



HOSHIZAKI

Service Manual

Stackable Square Cuber

Models
IM-500SAB



hoshizakiamerica.com

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⚠ WARNING

Only qualified service technicians should install and service the appliance. To obtain the name and phone number of your local Hoshizaki Certified Service Representative, visit www.hoshizakiamerica.com. No service should be undertaken until the technician has thoroughly read this Service Manual. Failure to service and maintain the appliance in accordance with this manual will adversely affect safety, performance, component life, and warranty coverage. Proper installation is the responsibility of the installer. Product failure or property damage due to improper installation is not covered under warranty.

Hoshizaki provides this manual primarily to assist qualified service technicians in the service of the appliance.

Should the reader have any questions or concerns which have not been satisfactorily addressed, please call, send an e-mail message, or write to the Hoshizaki Technical Support Department for assistance.

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HOSHIZAKI AMERICA, INC.

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Peachtree City, GA 30269

Attn: Hoshizaki Technical Support Department

NOTE: To expedite assistance, all correspondence/communication **MUST** include the following information:

- Model Number _____
- Serial Number _____
- Complete and detailed explanation of the problem.

IMPORTANT

This manual should be read carefully before the appliance is serviced. Read the warnings and guidelines contained in this manual carefully as they provide essential information for the continued safe use, service, and maintenance of the appliance. Retain this manual for any further reference that may be necessary.

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Important Safety Information

Throughout this manual, notices appear to bring your attention to situations which could result in death, serious injury, damage to the appliance, or damage to property.

⚠ WARNING Indicates a hazardous situation which could result in death or serious injury.

NOTICE Indicates a situation which could result in damage to the appliance or property.

IMPORTANT Indicates important information about the use and care of the appliance.

⚠ WARNING

The appliance should be destined only to the use for which it has been expressly conceived. Any other use should be considered improper and therefore dangerous. The manufacturer cannot be held responsible for injury or damage resulting from improper, incorrect, and unreasonable use. Failure to service and maintain the appliance in accordance with this manual will adversely affect safety, performance, component life, and warranty coverage and may result in costly water damage.

To reduce the risk of death, electric shock, serious injury, or fire, follow basic precautions including the following:

- Only qualified service technicians should install and service this appliance.
- The appliance must be installed in accordance with applicable national, state, and local codes and regulations. Failure to meet these code requirements could result in death, electric shock, serious injury, fire, or damage to the appliance.
- Electrical connection must be hard-wired and must meet national, state, and local electrical code requirements. Failure to meet these code requirements could result in death, electric shock, serious injury, fire, or severe damage to the appliance.
- The icemaker requires an independent power supply of proper capacity. See the nameplate for electrical specifications. Failure to use an independent power supply of proper capacity can result in a tripped breaker, blown fuses, damage to existing wiring, or component failure. This could lead to heat generation or fire.
- **THE ICEMAKER MUST BE GROUNDED.** Failure to properly ground the icemaker could result in death or serious injury.
- Move the control switch to the "OFF" position and turn off the power supply before servicing. Lockout/Tagout to prevent the power supply from being turned back on inadvertently.
- To reduce the risk of electric shock, do not touch the control switch with damp hands.
- Do not make any alterations to the unit. Alterations could result in electric shock, injury, fire, or damage to the unit.
- The appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

⚠ WARNING, continued

- Children should be properly supervised around this appliance.
- Do not climb, stand, or hang on the appliance or allow children or animals to do so. Serious injury could occur or the appliance could be damaged.
- Do not use combustible spray or place volatile or flammable substances near the appliance. They might catch fire.
- Keep the area around the appliance clean. Dirt, dust, or insects in the appliance could cause harm to individuals or damage to the appliance.

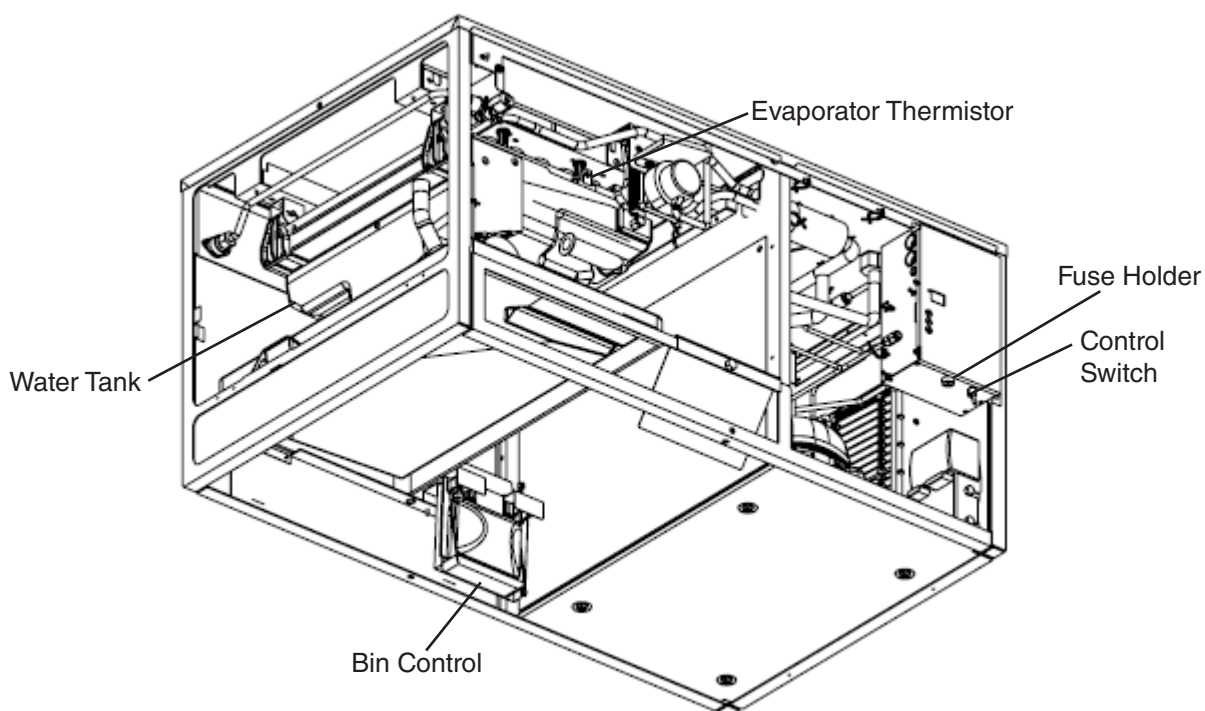
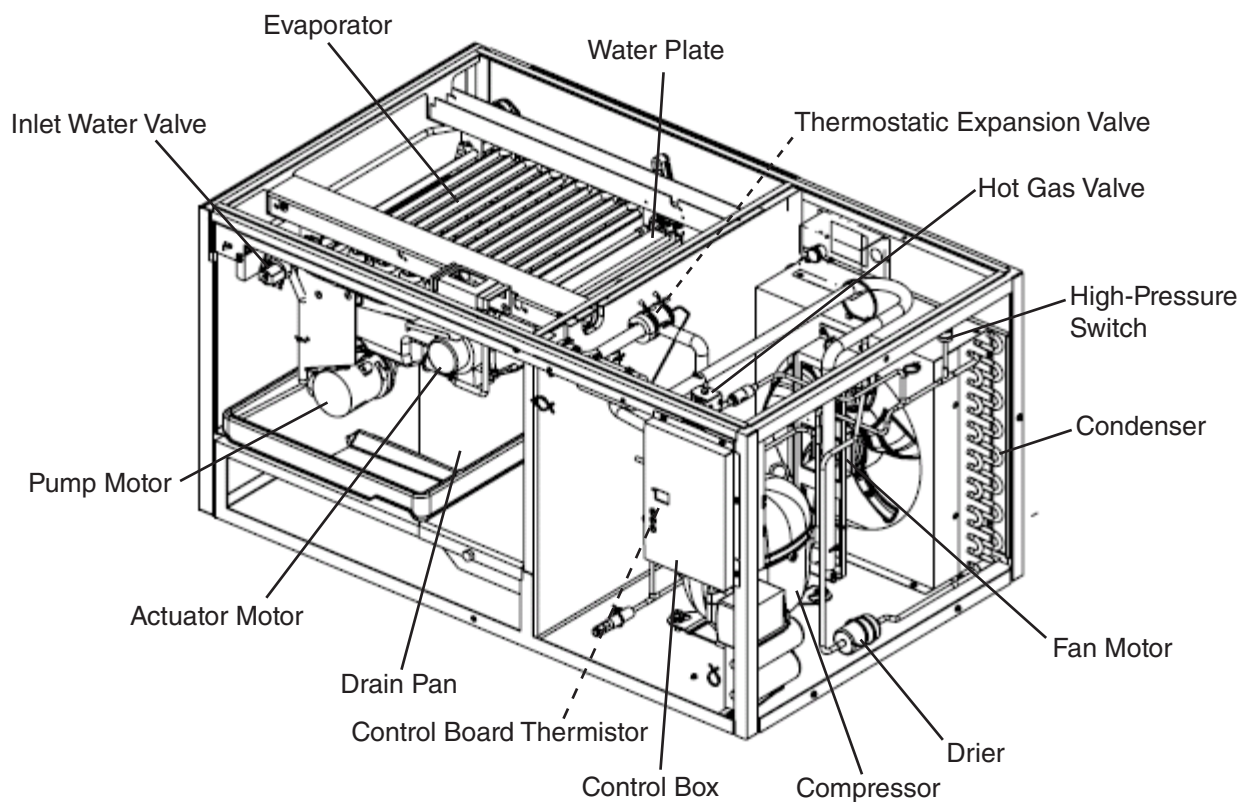
NOTICE

- Follow the instructions in this manual carefully to reduce the risk of costly water damage.
- In areas where water damage is a concern, install in a contained area with a floor drain.
- Install the appliance in a location that stays above freezing. Normal operating ambient temperature must be within 45°F to 100°F (7°C to 38°C).
- Do not leave the appliance on during extended periods of non-use, extended absences, or in sub-freezing temperatures. To properly prepare the appliance for these occasions, follow the instructions in "VI. Preparing the Appliance for Periods of Non-Use."
- Do not place objects on top of the appliance.
- The ice storage bin is for ice use only. Do not store anything else in the ice storage bin.

I. Construction and Water/Refrigeration Circuit Diagram

A. Construction

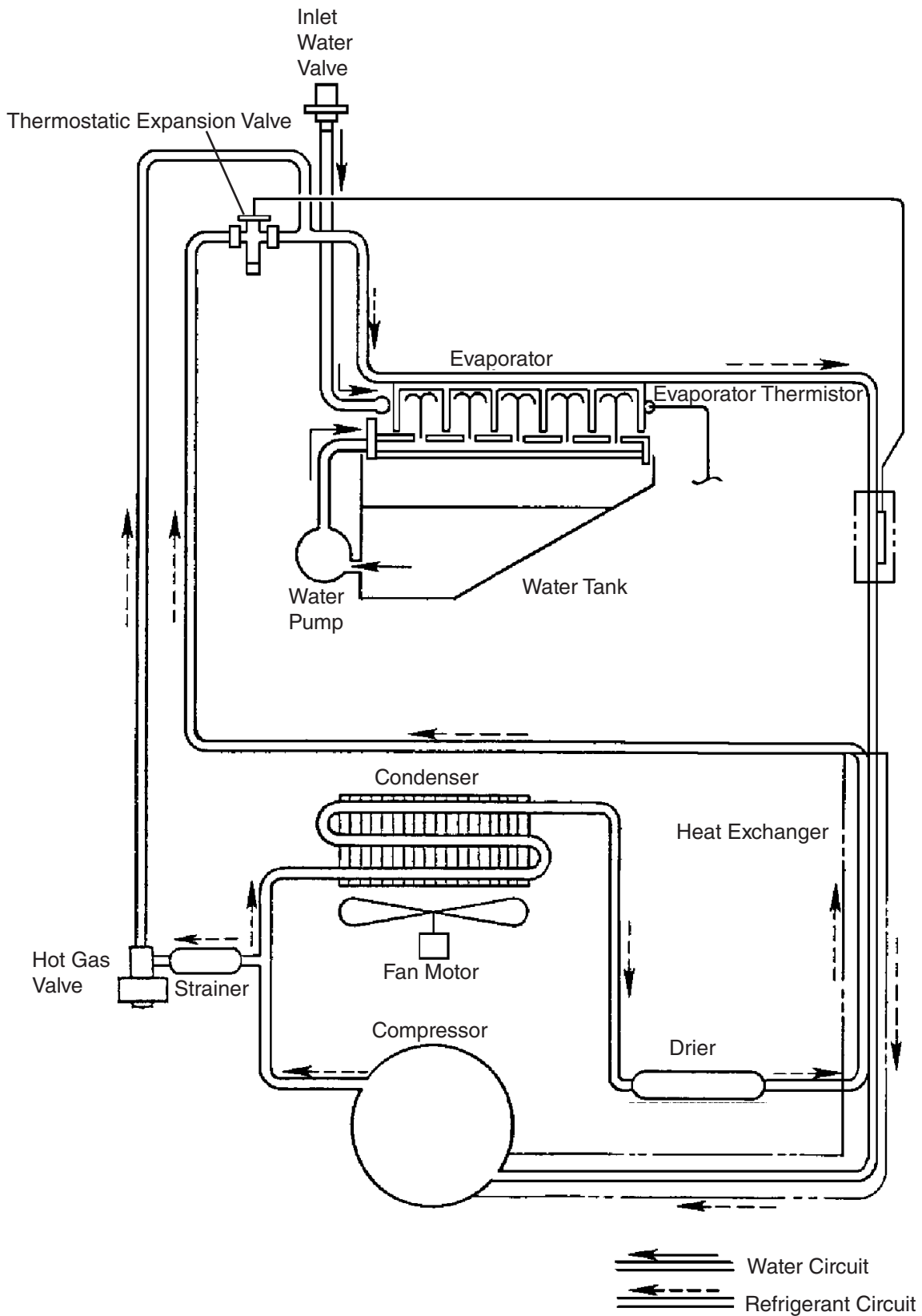
1. Air-Cooled Model (SAB)



Model Shown: IM-500SAB

B. Water/Refrigeration Circuit Diagram

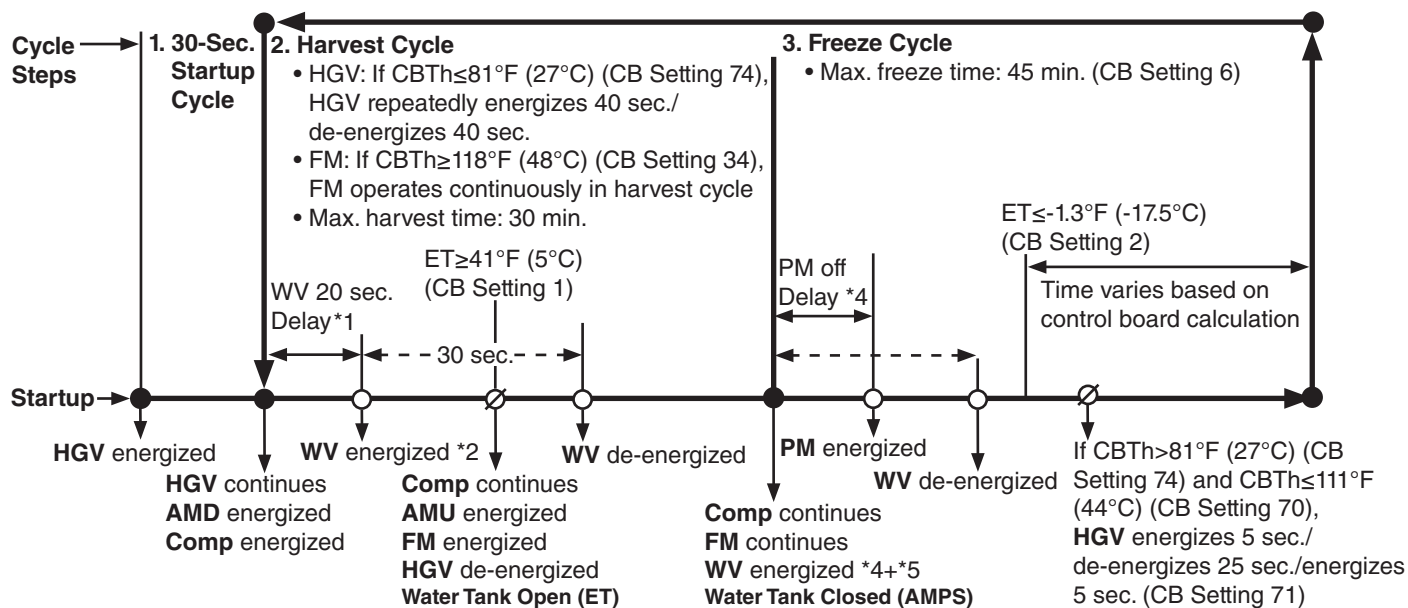
1. Air-Cooled Model (SAB)



II. Sequence of Operation and Service Diagnosis

A. Sequence of Operation Flow Chart

Operation Flow Chart



Note	CB Setting	Power On-Startup Initial Harvest and Initial Freeze	Bin Control-Startup Initial Harvest and Initial Freeze after Bin Control Initiated Restart		Normal Harvest and Freeze	
		All WT	WT $> 48^{\circ}F$ ($9^{\circ}C$)	WT $\leq 48^{\circ}F$ ($9^{\circ}C$)	WT $> 48^{\circ}F$ ($9^{\circ}C$)	WT $\leq 48^{\circ}F$ ($9^{\circ}C$)
*1	NA	20 sec.	0 sec.	0 sec.	20 sec.	20 sec.
*2	10	WT $< 48^{\circ}F$ ($9^{\circ}C$) 95 sec.	10 sec. (CB Setting NA)	95 sec.	30 sec.	95 sec.
	11	WT $> 48^{\circ}F$ ($9^{\circ}C$) 30 sec.				
*3	NA	0 sec.	0 sec.	10 sec.	0 sec.	10 sec.
PD*4	12	30 sec. \times 2	30 sec. \times 2	30 sec. \times 2	30 sec.	30 sec.
PD*5	15	22 sec. \times 2	22 sec. \times 2	22 sec. \times 2	22 sec.	22 sec.
FD*4	12	60 sec.	60 sec.	60 sec.	60 sec.	60 sec.
FD*5	15	44 sec.	44 sec.	44 sec.	44 sec.	44 sec.

Legend:

AMD—actuator motor down
AMPS—actuator motor position sensor
AMU—actuator motor up
BC—bin control
CBTh—control board thermistor
Comp—compressor
ET—evaporator thermistor
FD—full drain (CB Setting 14)
FM—fan motor
HGV—hot gas valve
PD—partial drain (CB Setting 14)
PM—pump motor
WT—water temperature
WV—inlet water valve

B. Service Diagnosis

WARNING

- The appliance should be diagnosed and repaired only by qualified service personnel to reduce the risk of death, electric shock, serious injury, or fire.
- Risk of electric shock. Control switch in "OFF" position does not de-energize all loads Use extreme caution and exercise safe electrical practices.
- Moving parts (e.g., fan blade) can crush and cut. Keep hands clear.
- Before servicing the appliance, move the control switch to the "OFF" position and turn off the power supply.
- **CHOKING HAZARD:** Ensure all components, fasteners, and thumbscrews are securely in place after the appliance is serviced. Make sure that none have fallen into the dispenser unit/ice storage bin.
- Make sure all food zones in the appliance and dispenser unit/ice storage bin are clean after service.

The diagnostic procedure is a sequence check that allows you to diagnose the electrical system and components. Before proceeding, check for correct installation, proper voltage per nameplate, and adequate water supply. Check CB using the steps in "II.D. Control Board Check."

Note: • When checking high voltage (115VAC), always choose a white (W) neutral wire to establish a good neutral connection.

- When checking voltage from the CB connectors, pull CB connectors out slightly to allow room for multimeter test leads contact.

- 1) Turn off the power supply, then access the control box. Move the control switch to the "OFF" position. Clear any ice from BC.
- 2) Check that BC is closed and the 5A fuse is good.

1. Operation Diagnosis

- 1) **Startup Cycle:** Turn on the power supply. Move the control switch to the "ICE" position. "on" appears on CB display. HGV energizes and Comp/AMD 30-sec. delay timer starts.

Note: • CB display "on" LED remains on unless the 10.5VAC power supply to CB CN1 is interrupted.

- Check CB using the steps in "II.C.Control Board Check."
- Confirm BC is CLOSED. If BC is open, remove ice from BC. If no ice is around BC and icemaker does not start, see "II.D. Bin Control Check."

a) **Startup Cycle Diagnosis:** If CB "on" is off, confirm 5A fuse is good. Check for 115VAC at CS #2 (DBU) to neutral (W) then at CS #1 (R) to neutral (W). If 115VAC is present on #2 (DBU) and not on #1 (R), replace CS. If 115VAC is present on CS #1 (R), check for 115VAC at HPS (R) to neutral (W) then HPS (LBU) to neutral (W). If 115VAC is present at HPS (R) and not at HPS (LBU), HPS is open. See HPS Diagnosis below. If 115VAC is present at HPS (LBU), check for 10.5VAC at CB CN1 #1 red wire to CB CN1 #2 red wire. If 10.5VAC is not present, check CT continuity. If open, replace CT. If 10.5VAC is present and "on" is not on CB display, replace CB.

b) **HPS Diagnosis:** Confirm condenser coil is not clogged or restricted. Let refrigeration circuit pressures equalize. If HPS does not reset and pressures are equalized, replace HPS. If pressures are not equalized, reclaim refrigerant and diagnose refrigeration circuit restriction. Check that there are no restrictions in the refrigeration circuit.

Harvest Cycle: HGV or strainer.

Freeze Cycle: FM, TXV, drier, and fan blade for binding.

Confirm that the location meets installation requirements. See the appliance's instruction manual for details.

- 2) **Harvest Cycle:** Comp 30-sec. delay timer terminates, 20-sec. WV delay timer starts, Comp and AMD (opening) energize. HGV continues. 20-sec. WV delay timer terminates, WV energizes. 30 sec. WV on timer starts. AMD de-energizes when AMPS activates at water tank fully open position. Once ET reaches 41°F (5°C), HGV de-energizes, FM and AMU (closing) energize. 30-sec. WV on timer terminates, WV de-energizes. AMU de-energizes when AMPS activates at water tank fully closed position. WV energizes. 144-sec. on timer starts (when WT > 48°F (9°C)). Note: HGV de-energizes when ET reaches 41°F (5°C). During a start up scenario this occurs at same time AMU (closing) and FM energize. Evap starts cooling before harvest cycle is complete. Harvest cycle is complete once AMPS indicates water tank is fully closed.
- a) **Comp Diagnosis:** Check that Comp energizes and evaporator is warming. If not, check for 115VAC at CB CN3 #9 orange (O) to neutral (W). If 115VAC is not present, check for 115VAC at CB CN2 #3 red (R) to neutral (W). If 115VAC is not present, check CS terminal #2 (DBU) to neutral (W). If 115VAC is not present, check 5A fuse and breaker status. If 115VAC is present at CS terminal #2 (DBU) to neutral (W) and not at CS terminal #3 red (R), replace CS. If 115VAC is present at CB CN2 #3 red (R) and not at CB CN3 #9 orange (O), replace CB. If 115VAC is present at CB CN3 #9 orange (O), check for 115VAC at CR solenoid. If 115VAC is present, confirm contacts are closed. If not, replace CR. If CR contacts are closed, check Comp external protector, Comp start and run capacitors, Comp start relay, and Comp motor winding.
- b) **HGV Diagnosis:** If Comp is energized and evaporator is not warming, check that HGV energizes and opens. Check for 115VAC at CB CN3 #3 (P) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present, check for 115VAC at HGV coil and check HGV coil continuity. Replace as needed.
- c) **AMD Diagnosis:** AMD energizes (opens). If not, check for 115VAC at CN5 #3 (GY) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present, check AM actuator arms for binding, spring connections, capacitor, and motor windings. If AMPS does not indicate water tank is fully open within 3 min. display shows "EE" and unit shuts down for 60 min. If error recurs after icemaker resumes operation, display shows "EE" again and icemaker shuts down. See "III.F. Error Codes."
- d) **WV Diagnosis:** 20-sec. WV delay timer terminates. WV energizes. Check that water enters the water tank. If not, check that the water supply line shut-off valve is open and screens or external filters are clear. Check for 115VAC at CB CN3 #7 (V) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present and WV does not energize, check for 115VAC at WV. If 115VAC is present, check coil continuity. If open, replace WV. If 30-sec. WV on timer terminates and WV does not de-energize, check for 115VAC at CB CN3 #7 (V) to neutral for 115VAC. If 115VAC is present (WV does not de-energize during harvest), replace CB. If 115VAC is not present, check for WV leaking by. Clean or replace WV.

3) **Freeze Cycle:** AMPS activated (water tank completely closed). 60-sec. PM delay timer starts (initial startup; 60-sec. PM delay timer, normal operation; 30-sec. PM delay timer). WV energizes and 144-sec. WV on timer starts (initial startup; 144-sec. WV on timer, normal operation 52-sec. WV on timer). Comp and FM continue. Evaporator cooling. Once PM delay timer terminates, PM energizes. 44 sec. (or 22 sec.) later WV on timer terminates, WV de-energizes.

- a) **AMU Diagnosis:** AMU completes its rotation and AMPS is activated. If AM does not rotate up, check for 115VAC at CB CN5 #1 (O) to neutral (W). If 115VAC is not present, confirm ET is at 41°F (5°C) or higher. If ET achieved and AM does not energize, replace CB. If 115VAC is present, check AM actuator arms for binding, actuator springs for proper connection, capacitor, and AM motor windings. Repair or replace as needed. If AMPS does not indicate water tank is fully closed within 3 min. display shows "EE" and unit shuts down for 60 min. If error recurs after icemaker resumes operation, display shows "EE" again and icemaker shuts down. See "III.F. Error Codes."
- b) **Freeze Cycle Diagnosis:** If Comp de-energizes once freeze begins, check that appliance has not shut off on HPS ("on" display off). If so, check "1)b) HPS Diagnosis" above. If "on" display is on, check for 115VAC at CB CN3 #9 (O) to neutral (W). If 115VAC is not present, replace CB. Confirm Comp and FM continue. Confirm that PM energizes after PM delay timer terminates. Confirm evaporator is cooling. If not, confirm HGV de-energized (not bypassing) and FM energizes, TXV operating correctly, Comp is efficient, and refrigerant charge is correct. See "VIII.A. Specification and Performance Data." Note: Refrigerant gauges should not be placed on the icemaker until all other components have been confirmed.
- c) **Comp Diagnosis:** If Comp is not energized, check for 115VAC at CB CN3 #9 (O). If 115VAC is present, check for 115VAC at CR coil. If 115VAC is present, check CR coil and contact continuity. Replace as needed. If CR is okay, check Comp start relay and start and run capacitors. Next, check Comp motor winding continuity. If Comp is energized but evaporator is not cooling, check for HGV leaking by or an inefficient Comp. See "VIII.A. Specification and Performance Data."
- d) **FM:** If Comp is energized but FM is not, check for 115VAC at CB CN3 #5 (DBU) to neutral. If 115VAC is not present, replace CB. If 115VAC is present, check capacitor, motor winding, and fan blade for binding.
- e) **PM:** Confirm water is flowing over evaporator. If not, check for 115VAC at CB CN3 #1 (BK) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present and PM is de-energized, check PM impeller for binding, capacitor, and motor winding continuity.
- f) **WV Diagnostics:** WV energizes, 144-sec. or 52-sec. WV on timer starts. Check that water enters the water tank. If not, check that the water supply line shut-off valve is open and screens or external filters are clear. Check for 115VAC at CB CN3 #7 (V) to neutral (W). If 115VAC is not present, replace CB. If 115VAC is present and WV does not energize, check for 115VAC at WV. If 115VAC is present, check coil continuity. If open, replace WV. 144-sec. or 52-sec. WV on timer terminates. WV de-energizes. If WV continues, check for 115VAC at CB CN3 #7 (V) to neutral (W). If 115VAC is present, and WV on timer time has expired, replaced CB. If WV de-energizes and water continues to fill the reservoir, replace WV.

Freeze Termination: CB monitors time after ET temperature $\leq 32^{\circ}\text{F}$ (0°C).

CB terminates freeze cycle when the following equation is satisfied:

$\text{temp. (absolute value)} \times \text{time (min.)} = (\text{absolute value of CB Setting 2}) \times (\text{CB Setting 3})$

Using default settings, freeze cycle is terminated when:

$\text{temp. (absolute value)} \times \text{time (min.)} = 185$

This formula helps maintain consistent dimple size regardless of differences in seasonal ambient and water temperatures.

ET temperature is recorded 30 seconds after PM energizes. Water temperature correction value (CB Setting 13) is added to ET temperature and this is used as WT value in the following harvest cycle.

If $\text{CBT} > 81^{\circ}\text{F}$ (27°C) (CB Setting 74) and $\text{CBT} \leq 111^{\circ}\text{F}$ (44°C) (CB Setting 70), when $\text{ET} \leq -1.3^{\circ}\text{F}$ (-18.5°C) (CB Setting 2), HGV energizes 5 sec., de-energizes 25 sec., energizes 5 sec. (CB Settings 71) to reduce bonding of the water tank to the evaporator.

- 4) **Harvest Cycle:** Same as the initial harvest cycle. Return to step 2) above.

Note: Appliance continues to cycle until BC is satisfied or power is switched off.

The appliance always restarts at the startup cycle.

2. Shutdown Diagnosis

- 1) When BC is engaged (open) for more than 10 seconds, the icemaker shuts down after harvest cycle. When BC is disengaged (closed) for more than 80 seconds, icemaker restarts at startup cycle. If BC is engaged (open) while the water tank is opening after the power supply is turned on (or after the "RESET" button is pressed), shutdown does not start: Shutdown occurs 10 seconds after actuator motor's internal position sensor indicates water tank is fully open. See "II.E.1. Bin Control Check."

Legend: **AMD**—actuator motor down; **AMPS**—actuator motor position sensor;

AMU—actuator motor up; **BC**—bin control; **CB**—control board; **CBT**—control board thermistor; **Comp**—compressor; **CS**—control switch; **ET**—evaporator thermistor;

FM—fan motor; **HGV**—hot gas valve; **HPS**—high-pressure switch; **PM**—pump motor;

WT—water temperature; **WV**—inlet water valve

C. Control Board Check

Before replacing CB that does not show a visible defect and that you suspect is bad, always conduct the following check procedure. This procedure will help you verify your diagnosis. Always choose a white (W) neutral wire to establish a good neutral connection when checking voltages.

Error Codes: If CB is in error (E1, E2, EE(3-9), EE(EA), EE(EC), EE(Ed)), see "III.F. Error Codes."

- 1) Move CS to the "ICE" position. If CB "on" display turns on, control voltage is good, continue to step 2. **Diagnosis CB "on" Display:** If CB "on" display is off, check CT secondary circuit. CT output is 10.5VAC at 115VAC primary input. If the secondary circuit has proper voltage and CB "on" display is off, replace CB.

If the secondary circuit does not have proper voltage, check CT primary circuit. Check for 115VAC at 5A fuse (BR) to neutral (W). If 115VAC is not present, check power supply and breaker. If 115VAC is present, check for 115VAC at CS terminal #2 (DBU) to neutral (W). If 115VAC is not present, check 5A fuse continuity. If 115VAC is present, check for 115VAC at CS terminal #1 (R) to neutral (W). If 115VAC is not present, replace CT. If 115VAC is present, check for 115VAC at HPS (LBU) to neutral (W). If 115VAC is not present, see "II.B.1.1)b). HPS Diagnosis." If 115VAC is present, and secondary circuit does not have proper voltage, . replace CT.

- 2) To verify voltage output from CB to the components, slide CB connector out far enough to allow multimeter lead contact. With the icemaker in the cycle to be tested, check output voltage from the corresponding pin on CB connector to a neutral (W wire). If output voltage is not found, replace CB.
- 3) Confirm BC communication and shutdown sequence: Move CS to the "ICE" position. Once the startup cycle starts, press and hold the BC actuator paddle. CB shuts down the appliance after the next harvest cycle. If not, confirm BC status. See "II.D.1. Bin Control Check." If BC checks okay, replace CB.

Legend: **BC**—bin control; **CB**—control board; **CS**—control switch; **CT**—control transformer; **HPS**—high-pressure switch

D. Bin Control Check

1. Bin Control Check

This appliance uses a lever-actuated proximity switch to control the ice level in the storage bin. No adjustment is required.

To check BC, follow the steps below.

- 1) Turn off the power supply.
 - 2) Remove the front panel, then move the control switch to the "OFF" position.
 - 3) Remove the control box cover. Clear any ice away from BC.
 - 4) Check BC wire harness connections.
 - 5) Disconnect BC wire harness connector from CB CN11 connector.
 - 6) Check for continuity across the wires of BC wire harness connector. When the actuator paddle is not engaged, BC switch is closed. If open, check that the wire harness connector is properly connected and that the actuator paddle is not sticking. Clean if necessary. See "II.D.2. Bin Control Cleaning." If BC switch still reads open, replace BC.
 - 7) Press and hold the actuator paddle; check for continuity across the wires of BC wire harness connector. When the actuator paddle is engaged, BC switch is open. If closed, check that the actuator paddle is not restricted. Clean if necessary. See "II.D.2. Bin Control Cleaning." If BC switch still reads closed, replace BC.
 - 8) Reconnect BC wire harness connector to CB CN11 connector, then move the control switch to the "ICE" position. Turn on the power supply.
 - 9) Allow the icemaker to cycle on. Press and hold the actuator paddle for at least 10 sec. The icemaker should shut down. If it does not, replace CB.
- Note: If BC is engaged (open) while the water tank is opening after the power supply is turned on (or after the "RESET" button is pressed), shutdown does not start: Shutdown occurs 10 seconds after actuator motor's internal position sensor indicates water tank is fully open.

Cycle at Mechanical Bin Control Activation	Shutdown
Harvest Cycle	At the end of the harvest cycle, or up to 15 sec. into the freeze cycle if activated at the end of the harvest cycle.
Freeze Cycle	15 sec. after activation if activated at least 15 sec. before the 5-min. short cycle protection timer terminates. Otherwise, at the end of the next harvest cycle.

Legend: **BC**—bin control; **CB**—control board

2. Bin Control Cleaning

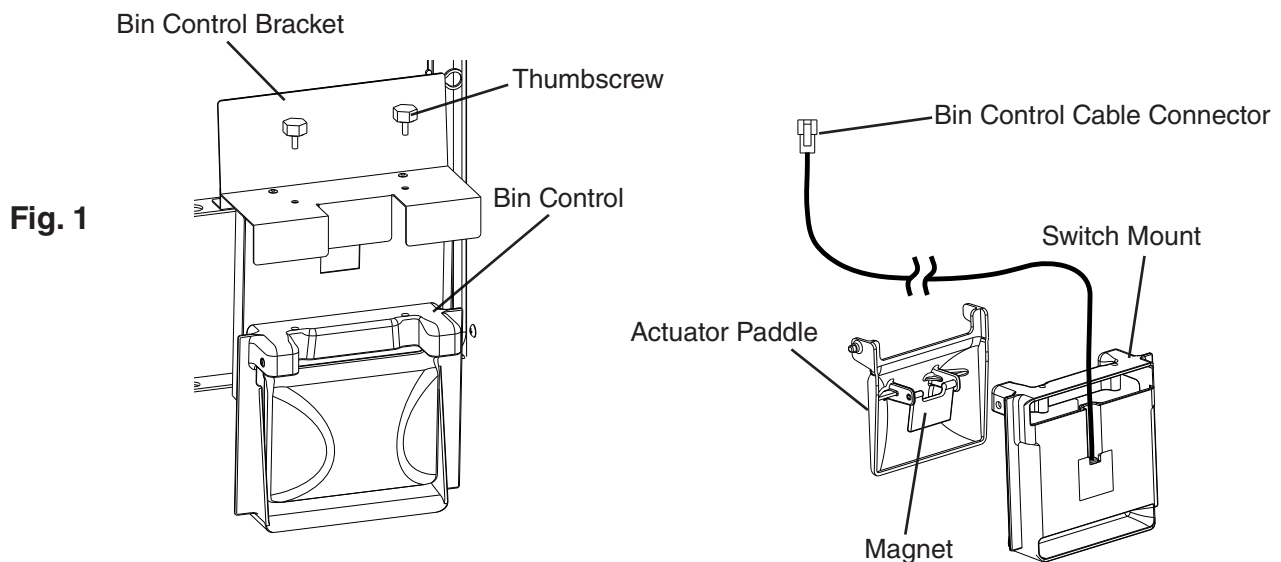
Scale may build up on BC. Scale can cause the actuator paddle and magnet to stick. In this case, BC should be cleaned.

⚠ WARNING

CHOKING HAZARD: Ensure all components, fasteners, and thumbscrews are securely in place after the icemaker is serviced. Make sure that none have fallen into the dispense unit/ice storage bin.

- 1) Turn off the power supply.
- 2) Remove the front panel, then move the control switch to the "OFF" position.
- 3) Clear any ice away from BC.
- 4) Carefully remove the BC cable from the cable ties in the evaporator case, then remove the BC from the bin control bracket and move to the front of the icemaker for cleaning.
- 5) Remove the actuator paddle from the switch mount. See Fig. 1.
- 6) Wipe down BC with a mixture of 1 part of Hoshizaki "Scale Away" and 25 parts of warm water. Rinse the parts thoroughly with clean water.
- 7) Reassemble BC and replace it in its correct position.
Note: If the magnet was removed for cleaning, be sure to replace it in its correct position.
- 8) Replace the BC cable into the cable ties in the evaporator case, then move the control switch to the "ICE" position.
- 9) Confirm CB wire harness connections are secure, then replace the control box cover in its correct position.
- 10) Turn on the power supply to start the automatic icemaking process.
- 11) Replace the front panel in its correct position.

Legend: **BC**—bin control; **CB**—control board



E. Evaporator Thermistor Check

To check thermistor resistance, follow the steps below.

- 1) Turn off the power supply.
- 2) Remove the front panel. Move the control switch to the "OFF" position.
- 3) Remove the control box cover.
- 4) Remove the thermistor from the evaporator.
- 5) Immerse the thermistor sensor portion in a glass containing ice and water for 2 or 3 min.
- 6) Disconnect the thermistor connector from CB CN13 connector and check the resistance between thermistor leads. Normal range is 4.7 to 6.2 kΩ. If outside the normal range, replace the thermistor. See "IV.B. Component Service Information." If within the normal range, continue to the next step.
- 7) Replace the thermistor in its correct position. See "IV.B. Component Service Information."
- 8) Reconnect the thermistor connector to CB CN13 connector.
- 9) Replace the control box cover in its correct position.
- 10) Move the control switch to the "ICE" position.
- 11) Replace the front panel in its correct position.
- 12) Turn on the power supply.

Legend: **CB**—control board; **Comp**—compressor

F. Control Switch

The control switch has three positions: "OFF" for power off, "ICE" for icemaking, and "WASH" to energize the pump motor when cleaning and sanitizing. **WARNING! Control switch in "OFF" position does not de-energize all loads. Risk of electric shock. Use extreme caution and exercise safe electrical practices.**

G. Diagnosis Table

First see "III.F. Error Codes." If there are no recorded errors, refer to the table below.

No Ice Production - Possible Cause	
1. Power Supply	a) Off, blown fuse, or tripped breaker. b) Not within specifications.
2. Fuse (Control Box)	a) Blown.
3. Control Switch	a) In "OFF" or "WASH" position. b) Bad contacts.
4. High-Pressure Switch	a) Dirty condenser or air filter. b) Fan motor not operating. c) Refrigerant overcharged. d) Bad contacts. e) Refrigerant lines or components restricted.
5. Control Transformer (115VAC/10.5VAC)	a) Coil winding open or shorted.
6. Control Board See "II.C. Control Board Check"	a) Error. See "III.F. Error Codes." b) Defective.
7. Bin Control See "II.D. Bin Control Check and Cleaning"	a) Tripped with bin filled with ice. b) Actuator does not move freely. c) Defective.
8. Water Supply	a) Water supply off or improper water pressure. b) External water filters restricted.
9. Inlet Water Valve	a) Screen or orifice restricted. b) Coil winding open.
10. Compressor	a) Compressor relay/magnetic contactor contacts bad or coil winding open. b) Start capacitor or run capacitor defective (single phase). c) Internal protector open. d) Start relay contacts bad or coil winding open (single phase). e) Defective.
11. Hot Gas Valve	a) Defective.
12. Evaporator (Cube Control) Thermistor See "II.E. Evaporator Thermistor Check"	a) Loose, disconnected, or defective.
13. Pump Motor	a) Mechanical seal worn out. b) Defective. c) Defective capacitor.
14. Thermostatic Expansion Valve	a) Bulb loose. b) Defective.
15. Fan Motor	a) Defective. b) Defective capacitor.
16. Water System	a) Water leaks.

Low Ice Production - Possible Cause	
Long Harvest Cycle	
1. Evaporator	a) Scaled up.
2. Control Board	a) Thermistor connection loose (K3).
	b) Defective.
3. Evaporator (Cube Control) Thermistor See "II.E. Evaporator Thermistor Check"	a) Loose, disconnected, or defective.
4. Hot Gas Valve	a) Erratic or closed.
5. Compressor	a) Inefficient or off.
6. Thermostatic Expansion Valve	a) Defective.
7. Refrigerant Charge	a) Low.
Long Freeze Cycle	
1. Evaporator	a) Scaled up, dirty.
2. Hot Gas Valve	a) Defective.
3. Condenser	a) Restricted.
4. Control Board	a) Defective.
5. Thermostatic Expansion Valve	a) Bulb loose.
	b) Defective.
6. Compressor	a) Inefficient or off.
7. Refrigerant Charge	a) Low.
Slab Does Not Break Into Separate Cubes - Possible Cause	
1. Spring	a) Over-extended.
2. Water Plate	a) Obstacle caught between evaporator and water plate.
Cubes Drop Separately - Possible Cause	
1. Refrigerant Charge	a) Low - Long harvest cycle.
2. Cam Arm	a) Worn out.
Imperfect Ice Production - Possible Cause	
1. Water Supply	a) Improper water pressure.
	b) External water filters restricted.
	c) Water leaks from water tank or water plate due to broken tank or plate or icemaker out of level.
2. Inlet Water Valve	a) Water leaks from valve body or water supply pipe joint.
3. Water Plate	a) Spray holes restricted.
4. Pump Motor	a) Defective.

Large-Hole Cubes - Possible Cause (Also see III.G.1. Dimple Diameter")	
1. Condenser	a) Dirty condenser or air filter.
2. Fan Motor	a) Defective.
3. Refrigerant Charge	a) Low.
Large-Hole Cubes - Possible Cause (Also see III.G.1. Dimple Diameter")	
4. Icemaker Location	a) Insufficient clearance.
	b) Ambient temperature too high.
5. Water Supply	a) Water leaks.
	b) Improper water pressure.
Cloudy Cubes - Possible Cause	
1. Water Quality	a) High hardness. See "III.G.2. Ice Clarity."
2. Slush Ice	a) Use Anti-Slush Control (Control Board Settings 50 and 51).

H. Freeze-Up Check List

Freeze-Up Check List IM Series

Please Complete When Diagnosing a Freeze-Up, Refrigerant Leak, or Low Charge

Technical Support Fax #: 770-487-3360

Make Copies And Use As Needed

Model # _____ **Serial #** _____ **Install Date** _____ **Freeze-Up Date** _____

List model and manufacture of bin or dispenser: _____.

Date appliance was last cleaned: _____.

Freeze-Up Defrost

YES NO

- [] [] 1) After defrosting, was the appliance leak checked?
[] [] 2) Were any leaks found?
If so where? _____.
[] [] 3) Was any refrigerant added to the unit?
If so, how much? _____.

Setup

- [] [] 4) Is the appliance stand alone?
[] [] 5) Is water line independent?
[] [] 6) Is water line correct size? If not _____."
1/4" Nominal ID Copper Water Tubing or
Equivalent.
[] [] 7) What is water pressure? _____.
Water Temperature _____.
[] [] 8) Does appliance have any water filtration?
If yes please list the following:
Filter brand _____.
Model _____.
Filter pressure gauge reading during the fill
cycle _____.
Date filter was last
replaced? _____.
GPM or LPM flow rate of filter
system? _____.
[] [] 9) Ambient temperature at appliance?
_____.
At remote condenser (if applicable)? _____.

Appliance Status

- [] [] 10) Is the appliance dirty?
[] [] 11) Are the actuator springs in place?
[] [] 12) Are actuator cam A and Cam B in their correct
positions?
[] [] 13) Is the bin control properly mounted and
secured?
[] [] 14) Is the evaporator thermistor properly mounted,
tight, and insulated?
[] [] 15) Is the TXV bulb properly mounted, tight, and
insulated (wrapped)?
[] [] 16) Is there an error code on the control board
display? if so, what error code? _____.

Appliance Operation

YES NO

- [] [] 17) Does the water tank fill and overflow?
[] [] 18) If NO in step 17, is water flow 5GPM or more?

Harvest

- [] [] 19) Is the hot gas valve opening?
[] [] 20) Does the water valve remain energized for the
appropriate time?
[] [] 21) Does the water valve energize at correct times?
[] [] 22) Does water valve close completely when
de-energized?
23) What was length of harvest? _____.

Freeze

- [] [] 24) Is pump motor energized in freeze cycle except
during pump motor delay?
[] [] 25) Are the water plate spray holes clean and
providing proper water flow?
26) What was length of freeze? _____.
[] [] 27) Is the cube size consistent across evaporator?
[] [] 28) Is dimple size consistent throughout ice drop?
29) What is the ice drop weight? _____.
30) What is head pressure?
Freeze _____ Harvest _____.
(Freeze pressure should be taken 5 minutes into
the cycle).
31) What is suction pressure?
Freeze _____ Harvest _____.
(Freeze pressure should be taken 5 minutes into
the cycle).
[] [] 32) Did appliance shut down when the bin control
was activated?

Note: Make copies of this form and use it when diagnosing a freeze up condition. Submit a completed copy of the checklist along with the freeze-up labor claim form.

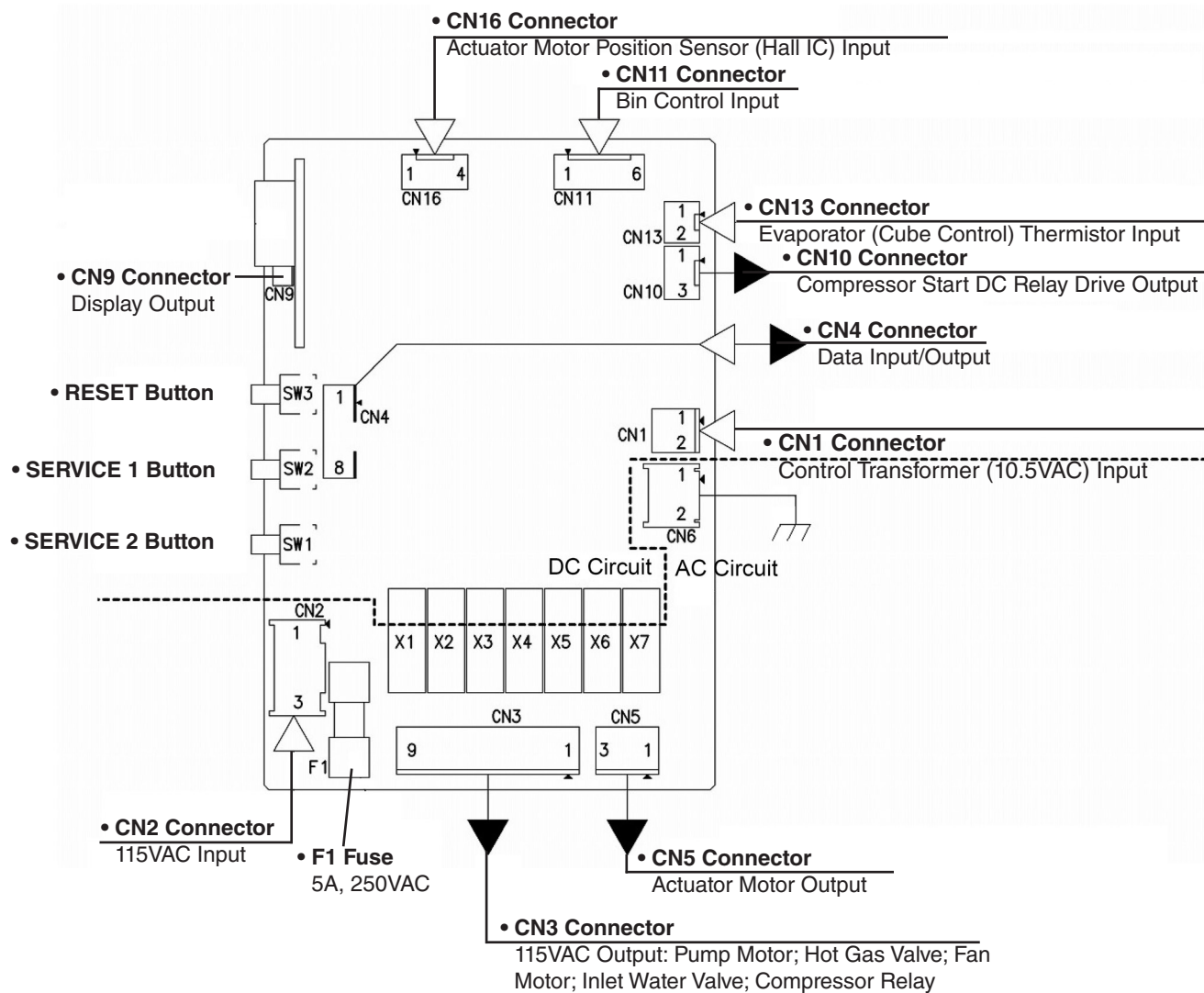
III. Controls and Adjustments

A. Control Board

- A Hoshizaki exclusive control board is employed in IM series appliances.
- All models are pretested and factory adjusted.

<i>NOTICE</i>
<ul style="list-style-type: none">• Fragile, handle very carefully.• The control board contains integrated circuits, which are susceptible to failure due to static discharge. It is especially important to touch the metal part of the icemaker when handling or replacing the control board.• Do not touch the electronic devices on the control board or the back of the control board.• Do not change wiring and connections.• Do not short out power supply to test for voltage.• Always replace the whole control board assembly if it goes bad.

1. Control Board Layout



Control Board	
Part Number	P01873-01 Version 1.3A or Later

B. Control Board Buttons

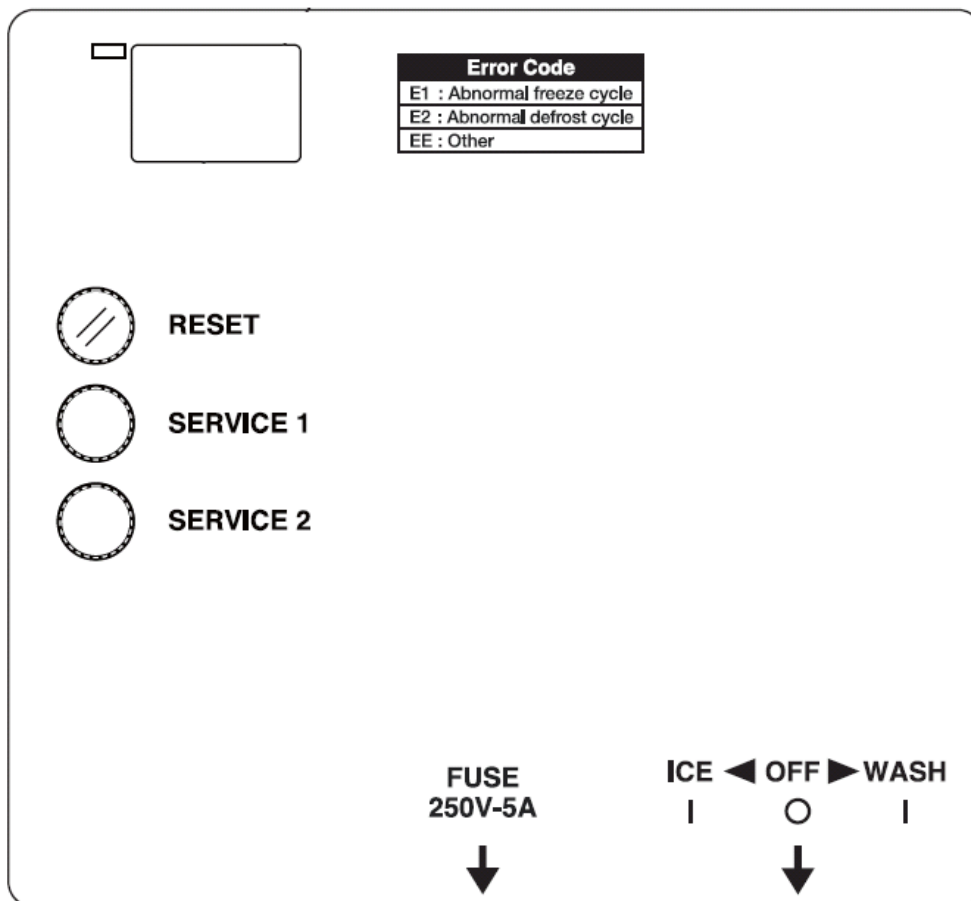
The control board features RESET, SERVICE 1, and SERVICE 2 Buttons

1. RESET Button

- Press briefly to go to initial harvest cycle.
- Press and hold for 3 seconds to enter control board setting mode. For details about control board settings, see "III.C. Control Board Settings."

2. SERVICE 1 and SERVICE 2 Buttons

- Press the "SERVICE 1" or "SERVICE 2" button briefly to display the current freeze cycle termination temperature (Control Board Setting 2). This setting controls dimple diameter. For details about adjusting the dimple diameter, see "III.G.1. Dimple Diameter." **NOTICE! Do not decrease dimple size below 3/16" (5 mm).**
- Press and hold the "SERVICE 1" button for 3 seconds to enter information display and model code setting mode. For details about information display and model code setting, see "III.E. Control Board Model Code Setting."



C. Control Board Settings

NOTICE

Failure to maintain factory settings may adversely affect performance and warranty coverage. For more information, contact your Hoshizaki Service Center.

- 1) With "on" in display, press and hold the "RESET" button for 3 seconds. Display changes to "1".
- 2) Use the "SERVICE 1" and "SERVICE 2" buttons to choose a control board setting.
- 3) Press the "RESET" button to view the setting's value. Current value flashes in display.
- 4) Use the "SERVICE 1" and "SERVICE 2" buttons to change value.
- 5) Press the "RESET" button to select value. Display returns to control board setting number.
- 6) Once display returns to "on" (20 seconds), the new setting is saved.

Control Board (CB) Setting Menu				
Category	No.	Item	Range	IM-500SAB Default
Basic	1	<u>Harvest Cycle Termination Temperature</u> Temperature to complete harvest cycle.	2 to 20°C (1°C increments)	5
	2	<u>Freeze Cycle Termination Temperature</u> Integrated with freeze cycle termination time (CB Setting 3) to control length of freeze cycle after evaporator (cube control) thermistor temperature drops to 32°F (0°C). To use this setting for dimple size adjustment, see "III.G.1. Dimple Diameter."	-14.5 to -20.5°C (0.5°C increments. The "." in the lower, right corner of the display indicates .5°C.)	-17.5
	3	<u>Freeze Cycle Termination Time</u> Integrated with freeze cycle termination temperature (CB Setting 2) to control length of freeze cycle after evaporator (cube control) thermistor temperature drops to 32°F (0°C).	7 to 11 min. (1 min. increments)	9
	4	<u>Ambient Temperature Correction Value for Freeze Cycle Termination</u> DO NOT ADJUST	10 to 50°C (1°C increments)	10
	5	<u>Ambient Temperature Correction Rate for Freeze Cycle Termination</u> DO NOT ADJUST	10 to 100% (00 = 100) (1% increments)	100
	6	<u>Freeze Cycle Backup Timer</u> Maximum allowed freeze time to prevent possible freeze-up issues.	45 to 90 min. (5 min. increments)	45
Water Supply	10	<u>Harvest Cycle Water Supply Time: Water Temperature 48°F (9°C) or Lower</u> When set to "99", inlet water valve energized until harvest cycle termination temperature (CB Setting 1) is reached.	1 to 99 sec, 99 = continuous (1 sec. increments)	95
	11	<u>Harvest Cycle Water Supply Time: Water Temperature Higher Than 48°F (9°C)</u> When set to "99", inlet water valve energized until harvest cycle termination temperature (CB Setting 1) is reached.	1 to 99 sec, 99 = continuous (1 sec. increments)	30

Control Board (CB) Setting Menu				
Category	No.	Item	Range	IM-500SAB Default
Water Supply, continued	12	<u>Freeze Cycle Water Supply Time 1: Partial Drain</u> (CB Setting 14)	0 to 90 sec. (1 sec. increments)	30
		<u>Freeze Cycle Water Supply Time 1: Full Drain</u> (CB Setting 14)		60
	13	<u>Water Temperature Correction Value</u> Value added to correct the difference between the temperature at the evaporator (cube control) thermistor and actual water supply temperature.	+0 to +20°C (1°C increments)	11
	14	<u>Partial/Full Drain Selection</u> Controls timing for inlet water valve and pump motor in the freeze cycle. <u>Partial Drain:</u> Pump motor energizes after freeze cycle water supply time 1 (CB Setting 12) timer terminates. During the first freeze cycle after startup or following a bin control initiated shutdown and restart, freeze cycle water supply times 1 and 2 (CB Settings 12 and 15) are doubled. <u>Full Drain:</u> Pump motor energizes after freeze cycle water supply time 1 (CB Setting 12) timer terminates. If full drain is selected, change freeze cycle making water supply times 1 and 2 (CB Settings 12 and 15) to the full drain times listed in this table and move the water tank drain pipe to the drain position. For details, see "III.G.2. Ice Clarity."	Partial=1; Full=0	1
	15	<u>Freeze Cycle Water Supply Time 2: Partial Drain</u> (CB Setting 14)	0 to 90 sec. (1 sec. increments)	22
		<u>Freeze Cycle Water Supply Time 2: Full Drain</u> (CB Setting 14)		44
	17	<u>Ice Bridge Control Divided Harvest Cycle Water Supply</u> Divides harvest cycle water supply to prevent water from flowing over ice when ice drops in harvest. e.g. CB Setting 1 = 6 CB Setting 10 = 90 CB Setting 17 = 1 CB Setting 18 = 2 When set as above, harvest cycle water supply is as follows: Inlet water valve energizes for 40 sec. when harvest cycle starts. Inlet water valve energizes again when thermistor temperature reaches 39°F (4°C) (CB Setting 1 - CB Setting 18). Inlet water valve de-energizes after 50 sec. (CB Setting 10 - 40 sec.) or when thermistor temperature reaches 43°F (6°C) (CB Setting 1) whichever comes first.	Yes=1; No=0	0
	18	<u>Ice Bridge Control Divided Harvest Cycle Water Supply Restart Temperature Factor</u> When CB Setting 17 is set to 1, CB Setting 1 - CB Setting 18 = temperature at which harvest cycle water supply restarts.	0 to 20°C (1°C increments)	0

Control Board (CB) Setting Menu				
Category	No.	Item	Range	IM-500SAB Default
Other	21	<u>Stackable Bin Control</u> Allows for stacked units to be controlled through one bin control. DO NOT ADJUST	Yes=1; No=0	1
	22	<u>Refrigeration Circuit Cycling when Bin Full</u> DO NOT ADJUST	On=1; Off=0	0
Model	30	<u>Type</u> 0: WC, PS, No CondTherm, Ignore CB Setting 34 1: AC, No PS, No CondTherm, Use CB Setting 34 2: AC, No PS, CondTherm, Use CB Setting 34 3: AC, PS, No CondTherm, Use CB Setting 34 DO NOT ADJUST	0 to 3	3
Harvest Cycle High Temperature Control	34	<u>Harvest Cycle High Temperature Control</u> Active if type setting (CB Setting 30) is set to 1, 2, or 3. If control board thermistor temperature at the beginning of harvest cycle is equal to or greater than the harvest cycle high temperature control setting, fan motor operates continuously in harvest cycle.	40 to 70°C (1°C increments)	48
Water Regulating Valve	36	<u>Water Regulating Valve Error Detection Temperature</u> DO NOT ADJUST	0 to 50°C 0=ignore, air-cooled model (1°C increments)	0
Compressor	37	<u>Compressor Output Selection</u> DO NOT ADJUST	0: X8 (DC Relay) On 1: X1 (AC Relay) On	1
Anti-Slush Control	50	<u>Pump De-Energized Time</u> When temperature at evaporator (cube control) thermistor drops to 37°F (3°C) in the freeze cycle, pump de-energizes for the length of time set.	0 to 90 sec. 0=ignore, no anti-slush (1 sec. increments)	0
	51	<u>Anti-Slush Control Water Supply Time</u> Time inlet water valve is energized while pump is de-energized if pump de-energized time (CB Setting 50) is greater than 0.	0 to 5 sec. (1 sec. increments)	0
Hard Water Control	60	<u>Integrated Value</u> If hard water control water supply time (CB Setting 61) is greater than 0: After evaporator (cube control) thermistor indicates temperature of 32°F (0°C) in freeze cycle, inlet water valve energized starting when percentage of freeze cycle termination temperature and freeze cycle time integrated value has been achieved. DO NOT ADJUST	10 to 100% (00=100) (1% increments)	10
	61	<u>Hard Water Control Water Supply Time</u> Time inlet water valve is energized after integrated value (CB Setting 60) conditions are met. Before using this setting, follow the instructions to improve ice clarity; see "III.G.2. Ice Clarity."	0 to 90 sec. (1 sec. increments)	0

Control Board (CB) Setting Menu				
Category	No.	Item	Range	IM-500SAB Default
Water Tank Ice Control	70 71 74	If control board thermistor temperature is above the water tank ice control lower temperature setting (CB Setting 74) and equal to or less than the water tank ice control upper temperature setting (CB Setting 70) when freeze cycle termination temperature (CB Setting 2) is met, the hot gas valve energizes/de-energizes/energizes for the times set by the hot gas valve energized/de-energized times (CB Settings 71) to reduce bonding of the water tank to the evaporator.	See Ranges Below	See Defaults Below
Water Tank Ice Control & Ice Bridge Control	70	<u>Water Tank Ice Control Upper Temperature</u> See CB Setting 70, 71, 74 description above. <u>Ice Bridge Control Temperature</u> See CB Setting 73 description below.	10 to 60°C (1°C increments)	44
Water Tank Ice Control	71	<u>Water Tank Ice Control Hot Gas Valve Energized Time</u> See CB Setting 70, 71, 74 description above.	0 to 10 sec. (1 sec. increments)	5
Ice Bridge Control	73	<u>Ice Bridge Control Hot Gas Valve De-Energized Time</u> Time hot gas valve is de-energized after 20 sec. in harvest cycle if control board thermistor temperature is above the ice bridge control temperature (CB Setting 70) when freeze cycle termination temperature (CB Setting 2) is met.	0 to 30 sec. (1 sec. increments)	0
Water Tank Ice Control & Harvest Cycle Low Temperature Control	74	<u>Water Tank Ice Control Lower Temperature</u> See CB Setting 70, 71, 74 description above. <u>Harvest Cycle Low Temperature Control</u> If control board thermistor temperature at the beginning of harvest cycle is equal to or less than the harvest cycle low temperature control setting, hot gas valve repeatedly energizes for 40 seconds then de-energizes for 40 seconds to promote a balanced harvest across the evaporator plate.	0 to 40°C (1°C increments)	27

D. Control Board Information Display

- 1) With unit on, press and hold the "SERVICE 1" button for 3 seconds. Display changes to "n1".
- 2) Use the "SERVICE 1" and "SERVICE 2" buttons to move through the list.
- 3) Press the "RESET" button to view the item's value.
- 4) Press the "RESET" button to return to list.
- 5) Display returns to normal if no buttons are touched for 20 seconds.

Control Board Information Display			
No.	Item	Description	History Cleared by Pressing and Holding SERVICE 1 and SERVICE 2 Buttons Simultaneously for 5 Sec. when Item Value is Displayed?
n1	<u>Freeze Cycle Time</u> During Freeze Cycle: Time since freeze cycle started. After Freeze Cycle: Time of previous freeze cycle.	0 to 99 min.	No
n2	<u>Freeze Cycle Completion Rate</u> During Freeze Cycle: Percent of freeze cycle completed. After Freeze Cycle: Percent of previous freeze cycle completed.	0 to 100% 00 = 100%	No
n3	<u>Current Evaporator (Cube Control) Thermistor Temperature</u>	°C	No
n4	<u>Current Control Board Thermistor Temperature</u>	°C	No
n5	<u>Water Temperature</u> Temperature at evaporator (cube control) thermistor 30 seconds after pump motor energized in freeze cycle plus the water temperature correction value (Control Board Setting 13).	"H" if Higher than 48°F (9°C) "L" if 48°F (9°C) or Lower	No
n6	<u>Current Condenser Thermistor Temperature</u> Not Applicable to IM-500SAB	°C	No
h1	<u>Last Completed Freeze Cycle Time</u> Freeze cycles interrupted by bin control shutdown or the "RESET" button are not recorded.	0 to 99 min.	Yes
h2	<u>Number of Completed Freeze Cycles Since Last Counter Reset</u> Counter updates every 10 freeze cycles. Freeze cycles interrupted by bin control shutdown or the "RESET" button are not recorded.	Displays up to 999,999 cycles. Displays two digits at a time. For example, 655,350 cycles display as follows: 65>off>53>off>50>off>- -	Yes
h3	<u>Total Number of Completed Freeze Cycles</u> Counter updates every 10 freeze cycles. Freeze cycles interrupted by bin control shutdown or the "RESET" button are not recorded.	65>off>53>off>50>off>- - (repeat)	No

Control Board Information Display			
No.	Item	Description	History Cleared by Pressing and Holding SERVICE 1 and SERVICE 2 Buttons Simultaneously for 5 Sec. when Item Value is Displayed?
h4	<u>Error Log</u> Displays up to 5 errors with the most recent error first. For error details, see "III.F. Error Codes."	For example, E5 (most recent), E4, E3, E2, E1 (least recent of up to 5 errors) displays as follows: E5>off>E4>off>E3>off>E2>off>E1>off>- - (repeat)	Yes
h5	<u>Firmware Version</u> Displays control board's firmware version.	For example, version 1.0A, displays as follows: 01.>off>0A>off>- - (repeat)	No
h6	<u>Model Code</u> The model code puts all settings for a given model to the correct default settings. The model code setting mode should only be used when the control board has been changed, the model code is incorrect, or to reset all settings to the default. For details about the model code setting mode, see "III.E. Control Board Model Code Setting."	Displays two-character model code. "00" to "FF"	No

E. Control Board Model Code Setting

1. Control Board Replacement

WARNING

- This appliance should be diagnosed and repaired only by qualified service personnel to reduce the risk of death, electric shock, serious injury, or fire.
- Move the control switch to the "OFF" position and turn off the power supply. Place the disconnect in the "OFF" position. Lockout/Tagout to prevent the power supply from being turned back on inadvertently.

- 1) Move the control switch to the "OFF" position and turn off the power supply. Place the disconnect in the "OFF" position. Lockout/Tagout to prevent the power supply from being turned back on inadvertently.
- 2) Remove the front cover and control box cover.
- 3) Disconnect all the connectors from the control board.
- 4) Remove the old control board and install the new control board (P01873-01 Version 1.3A or Later).
- 5) Connect the connectors to the new control board.
- 6) Replace the control box cover in its correct position.
- 7) Turn on the power supply, then move the control switch to the "ICE" position.
- 8) "00" appears in the display of the new control board.
- 9) Press the "SERVICE 1" button to increase the first digit in the display and the "SERVICE 2" button to increase the second digit. Digits appear in the following order: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F. When a valid model code is displayed, the dot in the bottom right of the display turns on. For IM-500SAB, set model code to "08".
- 10) When the desired model code is displayed, press the "RESET" button to save the setting. "on" appears in the display.
- 11) Replace the front panel in its correct position.

2. Checking or Changing the Control Board Model Code

- 1) With unit on, press and hold the "SERVICE 1" button for 3 seconds. Display changes to "n1".
- 2) Use the "SERVICE 1" and "SERVICE 2" buttons to move through the list until "h6" is displayed.
- 3) Press the "RESET" button to view the current model code. To change the model code, continue through the remaining steps; otherwise, the display returns to normal if no buttons are touched for 20 sec.
- 4) Press and hold the "SERVICE 1" and "SERVICE 2" buttons simultaneously for 15 sec. "00" appears in display.
- 5) Press the "SERVICE 1" button to increase the first digit in the display and the "SERVICE 2" button to increase the second digit. Digits appear in the following order: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F. When a valid model code is displayed, the dot in the bottom right of the display turns on. For IM-500SAB, set model code to "08".
- 6) When the desired model code is displayed, press the "RESET" button to save the setting. "on" appears in the display.

F. Error Codes

When the control board detects an error, the display shows one of the following error codes in the display mode. Error codes other than E1 and E2 are displayed as "EE" at the time of occurrence. To see the actual error code, see the error log.

- 1) With the unit on, press and hold the "SERVICE 1" button for 3 seconds. Display changes to "n1".
- 2) Use the "SERVICE 1" and "SERVICE 2" buttons to move through the list until "h4" is displayed.
- 3) Press the "RESET" button to view the error log. Displays up to 5 errors with the most recent error first.
- 4) Press the "RESET" button to return to list. To clear error log history, press and hold the "SERVICE 1" and "SERVICE 2" buttons simultaneously for 5 sec.
- 5) Display returns to normal if no buttons are touched for 20 sec.

Error Codes		
Error Code	Problem	Corrective Action/Reset Details
E1	<u>Freeze Cycle Backup Timer</u> Freeze cycle backup timer (Control Board Setting 6) has terminated. 45 min. after water tank starts to close in preceding harvest cycle, unit stops if the evaporator temperature is above 32°F (0°C).	Check for inlet water valve leaking by, hot gas valve leaking by, pump motor not pumping, thermostatic expansion valve not feeding properly, low charge, or inefficient compressor. Press the "RESET" button to reset.
E2	<u>Harvest Cycle Backup Timer</u> Harvest cycle backup timer has terminated. 30 min. after water tank starts to open in harvest cycle, unit stops if harvest cycle termination temperature (Control Board Setting 1) has not been reached.	Check for open thermistor, HGV not opening, TXV leaking by, low charge, or inefficient compressor. Press the "RESET" button to reset.
EE (E3)	<u>Water Tank Opening Backup Timer</u> 3-minute opening backup timer starts when water tank starts to open. If actuator motor's internal position sensor does not indicate water tank is fully open within 3 minutes, display shows "EE" and unit stops for 60 minutes. If error recurs after unit resumes operation, display shows "EE" and unit shuts down.	Check actuator motor and control board. Press the "RESET" button to reset.
EE (E4)	<u>Water Tank Closing Backup Timer</u> 3-minute closing backup timer starts when water tank starts to close. If actuator motor's internal position sensor does not indicate water tank is fully closed within 3 minutes, display shows "EE" and unit stops for 60 minutes. If error recurs after unit resumes operation, display shows "EE" and unit shuts down.	Check actuator motor and control board. Press the "RESET" button to reset.
EE (E5)	<u>High Evaporator Temperature</u> If evaporator temperature 140°F (60°C) or higher for 5 sec., unit stops.	Check for harvest problem (stuck HGV or control board relay), hot water entering unit, or shorted thermistor. Press the "RESET" button to reset.
EE (E9)	<u>Condenser Thermistor Error</u> If condenser thermistor is open or shorted for 2 sec., unit stops. Note: IM-500SAB does not utilize a condenser thermistor, therefore E9 error will not occur.	Replace condenser thermistor.
EE (EA)	<u>Control Board Error</u> If model data IC is defective, unit stops.	Replace control board.
EE (EC)	<u>Evaporator (Cube Control) Thermistor Error</u> If evaporator thermistor is open or shorted for 2 sec., unit stops.	Replace evaporator thermistor.
EE (Ed)	<u>Water Regulating Valve Error</u> If water regulating valve thermistor detects a temperature below the water regulating valve error detection temperature (Control Board Setting 36), error is displayed but unit continues to operate. Note: IM-500SAB does not utilize a water regulating valve, therefore Ed error will not occur.	Check water regulating valve. Press the "RESET" button to reset.

G. Quick Adjustments

1. Dimple Diameter

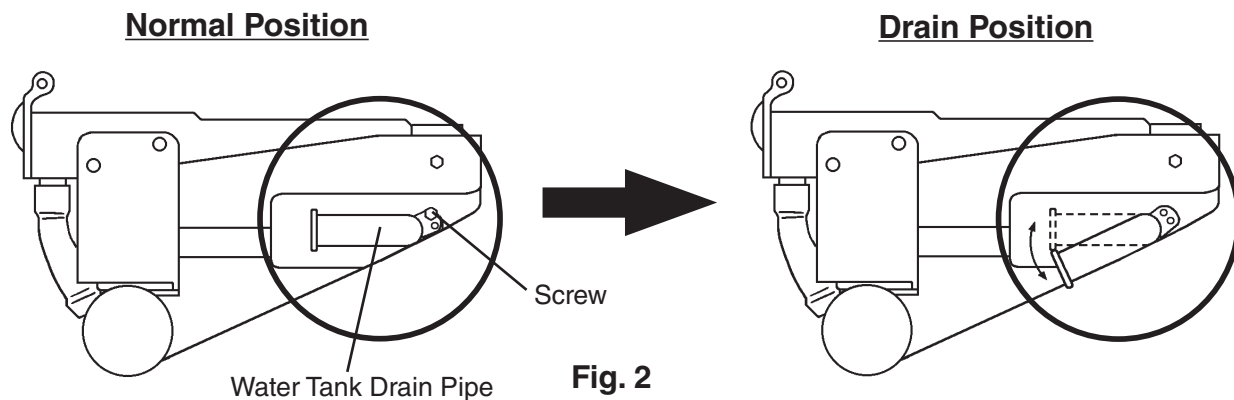
The factory set dimple diameter is 3/16" (5 mm). **NOTICE! Do not decrease the dimple diameter below 3/16" (5 mm).**

a) To increase dimple diameter:

- 1) Remove front panel.
- 2) Press the "SERVICE 1" button to view the current freeze cycle termination temperature setting.
- 3) Press the "SERVICE 1" button to raise freeze cycle termination temperature setting (Control Board Setting 2). Temperature setting rises in .5°C increments. The "." in the lower, right corner of the display indicates .5°C. Default is -18.5°C. For reference, raising freeze cycle termination temperature setting to -13°C will result in a dimple diameter of approximately 3/8" (10 mm).
- 4) Once the display returns to "on" (20 seconds), the new setting is saved.

b) To decrease dimple diameter:

- 1) Remove front panel.
- 2) Press the "SERVICE 2" button to view the current freeze cycle termination temperature setting.
- 3) Press the "SERVICE 2" button to lower freeze cycle termination temperature setting (Control Board Setting 2). Temperature setting lowers in .5°C increments. The "." in the lower, right corner of the display indicates .5°C. Default is -18.5°C. **NOTICE! Do not decrease dimple size below 3/16" (5 mm).**
- 4) Once the display returns to "on" (20 seconds), the new setting is saved.



2. Ice Clarity

In hard water conditions, white ice may be produced. In such cases, install a water filter and/or water softener, then follow the instructions below.

- 1) Move the control switch to the "OFF" position, then turn off the power supply.
- 2) Remove the front panel.
- 3) Remove the screw, then move the water tank drain pipe to the drain position. See Fig. 2. Use the screw to secure the water tank drain pipe in the drain position.
- 4) Turn on the power supply, then move the control switch to the "ICE" position.
- 5) Press and hold the "RESET" button for 3 seconds. "1" appears in the display.
- 6) Press the "SERVICE 1" button until "12" appears in the display. Press the "RESET" button. The current icemaking water supply time value flashes in the display. Press the "SERVICE 1" or "SERVICE 2" buttons to change the setting to "60".
- 7) Press the "RESET" button to save the setting and return to the menu.
- 8) Using the same procedure as above, change the full/partial drain setting (Control Board Setting 14) from "1" (partial drain) to "0" (full drain).
- 9) Using the same procedure as above, change the additional icemaking water supply time setting (Control Board Setting 15) to "44".
- 10) Once the display returns to "on" (20 seconds), the new setting is saved.
- 11) Replace the front panel in its correct position.

Note: If white ice continues to be an issue, set hard water setting water supply time (Control Board Setting 61) to "15". This results in the inlet water valve energizing for 15 seconds part way through the freeze cycle and diluting the water in the water tank. Do not increase this setting beyond 15 seconds; otherwise, freeze cycle times may become long and bridging may occur in the ice storage bin.

IV. Refrigeration Circuit and Component Service Information

WARNING

- This appliance should be diagnosed and repaired only by qualified service personnel to reduce the risk of death, electric shock, serious injury, or fire.
- Move the control switch to the "OFF" position and turn off the power supply. Place the disconnect in the "OFF" position. Lockout/Tagout to prevent the power supply from being turned back on inadvertently.
- **CHOKING HAZARD:** Ensure all components, fasteners, and thumbscrews are securely in place after the icemaker is serviced. Make sure that none have fallen into the dispenser unit/ice storage bin.
- Make sure all food zones in the icemaker and dispenser unit/ice storage bin are clean after service.

A. Refrigeration Circuit Service Information

WARNING

- Repairs requiring the refrigeration circuit to be opened must be performed by properly trained and EPA-certified service personnel.
- Use an electronic leak detector or soap bubbles to check for leaks. Add a trace of refrigerant to the system (if using an electronic leak detector), and then raise the pressure using nitrogen gas (140 PSIG). Do not use R-404A as a mixture with pressurized air for leak testing.

NOTICE

- Always recover the refrigerant and store it in an approved container. Do not discharge the refrigerant into the atmosphere.
- Do not leave the system open for longer than 15 min. when replacing or servicing parts. The Polyol Ester (POE) oils used in R-404A applications can absorb moisture quickly. Therefore it is important to prevent moisture from entering the system when replacing or servicing parts.
- Always install a new drier every time the sealed refrigeration system is opened. Do not replace the drier until after all other repair or replacement has been made. Install the new drier with the arrow on the drier in the direction of the refrigerant flow.
- When brazing, protect the drier by using a wet cloth to prevent the drier from overheating. Do not allow the drier to exceed 250°F (121°C).

1. Refrigerant Recovery

The icemaker is provided with refrigerant access valves. Using proper refrigerant practices, recover the refrigerant. Store the refrigerant in an approved container. Do not discharge the refrigerant into the atmosphere.

2. Brazing

WARNING

- R-404A itself is not flammable at atmospheric pressure and temperatures up to 176°F (80°C).
- R-404A itself is not explosive or poisonous. However, when exposed to high temperatures (open flames), R-404A can be decomposed to form hydrofluoric acid and carbonyl fluoride both of which are hazardous.
- Do not use silver alloy or copper alloy containing arsenic.

- 1) Braze all fittings while purging with nitrogen gas flowing at a pressure of 3 to 4 PSIG.

Note: Because the pipes in the evaporator case are specially coated to resist corrosion, it is important to make connections outside the evaporator case when possible. If it is necessary to braze inside the evaporator case, use sandpaper to remove the coating from the brazing connections before unbrazing the components.

NOTICE

- Always install a new drier every time the sealed refrigeration system is opened.
- Do not replace the drier until after all other repair or replacement has been made. Install the new drier with the arrow on the drier in the direction of the refrigerant flow.
- When brazing, protect the drier by using a wet cloth to prevent the drier from overheating. Do not allow the drier to exceed 250°F (121°C).

- 2) Use an electronic leak detector or soap bubbles to check for leaks. Add a trace of refrigerant to the system (if using an electronic leak detector), and then raise the pressure using nitrogen gas (140 PSIG). Do not use R-404A as a mixture with pressurized air for leak testing.

3. Evacuation and Recharge (R-404A)

- 1) Attach a vacuum pump to the system. Be sure to connect the charging hoses to both high and low-side refrigerant access valves.

IMPORTANT

The vacuum level and vacuum pump may be the same as those for current refrigerants. However, the rubber hose and gauge manifold to be used for evacuation and refrigerant charge should be exclusively for POE oils.

- 2) Turn on the vacuum pump. Open the gauge manifold valves. Never allow the oil in the vacuum pump to flow backwards.
- 3) Allow the vacuum pump to pull down to a 29.9" Hg vacuum. Evacuating period depends on pump capacity.
- 4) Close the low-side valve and high-side valve on the gauge manifold.

- 5) Disconnect the gauge manifold hose from the vacuum pump and attach it to a refrigerant service cylinder. Remember to loosen the connection and purge the air from the hose. For the required refrigerant charge, see the nameplate. Hoshizaki recommends only virgin refrigerant or reclaimed refrigerant which meets ARI Standard 700 (latest edition) be used.
- 6) A liquid charge is required when charging an R-404A system (to prevent fractionation). Place the service cylinder on the scales; if the service cylinder is not equipped with a dip tube, invert the service cylinder, then place it on the scales. Open the high-side valve on the gauge manifold.
- 7) Allow the system to charge with liquid until the proper charge weight is met.
- 8) If necessary, add any remaining charge to the system through the low-side.
NOTICE! To prevent compressor damage, use a throttling valve or liquid dispensing device to add the remaining liquid charge through the low-side refrigerant access valve with the icemaker running.
- 9) Close the high and low-side gauge manifold valves, then disconnect the gauge manifold hoses.
- 10) Cap the refrigerant access valves to prevent a possible leak.

B. Component Service Information

NOTICE

When replacing a component listed below, see the notes to help ensure proper operation.

Component	Notes
Compressor	Install a new start capacitor, run capacitor, and start relay.
Thermostatic Expansion Valve	<ul style="list-style-type: none">• Attach the thermostatic expansion valve bulb to the suction line in the same location as the previous bulb.• The bulb should be between the 10 and 2 o'clock positions on the tube.• Secure the bulb with the clamp and holder, then insulate it.
Hot Gas Valve	<ul style="list-style-type: none">• Replace the strainer if applicable.• Use copper tube of the same diameter and length when replacing valve lines.
Fan Motor	Install a new capacitor.
Pump Motor	Install a new capacitor.
Actuator Motor	Install a new capacitor.
Evaporator (Cube Control) Thermistor	<ul style="list-style-type: none">• Attach the new thermistor to the same location on the evaporator as the previous thermistor.• Smoothly fill the recessed area of the thermistor holder with high thermal conductive type sealant. KE-4560 RTV (manufactured by ShinEtsu Silicones) or equivalent are recommended.• Attach the new thermistor in position on the evaporator and press down the thermistor holder over the thermistor.• Be very careful to prevent damage to the leads.

V. Maintenance

The maintenance schedule below is a guideline. More frequent maintenance may be required depending on water quality, the appliance's environment, and local sanitation regulations

WARNING

- Only qualified service technicians should service the appliance.
- To reduce the risk of electric shock, do not touch the control switch or service switch with damp hands
- Before servicing: Move the control switch to the "OFF" position and turn off the power supply. Place the disconnect in the "OFF" position. Lockout/Tagout to prevent the power supply from being turned back on inadvertently.
- **CHOKING HAZARD:** Ensure all components, fasteners, and thumbscrews are securely in place after any maintenance is done to the icemaker. Make sure that none have fallen into the dispenser unit/ice storage bin.

Maintenance Schedule

Frequency	Area	Task
Daily	Scoop	Clean the ice scoop using a neutral cleaner. Rinse thoroughly after cleaning.
Bi-Weekly	Air Filters	Inspect. Wash with warm water and neutral cleaner if dirty.
Monthly	External Water Filters	Check for proper pressure and change if necessary.
	Icemaker Exterior	Wipe down with a clean, soft cloth. Use a damp cloth containing a neutral cleaner to wipe off oil or dirt build up. Clean any chlorine staining (rust colored spots) using a non-abrasive cleanser.
Yearly	Icemaker and Dispenser Unit/Ice Storage Bin Liner	Clean and sanitize per the cleaning and sanitizing instructions provided in the instruction manual or maintenance label on the icemaker.
	Water Supply Inlet	Close the icemaker water supply line shut-off valve and drain the water system. Clean the water supply inlet screen.
	Condenser	Inspect. Clean if necessary by using a brush or vacuum cleaner. More frequent cleaning may be required depending on location.
	Water Hoses	Inspect the water hoses and clean/replace if necessary.

VI. Preparing the Icemaker for Periods of Non-Use

NOTICE
<ul style="list-style-type: none">• When storing the appliance for an extended time or in sub-freezing temperatures, follow the instructions below to prevent damage.• To prevent damage to the water pump, do not operate the appliance with the control switch in the "WASH" position when the water tank is empty.

When the appliance is not used for two or three days under normal conditions, it is sufficient to move the control switch to the "OFF" position. When storing the appliance for an extended time or in sub-freezing temperatures, follow the instructions below.

1. Remove the water from the icemaker water supply line:

- 1) Turn off the power supply.
- 2) Move the control switch to the "OFF" position.
- 3) Close the icemaker water supply line shut-off valve and open the icemaker water supply line drain valve.
- 4) Allow the icemaker water supply line to drain by gravity.
- 5) Attach compressed air or carbon dioxide supply to the icemaker water supply line drain valve.
- 6) Move the control switch to the "ICE" position and turn on the power supply.
- 7) Blow the icemaker water supply line out using compressed air or carbon dioxide.

2. Drain the water tank:

- 1) Turn off the power supply.
- 2) Remove the front panel.
- 3) Remove the screw, and move the tank drain pipe to the drain position.
- 4) Close the icemaker water supply line.
- 5) Turn on the power supply.
- 6) Press the the "RESET" button. The water tank will start to open.
Note: This procedure is necessary to protect the icemaker from freezing up at subfreezing temperatures.
- 7) Turn off the power supply when the water tank has fully opened.
- 8) Move the tank drain pipe to the normal position, and secure it with the screw.
- 9) Replace the front panel.

VII. Disposal

The appliance contains refrigerant and must be disposed of in accordance with applicable national, state, and local codes and regulations. Refrigerant must be recovered by properly certified service personnel.

VIII. Technical Information

We reserve the right to make changes in specifications and design without prior notice.

A. Specification and Performance Data Sheets

1. IM-500SAB

Specification Sheet

AC SUPPLY VOLTAGE	115/60/1
AMPERAGE	11.5 A (5 Min. Freeze AT 104°F / WT 80°F)
MINIMUM CIRCUIT AMPACITY	20 A
MAXIMUM FUSE SIZE	20 A
ELECTRIC & WATER CONSUMPTION	90/70°F 70/50°F
ELECTRIC W (kWH/100 lbs.)	1100(5.88) 1000(4.52)
WATER gal./24HR (gal./100 lbs.)	103(23.0) 113(21.2)
SHAPE OF ICE	Square Cube
ICE PRODUCTION PER CYCLE	7.2 lbs. (3.3 kg) 140pcs.
BIN CONTROL SYSTEM	Mechanical Bin Control
REFRIGERANT CHARGE	R404A, 1 lb. 10.5 oz. (750g)

Performance Data Sheet

APPROXIMATE ICE PRODUCTION PER 24 HR.	AMBIENT TEMP. (°F/°C)	WATER TEMP. (°F/°C)					
		50/10		70/21		90/32	
	70/21	533	<u>242</u>	509	<u>231</u>	477	<u>217</u>
	80/27	515	<u>233</u>	476	<u>216</u>	446	<u>202</u>
	90/32	509	<u>231</u>	449	<u>204</u>	418	<u>190</u>
lbs./day kg./day	100/38	503	<u>228</u>	442	<u>200</u>	389	<u>177</u>
APPROXIMATE ELECTRIC CONSUMPTION	70/21	1000		1029		1051	
	80/27	1022		1068		1079	
	90/32	1029		1100		1116	
watts	100/38	1027		1104		1130	
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70/21	113	<u>0.43</u>	110	<u>0.42</u>	97	<u>0.37</u>
	80/27	111	<u>0.42</u>	106	<u>0.40</u>	88	<u>0.33</u>
	90/32	110	<u>0.42</u>	103	<u>0.39</u>	87	<u>0.33</u>
gal./day m ³ /day	100/38	102	<u>0.39</u>	99	<u>0.38</u>	71	<u>0.27</u>
FREEZING CYCLE TIME	70/21	17		18		20	
	80/27	18		20		22	
	90/32	18		22		24	
min.	100/38	18		22		26	
HARVEST CYCLE TIME	70/21	2.4		2.1		2.0	
	80/27	2.2		1.8		1.7	
	90/32	2.1		1.5		1.4	
min.	100/38	1.8		1.5		1.3	
HEAD PRESSURE	70/21	228	<u>16.0</u>	248	<u>17.4</u>	270	<u>19.0</u>
	80/27	243	<u>17.1</u>	273	<u>19.2</u>	293	<u>20.6</u>
	90/32	248	<u>17.4</u>	295	<u>20.7</u>	316	<u>22.2</u>
PSIG kg/cm ² G	100/38	251	<u>17.6</u>	300	<u>21.1</u>	336	<u>23.6</u>
SUCTION PRESSURE	70/21	45	<u>3.2</u>	47	<u>3.3</u>	50	<u>3.5</u>
	80/27	47	<u>3.3</u>	50	<u>3.5</u>	52	<u>3.7</u>
	90/32	47	<u>3.3</u>	53	<u>3.7</u>	55	<u>3.9</u>
PSIG kg/cm ² G	100/38	48	<u>3.3</u>	53	<u>3.8</u>	57	<u>4.0</u>
TOTAL HEAT OF REJECTION FROM CONDENSER		4,500 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]					
TOTAL HEAT OF REJECTION FROM COMPRESSOR		1,000 BTU/h [AT 90°F (32°C) / WT 70°F (21°C)]					

B. Wiring Diagram

1. IM-500SAB

