode, power is applied to the water purge valve which allows the water pump to expel all the water from the water trough, removing all impurities and sediment. This allows the unit to make clear ice cubes and keep mineral build-up to a minimum in the water system.

After the purge mode, the electronic controller begins the defrost mode. During defrost, the hot gas solenoid opens, allowing hot refrigerant gas to go directly to the evaporator, breaking the bond between the evaporator and the ice slab. Twenty seconds later the harvest mode is initiated and power is applied to the harvest assist motor(s). The clutch assembly on the harvest motor slips until the clutch overcomes the capillary attraction of the ice to the evaporator allowing the ice to be moved off the evaporator into the bin.

As the harvest assist motor turns the clutch assembly, the cam switch arm riding on the outside edge of the clutch is lifted moving the switch contacts from the open position to the closed position. Once the clutch assembly has made a complete revolution the arm drops back into the indentation on the clutch, opening the contacts. This switching action resets the electronic controller allowing the machine to go back into a freeze mode unless the splash curtain is held open closing the contacts in the curtain switch and shutting the machine off on full bin. If the curtain returns to its normal position the curtain switch will open and the machine will begin another cycle.

Scheduled Maintenance

Quarterly Maintenance Procedure

Danger

Electrical shock and/or injury from moving parts inside this machine can cause serious injury. Disconnect electrical supply to machine prior to performing any adjustments or repairs.

To insure economical, trouble free operation of your machine, it is recommended that the following maintenance be performed every 3 months.

1. Clean the ice-making section, if necessary, per instructions on page B-2. Local water conditions may require that cleaning be performed more often than 6 month intervals.

2. Check ice bridge thickness. See page H-20 for proper thickness and adjustment procedure.

3. Check water level in trough. See page D-2 for proper level and adjustment.

4. Clean the condenser (air cooled machines) to insure unobstructed air flow.

5. Check for leaks of any kind; water, refrigerant, oil, ect.

6. Check the Bin Switch for proper adjustment, see bin switch adjustment on page G-5.

7. Check the Cam Switch Setting, see page F-3.

8. Check water regulating valve (water cooled machines) for proper adjustment by measuring water temperature, see page E-10.

9. Check to see that the T.X.V. bulb is securely fastened.

10. Check all electrical connections.

11. Oil fan motor if motor has oil fitting (self contained air cooled).

Scheduled Maintenance

Semi-Annual Cleaning Procedure

CLEANING AND SANITIZING INSTRUCTIONS

Harvest problems may occur if the following procedures are not performed every six months.

1. Remove ice machine front panel.

2. Make sure all ice is off evaporator. If ice is being made, initiate harvest or wait for cycle completion, then turn machine "OFF" at the ICE/OFF/ WASH switch.

3. Remove or melt all ice from the bin.

4. Add recommended amount of approved ice machine cleaner to water trough according to label instructions on container.

5. Initiate the wash cycle at the ICE/OFF/WASH switch by moving switch to the "WASH" position. Allow the cleaner to circulate for approximately 15 minutes to remove mineral deposits.

6. Depress the purge switch and hold until cleaner has been flushed down the drain and diluted by fresh incoming water.

7. Terminate the wash cycle by moving the ICE/OFF/WASH switch to the "OFF" position. Remove the splash curtain and inspect the evaporator and water spillway to assure all mineral residue has been removed.

8. If necessary, wipe evaporator, spillway and other water transport surfaces with a clean, soft cloth to remove remaining residue. If necessary, remove the water distribution tube, disassemble and clean with a bottle brush, see page D-4. Reassemble all parts and repeat steps 4 through 7 as required to remove residue.

9. Turn off machine water supply and clean water trough thoroughly to remove all scale or slime build-up. If necessary, remove trough to reach all splash area and float.

10. Prepare 1-1/2 to 2 gallons (5.7 to 7.5 liters) of approved (EPA/FDA) sodium hypocloride food equipment sanitizer to form a solution with 100 ppm free chlorine yield minimum.

Semi-Annual Cleaning Procedure, Continued

11. Add enough sanitizing solution to fill the water trough to overflowing and move the ICE/OFF/WASH switch to the "WASH" position and allow circulation to occur for 10 minutes and inspect all disassembled fittings for leaks. During this time, wipe down all other ice machine splash zones, plus the interior surfaces of the bin, deflector and door with the remaining sanitizing solution. Inspect to insure that all functional parts, fasteners, thermostat bulbs (if used), etc. are in place.

12. Depress the purge switch and hold until sanitizer has been flushed down the drain. Turn on the machine water supply and continue to purge the diluted sanitizing solution for another 1-2 minutes.

13. Move the ICE/OFF/WASH switch to the "ICE" position and replace the front panel.

14. Discard the first two ice harvests.

Scheduled Maintenance

Winterizing Procedure

Important

Whenever the ice machine is taken out of operation during the winter months, the procedure below must be performed. Failure to do so may cause serious damage and will void all warranties.

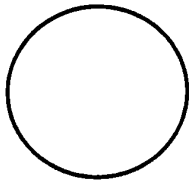
1. Shut water off to the machine.
2. Turn the ICE/OFF/WASH Switch to the off position.
3. Make sure all ice is off evaporator. If ice is being made, initiate harvest or wait for cycle completion, then turn machine "OFF" at the ICE/OFF/ WASH switch.
4. Disconnect the tubing between the pump discharge and the water distributor manifold.
5. Drain the water system completely. Do not replace the tubes.
6. On water cooled machines, hold water regulating valve open by prying upward on the spring with a screwdriver while using compressed air to blow all the water out of the condenser.
7. Wipe out the storage bin.

How To Use The Troubleshooting Trees

Introduction

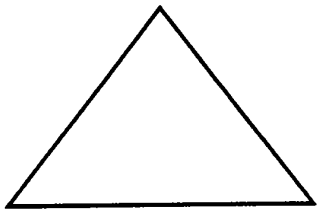
The troubleshooting trees on the following pages were developed to be used in conjunction with the service information section of this manual. If used together as intended, these two sections of the manual will help the ice machine service technician, to quickly diagnose many of the problems often encountered with ice machines. When used as designed, the troubleshooting trees can lead you from a general symptom to the most likely component to suspect as the cause of the problem. The trees are not designed to be "parts changer guides;" please do not use them as such! Please refer to page A-1 for instructions on using the entire manual.

The trees are made of three types of boxes:



QUESTION

CHECK



SOLUTION

QUESTION boxes ask a yes/no question and the answer will lead to either another question box, a check box, or a solution box.

CHECK boxes will suggest a point to check for proper operation, and will often refer you to a page in the SERVICE INFORMATION SECTION of this manual. The result of the check may lead to another box, or a solution box.

SOLUTION boxes suggest the most likely component to cause the malfunction described in the heading of the tree. When reaching a solution box, **DO NOT** immediately assume the component is defective. The final step is to use the **SERVICE INFORMATION SECTION** of this manual to verify that the component is, indeed defective.

To use the troubleshooting trees, first find the page with the heading describing the type of problem occurring. Begin at the top of the page and follow the tree, step-by-step. When a check box is reached, refer to the service information section to make the check suggested. Once a solution box is reached, refer to the service information section to verify that the component in the solution box is, indeed, defective, and repair or replace per the directions in that section.

Troubleshooting Trees

Table of Contents

Troubleshooting Trees

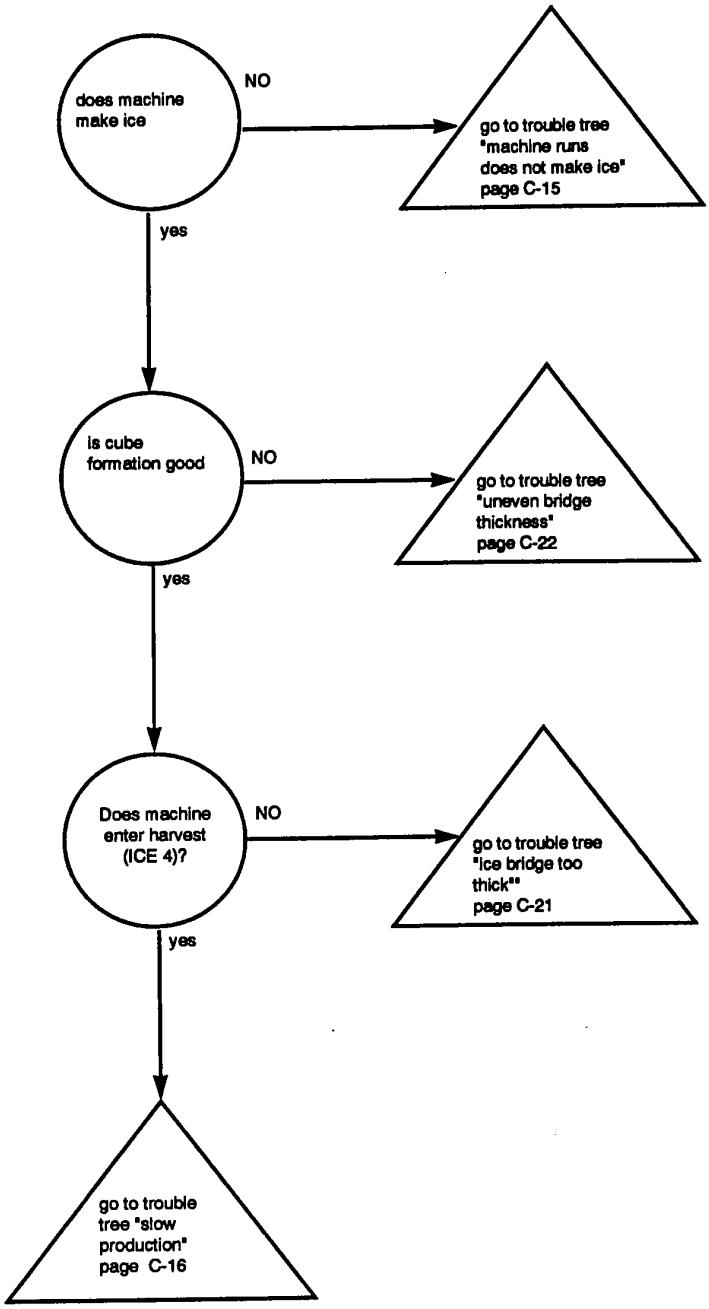
Continued Page C-3

Table of Contents (Cont.)

Troubleshooting Trees

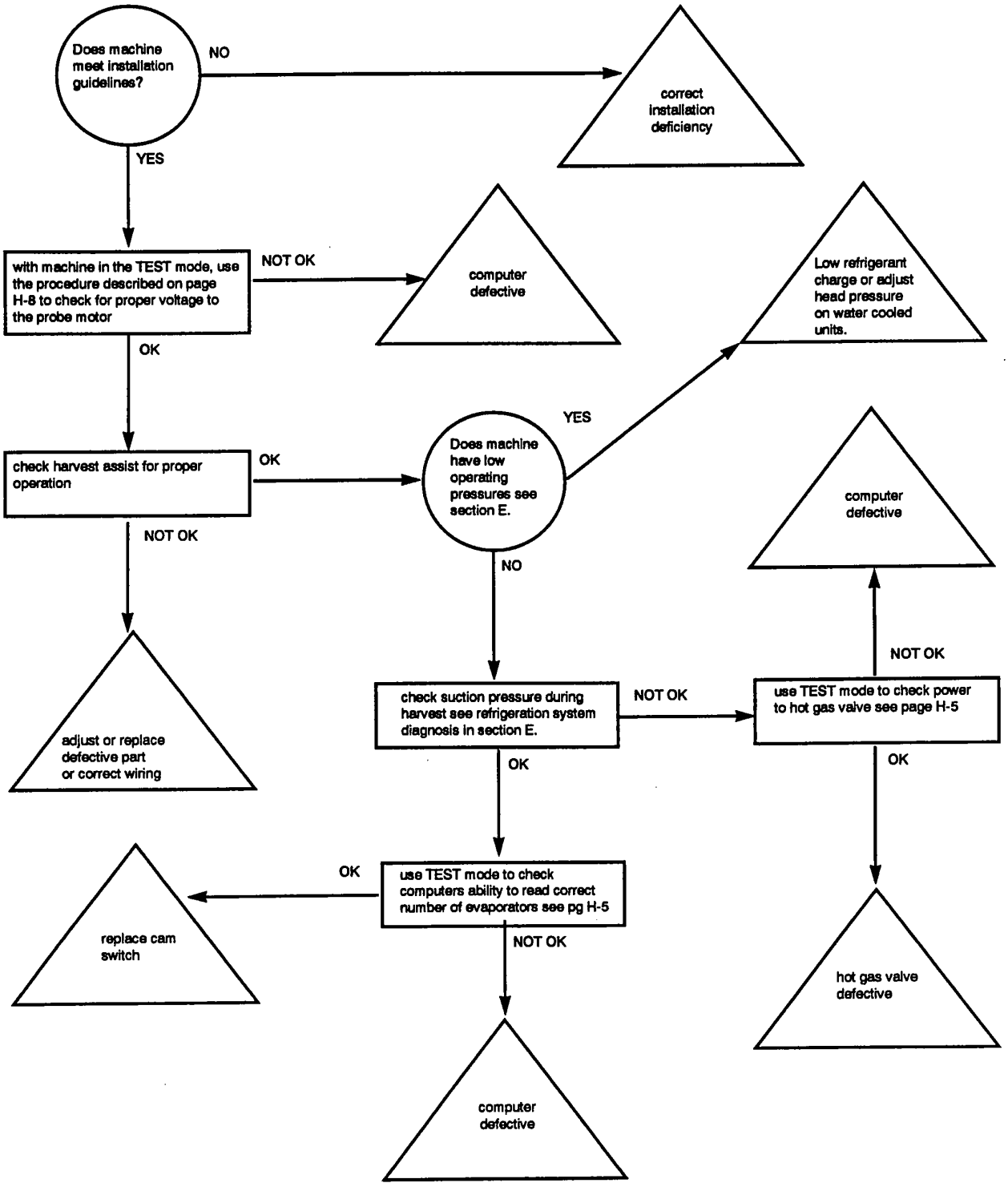
Troubleshooting Trees

Error Code 1



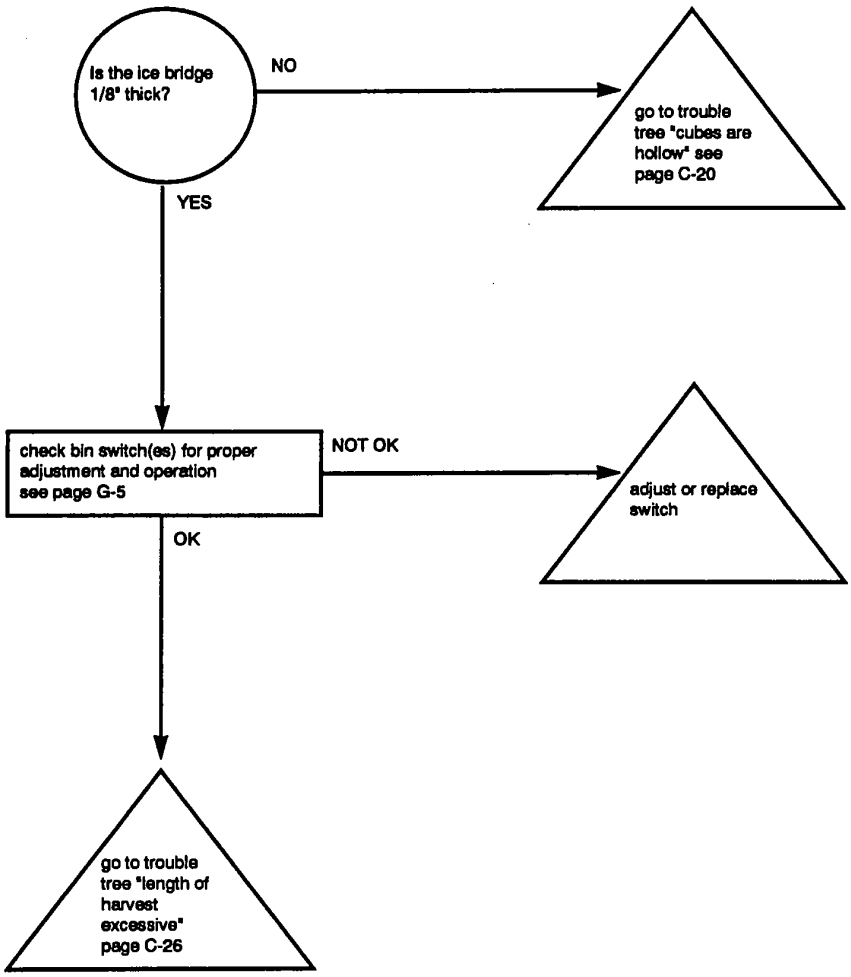
Troubleshooting Trees

Error Code 2



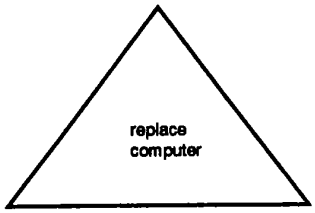
Troubleshooting Trees

Error Code 3



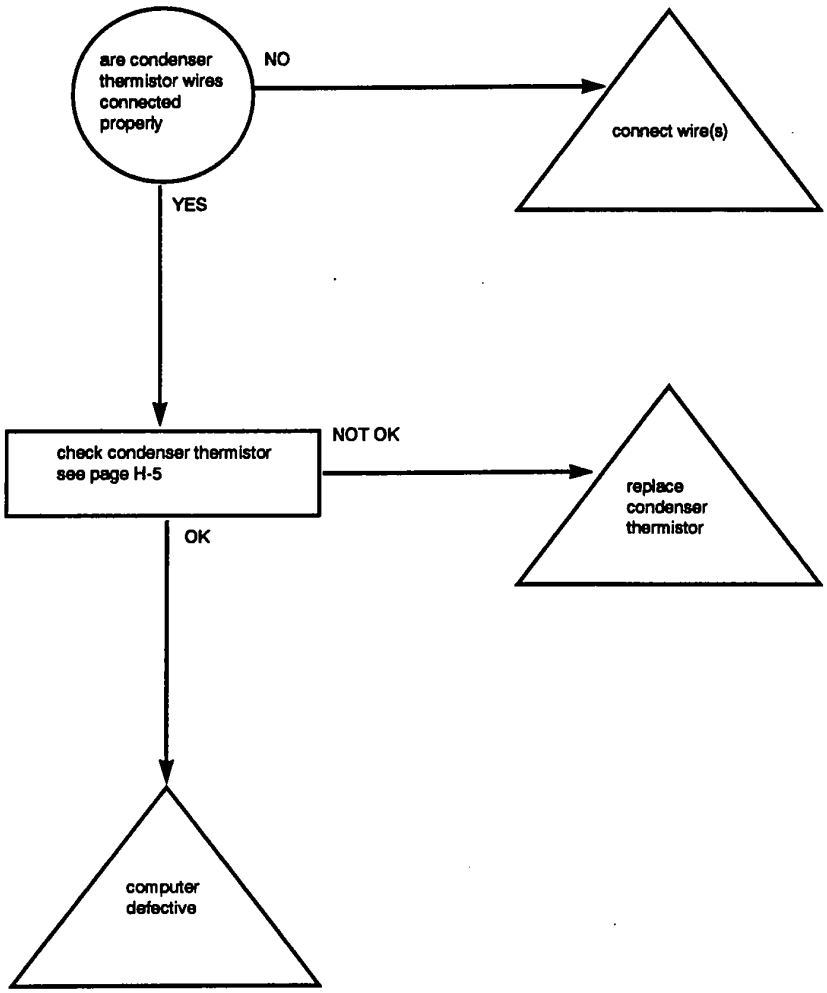
Troubleshooting Trees

Error Code 4

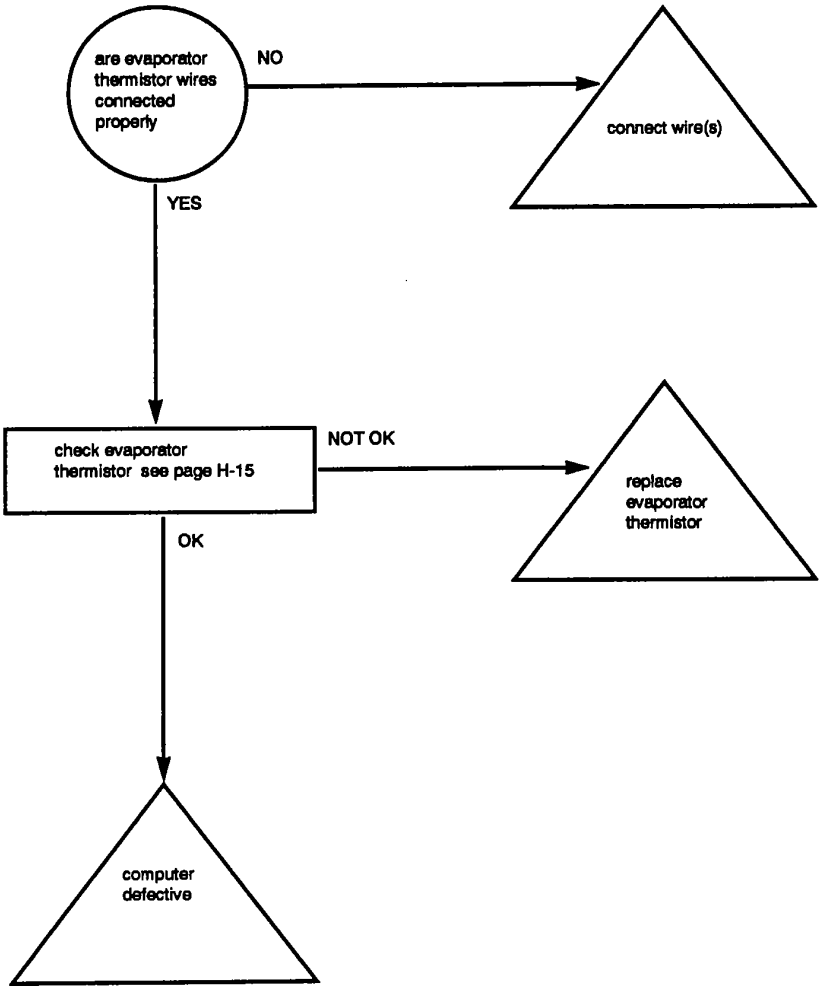


Troubleshooting Trees

Error Code 5

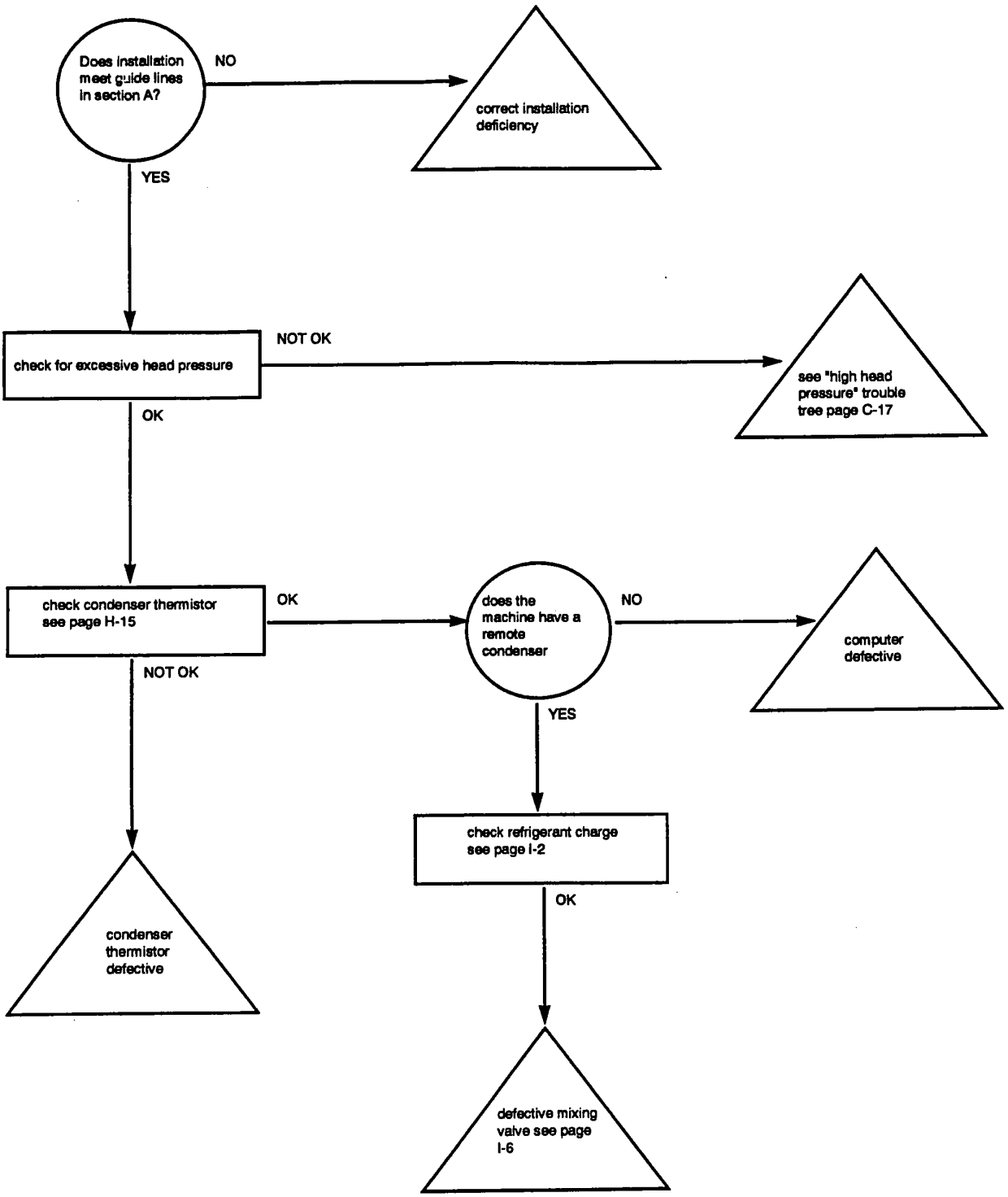


Error Code 6

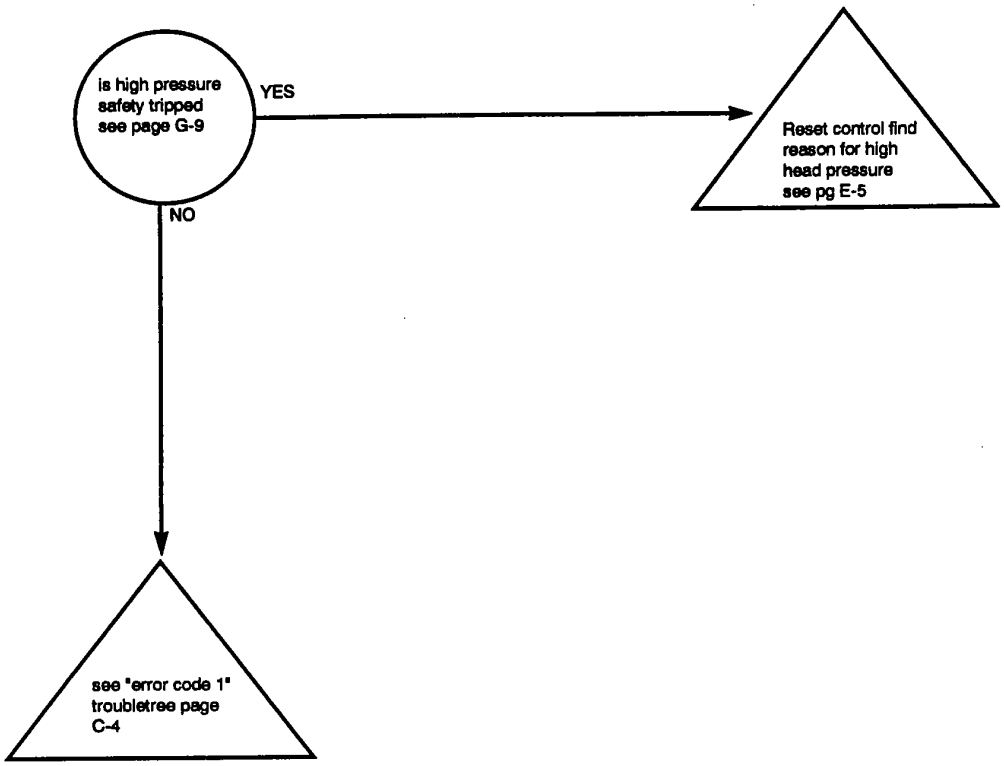

are evaporator thermistor wires connected properly
NO
connect wire(s)
YES
check evaporator thermistor see page H-15
NOT OK
replace evaporator thermistor
OK
computer defective

Troubleshooting Trees

Error Code 7

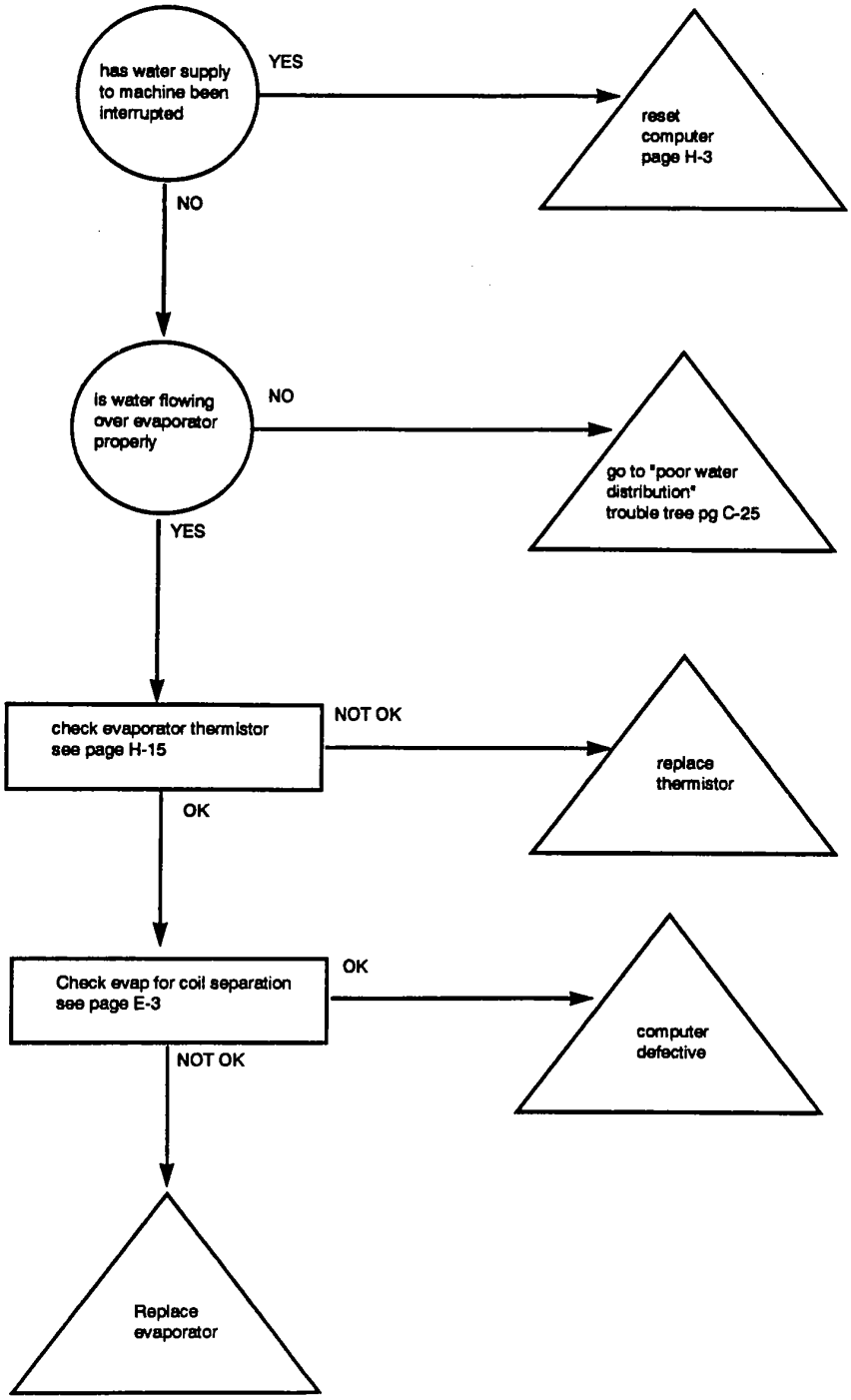


Error Code 8

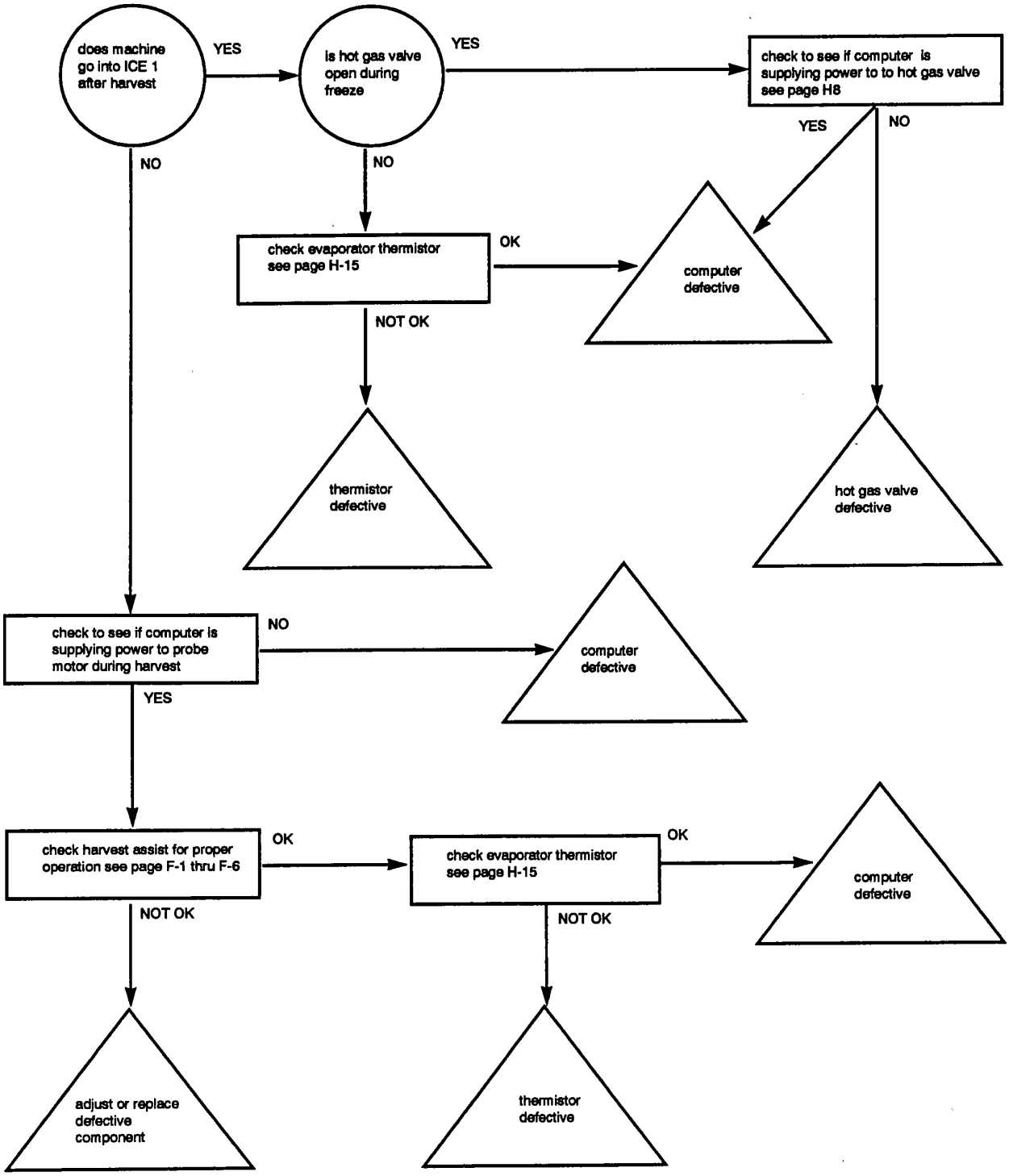

is high pressure safety tripped see page G-9
YES
Reset control find reason for high head pressure see pg E-5
NO
see "error code 1" troubletree page C-4

Troubleshooting Trees

Error Code 9

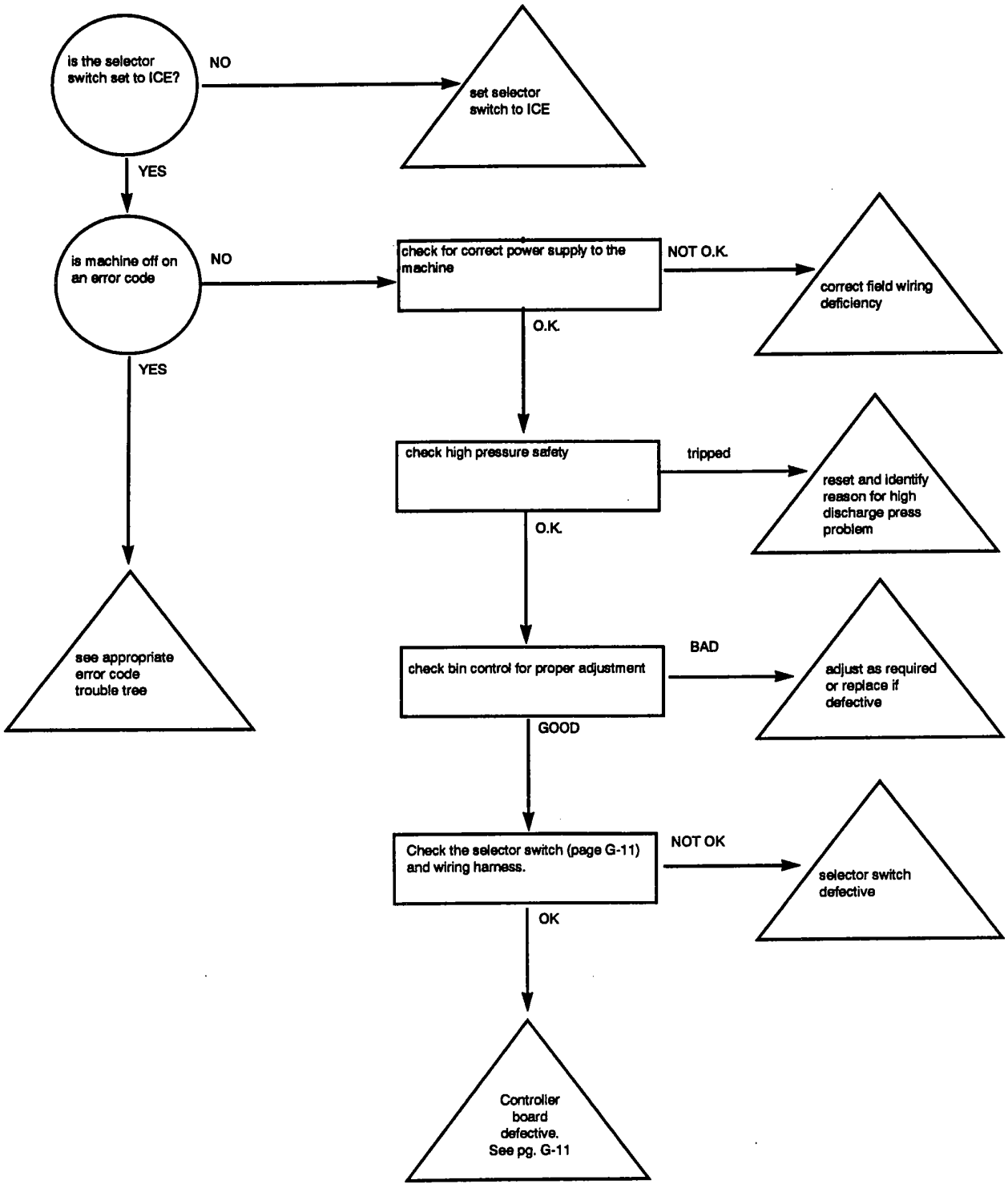


Error Code 12

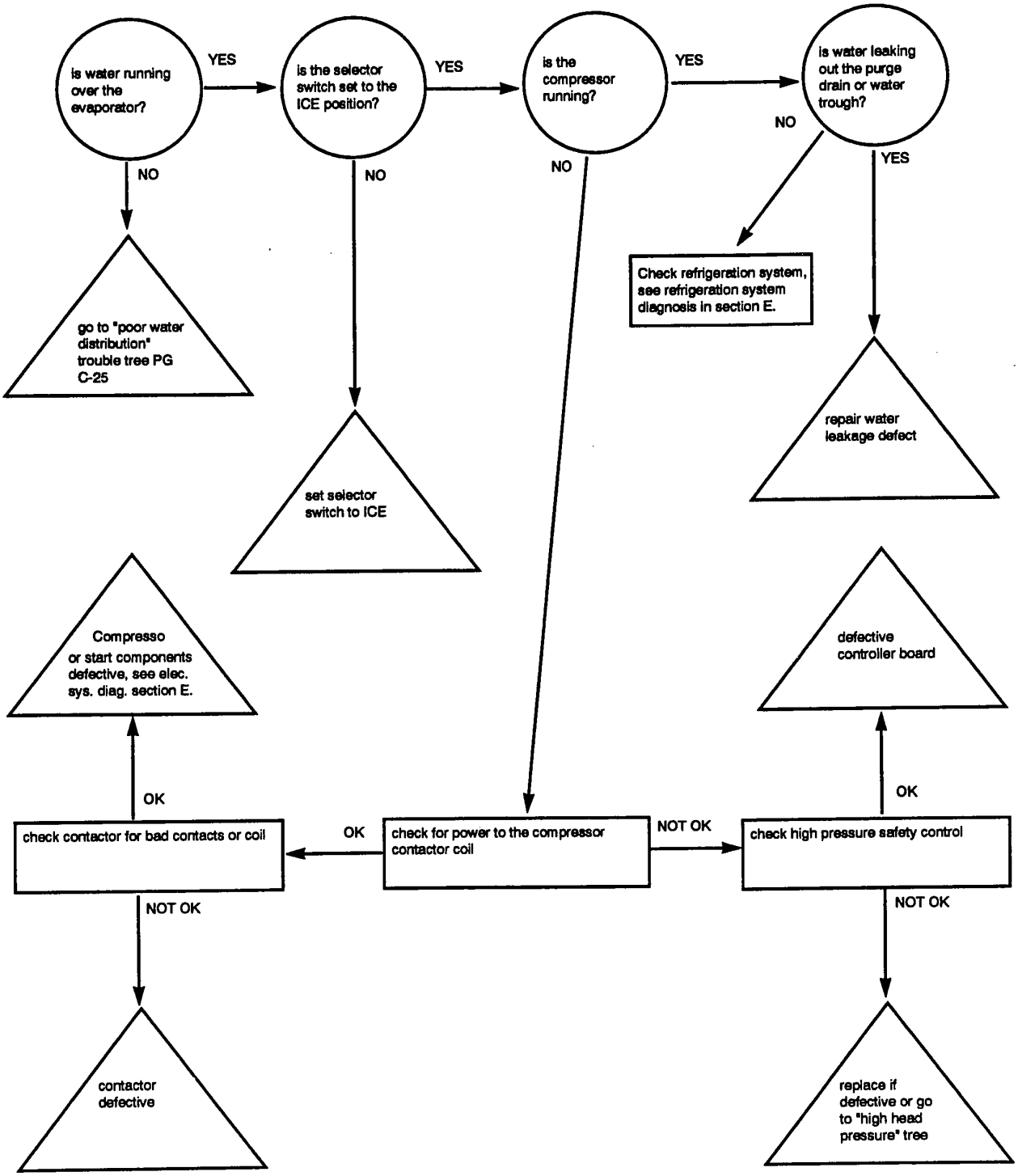


Troubleshooting Trees

Machine Does Not Run

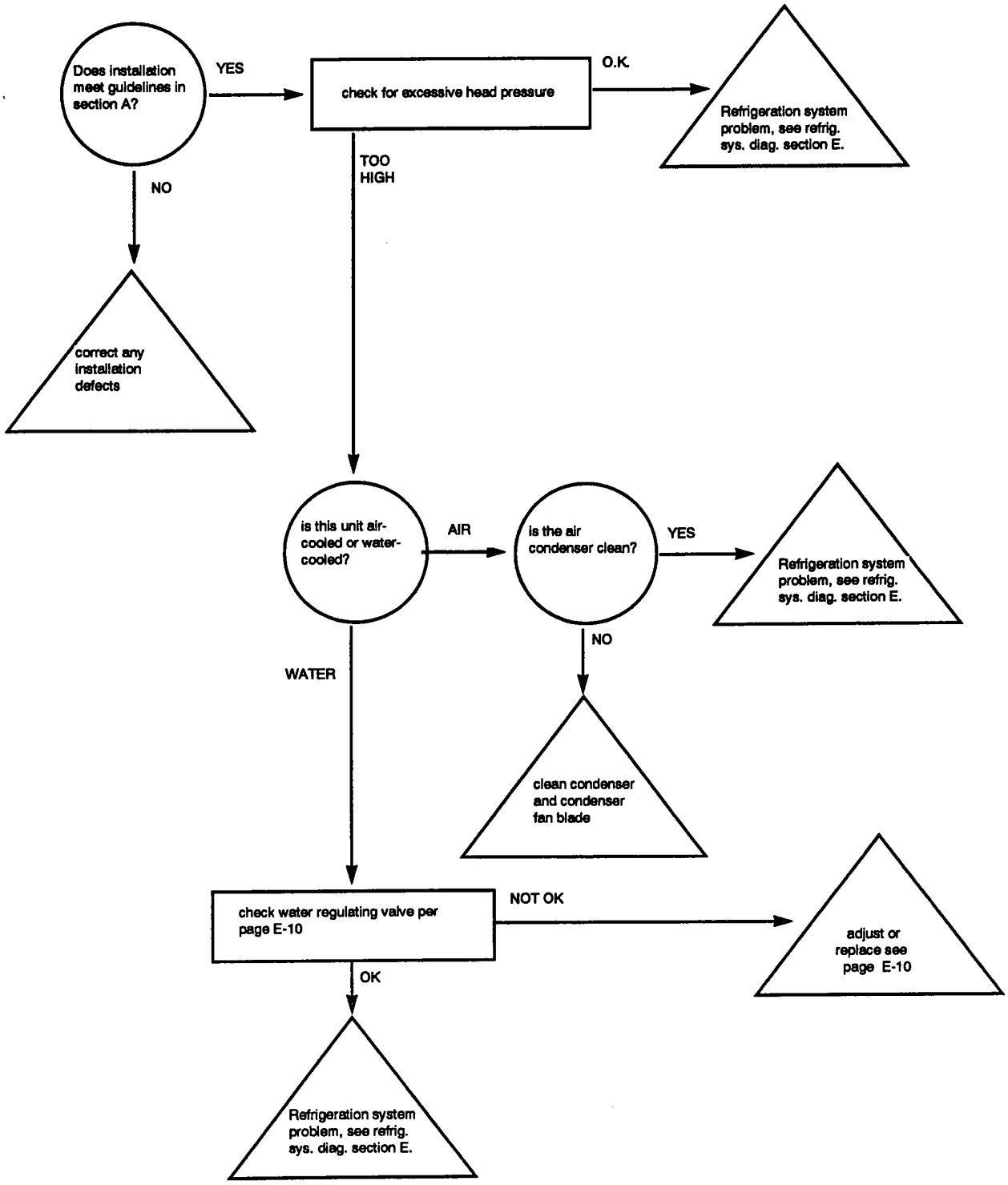


Machine Runs, Does Not Make Ice

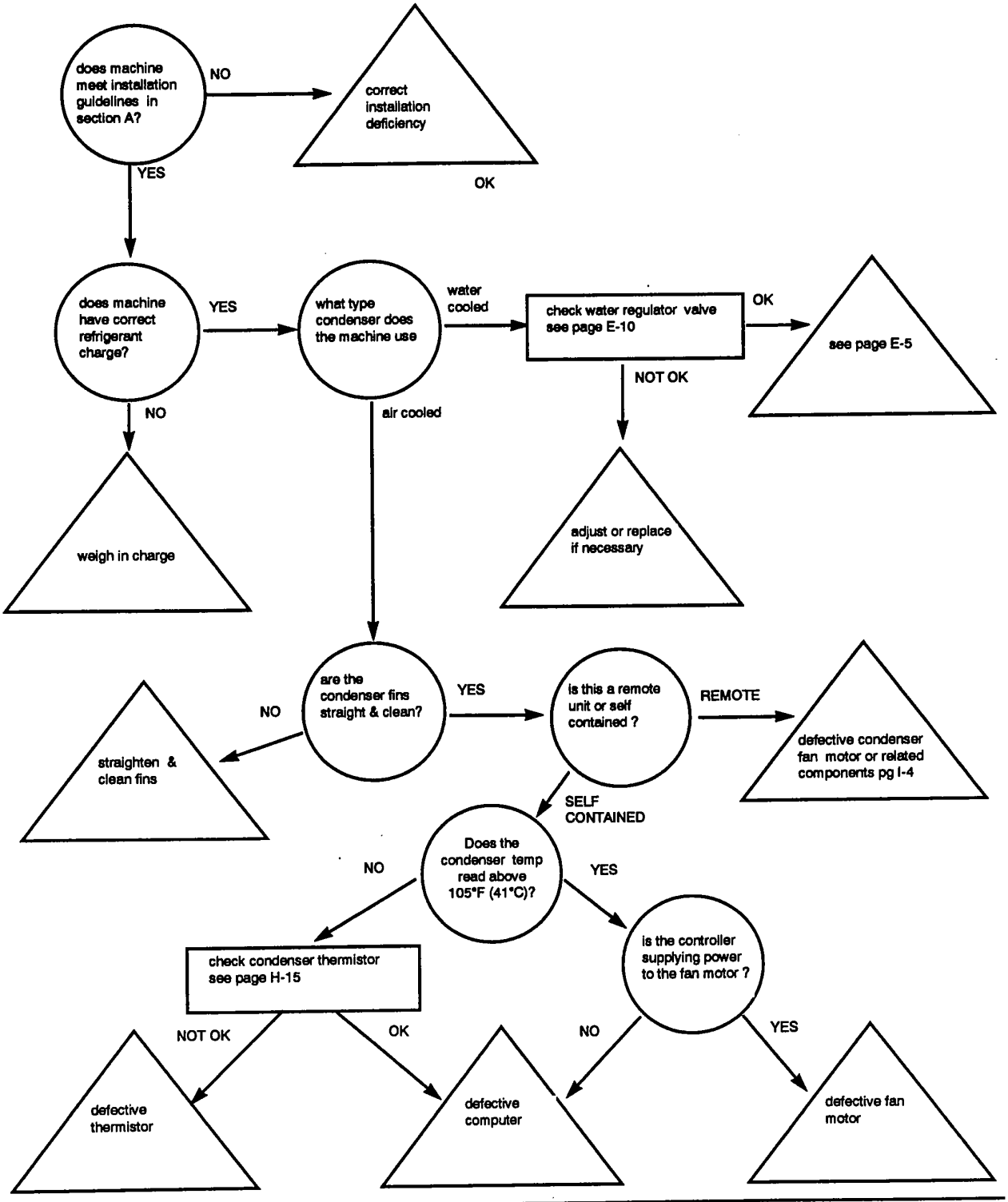


Troubleshooting Trees

Slow Production (Cube Formation Good)

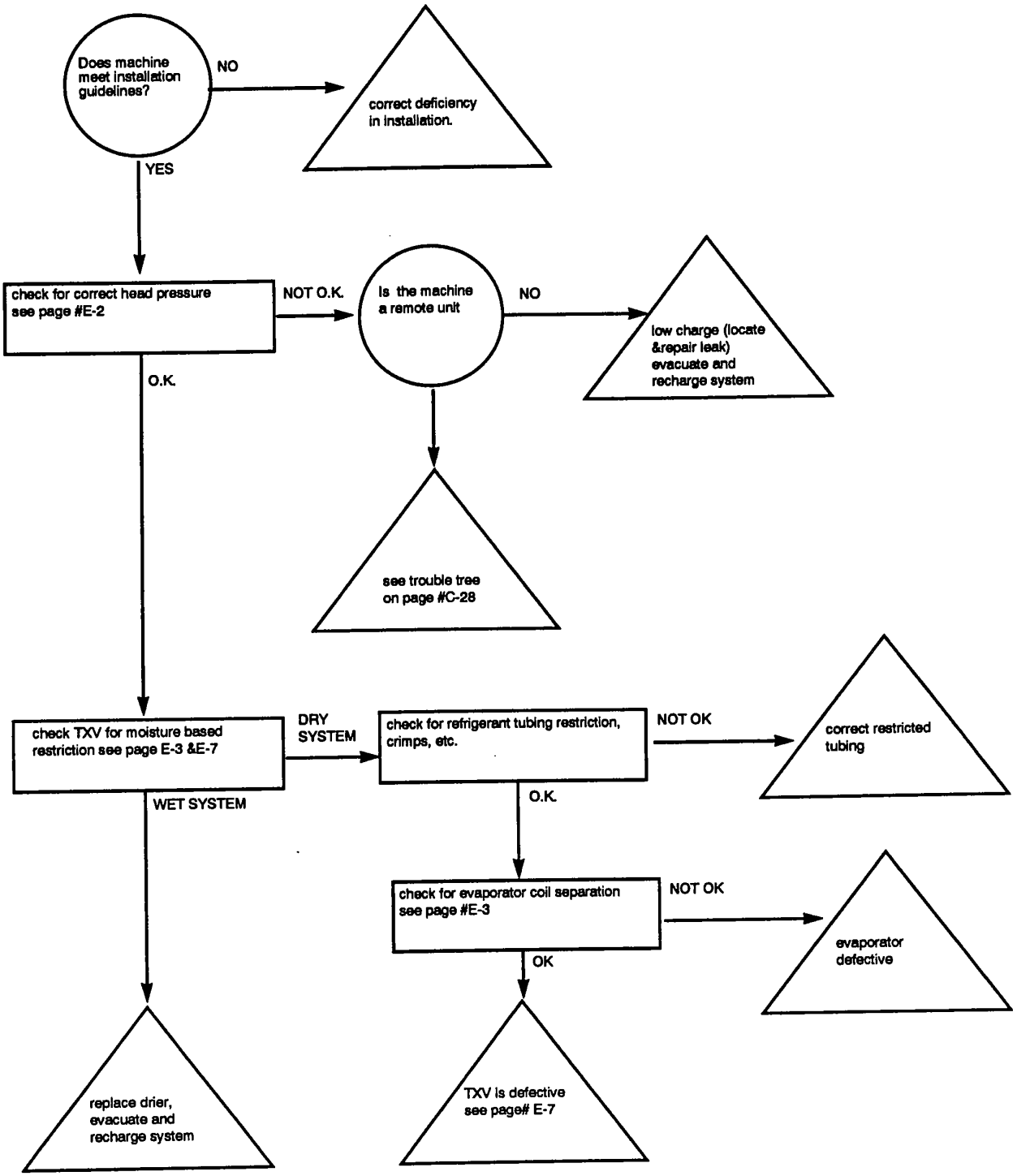


High Head Pressure



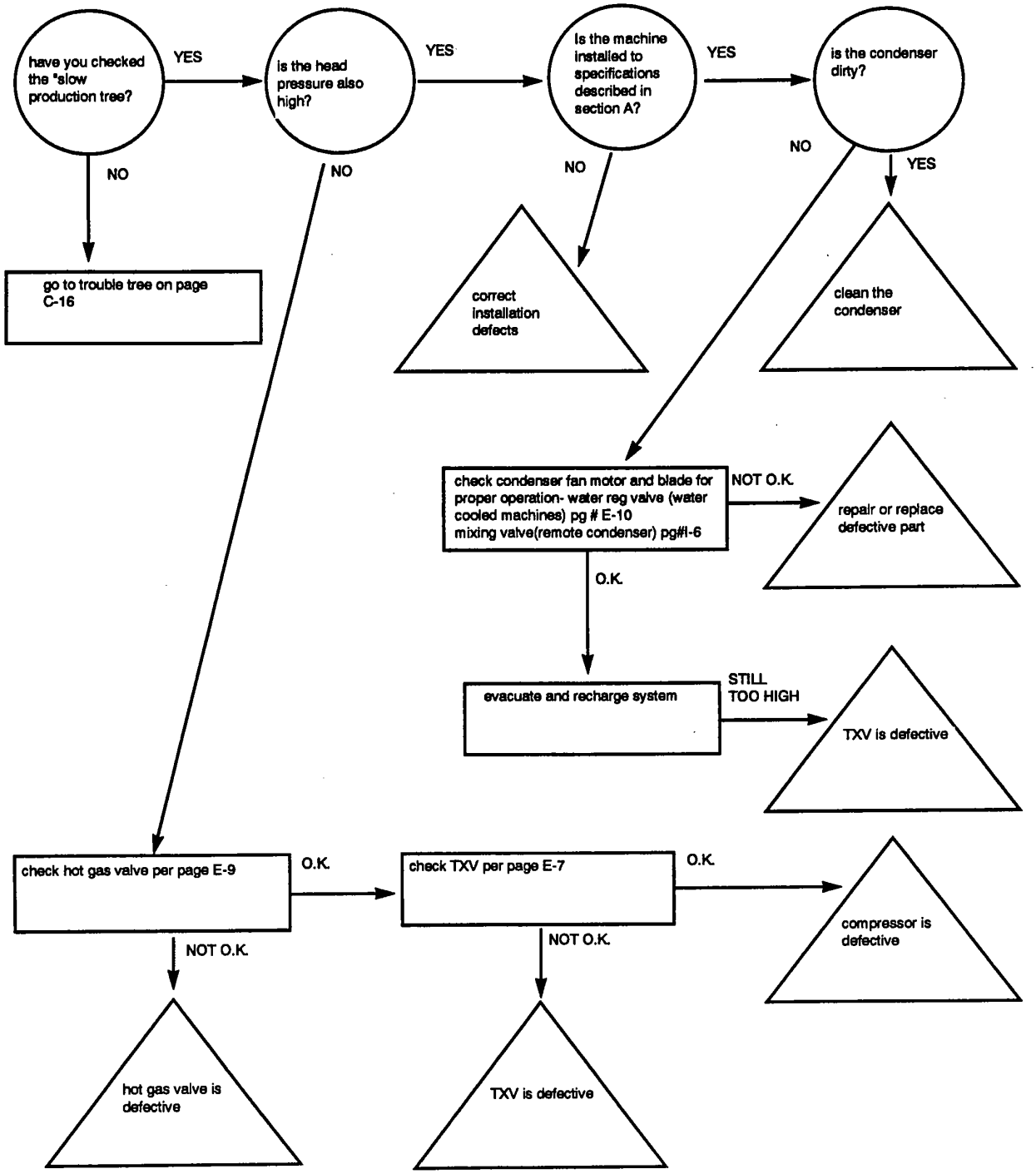
Troubleshooting Trees

Low Suction Pressure



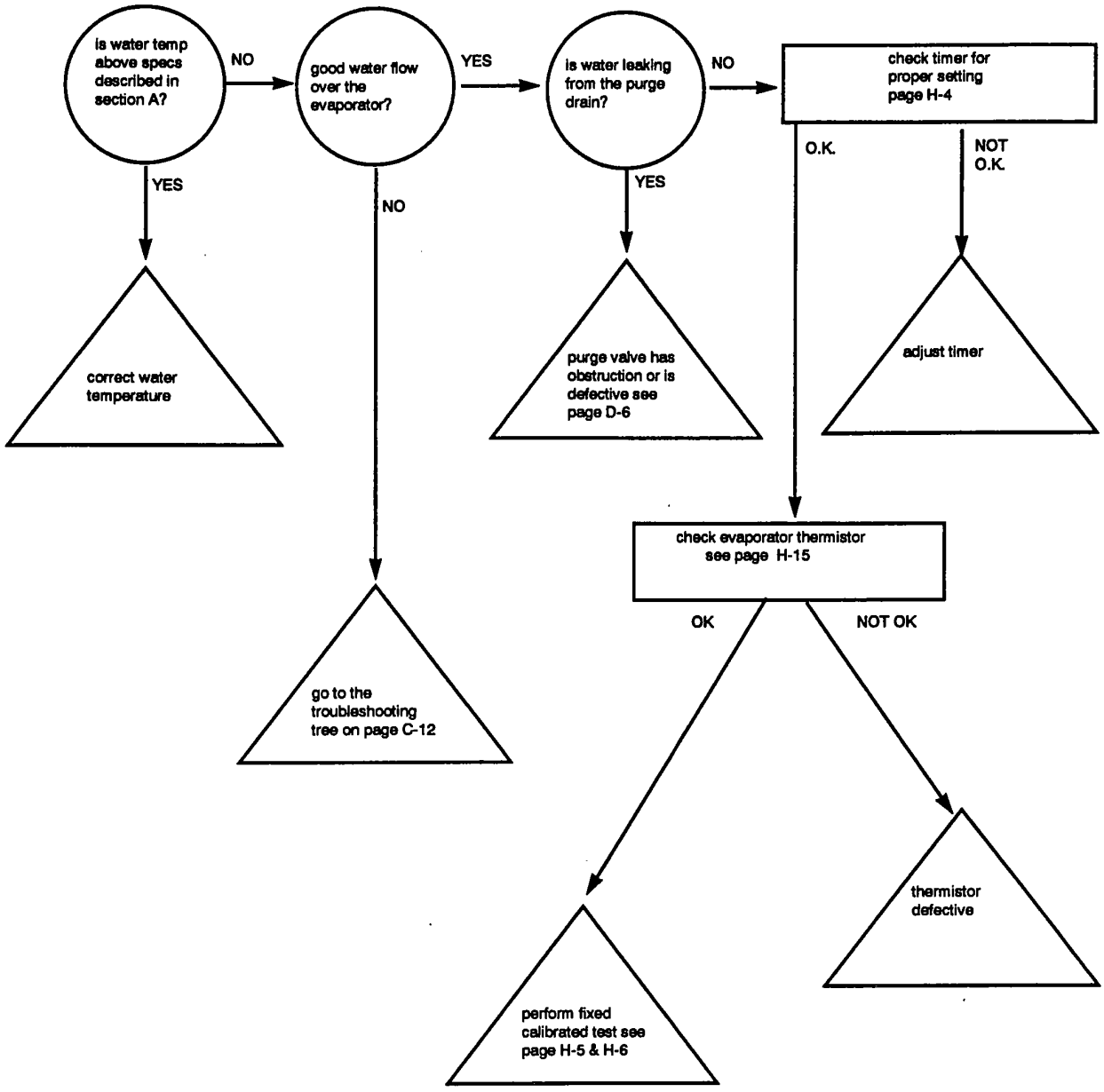
Troubleshooting Trees

High Suction Pressure



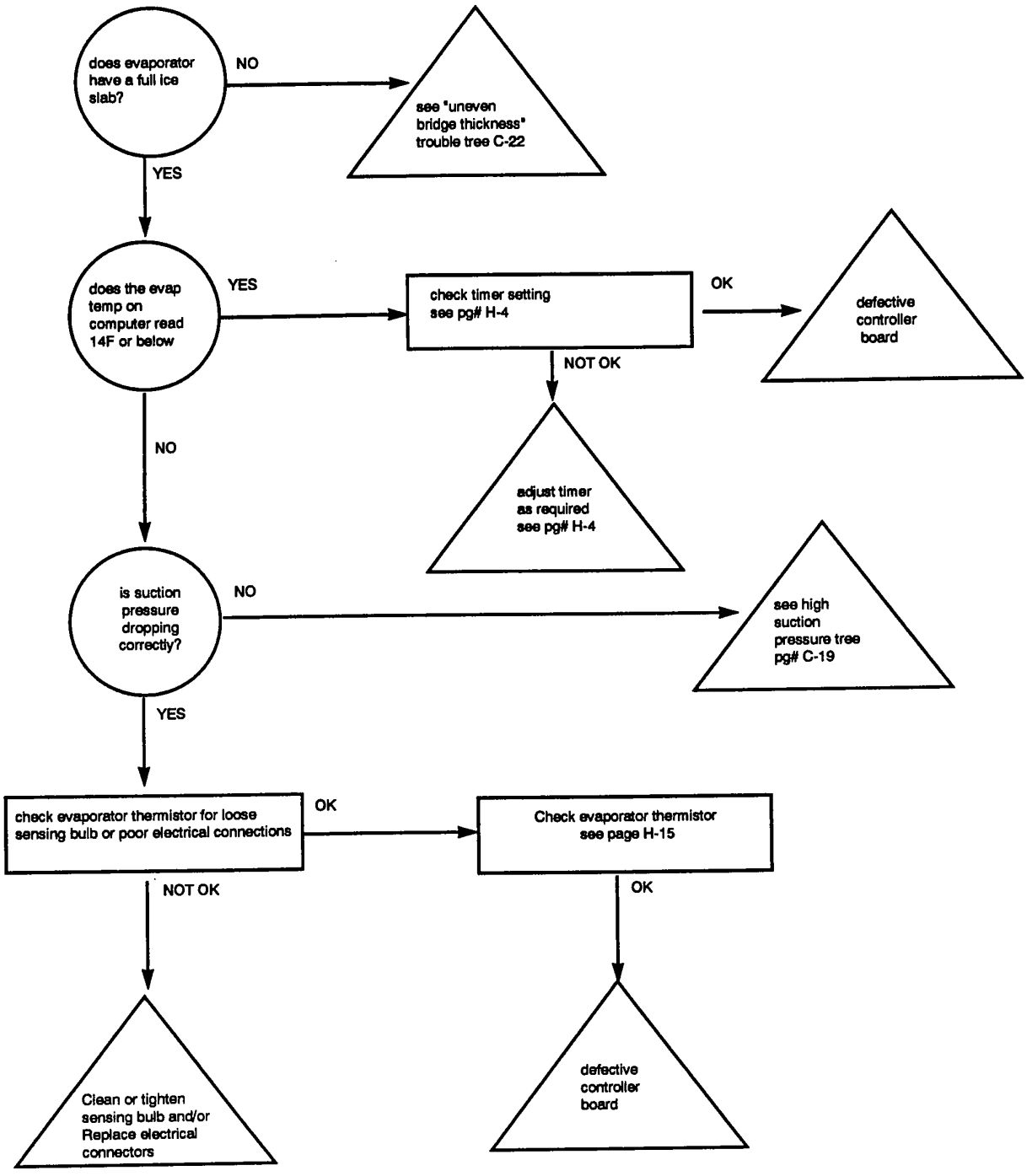
Troubleshooting Trees

Cubes are Hollow



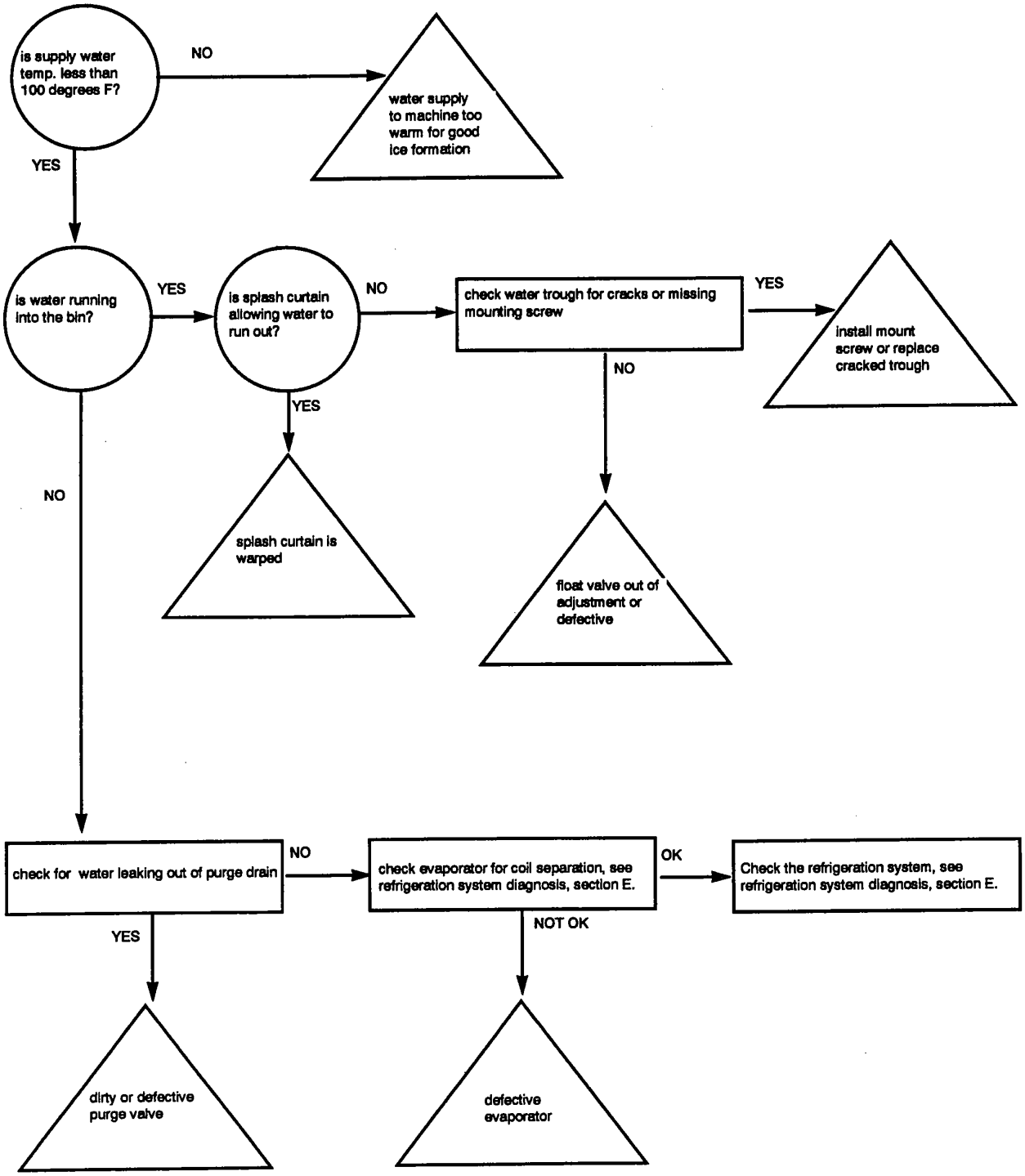
Troubleshooting Trees

Ice Bridge Too Thick

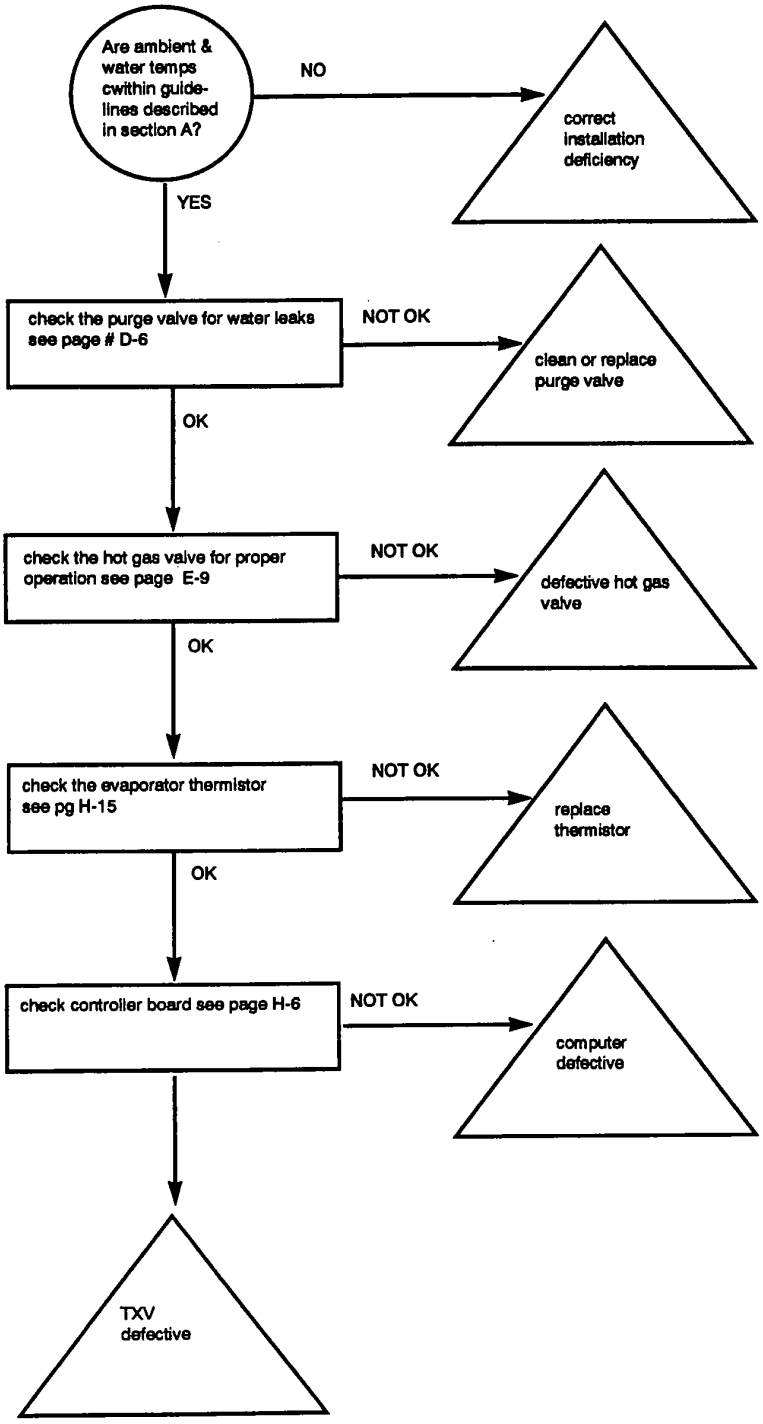


Troubleshooting Trees

Uneven Bridge Thickness

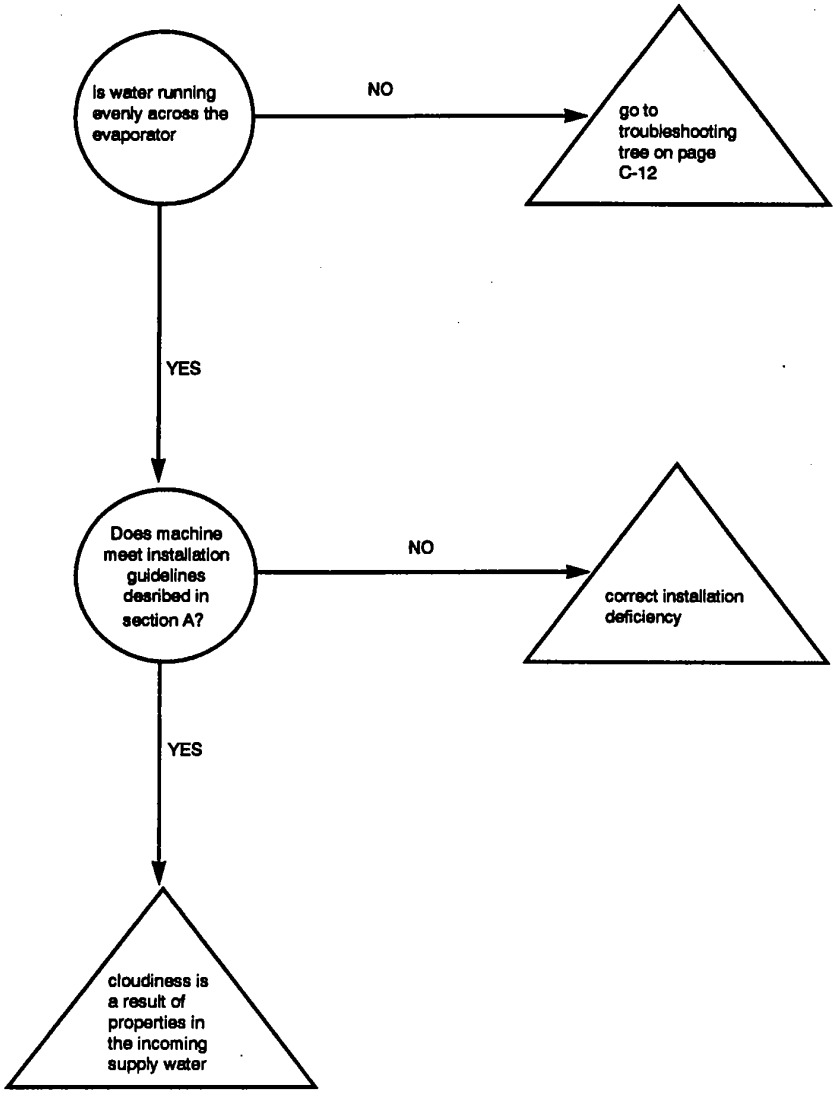


Ice Bridge Varies Cycle to Cycle

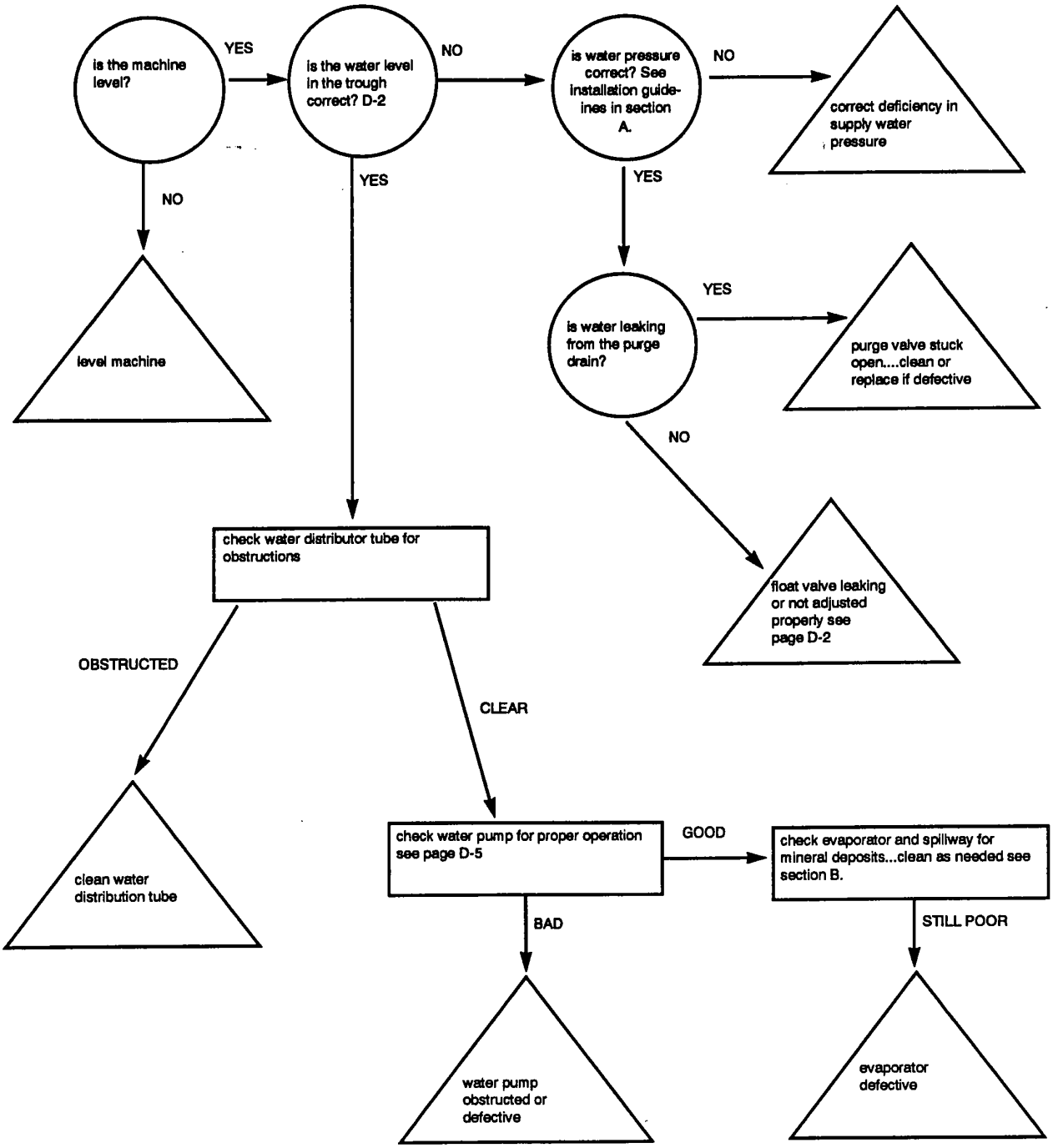


Troubleshooting Trees

Machine Produces Cloudy Ice

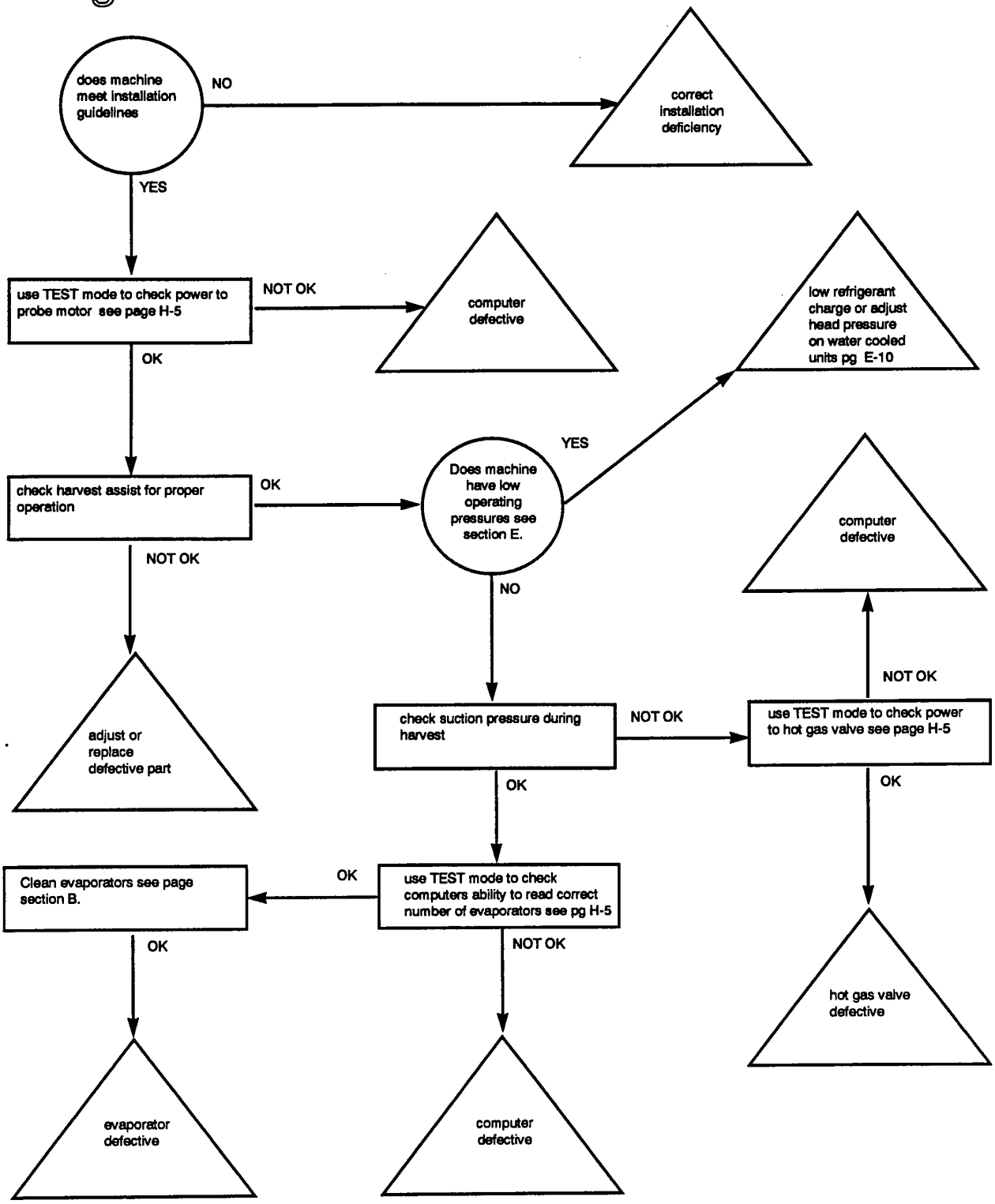


Poor Water Distribution Over The Evaporator

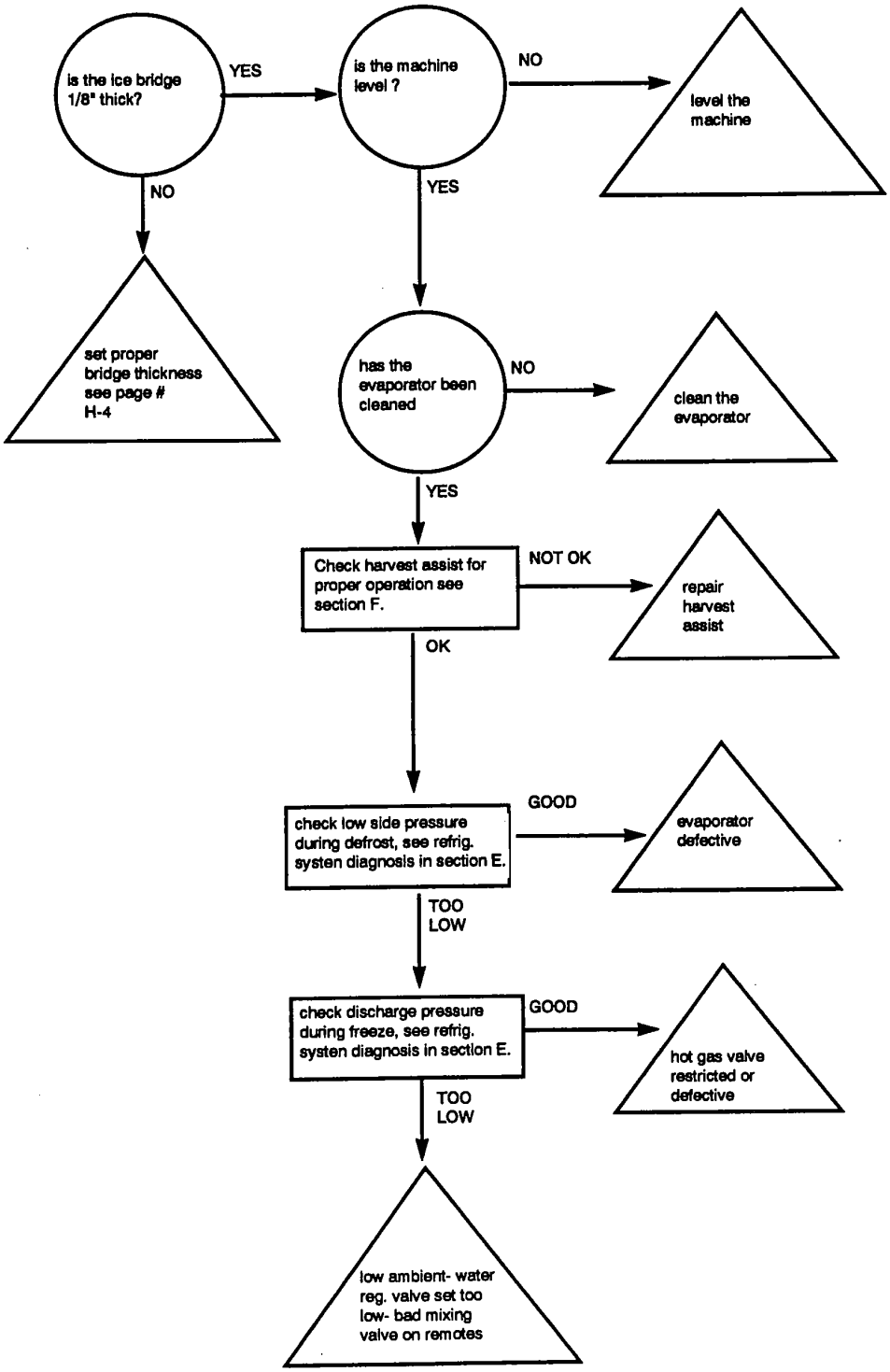


Troubleshooting Trees

Length of Harvest Excessive

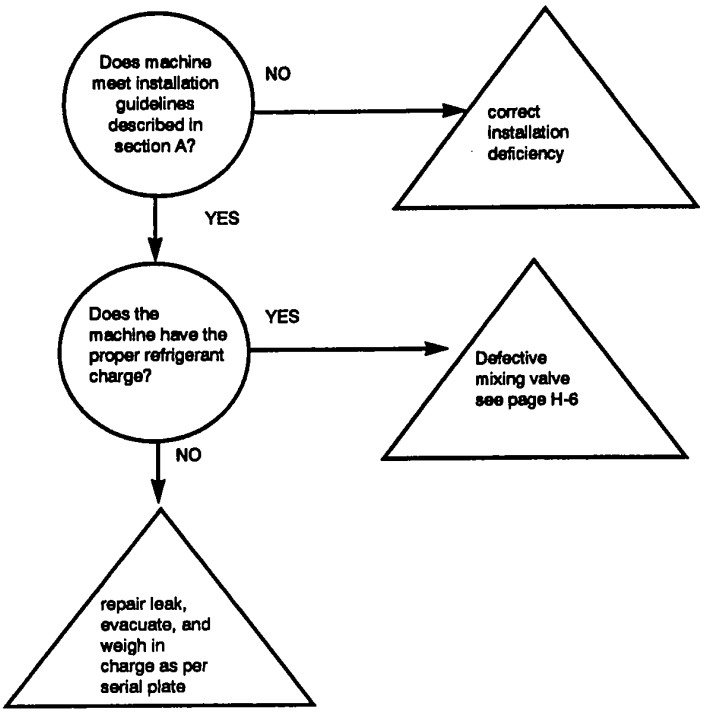


Ice Does Not Release From Evaporator



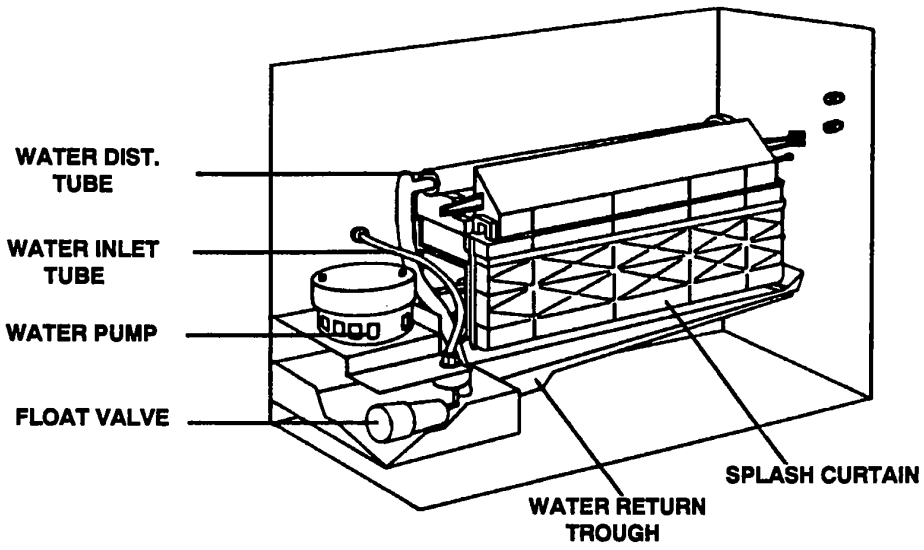
Troubleshooting Trees

Hot Receiver & Evaporator, Low Suction And Discharge Pressures (Remotes Only)



Water Distribution System

Component Description



Float Valve

A water valve used to maintain the water level in the water trough at 1/2 " (1.3 cm) above the top of the water pump impeller housing during the freeze cycle.

Splash Curtain

A plastic evaporator cover used to prevent water from splashing into the ice bin. Also actuates the bin switch.

Water Dist. Tube

A tube within a tube which distributes water evenly over the evaporator plate.

Water Pump

Impeller type pump, used to circulate water over the evaporator plate(s) during the freeze cycle.

Water Purge Valve (Not Shown)

A solenoid valve which is energized during the last 20 seconds (12 seconds on single evaporator units) of the freeze cycle allowing mineral laden water to be pumped out of the machine through the purge drain. Can also be energized manually by pushing purge switch to allow cleaning solution to be flushed from water trough after cleaning.

Water Return Trough

A reservoir designed to catch water flowing off the evaporator(s) and return it to the pump for distribution.

Water Distribution System

Service Information

FLOAT VALVE ASSEMBLY

Location
Mounted to the water pump bracket.

Access
Remove front panel.

Operation
Maintains constant water level in the water return trough.

Adjustment
Bend the float arm to maintain a water level of 1/2 inch (1.3 cm) above the top of the water pump impeller housing.

Problem	Possible Cause	Remedy
1.Float valve does not allow water into trough.	a.Float valve restricted.	a.Remove float valve and clean valve orifice.
2.Float valve does not shut off water flow.	a.Float valve seal worn. b.Water pressure too high.	a.Replace float. b.Install water pressure regulator. (See section A for proper setting.)
3.Water level in trough too high or too low.	a.Float out of adjustment.	a.Adjust float.

Replacement Procedure
Turn off incoming water supply. Remove water line from float valve. Remove the brass nut which holds the float valve to the pump bracket. Install new float valve.

SPLASH CURTAIN

Location
Hangs in front of evaporator plate.

Access
Remove front cover panel.

Operation
Prevents water from splashing into bin. Actuates bin switch.

Problem	Possible Cause	Remedy
1.Water dripping into bin.	a.Curtain warped or cracked.	a.Curtain warped.

Replacement Procedure
Swing bottom of curtain away from evaporator. Lift right side of splash curtain up and out of hinge pin slot.

Water Distribution System

Service information

WATER DISTRIBUTION TUBE

Location
Mounted to top of evaporator.

Access
Remove front panel.

Operation
Distributes water evenly over evaporator plate.

Adjustment
Holes in inside tube must face up. Holes in outer tube face down.

Assembly
Twist end caps C.C.W. and pull to remove inner tubes from outer tube. To reassemble push inner tubes into outer tube with holes facing same direction, making sure inner tubes seat completely. Twist end caps C.W. 1/2 turn to lock inner tubes in place. Holes in tubes are now facing opposite directions.

Problem	Possible Cause	Remedy
1.Poor water flow over evaporator.	a.Holes plugged with mineral deposits.	a.Disassemble and clean tube.Clean water system with ice machine cleaner, (see section B for cleaning instructions).
	b.Tube assembled incorrectly.	b. Assemble correctly. See assembly instructions.

Replacement Procedure
Remove hose clamp and hose from distribution tube. Remove thumb screws. Install new tube.

WATER PUMP

Location
Left side of water trough on single evaporator units. Center of water trough on dual evaporator units.

Access
Remove front cover panel.

Operation
Circulates water over evaporator.

Problem	Possible Cause	Remedy
1.Pump does not run.	a.Poor electrical connection.	a.Repair electrical connection.
	b.Pump impeller obstructed.	b.Remove pump and check impeller for free operation. Remove obstruction if present.
	c.Pump motor defective.	c.Replace water pump.
2.Noisy pump.	a.Pump impeller hitting obstruction.	a.Remove obstruction.
	b.Bad bearing in pump motor.	b.Replace pump.

Replacement Procedure
Shut off incoming water supply and electrical supply. Unplug pump. Remove float valve from pump bracket. Remove hose clamp and hose from pump. Loosen 2 mounting screws holding pump bracket in place and remove pump and pump bracket. Reverse procedure for installation.

WATER PURGE VALVE

Location
600 series: Mounted to the back of bulkhead directly behind water pump.
1000 series: In control box. 1200, 1300 & 1800 series: Above water pump.

Access
600 series: Remove top or left side panel. 1000 series: Remove front panel and electrical box cover. 1200, 1300 & 1800 series: Remove front panel.

Operation
Energized by the computer during the last 20 seconds (12 seconds on single evaporator units) of the freeze cycle, opening the valve to allow the pump to empty the mineral laden water from the water trough. Energized manually by pushing the purge switch.

Problem	Possible cause	Remedy
1.Does not open when power is applied.	a.Open circuit in coil.	a.Replace coil.
2.Leaking during freeze cycle.	a.Obstruction in valve.	a.Disassemble valve and remove obstruction.
	b.Worn seal in valve.	b.Replace valve.

Replacement Procedure
Disconnect electrical supply. Disconnect electrical plug from valve coil. Remove clamps and hoses from valve. Remove mounting screws from valve bracket. Install new valve, re-connect hoses and plug.

WATER RETURN TROUGH

Location
Below evaporator(s).

Access
Remove front panel.

Operation
Holds water to be circulated over evaporator(s).

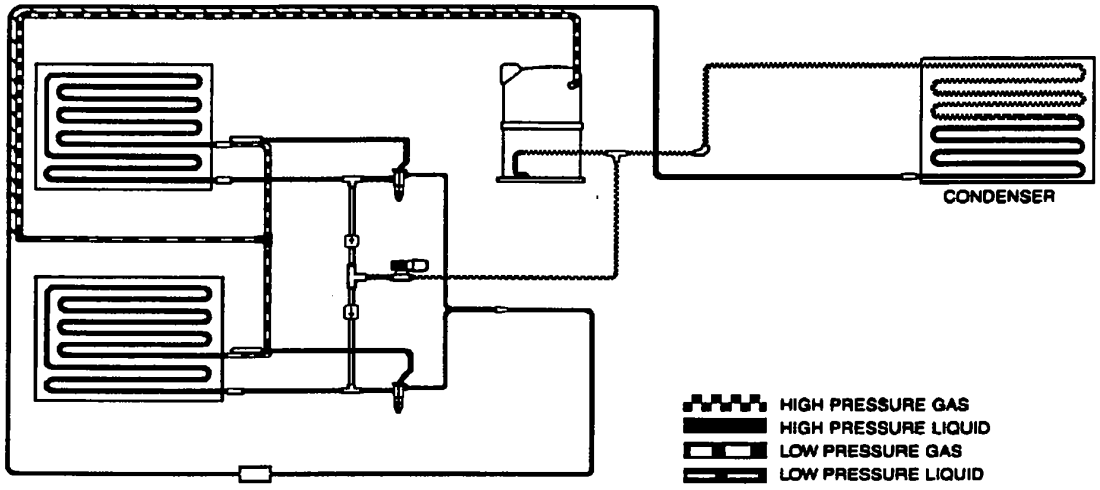
Problem	Possible Cause	Remedy
1.Water running into bin.	a.Mounting screw loose from trough.	a.Replace screw(s).
	b.Trough cracked or broken.	b.Replace trough.

Replacement Procedure
Shut water off at supply. Remove thumb screws. Pull trough forward and down. Install new trough.

NOTES

Refrigeration System

Component Description



Compressor
A hermetically sealed motor which pumps refrigerant throughout system.

Condenser
A tubing coil, which refrigerant flows through, that is designed to remove heat from the refrigerant, changing its state from a high pressure vapor to a high pressure liquid.

Evaporator
Part of the refrigeration system where refrigerant vaporizes and absorbs heat from water flowing over the front of the evaporator plate, turning it to ice.

Expansion Valve
A metering device which reduces the pressure of the liquid refrigerant flowing into the evaporator, causing it to boil and absorb heat.

Filter-Drier
Filters liquid refrigerant, keeping system clean. Desiccant traps small quantities of moisture, keeping the system dry. Must be replaced any time the refrigeration system is opened.

Hot Gas Valve
Solenoid valve which is energized during defrost allowing hot gas refrigerant to enter the evaporator(s), warming it to break the bond of the ice slab to the evaporator.

Refrigeration System

Diagnosis

One of the characteristics of an ice machine that makes it different from most other refrigeration equipment is that the evaporator(s) needs to be completely flooded with liquid during the freeze cycle. Without a completely flooded evaporator the cubes in the upper portion of the evaporator will be less developed than those in the lower potion. This can be caused by a low refrigerant charge, a leaking purge valve, leaking hot gas valve, defective T.X.V., or a weak compressor. Below is information that will help the service technician diagnose this problem as well as other problems that may arise in the refrigeration system. It is important that when diagnosing the refrigeration system, the procedure for diagnosis be followed in the order presented below.

Refrigerant Charge

Before diagnosing the refrigeration system, it is very important that refrigerant charge be correct. Whenever the refrigeration system has been opened, the filter-drier must be replaced and the proper refrigerant charge must be weighed in. The type of refrigerant and the charge can be found on the serial plate below the access valves on the right side of the machine. On early model machines the serial plate is on back of the machine near the electrical hook-ups.

Refrigerant Pressures

At the beginning of the freeze cycle the suction pressure on R-502, R-22 and R-404a units should initially start at approximately 50 p.s.i. (3.4 bar). This starting pressure may be up to 10 p.s.i. (.7 bar) less then stated, depending on operating conditions. Pressures less than this may indicate an under charge. With proper bridge thickness, the suction pressure at the end of the freeze cycle will be approximately 26 p.s.i. (1.8 bar) on R-502 and R-22 units. R-404a units will run slightly higher, around 30 p.s.i. (2 bar) at the end of freeze. These pressures may vary with operating conditions. The head pressure should be adjusted to 225 p.s.i. (15.5 bar) on R-502 and R-22 water cooled units and 250 p.s.i. (17.2 bar) on R-404a units. Head pressure on air cooled units will vary with ambient conditions but will typically run higher than water cooled units.

Purge Valve and Hot Gas Valve

If the back pressure is higher than normal and the evaporator(s) is not completely flooded, check the **purge valve** to make sure it is not leaking (see page D-6). If the purge valve is not leaking, next check the **hot gas valve** to make sure it is not leaking, allowing hot gas into the evaporator(s). To check the hot gas valve let the machine run in the freeze cycle for about 5 minutes, now feel the difference in temperature between the inlet and outlet of the valve. A definite temperature difference should be felt. If the lines feel close to the same temperature the hot gas valve is leaking and should be replaced. If a hot gas valve does not open enough during harvest it will not allow enough hot gas into the evaporator to defrost the ice. This can be checked by watching the suction pressure during harvest. If this pressure is below 70 p.s.i. on R-502, R-22 and R-404a units the valve should be replaced.

Compressor

If the valves in the compressor are weak you will normally see a high suction pressure and lower than normal head pressure. Also the compressor will have an amperage draw of less then 70% of full load amps. An excessively long freeze cycle will also be experienced. The evaporator may not always be starved of refrigerant if the compressor is weak.

Thermostatic Expansion Valve

A thermostatic expansion valve which is restricted or not opening properly will starve the evaporator. This will usually cause pressures simular to an under charged unit. A defective or restricted T.X.V. should be replaced. If a T.X.V. sticks open it will keep the evaporator(s) flooded but the pressure will not drop. This problem may be erratic and the T.X.V. should be replaced if the valve is not closing properly.

Evaporator

Evaporator coil separation is the separation of the refrigerant tubing from the back of the evaporator plate. Although this is not a common problem it may be found on older equipment and is usually very easy to diagnose. One or all of the following symptoms will be present.

1.Low suction pressure.
2.Ice not releasing from the evaporator during harvest.
3.Hollow cubes or uneven ice bridge on some areas of the evaporator.

If coil separation is suspected let the machine run in freeze until the timer has energized. Now check the evaporator for areas where cubes are less developed than the cubes in other areas. If the cubes are all the same size, coil separation is not the problem. If there are areas other than the top row with less developed cubes, check the refrigerant lines at the inlet and outlet of the evaporator, if both lines are frosted the coil is separated. To confirm coil separation remove and check the back of the evaporator. If the the coil is separated the evaporator must be replaced. If the outlet of the evaporator is not frosted the problem is not coil separation (refer to the troubleshooting trees, page C-1).

Other problems related to the refrigeration system are covered in the service section by component.

COMPRESSOR

Location
Behind bulkhead.

Access
Remove top and/or left side panel. Remove back panel if water cooled.

Operation
Pumps refrigerant throughout system.

Problem	Possible Cause	Remedy
1.Compressor running but not pumping.	a.Compressor valves leaking. (See compressor diagnosis section E.)	a.Replace compressor.
2.Compressor tripping circuit breaker.	a.Compressor windings shorted. (See compressor diagnosis section E.)	a.Replace compressor.
3.Compressor not running.	a.Open windings.	a.Replace compressor.
	b.Locked rotor. (See compressor diagnosis section E.)	b.Replace compressor.

Replacement Procedure
Disconnect power supply. Recover refrigerant. Disconnect compressor wiring. Unsweat refrigerant lines. Remove compressor mounting bolts. Braze in new compressor. Replace filter drier, if electrical burn out has occurred install suction filter. Evacuate and weigh in proper refrigerant charge. Leak check system, connect wiring and remount compressor.

CONDENSER

Location
Air Cooled: Mounted to back of machine.
Water Cooled: Behind bulkhead.

Access
Air Cooled: Remove top panel and left side panel.
Water Cooled: Remove top panel, right side panel or back panel.

Operation
Removes heat from discharge refrigerant.

Problem	Possible Cause	Remedy
1.High head pressure (condenser temperature too high).	a.Air condenser dirty.	a.Clean air condenser.
	b.Fins on condenser bent.	b.Straighten fins.
	c.Water valve out of adjustment (water cooled).	c.Adjust valve, see pg. E-10.
	d.Non-condensables in system.	d.Evacuate system and weigh in proper charge.
	e.Low water pressure (water cooled).	e.Increase water pressure to machine.
	f.Water lines plugged with mineral deposits (water cooled).	f.Clean water lines in condenser. Replace if severe.

Replacement Procedure
Recover refrigerant, unsweat refrigerant lines from condenser. Unsweat water lines (water cooled units) and remove mounting bolts from condenser. Mount new condenser and braze refrigerant lines to condenser. Replace filter-drier, evacuate system and weigh in proper refrigerant charge. Leak check system.

EVAPORATOR

Location
Mounted to bulk head in front of machine.

Access
Remove front panel and splash curtain.

Operation
As water is circulated over the front of the evaporator, liquid refrigerant is circulated through the tubing attached to the back of the evaporator. As the liquid refrigerant in the tubing vaporizes it absorbs heat from the water, causing it to freeze.

Problem	Possible Cause	Remedy
1. Ice not harvesting properly.	a. Evaporator plate dirty.	a. Clean evaporator and water system with ice machine cleaner, see section B.
	b. Dividers in evaporator plate loose.	b. Replace evaporator.
	c. Tubing loose from back of evaporator, see pg. E-3.	c. Replace evaporator.
	d. Plating worn or peeling. (see note below)	d. Replace evaporator.
2. Ice forming unevenly on evaporator.	a. Tubing loose from back of evaporator, see pg. E-3.	a. Replace evaporator.

Note: Permanent discoloration on the evaporator plating is normal in certain water conditions and will cause no problems with harvesting the ice or with sanitary conditions. Before condemning the evaporator for plating problems be certain it is not just discoloration.

Replacement Procedure
Disconnect probe from clutch assembly. Remove water distribution tube and splash curtain. Recover refrigerant from system and unsweat tubing from evaporator. Remove evaporator mounting screws and mount new evaporator. Solder tubing to evaporator using silver bearing solder. Replace filter-drier. Evacuate system and weigh in proper refrigerant charge and leak check. Reinstall probe, distribution tube and splash curtain.

EXPANSION VALVE (T.X.V.)

Location
In refrigerant line between filter-drier and evaporator. There is one T.X.V. for each evaporator.

Access
Remove top panel.

Operation
Meters the flow of refrigerant into the evaporator and changes its state from a high pressure liquid to a low pressure liquid.

Problem	Possible Cause	Remedy
1.Evaporator flooded but back pressure not dropping.	a.T.X.V. allowing too much refrigerant into evaporator.	a.Check T.X.V. sensing bulb. It must be mounted securely to a clean suction line and insulated. b.Replace T.X.V.
2.Evaporator starved, no frost on suction line leaving evaporator.	a.T.X.V. not allowing enough refrigerant into evaporator.	a.Check T.X.V. sensing bulb. It must be located on top of suction line. b.Replace T.X.V.

Replacement Procedure
Recover refrigerant from system. Remove insulation from valve body and sensing bulb. Remove sensing bulb clamp. Unsweat joints at valve body (loosen flare nuts if flare type valve). Solder in new valve using silver solder making sure valve body is wrapped with heat sink (if flare type valve tighten flare nuts). Clean tubing where sensing bulb will mount and clamp sensing bulb to top of suction line. Replace filter-drier, evacuate system and weigh in proper charge. Leak check and wrap valve body and sensing bulb with insulation.

FILTER-DRIER

Location
In liquid line between condenser and T.X.V.

Access
Remove top and/or side panel.

Operation
Filters liquid refrigerant and traps small amounts of moisture. Must be replaced whenever refrigeration system is opened.

Problem	Possible Cause	Remedy
1.Frost appears on or at outlet of filter-drier.	a.Moisture or other contaminants in system.	a.Replace filter-drier.
2.Low suction pressure.	a.Same as above.	a.Replace filter-drier.

Replacement Procedure
Recover refrigerant. Unsweat filter-drier and braze in new filter-drier. Evacuate system, weigh in proper charge and leak check.

HOT GAS VALVE

Location
In compressor discharge line between compressor and evaporator.

Access
Remove top panel and/or left side panel.

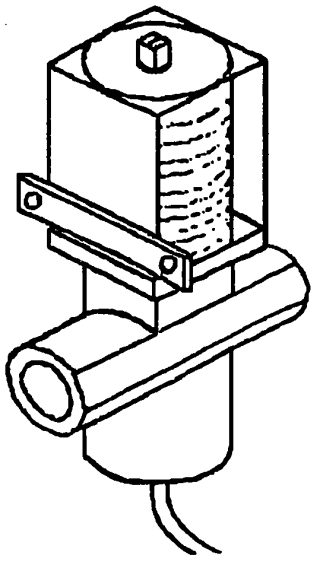
Operation
Opens during the defrost cycle to allow hot gas refrigerant into the evaporator. This causes the evaporator to become warm, allowing the ice to release.

Problem	Possible Cause	Remedy
1.Evaporator not heating properly.	a.Hot gas valve not opening properly, see pg. E-2.	a.Replace valve.
2.Poor ice formation at top of evaporator.	a.Hot gas valve leaking, see pg. E-2.	a.Replace valve.
3.Evaporator not heating at all.	a.Hot gas valve coil burnt out. b.Valve stuck closed.	a.Replace coil. b.Replace valve.

Replacement Procedure
Recover refrigerant. Remove coil. Unsweat valve. Wrap valve body with a heat sink to prevent damage to valve. Silver solder new valve in place. Replace filter-drier. Evacuate and weigh in proper charge. Leak check and install coil.

Refrigeration System

Service Information



WATER REGULATING VALVE (WATER COOLED)

Location
Connected to incoming condenser water supply.

Access
Remove right side panel, top panel or back panel.

Operation
Controls the amount of water flowing through the condenser to maintain a proper head pressure.

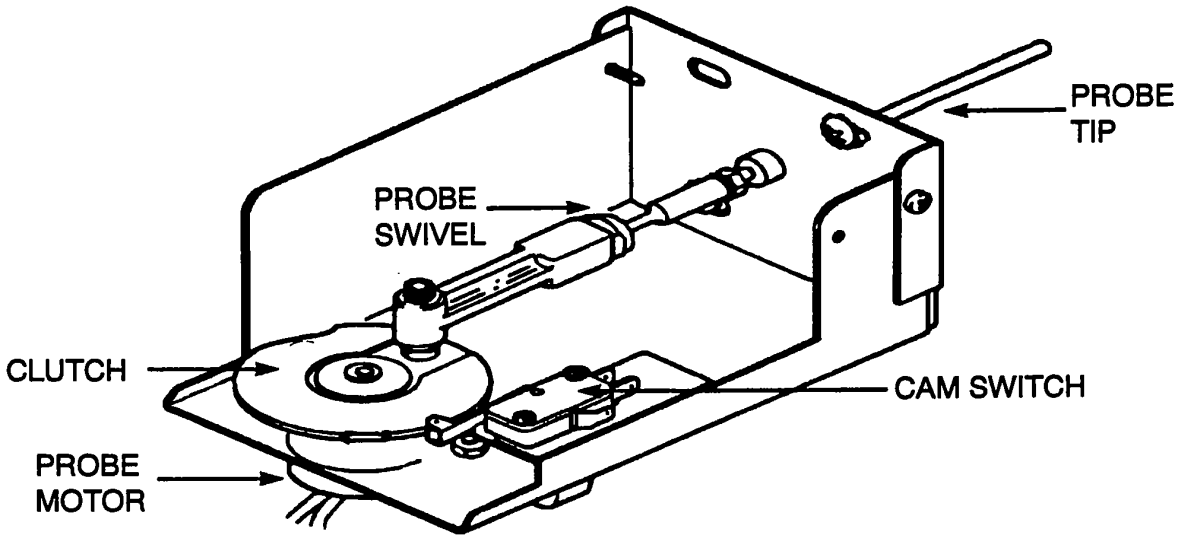
Adjustment
Turn the adjusting screw on top of the valve to maintain a head pressure of 125 p.s.i. (8.6 bar) on R-12 units, 225 p.s.i. (15.5 bar) on R502 and R-22 units and 250 p.s.i. (17.2 bar) on R404a (HP62) units. Resulting water temperature at outlet of condenser should be between 100 F and 110 F (10 C and 43 C).

Problem	Possible Cause	Remedy
1.Head pressure too high or too low.	a.Valve not adjusted properly.	a.Adjust Valve.
2.Water flowing through condenser when machine is off.	a.Valve not closing completely.	a.Replace valve.

Replacement Procedure
Turn off water supply. Disconnect incoming water line from valve and remove mounting nut and fitting from valve body. Unsweat out going waterline from valve and remove fitting. Recover refrigerant. Unsweat cap tube from refrigeration system. Braze cap tube from new valve in place. Replace filter-drier. Evacuate, weigh in proper charge and leak check. Install fittings in valve body, mount valve and connect water lines.

Harvest Assist Assembly

Component Description



Cam Switch
A single pole double throw switch which opens at the end of harvest allowing the computer to terminate the harvest cycle.

Clutch
A brass cam which is designed to slip as it pushes the attached probe tip against back of ice slab during harvest.

Probe Motor
Gear motor which turns the clutch assembly during harvest.

Probe Swivel
A ball joint which connects the probe tip to the clutch, allowing the probe tip to pivot as it is being pushed through guide holes.

Probe Tip
A stainless steel rod which is pushed against the ice slab during harvest.

Harvest Assist Assembly

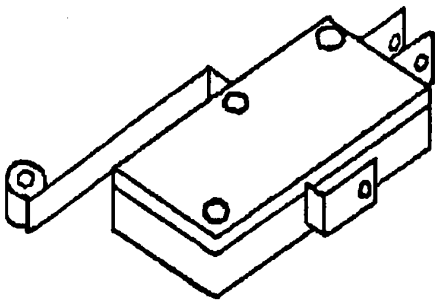
Operation

The **harvest assist assembly** is unique to Ice-O-Matic ice machines and combined with the slant evaporator plate creates a fast harvest. The harvest assist assembly plays a very important role in the operation of the machine therefore it is very important that the service technician understand its operation.

When the machine goes into harvest power is sent to a **probe motor** which turns a **clutch.** A **probe** is attached to the clutch which is pushed against the back of the ice slab. Since it takes approximately 1 minute for hot gas to heat the evaporator enough to loosen the ice, and the probe motor is energized 20 seconds after the hot gas valve is energized, the clutch is designed to slip until the ice can be pushed off of the evaporator plate. At this point the clutch stops slipping and begins to turn, extending the probe enough to push the ice off the evaporator plate.

Now that the ice has been harvested, the computer must de-energized the harvest components as quickly as possible so another freeze cycle can begin. This happens when the **cam switch** which rides on the outside edge of the cam, returns to its normally open position. The actuator arm of the switch rides against the cam portion of the clutch which closes and opens the switch as the clutch turns. When the cam switch drops into the low part of the cam, which happens when the clutch makes one complete revolution, the N.O. contacts open and the computer begins another freeze cycle. At this point the probe is retracted and no longer in the freeze area of the evaporator.

CAM SWITCH



Location
Mounted to harvest assist assembly mounting bracket.

Access
Remove top panel, remove drip shield on machines manufactured after March 1991.

Operation
The actuator arm of the cam switch rides on the edge of the cam and is actuated by the high and low part of the cam. When the actuator arm is on the high part of the cam the normally open contacts are in the closed position When the actuator arm falls into the low part of the cam, the contacts return to the open position. Now the computer reads 5V DC and begins another freeze cycle.

Adjustment
The normally open contacts of the switch must be open when the actuator arm is in the low part of the cam and closed when the actuator arm is on the high part of the cam. Adjust the switch by loosening the mounting screws and moving the position of the switch. On early model machines, bend the actuator arm.

Problem	Possible Cause	Remedy
1.Machine stays in harvest and probe motor continues to turn.	a.Cam switch out of adjustment. b.Cam switch defective.	a.Adjust switch. b.Replace switch.
2.Machine returns to freeze prematurely.	a.Cam switch out of adjustment. b.Cam switch defective.	a.Adjust switch. b.Replace switch.

Replacement Procedure
Disconnect power supply. Remove drip shield on machines manufactured after April 1991. Remove mounting screws and electrical wires from switch. Install new switch, install drip shield and adjust switch.

Harvest Assist Assembly

Service Information

CLUTCH ASSEMBLY

Location
Mounted to harvest motor shaft.

Access
Remove top panel, remove drip shield on machines manufactured after April 1991.

Operation
As the probe motor turns the clutch, the clutch pushes the probe against the back of the ice slab. The clutch slips until the ice is free enough to be pushed off the evaporator plate. At this point the clutch stops slipping and completes its revolution.

Problem	Possible Cause	Remedy
1.Ice slab splitting.	a.Clutch too stiff, exerting too much pressure to back of ice slab.	a.Replace clutch.
2.Harvest cycle too long.	a.Clutch too weak, not exerting enough pressure to back of ice slab.	a.Replace clutch.

Replacement Procedure
Remove set screw holding probe to clutch. Loosen set screw holding clutch to probe motor shaft and remove clutch. Install new clutch and attach probe.

PROBE MOTOR

Location
Mounted to harvest assembly bracket on bulkhead directly behind evaporator.

Access
Remove top panel.

Operation
Turns clutch assembly during harvest.

Problem	Possible Cause	Remedy
1.Motor not running during defrost.	a.Defective motor.	a.Replace motor.
2.Motor running C.C.W. (backwards).	a.Defective motor.	a.Replace motor.

Replacement Procedure
Disconnect power supply. Disconnect leads from motor. remove drip shield on machines manufactured after April 1991. Remove probe from clutch and remove clutch from probe motor shaft. Remove mounting screws from probe motor. Install new probe motor, reverse procedure for assembly. Check cam switch adjustment.

Harvest Assist Assembly

Service Information

PROBE TIP AND SWIVEL

Location
Attached to clutch.

Access
Remove top panel. Remove drip shield on machines manufactured April 1991.

Operation
Probe Tip. Applies pressure to back of ice slab during harvest.
Swivel. Pivots probe tip allowing it to be pushed straight through guide holes.

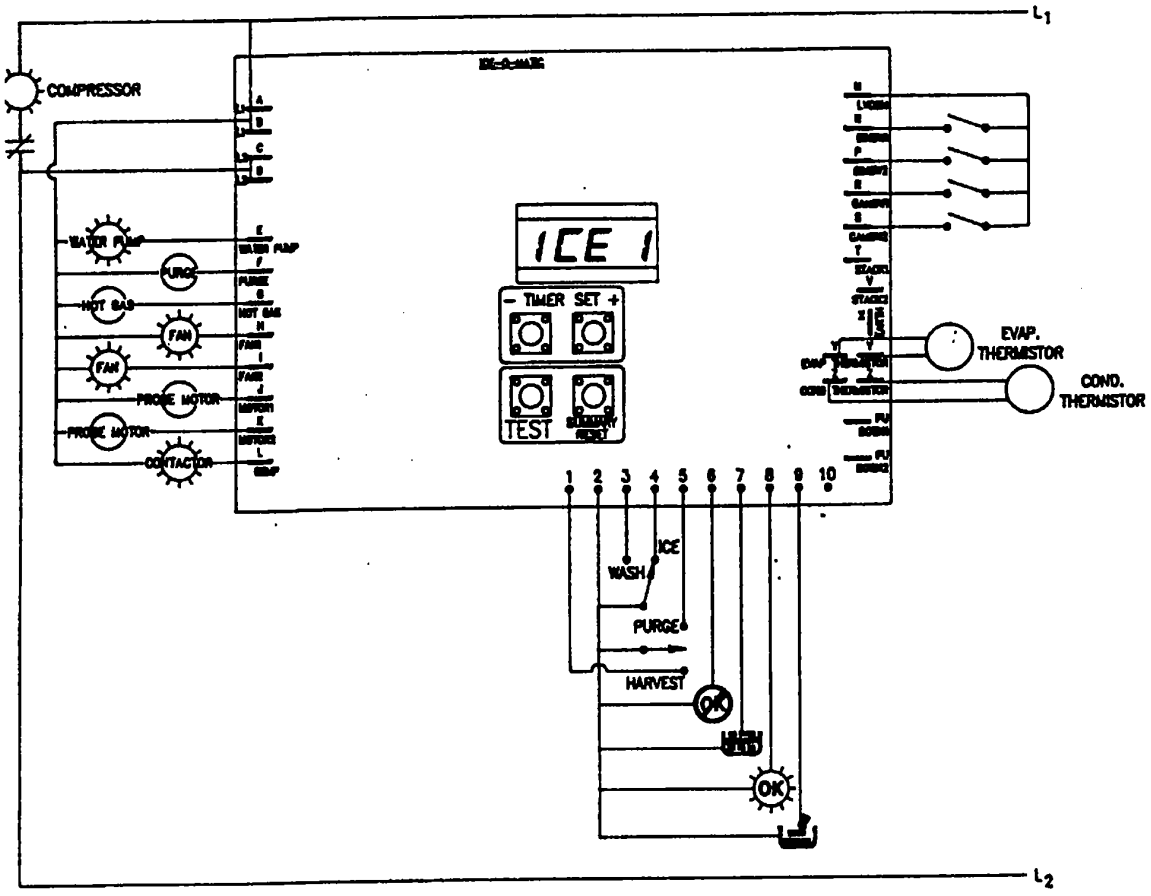
Adjustment
Length of probe tip should be adjusted so that it is recessed 1/16" (.16 cm) from the freeze area of the evaporator when cam is in the freeze position. Probe tip must not be in freezing area of the evaporator during freeze. Loosen lock nut and screw probe tip in or out of swivel to adjust probe to proper length; tighten lock nut.

Probe motor mounting bracket can also be adjusted so that probe tip slides freely in and out of guide holes. This can be checked by removing set screw holding probe to clutch and pushing probe in and out of guide holes. If the probe tip is binding in the guide holes, loosen two screws holding probe motor mounting bracket in place and reposition the bracket until probe moves freely.

Problem	Possible Cause	Remedy
1.Ice not harvesting properly.	a.Probe tip protruding into freezing area of evaporator.	a.Adjust probe tip.
	b.Probe tip binding.	b.Adjust position of probe motor mounting bracket.
2.Probe tip continues to bind even after adjustment.	a.Probe tip bent.	a.Replace probe tip.

Replacement Procedure
Remove set screw holding probe to clutch. Pull probe out of guide holes. On machines manufactured before February 1989 remove probe tip from swivel and lock nut from probe tip and pull probe tip through front of evaporator.

Component Description



Bin Switch

A mechanical switch that closes when the bin fills with ice. Actuated by the splash curtain.

Cam Switch

A mechanical switch that opens at the end of harvest allowing the computer to terminate the harvest cycle.

Compressor Overload (Internal)

Safety device which opens electrical circuit to compressor if temperature of compressor body gets too hot or if compressor draws too much current.

Contactor

A relay that controls power to the compressor.

Electrical System

Component Description

Fan Motor
Motor used to turn a fan blade which moves air across the condenser removing heat from the condenser.

High Pressure Safety (water cooled & remotes only)
A pressure control that de-energizes the contactor when condenser temperature gets too high.

Purge/Harvest Switch
Manual 3-position momentary switch which is used to energize the purge valve or initiates the harvest mode.

Run Capacitor
Electrical storage device used to improve running characteristics and efficiency of compressor.

Selector Switch
Manual 3-position switch used to turn the machine to the ON, OFF or WASH mode.

Start Capacitor
Electrical storage device used to provide starting torque to compressor.

Start Relay
Compressor relay which breaks electrical circuit to start windings in compressor.

Most of the components in the electrical system are easily diagnosed by using an ohm meter or volt meter. However the compressor and starting components are not as easily diagnosed. The procedure for checking these components are described below.

Compressor

All machines covered in this manual use compressors with an internal overload, be certain that the compressor has cooled and the overload has reset before diagnosing the compressor. If the compressor is cool and is still not running, check the windings by first removing the wires at the compressor terminals. With an ohm meter, check for continuity between all three terminals, if an open circuit exists between any of the terminals the compressor must be replaced. Now check for continuity from each terminal to the compressor body, if continuity is found from any terminal to the compressor body the compressor windings are shorted to ground and the compressor will need to be replaced. If the compressor appears to be good at this point it is advisable to use a compressor analyzer to isolate the compressor from the start components while checking for a locked rotor. If an analyzer is not available, the compressor starting components must be checked before proceeding.

If all starting components are good, check the amperage draw from the common terminal of the compressor making sure proper voltage is supplied to the compressor and all wiring is properly connected. If the compressor does not start and there is excessive amperage draw, the compressor has a locked rotor and the compressor should be replaced.

Overload

All machines covered in this manual use compressors with an internal overload. Allow time for the compressor to cool and the overload to reset before diagnosing the compressor.

Capacitor

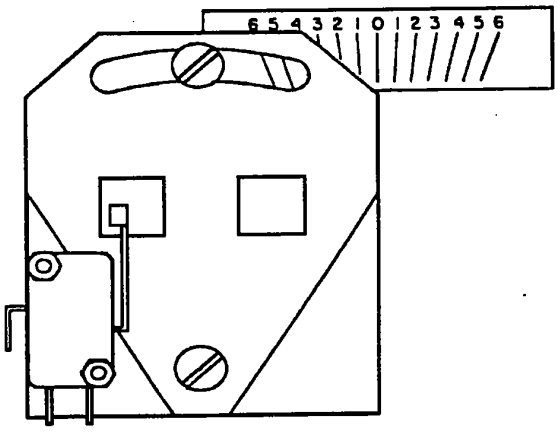
Before checking a capacitor, it should be discharged by shorting across the terminals. If a run or **start capacitor** is leaking or bulging it should be replaced. If a capacitor is suspected of being defective it can easily be checked by replacing it with a capacitor of the correct size which is "known to be good", if the compressor starts and runs properly replace the original capacitor. If a good capacitor is not available the capacitor can be checked with an ohm meter set to the highest resistance scale. Remove and discharge the capacitor, then connect the meter leads across capacitor terminals, the indicator should first move to zero then gradually increase towards infinity. If there is no movement of the ohm meter indicator the capacitor circuit is open. If the ohm meter indicator moves to zero and remains there or if the indicator remains on a low resistance reading, a short circuit is indicated. A **run capacitor** can be further tested by checking for continuity between each terminal and the case. Continuity indicates a short and the capacitor should be replaced.

Diagnosis, Continued

Relay

A compressor relay can be easily checked by replacing it with one that is "known to be good", if the compressor then starts and runs correctly replace the original relay. If a good relay is not available, remove the relay and check the relay contacts for damage and check for continuity across the closed relay points. Check the relay coil with a ohm meter, if no continuity is read replace the relay.

BIN SWITCH



Location
600, 1000 and 1200 Series: Right side of machine, upper right side of evaporator.
1300 and 1800 series: In control box.

Access
600, 1000 & 1200 series: Remove side panel.
1300 & 1800 models: Remove front panel and control box cover.

Operation
Shuts machine off when bin fills with ice.

Adjustment
To check bin switch adjustment, swing bottom of splash curtain away from evaporator. Slowly swing curtain back towards evaporator plate. When bottom edge of splash curtain is even with outer edge of water trough, you should hear the switch contacts OPEN. Adjust the position of the switch by loosening the two hold down screws. Move switch to proper position and tighten screws. Recheck adjustment. NOTE: Switch contacts should CLOSE when curtain is held open this will allow the computer to shut the machine off.

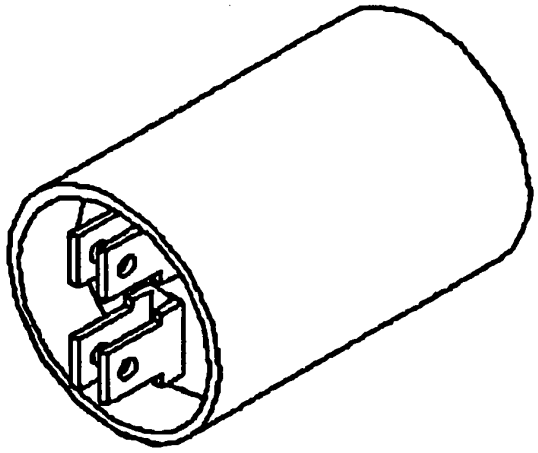
Problem	Possible Cause	Remedy
1.Machine does not shut off when bin is full. Machine does not come back on when ice is removed.	a.Bin switch not adjusted properly. b.Bin switch defective.	a.Adjust bin switch. b.Replace switch.

Replacement Procedure
Disconnect power supply and remove electrical wires from switch. Remove mounting screws. Install and adjust new switch.

Electrical System

Service Information

CAPACITOR



Location

600 and 1000 series: In control box.
1200, 1300 and 1800 series: Behind bulkhead.

Access

600 and 1000 series: Remove top panel.
1200, 1300 and 1800 series: Remove front panel and control box cover.

Operation

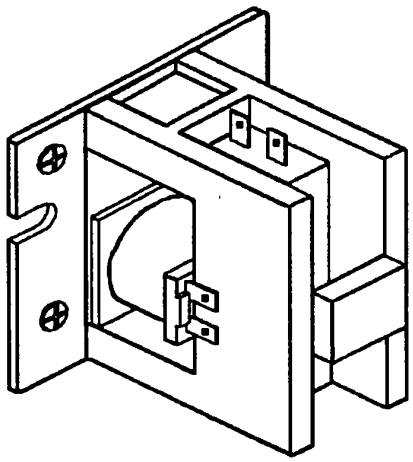
Start capacitor. Provides starting torque to compressor.
Run capacitor. Stores electrical energy used to improve compressor efficiency.

Problem	Possible Cause	Remedy
1.Capacitor bulging, cracked or leaking.	a.Capacitor defective.	a.Replace capacitor.
2.Compressor tripping overload upon start up.	a.Start capacitor open or shorted.	a.Replace start capacitor.
3.Compressor drawing too much current while running.	a.Run capacitor open or shorted.	a.Replace run capacitor.

Replacement Procedure

Disconnect electrical supply and discharge capacitor by shorting across terminals. Remove capacitor mounting bracket and electrical wires. Install new capacitor.

CONTACTOR



Location
In control box.

Access
Remove front cover panel and control box cover.

Operation
Supplies power to the compressor when coil is energized.

Problem	Possible Cause	Remedy
1.Electrical contacts not closing.	a.Contactor coil burnt out.	a.Replace contactor.
2.Contacts sticking or arcing.	a.Contacts pitted or burnt.	a.Replace contactor.

Replacement Procedure
Disconnect power supply and remove electrical wires. Remove mounting screws and install new contactor.

FAN MOTOR
(Air Cooled)

Location
600 and 1000 series: Right side of machine behind bulk head.
1200 and 1300 series: One fan on each side.

Access
Remove side panel or top panel.

Operation
Turns blade to draw air in through condenser and exhaust it out through side panel(s). Cycles on when the computer receives a condenser thermistor temperature of 105F (40.5C) and off when the condenser thermistor temperature reaches 90F (32C).

Problem	Possible Cause	Remedy
1.Not running.	a.Motor burnt out.	a.Replace motor.
2.Noisy	a.Bearings in motor bad.	a.Replace motor.

Replacement Procedure
Disconnect power supply and electrical leads from motor. Remove fan blade. Remove mounting screws. Install new motor.

HIGH PRESSURE SAFETY
(Water cooled & Remotes)

Location
Mounted to back of bulkhead on left side of machine.

Access
Remove top panel.

Operation
Shuts machine off if head pressure exceeds 400 p.s.i. (27.6 bar) on R-502 and R-22 machines and 450 p.s.i. (30 bar) on R-404a machines.

NOTE: When the HIGH PRESSURE SAFETY trips on machines manufactured before Dec. 1992, the compressor is de-energized but the computer program will stay in the freeze mode. Therefore the computer will generate an ERROR CODE 1 after 50 minutes and an ERROR CODE 8 after 80 minutes.

Problem	Possible Cause	Remedy
1.High pressure control tripped.	a.Head pressure too high.	a.Reset machine by pushing in on red button. Find problem, see page C-5.
2.Control will not reset.	a.Head pressure too high.	a.Be certain head pressure has dropped to proper operating pressure.
	b.Control defective.	b.Replace control.
3.Control opens too soon or too late.	a.Control defective.	a. Replace control.

Replacement Procedure
Disconnect electrical supply. Recover refrigerant from system. Remove electrical wires. Unsweat cap tube from discharge tube and braze in cap tube from new control. Remove mounting screws from control, mount new control and connect electrical wires. Replace filter-drier, evacuate system and weigh in proper charge. Leak check.

PURGE/HARVEST SWITCH

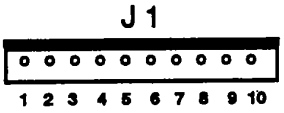
Location
In control box.

Access
Remove front panel and control box cover.

Operation
Allows the computer to energize the purge valve when left side of the switch is depressed. Initiates the harvest mode, beginning with ICE 3, when the right side of switch is depressed.

Problem	Possible Cause	Remedy
1.Does not energize purge valve and/or initiate harvest when manually depressed.	a.Normally open contacts not working properly.	a.Replace switch.
2.Purge valve is energized continuously.	a.Normally open contacts stuck closed.	a.Replace switch.

If the switch is suspected of being defective because the purge valve is continuously energized during ICE and WASH modes, disconnect the wiring harness that's plugged into the 10 pin terminal marked J1 at bottom right side of computer. If the purge valve then de-energizes, the purge switch contacts are stuck closed. If the harvest contacts are stuck closed, harvest cannot be initiated again unless the switching circuit is open and then closed again.



With the machine in the ICE or WASH mode, if the purge valve does not energize when the PURGE switch is depressed, disconnect the wiring harness described above, and use a jumper wire to jump across pin terminals 2 & 5 (see diagram), if the purge valve now energizes the switch is defective. If the purge valve still does not energize use the computers TEST mode to determine the problem, see page H-6. If the HARVEST mode does not initiate when the HARVEST switch is depressed, disconnect the wiring harness and use a jumper wire to jump across pin terminals 2 & 1, if harvest mode now initiates (beginning with ICE 3) the switch is defective. If the program does not immediately display ICE 3 the board is defective.

Replacement Procedure
Disconnect power supply. Remove wires from switch terminals. Push in on tabs on side of switch and remove switch. Install new switch.

SELECTOR SWITCH

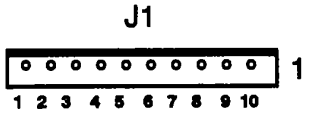
Location
In control box.

Access
Remove front panel and control box cover.

Operation
Switches machine to the OFF, WASH or ICE mode.

Problem	Possible Cause	Remedy
1.Switch does not put the machine into all three modes.	a.Switch contacts not working properly.	a.Replace switch.

If the selector switch is suspected of being defective because water pump and/or compressor is running when it should be OFF, disconnect the wiring harness that plugs into the 10 pin terminal marked J1 at bottom right side of computer. If the water pump and/or compressor is de-energized when harness is unplugged, the switch contacts are stuck closed. If the water pump and/or compressor continue to run, either the computer is defective or the contactor is stuck closed or is energized to allow pump down on a remote unit.



If the water pump does not run with the switch in the WASH position, disconnect wiring harness (described above) and use a jumper wire across pin terminals 2 & 3 (see diagram), if the water pump now runs, the switch contacts are not closing. If the compressor and water pump do not run in the ICE position use a jumper wire to jump across pin terminals 2 & 4, if the water pump and compressor now runs, the switch contacts are not closing. If the water pump and/or compressor still do not run after jumping across the appropriate terminals, use the computers TEST mode to determine the problem, see page H-6.

Replacement Procedure
Disconnect power supply. Squeeze side tabs and push switch foreword out of mounting hole. Remove wires from switch terminals. Install new switch.

START RELAY

Location
In control box.

Access
Remove front panel and control box cover.

Operation
Breaks electrical circuit to start capacitor as motor speed increases.

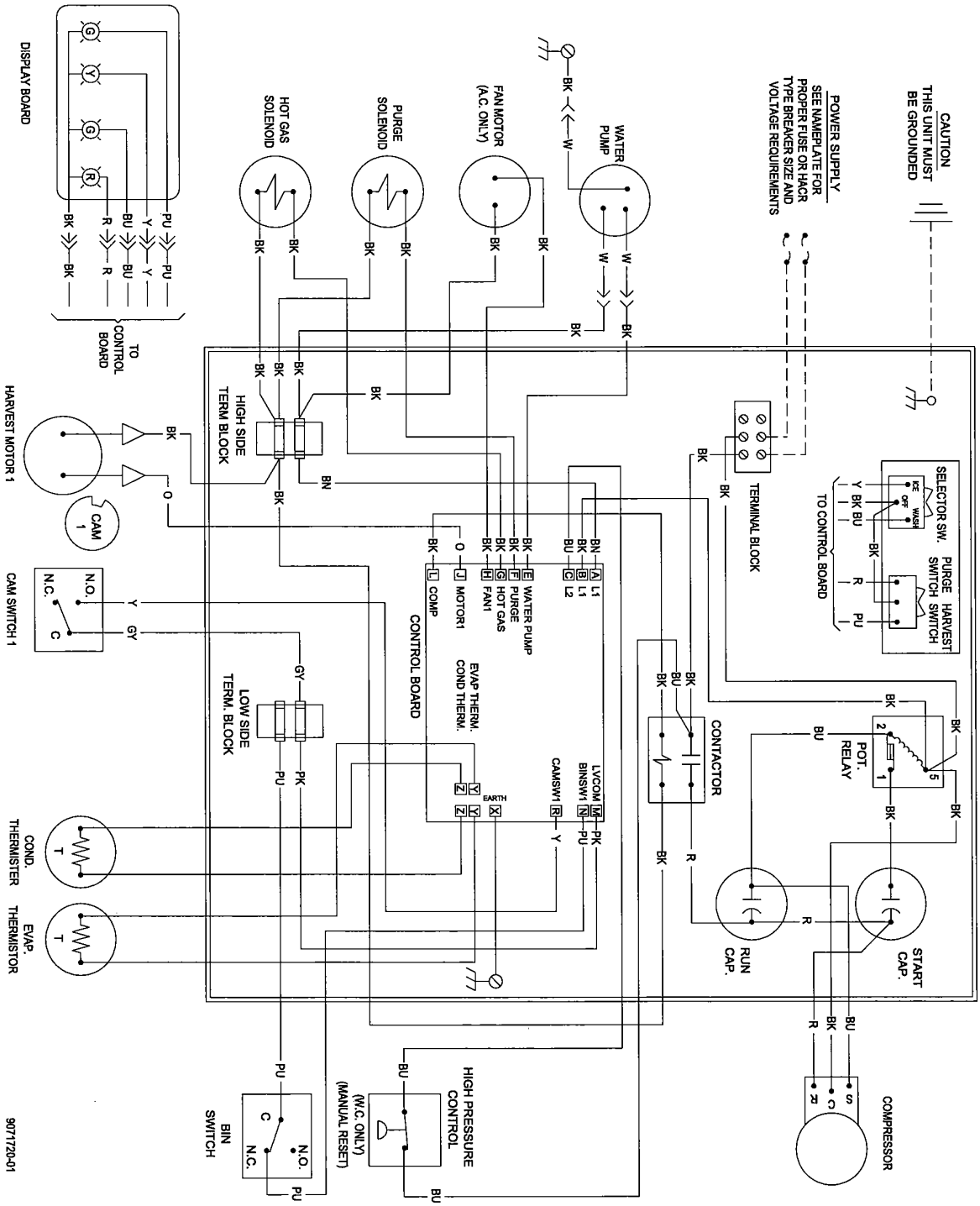
Problem	Possible Cause	Remedy
1.Compressor will not start or starts but runs for only a short time.	a.Defective relay, see page G-4.	a.Replace relay.

Replacement Procedure
Disconnect power supply. Remove electrical wires from relay terminals. Remove relay mounting screw and install new relay.

Electrical System

Wiring Diagram

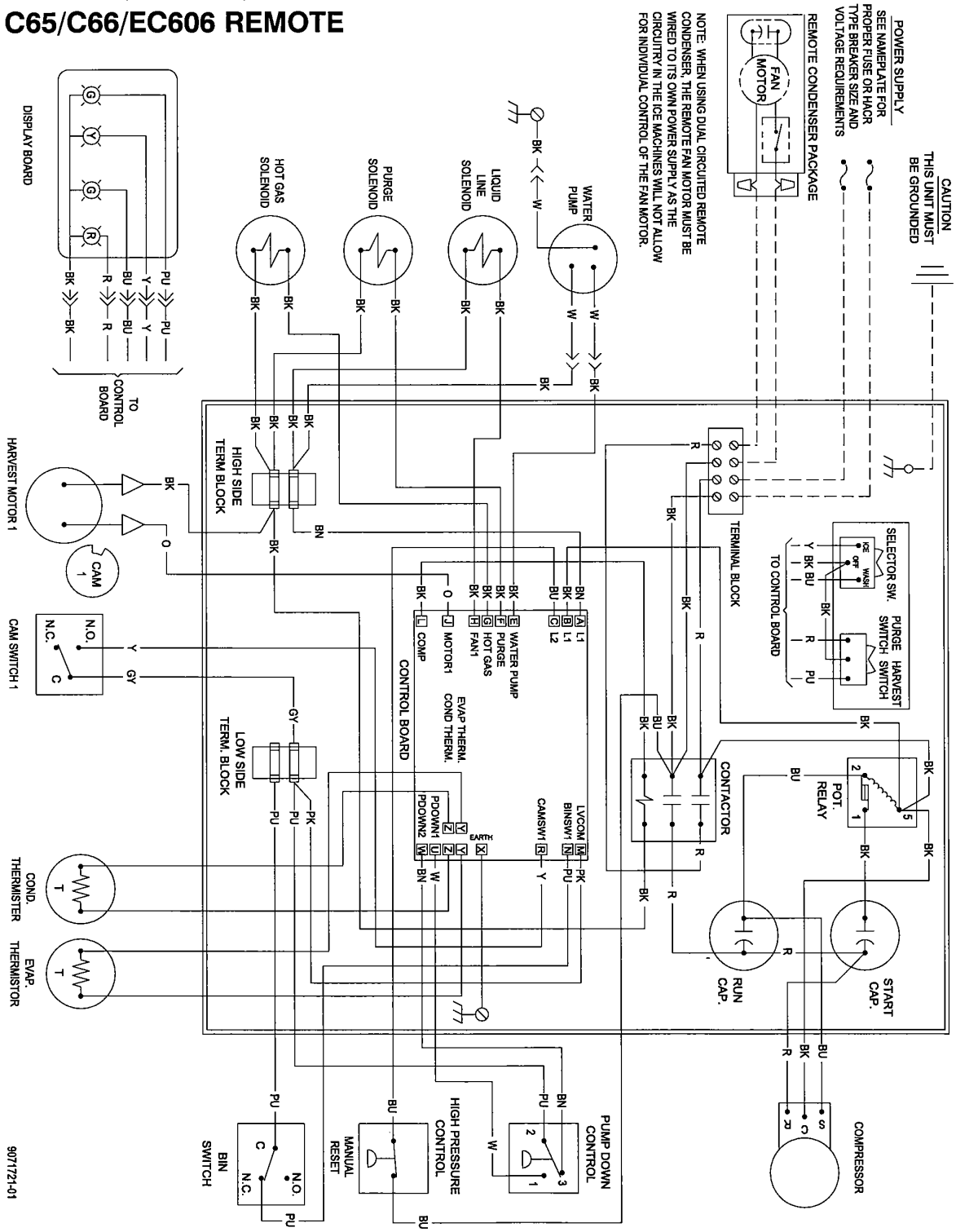
C65/C66/EC606 AIR & WATER



Electrical System

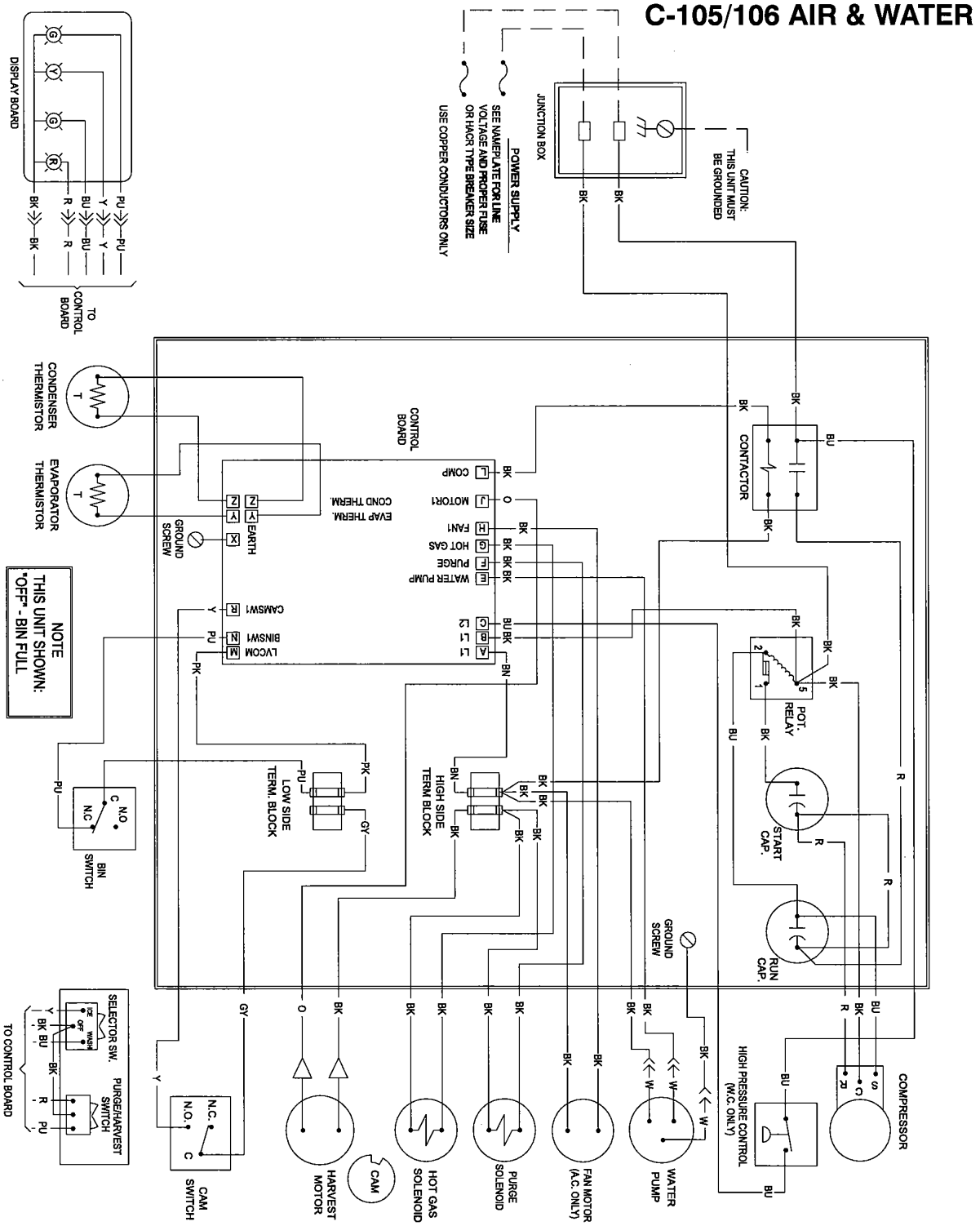
Wiring Diagram

C65/C66/EC606 REMOTE



Wiring Diagram

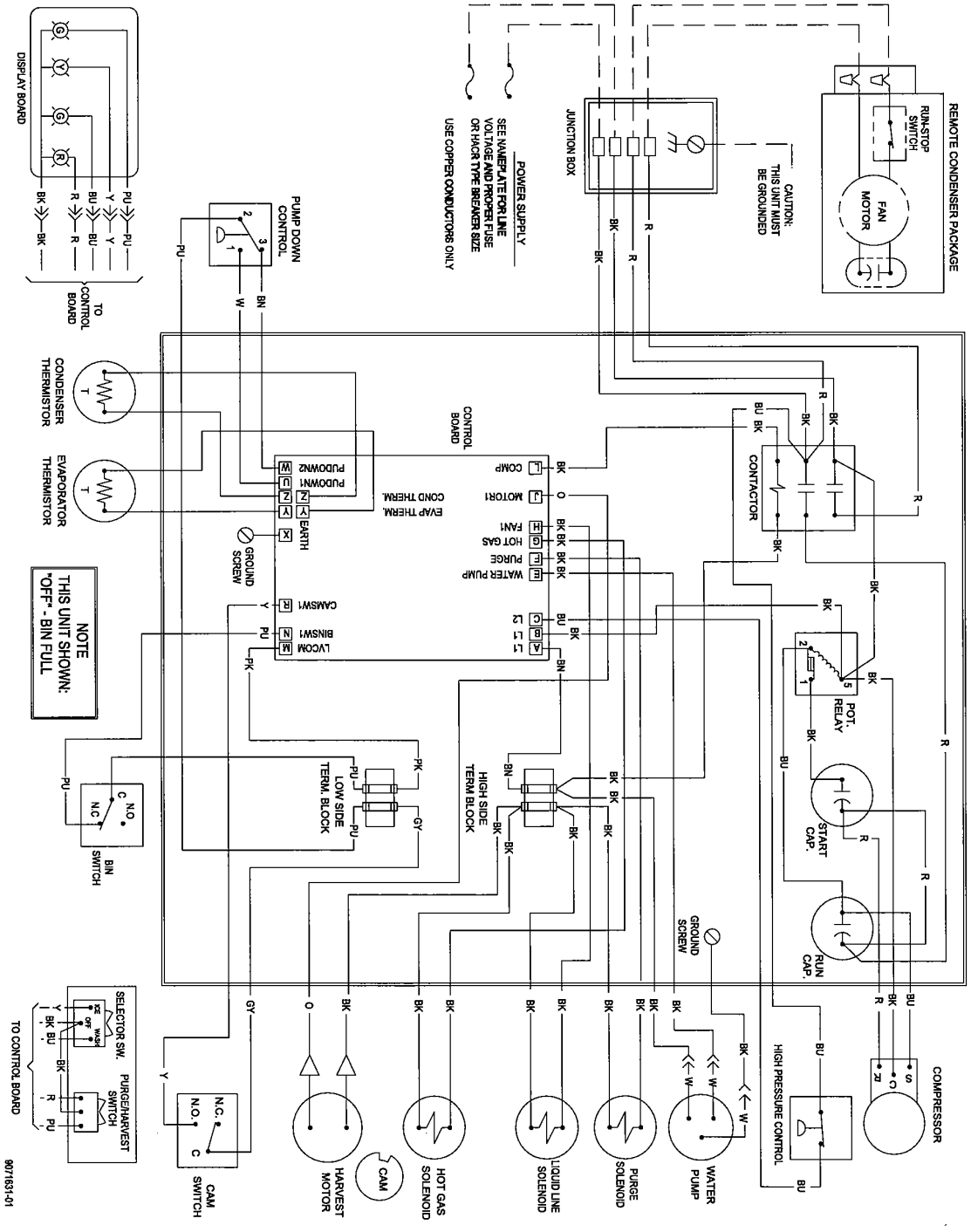
C-105/106 AIR & WATER



Electrical System

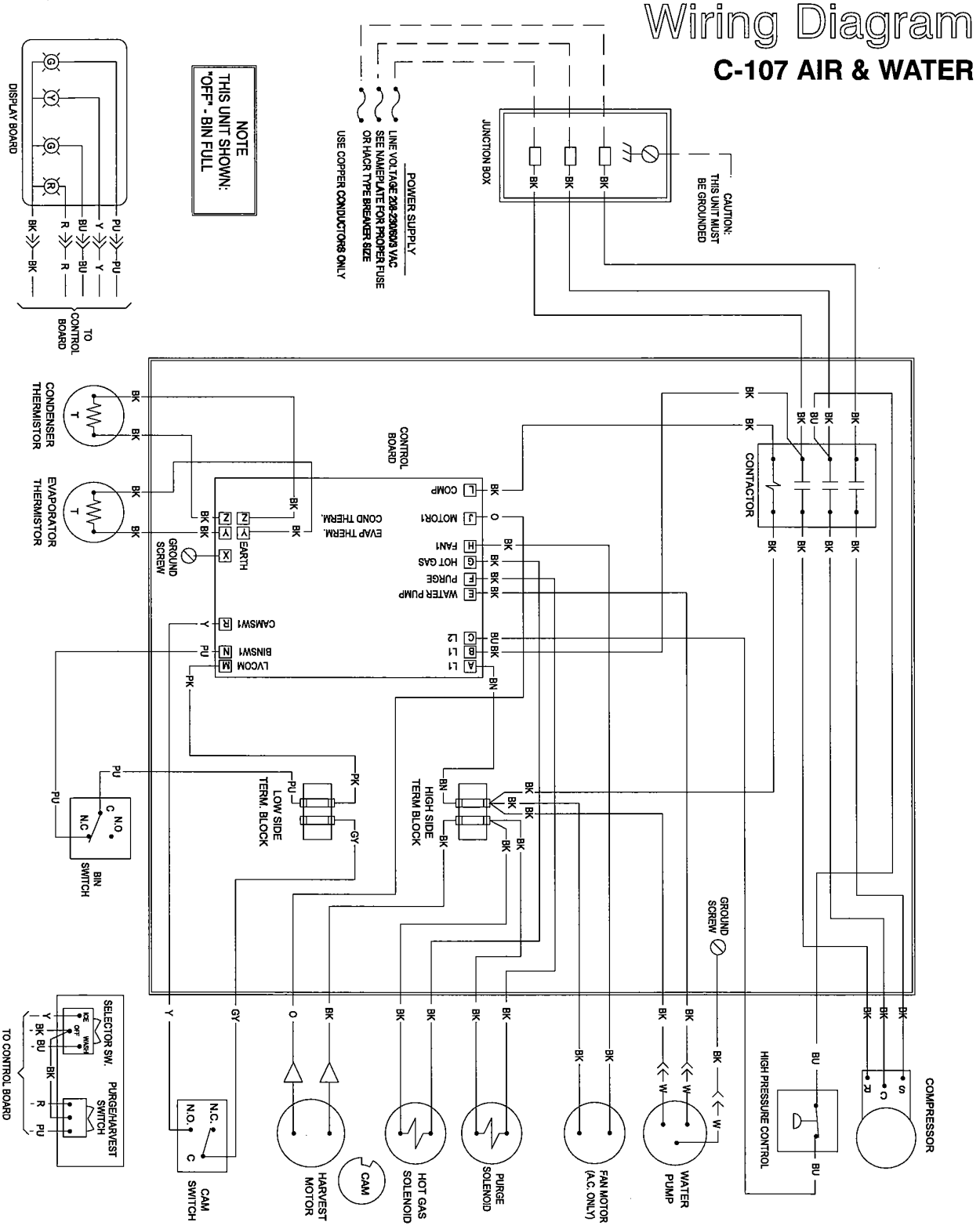
Wiring Diagram

C-105/106-REMOTE



Wiring Diagram

C-107 AIR & WATER

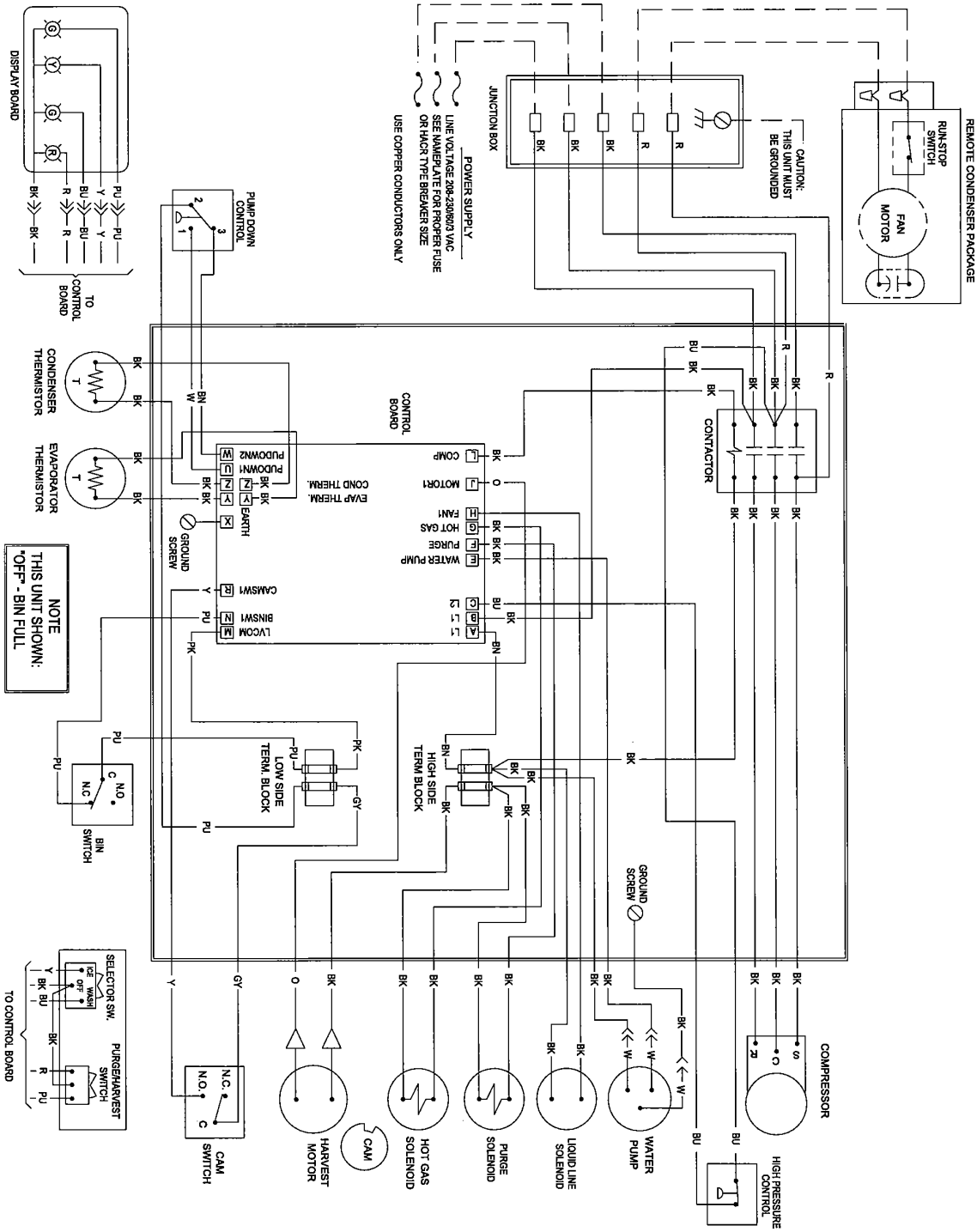


907623-01

Electrical System

Wiring Diagram

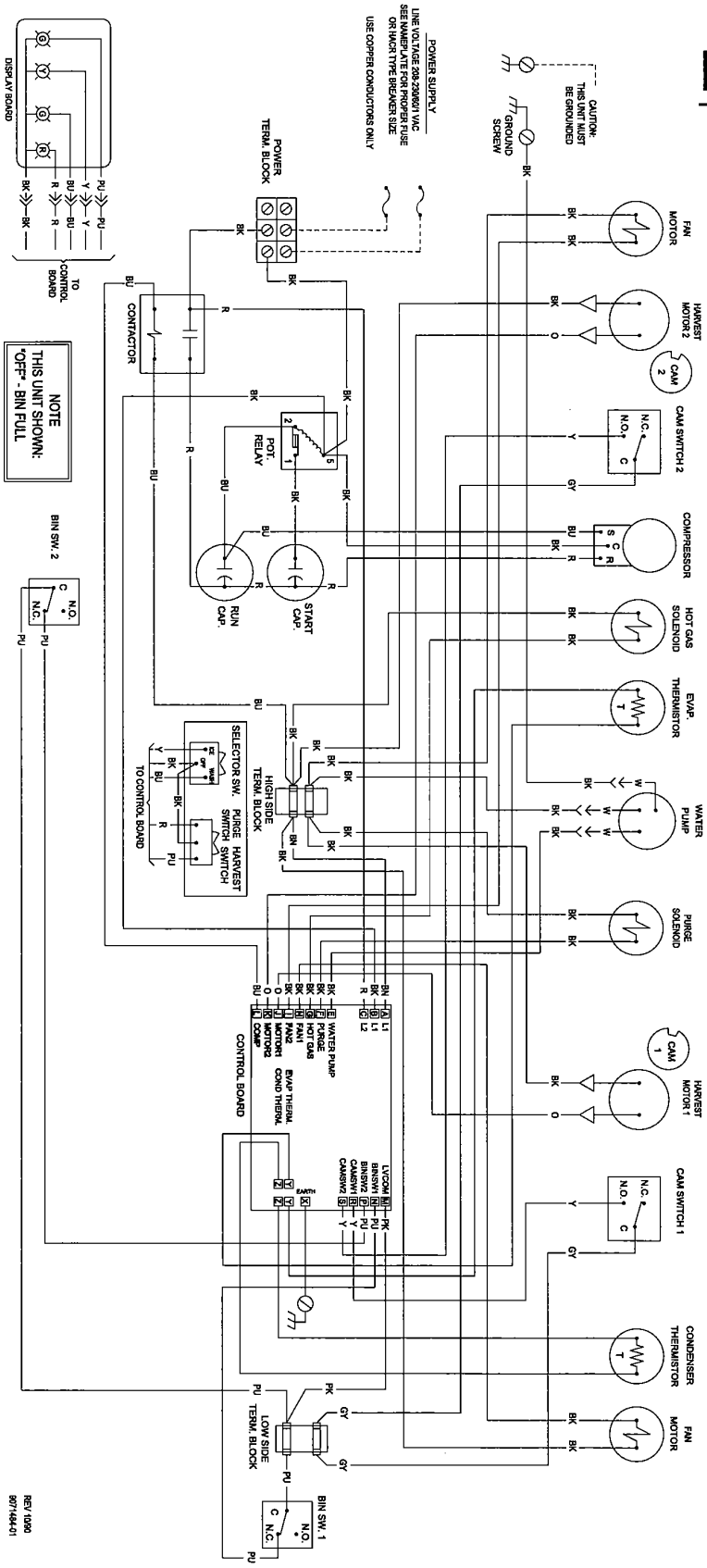
C-107 REMOTE



Electrical System

Wiring Diagram

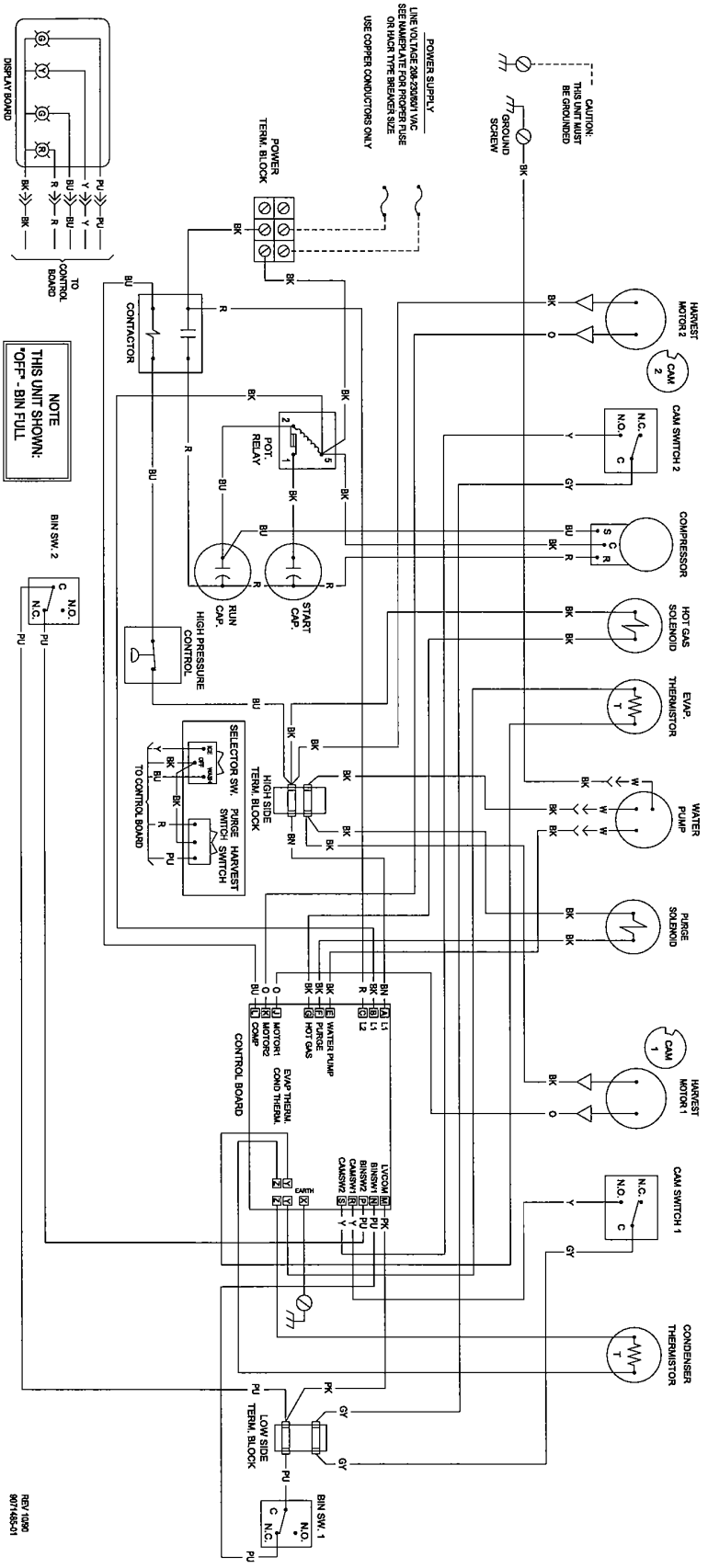
C-86/C-126 AIR



Electrical System

Wiring Diagram

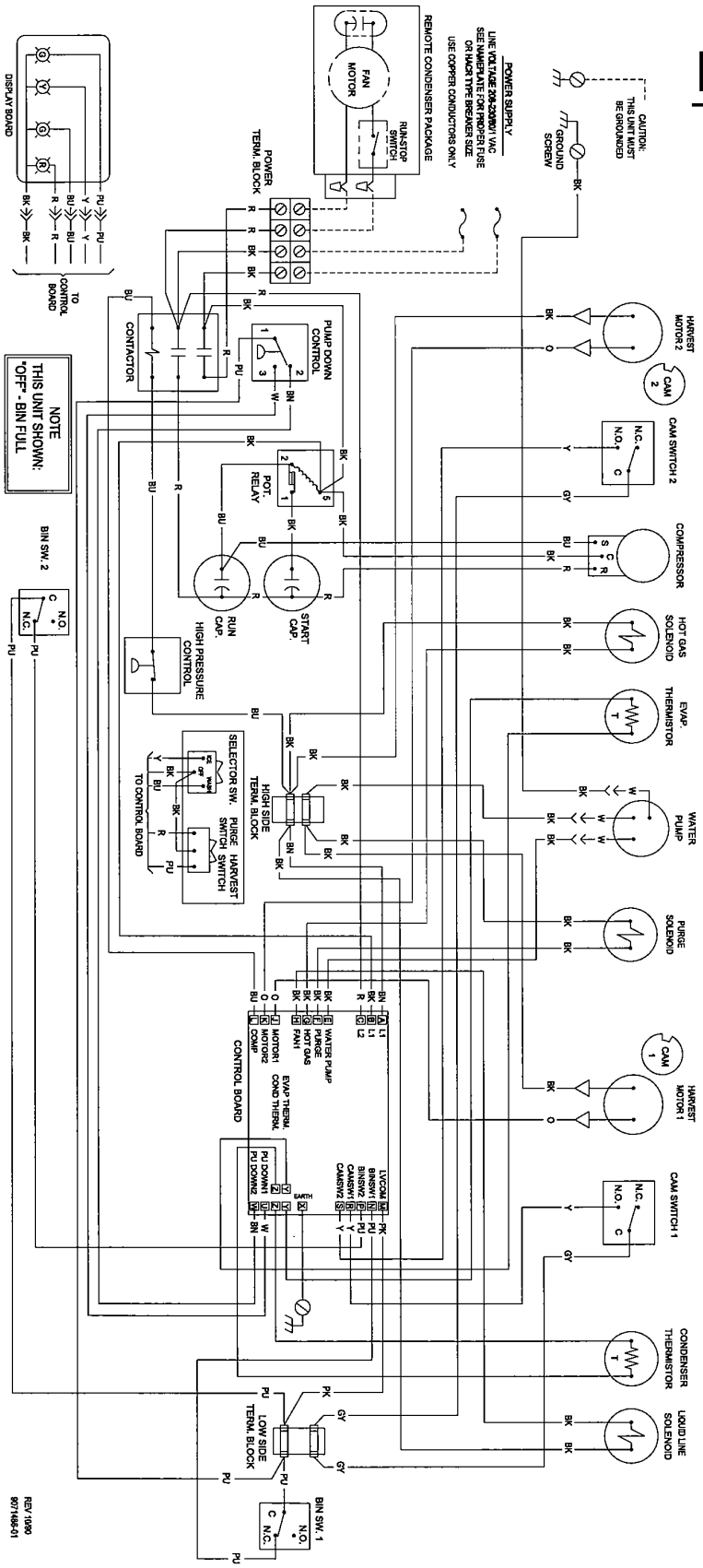
C-86/C-126 WATER



Electrical System

Wiring Diagram

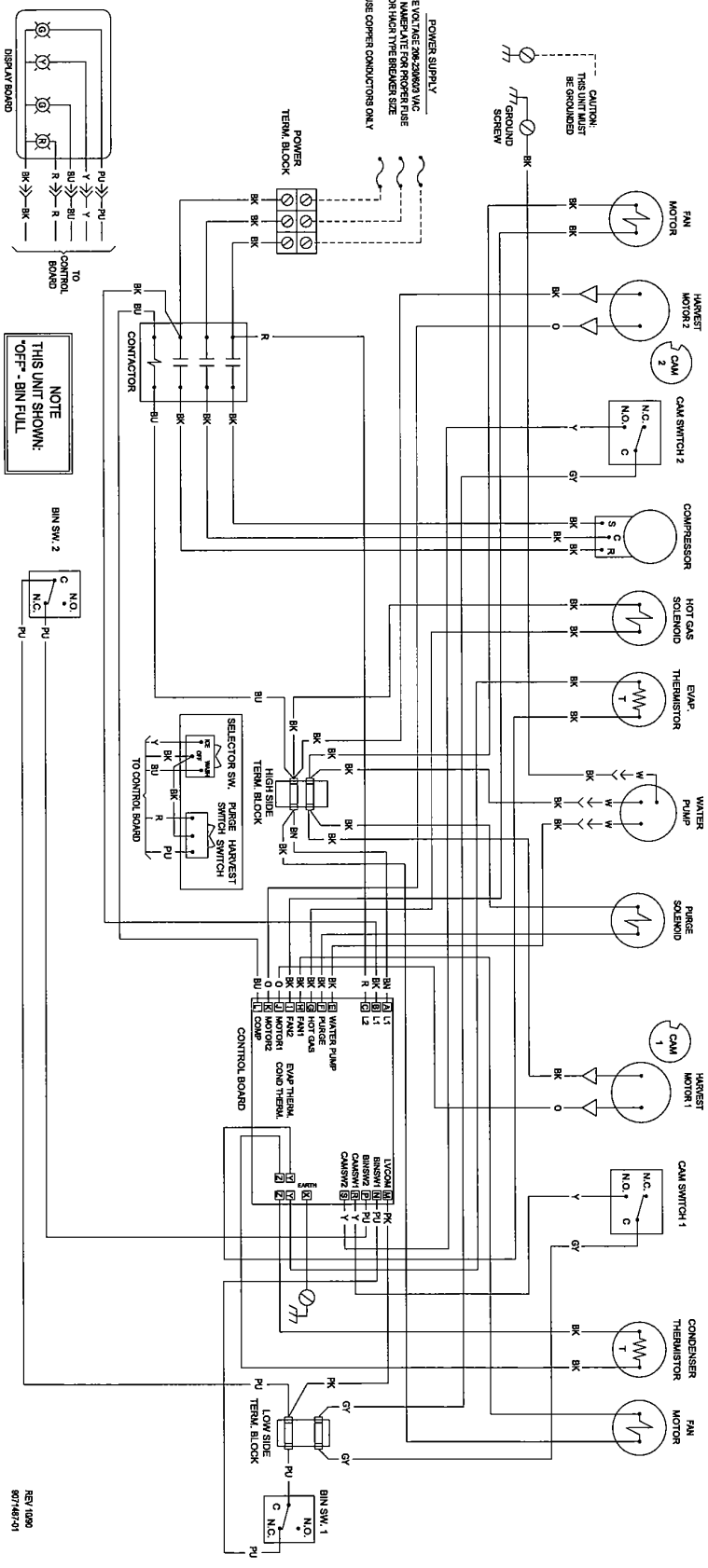
C-86/C-126 REMOTE



Electrical System

Wiring Diagram

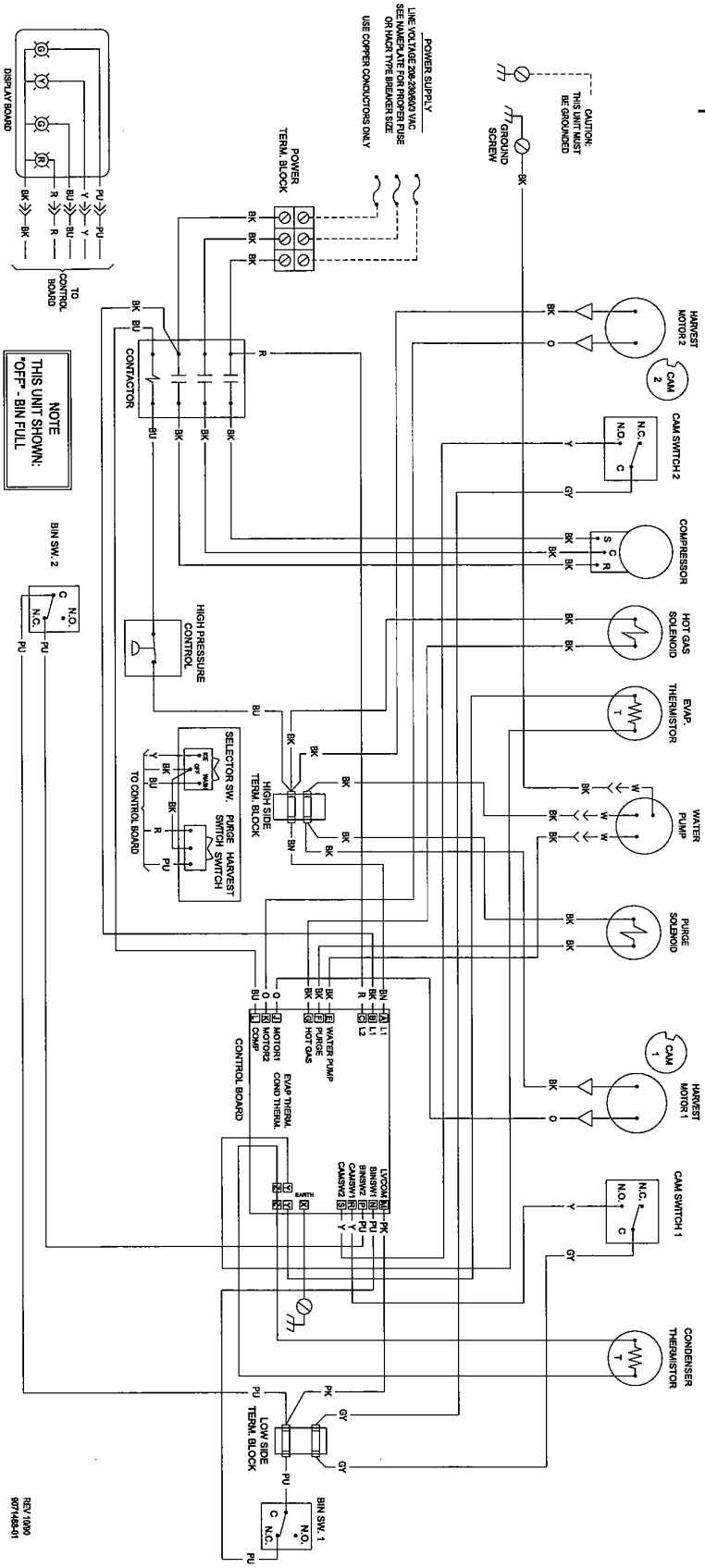
C-87/C-127 AIR



Electrical System

Wiring Diagram

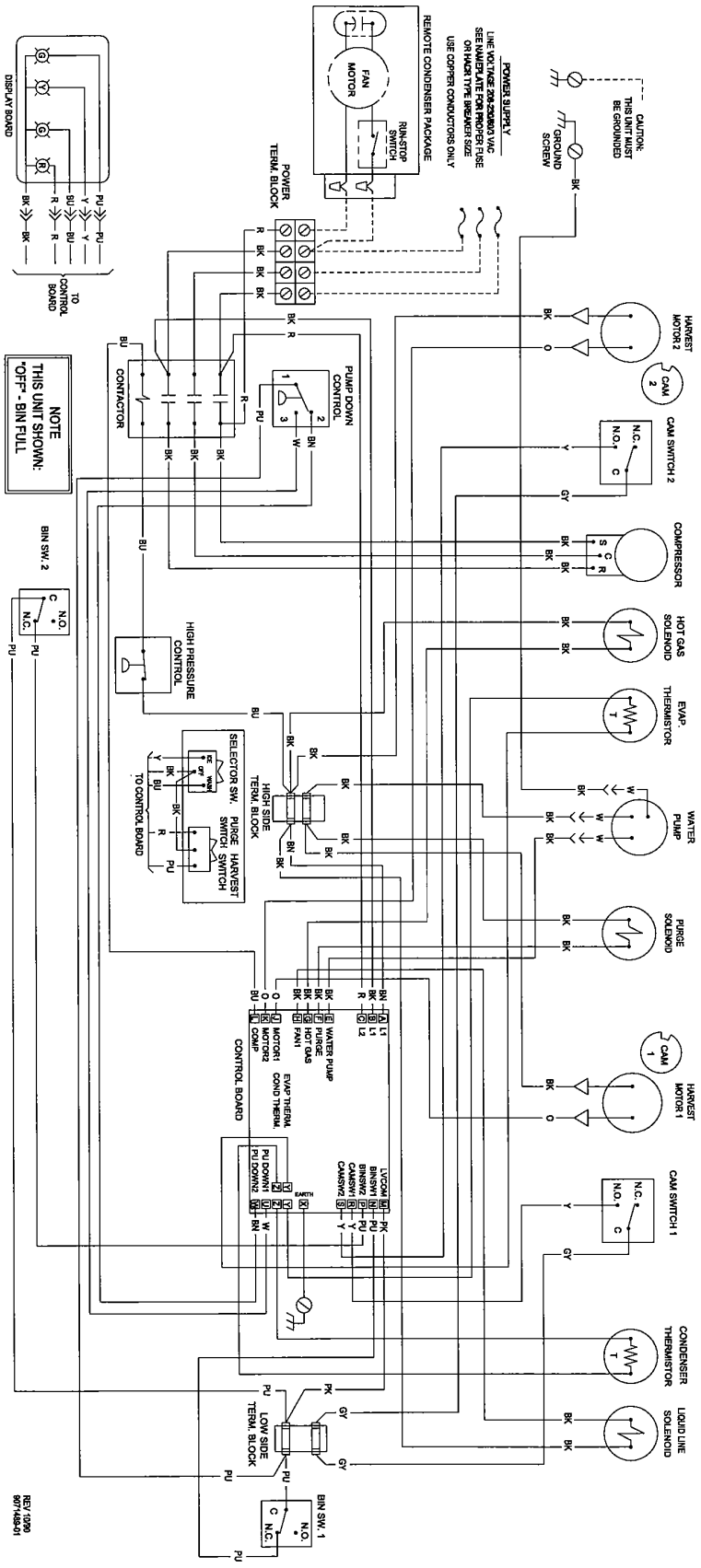
C-87/C-127 WATER



Electrical System

Wiring Diagram

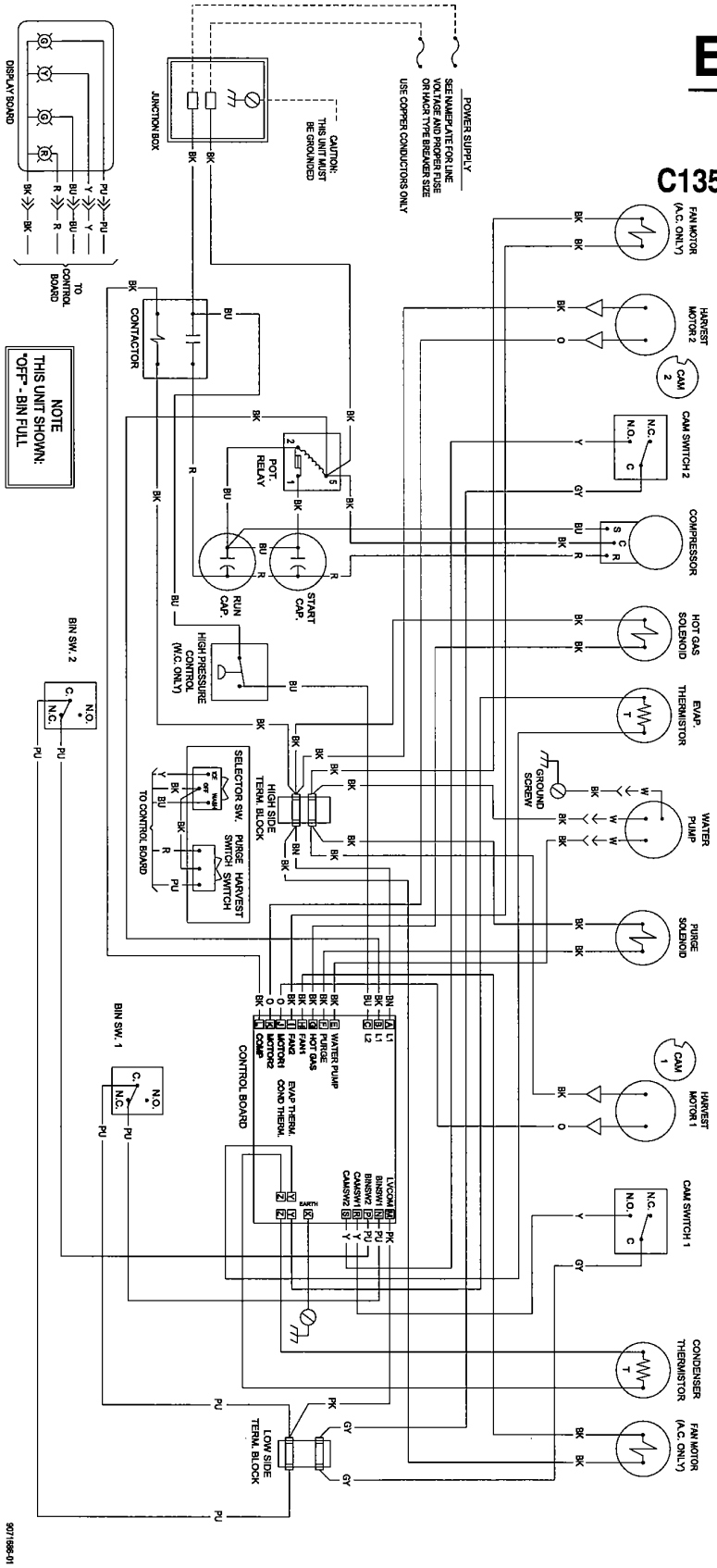
C-87/C-127 REMOTE



Electrical System

Wiring Diagram

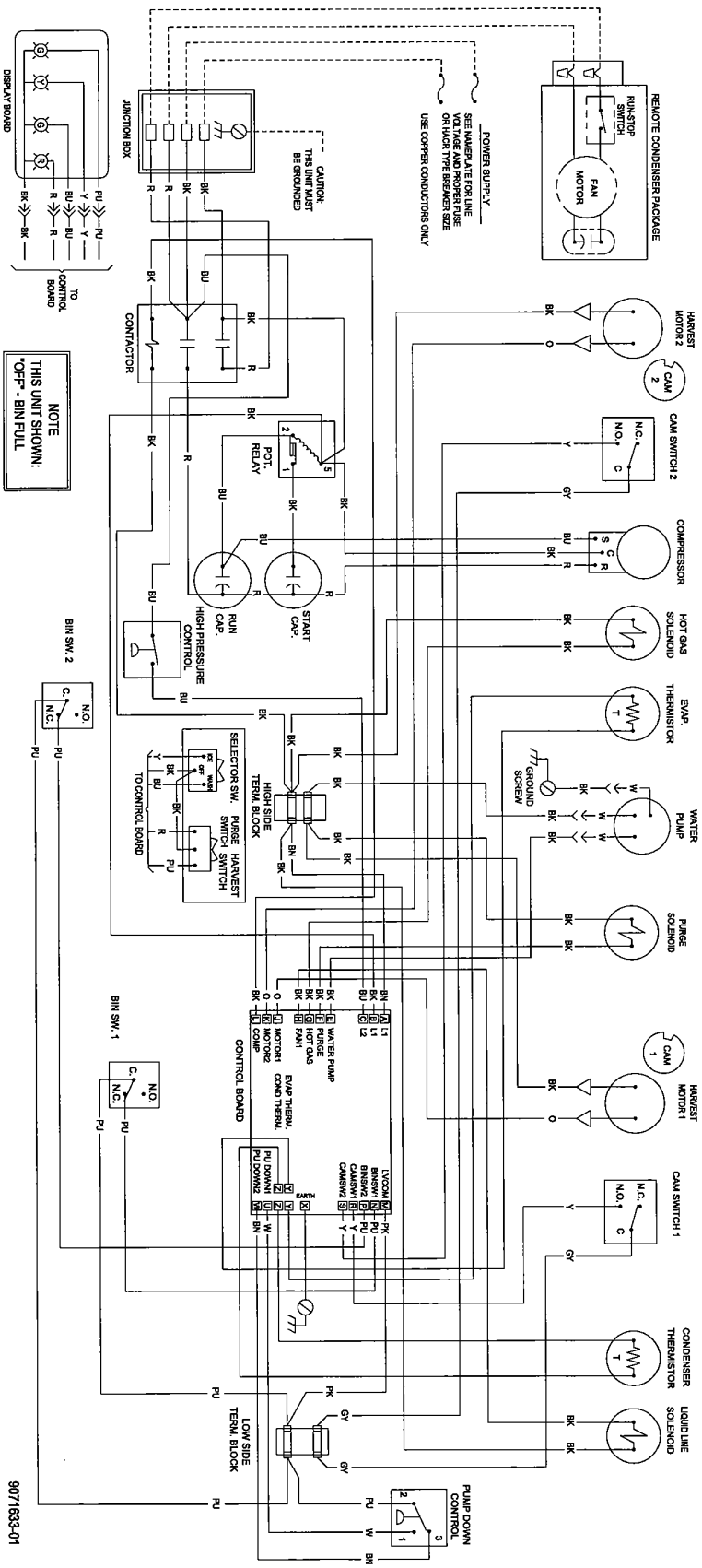
C135/C136/C185/C186 AIR & WATER



Electrical System

Wiring Diagram

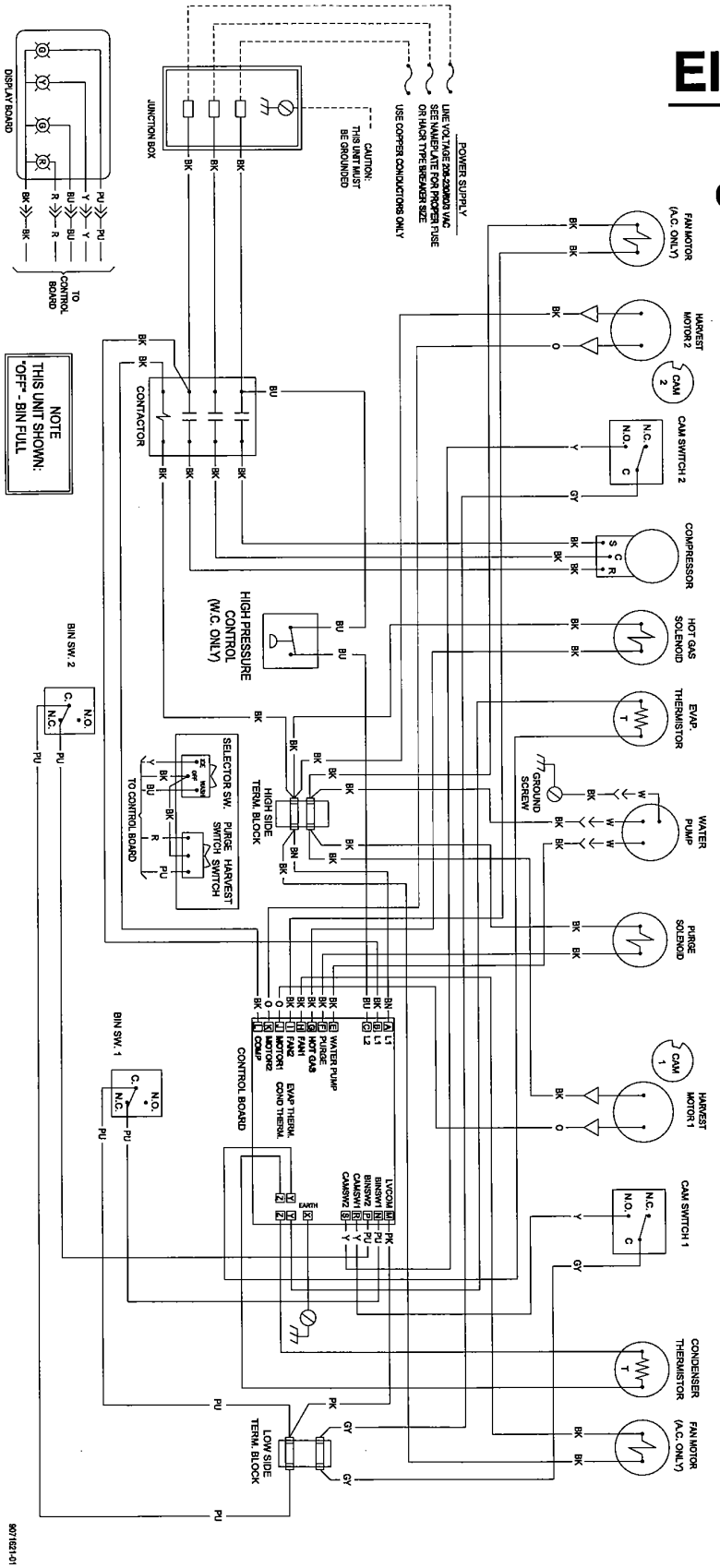
C135/C136/C185/C186 REMOTE



Electrical System

Wiring Diagram

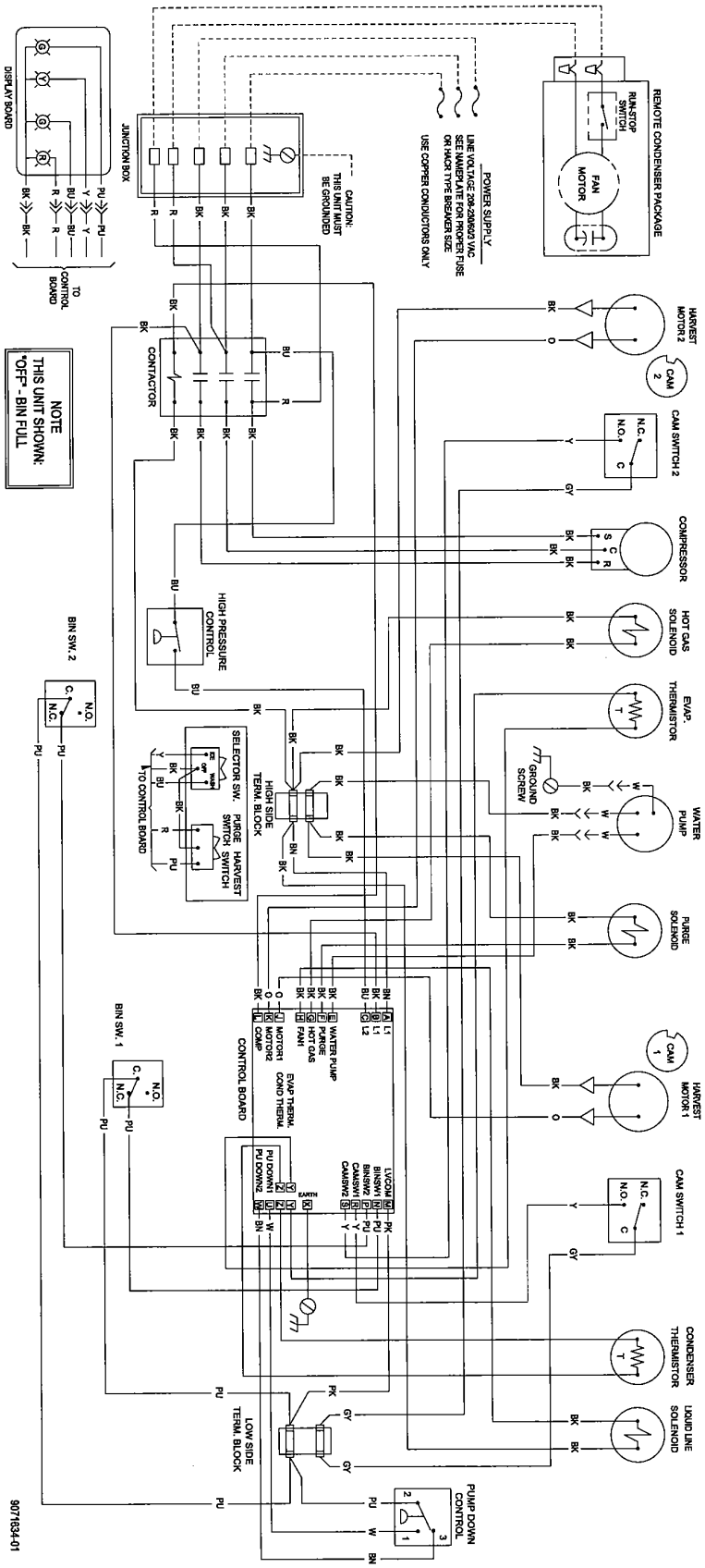
C-137/C-187 AIR & WATER



Electrical System

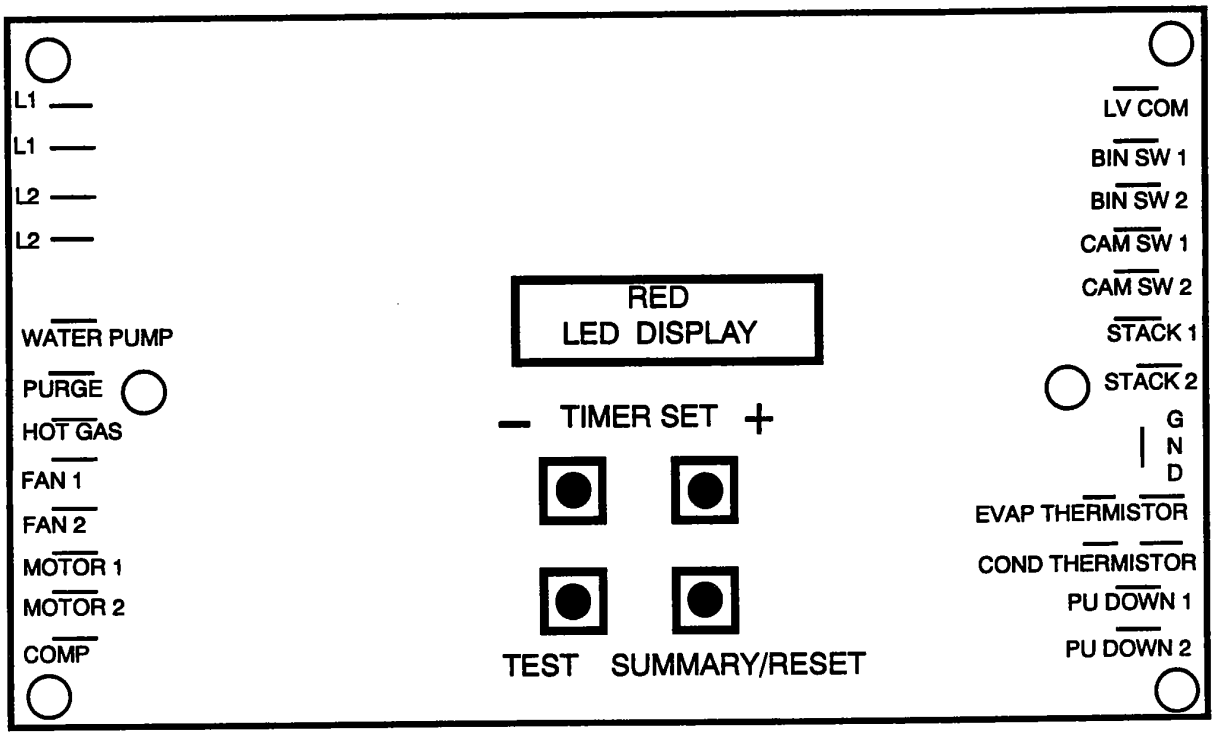
Wiring Diagram

C-137/C -187 REMOTE



Electronic Controller

Component Description



Computer

A PC board which controls the ice making and harvest functions of the machine. The computer also stores a history of the machines operation and displays information useful to the service technician.

Thermistor

An electronic sensor which changes resistance with temperature change.

Status Lights

A set of four low voltage LED's which illuminate individually depending on the operation of the machine.

Buzzer (optional)

An alarm which sounds when a "FATAL" error code occurs.

Electronic Controller

Operation

General Information

During normal ice making operations, the computer receives 5V DC input signals from the bin switch(es), cam switch(es), thermistors and the pump down control on remote machines. With this information the computer controls the high voltage components needed to make and harvest the ice. The computer will display information which tells the service technician the evaporator and condenser temperatures as well as what part of the cycle the machine is in. In addition to the normal ice making operations the computer has the capability of recording information about the operation of the machine as well as preforming several test functions. On the following pages is a detailed description of the operation of the computer.

Initialization

The microprocessor automatically performs a short series of tests and initialization procedures upon being powered-up. This is the only time the computer will display this information.

F 60	F 60 indicates that the computer has determined that the frequency is 60 Hz and evaporator and condenser temperatures will be displayed in fahrenheit.
C 50	C 50 indicates that the computer has determined that the frequency is 50 Hz and evaporator and condenser temperatures will be displayed in celsius.
0612	The 4 digit number indicates the software version that is in the microprocessor. If a change is made in the software the version number will change. The current version number is 0612.

Temperature Display

The computer will display the evaporator and condenser temperatures whenever the machine is OFF or in the ICE making mode. In the ice mode the computer will also display the ice making program described on the following page.

E	The E on the display indicates evaporator. The evaporator temperature will appear in front of the E.
C	The C on the display indicates condenser. The condenser temperature will appear in front of the C.

Off Mode

When the selector switch is in the off position the word OFF will appear on the display.

OFF	There are no components powered when the computer is in the OFF mode.

Wash Mode

When the selector switch is in the wash position, UUSH will appear on the display.

U U S H	This mode is used to circulate ice machine cleaner over the evaporator plate(s). Only the water pump runs in the wash mode.

Ice Making Program

When the selector switch is turned to the ICE position, in addition to displaying the evaporator and condenser temperatures, the computer will also display the part of the program that the computer is in.

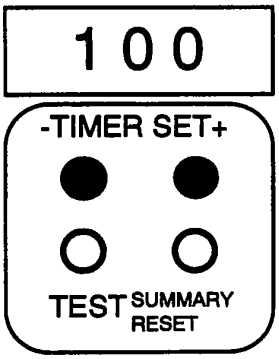
ICE 1	ICE 1 is the untimed portion of the freeze cycle. In this part of the program the computer is waiting for the evaporator temperature to reach 14F (-10C) before it starts the timer.
ICE 2	ICE 2 is the timed portion of the freeze cycle. The machine is still in freeze, but the timer in the computer is now running.
ICE 3	ICE 3 occurs during the last 20 seconds (12 seconds on single evaporator units) of the timed portion of the freeze cycle. During this time the purge valve is energized.
ICE 4	Once the amount of time set on the timer has past, the program enters ICE 4 for 20 seconds. The WATER PUMP is now switched off and the HOT GAS VALVE is energized (open).
ICE 5	During ICE 5 the harvest assist motor(s) are now switched on and remain energized until the cam switch(s) return to the N.O. position at which time the program returns to ICE 1 or ICE 0. See pg. H-4.
ICE 0	If the splash curtain(s) are held open when the cam switch(es) opens at the end of ICE 5, the machine will shut off and ICE 0 will display. When the curtain(s) close the program returns to ICE 1.

Electronic Controller

Operation

Timer

The timer located on the computer board is used to increase or decrease the ice bridge thickness. The bridge thickness on all machines should be 1/8 ".



To check the amount of time now on the timer, push one of the top two buttons on the computer board labeled TIMER SET. The timer setting in seconds will be displayed on the LED. Now time can be added by pushing the + button or deleted by pushing the - button. Each time a button is depressed 10 seconds will be added or deleted. Maximum time setting is 990 seconds, minimum time setting is 20 seconds.

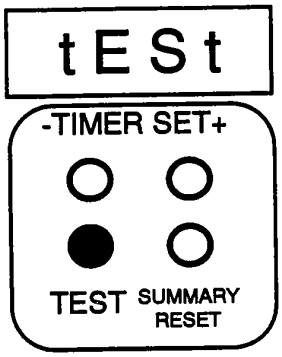
The time can be checked or adjusted with the selector switch in either the ICE or OFF position.

After checking or changing the timer setting the display will revert back to displaying the normal ice cycle read-outs in about 5 seconds.

The timer setting will remain in the computers memory even after a power interruption.

Test Function

The test function of the computer allows a technician to quickly check all electrical components for proper operation. The test mode can only be entered when the selector switch is in the OFF position. The test mode can be terminated at any time by returning the selector switch to the ICE or WASH position.



TO ENTER TEST turn the selector switch to the OFF position. Momentarily press the TEST button on the computer board. The computer is now in the test mode and the LED will display the word "tESt". Now each time the test button is pressed the computer will move to a different test function and that function will be displayed on the LED. There are 16 test functions. Pushing TEST will move through the functions list from the top down. If you wish to move up the list (to recheck a component), push the SUMMARY/RESET button.

Below is an explanation of each test function and the associated LED display.

Temperature Test

Evaporator and condenser temperatures displayed on the computer are based on input from the thermistors. When using the first two test functions the LED will display a thermistor-based temperature. If the thermistor is defective the temperature displayed will be incorrect. The temperature tests allow the technician to quickly diagnose a defective thermistor. To check a thermistor, the computer is put into the first test to check the evaporator thermistor and the second test to check the condenser thermistor. Place the thermistor bulb in an ice bath of 50% ice and 50% water. Allow the bulb to stand in the ice bath for at least 3 minutes before testing, check the bath temperature to be sure it is 32 F. If the display reads 32 F plus or minus 2 F, the thermistor is good. If the display reads a number outside of this range, remove thermistor leads from the computer board and check the resistance across the thermistor leads with an ohm meter. The correct resistance reading while the thermistor bulb is in the ice bath, is between 31K and 34.3K ohms. If the reading is outside of this range, replace the thermistor.

The first test function is the evaporator temperature, the number that appears in front of E is the temperature the board is reading.

The second test function is the condenser temperature, the number that appears in front of C is the temperature the board is reading.

Use the ice bath test described above to verify that the temperature is correct.

Fixed Calibrated Temperature Test

The fixed calibrated temperature allows a technician to determine whether or not the computer is able to accurately translate the thermistor input and display the reading correctly on the LED. During this test, a fixed resistor which has been incorporated into the computer, provides the input to the computer. The computer reads the fixed resistor rather than the thermistor input. Since this is a fixed resistor the computer should always read F 32 plus or minus 1. If the LED displays a number outside of this range, the computer is defective and should be replaced.

During the fixed calibrated test , the number that appears in front of the F must read 31, 32, or 33. Any reading outside of this range indicates a defective computer.

NOTE: The fixed calibrated test can quickly diagnose a defective computer if the display reads higher than F 33 or lower than F 31, however a CORRECT reading does not necessarily mean the computer can read the thermistor input correctly. If the fixed calibrated test is correct but the thermistor temperature reading(s) is suspected of being incorrect, the thermistor resistance must be checked as described on page H -5, to determine whether it is the thermistor(s) or the computer that is defective.

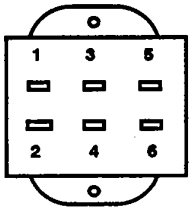
Status Light Test

During the status light tests the LED indicates which lamp should be energized. At the same time the computer switches power to that particular lamp. This test allows the technician to easily distinguish between a defective lamp or harness and a defective computer. During this test if a lamp does not illuminate but the board switches power to that lamp, either the lamp or the harness from the board to the status light is defective. If the computer does not switch power to the lamp being tested, the computer is defective. To use the status light test follow the procedure described below.

With the machine in test, bring up the display which describes the lamp to be tested.

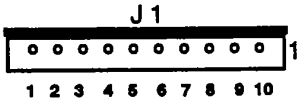
L - S F	Power is switched to the NOT OK (service fault) light. Check voltage across terminals 1 & 5 of the status light receptacle,or 2 &6 of the computer pin terminals.
L - b F	Power is switched to the BIN FULL light. Check across terminals 1 & 4 of the status light receptacle, or 2 & 7 of the computer pin terminals.
L - H	Power is switched to the HARVEST light. Check across terminals 1 & 2 of the status light receptacle, or 2 & 9 of the computer pin terminals
L - O n	Power is supplied to the OK light. Check across terminals 1 & 3 of the status light receptacle, or 2 & 8 of the the computer pin terminals.

Use the diagrams below to locate the proper terminals in the status light receptacle and computer pin terminals for each light to be tested. With a volt meter set to the DC scale, check across the appropriate pins for the lamp to be tested (see LED descriptions above), 12V DC plus or minus 10 % should be read between the terminals. If the reading is outside of this range or does not remain constant either the board or the harness is defective.



Status Light Receptacle

Computer Pin Terminal



When using the status light test, check power to the status light receptacle first, if there is correct voltage at the receptacle the light is defective, replace the status light assembly.

If there is no voltage at the receptacle, remove the wiring harness from the 10 pin terminal marked J1 located at the bottom right side of the computer board. Check power at the appropriate pin terminals for the light being tested. If there is power at the pin terminals replace the harness. If there is no power at the the pin terminals, computer is defective.

Electronic Controller

Operation

Component Test

All high voltage components are tested in this function. This test allows the technician to distinguish between a defective computer and a defective component or component circuitry. With the machine in the test mode, the component which is indicated on the display should energize and operate.

To use this test, bring up the display which describes the component to be tested. If the component is indicated on the LED, but the component does not energize, check the output at the high voltage (left) side of the computer. This is done by checking voltage between the top terminal which is marked L1 and the terminal marked with component description being tested. If the computer output is the same as the supply voltage, the problem is in the component, or the wiring to that component, ie; a broken wire. If the computer output is different from the supply voltage, the computer is defective and must be replaced.

H2OP	The water pump is switched on. Check voltage across the terminals labeled L1 and WATER PUMP.
PrG	The purge solenoid is switched on. Check voltage across the terminals labeled L1 and PURGE.
GAS	The hot gas solenoid is switched on . Check voltage across the terminals labeled L1 and HOT GAS.
FAn	The condenser fan motor(s) is switched on . Check voltage across the terminals labeled L1 and FAN 1and L1 and FAN 2.
HP-2	Harvest probe motor 2 is switched on . Check voltage across the terminals labeled L1 and MOTOR 2.
HP-1	Harvest probe motor 1 is switched on . Check voltage across the terminals labeled L1 and MOTOR 1.
CnnP	The compressor is switched on . Check voltage across the terminals labeled L1 and COMP.

Optional Buzzer Test

There is an optional buzzer available which will sound when a "FATAL" error code is generated. When the machine is put into the buzzer test the computer should sound the buzzer if present. If it does not, verify the board is supplying voltage by checking output at the two pin terminal marked BUZZER located to the left of the 10 pin wiring harness. Set the meter to read DC voltage, a reading of 12 volts DC plus or minus 10 % should be read.

PEEP	Power has been switched to the BUZZER. The buzzer should sound if present.

Machine Size Test

In this test, the computer will display the number of evaporators it has identified. It is important that the computer identifies the correct number of evaporators since its operation is based on this information. If the computer displays the incorrect number of evaporators the, computer is defective and must be replaced.

n n 1	The computer detects one EVAPORATOR.
n n 2	The computer detects two EVAPORATORS.

LOW VOLTAGE SWITCHES

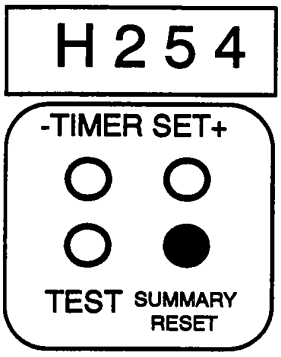
Cam switches, bin switches, pump down control on remote units and thermostatic bin control on stacked machines can all be checked by reading voltage across the low voltage (input) terminals on the right side of the computer. Turn the machine to the ICE mode and use a DC volt meter across the terminal marked LVCOM (low voltage common) and the terminal marked with the component description being tested. If the contacts of the switch being tested are open, 5 VOLTS DC should be read. If the switch contacts are closed, 0 volts should be read. See operation information on the component being tested in the Service Information Section to find out when the contacts should be open and when they should be closed.

Electronic Controller

Operation

Summary

The machines history is recorded by the computer. This summary of past operation can be recalled and reviewed anytime that the selector switch is in the ICE or OFF position. The history may only be erased when the selector switch is in the OFF position, see page H-15. The summary is not affected by power loss.



To recall the history, press the SUMMARY/RESET button momentarily. A summary of past operation will now be displayed.

The drawing to the left gives an example of the first part of the summary, which is the harvest count. The H shown on the display indicates the harvest count in thousands, the number that follows, (254) indicates the machine has cycled 254,000 times since last being reset.

The remaining history will be displayed in the order given below.

h	The number that appears in front of h indicates the number of harvests UP TO ONE THOUSAND since last being reset.
E C	The number that appears in front of EC indicates any error code that has been stored in the memory and not yet erased.
r r r r	This tells the service tech that the computer is now going to display information or "reviews" of prior ice making cycles. A review is the average cycle time of a group of ten ice making cycles.
r 1	The computer is now going to display the first review.
1 5	The number displayed after r 1 has been displayed, is the average cycle time of the 10 most recent ice making cycles. The example to the left shows a 15 minute review.
r 2	The computer is now going to display the second review. The number displayed after r 2 has been displayed is the next 10 most recent ice making cycles.

Note: The maximum number of reviews is 10 (a total history of 100 cycles). If the computer has not operated for a minimum of 10 cycles, there will be no reviews.

Error Codes

The computer constantly monitors the ice making cycles to determine if everything is operating correctly. Should the computer detect a malfunction, it will record the associated error code in it's memory. If the error code is a "FATAL ERROR," the computer will shut the machine down, light the front panel "SERVICE LIGHT," and indicate the error code on the LED display.
NOTE: On machines manufactured after August, 1991, error codes 2,5,7, and 12, will automatically make 4 attempts (one attempt every 15 minutes) to reset before the machine is shut down and the service fault light illuminates. The same error code must occur 4 consecutive times before the machine shuts down. All computers incorporating this change can be identified by a version number of 0612 or higher. See version number identification, page H-2. Error codes that do not cause a machine shut-down, (EC 1 and EC 3,) will ONLY display on the LED when in the "summary mode." See page for summary mode information.

Below is a description of each Error code.

EC 1	Freeze time is greater than 50 minutes or the temperature of the evaporator is above 40 F at 6 minutes into the freeze cycle.
EC 2	Cam switch(es) did not cycle closed and open within 45 minutes of initiating the harvest sequence, (ICE 5). See note below.

NOTE: On computers with version number 0612 or higher, time of failure for EC 2, has been changed from 45 minutes to 15 minutes.

EC 3	Curtain switch(es) did not close within 5 minutes of initiating the harvest sequence, (ICE 5).
EC 4	The microprocessor chip has a defect. The computer must be replaced.
EC 5	Condenser thermistor circuit is either open or shorted.
EC 6	Evaporator thermistor circuit is either open or shorted.
EC 7	Condenser temperature exceeds 150F (65C).

Electronic Controller

Operation

Error Codes, Continued

EC 8	Freeze time greater than 80 minutes.
EC 9	Evaporator temperature has reached 14F (-10C)in LESS than 90 seconds for FOUR CONSECUTIVE ice making cycles.

NOTE: On computers with version number 0612 or higher, EC 9 has been eliminated.

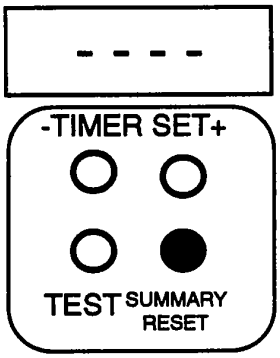
EC 12	Evaporator temperature exceeds 150F (65C).

If a machine is shut down on a "FATAL" error code, the machine must be reset following the procedure on page before it can be returned to the ice making mode. Error codes will remain in the memory even after a power interruption.

Information for troubleshooting error codes can be found in the TROUBLESHOOTING TREE Section beginning on page C-1.

Reset Mode

The reset mode is used to reset the memory of the computer. The memory items that can be reset in this mode are: ERROR CODES, REVIEW DATA, and HARVEST COUNT.



To enter this mode, set the selector switch to the OFF position. Next depress the SUMMARY/RESET button and hold it in. The display will show 4 dashes as shown in the drawing to the left. Continue to hold the button until the display changes to one of the three displays shown below. Release the button when the numbers that represent the information you intend to erase is shown on the display. INFORMATION CANNOT BE ERASED UNLESS THE BUTTON IS RELEASED WHILE NUMBERS ARE BEING DISPLAYED.

Release the SUMMARY/RESET button while one of the following groups of numbers is being displayed.

1 1 1 1	ERROR CODES are erased. The computer is now reset and can be returned to the ICE mode.
2 2 2 2	REVIEW DATA (average cycle times) and ERROR CODES are erased. The computer is now reset and can returned to the ICE mode
3 3 3 3	HARVEST COUNT, ERROR CODES and REVIEW DATA is erased. Harvest count will now begin at 0. The computer is now reset and can be returned to the ICE mode.

Electronic Controller

Service information

COMPUTER

Location
In control box.

Access
Remove front panel and electrical box cover.

Operation
The computer controls high voltage components by following its own program and adjustable timer. The computer program is controlled by low voltage input received from thermistors, pressure controls and switches. The computers timer, which is energized once the evaporator temperature has reached 14F (-10C), controls the ice bridge thickness. For a detailed description of the operation of the computer, see pages H-2 through H-13.

Adjustment
The only part of the computer which is adjustable is the timer. With the machine in either the OFF or ICE mode, push one of the TIMER SET buttons on the computer board. The timer set buttons are marked - and +. The timer setting in seconds will appear on the display. To change the timer setting, push the - button to delete time or the + button to add time. Each time a button is depressed 10 seconds will be deleted or added to the timer setting. The timer should be adjusted to achieve a 1/8" ice bridge thickness.

Problem	Possible Cause	Remedy
1.Ice bridge too thick or thin.	a.Timer out of adjustment. b.Computer not reading thermistor input correctly.	a.Adjust timer. b.Replace computer. Preform tests on pg. H-7 & H-6 to verify defective computer.
2.LED displays EC 4.	a.Defective microprosser.	a.Replace computer.

NOTE: If a problem is suspected with the computer that is not addressed above, there are several TEST functions described on pages H-6 through H-10 which will help the service technician diagnose the problem.

Replacement Procedure
Disconnect power supply. Remove wiring, turn stand-off mounts 1/4 turn C.C.W. remove computer. Handle and install new computer carefully. Check timer adjustment.

THERMISTOR

Location
Evaporator Thermistor: Clamped to suction line next to T.X.V. sensing bulb (Rt. side if dual evaporator).
Condenser Thermistor: Air Cooled units, clamped to "U " bend on right side of condenser third row down from top. Water Cooled units, clamped to liquid line at outlet of condenser. Remotes, clamped to liquid line at outlet of receiver.

Access
Remove top panel.

Operation
Evaporator Thermistor: Changes the low voltage input to the computer board as the suction line temperature changes.
Condenser Thermistor: Changes the low voltage input to the computer board as the condenser temperature changes.

Thermistor Check
Disconnect the thermistor leads from the computer board and place the thermistor bulb in an ice bath of 50% ice and 50% water. Allow the ice bath to reach 32°F. Check the resistance across the thermistor leads with an ohm meter. The correct resistance reading while the thermistor is in the 32° ice bath, is between 31K and 34.3K ohms. If the reading is outside of this range, replace the thermistor.

Problem	Possible Cause	Remedy
1.Evaporator or condenser temperature on computer LED incorrect.	a.Thermistor defective.	a.Replace thermistor. Preform TEST function on pg. H-6 to verify defective thermistor.
2.Computer displays EC 5.	a.Condenser thermistor electrically open or shorted.	a.Replace thermistor.
3.Computer displays EC 6.	a.Evaporator thermistor electrically open or shorted.	a.Replace thermistor.

Replacement Procedure
Un-clamp thermistor from refrigerant line. Remove thermistor wires from computer. Install new thermistor. Insulate evaporator thermistor.

Electronic Controller

Service information

STATUS LIGHTS

Location
In front cover panel.

Access
Remove front panel.

Operation
OK lamp (green): Energized during the freeze cycle and whenever the machine is off due to a full bin.
Harvest lamp (amber): Energized during harvest.
Bin full lamp (green): Energized whenever the machine is off due to a full bin.
Not OK lamp (red): Energized whenever a "fatal error code" occurs.

Problem	Possible Cause	Remedy
1.Lamp not illuminating when it should.	a.Bulb burnt out.	a.Replace status light assembly. See STATUS LIGHT test, page H-8.
	b.Poor electrical connection.	b.Repair connection. See pg. H-8.
2.Lamp illuminating when it should be off.	a.Electrical short in status light assembly.	a.Replace status light assembly. See pg. H-8

Replacement Procedure
Remove insulation from back of panel. Cut off plastic mounting tabs on back of status light housing. Remove status light assembly and install new assembly. Install insulation.

BUZZER (OPTIONAL)

Location
Buzzer can be located in any accessible place where it can be heard.

Access
Will depend on location.

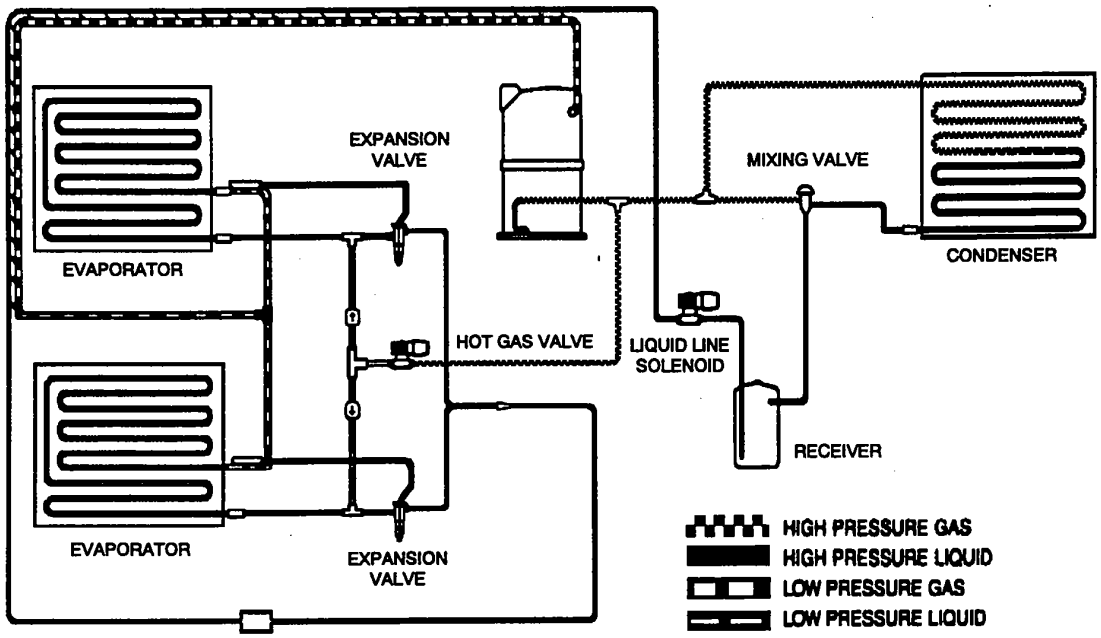
Operation
Buzzer sounds for 15 seconds every 15 minutes whenever an "fatal error" has occurred.

Problem	Possible Cause	Remedy
1.Buzzer not sounding.	a.Defective buzzer.	a.Replace buzzer. See buzzer test, pg.H-10.

Replacement Procedure
Unplug buzzer leads from computer install new buzzer.

Remote System

Component Description



Condenser
A tubing coil, which refrigerant flows through, that is designed to remove heat from the refrigerant, changing its state from a high pressure vapor to a high pressure liquid.

Fan Motor
A motor used to turn a fan blade which forces air through the condenser .

Liquid Line Solenoid
A solenoid valve which remains energized (open) while the machine is in the normal ice making mode.

Mixing valve
A three way valve used to regulate head pressure.

Pump Down Control
A low pressure control used to shut the machine off after pump down.

Receiver
A storage tank which holds liquid refrigerant.

Remote System

Operation

Because the condenser on a remote system is often installed in an area where the ambient temperature may vary dramatically, a remote ice machines must incorporate a few additional parts so the machine can operate properly under these changing ambient conditions.
A description of the operation of the remote system is given below.

On a properly charged system, the **mixing valve** begins to open when the ambient condenser temperature drops below 70 F (21 C). At this temperature the pressure in the bellows of the valve begins to equalize with the discharge pressure. The valve now begins to bleed a small amount of discharge gas directly into the receiver. As the ambient temperature at the condenser drops, the amount of discharge gas by-passed into the receiver increases. The remote system depends on an adequate refrigerant charge in order for the system to remain balanced during ambient temperature changes.
If a remote machine is shut down either by the selector switch, bin control or high pressure safety, the **liquid line solenoid** is de-energized allowing the valve to close. This blocks the flow of refrigerant causing all the refrigerant to be pumped in to the condenser and **receiver**. This is done to prevent liquid refrigerant from migrating into the compressor during the off cycle, which could cause damage to the compressor upon start-up. As the refrigerant is pumped into the receiver the suction pressure begins to drop, once the back pressure reaches 17 p.s.i. (1.2 bar) the **pump down control** opens, de-energizing the compressor contactor.

When the machine is turned back on, power is then supplied to the liquid line solenoid allowing the back pressure to rise enough to close the pump down control.

There are four things that can affect the balance of a remote system.

- -An improper refrigerant charge.
- -An improperly sized condenser.
- -A condenser installed below the ice machine. This creates excessive pressure drop which affects the mixing valve.
- -A defective mixing valve.

CONDENSER

Location
In remote condenser housing, located not more that 12' above or 40' away from ice machine.

Access
Remove fan blade guard.

Operation
Removes heat from refrigerant which was absorbed from water running over the evaporator.

Problem	Possible Cause	Remedy
1.High head pressure (condenser temperature too high).	a.Air condenser dirty.	a.Clean air condenser.
	b.Fins on condenser bent.	b.Straighten fins.

Replacement Procedure
Recover refrigerant, disconnect refrigerant lines from condenser. Remove bolts holding condenser stand in place. Replace condenser, fan motor and housing as one unit. Replace filter drier, evacuate and weigh in proper charge.

Remote System
Service Information

FAN MOTOR

Location
Above condenser.

Access
Remove fan guard and blade.

Operation
Turns blade to draw air up and through the condenser and exhaust it through the top of the housing.

Problem	Possible Cause	Remedy
1.Not running.	a.Motor burnt out.	a.Replace motor.
2.Noisy	a.Bearings in motor bad.	a.Replace motor.

Replacement Procedure
Disconnect power supply and electrical leads from motor. Remove fan guard and fan blade. Remove mounting screws. Install new motor.

LIQUID LINE SOLENOID

Location
In liquid line between receiver and filter drier.

Access
Remove top panel and/or left side panel.

Operation
De-energized when machine is shut down, either manually, by the bin switch or by the high pressure safety. When de-energized it blocks the flow of refrigerant allowing the compressor to pump the refrigerant into the receiver to be stored.

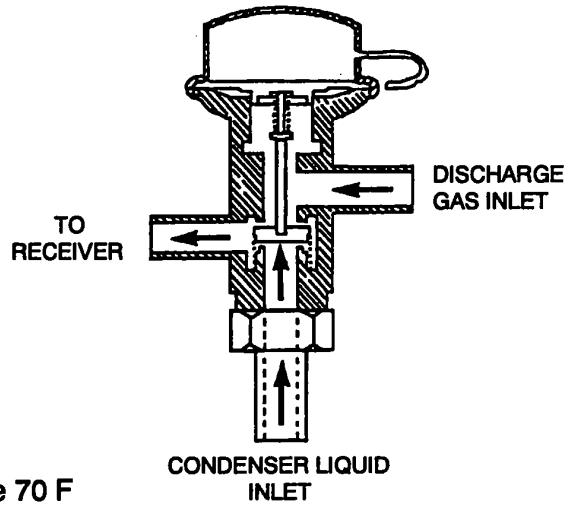
Problem	Possible Cause	Remedy
1.Machine continues to pump down even though selector switch, high pressure control, and bin switch are closed. NOTE: Compressor may be off on overload.	a.Valve coil defective. b.Valve stuck closed.	a.Replace coil. b.Replace valve.
2.Machine will not pump down or takes a long time to pump down.	a.Valve stuck open. b.Obstruction in valve.	a.Replace valve. b.Remove obstruction.

Replacement Procedure
Recover refrigerant. Remove coil. Unsweat valve. Disassemble new valve or wrap valve body with a heat sink to prevent damage to valve. Silver solder new valve in place. Replace filter-drier. Evacuate and weigh in proper charge. Leak check and install coil.

Remote System

Service Information

MIXING VALVE



Location
In liquid line between condenser and receiver.

Access
Remove top panel and/or back panel.

Operation
When the temperature at the condenser is above 70 F (21 C), the refrigerant flow from the compressor is directed by the mixing valve through the condenser and into the receiver. As the temperature at the condenser drops below 70 F (21 C), the pressure in the bellows of the mixing valve becomes greater than the pressure of the liquid refrigerant coming from the condenser. This change allows the valve to partially restrict the flow of liquid refrigerant leaving the condenser, at the same time allows discharge gas to by-pass the condenser and flow directly into the receiver, mixing with the liquid refrigerant from the condenser. This action of the mixing valve allows the head pressure to be maintained at approximatly 190 p.s.i. (13.1 bar) on R-502 and R-404a machines and 180 p.s.i.(12.4 bar) on R-22 machines during low ambient conditions.

Problem	Possible Cause	Remedy
1.Head pressure low/liquid line between valve and receiver cold. Ambient condenser temp. below 70 F (21 C).	a.Valve defective, not allowing discharge gas into receiver.	a.Replace valve.
2.Head pressure low /liquid line between valve and receiver hot.	a.System low charged, see page I-2.	a.Find and repair leak if present. Recover refrigerant and weigh in proper charge.
	b.Valve defective, not allowing enough sub-cooled liquid into receiver.	b.Replace valve.

Replacement Procedure
Recover refrigerant. Cut off process tube on dome of valve to release pressure. Unsweat valve. Wrap new valve body with a heat sink to prevent damage to valve. Silver solder new valve in place. Replace filter-drier. Evacuate and weigh in proper charge. Leak check.

PUMP DOWN CONTROL
(Low Pressure Control)

Location
In control box.

Access
Remove front panel and control box cover.

Operation
Opens on pressure drop, de-energizing the compressor contactor after pump down.

Adjustment
Control is factory set to close at 17 p.s.i. (1.2 bar) and open at 45 p.s.i. (3.1 bar). Minor field adjustments may be made by turning adjusted screw.

Problem	Possible Cause	Remedy
1.Control does not open or close at proper pressures.	a.Control out of adjustment. b.Control defective.	a.Adjust control. b.Replace control.
2.Does not open or close consistently at set pressures or does not open or close at all.	a.Control defective.	a.Replace control.

Replacement Procedure
Disconnect power supply. Recover refrigerant from system. Remove wires and mounting screws from control. Unsweat cap tube from suction line. Braze cap tube from new control to suction line. Mount new control and connect wires. Replace filter drier, evacuate and weigh in refrigerant charge. Leak check and check adjustment.

Remote System
Service Information

RECEIVER

Location
Behind bulkhead.

Access
Remove top panel.

Operation
Holds reserve liquid refrigerant during the freeze cycle to insure the liquid line is provided with enough liquid refrigerant to prevent flash gas. Also stores liquid refrigerant during the off cycle.

Problem	Possible Cause	Remedy
1. Fusible plug on Receiver leaking.	a. Temperature of receiver has exceeded 430 F (221 C).	a. Replace Receiver.
	b. Bond between fusible plug and Receiver broken.	b. Replace Receiver.

Replacement Procedure
Recover refrigerant from system. Unsweat refrigerant lines from Receiver and Filter- Drier. Remove Filter-Drier. Remove bolts holding base plate to machine, pry up on base plate enough to reach Receiver mounting nut taking care not to crimp refrigerant tubing. Remove Receiver mounting nut and remove Receiver. Install new Receiver and Filter-Drier, evacuate and weigh in proper refrigerant charge.