

# Hoshizaki America, Inc.

Self-Contained Flaker

Model  
F-300BAF



“A Superior Degree  
of Reliability”

[www.hoshizaki.com](http://www.hoshizaki.com)

## SERVICE MANUAL



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Issued: 3-2-1999  
Revised: 01-25-2007

## **IMPORTANT**

Only qualified service technicians should attempt to service or maintain this unit. No such service or maintenance should be undertaken until the technician has thoroughly read this Service Manual.

HOSHIZAKI provides this manual primarily to assist qualified service technicians in the service and maintenance of the unit.

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

HOSHIZAKI AMERICA, INC.  
618 Highway 74 South  
Peachtree City, GA 30269

Attn: HOSHIZAKI Technical Support Department

Phone: 1-800-233-1940 Technical Service  
(770) 487-2331

Fax: 1-800-843-1056  
(770) 487-3360

E-mail: techsupport@hoshizaki.com

Web Site: [www.hoshizaki.com](http://www.hoshizaki.com)

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

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

Please review this manual. It should be read carefully before the unit is serviced or maintenance operations are performed. Only qualified service technicians should service and maintain the unit. This manual should be made available to the technician prior to service or maintenance.

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# I. Specifications

## A. Ice maker

### 1. F-300BAF

AC SUPPLY VOLTAGE	115/60/1		
AMPERAGE	9.0 A ( AT 104°F/ WT 80°F )		
MINIMUM CIRCUIT AMPACITY	N/A		
MAXIMUM FUSE SIZE	N/A		
APPROXIMATE ICE PRODUCTION PER 24 HR.	Ambient Temp.(°F)	WATER TEMP. (°F)	
lbs./day ( kg/day )		50	70
Reference without *marks		90	
	70	* 303 (137)	290 (131)
	80	267 (121)	256 (116)
	90	236 (107)	* 232 (105)
	100	209 (95)	201 (91)
SHAPE OF ICE	Flake		
ICE QUALITY	Approx. 70%, Ice (90/70°F, Conductivity 200 µs/cm)		
APPROXIMATE STORAGE CAPACITY	110 lbs.		
ELECTRIC & WATER CONSUMPTION	90/70°F	70/50°F	
ELECTRIC W (kWH/100 lbs.)	674 (7.0)	667 (5.3)	
POTABLE WATER	28 (12)	36 (12)	
gal./24HR (gal./100 lbs.)			
EXTERIOR DIMENSIONS (WxDxH)	36" x 24" x 33" (914 x 610 x 838 mm)		
EXTERIOR FINISH	PVC Coated Galvanized Steel; Galvanized Steel (Rear); Stainless Steel (Top)		
WEIGHT	Net 182 lbs. ( 83 kg ), Shipping 221 lbs. ( 100 kg )		
CONNECTIONS - ELECTRIC	Cord Connection		
- WATER SUPPLY	Inlet 1/2" FPT		
- DRAIN	Drain Pan 3/4" FPT Bin Drain 3/4" FPT		
ICE MAKING SYSTEM	Auger type		
HARVESTING SYSTEM	Direct Driven Auger ( 1/6 HP Gear Motor )		
ICE MAKING WATER CONTROL	Float Switch		
COOLING WATER CONTROL	N/A		
BIN CONTROL SYSTEM	Mechanical Bin Control ( Proximity Sw. )		
COMPRESSOR	Hermetic, Model JS25C1E-IAA-252		
CONDENSER	Air-cooled, Fin and tube type		
EVAPORATOR	Copper Tube on Cylinder		
REFRIGERANT CONTROL	Thermostatic Expansion Valve		
REFRIGERANT CHARGE	R-404A, 10.5 oz. (300 g)		
DESIGN PRESSURE	High 460 PSIG, Low 290 PSIG		
P.C. BOARD CIRCUIT PROTECTION	High Voltage Cut-off Relay		
COMPRESSOR PROTECTION	Auto-reset Overload Protector		
GEAR MOTOR PROTECTION	Manual reset Circuit Breaker		
REFRIGERANT CIRCUIT PROTECTION	Auto-reset High Pressure Control Switch		
LOW WATER PROTECTION	Float Switch and Timer		
ACCESSORIES - SUPPLIED	Ice Scoop, Spare Fuse		
- REQUIRED	Legs		
OPERATING CONDITIONS	VOLTAGE RANGE	104 - 127 V	
	AMBIENT TEMP.	45 - 100° F	
	WATER SUPPLY TEMP.	45 - 90° F	
	WATER SUPPLY PRESSURE	10 - 113 PSIG	

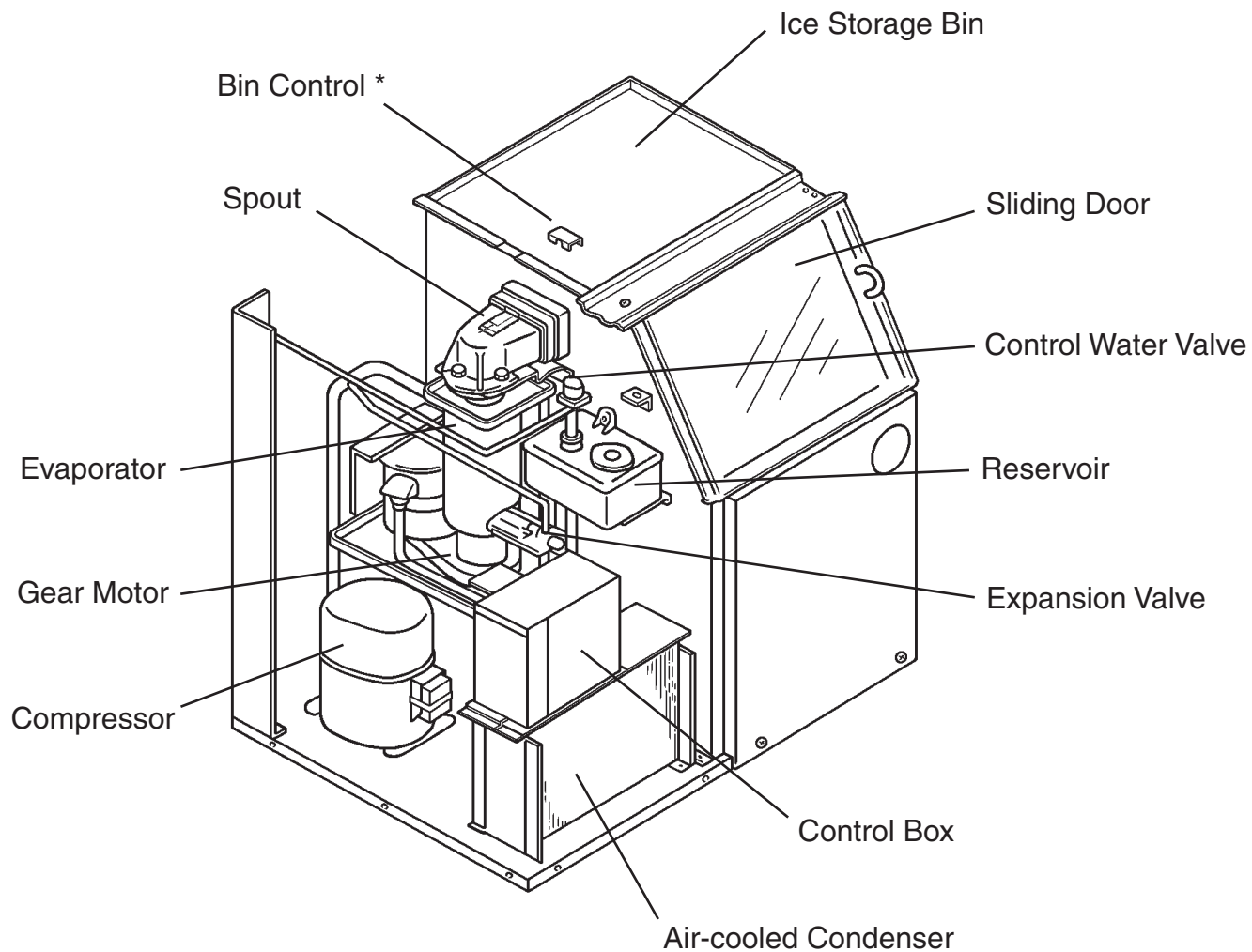
Note: We reserve the right to make changes in specifications and design without prior notice.

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## II. General Information

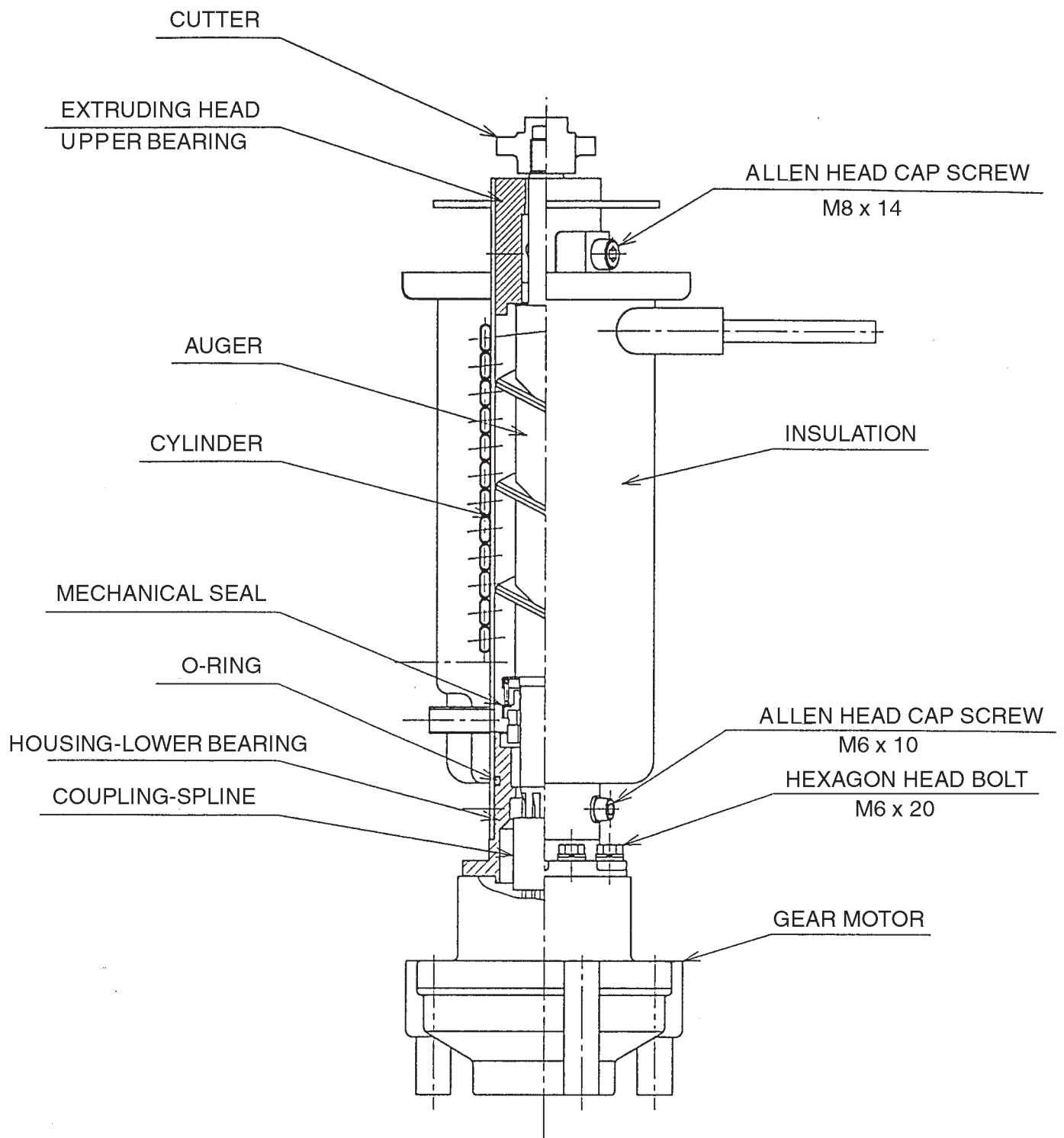
### A. Construction

#### 1. F-300BAF



\*The switch actuator is located in the ice storage bin.

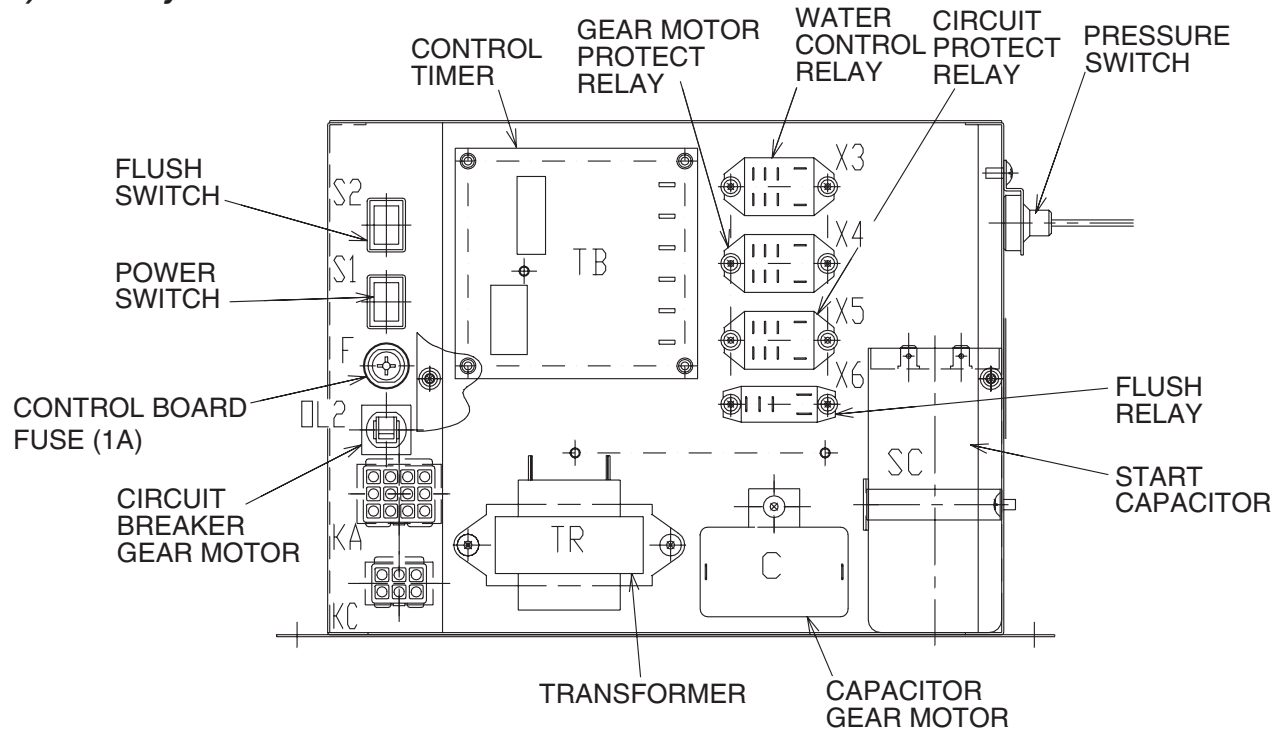
## B. Ice Making Unit



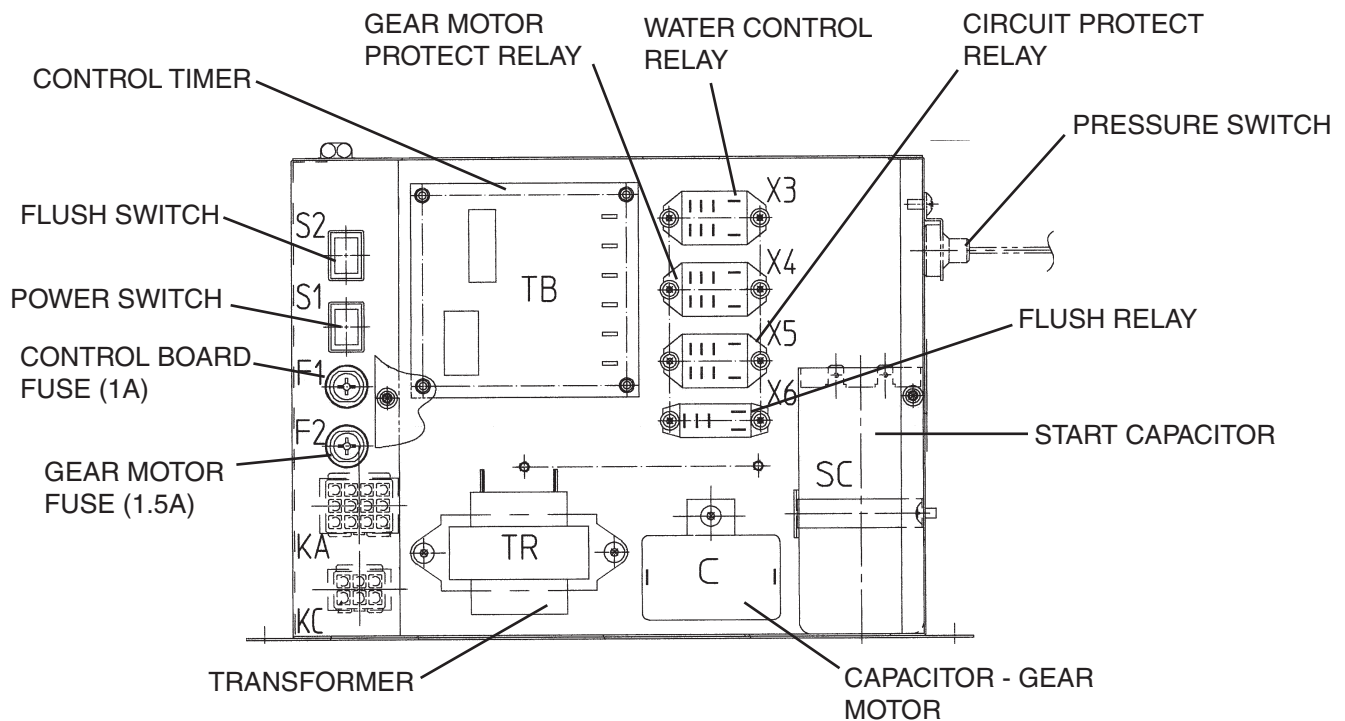
## C. Control Box Layout

### 1. F-300BAF

#### a) Auxiliary Code K-1 and Earlier

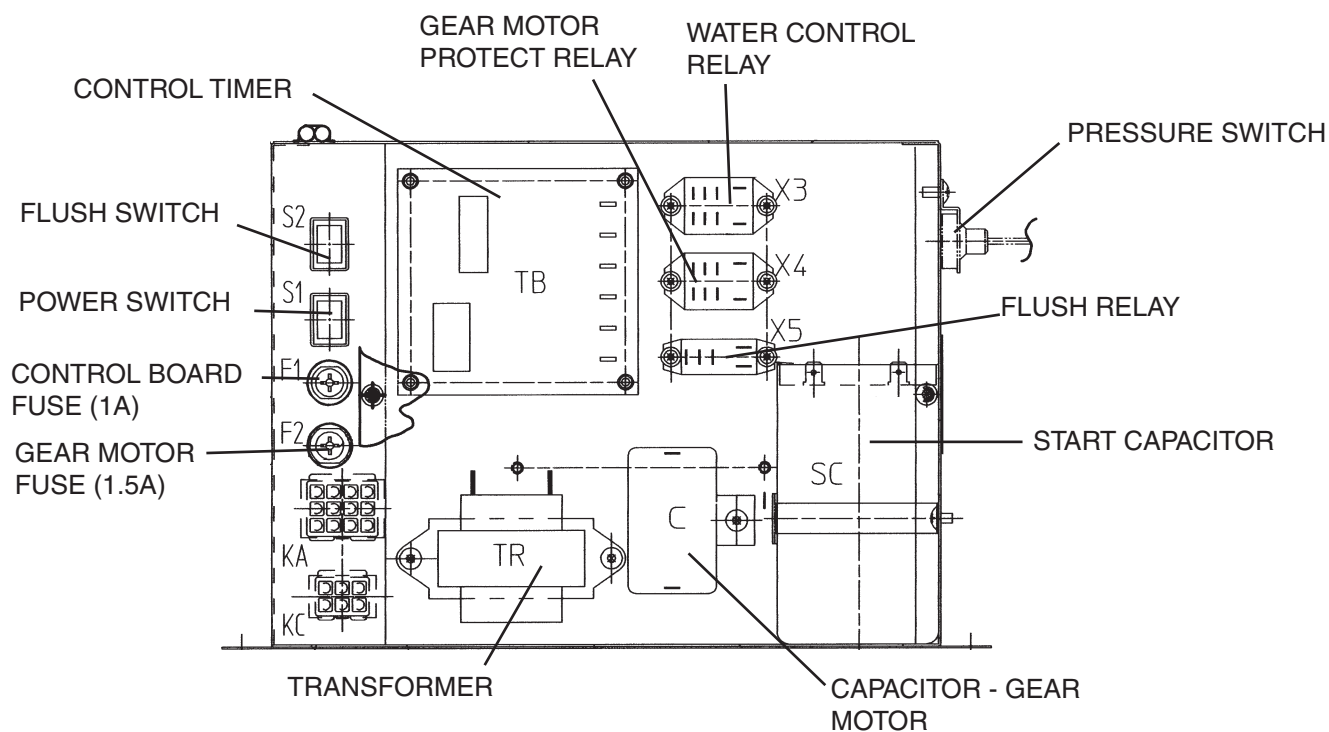


#### b) Auxiliary Code K-2 and L-0

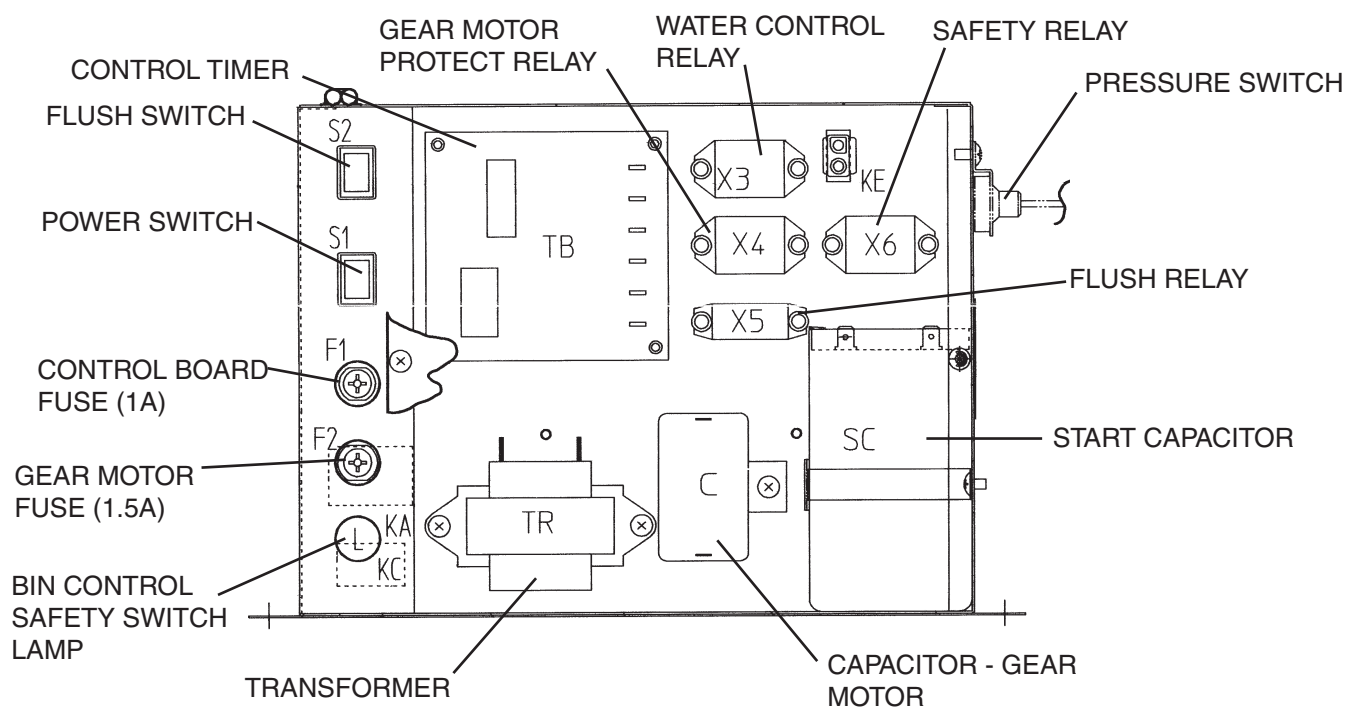


Note: The above component names are identical with the wiring label, but not with the parts list.

### c) Auxiliary Code L-1 and M-0



### d) Auxiliary Code M-1 and Later



Note: The above component names are identical with the wiring label, but not with the parts list.

## D. Timer Board

### 1. Solid-State Timer Board Control

- A HOSHIZAKI exclusive solid-state sequence timer board is employed in Hoshizaki self-contained flaker icemakers.
- All models are pre-tested and factory-adjusted.

#### CAUTION

1. Fragile, handle very carefully.
2. The timer board contains CMOS (Complementary Metal-Oxide Semiconductor) integrated circuits, which are susceptible to failure due to static discharge. It is especially important to use an anti-static wrist strap when handling or replacing the board.
3. Do not touch the electronic devices on the board or the back of the board to prevent damage to the board.
4. Do not change wiring and connections. Especially, never misconnect terminals.
5. Do not fix the electronic devices or parts on the board in the field. Always replace the whole board assembly if it goes bad.

The timer board provides the following safeguards:

- Provides component protection during low water supply.
- Purges remaining ice in the evaporator.
- Provides short cycle protection for the compressor.

## **E. Sequence of Operation**

Hoshizaki utilizes a solid state timer board to switch the components on and off as needed. The sequence is as follows:

### **1. Startup**

Flush switch in "ICE" position, power switch in "ON" position. FR energizes.

### **2. Fill Cycle**

WV opens and the reservoir fills with water until UF/S closes. Note: GM will not start unless UF/S is closed. For details, see "IV. Service Diagnosis".

### **3. Ice Purge Cycle (60 seconds)**

WCR energizes, closing the low water safety circuit and de-energizing WV. GMR energizes (clear relay located on TB). GM starts and GMPR energizes. GM runs for 60 seconds to clear any ice from the evaporator.

Note: Low water safety circuit is terminals 3 and 4 on TB.

### **4. Freeze Cycle (Ice Making Process)**

CR energizes (black relay located on TB). Comp and FMS energize. As the water in the evaporator cools, ice starts forming within 4 to 6 minutes. This time frame depends on the inlet water and ambient temperature conditions.

UF/S and LF/S operate WV as needed to continue the ice making process. This continues until BC shuts the ice maker down or power is turned off to the unit.

### **5. Shutdown:**

BC activates (opens). FR de-energizes, FWV energizes. Approximately 90 seconds after BC activates, Comp and FMS de-energize, one minute later GMPR de-energizes and GM stops.

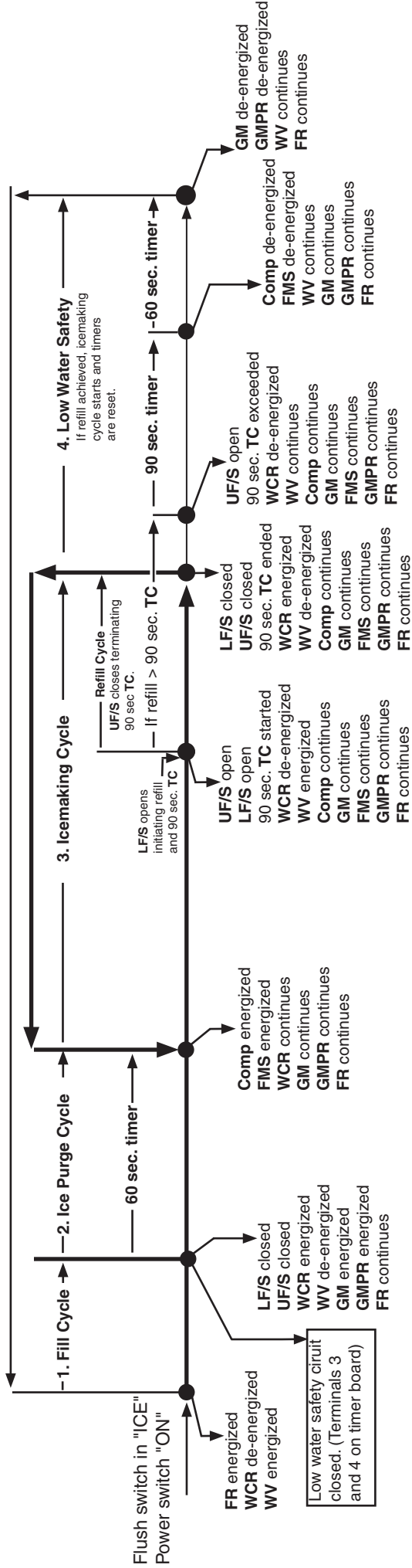
Legend: BC—bin control; Comp—compressor; CR—compressor relay; FMS—self-contained fan motor; FR—flush relay; FWV—flush water valve; GM—gear motor; GMPR—gear motor protect relay; GMR—gear motor relay; LF/S—lower float switch; TB—timer board; UF/S—upper float switch; WCR—water control relay; WV—inlet water valve.

## **F. Ice Production Check**

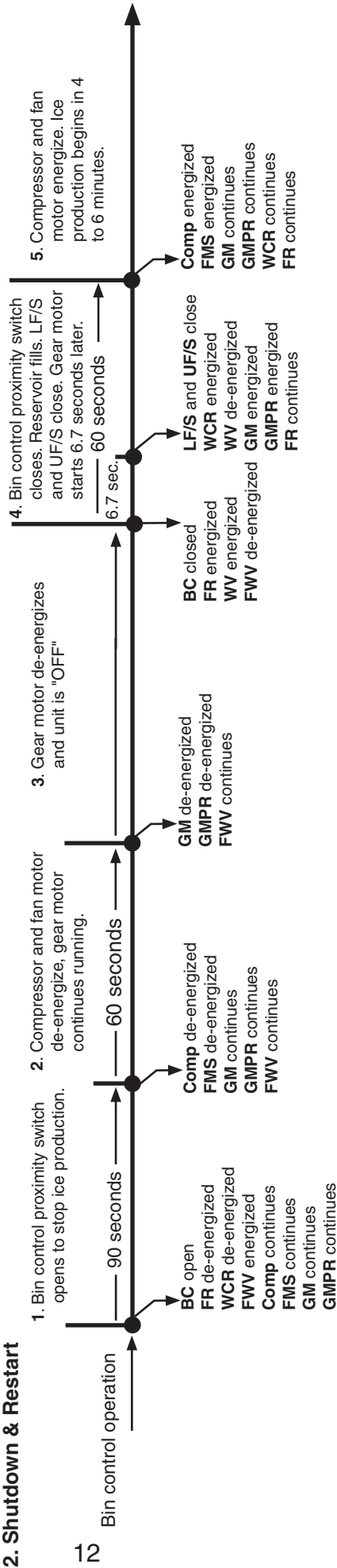
To check production, prepare a bucket or pan to catch the ice and a set of scales to weigh the ice. After the unit has operated for 10 to 20 minutes, catch the ice production for 10 minutes. Weigh the ice to establish the batch weight. Multiply the batch weight by 144 for the total production in 24 hours.

# F-300BAF, F-500BAF Sequence Flow Chart and Component Operation

## 1. Startup



## 2. Shutdown & Restart



### Legend:

- BC - bin control
- Comp - compressor
- FMS - self-contained fan motor
- FR - flush relay
- FWV - flush water valve
- GM - gear motor
- GMPR - gear motor protect relay
- LF/S - lower float switch
- TC - timer control
- UF/S - upper float switch
- WCR - water control relay
- WV - inlet water valve

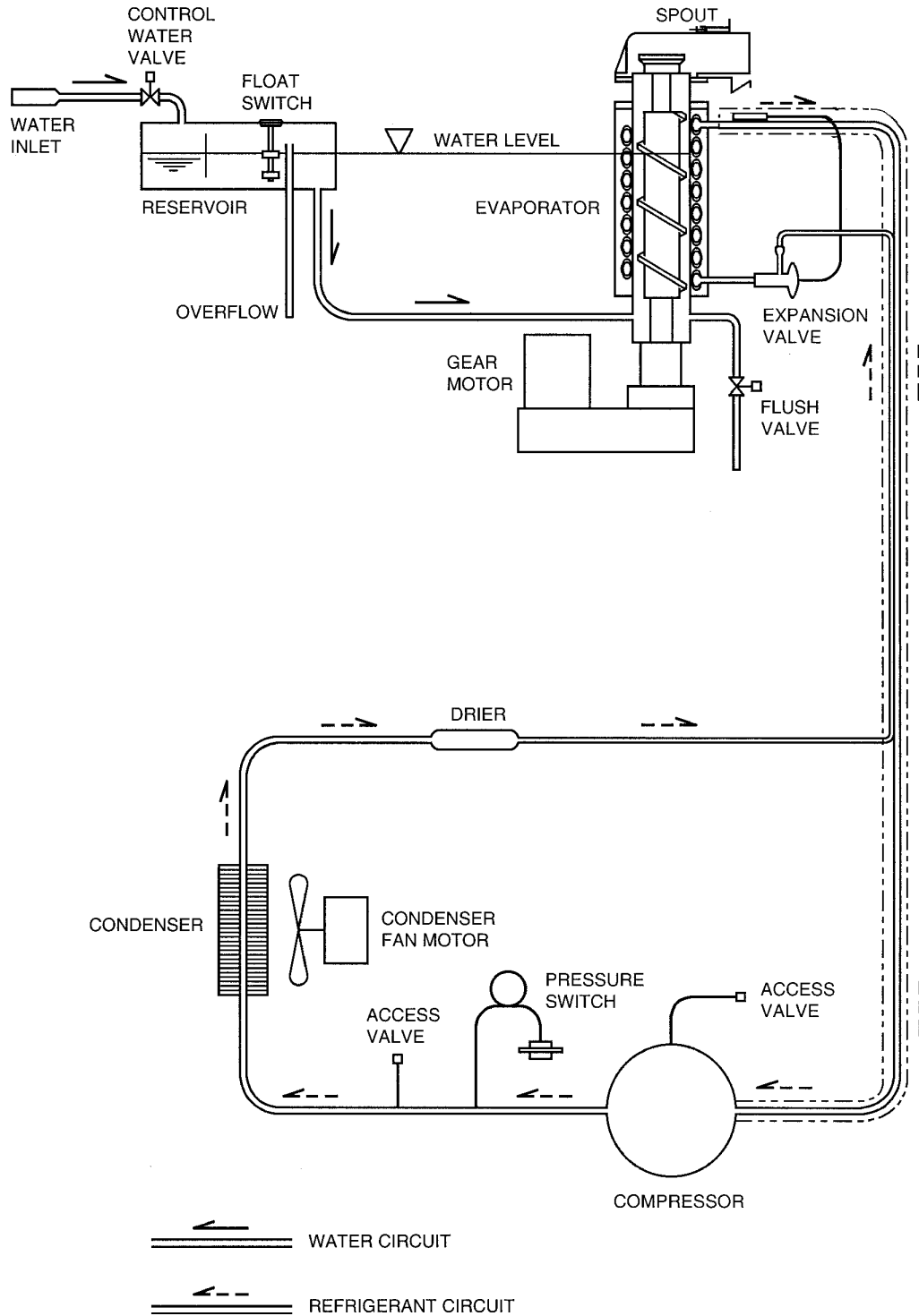
### Components Energized when the Flush Switch is in the FLUSH Position

The FLUSH position is used when cleaning and sanitizing the machine. When in the FLUSH position, power is supplied to the flush valve. This allows cleaner and sanitizer to drain from the evaporator assembly.

### III. Technical Information

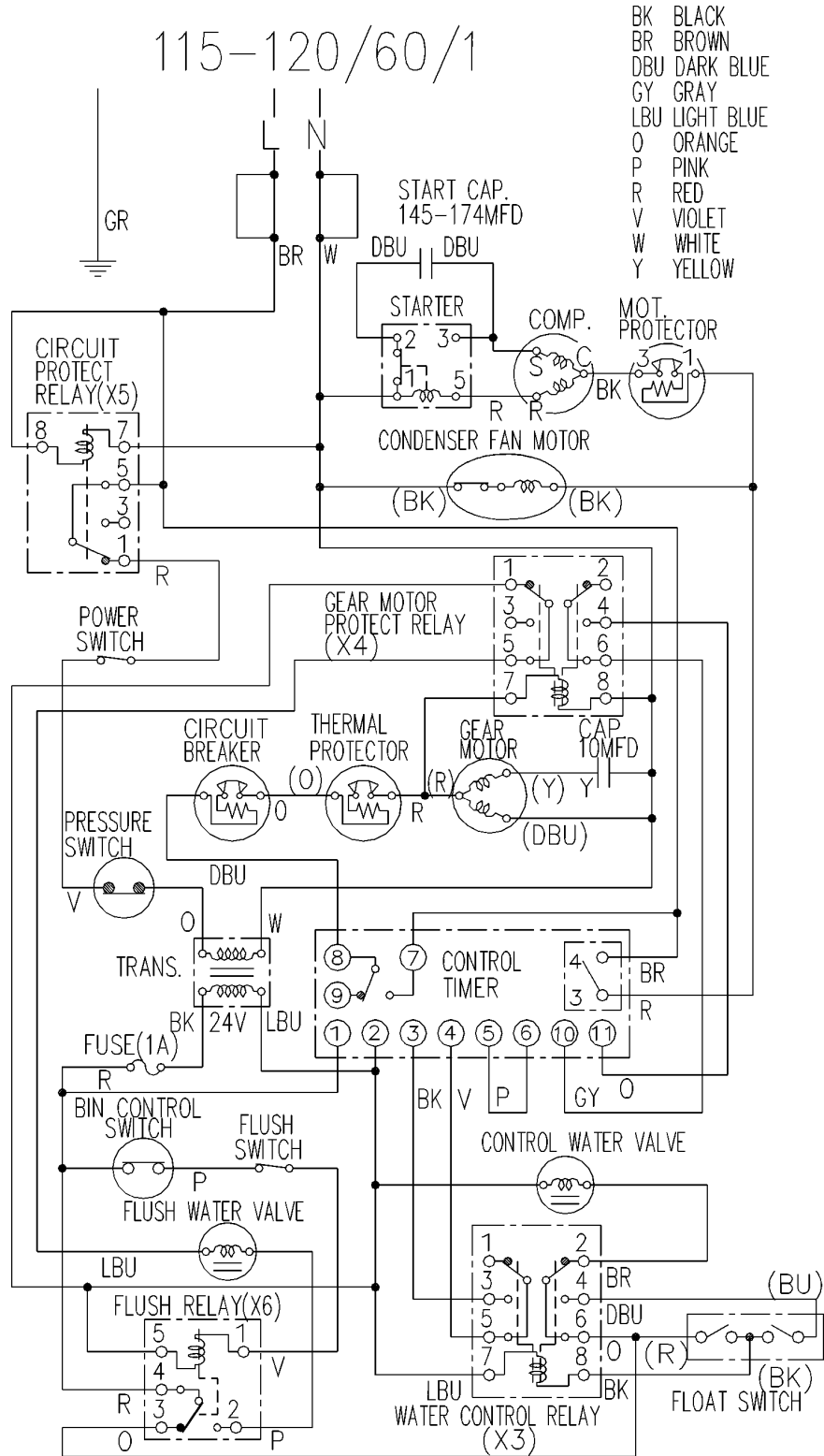
#### A. Water Circuit and Refrigeration Circuit

##### F-300BAF



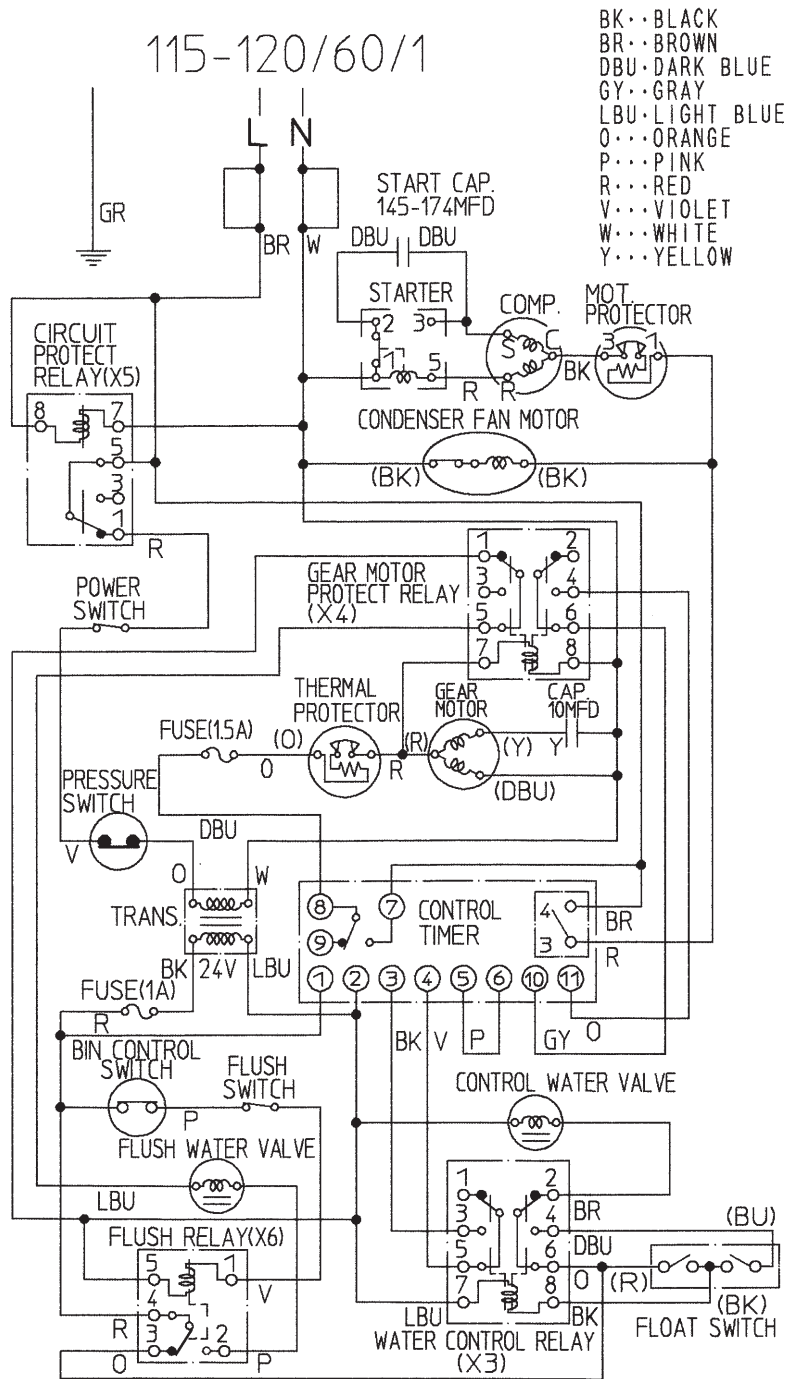
## B. Wiring Diagram

### 1. Auxiliary Code K-1 and Earlier



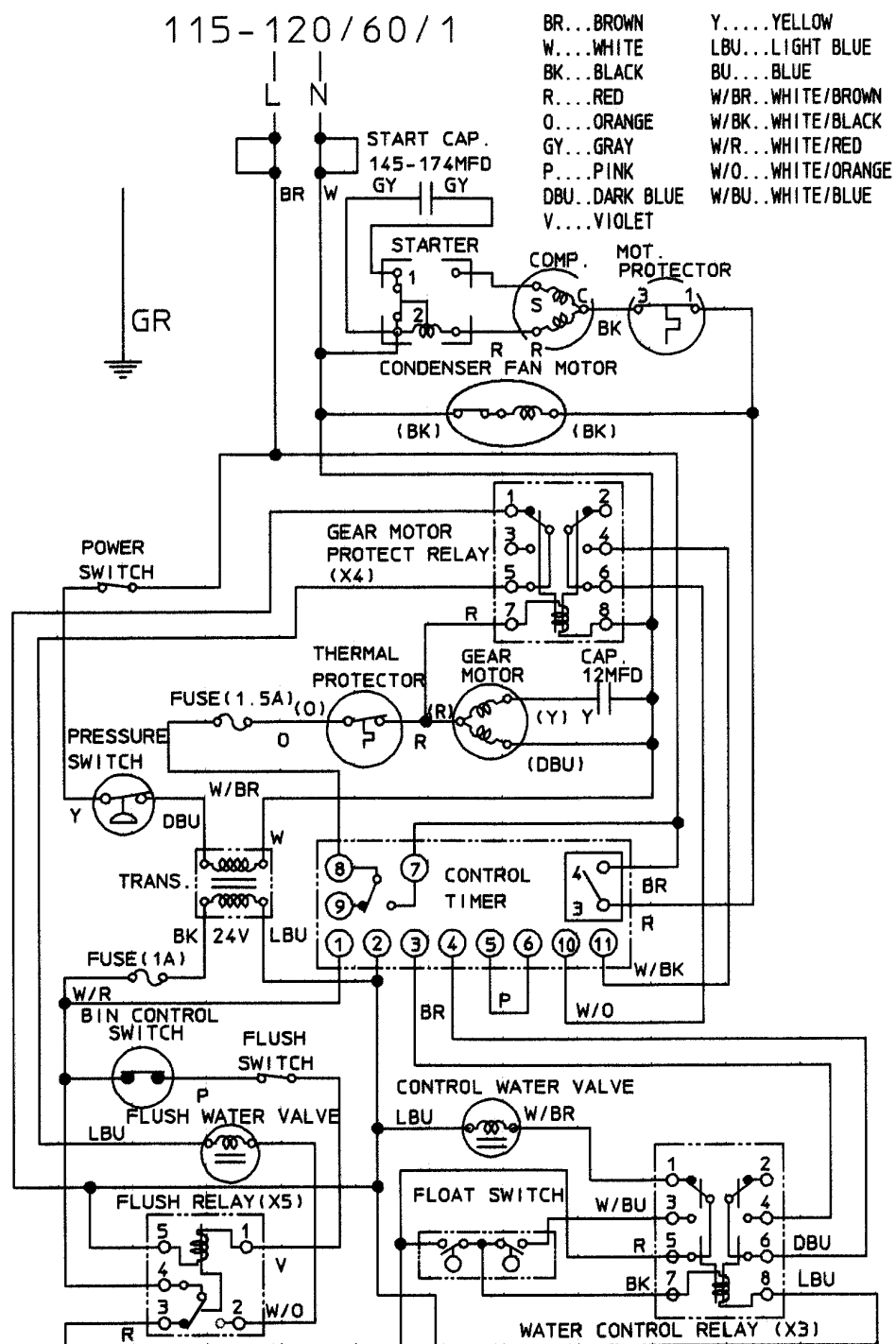
F-300BAF

## 2. Auxiliary Code K-2 and L-0



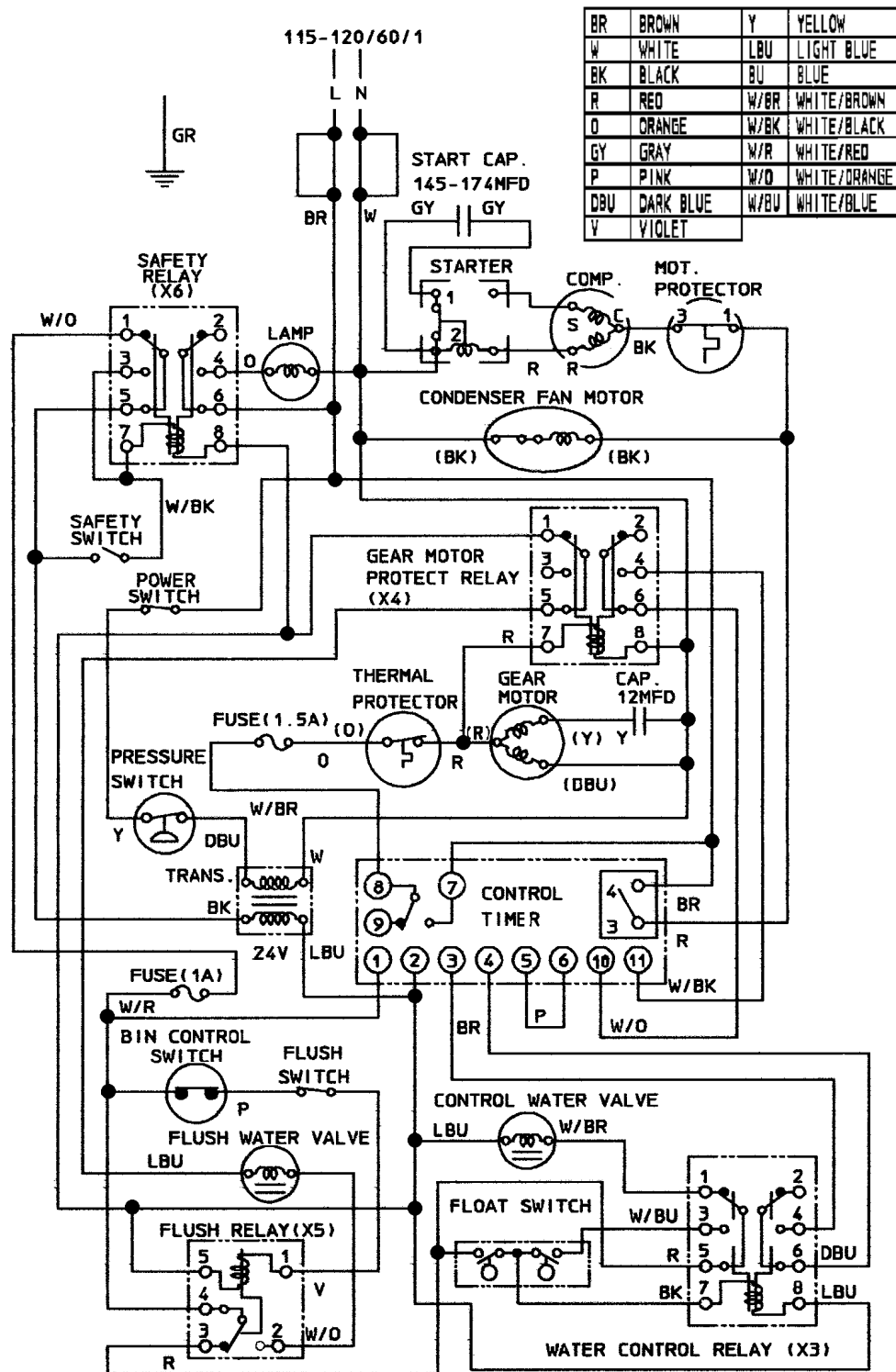
F-300BAF

### 3. Auxiliary Code L-1 and M-0



F-300BAF

#### 4. Auxiliary Code M-1 and Later

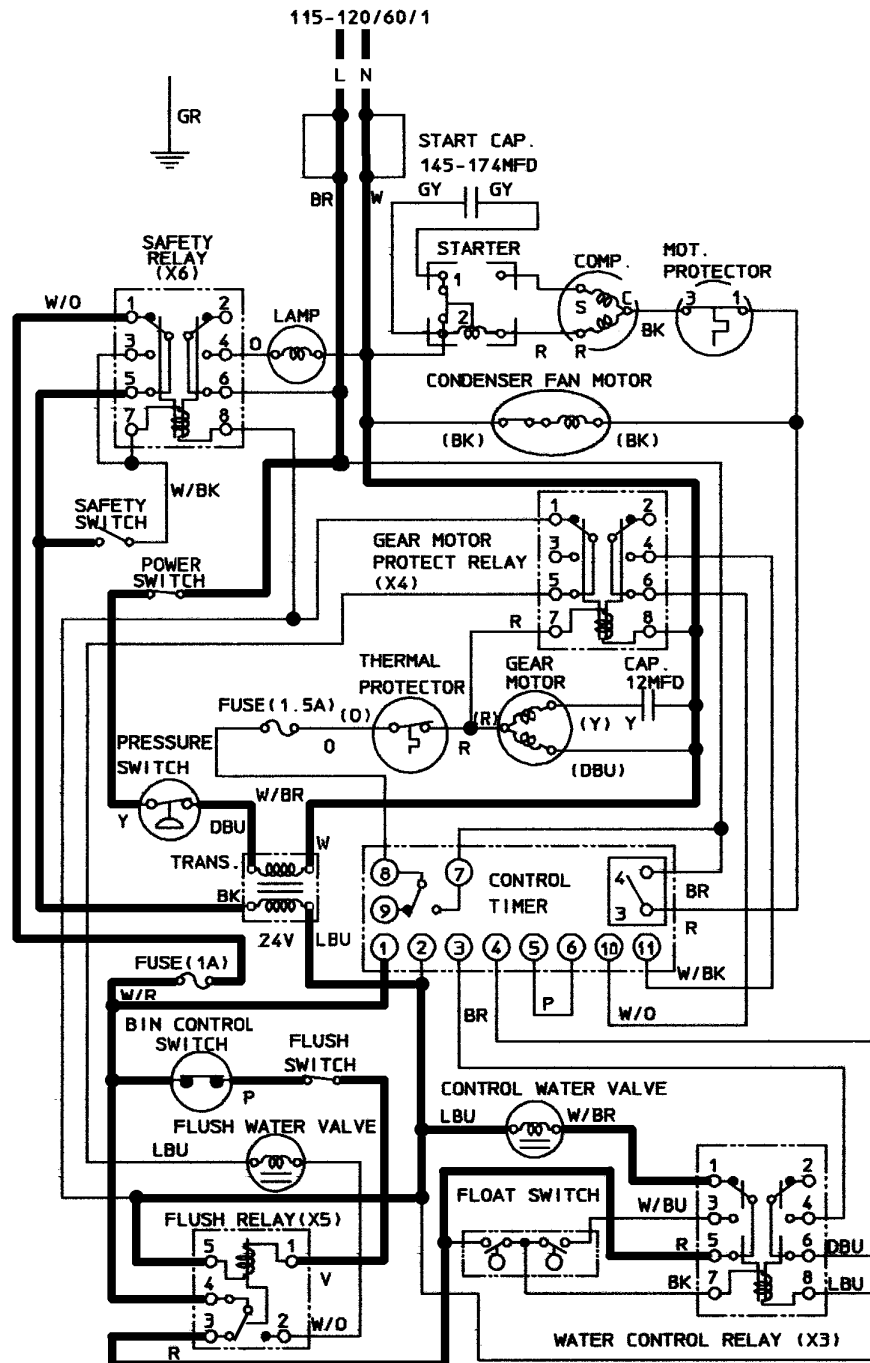


F-300BAF

## C. Sequence of Electrical Circuit

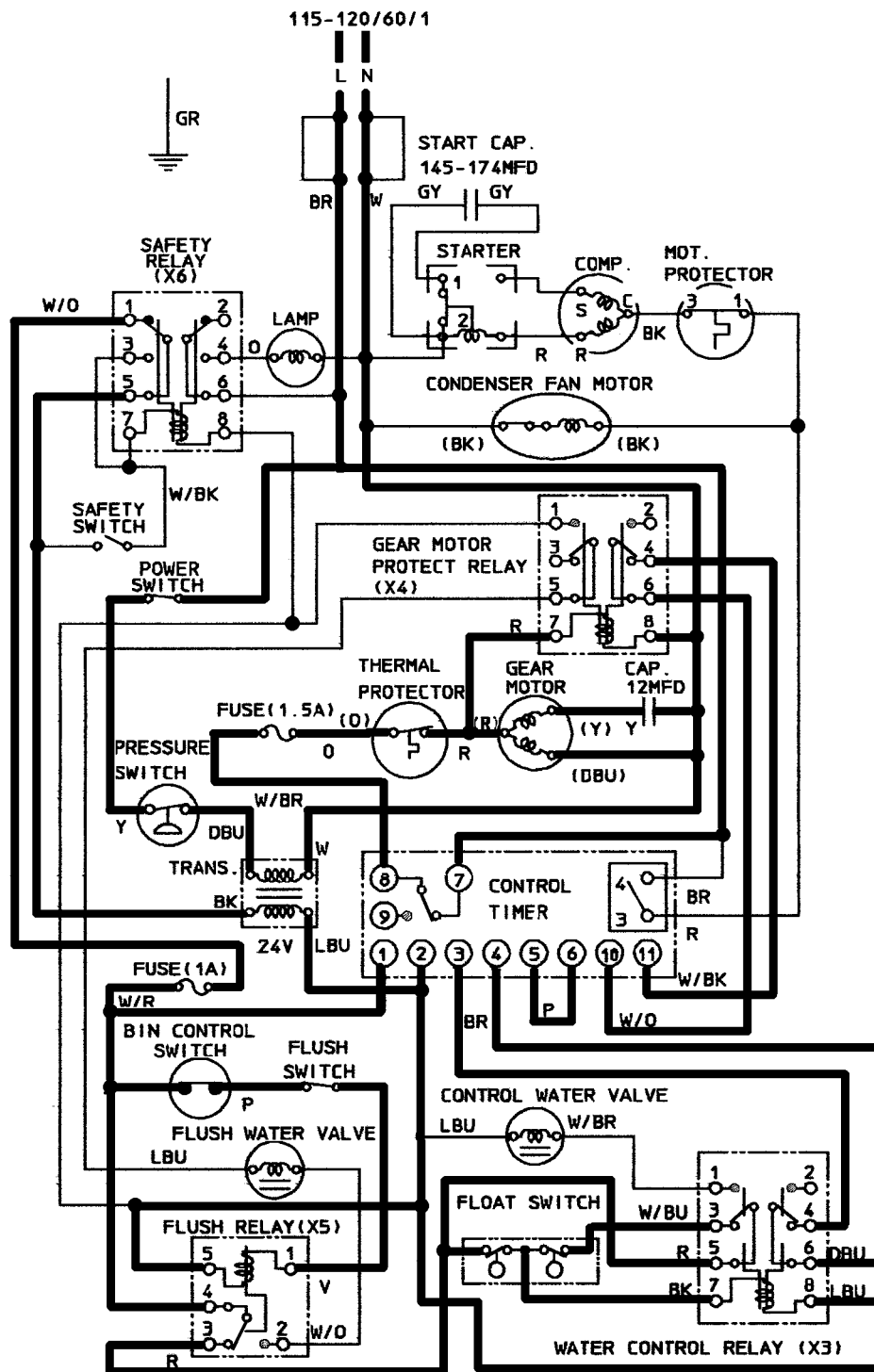
### 1. Fill Cycle

When power switch is moved to "ON" position, water is supplied to reservoir.



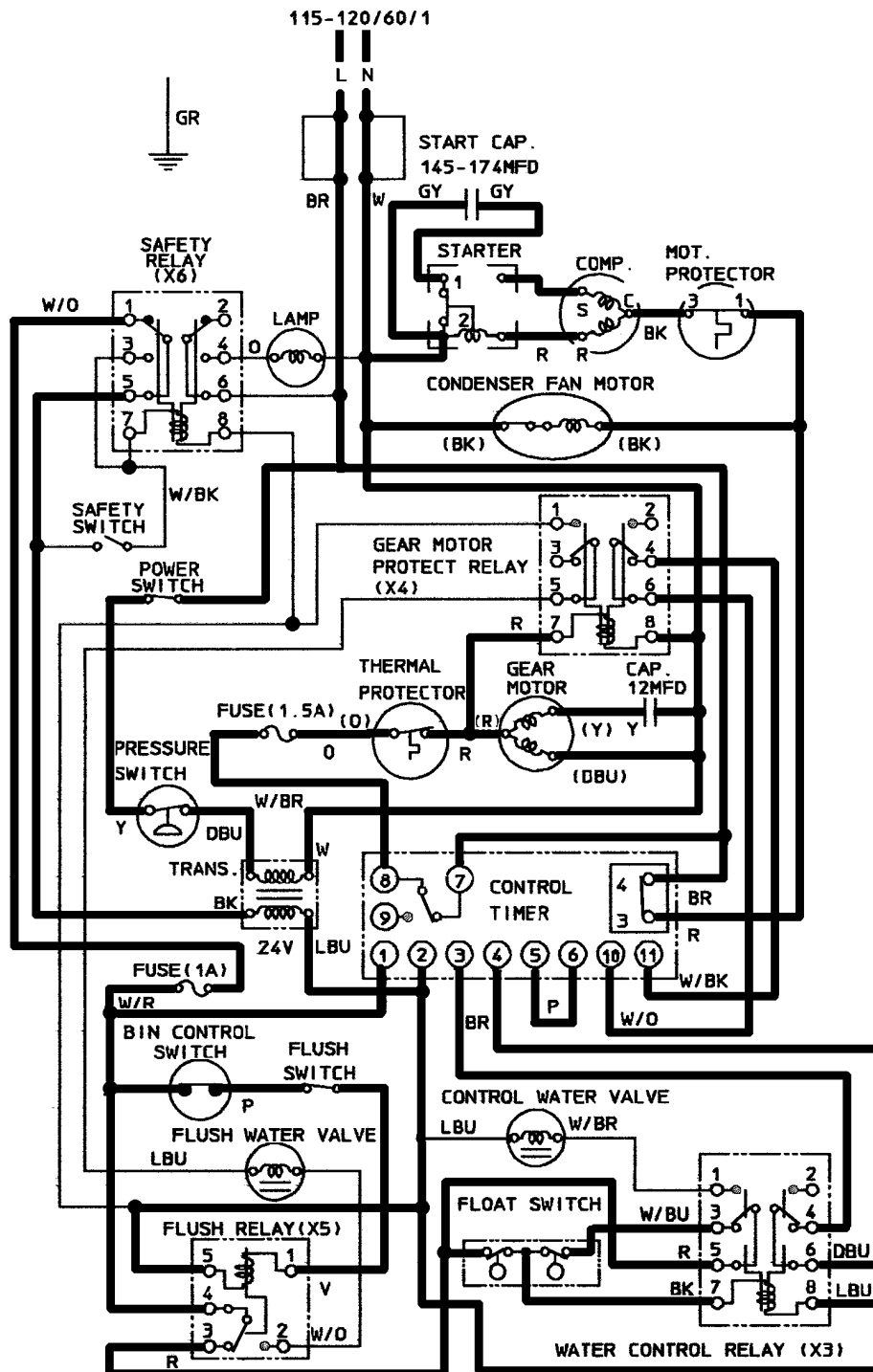
## 2. Ice Purge Cycle

When reservoir has filled, gear motor starts.



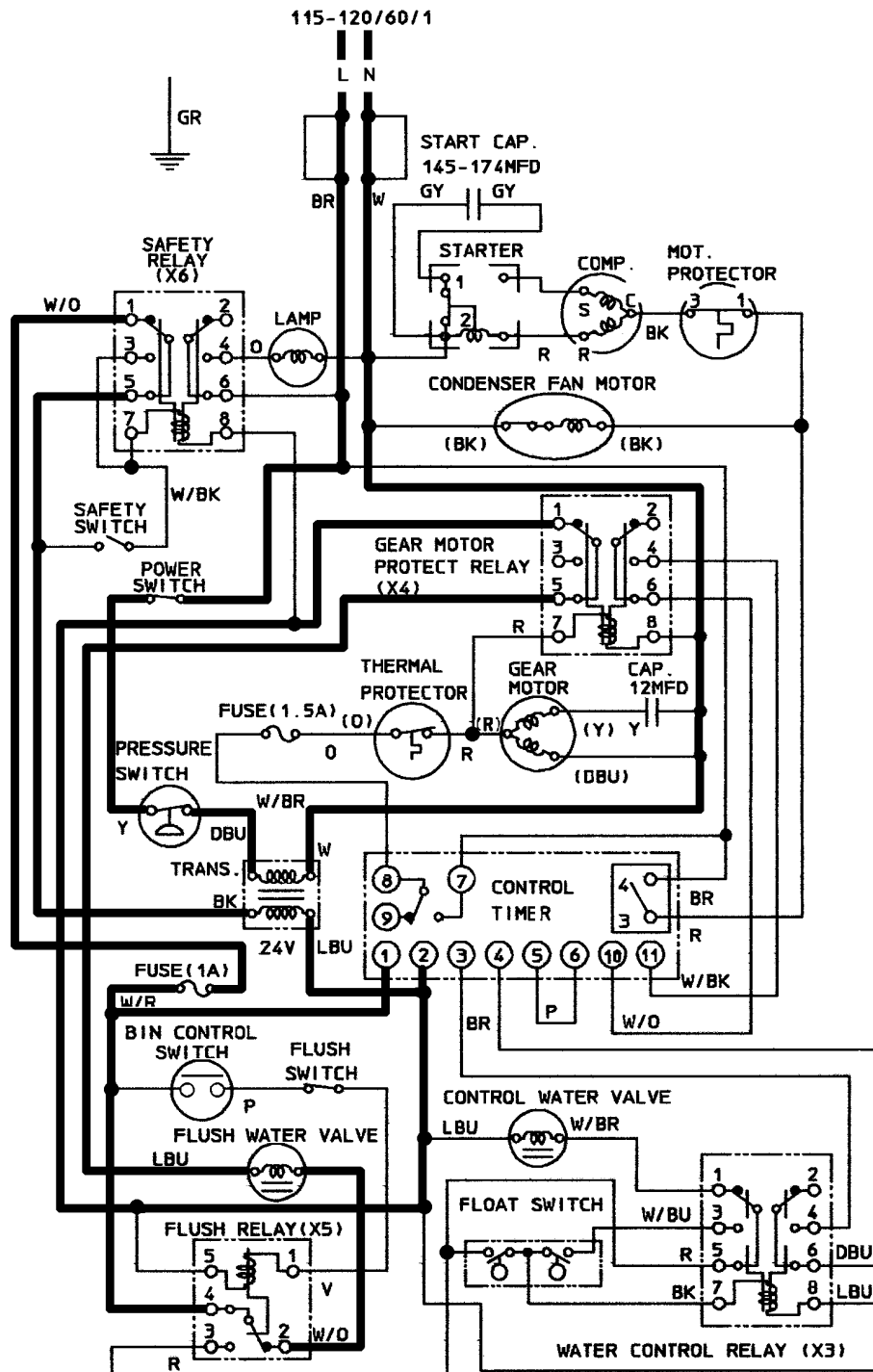
### 3. Freeze Cycle

Compressor and condenser fan motor start about 60 sec. after gear motor starts.



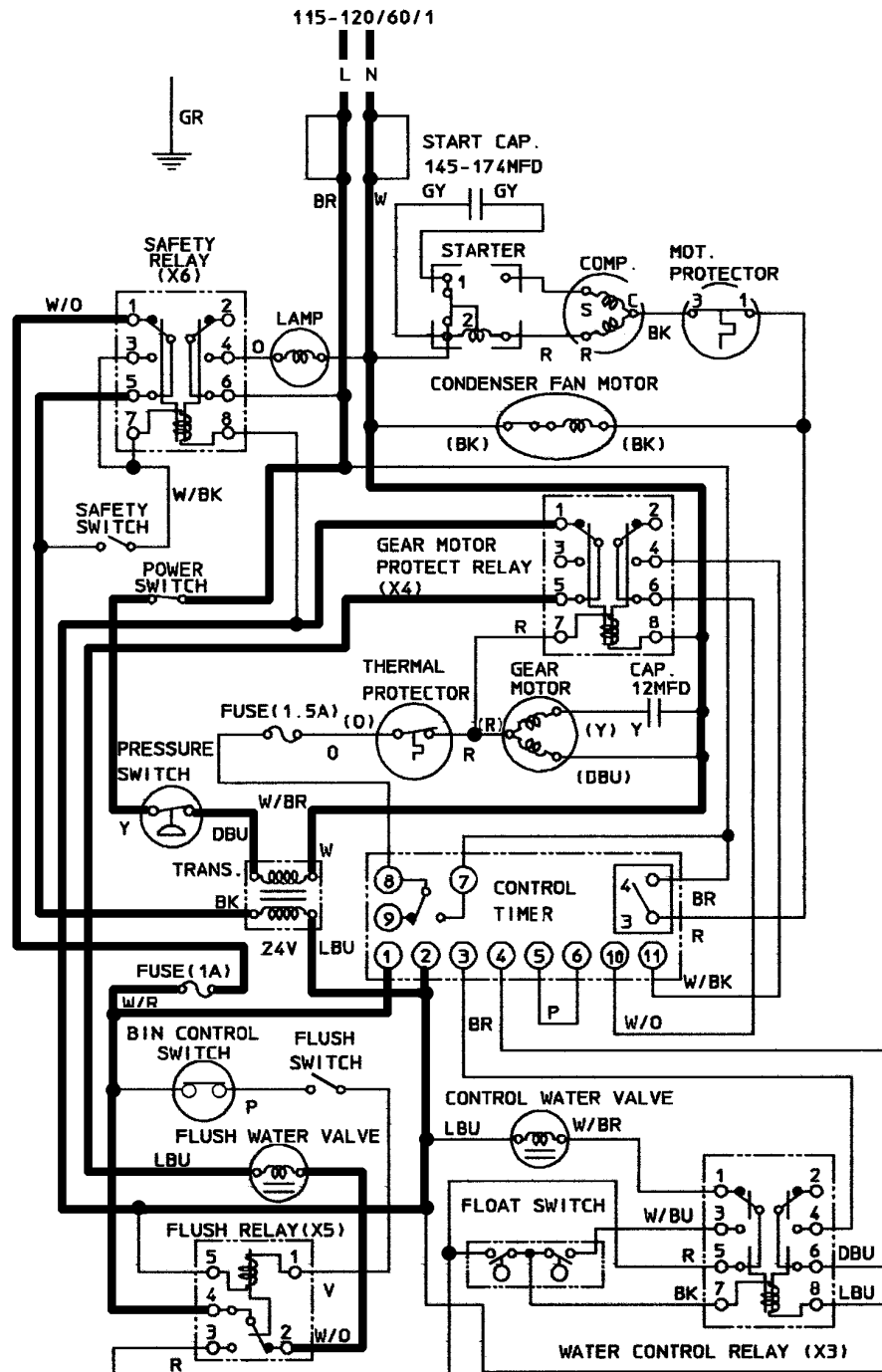
#### 4. Shutdown

Compressor and condenser fan motor stop about 90 sec. after bin control operates, gear motor stops about 60 sec. later. Flush water valve then operates.



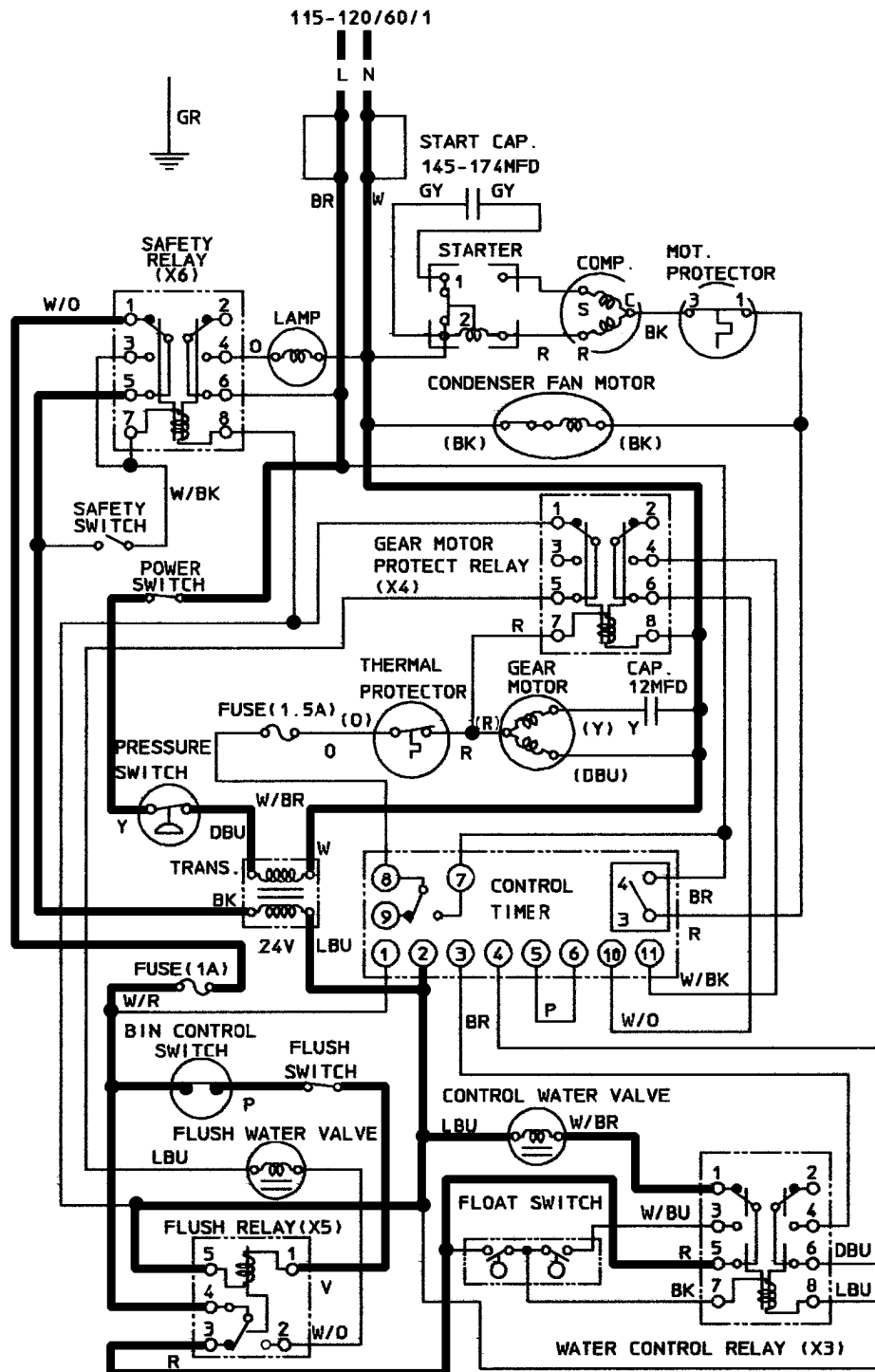
## 5. Cleaning - Flush Switch

Compressor and condenser fan motor stop about 90 sec. after manually moving flush switch to FLUSH position. Gear motor stops about 60 sec. later. Flush water valve then operates.



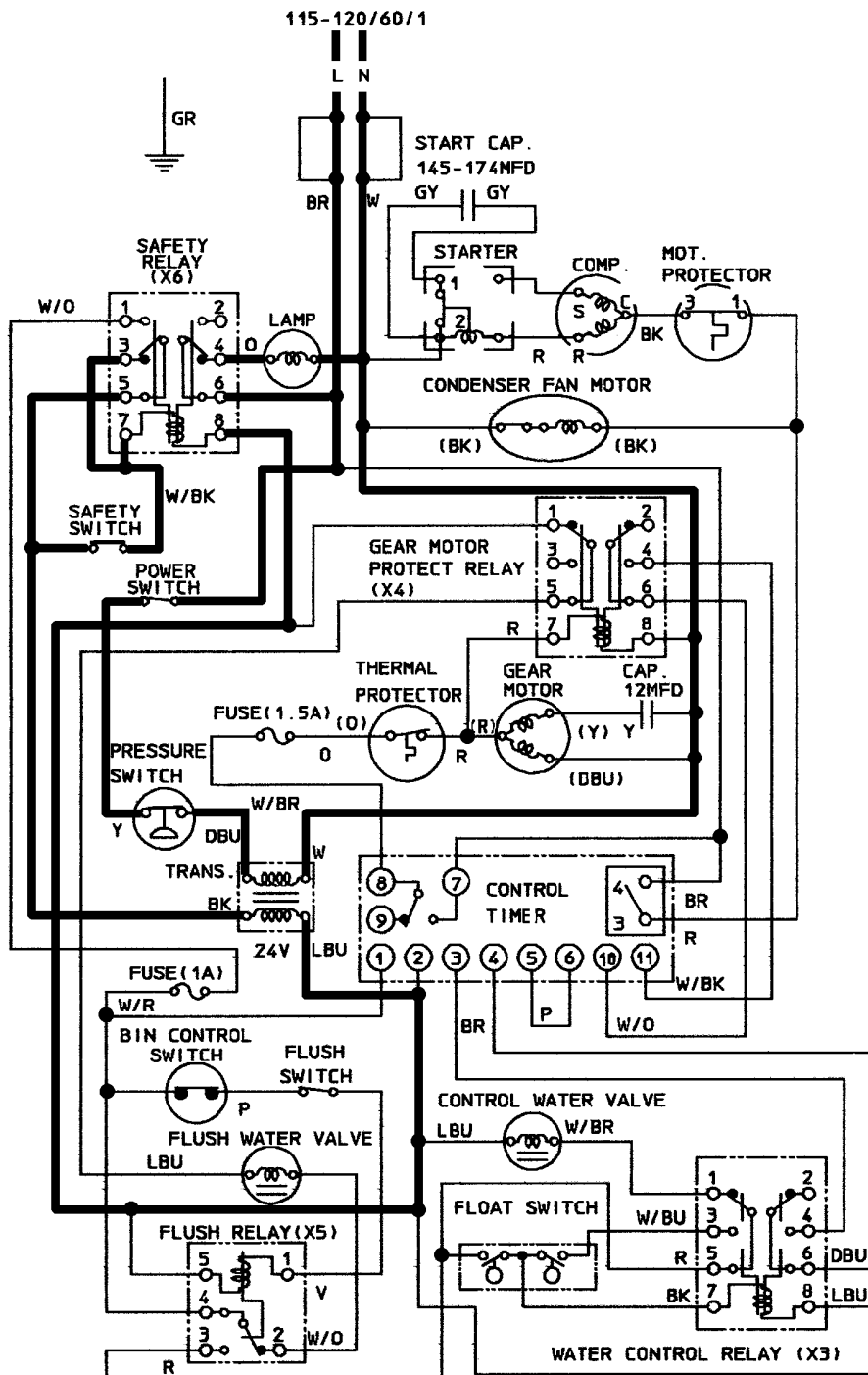
## 6. Low Water Safety

If upper float switch fails to close, water valve remains open until upper float switch closes and water control relay energizes.



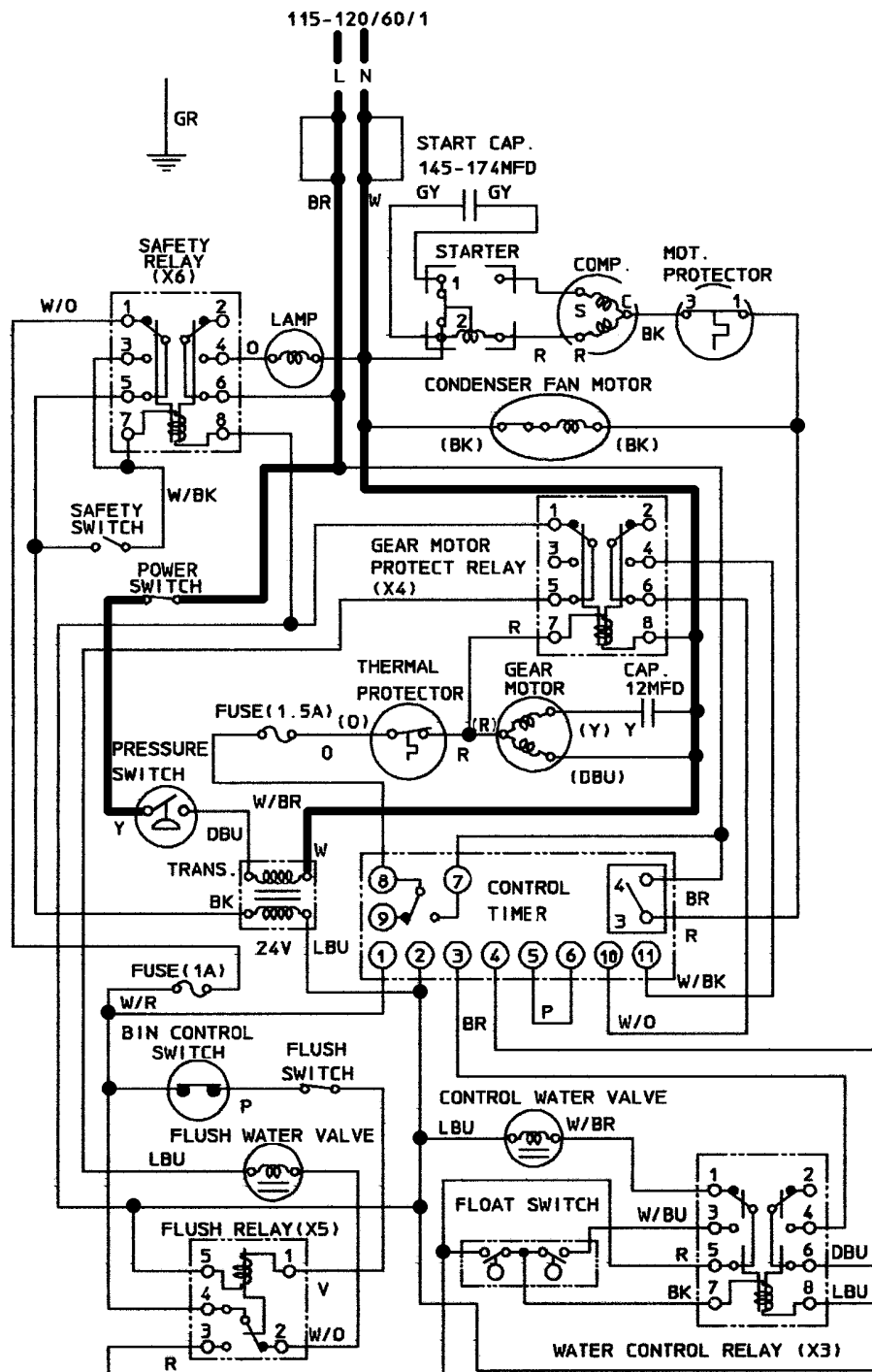
## 7. Spout Safety Switch

When safety switch is activated, the safety switch relay operates, and the icemaker does not run.



## 8. High Pressure Switch

In case of high pressure, pressure switch shuts down unit.



## D. Performance Data

### 1. F-300BAF

APPROXIMATE ICE PRODUCTION PER 24 HR.	Ambient Temp. (°F)	Water Temp. (°F)					
		50		70		90	
	70	*303	*(137)	290	(131)	278	(126)
	80	267	(121)	256	(116)	246	(112)
	90	236	(107)	*232	*(105)	218	(99)
lbs./day (kg/day)	100	209	(95)	201	(91)	*188	*(85)
APPROXIMATE ELECTRIC CONSUMPTION	70	*667	--	668	--	669	--
	80	670	--	671	--	672	--
	90	673	--	*674	--	681	--
	watts	100	688	--	695	--	*702
APPROXIMATE WATER CONSUMPTION PER 24 HR.	70	*36	*(137)	35	(131)	33	(126)
	80	32	(121)	31	(116)	30	(112)
	90	28	(107)	*28	*(105)	26	(99)
	gal./day (l/day)	100	25	(95)	24	(91)	*23
EVAPORATOR OUTLET TEMP.	70	*19	*(-7)	19	(-7)	19	(-7)
	80	19	(-7)	22	(-6)	22	(-6)
	90	22	(-6)	*22	*(-6)	26	(-4)
	°F (°C)	100	26	(-4)	26	(-4)	*26
HEAD PRESSURE	70	*250	*(17.5)	250	(17.5)	250	(17.5)
	80	280	(19.7)	280	(19.7)	280	(19.7)
	90	311	(21.9)	*311	*(21.9)	311	(21.9)
	PSIG (kg/cm²G)	100	351	(24.7)	351	(24.7)	*351
SUCTION PRESSURE	70	*35	*(2.5)	35	(2.5)	35	(2.5)
	80	37	(2.6)	37	(2.6)	37	(2.6)
	90	39	(2.7)	*39	*(2.7)	39	(2.7)
	PSIG ( kg/cm²G )	100	43	(3.0)	43	(3.0)	*43
TOTAL HEAT OF REJECTION		3178 BTU/h (AT 90°F /WT 70°F)					
Note: The data without *marks should be used for reference.							

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

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## IV. Service Diagnosis

### A. Diagnostic Procedure

This diagnostic procedure is a sequence check that allows you to diagnose the electrical system and components under normal operating conditions of 70°F or warmer air and 50°F or warmer water temperatures. Before proceeding, check for correct installation, proper voltage per unit nameplate and adequate water supply.

- 1) Unplug the unit from the electrical outlet and access the control panel.
- 2) Plug the unit back in. Make sure the flush switch is in the ICE position, then place the power switch in the ON position.
- 3) Fill Cycle – The water valve energizes. The reservoir begins to fill and the lower float switch closes. Nothing occurs at this time. The reservoir continues to fill and the upper float switch closes, energizing the water control relay. When the water control relay energizes, the inlet water valve de-energizes and the low water safety circuit closes to the timer board. **Diagnosis:** Check that the water valve fills the reservoir. If not, check for clogged water filters, clogged water valve screen, power supply to the unit, power circuit to the water valve (power switch, high pressure switch, transformer, safety switch, safety relay contacts, fuse, bin control, flush switch, flush relay, flush relay contacts, float switch, water control relay contacts), and the coil on the water valve.
- 3) Ice Purge Cycle – (short cycle protection) The gear motor and the gear motor protect relay energize, and the 60 second compressor short cycle protection timer starts. **Diagnosis:** Check that the gear motor starts. If not, check the low water safety circuit on terminals 3 and 4 on the timer board, check for 120 volts on the gear motor relay terminal 8 on the timer board, check the gear motor fuse, thermal protector, and gear motor windings. If the gear motor starts but the auger does not turn: check the gear motor coupling between the auger and the gear motor. If the compressor starts the same time the gear motor starts: Check the compressor relay on the timer board (the black relay on the timer board is the compressor relay).
- 4) Freeze Cycle – The compressor and fan motor energize, the gear motor, gear motor protect relay, flush switch relay, and the water control relay remain energized. Ice production begins 4 to 6 minutes after the compressor and fan motor start depending on ambient and water conditions. **Diagnosis:** Check that the compressor and fan motor are running. If not, check for 120 volts on the compressor relay terminal 4 on the timer board (the black relay on the timer board is the compressor relay), check for 120 volts on the gear motor protect relay, check gear motor relay contacts 4 and 6, check voltage on the compressor terminals, check the internal overload (motor protector), the compressor capacitors, and voltage to the fan motor and fan capacitor.

- 5) Refill/Low Water Safety Cycle – As ice is produced, the water level in the reservoir drops. As it drops, the upper float switch and lower float switch open. The upper float switch opens first. Nothing occurs at this time. When the lower float switch opens, the refill begins. The water control relay de-energizes, the low water safety circuit opens (terminals 4 and 6 on the water control relay, 3 and 4 on the timer board), a 90 second countdown timer begins on the timer board, and the inlet water valve energizes. The compressor, fan motor and gear motor continue to run. The upper float switch now has 90 seconds to close before the low water safety timer terminates and shuts down the unit. Once the upper float switch closes, the water control relay energizes, the inlet water valve de-energizes and the low water safety 90 second countdown timer terminates. **Diagnosis** – Check that the water fill begins. If not, check the lower float switch, voltage to the inlet water valve, the water control relay, water supply, filters, and inlet water valve screen.
- 7) Shutdown – The bin fills and activates the bin control proximity switch. 90 seconds later the compressor and fan motor de-energize, then 60 seconds later the gear motor de-energizes. **Diagnosis:** Check that the bin control paddle is activated and that the proximity switch opens. If the compressor and gear motor fail to stop, check the proximity switch and timer board relays.

## B. Diagnostic Charts

### 1. No Ice Production

Problem	Possible Cause	Remedy
[1] The icemaker will not start. (fill cycle, water valve)	a) Power Supply	1. Off.
		2. Power cord unplugged.
		3. Loose connection.
		4. Bad contacts.
		5. Blown fuse.
	b) Power Switch (Control Box)	1. Turn on.
		2. Plug into receptacle.
	c) High Pressure Switch	3. Tighten.
		4. Check for continuity and replace.
		5. Replace.
		1. OFF position.
		2. Check for continuity and replace.
		1. Dirty air filter or condenser.
		1. Clean.
		2. Ambient or condenser water temperature too warm.
		2. Reduce temperature.
		3. Condenser water pressure too low or off. (water-cooled model only)
		3. Check and get recommended pressure.
		4. Water regulating valve set too high. (water-cooled model only)
		4. Adjust it lower.
		5. Fan not rotating.
		5. See "3. [1] a) Fan Motor."
		6. Refrigerant overcharged.
		6. Recharge.
		7. Refrigerant line or components plugged.
		7. Clean and replace drier.
	d) Transformer	8. Check for continuity and replace.
		9. Tighten.
	e) Spout Safety Switch and Relay	1. Coil winding opened.
	f) Fuse (Control Box)	1. Replace.
		1. Bin control not activating.
	g) Bin Control	1. Check bin control actuator and proximity switch.
		1. Blown.
	h) Flush Switch	1. Check for short circuit and replace.
		1. Actuator sticking.
	i) Flush Switch Relay	1. Adjust or replace.
		2. Proximity switch open.
		2. Replace.
		1. FLUSH position.
		1. Move to ICE position.
		2. Check for continuity and replace.
		2. Bad contacts.
		2. Check for continuity and replace.
		1. Coil open.
		1. Replace.

Problem	Possible Cause		Remedy
	j) Water Control Relay	1. Bad contacts.	1. Replace.
		2. Open coil.	2. Replace.
	k) Water Valve	1. Coil winding opened.	1. Replace.
	l) Shut-off Valve	1. Closed.	1. Open.
		2. Water failure.	2. Wait until water is supplied.
	m) Plug and Receptacle (Control Box)	1. Disconnected.	1. Connect.
		2. Loose terminal.	2. Repair terminal connection.
[2] Water does not stop, and the gear motor will not start.	a) Float Switch	1. Bad contacts.	1. Check for continuity and replace.
		2. Float does not move freely.	2. Clean or replace.
	b) Water Control Relay	1. Contact fused.	1. Replace.
		2. Coil winding opened.	2. Replace.
	c) Flush Water Valve	1. Valve seat clogged and water leaking.	1. Clean or replace.
	d) Hoses	1. Disconnected.	1. Connect.
[3] Water has been supplied, but the gear motor will not start.	a) Bin Control	1. Open	1. Bin full, check for continuity on proximity switch.
	b) Water Control Relay	1. Low water safety circuit open (bad contacts).	1. Replace relay.
	c) Control Timer (Printed Circuit Board)	1. Fails to operate gear motor relay.	1. Check water control relay circuit.
	d) Gear Motor Fuse	1. Blown.	1. Check gear motor amperage, bearing wear (see "V. F. 1. Upper Bearing Wear Check"), supply voltage.
	e) Gear Motor Thermal Protector	1. Open.	1. Check gear motor bearings, voltage supply.
	f) Gear Motor	1. Open windings.	1. Replace gear motor.
		2. Locked bearings	1. Replace gear motor.
[4] Gear motor starts, but compressor will not start or operates intermittently.	a) Gear Motor Protect Relay	1. Open coil.	1. Replace.
		2. Open contacts.	2. Replace.
	b) Timer Board Relay	1. Bad contacts.	1. Check for continuity and replace.
		2. Coil winding opened.	2. Replace timer.
	c) Starter	1. Bad contacts.	1. Check for continuity and replace.
		2. Coil winding opened.	2. Replace.
		3. Loose connections.	3. Tighten.
	d) Start Capacitor or Run Capacitor	1. Defective.	1. Replace.

Problem	Possible Cause	Remedy
	e) Compressor	1. Loose connections.
		2. Motor winding opened or grounded.
		3. Compressor locked and motor protector tripped.
	f) Power Supply	1. Circuit ampacity too low.
[5] Gear motor and compressor start, but no ice is produced.	a) Refrigerant Line	1. Gas leaks.
		2. Refrigerant line clogged.
		1. Check for leaks with a leak detector. Replace drier and charge with refrigerant. Refrigerant charge is marked on nameplate or rating label.
		2. Replace the clogged component.

## 2. Low Ice Production

Problem	Possible Cause	Remedy
[1] Low ice production.	a) Refrigerant Line	1. Gas leaks.
		2. Refrigerant line clogged.
		3. Overcharged.
	b) High-Side Pressure Too High	1. Dirty air filter or condenser.
		2. Ambient or condenser water temperature too warm.
		3. Condenser water pressure too low or off. [water-cooled model only]
		4. Fan, slow rpm.
		5. Water regulating valve clogged. [water-cooled model only]
	c) Expansion Valve (not adjustable)	1. Low-side pressure too low.
		2. Low-side pressure too high.
		1. See "2. [5] a) Refrigerant Line."
		2. Replace the clogged component.
		3. Recharge.
		1. Clean.
		2. Reduce temperature.
		3. Check and get recommended pressure.
		4. See "3. [1] a) Fan Motor".
		5. Clean.
		1. Replace.
		2. See if expansion valve bulb is mounted properly, and replace the valve if necessary.

### 3. Other

Problem	Possible Cause	Remedy
[1] Abnormal noise	a) Fan Motor	1. Bearing worn out.
		2. Fan blade deformed.
		3. Fan blade does not move freely.
	b) Compressor	1. Bearings worn out, or cylinder valve broken.
		2. Mounting pad out of position.
	c) Refrigerant Lines	1. Rub or touch lines or other surfaces.
	d) Gear Motor	1. Bearing or gear worn out / damaged.
	e) Evaporator	1. Low refrigerant pressures.
		2. Expansion valve bad.
		3. Evaporator bad.
		4. Scale on inside wall of freezing cylinder.
[2] Overflow from reservoir (water does not stop).	a) Water Supply	1. Water pressure too high.
	b) Water Valve	1. Diaphragm does not close.
	c) Float Switch	1. Bad contacts.
	d) Water Control Relay	1. Bad contacts.
[3] Gear motor protector operates frequently or fuse blows frequently.	a) Power Supply Voltage	1. Too high or too low.
	b) Evaporator Assembly	1. Bearings or auger worn out.
	c) Bin Control	1. Bad contacts.
		2. Actuator does not move freely.

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## V. Removal and Replacement of Components

### IMPORTANT

Ensure all components, fasteners and thumbscrews are securely in place after the equipment is serviced.

### IMPORTANT

1. The Polyol Ester (POE) oils used in R-404A units can absorb moisture quickly. Therefore it is important to prevent moisture from entering the system when replacing or servicing parts.
2. Always install a new drier every time the sealed refrigeration system is opened.
3. Do not leave the system open for longer than 15 minutes when replacing or servicing parts.

## A. Service for Refrigerant Lines

### 1. Refrigerant Recovery

The icemaker unit is provided with refrigerant access valves. Using proper refrigerant practices recover the refrigerant from the access valves and store it in an approved container. Do not discharge the refrigerant into the atmosphere.

### 2. Evacuation and Recharge [R-404A]

- 1) Attach service manifold hoses and a vacuum pump to the system. Be sure to connect charging hoses to both high-side and low-side 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. Never allow the oil in the vacuum pump to flow backward.
- 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 service manifold.
- 5) Disconnect the vacuum pump, and attach a refrigerant service cylinder to the high-side line. Remember to loosen the connection, and purge the air from the hose. See the nameplate for the required refrigerant charge. Hoshizaki recommends only virgin refrigerant or reclaimed refrigerant which meets ARI Standard No. 700-88 be used.
- 6) A liquid charge is recommended for charging an R-404A system. Invert the service cylinder and place it on scales. Open the high-side, service manifold valve.
- 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. Use a throttling valve or liquid dispensing device to add the remaining liquid charge through the low-side access port with the unit running.
- 9) Close the two refrigerant access valves, and disconnect the service manifold hoses.
- 10) Cap the access valves to prevent a possible leak.

## **B. Brazing**

### **WARNING**

1. Refrigerant R-404A itself is not flammable at atmospheric pressure and temperatures up to 176°F.
2. Refrigerant 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.
3. Always recover the refrigerant and store it in an approved container. Do not discharge the refrigerant into the atmosphere.
4. Do not use silver alloy or copper alloy containing arsenic.
5. Do not use R-404A as a mixture with pressurized air for leak testing.  
Refrigerant leaks can be detected by charging the unit with a little refrigerant, raising the pressure with nitrogen and using an electronic leak detector.

Note: All brazing connections are clear-paint coated. Use sandpaper to remove the coating from the brazing connections before unbrazing the components.

## C. Removal and Replacement of Compressor

### IMPORTANT

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.

Note: When replacing a compressor with a defective winding, be sure to install the new start capacitor and start relay supplied with the replacement compressor. Due to the ability of the POE oil in the compressor to absorb moisture quickly, the compressor must not be opened more than 15 minutes for replacement or service. Do not mix lubricants of different compressors even if both are charged with R-404A, except when they use the same lubricant.

- 1) Unplug the unit from the electrical outlet.
- 2) Remove the panels.
- 3) Recover the refrigerant and store it in an approved container.
- 4) Remove the terminal cover on the compressor and disconnect the compressor wiring.
- 5) Remove the hold-down bolts, washers and rubber grommets .
- 6) Remove the discharge and suction pipes
- 7) Remove the compressor. Unpack the new compressor package.
- 8) Attach the rubber grommets of the prior compressor.
- 9) Place the compressor in position and secure it using the bolts and washers.
- 10) Remove the drier, then place the new drier in position.
- 11) Remove plugs from the suction, discharge and process pipes.
- 12) Braze all fittings while purging with nitrogen gas flowing at a pressure of 3 to 4 PSIG.
- 13) Check for leaks using nitrogen gas (140 PSIG) and soap bubbles.
- 14) Evacuate the system, and charge it with refrigerant. See the nameplate for the required refrigerant charge.
- 15) Connect the terminals and replace the terminal cover in its correct position.
- 16) Replace the panels in their correct positions.
- 17) Plug the unit back in.

## D. Removal and Replacement of Drier

### IMPORTANT

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.

- 1) Unplug the unit from the electrical outlet.
- 2) Remove the panels.
- 3) Recover the refrigerant and store it in an approved container.
- 4) Remove the drier, then place the new drier in position. Install the new drier with the arrow on the drier in the direction of the refrigerant flow.
- 5) Braze all fittings while purging with nitrogen gas flowing at a pressure of 3 to 4 PSIG.
- 6) Check for leaks using nitrogen gas (140 PSIG) and soap bubbles.
- 7) Evacuate the system, and charge it with refrigerant. See the nameplate for the required refrigerant charge.
- 8) Replace the panels in their correct positions.
- 9) Plug the unit back in.

## E. Removal and Replacement of Expansion Valve

### IMPORTANT

Sometimes moisture in the refrigeration circuit exceeds the drier capacity and freezes up at the expansion valve. 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.

- 1) Unplug the unit from the electrical outlet.
- 2) Remove the panels.
- 3) Recover the refrigerant and store it in an approved container.
- 4) Remove the insulation and the expansion valve bulb on the suction line.
- 5) Remove the expansion valve cover and disconnect the expansion valve. Place the new expansion valve in position.
- 6) Remove the drier, then place the new drier in position.
- 7) Braze all fittings while purging with nitrogen gas flowing at a pressure of 3 to 4 PSIG.

### WARNING

Always protect the valve body by using a damp cloth to prevent the valve from overheating. Do not braze with the valve body exceeding 250°F (121°C).

- 8) Check for leaks using nitrogen gas (140 PSIG) and soap bubbles.
- 9) Evacuate the system, and charge it with refrigerant. See the nameplate for the required refrigerant charge.
- 10) Attach the expansion valve bulb to the suction line in the same location as the previous bulb. The bulb should be at the 12 o'clock position on the tube. Be sure to secure the bulb with the clamp and holder and to insulate it.
- 11) Place the expansion valve cover in position.
- 12) Replace the panels in their correct positions.
- 13) Plug the unit back in.

## F. Removal and Replacement of Evaporator Assembly Components

### CAUTION

Make sure that the safety switch and spout are properly installed after making repairs in the evaporator assembly. Failure to install the safety switch and spout correctly could result in serious damage to the unit.

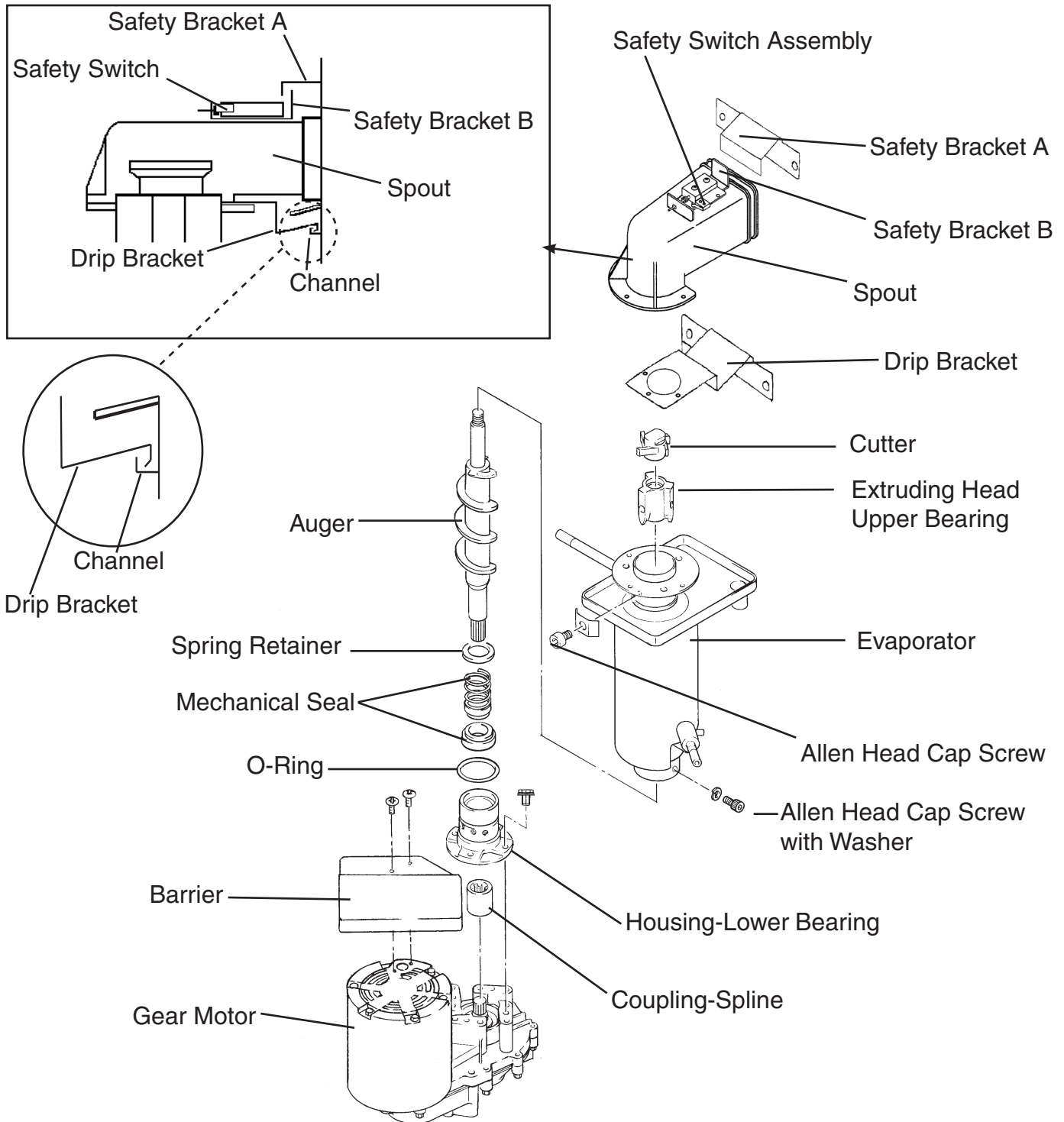
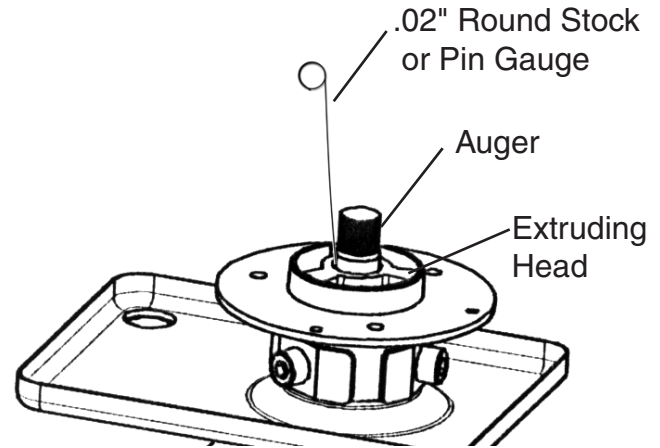


Fig. 1

## 1. Upper Bearing Wear Check

To ensure that the bearing inside the extruding head does not exceed the wear tolerance of .02", follow the instructions below.

- 1) Unplug the unit from the electrical outlet.
- 2) Remove the panels.
- 3) Remove the thumbscrews and take off the spout from the evaporator.
- 4) Loosen the cutter with a wrench and remove it.
- 5) Grasp the top of the auger and move the auger towards you and then try to insert a .02" round stock or pin gauge in between the back side of the auger shaft and the bearing surface. Check several locations around the auger shaft. If the gauge goes between the shaft and the bearing at any point or if the bearing is scratched or cracked, both the top bearing in the extruding head and the lower bearing in the housing should be replaced. Instructions for removing the extruding head and housing are located later in this procedure.



**Fig. 2**

Note: Replacing the bearing requires a bearing press adaptor. If one is not available, replace the whole extruding head and housing.

- 6) Replace the cutter.
- 7) Replace the spout. Make sure that the drip bracket is in the channel and that safety bracket B is behind safety bracket A. See Fig. 1.
- 8) Replace the panels in their correct positions.
- 9) Plug the unit back in.

## 2. Removal and Replacement of Cutter

- 1) Unplug the unit from the electrical outlet.
- 2) Remove the panels.
- 3) Remove the thumbscrews and take off the spout from the evaporator.
- 4) Loosen the cutter with a wrench and remove it.
- 5) Install the new cutter.
- 6) Replace the spout. Make sure that the drip bracket is in the channel and that safety bracket B is behind safety bracket A. See Fig. 1.
- 7) Replace the panels in their correct positions.
- 8) Plug the unit back in.

### 3. Removal and Replacement of Extruding Head

- 1) Unplug the unit from the electrical outlet.
- 2) Remove the panels.
- 3) Remove the thumbscrews and take off the spout from the evaporator.
- 4) Loosen the cutter with a wrench and remove it.
- 5) Remove the allen head cap screws and lift off the extruding head.
- 6) Place new extruding head in place and tighten down allen head cap screws. If the seals on the allen head cap screws are RED, they must be replaced. If the seals are BLUE, they may be re-used.
- 7) Replace the cutter and spout. Make sure that the drip bracket is in the channel and that safety bracket B is behind safety bracket A. See Fig. 1.
- 8) Replace the panels in their correct positions.
- 9) Plug the unit back in.

### 4. Removal and Replacement of Auger

- 1) Drain water from the evaporator by using the flush switch.
- 2) Unplug the unit from the electrical outlet.
- 3) Remove the panels.
- 4) Remove the thumbscrews and take off the spout from the evaporator.
- 5) Loosen the cutter with a wrench.
- 6) Remove the allen head cap screws securing the extruding head. Using the cutter, lift out the auger assembly.
- 7) Remove the cutter and extruding head from the auger and place on the new auger.
- 8) Install the new auger.
- 9) Replace the removed parts in the reverse order of which they were removed. When replacing the spout, make sure that the drip bracket is in the channel and that safety bracket B is behind safety bracket A. See Fig. 1.
- 10) Replace the panels in their correct positions.
- 11) Plug the unit back in.

### 5. Removal and Replacement of Evaporator

#### **IMPORTANT**

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.

- 1) Remove the panels.
- 2) Drain water from the evaporator by using the flush switch.
- 3) Unplug the unit from the electrical outlet.

- 4) Recover the refrigerant and store it in an approved container.
- 5) Remove the thumbscrews and take off the spout from the evaporator.
- 6) Disconnect the water hoses.
- 7) Remove the allen head cap screws securing the extruding head. Using the cutter, lift out the auger assembly.
- 8) Remove the insulation and the expansion valve bulb on the suction line.
- 9) Disconnect the inlet and outlet tubing.
- 10) Remove the allen head cap screws securing the evaporator to the lower housing.
- 11) Lift off the evaporator.
- 12) Inspect the mechanical seal and O-ring prior to installing the new evaporator. The mechanical seal consists of two parts. One moves along with the auger, and the other is fixed on the lower housing. If the contact surfaces of these two parts are worn, cracked or scratched, the mechanical seal may cause water leaks and should be replaced. Instructions for removing the mechanical seal and lower housing are located later in this procedure.
- 13) Make sure the lower mechanical seal is in place, then place the evaporator in position. Secure the evaporator to the lower housing using the allen head cap screws.
- 14) Remove the drier, then place the new drier in position.
- 15) Braze all fittings while purging with nitrogen gas flowing at a pressure of 3 to 4 PSIG.
- 16) Check for leaks using nitrogen gas (140 PSIG) and soap bubbles.
- 17) Evacuate the system, and charge it with refrigerant. See the nameplate for the required refrigerant charge.
- 18) Replace the removed parts in the reverse order of which they were removed. When replacing the spout, make sure that the drip bracket is in the channel and that safety bracket B is behind safety bracket A. See Fig. 1.
- 19) Replace the panels in their correct positions.
- 20) Plug the unit back in.

## **6. Removal and Replacement of Mechanical Seal and Lower Housing**

### **6a. Mechanical Seal**

- 1) Drain water from the evaporator by using the flush switch.
- 2) Unplug the unit from the electrical outlet.
- 3) Remove the panels.
- 4) Remove the thumbscrews and take off the spout from the evaporator.
- 5) Remove the allen head cap screws securing the extruding head. Using the cutter, lift out the auger assembly.
- 6) The mechanical seal consists of two parts. One moves along with the auger, and the other is fixed on the lower housing. If the contact surfaces of these two parts are worn, cracked or scratched, the mechanical seal may cause water leaks and should be replaced.

- 7) Remove the allen head cap screws securing the evaporator to the lower bearing housing.
- 8) Raise the evaporator up to access the lower housing.
- 9) Remove the O-ring and mechanical seal from the housing. If only replacing mechanical seal, proceed to step 12).

### **WARNING**

To help prevent water leaks, be careful not to damage the surfaces of the O-ring or mechanical seal.

#### **6b. Lower Housing**

- 10) Remove the bolts securing the housing to the gear motor and remove the housing from the gear motor. If inspection of the upper bearing inside the extruding head (see "F. 1. Upper Bearing Wear Check") indicates that it is out of tolerance, replace both it and the bearing inside the lower housing.  
Note: Replacing the bearing requires a bearing press adaptor. If one is not available, replace the whole extruding head and housing.
- 11) Mount the lower housing on the gear motor.
- 12) Install the O-ring and lower part of mechanical seal on the lower housing.
- 13 ) Lower the evaporator down and secure it to the lower housing.
- 14) Install the auger assembly with the upper part of the mechanical seal attached.
- 15) Replace the removed parts in the reverse order of which they were removed. When replacing the spout, make sure that the drip bracket is in the channel and that safety bracket B is behind safety bracket A. See Fig. 1.
- 16) Replace the panels in their correct positions.
- 17) Plug the unit back in.

#### **7. Removal and Replacement of Gear Motor**

- 1) Drain the water from the evaporator by using the flush switch.
- 2) Unplug the unit from the electrical outlet.
- 3) Remove the panels.
- 4) Remove the thumbscrews and take off the spout assembly from the evaporator.
- 5) Remove the bolts securing the lower housing to the gear motor. Lift the evaporator up slightly.
- 6) Remove the bolts securing the gear motor.
- 7) Remove the wiring from the gear motor, then remove the gear motor.
- 8) Remove the barrier, gear motor bracket and coupling-spline from the old gear motor and place on the new gear motor. Apply silicone over barrier screws.
- 9) Replace the removed parts in the reverse order of which they were removed. When replacing the spout, make sure that the drip bracket is in the channel and that safety bracket B is behind safety bracket A. See Fig. 1.

- 10) Replace the panels in their correct positions.
- 11) Plug the unit back in.

## **G. Removal and Replacement of Fan Motor**

- 1) Unplug the unit from the electrical outlet.
- 2) Remove the panels.
- 3) Remove the wire connectors from the fan motor leads.
- 4) Remove the fan motor bracket and fan motor.
- 5) Install the new fan motor.
- 6) Replace the fan motor bracket and the wire connectors.
- 7) Replace the panels in their correct positions.
- 8) Plug the unit back in.

## **H. Removal and Replacement of Inlet Water Valve**

- 1) Unplug the unit from the electrical outlet.
- 2) Remove the panels.
- 3) Close the water supply line shut-off valve.
- 4) Disconnect the terminals from the water valve.
- 5) Loosen the fitting nut on the water valve inlet, and remove the water valve. Do not lose the packings inside the fitting nut.
- 6) Remove the water supply hose from the water valve.
- 7) Install the new water valve.
- 8) Assemble the removed parts in the reverse order of the above procedure.
- 9) Open the water supply line shut-off valve.
- 10) Check for water leaks.
- 11) Replace the panels in their correct positions.
- 12) Plug the unit back in.

## **I. Removal and Replacement of Flush Water Valve**

- 1) Unplug the unit from the electrical outlet.
- 2) Remove the panels and close the water supply line shut-off valve.
- 3) Remove the clamp and disconnect the water valve.  
Note: Water may still remain inside the evaporator. Be sure to drain the water into the drain pan.
- 4) Disconnect the terminals from the water valve.
- 5) Remove the water valve from the bracket.
- 6) Remove the drain pipe from the water valve.
- 7) Connect the drain pipe to the new water valve, and place the valve in position.

- 8) Connect the hose to the water valve and secure it with the clamp.
- 9) Pour water into the reservoir, and check for water leaks.
- 10) Open the water supply line shut-off valve.
- 11) Plug the unit back in.
- 12) Move the flush switch to the "ICE" position.
- 13) Check for water leaks.
- 14) Move the flush switch to the "FLUSH" position, and make sure water is flushing.
- 15) Move the flush switch to the "ICE" position.
- 16) Replace the panels in their correct positions.
- 17) Plug the unit back in.

## VI. Cleaning and Maintenance

### IMPORTANT

Ensure all components, fasteners and thumbscrews are securely in place after any maintenance or cleaning is done to the equipment.

### A. Cleaning and Sanitizing Instructions

#### WARNING

1. HOSHIZAKI recommends cleaning this unit at least once a year. More frequent cleaning, however, may be required in some existing water conditions.
2. To prevent injury to individuals and damage to the icemaker, do not use ammonia type cleaners.
3. Always wear liquid-proof gloves to prevent the cleaning and sanitizing solutions from coming into contact with skin.

#### 1. Cleaning Solution

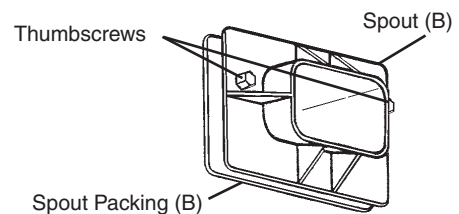
Dilute 4.8 fl. oz. (142 ml) of recommended cleaner Hoshizaki "Scale Away" or "LIME-A-WAY" (Economics Laboratory, Inc.) with 0.8 gallons (3 l) of warm water. This is a minimum amount. Make more solution if necessary.

### IMPORTANT

For safety and maximum effectiveness, use the solution immediately after dilution.

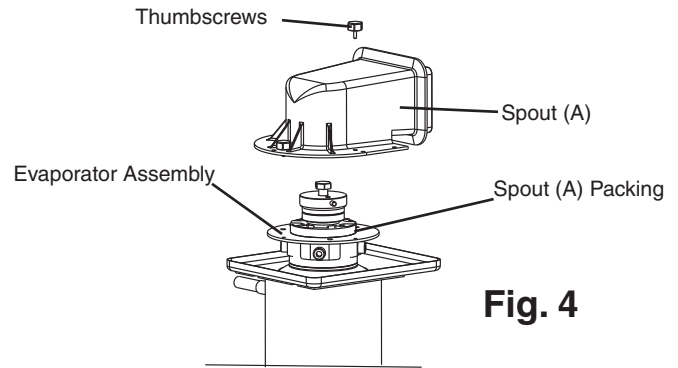
#### 2. Cleaning Procedure

- 1) Unplug the unit from the electrical outlet then remove the front panel and the top panel.
- 2) Close the water supply line shut-off valve.
- 3) Remove all ice from the storage bin.
- 4) Move the flush switch to the "FLUSH" position.
- 5) Plug the unit back in and turn on the power supply and drain out all water from the water line.
- 6) Turn off the power supply.  
Note: This unit is designed to start operating when the reservoir is filled with water.
- 7) In the storage bin, remove the thumbscrews attaching spout (B), then remove spout (B) and spout packing (B). See Fig. 3.



**Fig. 3**

- 8) Remove the thumbscrews attaching spout (A) to the evaporator assembly and lift off spout (A) and spout packing (A). See Fig 4.
- 9) Pour the cleaning solution over the extruding head until the evaporator assembly and the reservoir are filled and the solution starts to overflow into the drain pan.



**Fig. 4**

Note: If there is excess scale on the extruding head, fill the evaporator assembly and reservoir as described above, then use a clamp on the reservoir hose between the reservoir and evaporator assembly to block flow. Pour additional cleaning fluid over the extruding head until the evaporator assembly is completely full.

- 10) Using the thumbscrews, replace spouts (A) and (B) and spout packings (A) and (B) in their correct positions.
- 11) Allow the icemaker to sit for about 10 minutes before operation. If you placed a clamp on the reservoir hose in step 9, remove it before operation.
- 12) Move the flush switch to the "ICE" position, then turn on the power supply. Replace the top panel and the front panel in their correct positions. Make ice using the solution until the icemaker stops making ice.
- 13) Remove the front panel.
- 14) Move the flush switch to the "FLUSH" position to drain the remainder of the solution.
- 15) After the solution is drained, move the flush switch to the "ICE" position.
- 16) Replace the front panel in its correct position.
- 17) Open the water supply line shut-off valve, and supply water to the reservoir.
- 18) When the gear motor starts, remove the top panel and front panel. Turn off the power supply.
- 19) Drain out all water from the water line. See 4) through 6).

### 3. Sanitizing Solution

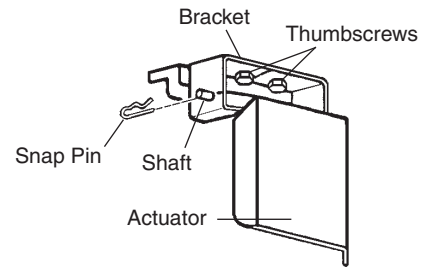
Dilute 2.5 fl. oz. (74 ml or 5 tbs) of a 5.25% sodium hypochlorite solution (chlorine bleach) with 5 gallons (19 l) of warm water.

#### **IMPORTANT**

For safety and maximum effectiveness, use the solution immediately after dilution.

#### 4. Sanitizing Procedure - Initial

- 1) Close the water supply line shut-off valve.
- 2) In the storage bin, remove the thumbscrews attaching spout (B), then remove spout (B) and spout packing (B).
- 3) Remove the thumbscrews attaching spout (A) to the evaporator assembly and lift off spout (A) and spout packing (A), and the cylinder packing.
- 4) Pour the sanitizing solution over the extruding head until the evaporator assembly and the reservoir are filled and the solution starts to overflow into the drain pan.
- 5) Remove the thumbscrews attaching the bin control assembly to the inside of the bin top panel. See Fig. 5.
- 6) Remove the snap pin, shaft and actuator.
- 7) Remove the sliding door.
- 8) Soak the removed parts in .25 gallons (1 l) of sanitizing solution for 10 minutes then wipe them down.
- 9) Rinse the parts thoroughly.



**Fig. 5**

#### **IMPORTANT**

If the solution is left on these parts, they will rust.

- 10) Replace all parts in their correct positions.
- 11) Move the flush switch to the "ICE" position, then turn on the power supply. Replace the top panel and the front panel in their correct positions. Make ice using the solution until the icemaker stops making ice.

#### 5. Sanitizing Procedure - Final

- 1) Remove the front panel and the top panel, then turn off the power supply.
- 2) Move the flush switch to the "FLUSH" position.
- 3) Turn on the power supply and drain out all water from the water line.
- 4) Turn off the power supply.

Note: This unit is designed to start operating when the reservoir is filled with water.

- 5) In the storage bin, remove the thumbscrews attaching spout (B), then remove spout (B) and spout packing (B).
- 6) Remove the thumbscrews attaching spout (A) to the evaporator assembly and lift off spout (A) and spout packing (A).
- 7) Pour the sanitizing solution over the extruding head until the evaporator assembly and the reservoir are filled and the solution starts to overflow into the drain pan.

- 8) Using the thumbscrews, replace spouts (A) and (B) and spout packings (A) and (B) in their correct positions.
- 9) Allow the icemaker to sit for about 10 minutes before operation.
- 10) Move the flush switch to the "ICE" position, then turn on the power supply. Replace the top panel and the front panel in their correct positions. Make ice using the solution until the icemaker stops making ice.
- 11) Remove the front panel.
- 12) Move the flush switch to the "FLUSH" position to drain the remainder of the solution.
- 13) After the solution is drained, move the flush switch to the "ICE" position.
- 14) Replace the front panel in its correct position.
- 15) Open the water supply line shut-off valve and supply water to the reservoir.
- 16) When the gear motor starts, remove the front panel and turn off the power supply.
- 17) Drain out all water from the water line. See 2) and 3).
- 18) Move the flush switch to the "ICE" position and run the icemaker.
- 19) Turn off the power supply after 30 minutes.
- 20) Pour warm water into the storage bin to melt all ice, then clean the bin liner with the solution.
- 21) Flush out any solution from the storage bin.
- 22) Turn on the power supply and start the automatic icemaking process.

### **IMPORTANT**

1. After cleaning, do not use ice made from the sanitizing solution. Be careful not to leave any solution in the storage bin.
2. Follow carefully any instructions provided with the bottles of cleaning or sanitizing solution.
3. Never run the icemaker when the reservoir is empty.

## B. Maintenance

### IMPORTANT

1. This icemaker must be maintained individually, referring to the instruction manual and labels provided with the icemaker.

2. To have the optimum unit performance, the following parts need periodic inspection and maintenance:

Extruding Head and Upper Bearing  
Housing and Lower Bearing  
Mechanical Seal  
Auger  
Evaporator Cylinder  
Gear Motor

These parts should be inspected at least once a year or every 10,000 hours of operation. Their service life, however, depends on water quality and environment. More frequent inspection and maintenance are recommended in bad or severe water conditions.

Replacement of the following consumable parts is recommended if wear exceeds factory recommendations:

Upper Bearing  
Lower Bearing  
Mechanical Seal

Consult with your local distributor about inspection and maintenance service. To obtain the name and phone number of your local distributor, call Hoshizaki Technical Support at 1-800-233-1940.

#### 1) Stainless Steel Exterior

To prevent corrosion, wipe the exterior occasionally with a clean and soft cloth. Use a damp cloth containing a neutral cleaner to wipe off oil or dirt build up.

#### 2) Storage Bin and Scoop

- Wash your hands before removing ice. Use the plastic scoop provided (bin accessory).
- The storage bin is for ice use only. Do not store anything else in the bin.
- Keep the scoop clean. Clean using a neutral cleaner and rinse thoroughly.
- Clean the bin liner using a neutral cleaner. Rinse thoroughly after cleaning.

#### 3) Air Filter

A plastic mesh air filter removes dirt or dust from the air, and keeps the condenser from getting clogged. As the filter gets clogged, the icemaker's performance will be reduced. Check the filter at least twice a month. When clogged, use warm water and a neutral cleaner to wash the filter.

#### 4) Condenser

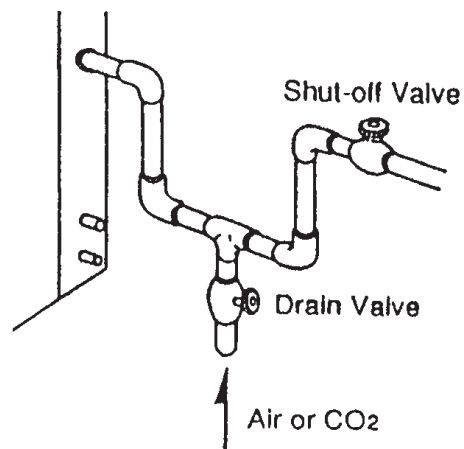
Check the condenser once a year, and clean if required by using a brush or vacuum cleaner. More frequent cleaning may be required depending on the location of the icemaker.

## C. Preparing the Icemaker for Long Storage

### WARNING

When shutting off the icemaker for an extended time, drain out all water from the water line and remove the ice from the storage bin. The storage bin should be cleaned and dried. Drain the icemaker to prevent damage to the water supply line at sub-freezing temperatures, using air or carbon dioxide. Shut off the icemaker until the proper ambient temperature is resumed.

- 1) Run the icemaker with the water supply line shut-off valve closed.
- 2) Open the drain valve and blow out the water inlet line by using air pressure.
- 3) Unplug the unit from the electrical outlet.
- 4) Remove the front panel.
- 5) Move the flush switch on the control box to the "FLUSH" position.
- 6) Plug the unit back in, drain all water from the water line.
- 7) Unplug the unit from the electrical outlet.
- 8) Turn off the power switch on the control box.
- 9) Replace the front panel in its correct position.
- 10) Close the drain valve.
- 11) Remove all ice from the storage bin, and clean the bin.



**Fig. 6**