

FD470

This service manual provides the specifications and the step-by-step procedures for the installation, start up and operation of the Scotsman FD470 Icemaker-Dispenser.

The FD470 is a flake icemaker and ice dispenser in one cabinet.

Flaked ice is manufactured in a refrigerated cylinder; it then fills up a plastic storage bin. From the bin the ice is vended into the users container. When the ice level drops, the icemaker portion of the machine restarts to refill the bin.

The purpose of the machine is to fill water or drink glasses with ice or ice and water, by pushing a lever with the glass.

Pressing the glass filler lever causes the ice dispensing mechanism to vend ice through the spout into the glass. Dispensing will continue until the glass is full, or, if filling multiple glasses, the bin is empty.

The base of the machine contains a sealing gasket which will seal the machine tight to the table top or counter top. This is a requirement for counter top installations.

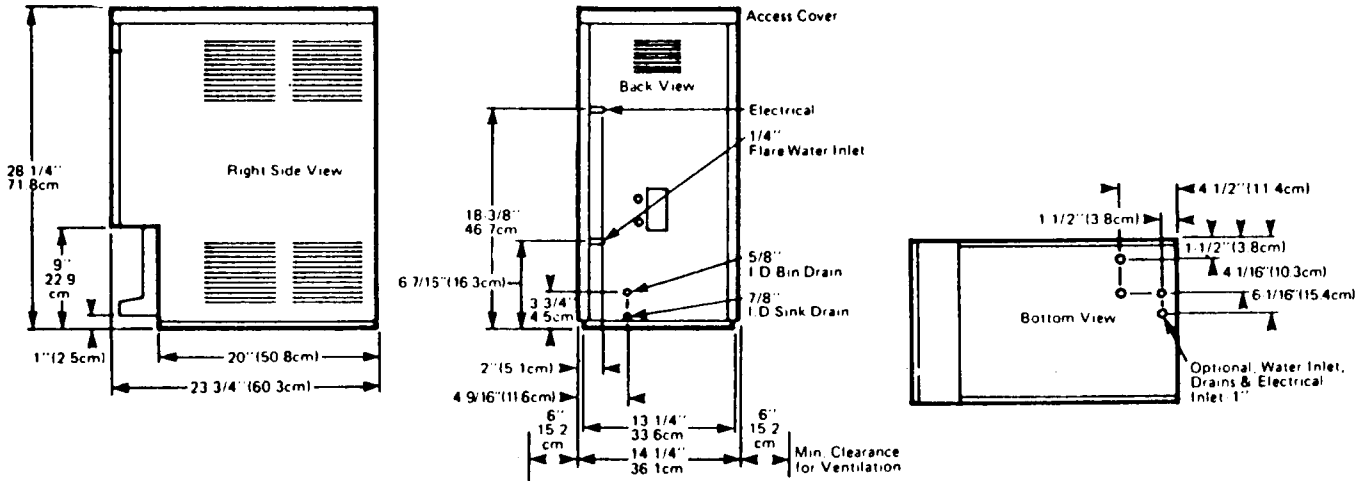
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A Wiring Diagram And The Parts List Are Located In The Center Of This Manual, Printed On Yellow Paper.

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FD470



SPECIFICATIONS

Model Number	H" x W" x D"	Bin Cap.	Ice Prod. Cap. 24 Hrs.	Cond. Type	Basic Electrical	Comp. H. P.	Min. Circuit Ampacity+	Max. Fuse Size
FD470AE-1B	28 1/4 x 14 1/4 x 23 3/4	12	470 lbs.	Air	115/60/1	1/2	15.9	20

+ Use this value to determine minimum wire size as per National Electric Code standards.

Scotsman Ice Systems are designed and manufactured with the highest regard for safety and performance. They meet or exceed the standards of U.L., N.S.F., and C.S.A.

Scotsman assumes no liability or responsibility of any kind for products manufactured by Scotsman that have been altered in any way, including the use of any parts and/or other components not specifically approved by Scotsman.

Scotsman reserves the right to make design changes and/or improvements at any time. Specifications and designs are subject to change without notice.

IMPORTANT OPERATING REQUIREMENTS

	MINIMUM	MAXIMUM
Air Temperatures	50°F (10.0°C)	100°F (38°C)
Water Temperatures	40°F (4.4°C)	100°F (38°C)
Water Pressures	20 lbs. gauge	120 lbs. gauge
Electrical Voltage Variation		
Voltage rating specified on nameplate	-10%	+ 10%

Extended periods of operation exceeding these limitations constitutes misuse under the terms of Scotsman Manufacturer's Limited Warranty, resulting in a loss of warranty coverage.

SEE NAMEPLATE for electrical and refrigeration specifications. Locate the **NAMEPLATE** on the left side shelf forward of the freezer and drivemotor assembly.

Refrigerant R12

SPKFD3C/FD4C STAINLESS STEEL PANEL KIT:
Contains stainless steel sides, back, top and front to replace enameled cabinet. Not factory installed.

DRAIN EXTENSION KIT

Permits convenient access to flake ice and water for larger than normal containers, such as pitchers and tall glasses. Adds 5-1/2" to unit height.

- KDE1 Enamel finish
- KDE1SS Stainless Steel finish

KWB1 WALL MOUNTING KIT

Wall mounting brackets are made of strong tempered steel. Wall mounted units are easy to install where adequate counter space is not available or above an existing sink. Holes are provided at the bottom of the icemaker for water and electrical connections.

FD470 LOCATION AND LEVELING

////////////////////CAUTION////////////////////

This icemaker is NOT designed for outdoor installations, nor for any area where the air temperature is below 50⁰ F. or above 100⁰F. Inlet water temperatures must not drop below 40⁰ F. or go above 100⁰ F.

Extended periods of operation exceeding these limitations, or any outdoor installation is considered MISUSE under the terms of the warranty, resulting in the warranty being VOID.

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Service Access

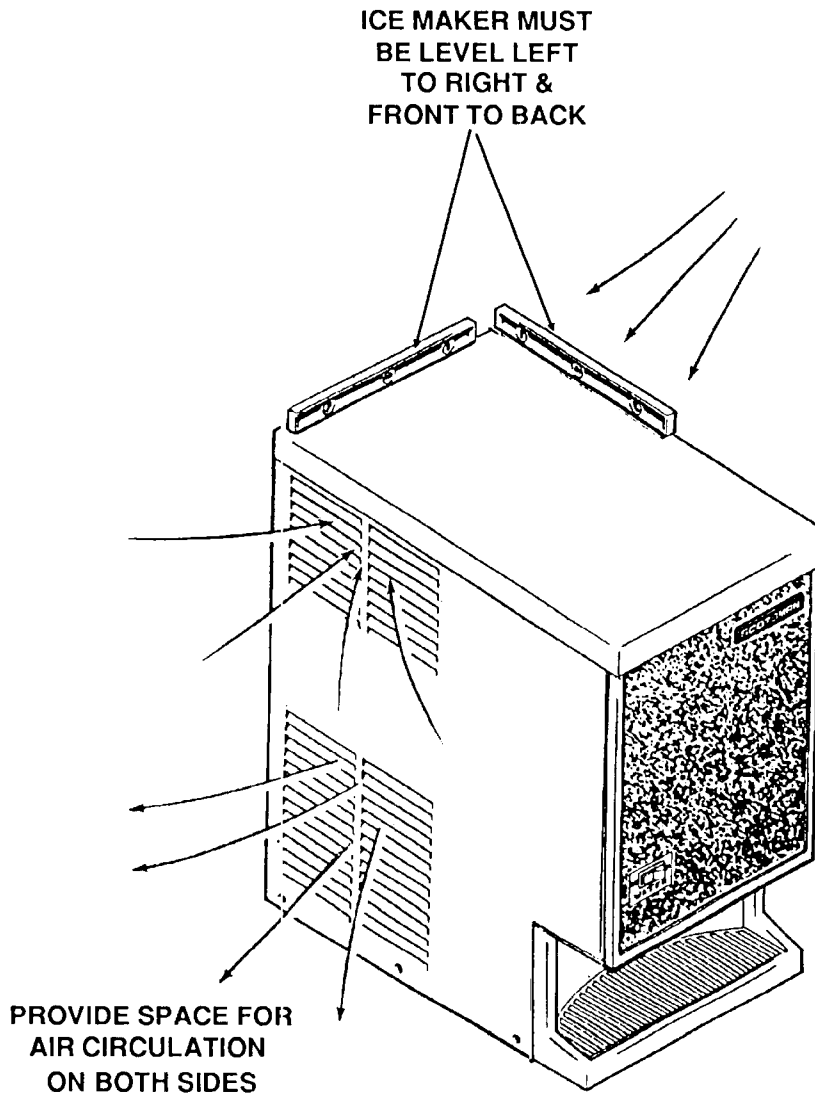
Adequate space is required for all utility connections, located at the rear or bottom of the cabinet.

When the wall mounting kit is used to hang the FD470 from the wall, utility connections may be made through the base.

A six inch minimum clearance at both side panels for air circulation. The icemaker discharges warm air from the left bottom louvers.

If wall mounted, allow access above the unit for cleaning and sanitation access.

When installing on the counter, avoid sliding on the sealing gasket. Check to be sure the unit is level.



FD470 FOR THE INSTALLER

SINK EXTENSION KITS

KDE1 — Painted Finish
KDE1-SS — Stainless Steel

An option for the FD4 dispenser to increase the distance between the discharge spout and the sink to twelve inches and to provide a faster sink drainage.

FEATURES:

With the use of the KWB1 Wall Mount Kit and the splash plate, the FD4 model can be mounted on a wall over an existing sink.

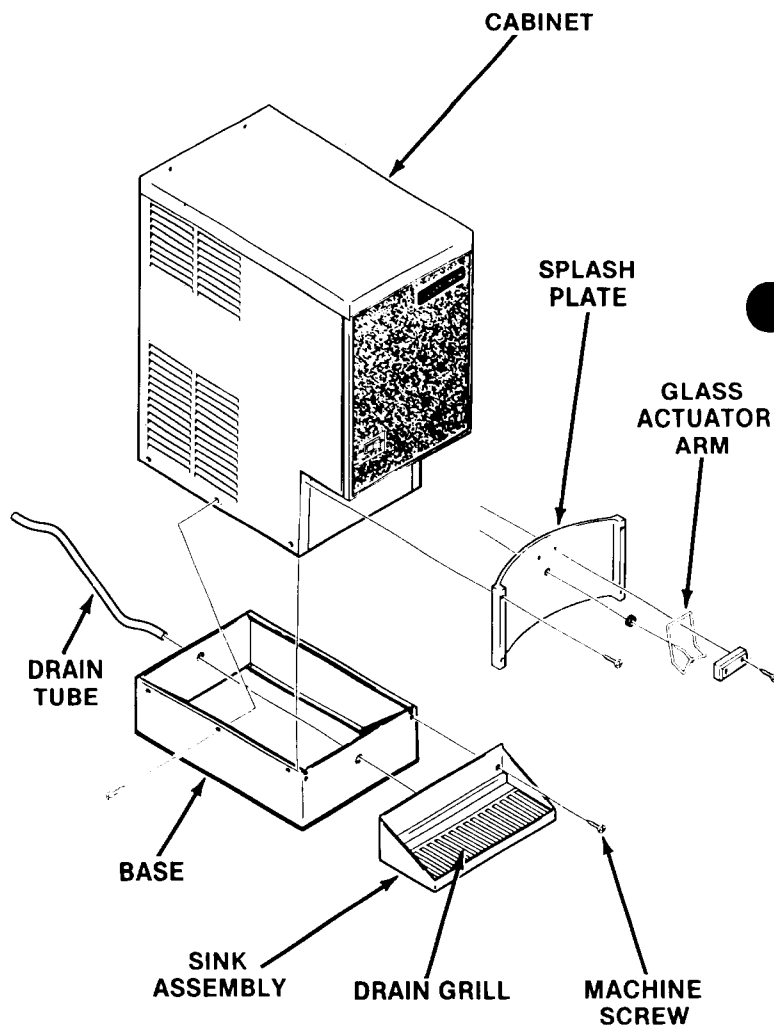
As a counter-top model, the dispenser is mounted on the six-inch base. The splash plate, sink and grill replace the standard sink on the FD4 icemaker dispenser.

KIT CONTENTS:

02-1699-00	Sink Assembly
03-1403-06	Screws (2)
02-1828-00	Splash Plate
03-1403-29	Screws (4)
02-1701-00	Drain Grill
A21538-000	Base, Enamel (W/KDE1)
A21538-001	Base, Stainless Steel (W/KDE1-SS)
03-1403-07	Screws (6)
03-1406-01	Nuts (6)
17-0905-00	Decal
13-0617-11	O-ring
02-2809-01	Drain Top
A18331-000	Drain Fitting

INSTALLATION:

1. Remove conventional sink from cabinet.
2. Remove glass actuator arm and holder from sink.
3. Remove drain tube from original sink.
4. Install drain tube to replacement sink.
5. Remove rubber seal from base of the dispenser.
6. Mount the dispenser on the base. The flange of the dispenser base fits in slots provided in the base extension. Secure with the 3 screws on the front side panel.
7. Mount sink in place and secure with two machine screws.
8. Install splash plate to cabinet with four machine screws, furnished. The splash plate fits over top of sink.
9. Install glass actuator arm and holder to splash plate. The plunger on the arm must operate freely through hole in splash plate.
10. Install grill.



FD470 FOR THE INSTALLER

KWB1 WALL MOUNT KIT COMPONENT DESCRIPTION

KIT CONTENTS

1. **Top Case Hanger Bracket.** Attach to inside of frame of the dispenser.
2. **Top Wall Bracket.** Mounts to wall and engages top case hanger bracket to support dispenser.
3. **Bottom Wall Bracket.** Mounts to wall and supports bottom of dispenser.
4. **Bottom Fittings Cover.** Fastened to bottom wall bracket to conceal electrical and plumbing fittings from view.

INSTALLATION, KWB1 WALL MOUNT KIT TOP HANGER BRACKET:

1. Remove back cover and save four screws for mounting bracket.
2. Remove top cover.
3. Drill out threads of weld nuts in back of frame with 3/16 dia. drill as indicated in illustration.
4. Place top hanger bracket on the inside of frame and fasten solidly with four screws, saved from Step 1, through drilled out holes.

TOP WALL BRACKET:

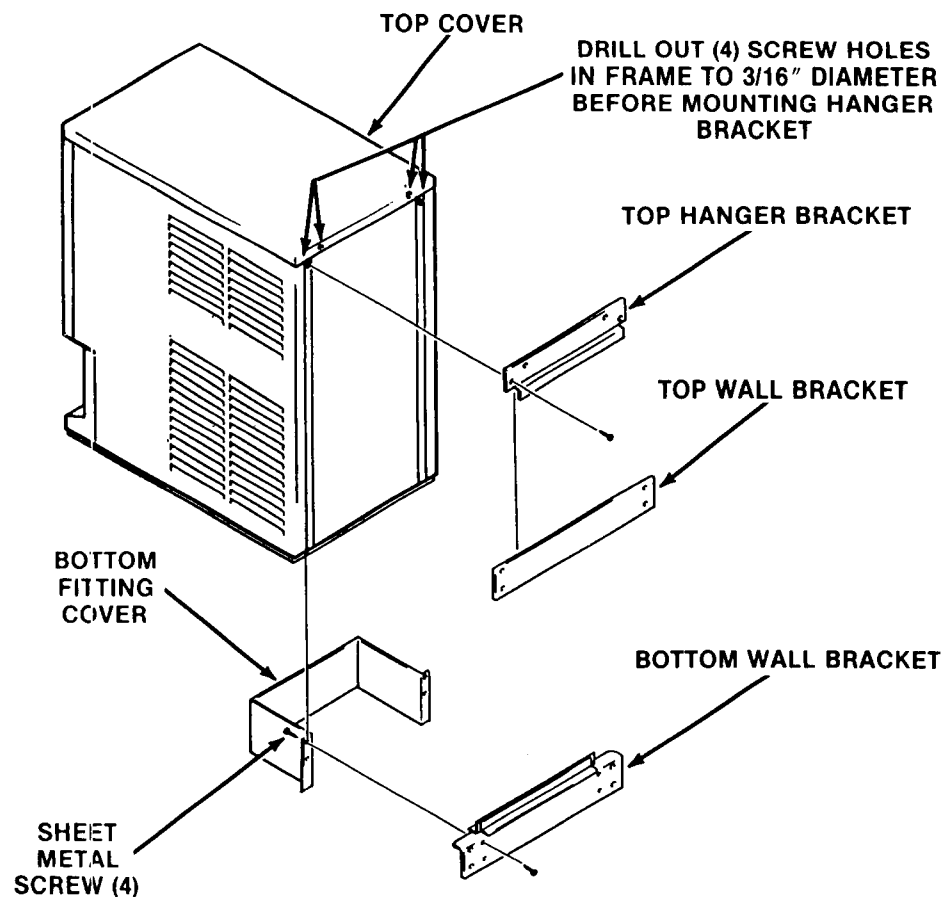
1. Position bracket in desired location.
2. Secure to wall with fasteners of any suitable type for that particular wall through the four holes in bracket. These fasteners or lag screws are not furnished. Be sure to secure bracket rigidly.

BOTTOM WALL BRACKET:

1. Hang the dispenser on top wall bracket.
2. Position bottom bracket so that moulding on dispenser base bottoms in channel of the bracket.
3. Secure bracket to wall through the four large holes with suitable fasteners. Fasteners not furnished.

BOTTOM FITTING COVER:

1. Connect water inlet, bin drain and sink drain of dispenser through bottom of case. Also run electrical cable in from bottom.
2. Secure bottom fitting cover to bottom wall bracket with the four sheet metal screws provided in this kit.



FD470 FOR THE ELECTRICIAN

ELECTRICAL CONNECTIONS

SEE NAMEPLATE for current requirements to determine wire size to be used for electrical hookup. The FD4 icemaker requires a solid earth ground wire. See wiring diagram.

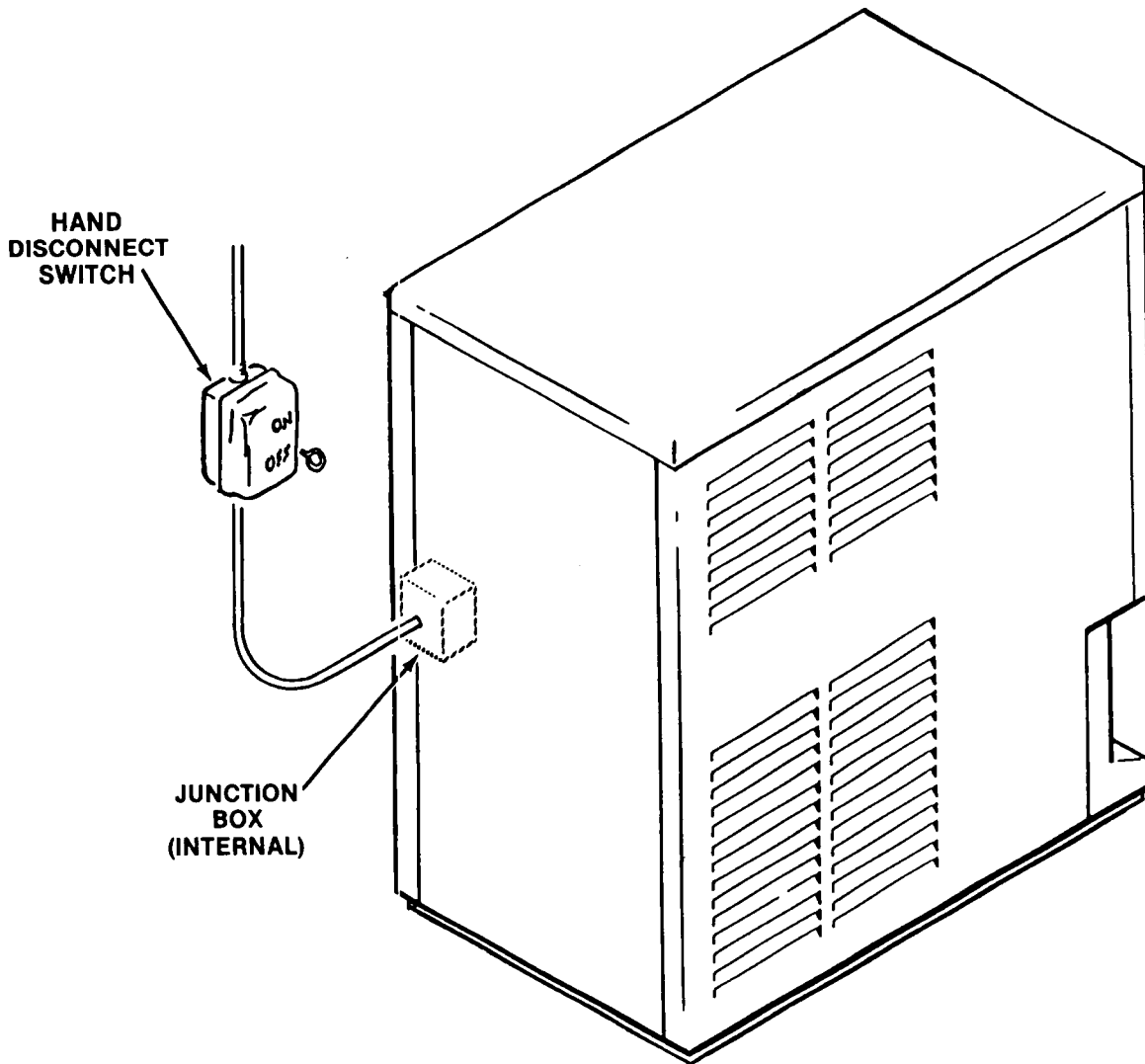
Be certain the icemaker is connected to its own electrical circuit and individually fused. The maximum allowable voltage variation should not exceed ten percent of the nameplate rating, even under starting conditions. Low voltages can cause erratic operation and may be responsible for serious damage to the compressor and motor windings.

All external wiring should conform to the national, state and local electrical codes and the services of a licensed electrician may be required.

Knockouts in cabinets are made for cord connectors.

Remove screws and remove back and right side panels to gain access for service connections.

Make electrical connections in the junction box located inside the back of the icemaker.



FD470 FOR THE PLUMBER

WATER SUPPLY

Remove screws and remove back and right side panels to gain access for service connections. The recommended potable water supply line is a 3/8 inch O.D. copper tubing with a minimum pressure of 20 psig.

The icemaker is equipped with a low water pressure safety device which in the event of low water pressure, will automatically stop the icemaker to prevent damage. The icemaker will automatically restart with increased water pressure.

A 1/4-inch S.A.E. flare fitting is provided internally. Route the inlet water line through the cabinet back panel to the flare fitting provided for potable inlet water connection. Connect the cold potable water supply line with standard plumbing fittings, with a shut-off valve installed in an accessible place between the water supply and the cabinet.

It is recommended a strainer or water purification system be installed between the shut-off valve and the icemaker connection.

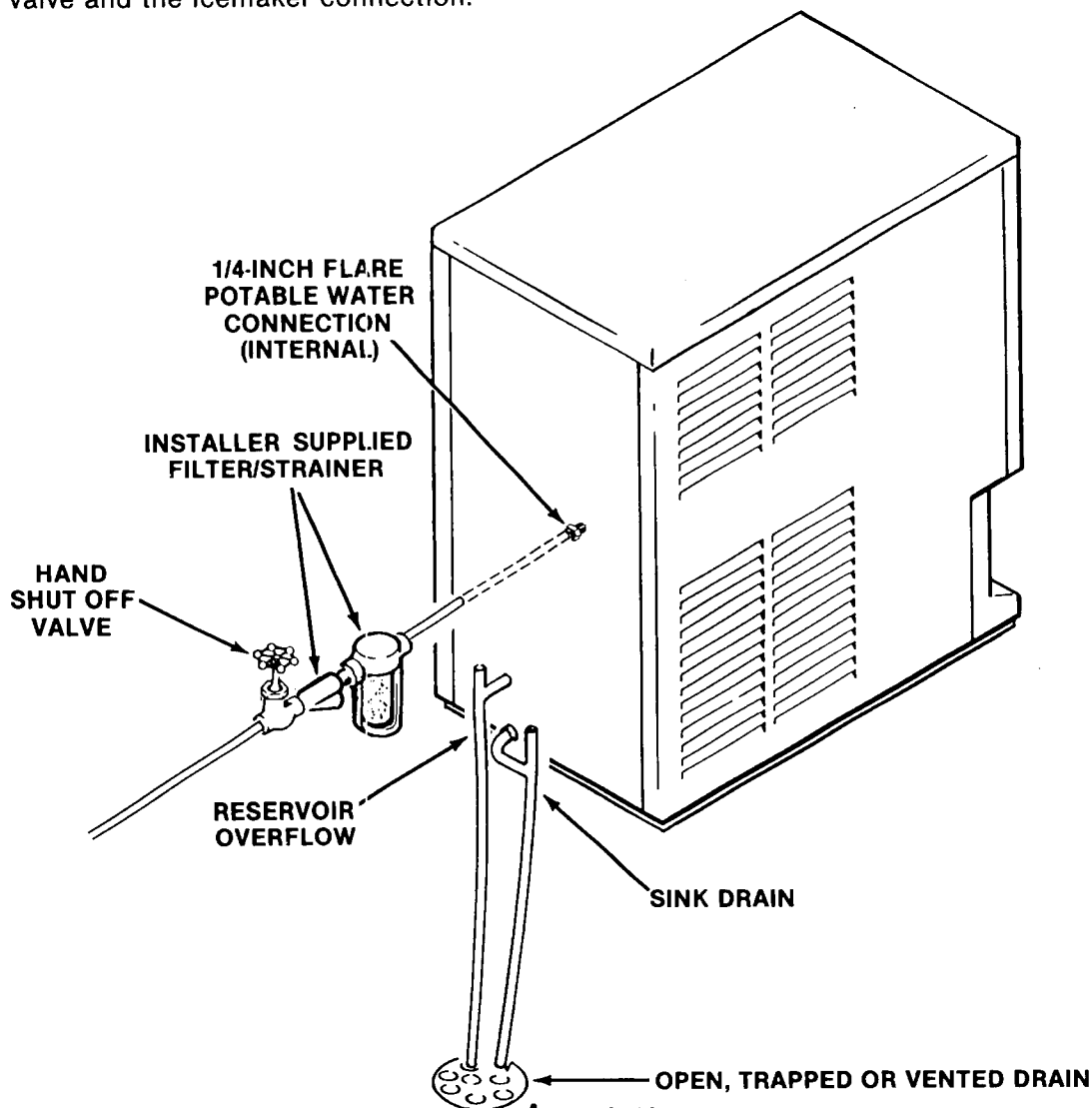
DRAIN CONNECTIONS

All drains are gravity type and must be a minimum of 1/4-inch fall per foot on horizontal runs. Drainage must be installed to conform with the local plumbing codes. Install a vertical open vent on drain line to insure good venting. The drain receptacle should be an open, trapped or vented construction.

The FD4 icemaker has two drains. The reservoir overflow, a 5/8-inch I.D. tube and the sink drain, a 7/8-inch I.D. tube. The two drain tubes may be routed through the holes provided in the back panel or through the holes provided in the base.

Pull each drain tube through the back panel or the base and connect using standard plumbing fittings and practices.

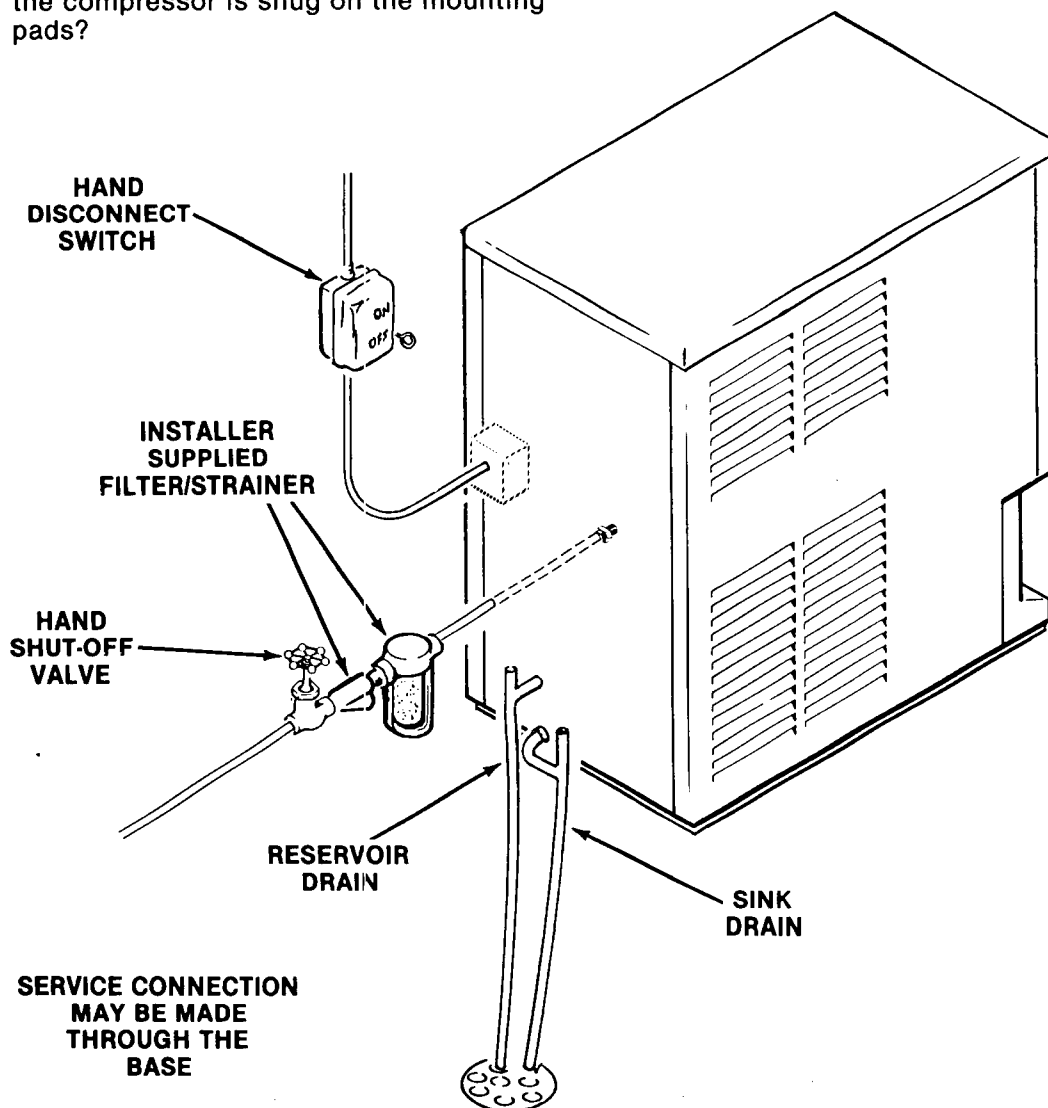
In some cases, a plumbing permit and services of a licensed plumber will be required.



FD470 FOR THE INSTALLER

FINAL CHECK LIST

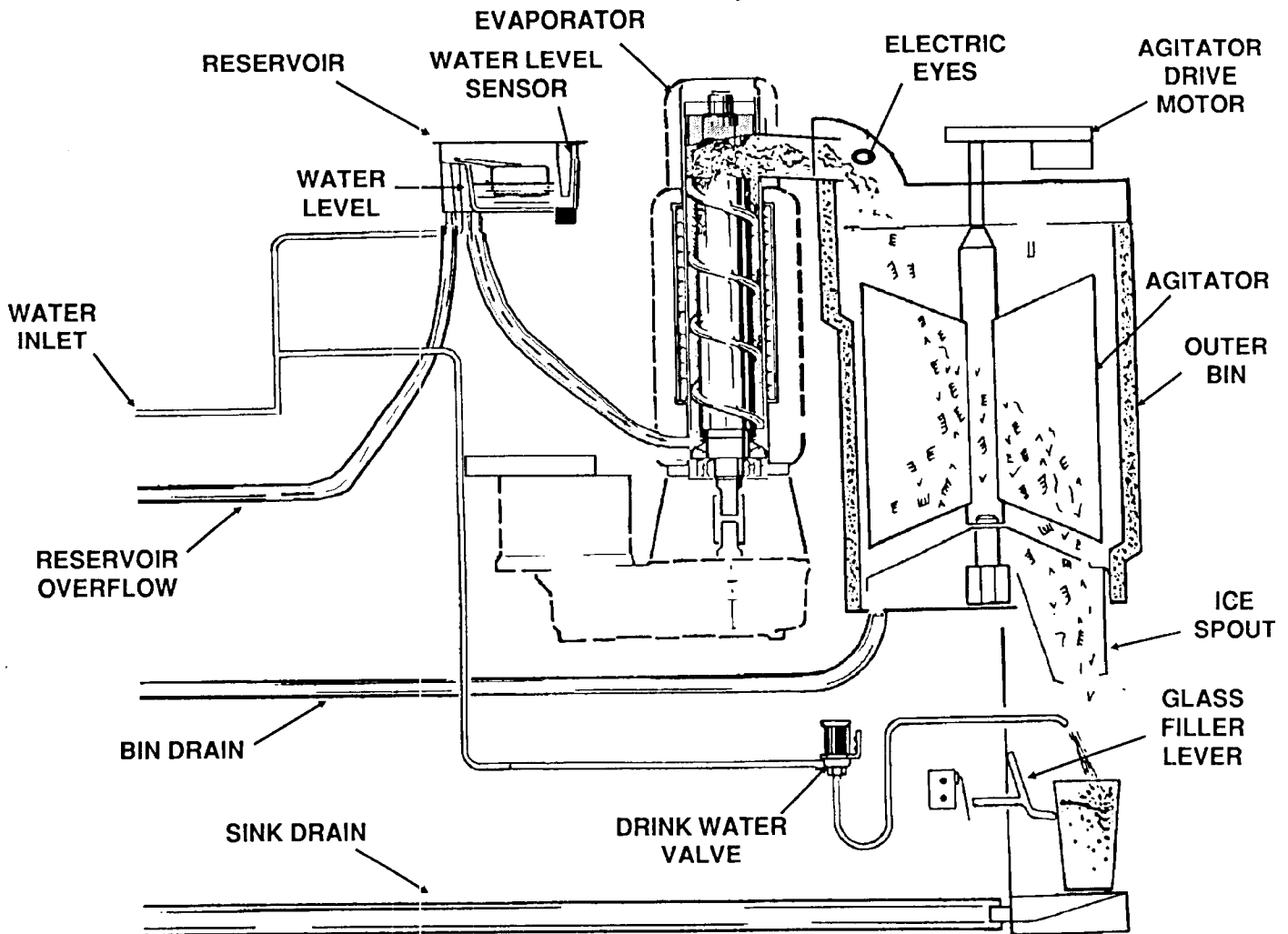
1. Is the cabinet in a room where ambient temperatures are within the minimum and maximum temperatures specified?
2. Is there at least six inches clearance at both sides of the cabinet for proper air circulation?
3. Has water supply pressure been checked to insure a minimum of 20 PSIG and a maximum of 120 PSIG operating pressure?
4. Is the cabinet level?
5. Have all electrical and piping connections been made?
6. Is the water supply line shut-off valve installed and electrical wiring properly connected?
7. Has the shipping block been removed from under the compressor. Have the compressor hold-down nuts been checked to be sure the compressor is snug on the mounting pads?
8. Check all refrigerant lines and conduit lines, to guard against vibration or rubbing and possible failure.
9. Have the bin and cabinet been wiped clean?
10. Has the Manufacturer's Registration Card been properly filled out? Check for correct model and serial numbers from Serial nameplate, then mail the completed card to the SCOTSMAN factory.
11. Has the owner/user been given the Service Manual and instructed how to operate and maintain the icemaker?
12. Has the owner been given the name and telephone number of the authorized SCOTSMAN Service Agency serving him?



FD470 INITIAL START UP

1. Remove screws and the top and side panels.
2. Open the water supply line shut off valve.
3. Observe the water filling operation, see the water schematic below.
 - A. Water flows into the water reservoir.
 - B. Water flows from the reservoir to the evaporator.
 - C. The float in the reservoir will rise to shut off the water supply when the evaporator water level matches that of the reservoir.
4. Check all internal water connections to be certain that there are no leaks.
5. Plug unit in or switch on the electrical power to start the unit making ice (there is no master switch).
6. Let the system operate, check for any unusual noises beyond normal compressor, fan and gearmotor noise.

- After the unit has been started and has run for about 10 minutes, there should be enough ice in the bin to test the dispense system.
7. Using a container, push the glass filler lever in and see that ice is dispensed (the bin drive motor will continue to run as long as the glass filler lever is pushed in).
 8. Move the water switch (rocker switch on the front panel) to ON. Then use a container to push in the glass filler lever again, both water and ice should be dispensed as long as the lever is held in.
 9. The refrigeration pressure can be checked: the suction pressure should be about 13-15 P.S.I.G. and the discharge pressure should be about 125-135 P.S.I.G.
 10. Explain the operation and maintenance requirements to the owner/user.
 11. Leave the service manual with the owner/user and explain who should be called for any service or maintenance.



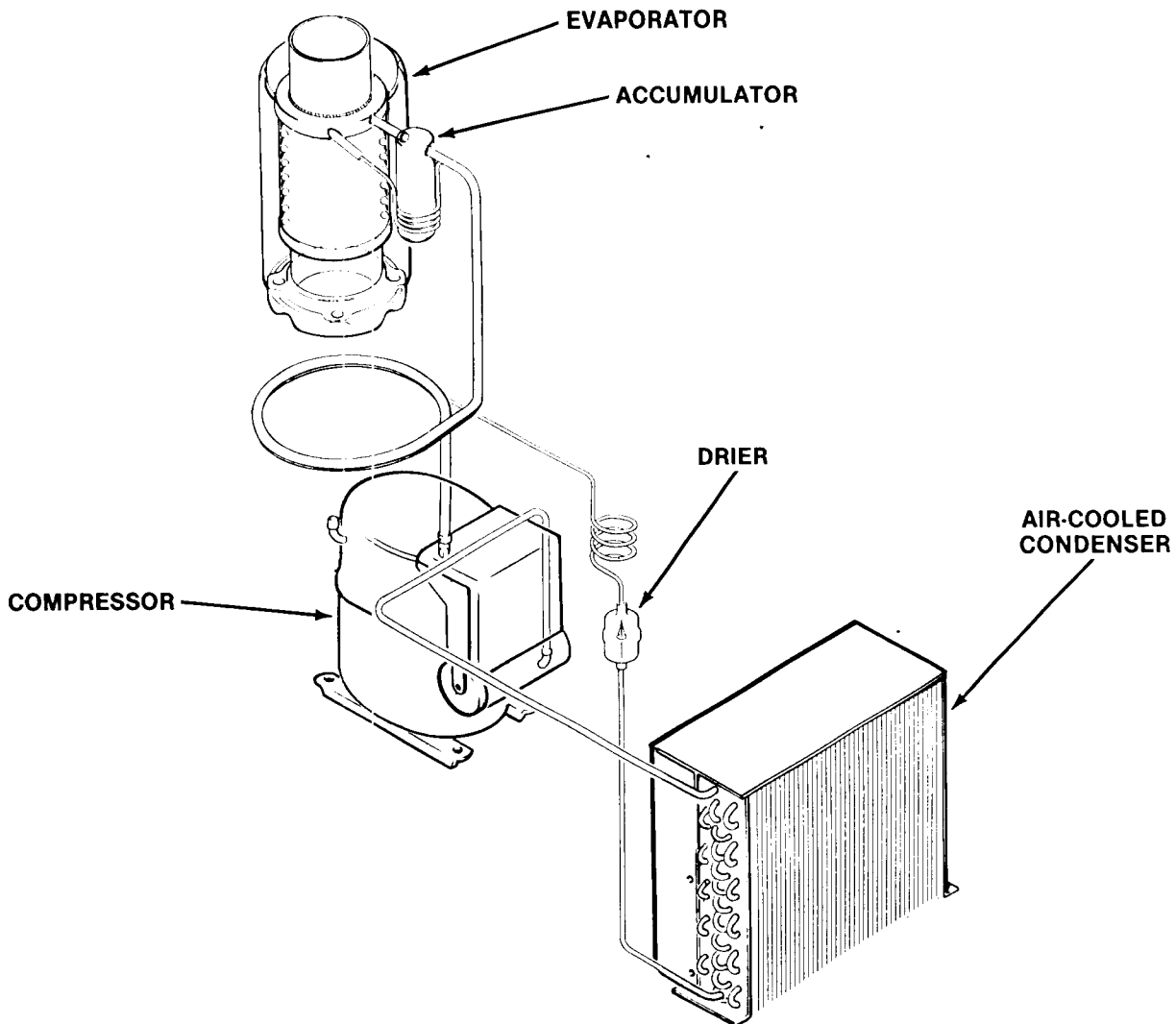
FD470 HOW IT WORKS

ICEMAKER OPERATION

The water supply flows from the building source through the optional inline water strainer, enters at the inlet fitting and on to the water reservoir. The water reservoir functions to maintain a constant water level inside the freezer assembly. Water from the water reservoir enters at the bottom of the freezer assembly and is changed into ice by low temperatures inside the freezer.

Move building source power switch to the ON position or plug into electrical outlet to start the automatic icemaking process.

A stainless steel auger within the freezer is powered by the drivemotor assembly, a direct-drive gearmotor, and the rotating auger carries the ice upward to the end of the auger, see Water Schematic Illustration, and pushed out through the ice chute and into the ice storage bin. When the ice storage bin has been filled with ice, up to the level of the bin control actuator, icemaking processes shut OFF.



FD470B OPERATION: Electrical

The FD470 needs the correct amount of voltage in order to operate properly. If voltage is not right, poor operation and possible equipment damage can be expected.

Cold water and air can cause excessively hard ice, and that can overload the auger drive motor.

How it Makes Ice:

When there isn't any ice at the top of the bin, the electric eyes "see" each other. This allows the circuit board to energize both the compressor and the auger drive motor relays. When the auger drive motor spins up to full speed, the microswitch on top of it closes, connecting power to the compressor.

As the compressor operates, it circulates refrigerant, moving heat from the evaporator to the condenser. This, and the revolving auger, causes ice to be made. The auger pushes ice up the evaporator and into the bin.

The ice making continues until the bin is full enough for ice to pile up in between the electric eyes in the plastic bin top.

After the electric eyes have been blocked for more than 15 seconds, the circuit board shuts off power to the compressor relay. This stops the refrigeration system. The auger relay is still on and the auger motor will continue to turn, pushing out any ice that may be in the evaporator. This will continue for about 2 and a half minutes, then the circuit board will shut off the power to the auger relay, and the ice making portion of the icemaker dispenser will be off.

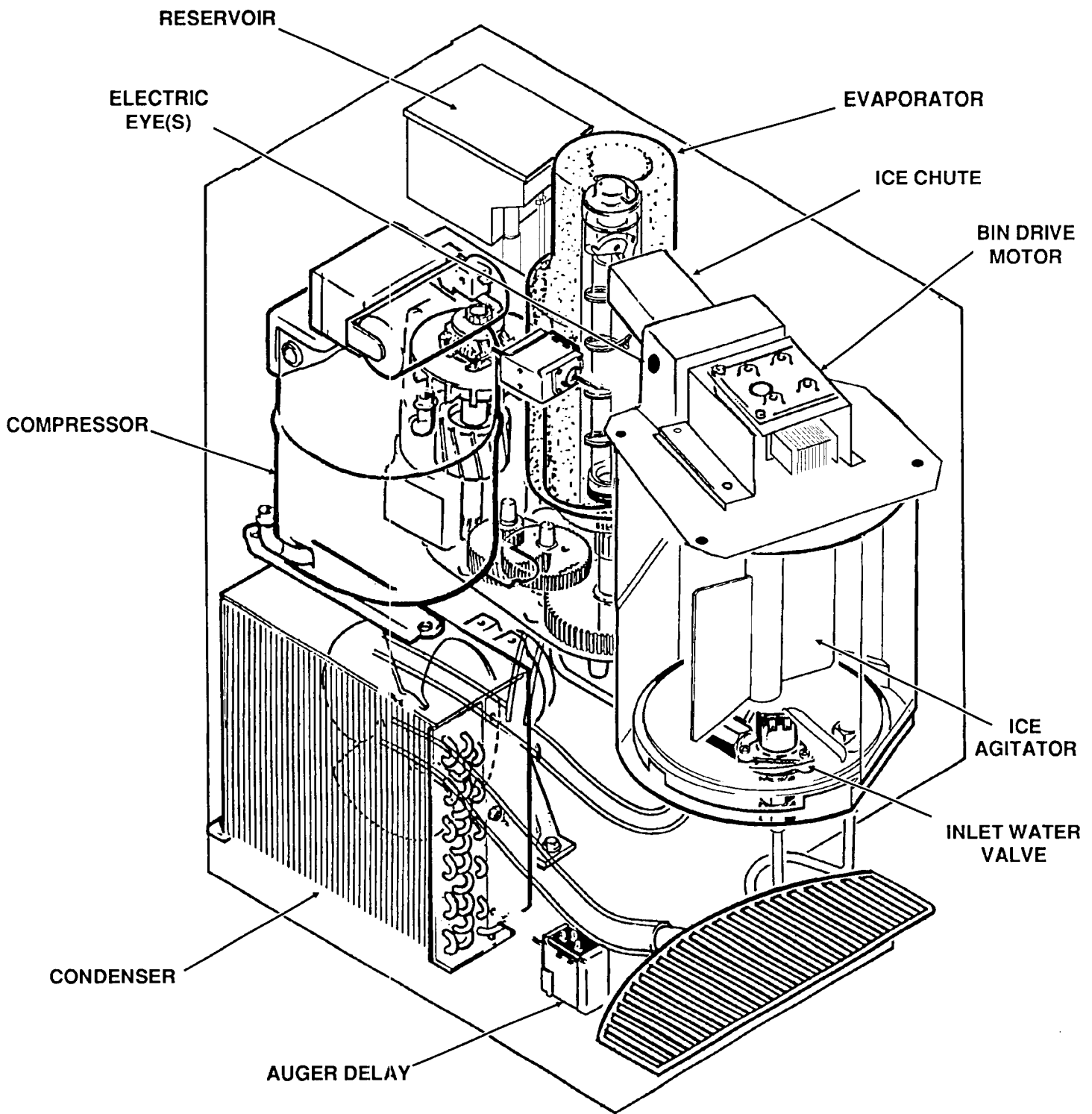
There is also a low refrigerant pressure control. It is an automatic reset. If the refrigerant pressure becomes too low (low charge or the auger not turning) the low pressure control will open, stopping the ice maker.

Vending

When the glass filler lever is pushed, the bin drive motor is energized and stays energized as long as the glass filler lever keeps the bin drive motor going.

Water may be dispensed with ice if the Water Switch is in the ON position.

FD470B COMPONENT LOCATION



FD470B COMPONENT DESCRIPTION

Water Reservoir

The water reservoir uses a float valve to maintain a constant water level both in the reservoir and in the connected evaporator. The water level in the evaporator will be the same as it is in the reservoir.

Water Level Sensor

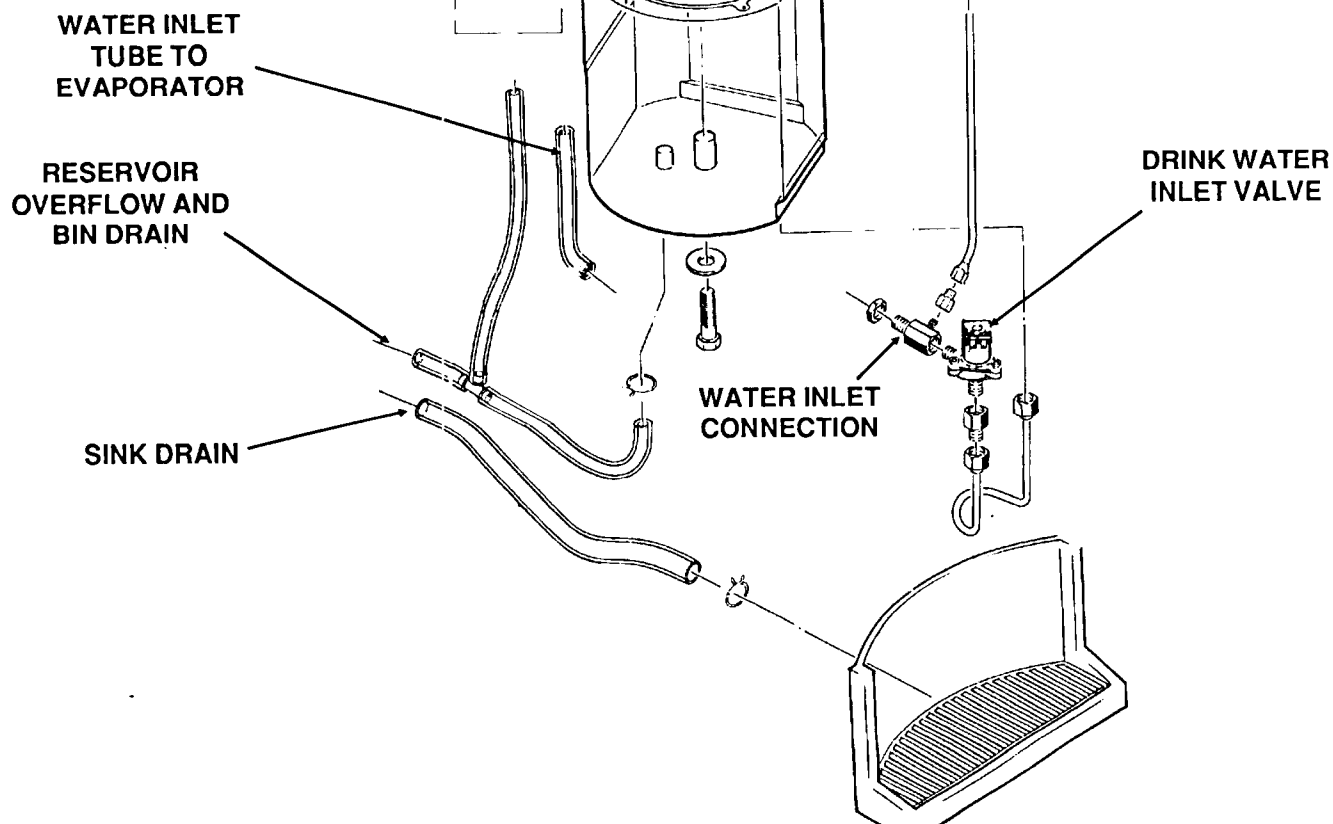
In the reservoir, the water sensor will not allow the ice machine to operate without water.

Agitator

This part is a central shaft with large vanes attached. When the agitator drive motor turns, the vanes of the agitator sweep the ice in the bin across the bin bottom.

Bin Bottom

The bin bottom is a conical, stationary base for the ice. When the ice is moved over a slot in the bin bottom, it falls through a chute into the user's container.



FD470 COMPONENT DESCRIPTION

FREEZER ASSEMBLY

Evaporator coils surround a cylindrical tube which is filled with water. As ice forms on the interior wall, it is lifted by a rotating auger which moves the ice to the ice breaker at the top of the cylinder where it is compacted and forced through the ice delivery chute.

ICE BREAKER ASSEMBLY

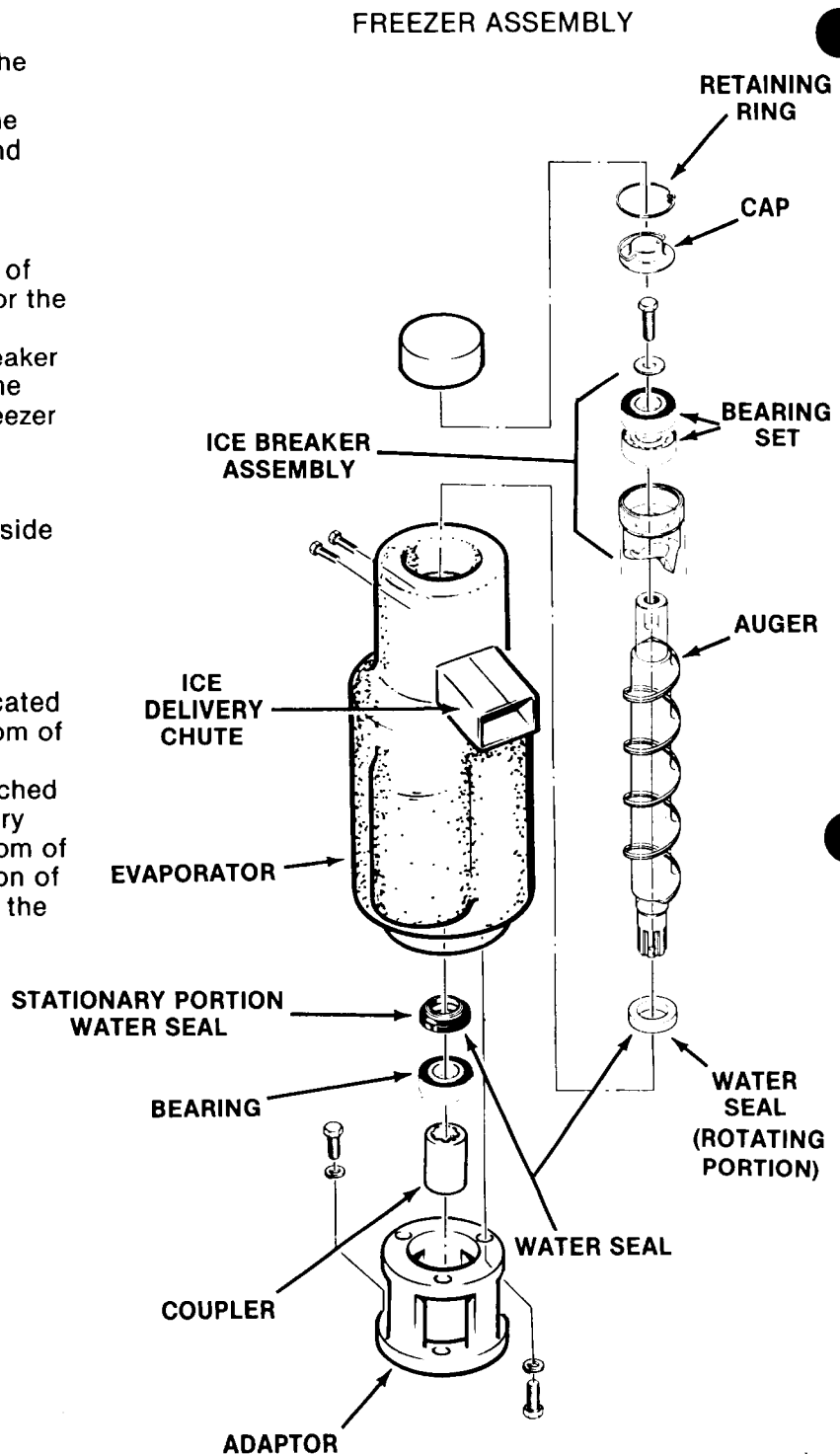
The ice breaker assembly, bolted to the top of the freezer, contains the bearing and seal for the top of the auger. Flaked ice created by the freezer is carried by the auger to the ice breaker assembly and the flaked ice is pushed by the auger through the hole in the side of the freezer and falls into the bin.

AUGER

The highly-polished stainless steel auger inside the freezer assembly, is rotated by the gearmotor and pushes ice to the top of the freezer.

LOWER WATER SEAL

The highly precision two-part water seal located at the bottom of the freezer, seals the bottom of the freezer assembly to contain water. The rotating part of the lower water seal is attached to the bottom of the auger and the stationary part of the seal is pressure fit into the bottom of the freezer assembly tube. Anytime condition of the lower water seal is in question, replace the seal.



FD470 COMPONENT DESCRIPTION: "A" MODEL BIN TOP

BIN TOP

The bin top assembly protects the ice supply and provides a mount for the bin ice level switch and the bin ice level safety switch.

SPOUT SWITCH

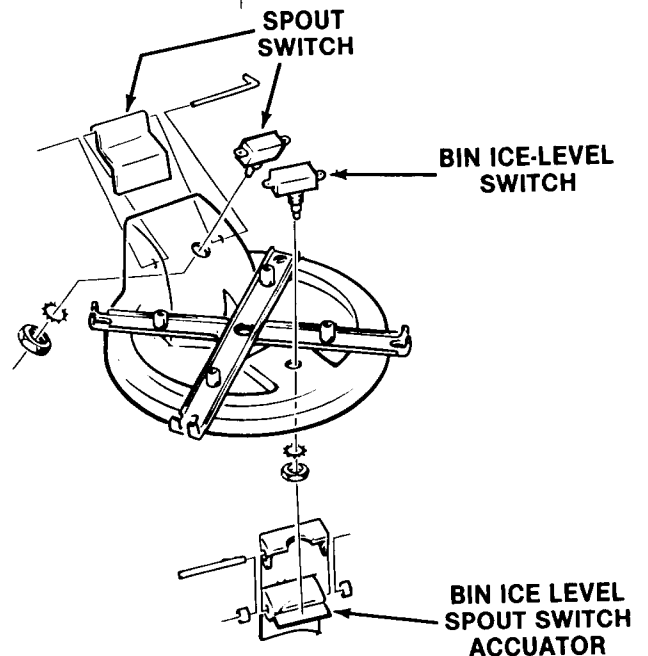
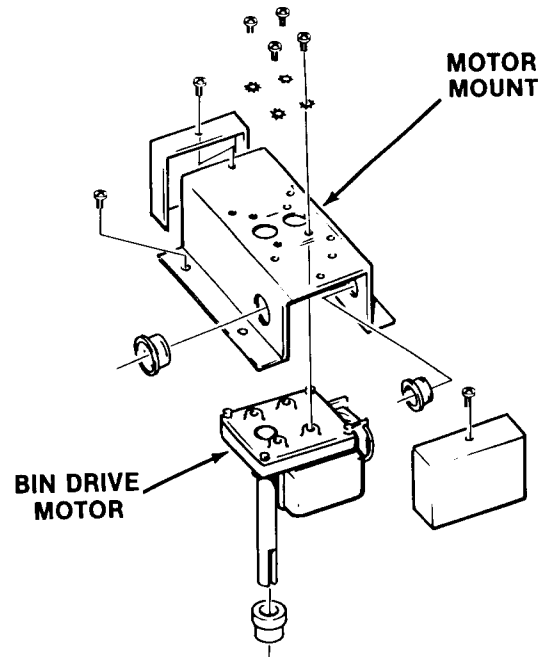
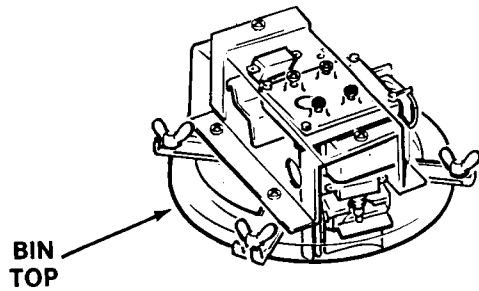
The spout switch is an ON-OFF switch, that shuts OFF the compressor to stop icemaking, while the freezer assembly drivemotor continues to operate, and clear all ice from the auger. When the refrigerant pressure equalizes, the refrigerant lo-pressure control will shut OFF the drivemotor. When the ice flow pushes the actuator arm of the switch IN, the compressor is shut OFF and when the action of the melting or dispensed ice releases the actuator arm, the switch CLOSSES the circuit and RESTARTS the compressor and the icemaking process.

BIN ICE LEVEL SWITCH

The bin ice level switch is mounted on the opposite side of the bin top to the spout switch and is actuated by the movement against the switch actuator. The switch acts as a differential switch, keeping the unit OFF until the ice level has dropped on both sides of the inner bin.

BIN DRIVE MOTOR

The bin drive motor and reduction gear assembly, located above the bin, is controlled with the ice vend switch. The bin drive motor rotates the inner bin and ice supply to vend ice into a container.



FD470 COMPONENT DESCRIPTION: "B" MODEL BIN TOP

BIN TOP

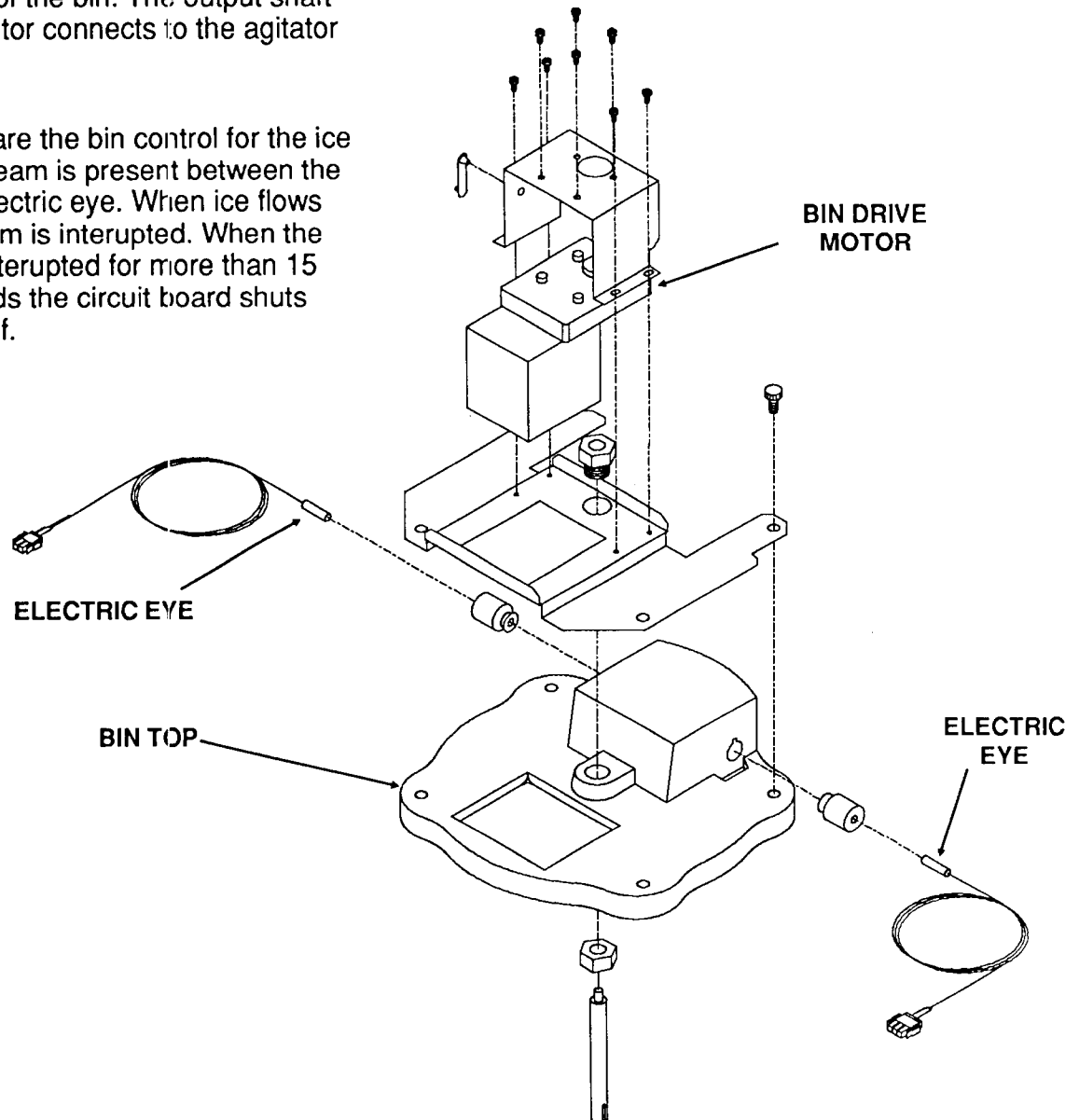
The bin top assembly protects the ice supply and provides a mounting place for the bin drive motor and electric eye bin control.

BIN DRIVE MOTOR

The bin drive motor and gear assembly is located at the top of the bin. The output shaft of the bin drive motor connects to the agitator in the bin.

ELECTRIC EYE

The electric eyes are the bin control for the ice machine. A light beam is present between the two parts of the electric eye. When ice flows through it, the beam is interrupted. When the beam has been interrupted for more than 15 continuous seconds the circuit board shuts the ice machine off.



FD470 CLEANING AND SANITIZING

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A Scotsman Ice System represents a sizable investment of time and money in any company's business. In order to receive the best return for that investment, the ice machine must receive periodic maintenance.

it is the USERS RESPONSIBILITY to see that the unit is properly maintained. It is always preferable, and less costly in the long run, to avoid possible down time by keeping it clean, adjusting it as needed and by replacing worn parts before they can cause failure. The following is a list of recommended maintenance that will help keep the machine running with a minimum of problems.

Maintenance and Cleaning should be scheduled at a MINIMUM of twice per year.

////////////////////////////////////
Cleaning

1. Push in glass filler lever and dispense all of the ice out of the bin.

////////////////////////////////////**WARNING**////////////////////////////////////

Disconnect electrical power.

////////////////////////////////////

2. Remove top panel.

3. Remove storage bin cover and spout extension.

4. Move both ice control flippers in the bin top; they must move freely, lubricate with food grade grease or lubricant if they do not.

5. Remove agitator assembly and bin bottom.

6. Replace bin cover.

7. Remove the reservoir cover, and block the float up to shut off water to the reservoir.

8. Drain the water from the evaporator by removing the water inlet tube from the evaporator inlet. Reconnect tubing.

////////////////////////////////////**WARNING**////////////////////////////////////

Scotsman Ice Machine Cleaner contains Phosphoric and Hydroxyacetic acids. These compounds are corrosive and may cause burns. If swallowed, DO NOT induce vomiting. Give large amounts of water or milk. Call Physician immediately. In case of external contact, flush with water. KEEP OUT OF THE REACH OF CHILDREN.

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9. Mix a solution of 4 ounces of Scotsman Ice Machine Cleaner and 1.5 quarts of hot (95^oF.-115^oF.) potable water. Pour some of the solution into the reservoir until it is full. Allow the solution to stay in the unit for at least 15 minutes.

10. After 15 minutes, reconnect electrical power and pour additional ice machine cleaner solution into the reservoir as it is used up. After all of the solution has been poured in, remove the block from the float.

11. Allow the unit to make ice for 15 additional minutes, and then taste the ice, if not sour, all of the ice machine cleaner has been used up.

12. Unplug or disconnect electrical power, remove bin top and pour hot water into the bin to melt the ice produced during cleaning.

13. Remove drain grate and ice vend lever from sink. Wash and sanitize these parts, as well as the agitator, bin bottom, inside of the bin top and the inside of the bin, including ice chute. See Sanitizing.

14. Reassemble the bin bottom and agitator, replace the cover of the bin. Reattach the ice vend lever and replace the sink grate.

15. Replace cabinet cover. Plug in and unit is ready for normal operation.

Sanitizing

The ice machine and dispenser will occasionally require sanitizing. Use an approved sanitizer and follow the directions and warnings of that sanitizer or use the following instructions for the use of household bleach, it meets most local codes:

1. Mix a solution of 1 ounce of household bleach to 2 gallons of water.

2. Using rubber gloves, immerse the parts in the sanitizing solution and wash the parts, flushing the solution thoroughly in, over and through all parts and surfaces of the parts being cleaned.

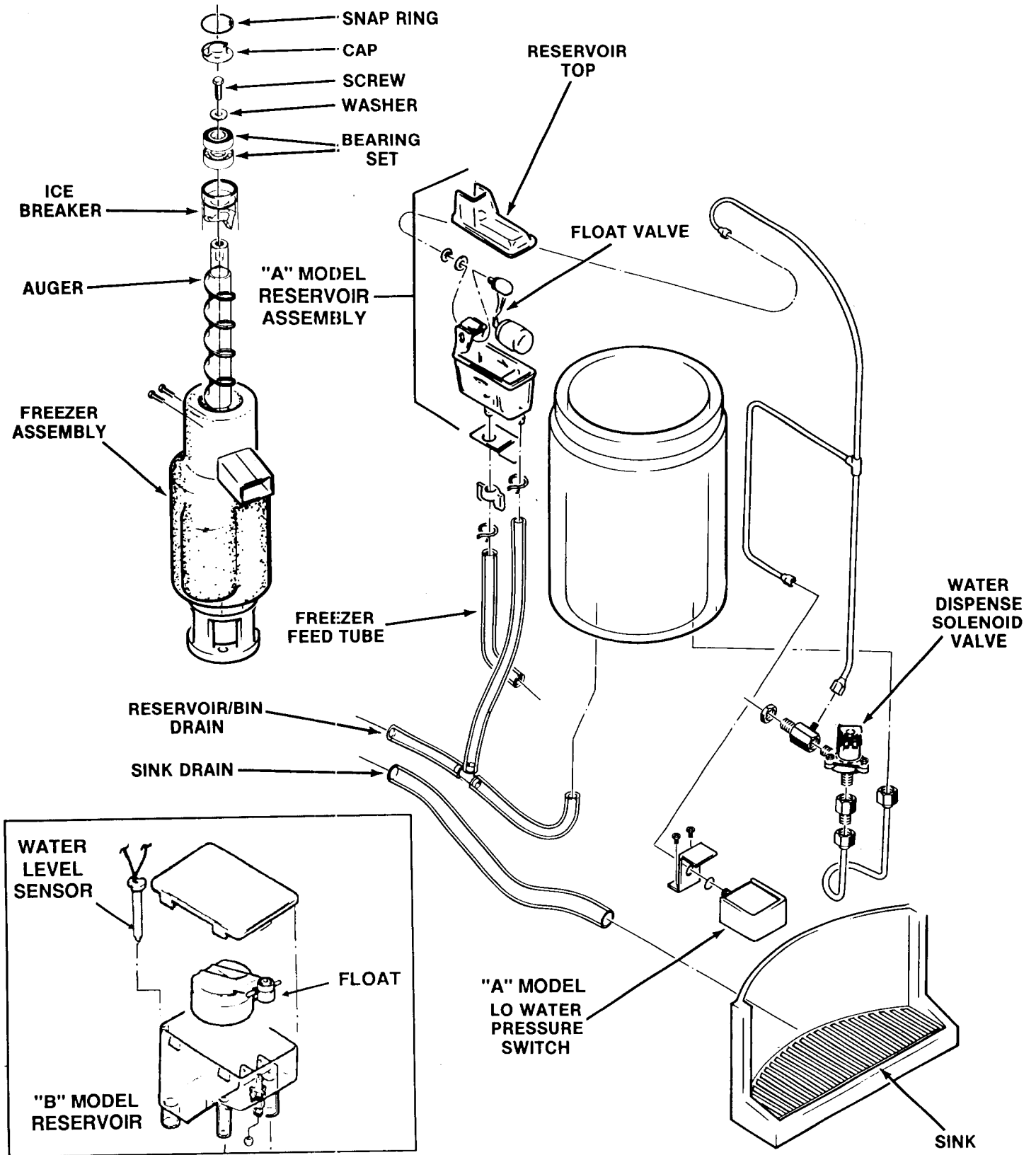
3. Allow to air dry.

4. Reassemble all sanitized components.

FD470 ICE MAKER MECHANISM MAINTENANCE

1. Check and clean any water strainer or filter that has been installed in the incoming water line.
2. Check the water reservoir. Check that the float shuts off the water when the water is high enough. It is normal for some water to flow out of the spout with the ice.
3. Clean the reservoir and the interior of the evaporator using the cleaning procedures on the product or in this manual.
4. B model: Check the water level sensor for scale on the tip. Wipe the tip clean with a clean cloth. Note the tip is made of glass, so be careful when wiping it.
5. Remove the auger to check the bearings. See the next page. Check the top bearing for wear and the auger for mineral build up. The auger, if still stained after the evaporator has been cleaned with ice machine cleaner, will require more cleaning.
6. Check the interior of the evaporator. The tube should have a uniform surface from the bottom to the top. There should be no horizontal scoring marks, nor deep pits. There are machined vertical grooves evenly spaced around the inside of the evaporator tube. They are there to guide the ice up the tube. If large portions of the vertical grooves are not there or are damaged, the evaporator will have to be replaced. Small pits or tough stains may be sanded out of the evaporator surface using 100 grit sand paper in a vertical motion.
7. Clean the air cooled condenser. Always shut off the machine when cleaning.
8. Check for water leaks.
9. B model: Check the electric eyes for mineral scale. Wipe them clean with a clean cloth.

FD470 MAINTENANCE



FD470 SERVICE DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE	CORRECTION
Water Leaks	Evaporator water seal worn or cracked	Replace seal
	Tubing to evaporator leaks	Check hose clamps
	Tubing to drains leaks	Check hose clamps & tubing
Water will not dispense	Solenoid defective	Replace
	Water shut off	Re-connect water
	Water switch set at OFF	Switch to ON
Water flow too slow	Screen on inlet of solenoid dirty	Clean screen
Unit will not dispense	No ice in bin	Faulty bin controls. B model-check with tester
		Unit too small for application, check usage
		No water to unit, restore water
		No power to unit, check breaker or fuse.
	Vend switch will not close	Replace vend switch
	Bin drive motor does not turn	Replace bin drive motor
	Bin jammed with ice in spout	Unplug unit and clear out ice
Will not stop dispensing	Vend switch stuck closed	Replace switch
Unit will not make ice	Power off	Reconnect power
	Water off	Restore water supply
	Auger drive motor will not turn	Drive motor worn out, replace
		Drive motor overheats, check gears, evaporator & bearings
	Auger drive motor turns, compressor will not come on	Centrifugal switch on motor will not close
	Low on refrigerant	Locate leak, repair, weigh in nameplate charge
	Cycles on low pressure control	Auger not turning, check coupling, check gearbox
		See "Low on Refrigerant" above
	Compressor does not start	Check for power to compressor
		Check compressor start capacitor
Check compressor start relay		
Compressor locked up, open, or shorted. Replace compressor.		

FD470 SERVICE DIAGNOSIS

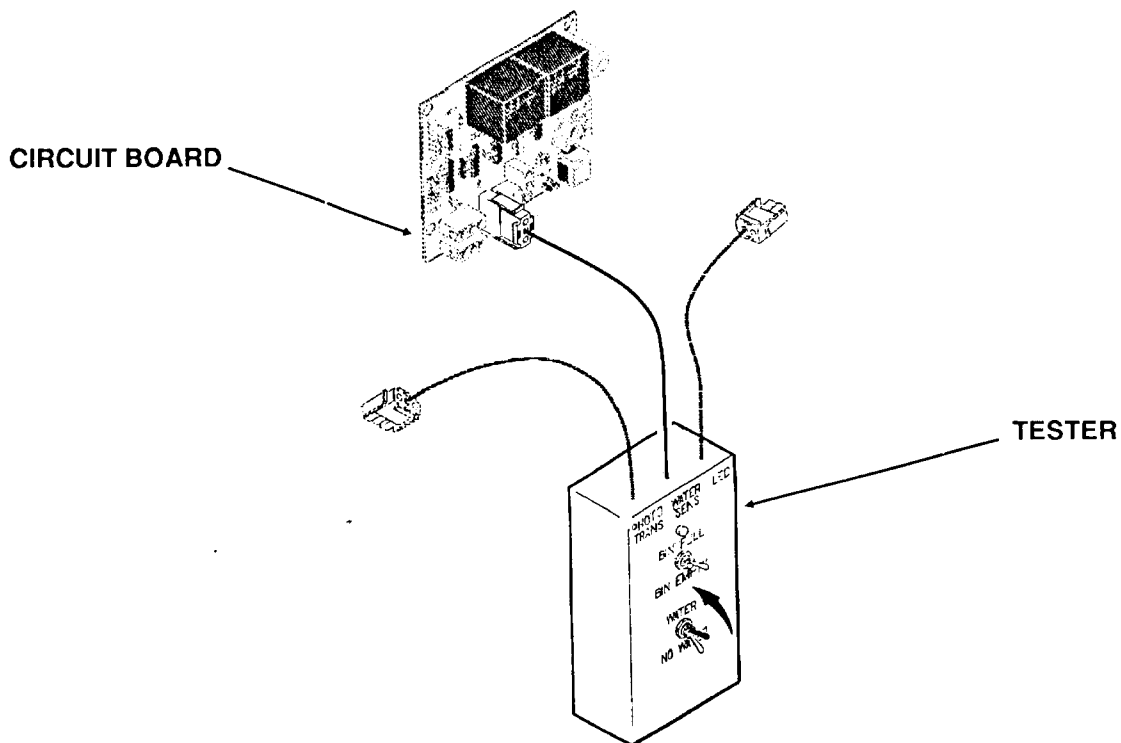
SYMPTOM	POSSIBLE CAUSE	CORRECTION
Makes too much noise when producing ice	Evaporator and auger have mineral scale on them	Clean machine with Scotsman Ice Machine Cleaner per instructions on unit or in manual
	Not enough water in evaporator	Check for water restriction between reservoir and evaporator
	Low suction pressure	Add refrigerant to raise suction pressure, check for a leak. If it declines again, there is a leak.
	Gearmotor loose on frame	Check mounting
	Coupling dry	Grease coupling
	Tubing vibrating	Check tubing for contact
	Tooth on a gear missing	Remove gearbox from ice machine, check gears.
	Compressor too loud internally	Replace compressor
	Gear noise	Low oil in gearmotor. Check for gear and bearing damage.
Oil leak from gearmotor	Gearmotor seals worn	Remove gearmotor from ice machine, check for internal damage, replace parts as needed or replace gearmotor assembly
	Water in gearmotor	Evaporator water seal leaking, replace it, evaporator bearings and gearmotor assembly.

FD470 SERVICE DIAGNOSIS

CIRCUIT BOARD TESTING - B MODELS ONLY

Use tester part number A33942-001. The instructions that follow assume that the ice machine will not run, and prior investigation of electric power, controls and mechanical parts indicate that the electronic circuit may be at fault. **WARNING: Testing requires that power to the machine be ON, but connections should only be made with the power OFF.**

Bin control sensors do not work	Unplug bin control sensors (electric eyes) from circuit board connections "Photo Trans" and "LED".
	Plug connectors from the tester into the circuit board.
	Move the bin full switch to FULL. The light on the tester should be ON. If the light on the tester is not on, the circuit board should be replaced
	IF the light is ON, move the Bin Full switch to EMPTY. The light on the tester should go off, the light on the circuit board should go on and after 10-20 seconds the ice machine should start. If the machine starts, the sensors (electric eyes) should be replaced.
Water Level	If the Bin Empty light does not come ON, the circuit board should be replaced.
	Unplug "water sen" connector from circuit board.
	Plug "water sen" connector from Scotsman tester into circuit board.
	Move "water" switch on tester to No Water position. The NO Water light on the circuit board should go ON. If not, replace the circuit board.
	Move the "water" switch on the tester to the Water position. The NO Water light on the board should go OFF, and the ice machine should start (if bin sensors are connected, working and there is no ice in the bin). If not, replace the circuit board, if the light does go off, replace the water level sensor.



ICE BREAKER AND AUGER REMOVAL

1. Remove permagum and two screws from the side of the freezer.
2. Pull up on cap hook located in the top of the freezer assembly to remove ice breaker with bearing set, auger and the top portion of the lower water seal.
3. Remove snap ring and cap and remove the bolt from the ice breaker and auger assembly to separate the ice breaker assembly from the auger. The bearings may be replaced or the ice breaker and bearings may be replaced as an assembly.

WATER SEAL INSTALLATION

Inspect the water seal in its package. Do not use if mating surfaces are scratched or cracked.

1. Remove auger, unbolt freezer from adaptor stand. Drive out old bottom bearing and water seal from the top down.
2. Remove old rotating half of water seal from auger and clean the auger at the seal mounting area.
3. Apply Scotsman part number 19-0529-01 RTV silicone rubber to the auger shoulder before pushing on the water seal. Place just enough silicone on to the auger, so that when the water seal is placed on the auger, the gap between the auger shoulder and water seal is completely filled with silicone.

The silicone must be allowed to "set-up" or dry on the surface before any water can be added to the freezer. (See illustration, page 26).

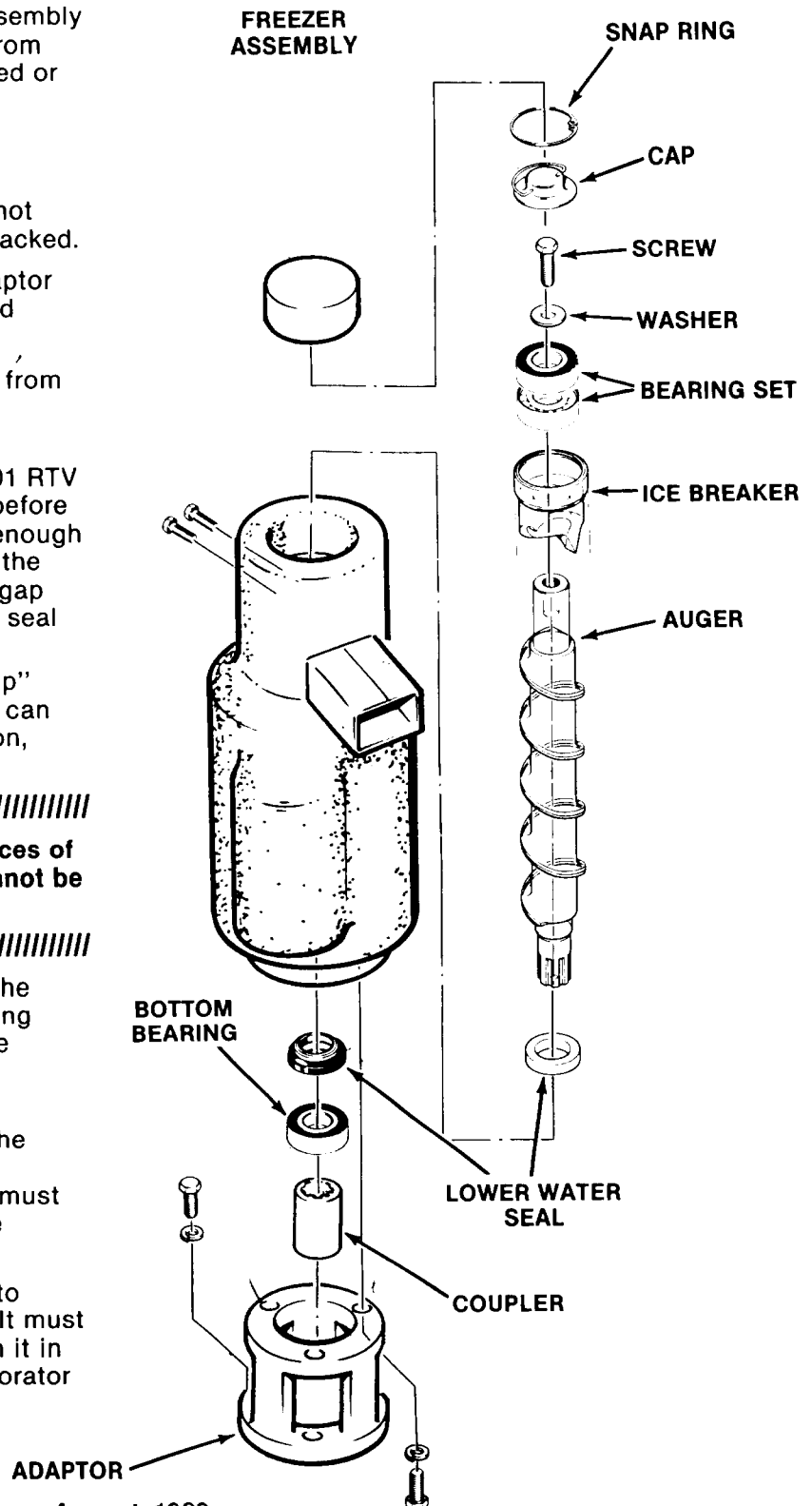
WARNING

If any silicone gets onto the mating surfaces of the water seal, the seal is ruined, and cannot be used.

4. Clean the inside of the evaporator at the bottom bearing and water seal mounting area. Lubricate the outside edge of the stationary seal with food grade lubricant to aid installation.
5. Carefully push the stationary part of the water seal up into the bottom of the evaporator. It must go in straight and must not be pushed in beyond 1/4" past the bottom of the freezer.
6. Install new bottom bearing, push it into the freezer under the new water seal. It must be pushed in straight, but do not push it in past 1/8" from the bottom of the evaporator tube.

7. Mount the adaptor stand to the bottom of the freezer. Hand tighten the three cap screws until the stand flange is tight against the bottom bearing. Then, tighten the cap screws in a rotating pattern to insure proper alignment.

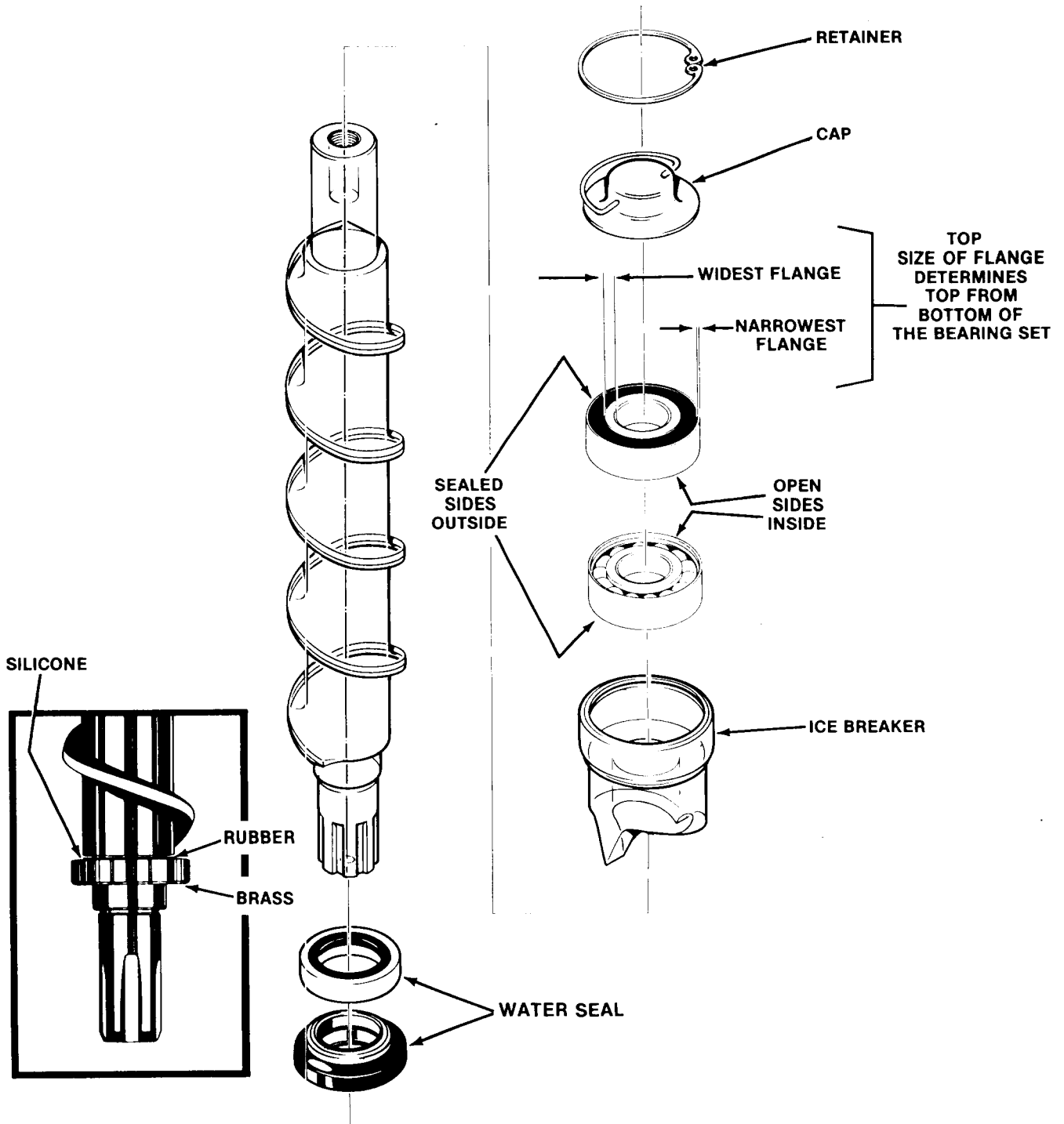
(CONTINUED)



FD470 REPAIR

8. The top bearing should also be changed at this time. Be sure to mount the top bearing/bearing retainer assembly onto the auger **first** before installing the auger into the freezer tube.

9. Install the auger and test the unit.



FD470 Refrigeration Service

General:

- Scotsman recommends that any work on the refrigeration system only be done when it is certain that the system needs repair.
- Refrigerant should not be added except as a way to determine the proper operation of the product. If the system was low on refrigerant, there is a leak, and it must be found and repaired.
- Refrigerant should not be wasted to the atmosphere, but reclaimed.
- This system has a critical charge, it must be recharged with the correct amount of refrigerant as listed on the nameplate of the ice machine, or performance will suffer.
- Anytime the refrigeration system has been opened, the dryer should be replaced.

Specifically:

Recover, reclaim or recycle refrigerant. The method chosen is up to the service company. There are various mechanical devices that may be used to recycle refrigerant at the field level, however, Scotsman requires that any refrigerant placed into a Scotsman ice machine meet ARI spec 700. Reclaim programs are available thru most refrigerant wholesalers.

Use conservation minded service procedures:

- Refrain from checking refrigeration pressures without reason. There are many ways to determine the proper operation of a Scotsman ice machine without using refrigerant gauges. Visual inspection of the water system, observation of the ice formation, amp draw, voltage, and other techniques will lead to proper diagnosis. Scotsman also recommends that, at the time of initial start up, gauges not be used.
- If gauges must be used, do not always check the high side pressure. If the condenser is clean and seems to be operating correctly, it most likely is. The low side pressure is much more important on an ice machine than is the high side.
- If gauges must be used, use very short hoses. Minimal refrigerant discharged into the hoses equals minimal refrigerant discharged into the air.

- If hi side pressure must be checked, use a quick connect at the end of the discharge hose to minimize the release of refrigerant, J/B Industires part number A33000 works well.
- Scotsman's schrader valve caps must be tightened to 70 inch - pounds to insure that the valves will not leak.
- If using recycled refrigerant, it must meet ARI spec 700 or have been cleaned by a machine capable of attaining ARI spec 700. Removal and Replacement: Refrigeration System

If the refrigeration system must be serviced, the quality of service must insure that there will not be a repeat failure, as repeat failures will cause refrigerant to be discharged into the air by the failure or when the failure is corrected:

- If there has been a compressor burn out, check for acid in the oil. If acid is indicated, extra steps must be taken to clean up the system.
- Never use refrigerant, such as R-11, to clean up or flush out a refrigeration system. When system clean-up is required, the use of suction line filter-dryers and liquid line filter-dryers are recommended.
- Always replace the dryer when repairing a leak or replacing a refrigeration component.
- Evacuate the system with a good vacuum pump to 500 microns or less. If the triple evacuation method is used, the vacuum should be broken each time with dry nitrogen, not refrigerant. Evacuation must be from both sides of the system.
- Weigh in or measure in the nameplate charge. Recharge into the high side.
- Check for leaks with a high quality, electronic leak detector. Halide torches will not locate the very small leaks.
- Scotsman's schrader valve caps must be tightened to 70 inch - pounds to insure that the valves will not leak.

If an ice machine is to be discarded and still contains refrigerant, Scotsman recommends that the refrigerant be recovered, reclaimed, or recycled so that it is not discharged into the air.

//////////////////// WARNING //////////////////////

Be sure the electrical power supply and the water supply are OFF, BEFORE starting any of the following REMOVAL AND REPLACEMENT procedures as a precaution to prevent possible personal injury or damage to equipment.

////////////////////////////////////

REMOVAL AND REPLACEMENT OF THE DRIER

NOTE: Always install a replacement drier, anytime the sealed refrigeration system is opened. Do not replace the drier until all other repair or replacement has been completed.

To replace the drier:

1. Remove screws and remove back panel.
2. Bleed off or blow the refrigerant charge through the Schrader valve.
3. Remove attaching hardware and drier brace or strap from the drier.
4. Unsolder refrigeration lines at both ends of the drier.

To replace the drier:

//////////////////// CAUTION //////////////////////

1. If the factory seal is broken on the replacement drier, exposing it to the atmosphere more than a few minutes, the drier will absorb moisture from the atmosphere and lose substantial ability for moisture removal.
2. Be sure the replacement drier is installed with the arrow positioned in the direction of the refrigerant flow.

////////////////////////////////////

1. Remove the factory seals from the replacement drier and install the drier in the refrigerant lines with the arrow positioned in the direction of the refrigerant flow.
2. Solder the drier into the lines, two places.
3. Secure drier with the drier brace or strap.
4. Purge the system and check for leaks.
5. Thoroughly evacuate the system to remove moisture and non-condensables.
6. Charge the system with refrigerant, by weight. SEE NAMEPLATE.

REMOVAL AND REPLACEMENT OF THE BIN DRIVE MOTOR ASSEMBLY

To remove the drive motor:

1. Remove wing nuts and remove bin top.
2. Remove screws and remove switch cover.
3. Remove screws and separate bin drive motor from the switch cover.
4. Unplug electrical lead wires from connector.

REMOVAL AND REPLACEMENT OF THE FAN MOTOR ASSEMBLY

To remove fan motor assembly:

1. Remove screws and remove back panel.
2. Disconnect electrical lead from the fan motor.
3. Remove two screws and lockwashers securing the fan motor bracket to the chassis base and remove the fan motor assembly and bracket from the cabinet.
4. Remove the nut from the end of the fan motor to the motor bracket and separate the motor from the bracket.

To replace the fan motor assembly, reverse the removal procedure.

REMOVAL AND REPLACEMENT OF THE CYLINDRICAL ICE STORAGE BIN

1. Remove cabinet top.
2. Remove bin top wing nuts and remove bin top.
3. Pull UP and remove inner bin from insulated container.
4. Rotate counter-clockwise and remove inner bin bottom.
5. Remove hex nuts washers from bin base mounting bolts. Remove insulated ice storage bin.

FD470 "A" MODEL REPAIR

REMOVAL AND REPLACEMENT OF THE WATER PRESSURE SWITCH ASSEMBLY

To remove the low water pressure switch assembly:

//////////////////// **WARNING** //////////////////////

Be sure the electrical power supply and the water supply are OFF, BEFORE starting any of the following REMOVAL AND REPLACEMENT procedures as a precaution to prevent possible personal injury or damage to equipment.
////////////////////////////////////

1. Remove screws and remove top, back and right side panel.
2. Disconnect electrical leads in the control box from the low pressure switch.
3. Unscrew the flare nut fitting and disconnect the low pressure control and washer from the bracket.

To replace the low water pressure control assembly, reverse the removal procedure.

REMOVAL AND REPLACEMENT OF THE WATER RESERVOIR ASSEMBLY

To remove the water reservoir assembly:

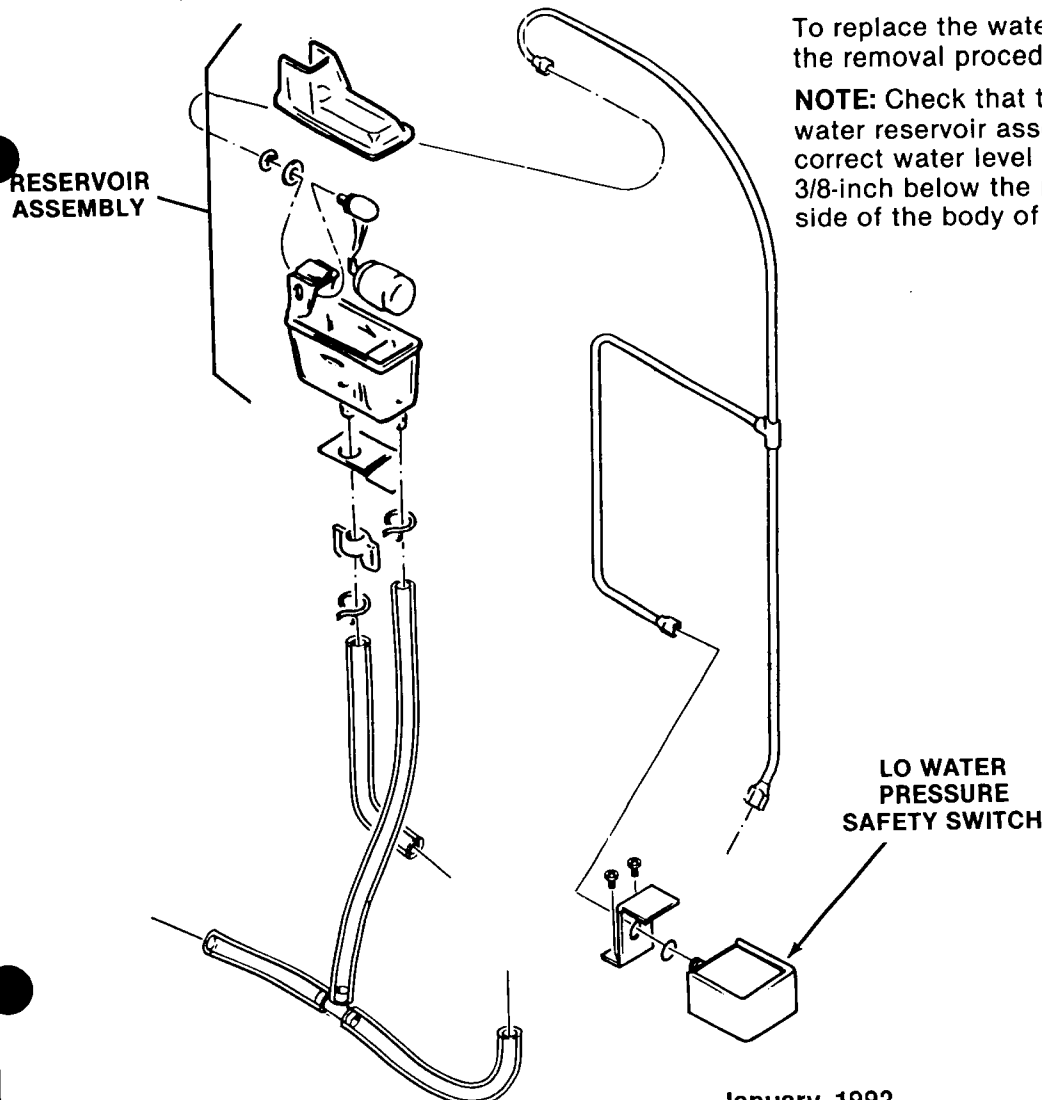
1. Remove screws and remove top, back and right side panel.
2. Turn OFF water supply to the icemaker at the hand shut-off valve.

NOTE: Be prepared with container or rags, to catch water left in lines, when lines are disconnected in next steps, to prevent draining water on parts, components, electrical lines, etc.

3. Disconnect the water inlet tube from the water reservoir assembly.
4. Remove two corbin clamps and two tubes from the bottom of the water reservoir assembly.
5. Unscrew and remove the plastic wingnut from the bottom of the water reservoir assembly.
6. Lift and remove the water reservoir assembly from the mounting bracket.

To replace the water reservoir assembly, reverse the removal procedure.

NOTE: Check that the installed replacement water reservoir assembly float moves freely. The correct water level in the water reservoir is 3/8-inch below the raised molded line, on the side of the body of the water reservoir.



FD470 REPAIR

REBUILDING THE 1/10 HORSEPOWER DRIVEMOTOR GEAR REDUCER ASSEMBLY

DRIVEMOTOR PARTS

To replace the centrifugal switch and mechanism or the motor winding or the motor rotor, removal of the gearbox assembly is not necessary.

//////////////////// **WARNING** //////////////////////

Be sure the electrical power supply and the water supply are OFF, BEFORE starting any of the following REMOVAL AND REPLACEMENT procedures as a precaution to prevent possible personal injury or damage to equipment.

////////////////////////////////////

1. Disconnect electrical power
Remove top and right side panels.
2. Remove cover from the top of the centrifugal switch assembly and remove the electric wires from the microswitch. To replace just the centrifugal switch, remove two machine screws retaining the switch and remove the switch. To replace, reverse the procedure to this point.
3. If the motor is to be removed, the next step is to remove the four screws holding down the plastic switch assembly housing and lift the housing off of the motor top.
4. Remove the centrifugal switch mechanism from the rotor by unscrewing the machine screw at the top of the rotor.
5. The motor and housing may now be removed. Lift off the motor fan housing, and pull off the plastic fan. The next part to be removed is the motor winding. Disconnect the electrical leads of the motor from its control box location and lift off the winding.
6. The rotor is all that remains of the motor in the gear motor assembly. Use a pry bar to carefully pry up the rotor. (The only thing holding it in is the tight fit of the bottom rotor bearing into the top of the gear case.) To replace any of the above parts, reverse the disassembly procedure.

REMOVAL OF THE DRIVEMOTOR ASSEMBLY

To remove the Drivemotor Assembly:

1. Remove top and right side panel.
2. Remove bin top assembly.
3. Unscrew three capscrews retaining freezer assembly to the gearmotor assembly.

4. Unscrew two capscrews under gearmotor chassis support retaining gearmotor to the frame.
5. Remove motor electrical leads from the connections.
6. Raise freezer assembly up enough that the output shaft clears the freezer adaptor.
7. Remove the gearmotor assembly by sliding it out from under the freezer.

DRIVEMOTOR ASSEMBLY

After removal of the drivemotor gear reducer from the unit, inspect the internal parts of this gearmotor:

1. Place gearbox on a flat surface, covered with rags to absorb any spilled lubricant.
2. Using a punch, drive the roll pins out of the casing.
3. Remove the four capscrews on the top of the gear case and the two under the motor.
4. Pry the two cases apart.

When inspecting the internal parts, look for:

- * Condition and quantity of lubricant. (The proper oil level is near the top of the output (biggest) gear.) (5 oz. capacity) Use Scotsman Gear Case Oil, P/N A25835-001.
- * Bearing condition
- * Gear and gear shaft condition
- * Woodruff key between output gear and shaft.
- * Grease seals, back to back
- * Vent hole

Be sure to count and retain the spacer washers as they come out of the gearbox.

Replace the parts as required, using the part numbers found in the parts list section of this manual. Replace the gears into a CLEAN bottom gearcase, replacing the spacer washers in the same quantity as they were upon disassembly. If no count was kept, refer to the parts illustration.

NOTE

Some bearing grease should be placed in all bearings before assembly to insure proper lubrication upon start-up.

FD470 REPAIR

DRIVEMOTOR ASSEMBLY

To reassemble:

1. Set top gearcase on gears and spacers and oil. Be sure O-ring is in place.
2. Drive rollpins back into locating holes.
3. Replace capscrews into gearcase covers and torque (8 capscrews) at 80-90 inch pounds.
4. Bench test the gearmotor assembly.

Test for noise, amp draw (must not be in excess of icemaker nameplate for gearmotor) and oil leaks.

Return gearbox to the unit. Be certain all mounting surfaces are clean and reassembly gearbox to chassis and freezer assembly.

If the freezer water seal begins to leak, removal of the auger is required in order to replace the top and bottom bearing and water seal. **AT THE SAME TIME**, it would be recommended to remove the gearmotor assembly, open it up and inspect it.

