



# **IM SERVICE TRAINING**


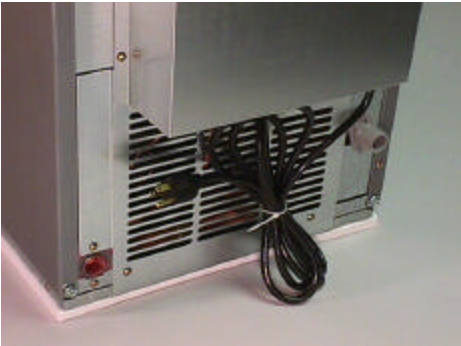

**Featuring the**  
**IM-51BAE**

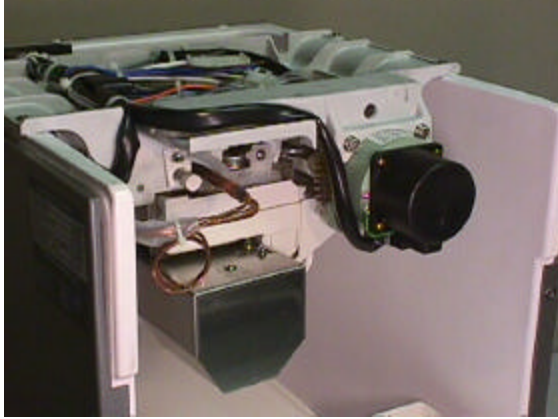


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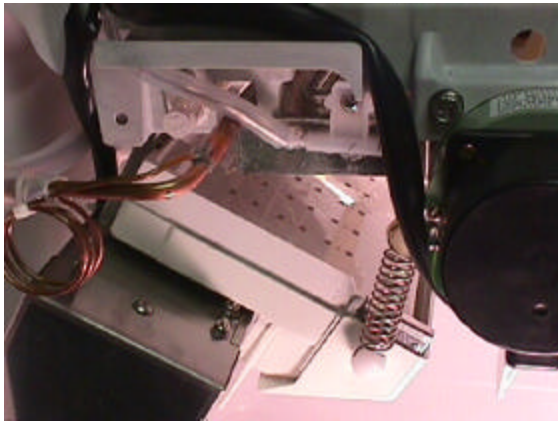
9/9/99

All IM models have similar sequence of operation. This manual is designed as a generic IM Training manual.

	<p>The Hoshizaki IM series ice machine uses a horizontal evaporator design. This compact unit is designed for counter-top, under-counter, or free-standing installations.</p>
	<p>A standard 120 volt power cord provides the electrical connection. The unit is designed to operate on a separate 15 amp circuit.</p> <p>The water supply connection is <math>\frac{1}{2}</math>"FIP and is located at the bottom right rear of the unit. A minimum <math>\frac{3}{8}</math>" water line is required for proper operation.</p> <p>The drain connection is <math>\frac{3}{4}</math>"MIP and is located on the left rear of the unit. Since the unit will likely be enclosed, it is recommended to use flexible supply and drain connections. This will allow easy removal if service is necessary.</p>
	<p>Access to the evaporator compartment is gained by removing the front and top covers.</p> <p>Open the bin door and remove the front cover screws and drain pan thumbscrews. Lower the drain pan pipe into the drain hole.</p> <p>Lift upward on the front panel and push backward to remove the top cover.</p>



This horizontal evaporator and water distribution system is unique to the IM series.

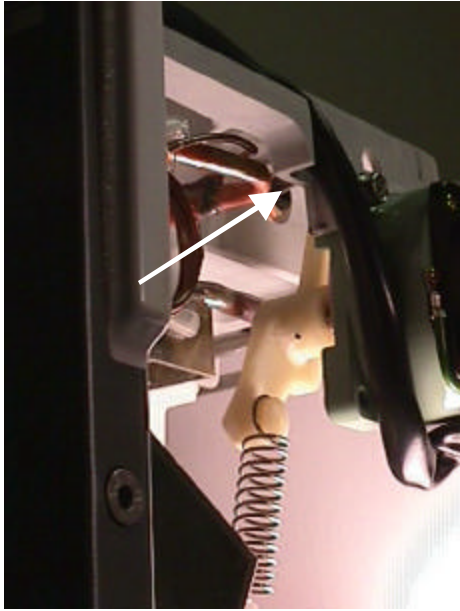


The ABS water plate sprays water up into the evaporator cells to form the square IM cube.



The moveable water pan assembly includes the water plate, reservoir pan, and pump motor assembly.

Tension springs connect two cam arms to the water plate assembly. An actuator motor rotates the cam arms to raise and lower the water pan during the ice making cycle.



The front cam arm has a switch lever that operates the actuator toggle switch located above the pan assembly.

The actuator toggle switch controls the direction of rotation for the actuator motor and energizes the pump motor during the freeze cycle.

- When the switch is in the right position, the actuator motor rotates counter clock wise to lower the water pan assembly.
- When the switch is in the left position, the actuator motor turns clock wise to raise the water pan assembly.



The IM51 uses a mechanical proximity switch bin control assembly located in the bin area.



When ice fills the bin and pushes the control arm over, the activator magnet moves to the switch and closes the contacts.

The IM bin control closes the contacts to signal the control board to shut down the unit. This is different from the standard KM control, which opens the contacts to de-energize the unit.



The louver has a flip down cover to access the control switch.

The switch has 3 positions.


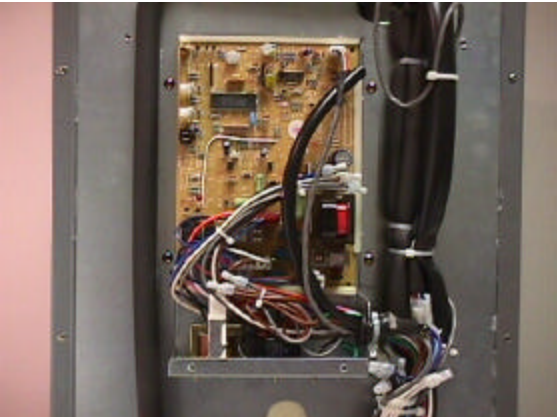
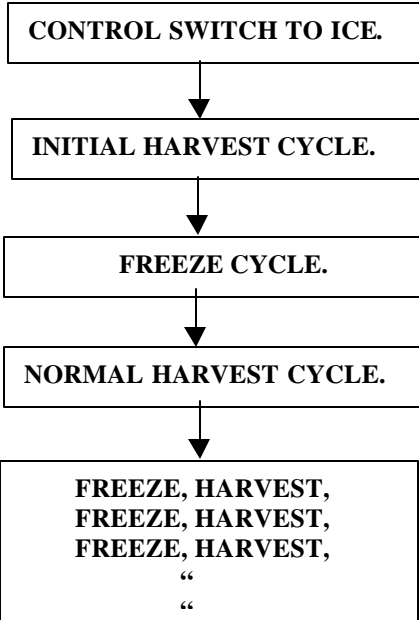
ICE, OFF, & WASH.

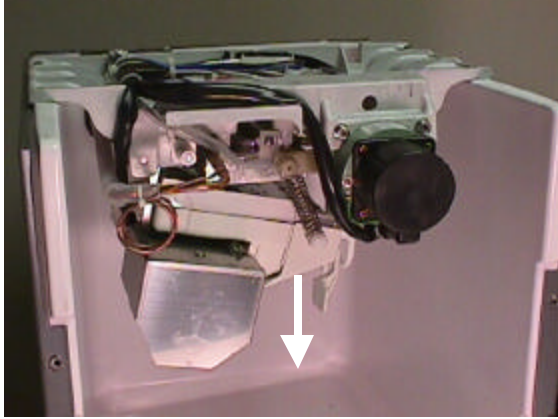


The louver covers the compressor compartment. Remove the louver screws and lift the louver forward to access the condenser coil fan assembly and compressor.

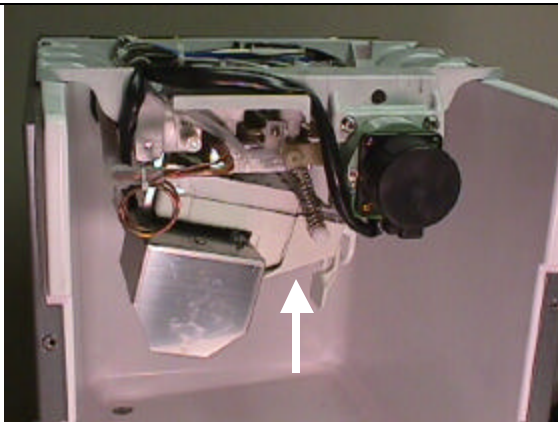


For easy access during preventative maintenance or service, the inlet water valve is located in the front right hand corner of the compressor compartment.

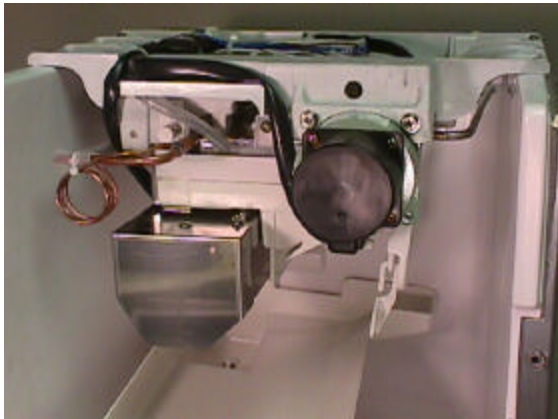
	<p>The control box is accessed from the rear of the unit. Remove the screws holding the pipe cover and the control box cover to reach the control board and other components.</p>
	<p>A solid state board controls the IM operation. Several adjustments are included on the board. These adjustments are factory set for proper operation.</p> <p>Later, we will cover the adjustments and discuss the proper settings.</p>
 <pre> graph TD     A[CONTROL SWITCH TO ICE.] --&gt; B[INITIAL HARVEST CYCLE.]     B --&gt; C[FREEZE CYCLE.]     C --&gt; D[NORMAL HARVEST CYCLE.]     D --&gt; E["FREEZE, HARVEST, FREEZE, HARVEST, FREEZE, HARVEST, “ “"] </pre>	<p>Now, lets take a look at the basic IM sequence of operation. When the control switch is placed in ICE, the unit starts in the Initial Harvest cycle.</p> <p>When power is supplied, the compressor, hot gas valve, and actuator motor energize. The compressor starts in harvest to reduce the starting load and increase compressor life. This will also clear any ice from the evaporator plate before the freeze cycle begins.</p>



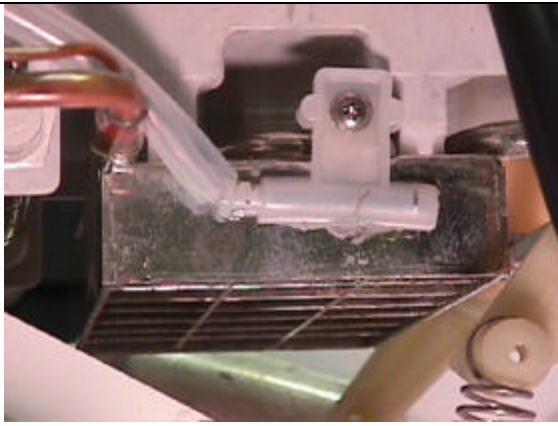
The actuator motor turns counter clock wise to rotate the cam arms and lower the water pan away from the evaporator. When the water plate is completely down the switch lever moves the actuator toggle switch to the left. The board energizes the inlet water valve and condenser fan motor and de-energizes the hot gas valve.



Switching the actuator toggle switch to the left position also reverses the actuator motor. The motor now turns clock wise to raise the water plate upward.



When the plate reaches the evaporator, the cam arm switch lever moves the actuator toggle switch to the right position. This stops the actuator motor and sets up the circuit to lower the plate in the next harvest cycle. It also energizes the pump motor and the board de-energizes the inlet water valve. The Freeze Cycle now begins.



The freeze cycle is controlled by a thermistor, which is mounted at the evaporator outlet. The pump is spraying water up into the evaporator cells to form the square IM cubes. The evaporator temperature lowers as the ice cubes form.



A thermistor temperature of  $-9.4^{\circ}\text{F}$  signals the control board to begin harvest and energize the hot gas valve and actuator motor circuit. The actuator motor now turns counter clock wise to lower the water pan. The switch lever moves the actuator toggle switch to the left. This sets the actuator motor circuit to raise the water plate at the end of harvest. The board energizes the inlet water valve.



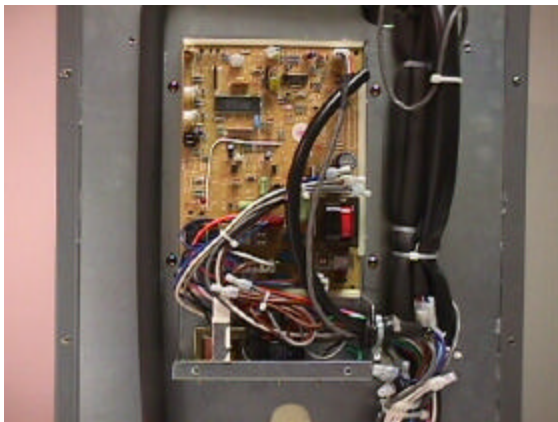
Unlike the initial harvest, the normal harvest is controlled by the thermistor. When the thermistor reaches  $59^{\circ}\text{F}$ , the control board de-energizes the hot gas valve and energizes the condenser fan motor. The actuator motor energizes to raise the plate. When the plate reaches the evaporator, the actuator toggle switch is moved back to the right. The board de-energizes the inlet water valve and the freeze cycle begins again. The average harvest cycle is about 3 minutes.





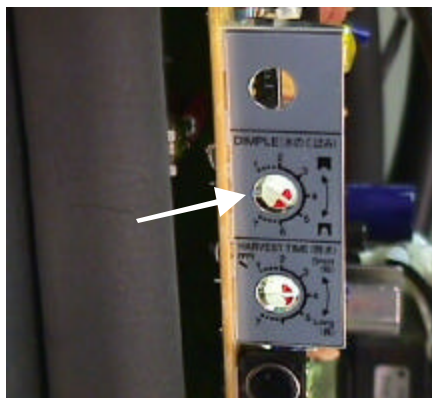
The unit will continue through the freeze and harvest cycle until the bin control shuts down the refrigeration system.

When pushed over, the bin control has a 10-second delay before shut down occurs. An 85-second delay occurs at startup when the bin control is released.

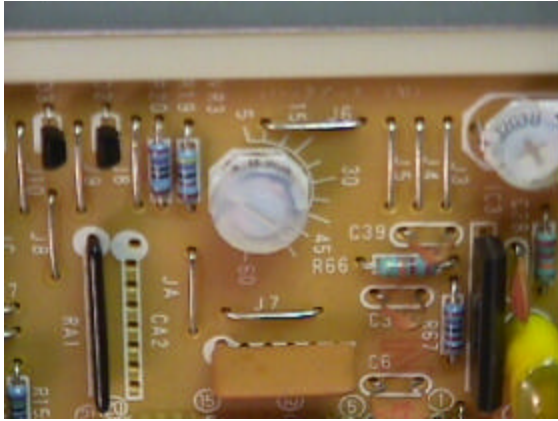


Now let's take a look at the control board adjustments. Remember that the adjustments are factory set to provide proper operation in normal operating conditions.

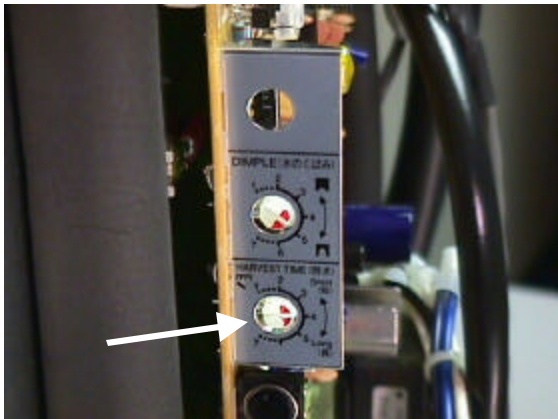
## **NO SEASONAL ADJUSTMENTS!**



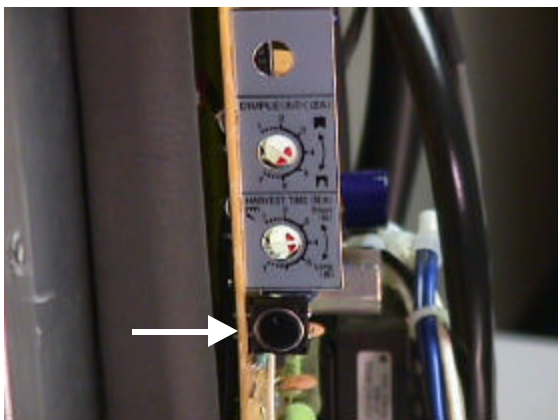
The board adjustments are made through variable resistors on the board. The cube control is marked VR5. This adjusts the thermistor switching temperature of  $-9.4^{\circ}\text{F}$  and the length of the freeze cycle. The dimple size in the cube also changes. Adjusting to a larger dimple will result in a shorter freeze cycle and a smaller cube. A smaller dimple setting will result in a longer cycle and a larger cube. The factory setting is 5.



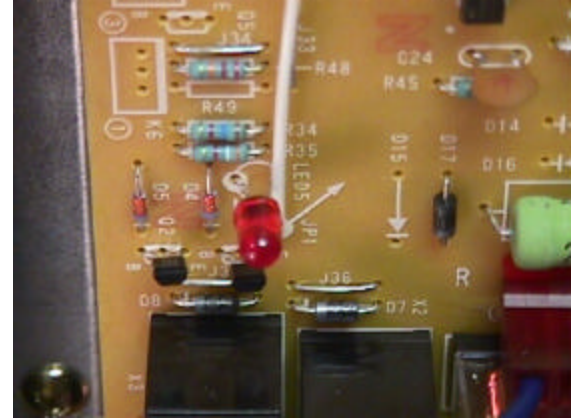


The maximum freeze timer is VR3. This timer will automatically switch the unit to the harvest cycle if the freeze cycle last longer than the setting time. The factory setting is 45 minutes.



The defrost control VR2 will adjust the time period between ice-drop and actuator motor restart during harvest. The factory setting is 4. This setting represents approximately 40 seconds. VR2 would be adjusted longer if the unit is operating in a cooler ambient temperature.



The control board includes a push-button reset. Pressing this button will initiate a harvest cycle anytime the control switch is in ICE position.

	<p>A red Service Indicator LED is also included on the control board. This LED will either light continually or flash to indicate a service fault. A fault diagnosis chart in the service manual will help the technician determine the actual problem.</p> <p>See chart next page.</p>
	<p>Preventative maintenance for the IM is simple. Follow these steps to allow the unit to operate efficiently.</p> <ol style="list-style-type: none"> <li>1. Clean the mesh air filter twice monthly to ensure good airflow.</li> <li>2. Clean the condenser once a year using a brush or vacuum.</li> <li>3. Check and clean the inlet water valve screen as needed to assure proper water flow.</li> <li>4. Clean and sanitize the water distribution system annually using the recommended cleaner.</li> <li>5. Wipe down the exterior using a soft cloth and neutral cleaner.</li> </ol>
	<p>Cleaning tips:</p> <ul style="list-style-type: none"> <li>• A detailed cleaning label is located under the top cover. More detailed instructions are included in the customers Instruction Manual or in the product Service Manual.</li> <li>• Always follow the cleaning instructions and use the recommended ice machine cleaner.</li> <li>• Use the cleaning brush shipped with the unit to clean tight places.</li> </ul>

## FAULT DIAGNOSIS

Check the status of the Service lamp on the Controller Board (LED-5) by removing the Control Box Cover.

### Lamp ON – Water Plate closed

This tends to indicate the Back-up Timer has stopped machine operation during the freeze cycle. High ambient and water temperature are an obvious cause. But check out each component that could result in an extended freezing time (See guide below).

### Lamp ON – Water Plate open

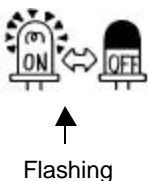
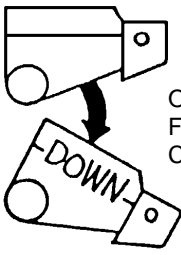


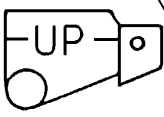

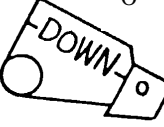

The Timer has stopped the machine because of an excessive defrost time. See the guide below to check out the probable cause.





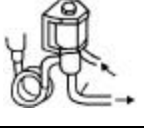




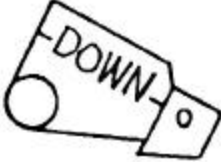
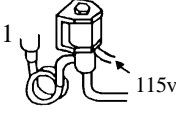



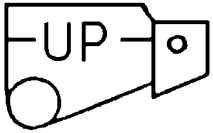
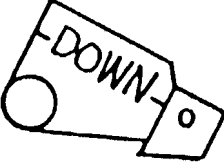
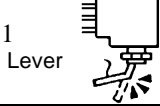


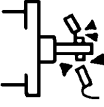

### Lamp flashing ON/OFF

If on the first cycle, check out the Cam operation and/or Toggle Switch. If the machine has been in service for some time, the Controller Board may be at fault.

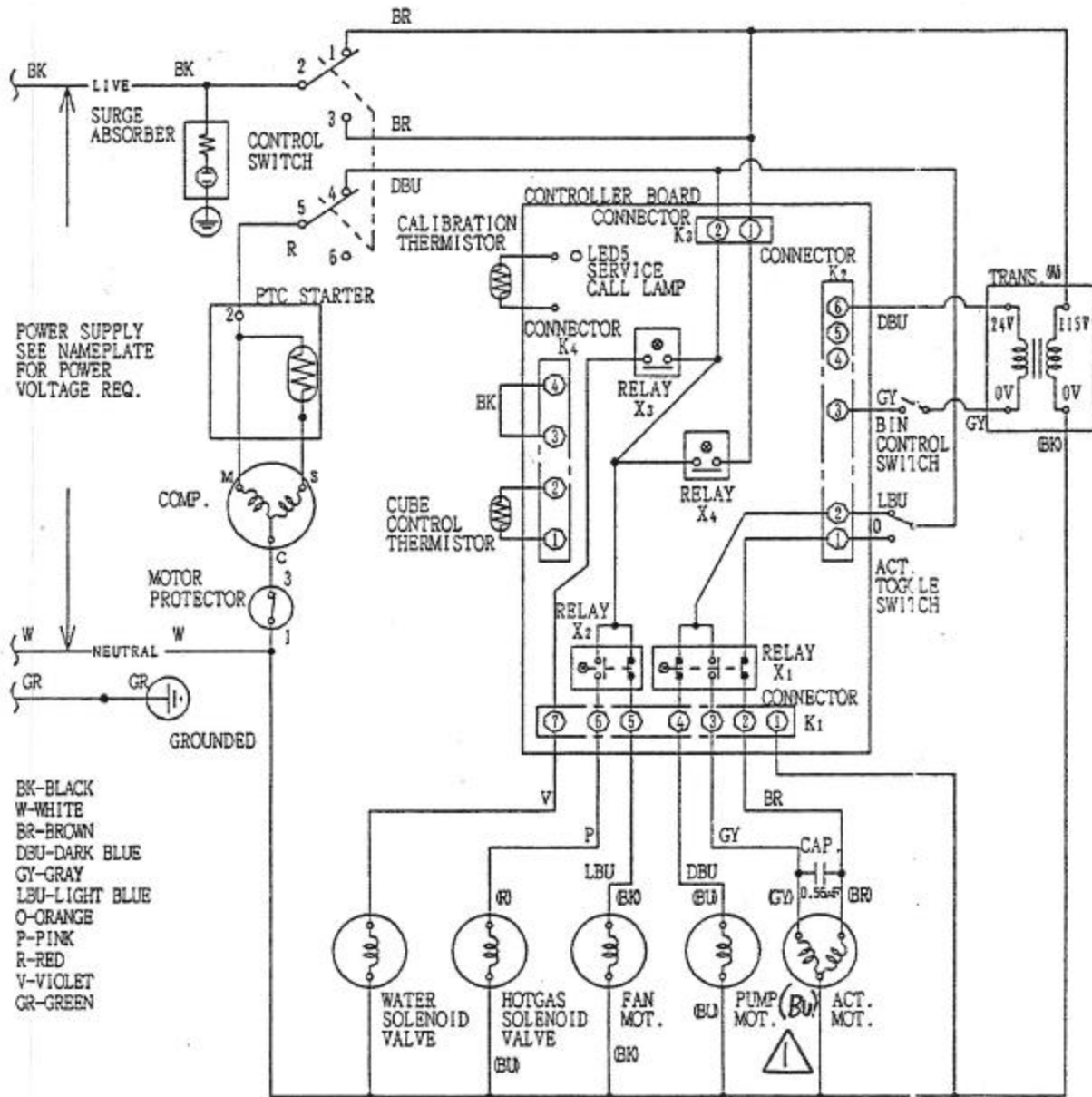
**REMEMBER:** Hoshizaki controllers are very reliable. They also control every component's Operation. So if a component malfunctions, the controller will respond. Do not replace controllers in an attempt to shorten the diagnosis process and not before carefully checking the actual fault and possible cause.

When the icemaker stops, the Controller Board Interlock indicator shows possible faults.

PATTERN	INTERLOCK INDICATOR	WATER TANK POSITION	POSSIBLE CAUSE	REMEDY
1.	 <p>Flashing</p>	 <p>Only First Cycle</p>	<p>1</p>  <p>Actuator Toggle Switch Lever bent</p>	Replace Actuator Toggle Switch
			<p>2</p>  <p>Can Arm (A) Broken Cam Arm</p>	Replace
			<p>3</p>  <p>Defective Actuator Motor</p>	Replace
			<p>4</p>  <p>Defective Controller Board</p>	Replace

PATTERN	INTERLOCK INDICATOR	WATER TANK POSITION	POSSIBLE CAUSE	REMEDY
2		  Freeze Cycle	1  Clogged Air Filter and/or Condenser	Clean or Replace
			2  0V Leak Water leak from Water Solenoid Valve	Replace
			3  Hot Gas leak Gas leak from Hot Gas Solenoid Valve	Replace
			4  Fan Motor stopped	Replace
			5  Gas Gas leak	Check for leak
			6  Compressor stopped	Replace Comp. Start Capacitor
3		  Harvest Cycle	1  115v Hot Gas Solenoid Valve closed and will not open	Replace
			2  Gas Gas leak	Check for leak
			3  Compressor stopped	Replace Comp. Start Capacitor
4		  OR  	1  Lever Actuator Toggle Switch Lever bent	Replace Actuator Toggle Swt.
			2  Cam Arm Can Arm (A) Broken	Replace
			3  Defective Actuator Motor	Replace
			4  Pin Actuator motor Cam Pin damaged	Replace Cam Pin and Cam Arm (A)
			5  Defective Cube Control Thermistor	Replace

# WIRING DIAGRAM IM-51BAE



## IM SERIES REVIEW QUIZ

Choose the best answer for each question below.

1. The IM control board is located in the rear of the unit.  
 **True**                       **False**
  
2. The IM unit uses a thermostatic bin control.  
 **True**                       **False**
  
3. The bin control switch must **OPEN** or **Close** to shut the unit down.
  
4. The IM series uses **R-404A** or **R-134A** refrigerant.
  
5. To raise the water pan assembly the actuator toggle switch must be in the **RIGHT** or **LEFT** position.
  
6. With the actuator toggle switch in the left position, the actuator motor turns **CLOCKWISE** or **COUNTER CLOCKWISE**.
  
7. Adjusting the cube control or dimple adjustment changes which temperature setting? - **9.4°F** or **59°F**.
  
8. The maximum freeze timer on the control board is factory set at **60 MINUTES** or **45 MINUTES**.
  
9. The black push button reset is included on the control board for **HARVEST INITIATION** or **SAFETY RESET**.
  
10. The control transformer used in the IM series units is a **12VOLT** or **24 VOLT** output.

NOTE: Quiz answers are at the bottom of next page.

**NOTES:**

Quiz answers:

1. True, 2. False, 3. Close, 4. R-134A, 5. Left, 6. CW, 7.  $-9.4^{\circ}\text{F}$ , 8. 45 min., 9. Harvest initiation, 10. 24 volt



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