

**Flaked and Nugget  
Ice Machines**

**Technical Training**

- Section 1: 1/10 HP Flakers
  - AFE325, AFE400 , MFE400
- Section 2: 1/4 HP Flakers
  - NME, FME, NSE

- Flaker - Nugget Topics
  - Component Location
  - Installation
  - Construction
  - Maintenance
  - Service Diagnosis
  - Refrigeration Service

- AFE400
- AFE325
- MFE400



- Flaked Ice Only
  - AFE325 and AFE400 are Self Contained
  - MFE400 is Modular
  - AFE400 and MFE400 available in air cooled or water cooled configurations
  - AFE325 is only available as an air cooled model

- Air Flow



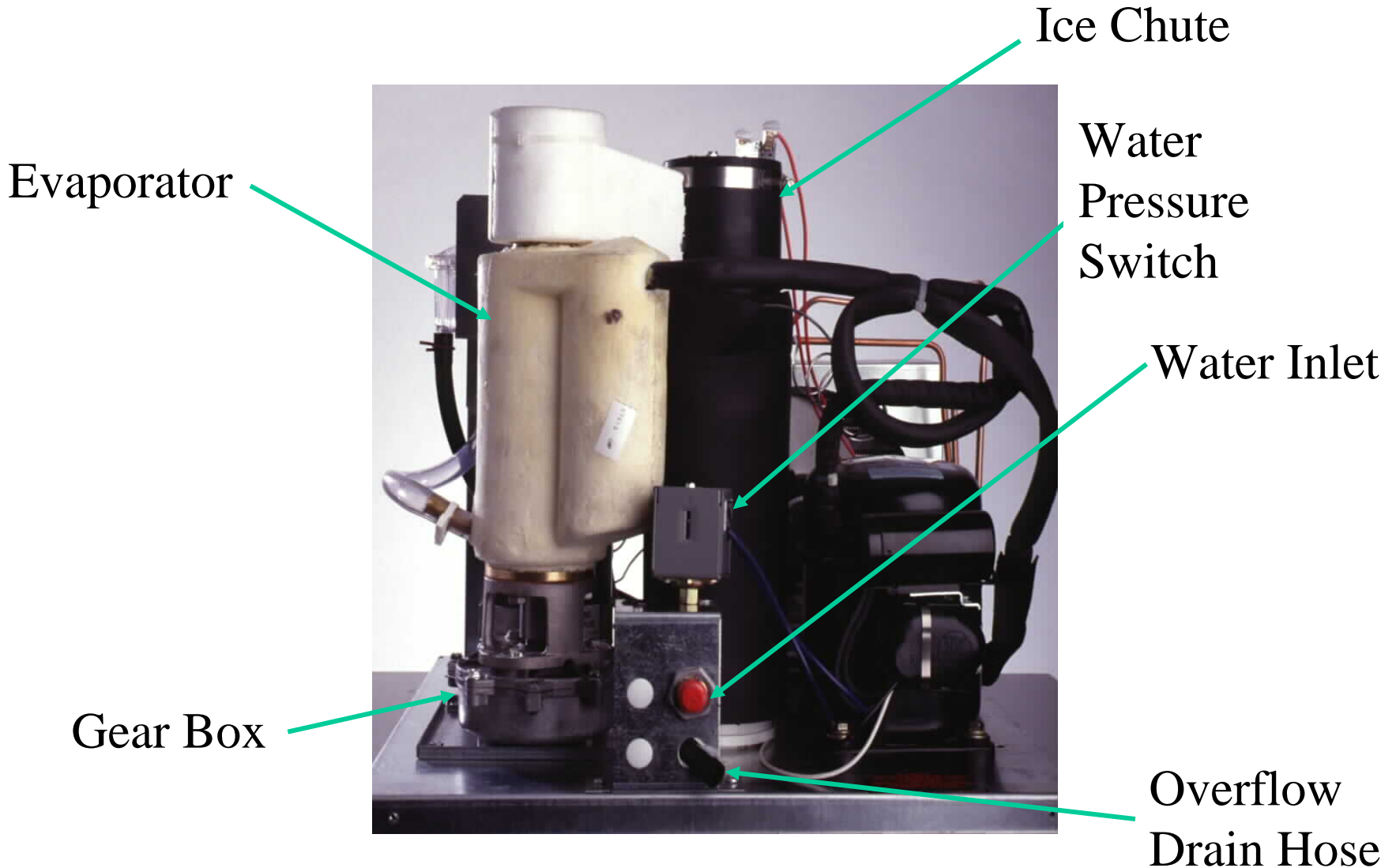
In and Out the Front



In the Front, Out the  
Left Side and Back



In the Front, Out  
the Sides and Back





Shipping Position

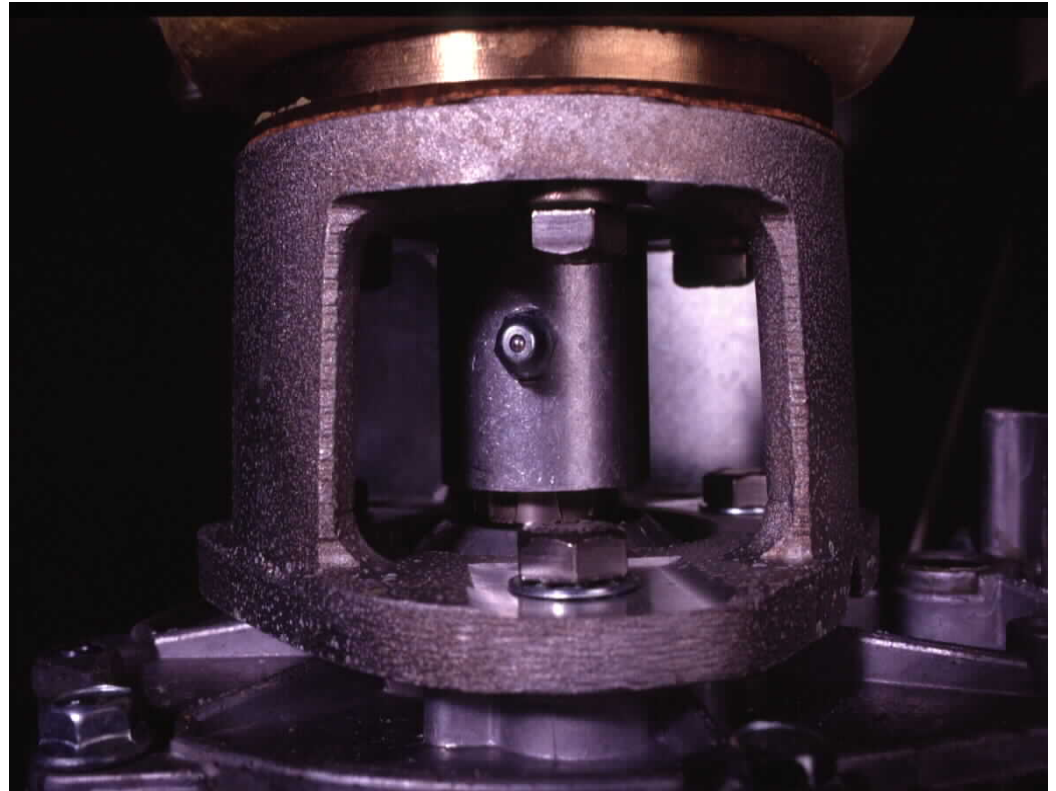


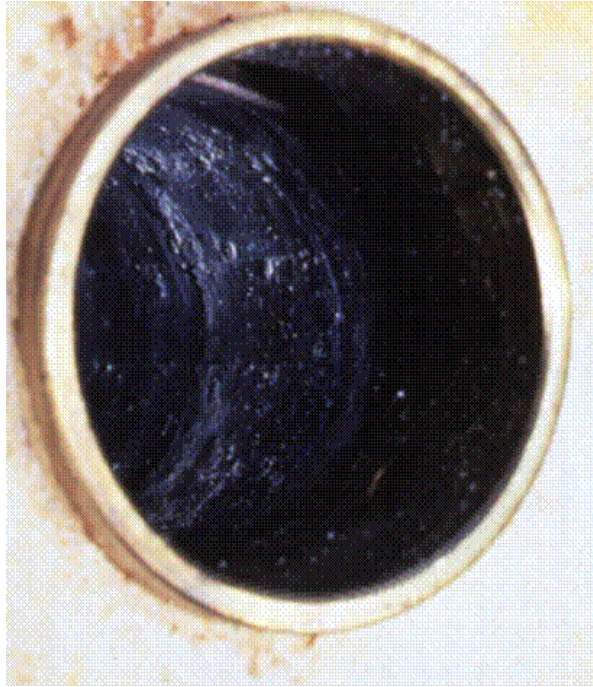
Assemble Ice Chute with pre-mounted Thermostat



- Brass Evaporators
- R-134a
- Cap Tube
  - AFE325, MFE400
- Expansion Valve
  - AFE400

- Cleaning
  - Condenser
  - Water System
- Lubrication
  - Grease Coupling



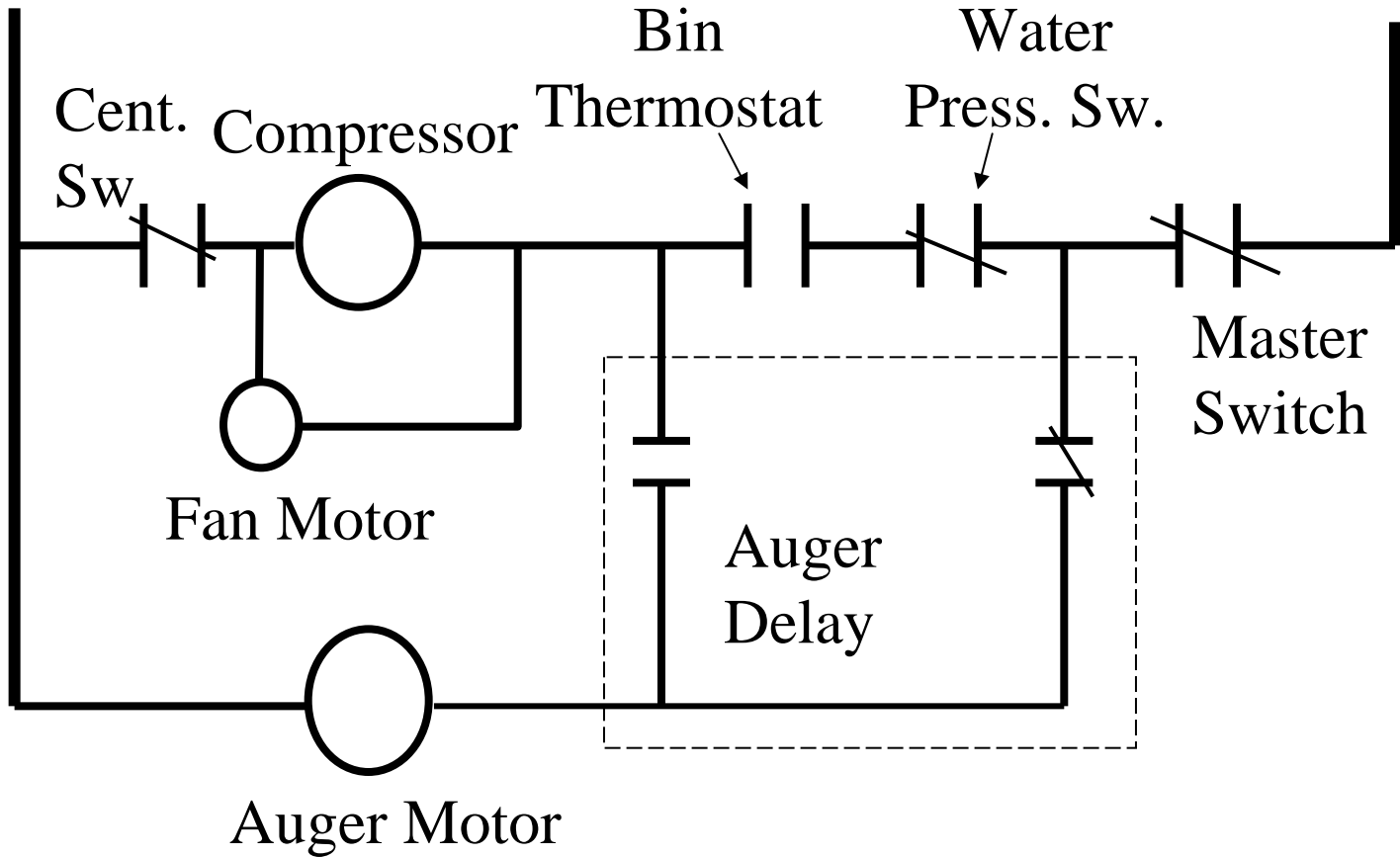


Water System Must Be Cleaned to Remove Mineral Scale

Remove  
Screws



- Electro-Mechanical
  - Bin Thermostat
  - Auger Delay Pressure Control
  - Water Pressure Switch
  - Centrifugal Switch on Auger Motor

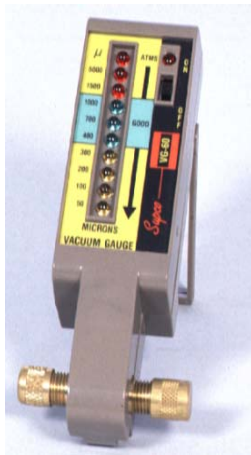


- What could be wrong if the machine has power but will not start?
  - Open bin thermostat
  - No water pressure
  - Open auger motor windings
  - Any of the above

- Typical Low Side Operating Pressure:
  - 7 - 10 PSIG (AFE325)
  - 12 PSIG (AFE400)
  - 13 - 14 PSIG (MFE400)



## R-134a



Evacuate to  
300 microns



Weigh In Charge



HFC Leak Detectors



Use Nitrogen Purge

- One Modular
- Two Self Contained
- R-134a
- Small Auger Drive Motor (1/10 HP)
- Electro-Mechanical Controls

- Condensing Types:
  - Air Cooled
  - Water Cooled
  - Remote Air Cooled
  - Remote Low Side

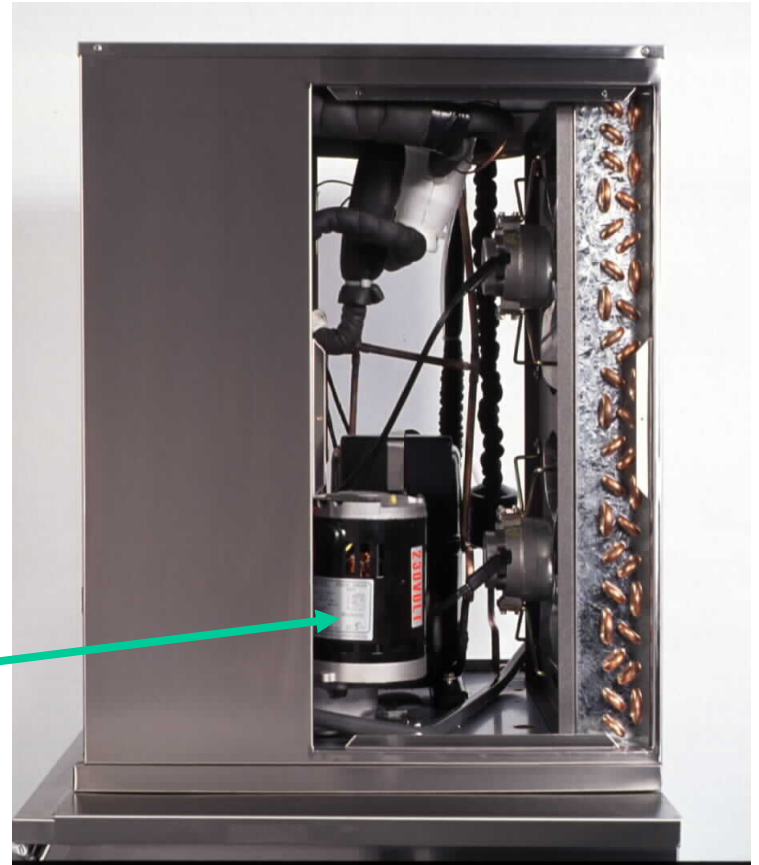


- 21" Wide
- 30" Wide
- 42" Wide



- Right Side View
  - Service Panel Removed
  - Right Side Panel May Also Be Removed

Auger Motor



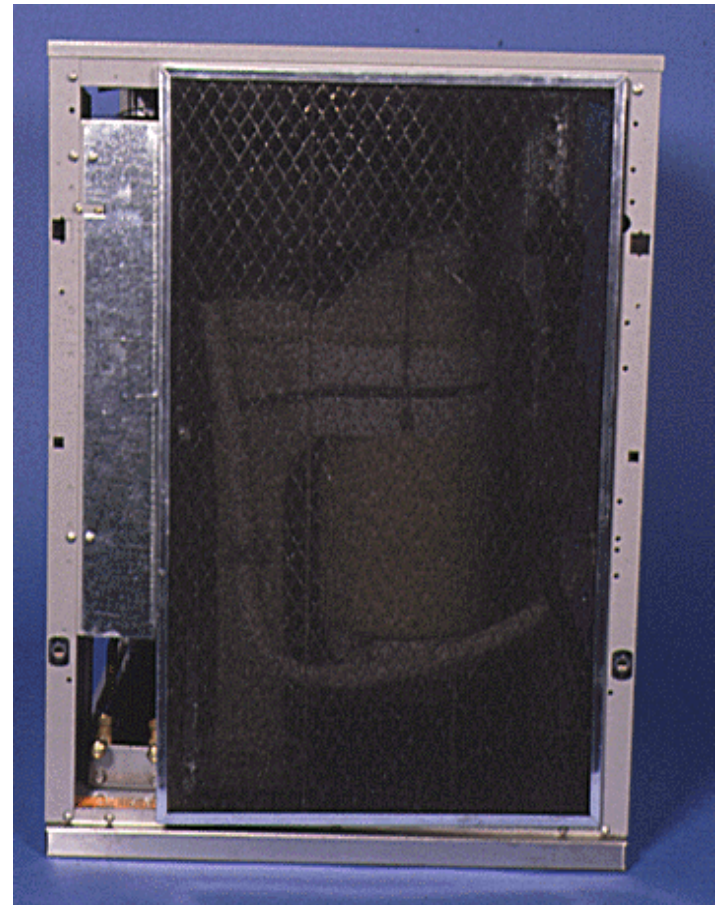
- Left Side View
  - Service panel removed
  - Side panel may also be removed

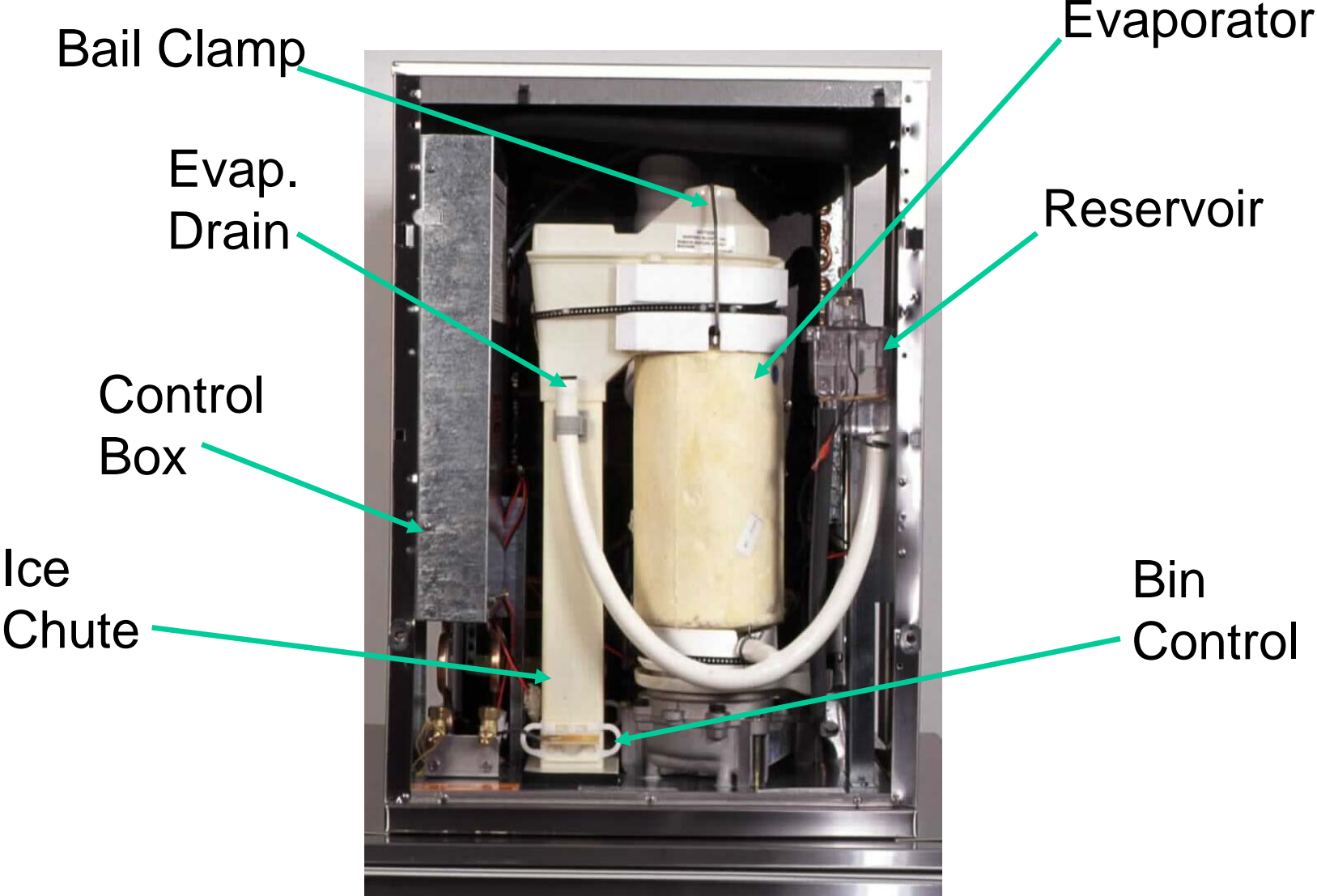
Compressor



- Two screws & two snaps hold the front panel on
- Cleanable Air Filter
- System access ports at the front

**Benefit: Easier Cleaning**







## Benefit: Easier Installation

- Standard Plumbing Fittings
  - 3/8" male flare
  - 3/4" drain
- Electrical Junction Box
- Options
  - Water Filters or
  - Water Treatment



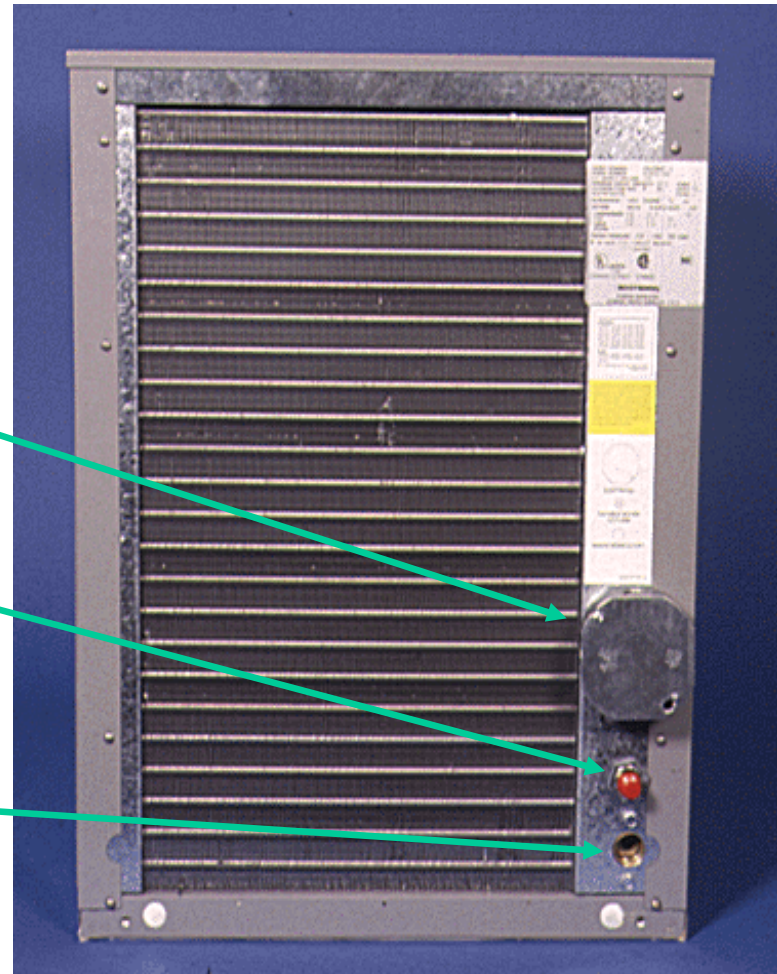
- Air Cooled:
  - Air out the back

**Benefit: Easier Installation**

Electrical Junction Box

Water Inlet

Water Drain



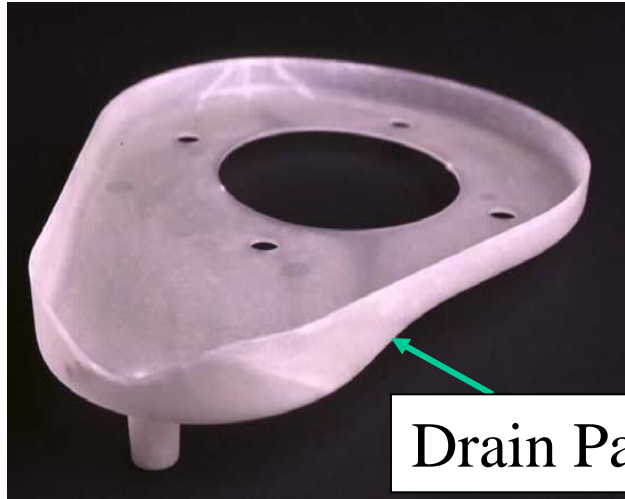
- Remotes

**Benefit: Easier Installation**

- 4 hour wait after electrical connection for crankcase heater soak out

- All others, switch Mode switch to ON

- No bin control to install

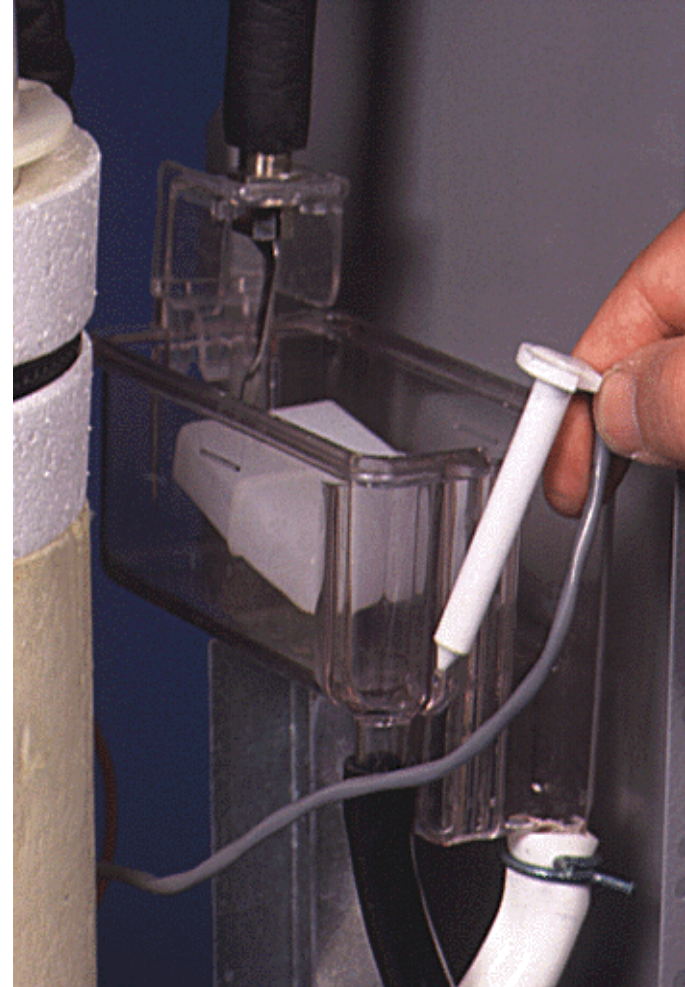


Drain Pan



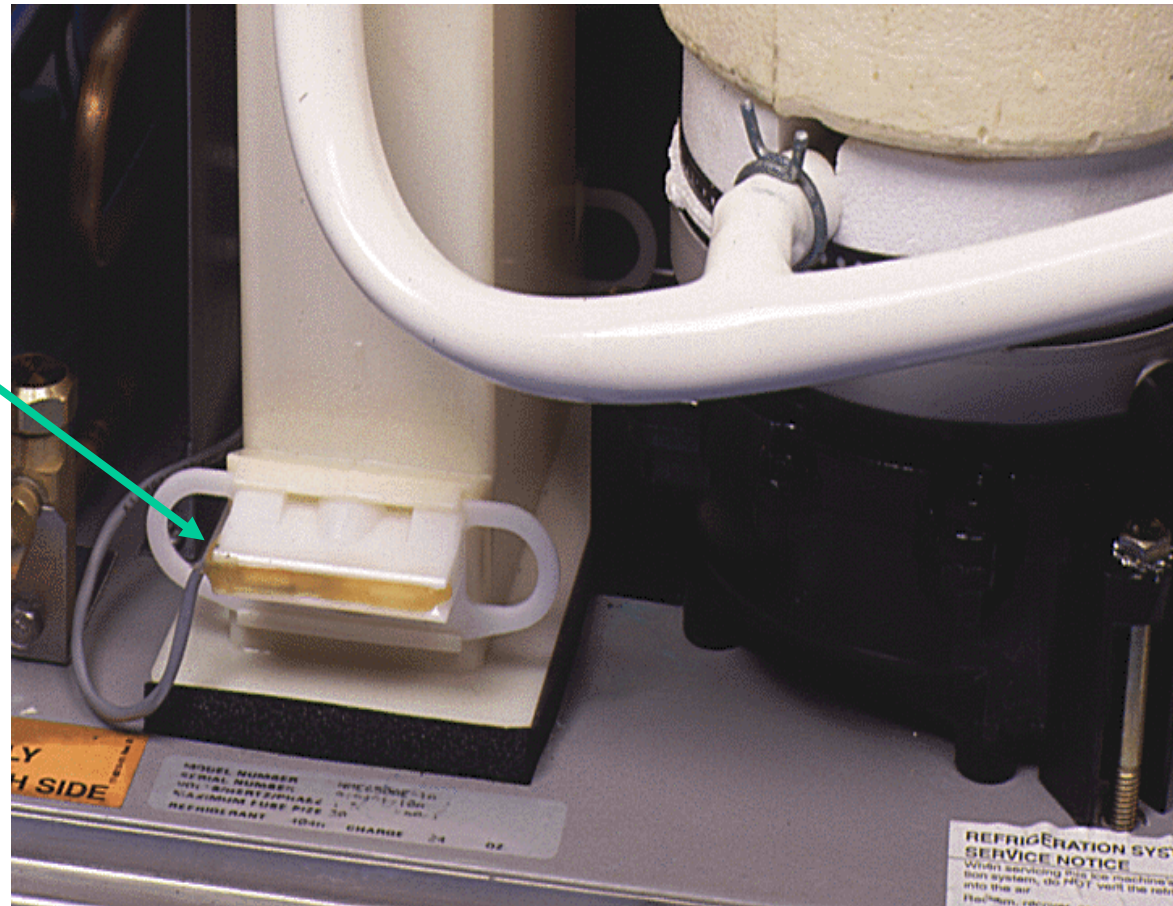
Drain Hose

- Float Controlled Water Level
- Water Sensor
  - Shuts unit down when water is gone



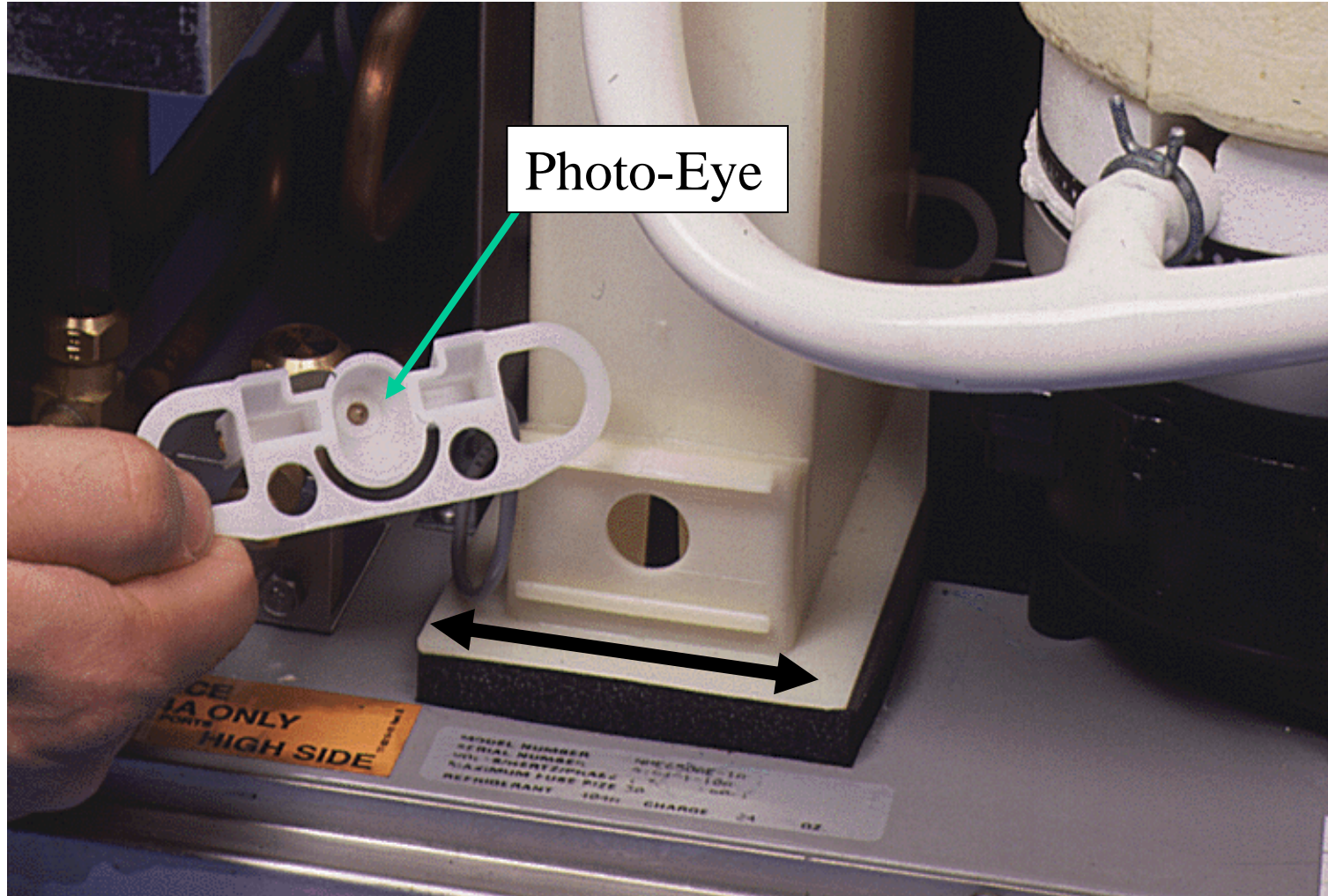
- Electric Eyes at the base of the Ice Chute

Ice Sensor  
Position



# Scotsman®

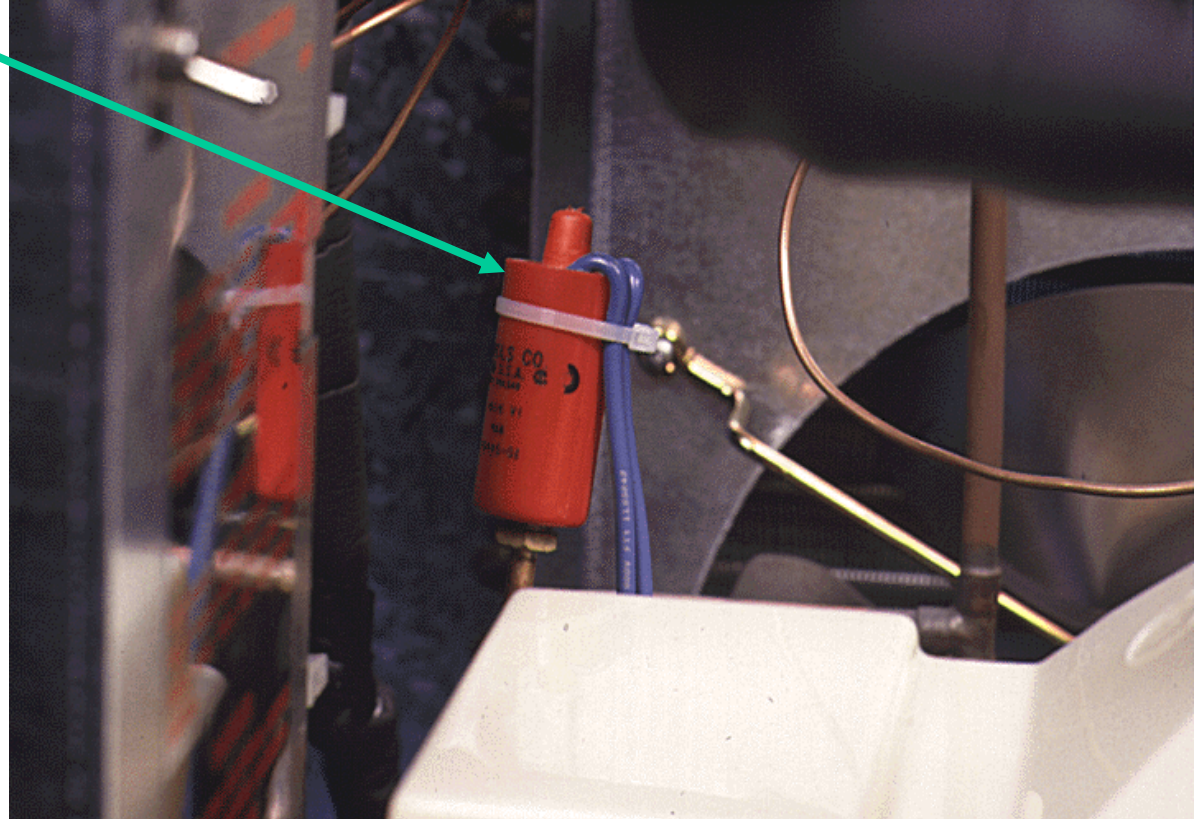
# Slide to Remove



Push to Reset

Prior Manual Reset  
HPC

Prior Manual Reset  
LPC in the Control



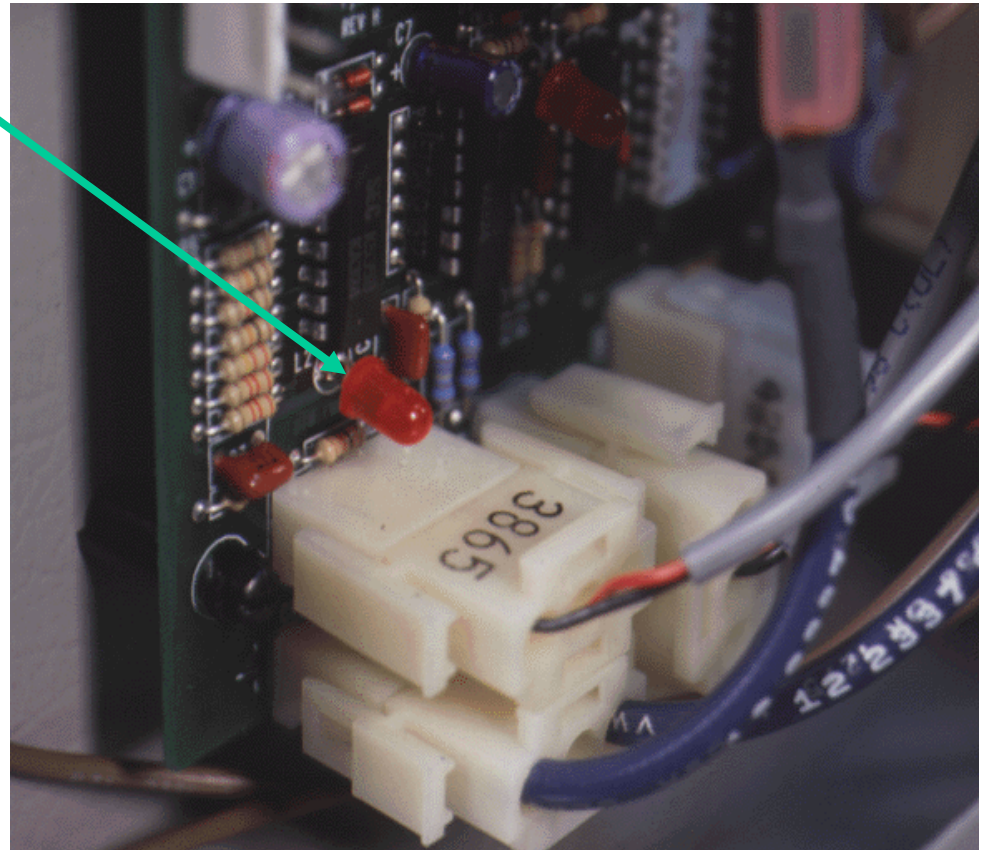


# Scotsman® Pressure Cut Outs: Current

- Automatic Reset
  - LPC
    - Cut Out: 15 PSIG
    - Cut In: 30 PSIG
  - HPC
    - Cut Out: 450 PSIG
    - Cut In: 350 PSIG

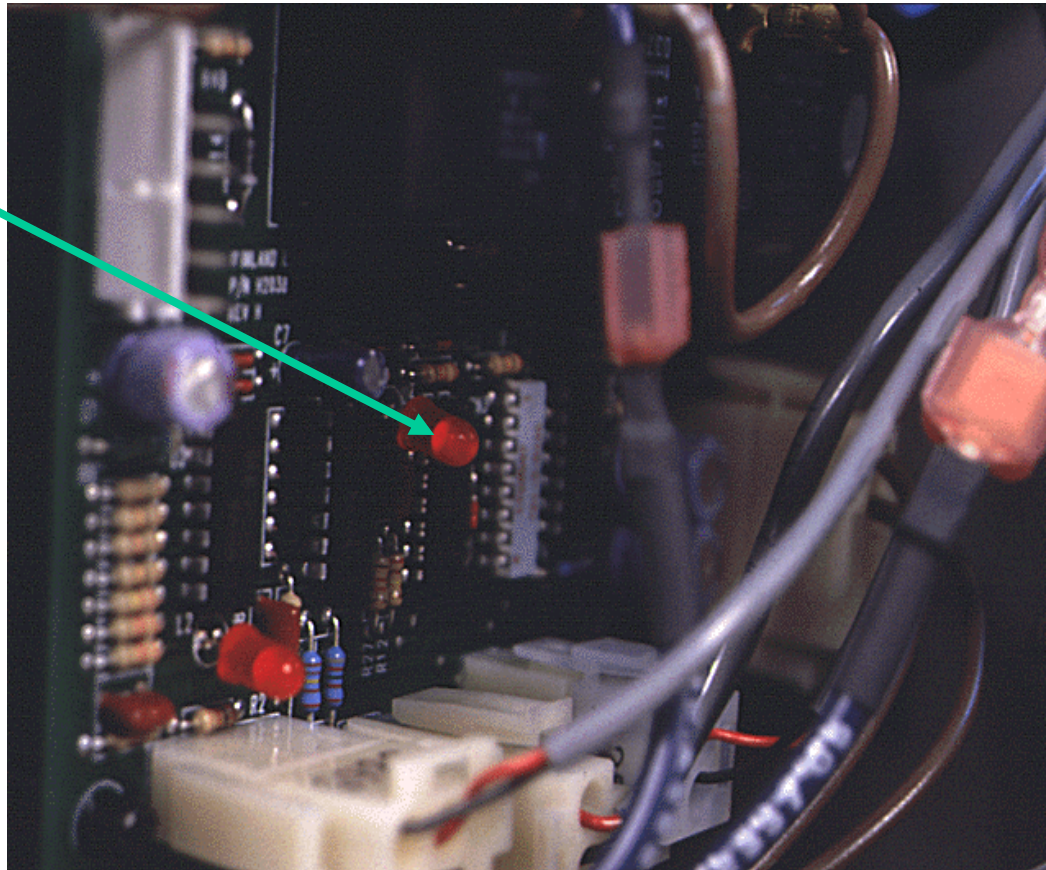


Bin Empty Light is  
ON When Ice Level  
is Low



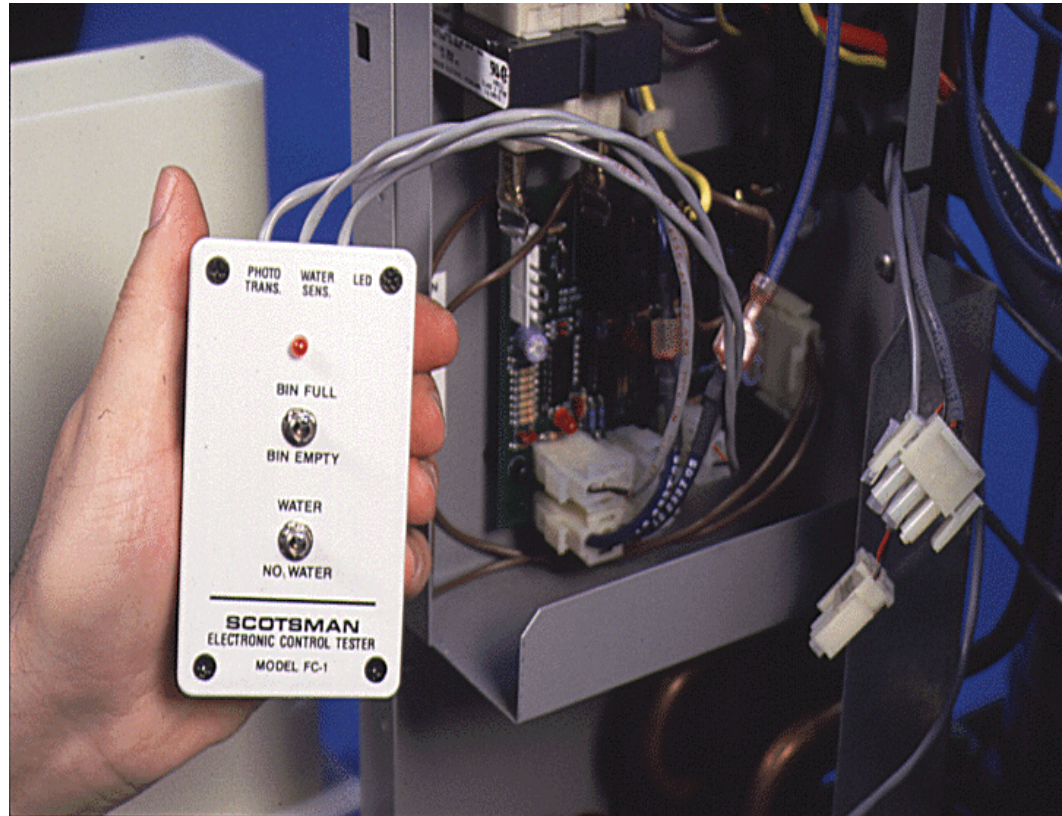
- The No Water Light is ON when the Water Level in the Reservoir is Low.

No Water Light



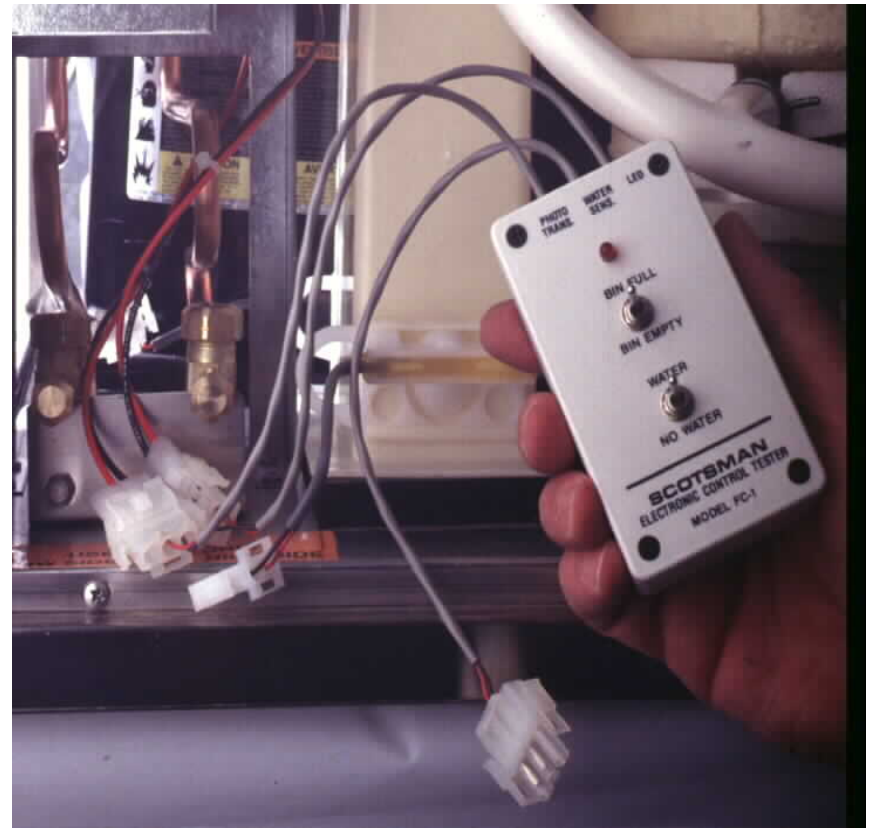
- A Tester is Available to Determine if a Sensor or Board Has a Problem.

Part Number  
A33942-001

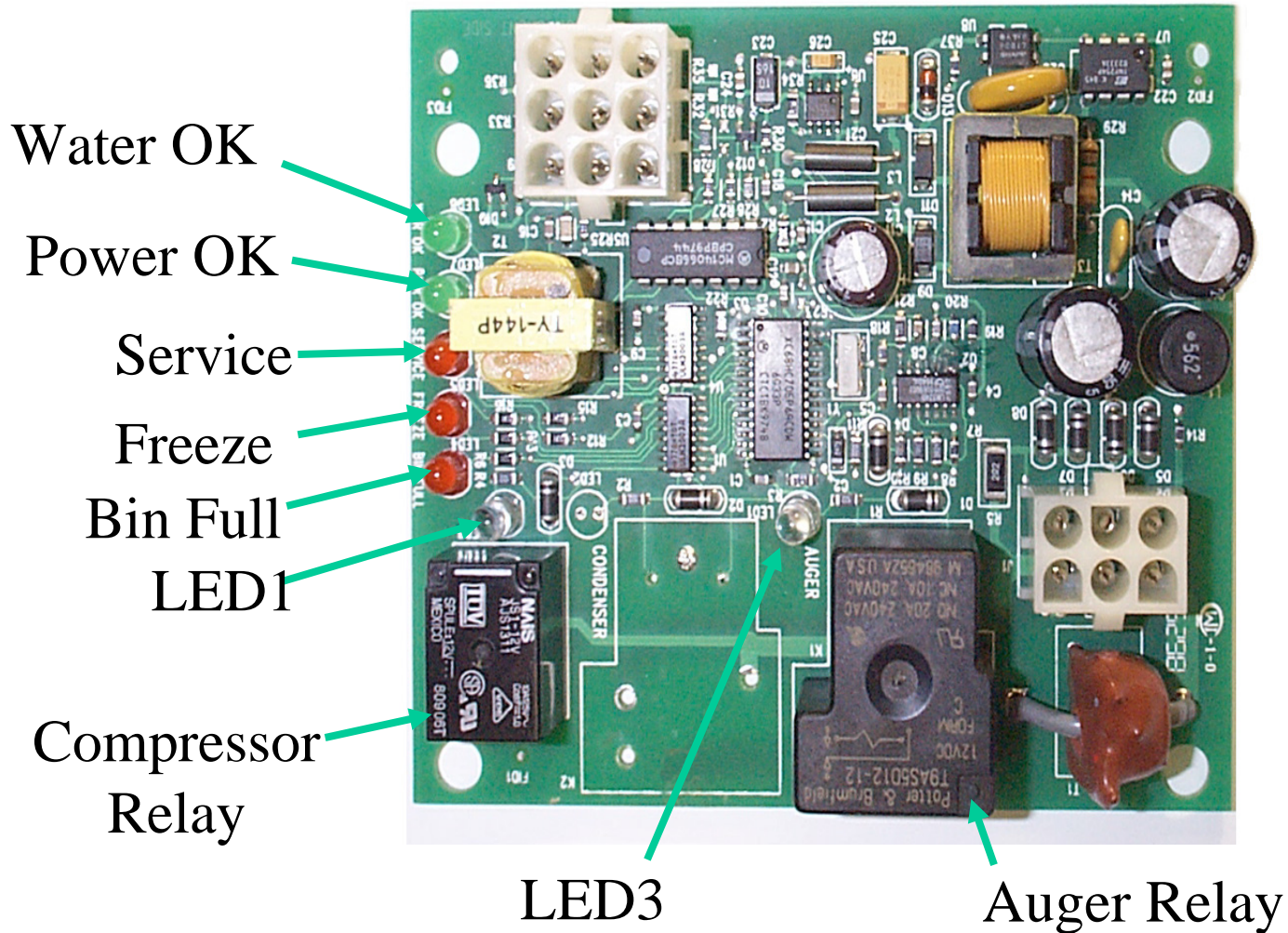


- Use Tester for Ice Sensor Check
  - Prior - connect at circuit board
  - AutoSentry - connect tester at ice sensor connections

**Benefit: Useable on ALL Electronic Flaker Systems**



*AutoSentry*

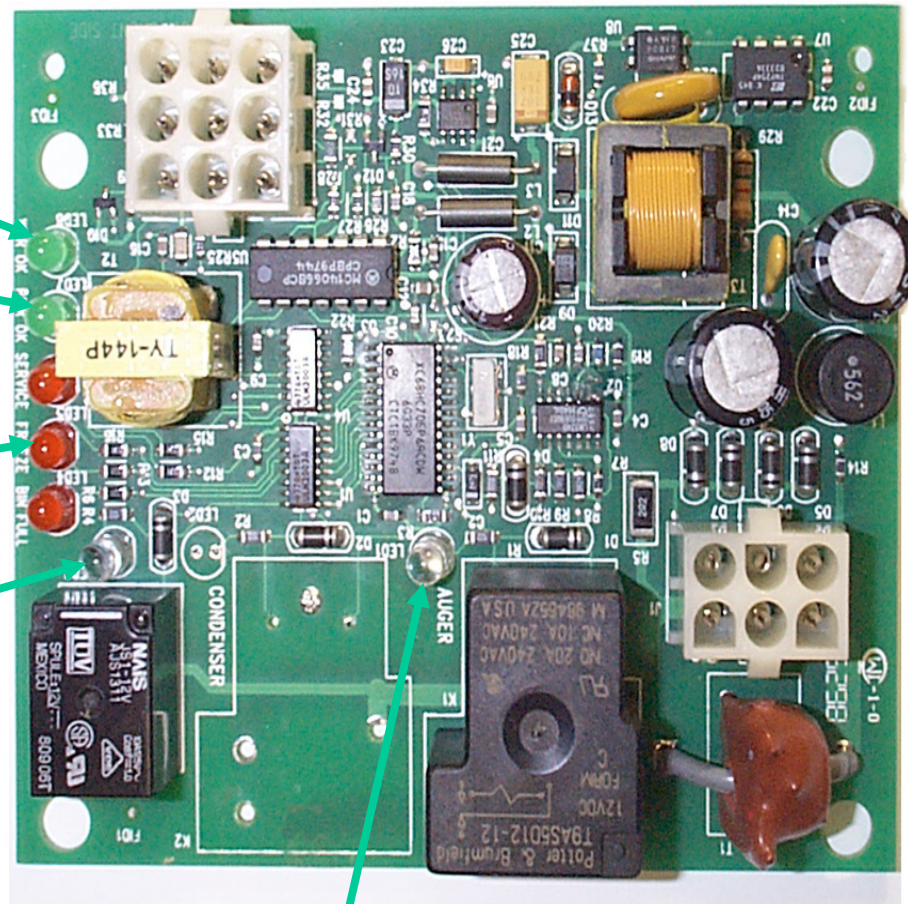


- Indicator Lights
  - Blinking Light Indicates a Pending Change
    - Starting
    - Shutting Down
  - LED1 and LED3 Lights
    - Indicate Control Has Powered that Relay's Coil
    - Example: LED3 is ON, Auger Motor Should Have Power To It

- No ice sensed for 10 seconds
  - Result: Start Up
- Ice sensed for 6 consecutive seconds
  - Result: Shut Down
- Unit Shuts Down
  - Auger Motor Delay runs 1 more minute
  - Compressor will not restart until 2 minutes have passed since shut down



*AutoSentry*



Water OK

Power OK

Freeze

LED1

Freeze light blinks during 2 minute Restart Delay.

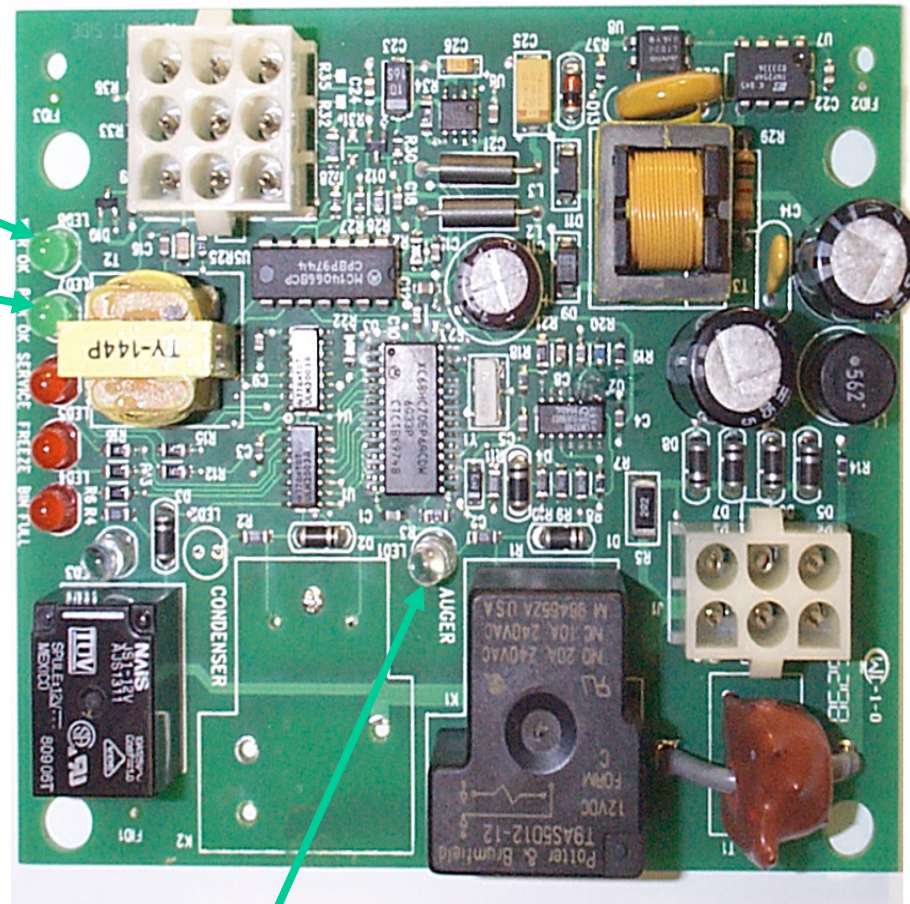
LED3

*AutoSentry*

Water OK

Power OK

Water OK  
Blinks Until  
Auger Motor  
Shuts Off, Then  
Then it and  
LED3 Are OFF



LED3

- Water
  - Automatic Restart
    - After 2 Minute Restart Delay
      - 2 Minute Timer Starts After Shut Down
- Power
  - Automatic Restart
    - After 2 Minute Restart Delay
      - 2 Minute Timer Starts After Power Restoration

*AutoSentry*

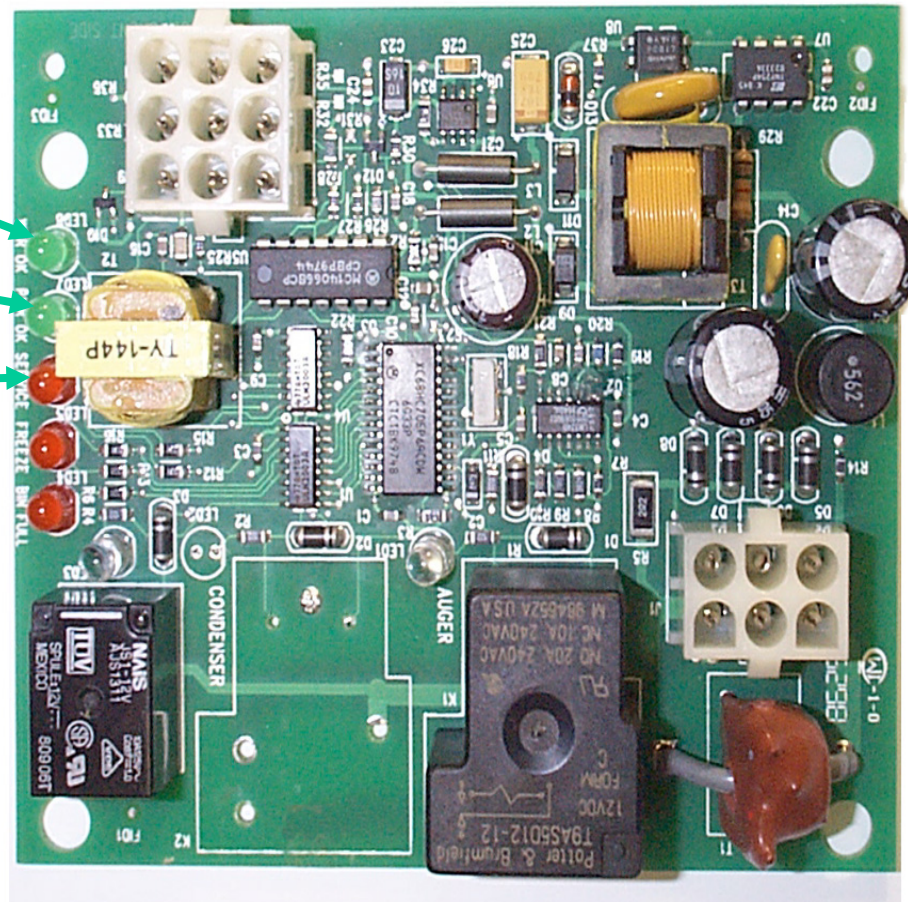
Water OK

Power OK

Service

Service Light Blinks  
During the Restart  
Period

Glows Continuously  
When Board Must be  
Manually Reset.



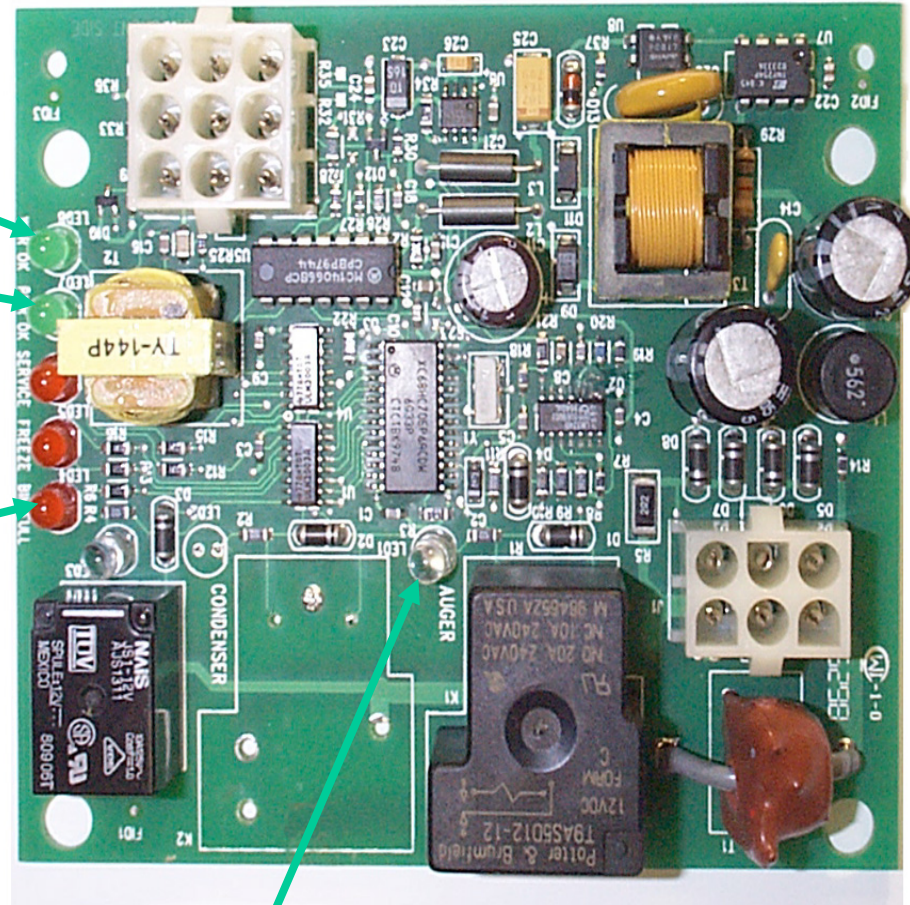
*AutoSentry*

Water OK

Power OK

Bin Full

Bin Full Blinks Until the Auger Motor Shuts OFF. Then Bin Full is ON and LED 3 is OFF



LED3

	Water OK	Power	Service	Freeze	Bin Full	LED1	LED3
Normal – making ice	ON	ON	Off	ON	Off	ON	ON
Normal - off	ON	ON	Off	Off	ON	Off	Off
Auger Motor Problem	ON	ON	Blinking	ON	Off	Off	Off
Cut Out Open	Off	Off	Off	Off	Off	Off	Off

- Water Sensor
  - Thermistor Probe
  - Diagnose with Tester
  - Cannot be used with AutoSentry Board

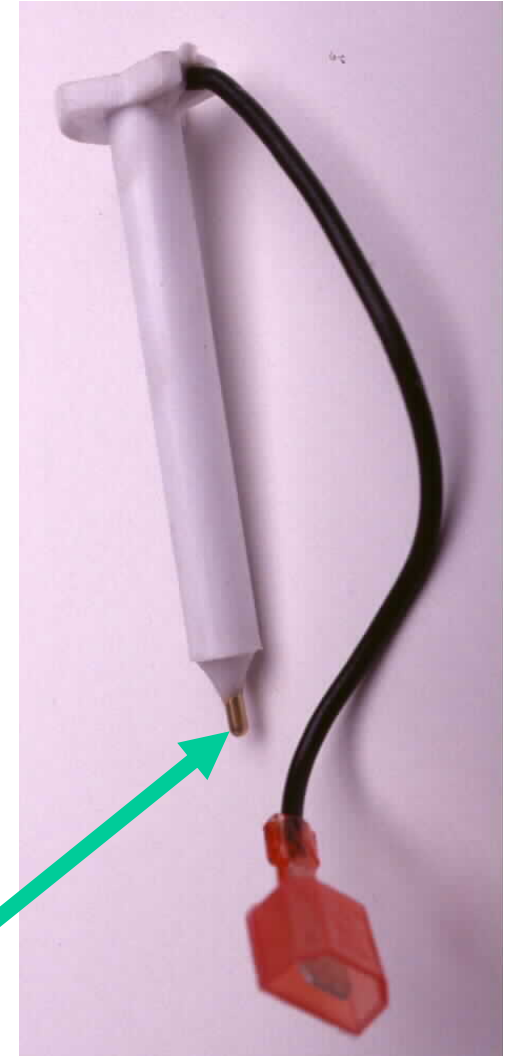


Tip Must Be Clean



## Benefit: Easy to Test

- Water Sensor
  - Conductivity Probe
  - Cannot be used with prior control board
  - Located in Reservoir
  - No tester needed
    - Use ohmmeter or
    - By-pass to ground



Tip Must Be Clean



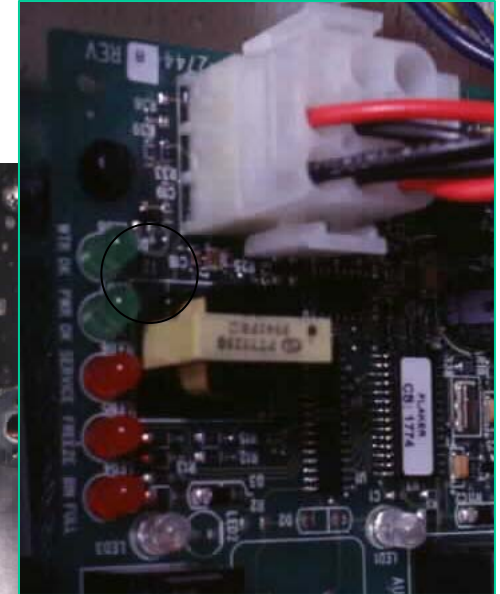
- Probe's Circuit
  - From Control Board
  - To Probe
  - To Tip
  - Through Water
  - To Evaporator
  - To Chassis (Ground)
  - Back to Control Board



Water  
Level  
Probe  
Tip

Evaporator Inlet

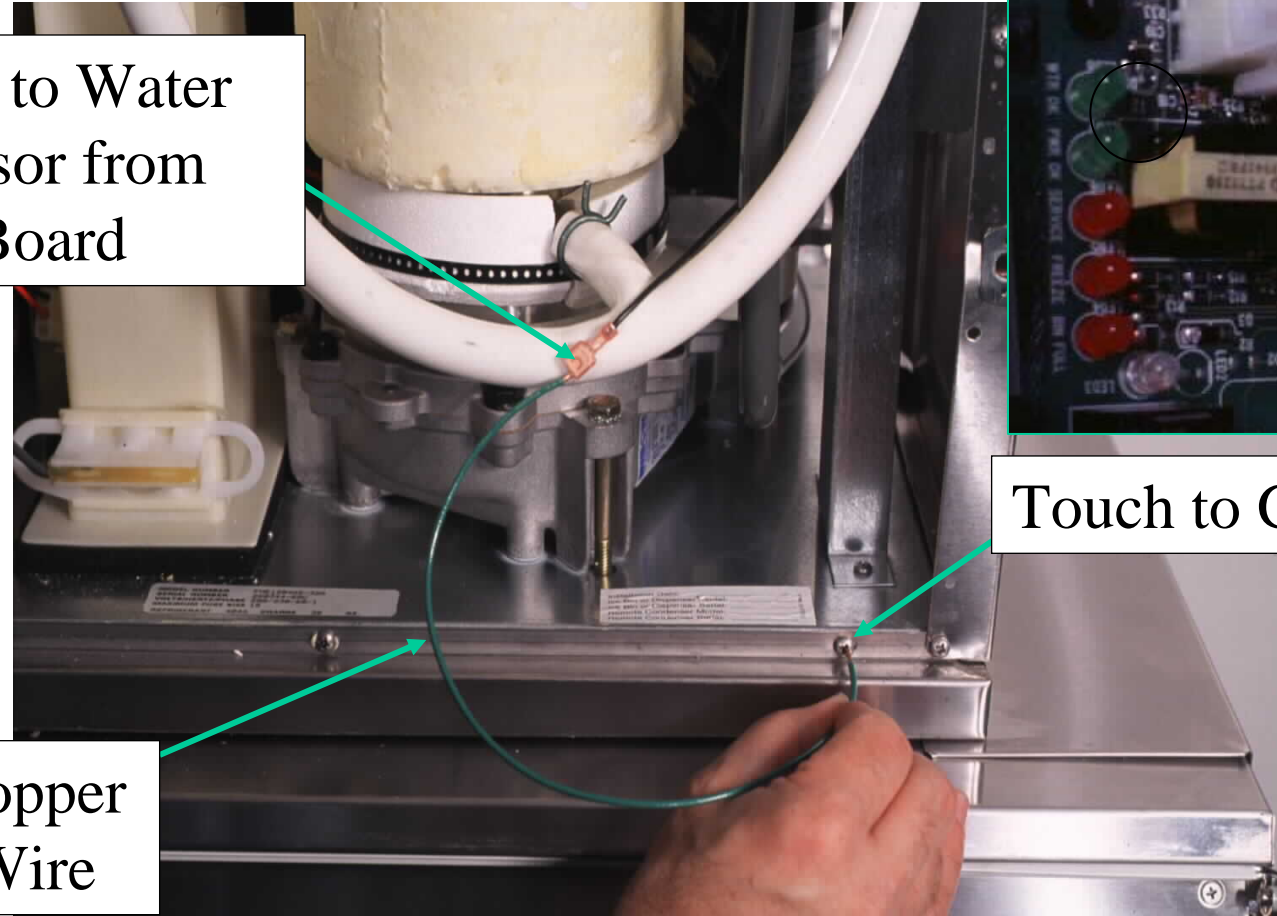
Water OK Light on AutoSentry Board  
Should be ON When Wire is Grounded



Touch to Ground

Wire to Water  
Sensor from  
Board

Copper  
Wire



# Scotsman® Component Removal: Auger

- Begin by Removing the Chute Cover



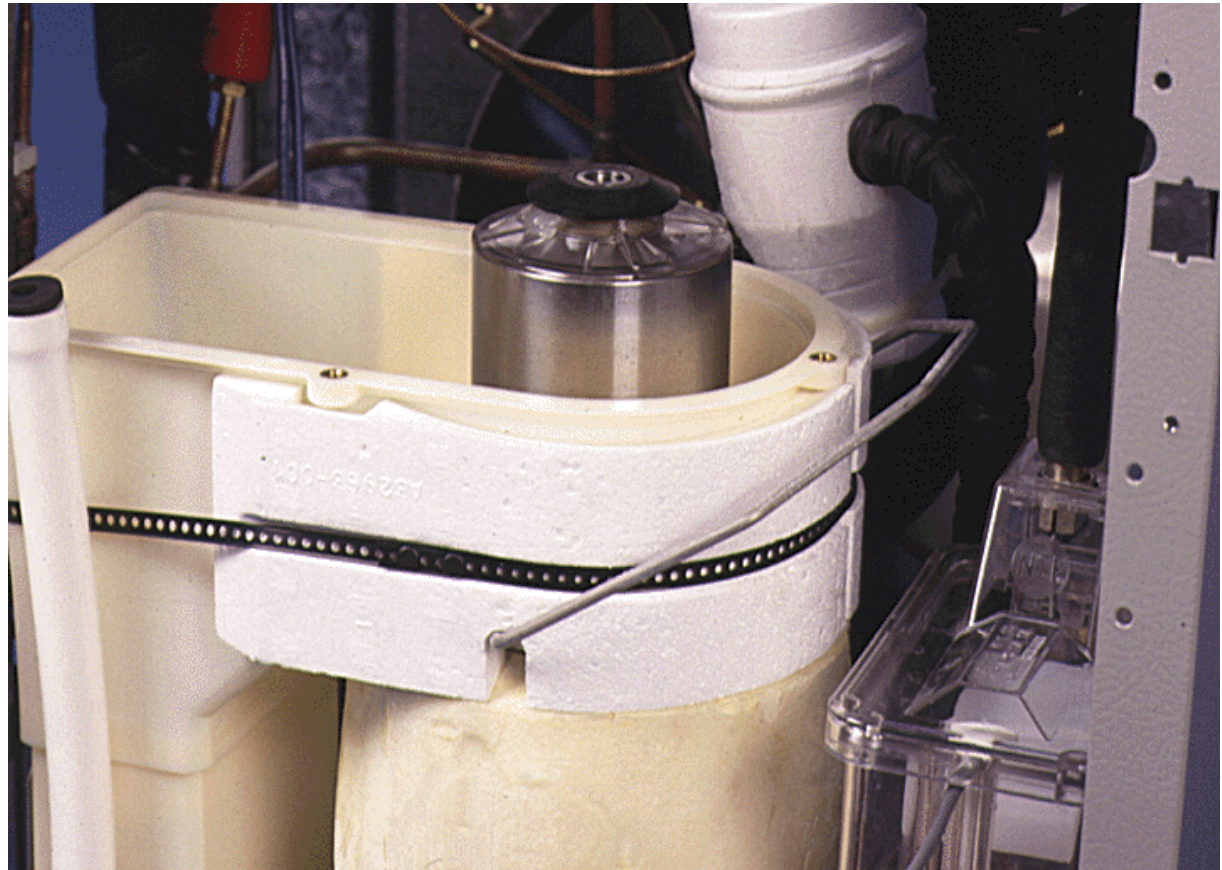
Chute Insulation  
Changed to Foam  
Type



Under-Chute Insulation  
Changed to Foam Type

# Scotsman® Component Removal: Auger

- Remove Ice Sweep



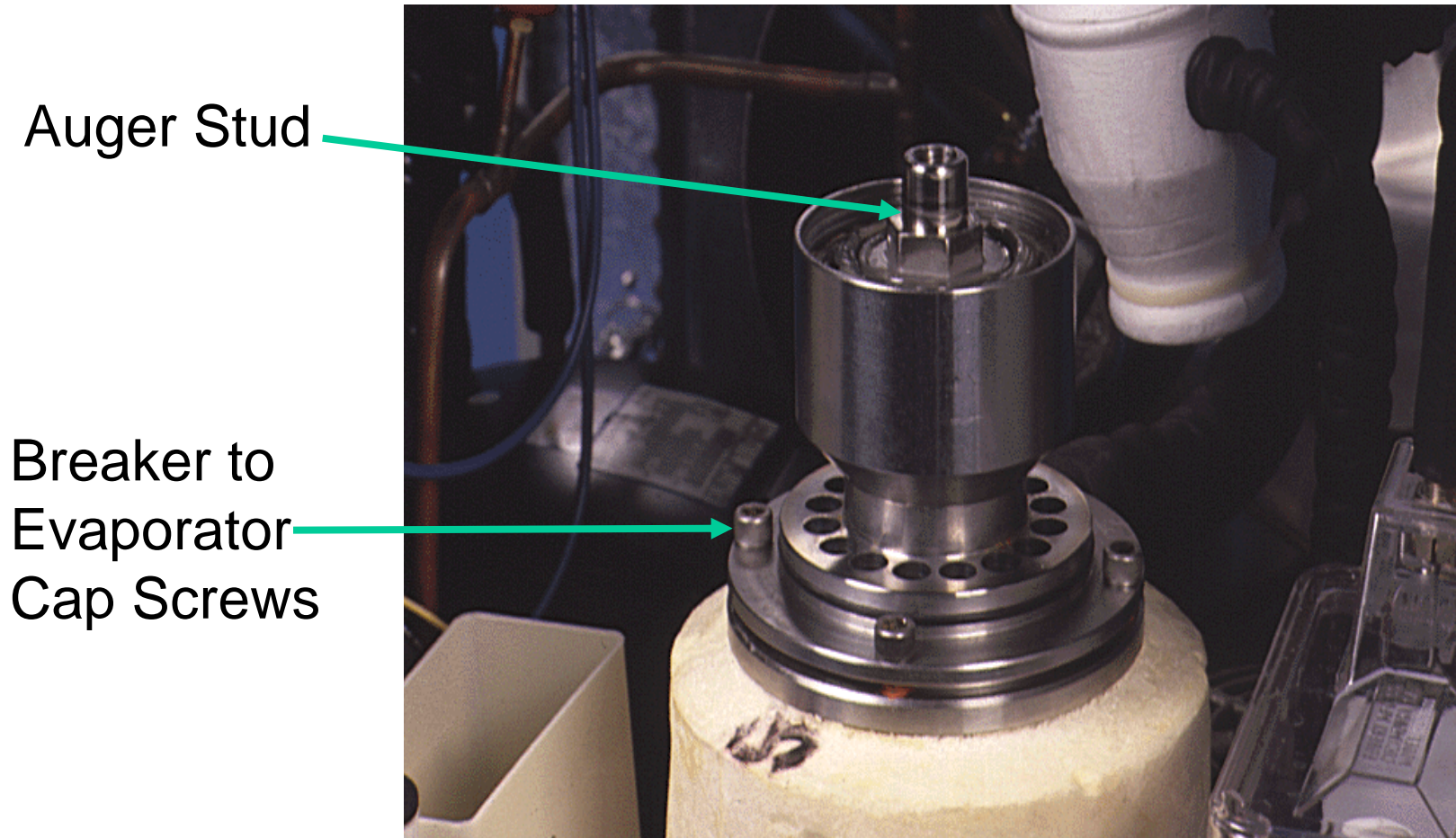
# Scotsman® Component Removal: Auger

- Remove Breaker Cover (Left Hand Threads).



# Scotsman® Component Removal: Auger

- Lower Chute and Breaker Cover Removed



# Scotsman® Component Removal: Auger

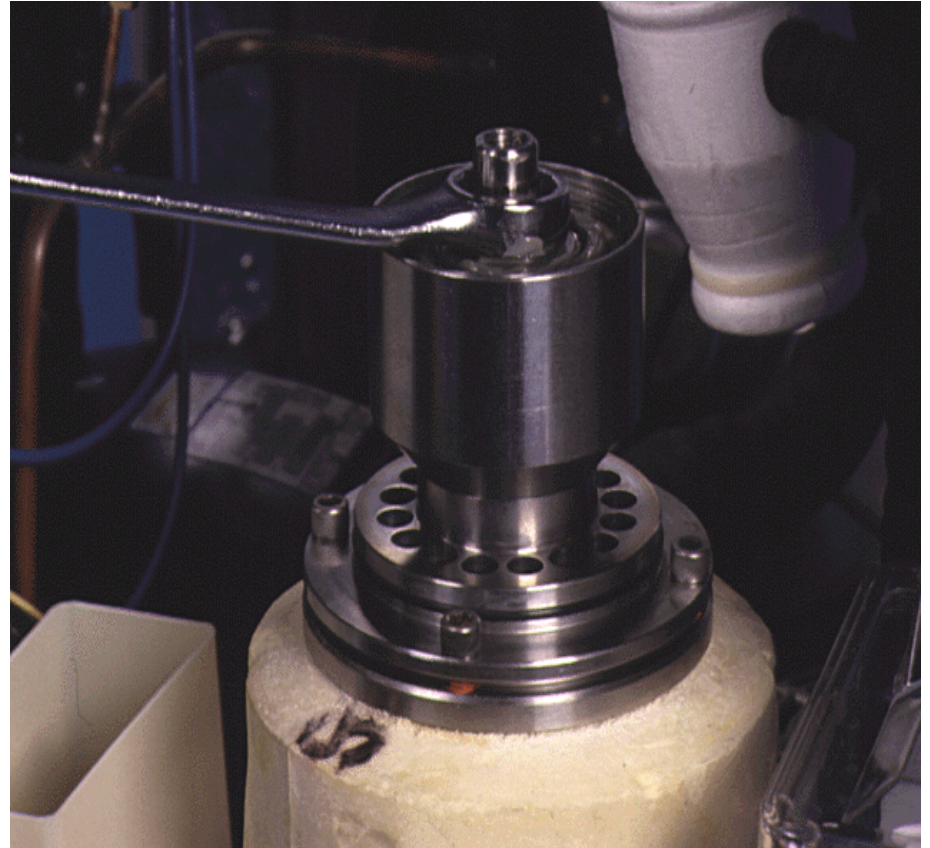
- Remove the 4 allen-head screws.
- Lift up on the breaker and pull the auger out.



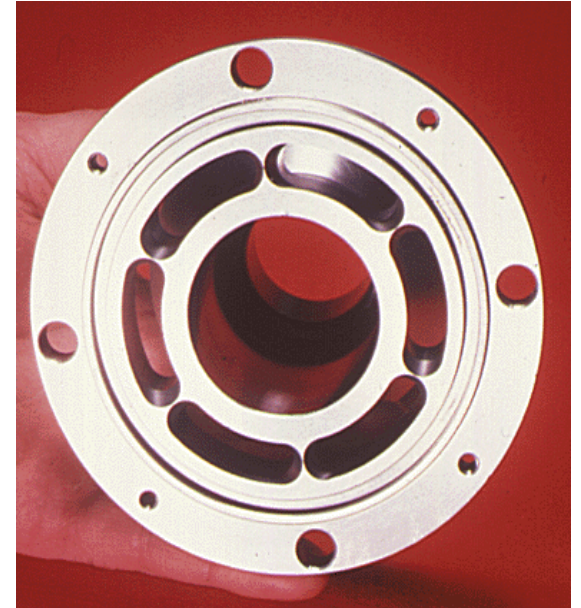
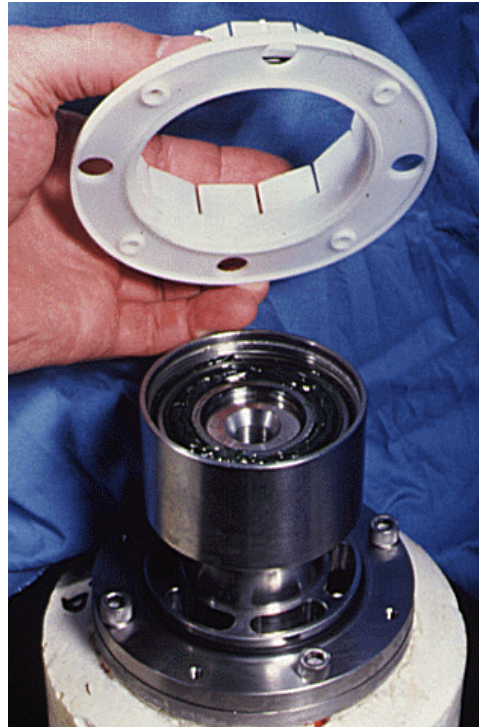
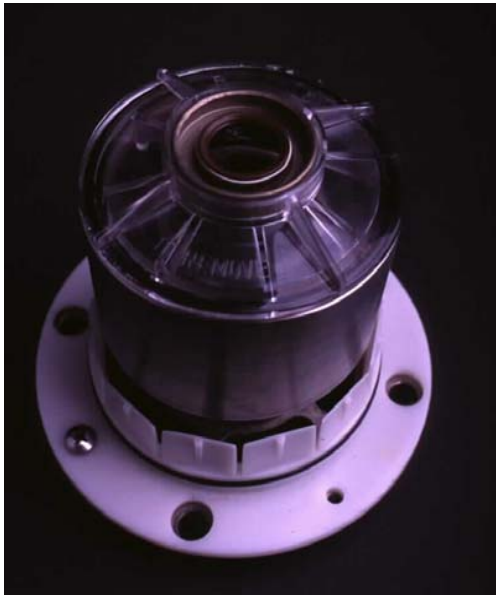


# Scotsman® Component Removal: Auger

- Or, Remove the Auger Stud and then Lift the Breaker Off the Auger.



- This is a "Flaker" Breaker
  - Extra "Slotted Collar"
  - 6 slots for ice



**Scotsman®**

# Nugget Breaker

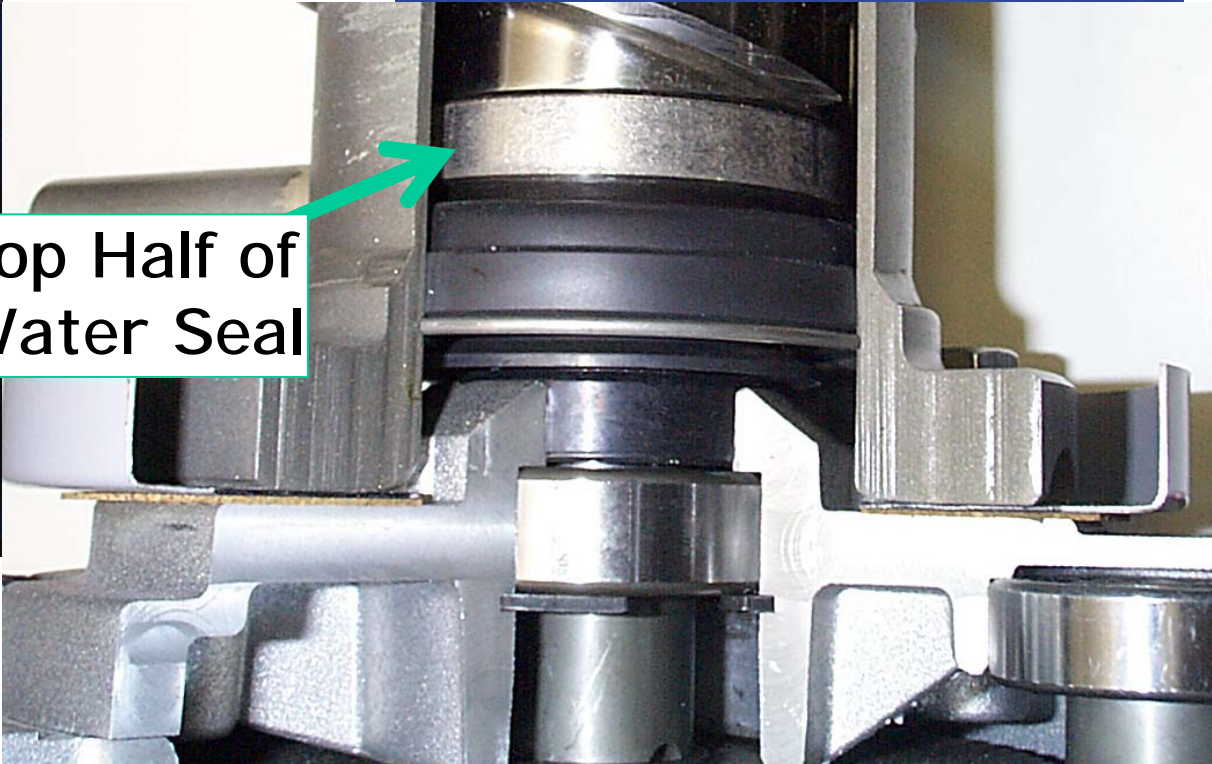




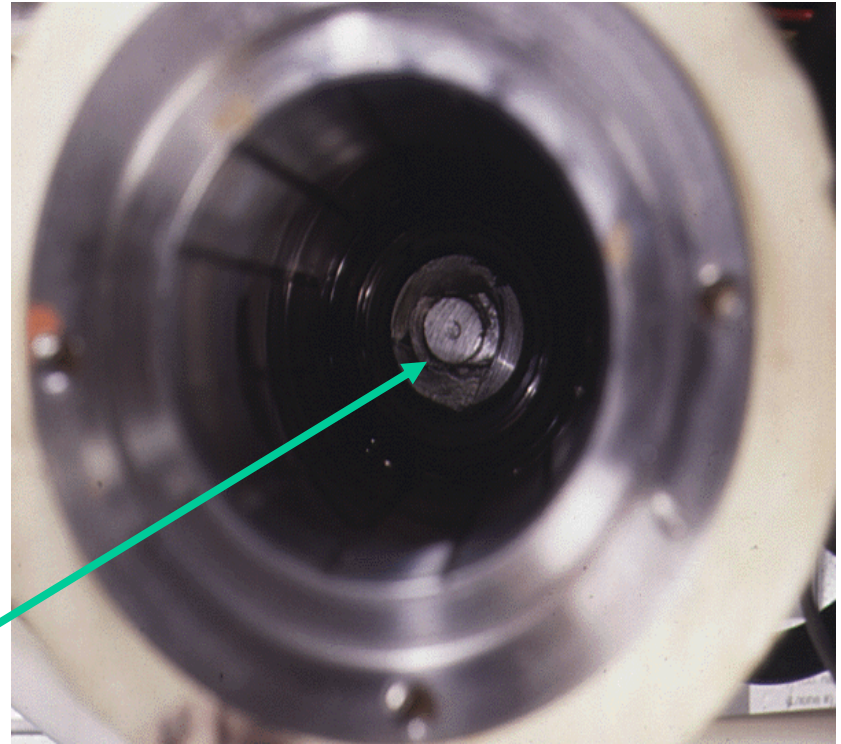
Top Half of Water Seal



Water Seal

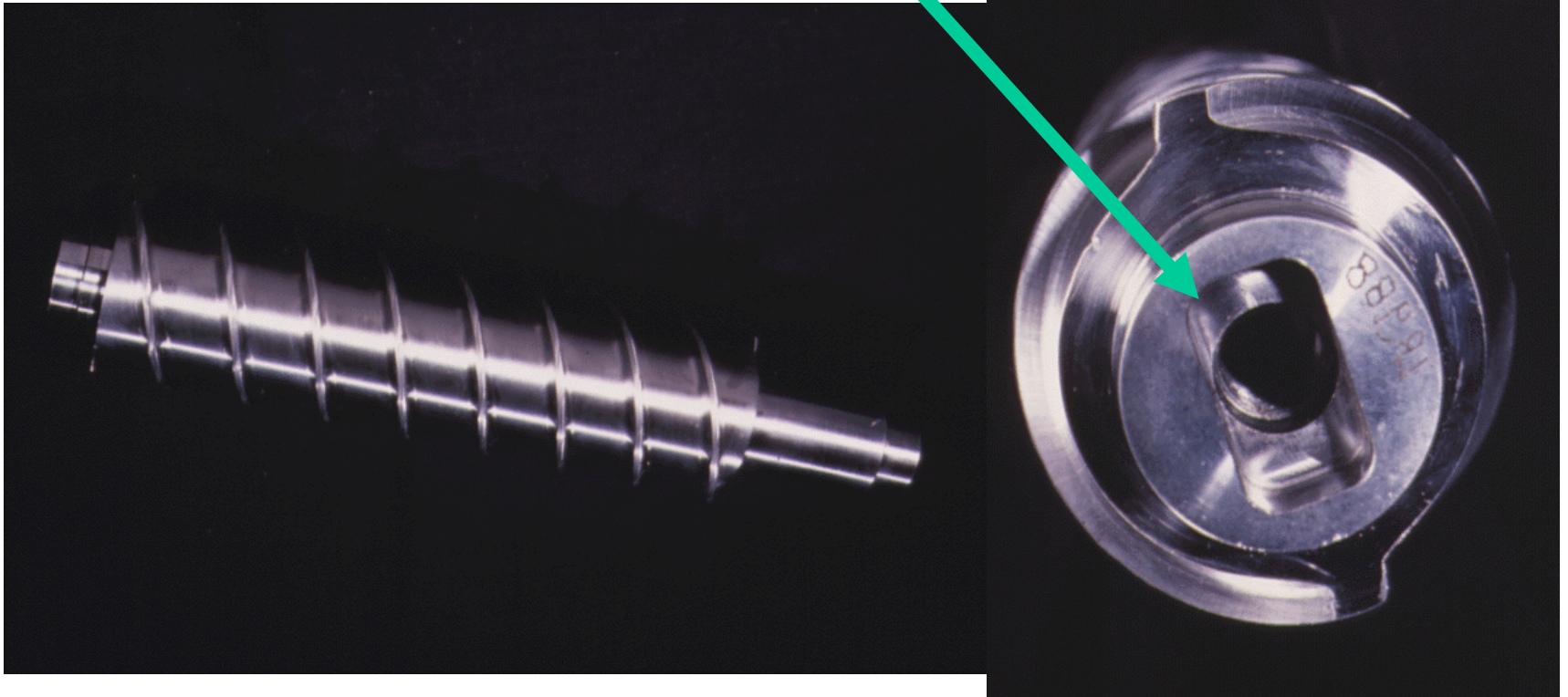


- With the Auger Removed, the Output Shaft and Bottom Part of the Water Seal Are Visible.



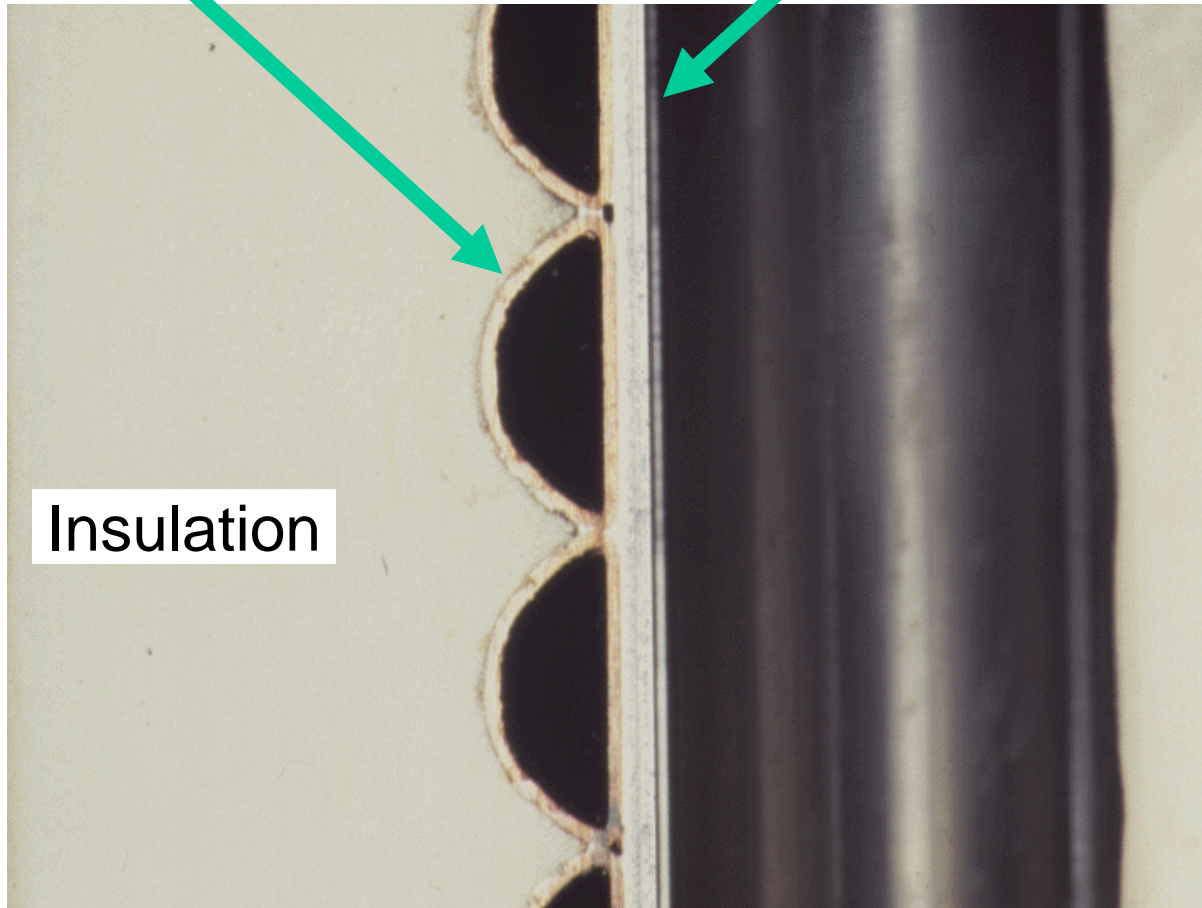
Output Shaft

Drive End, Output Shaft  
Engages Auger Here



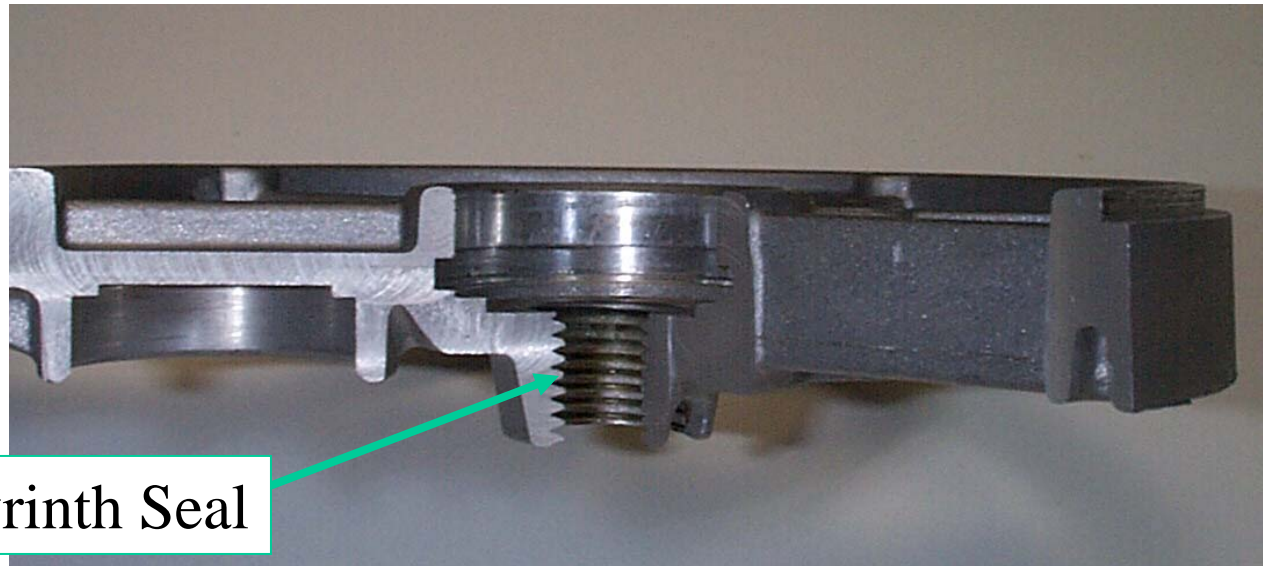
Refrigerant Tube

Evaporator Wall



Insulation

- Gear Case Input Shaft
  - Change from lip seal to
  - a Labyrinth type

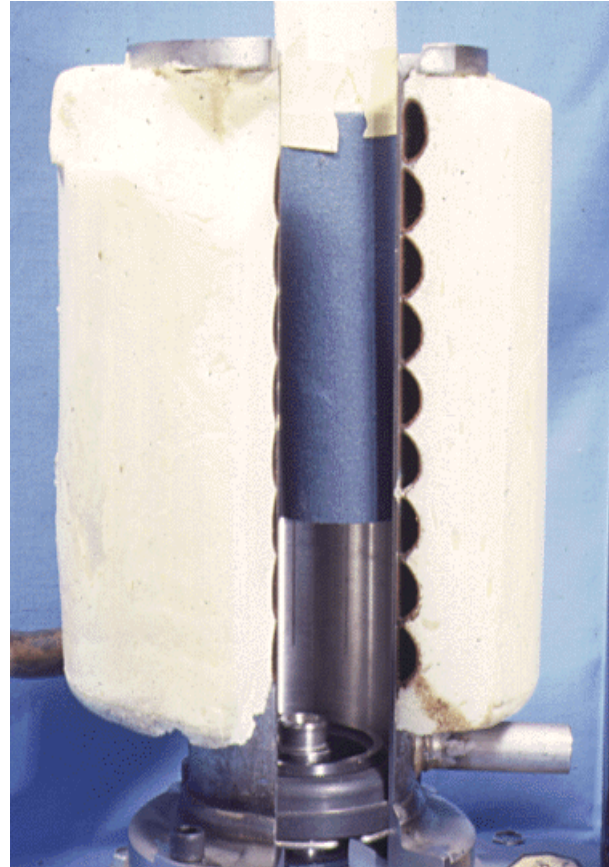


Labyrinth Seal

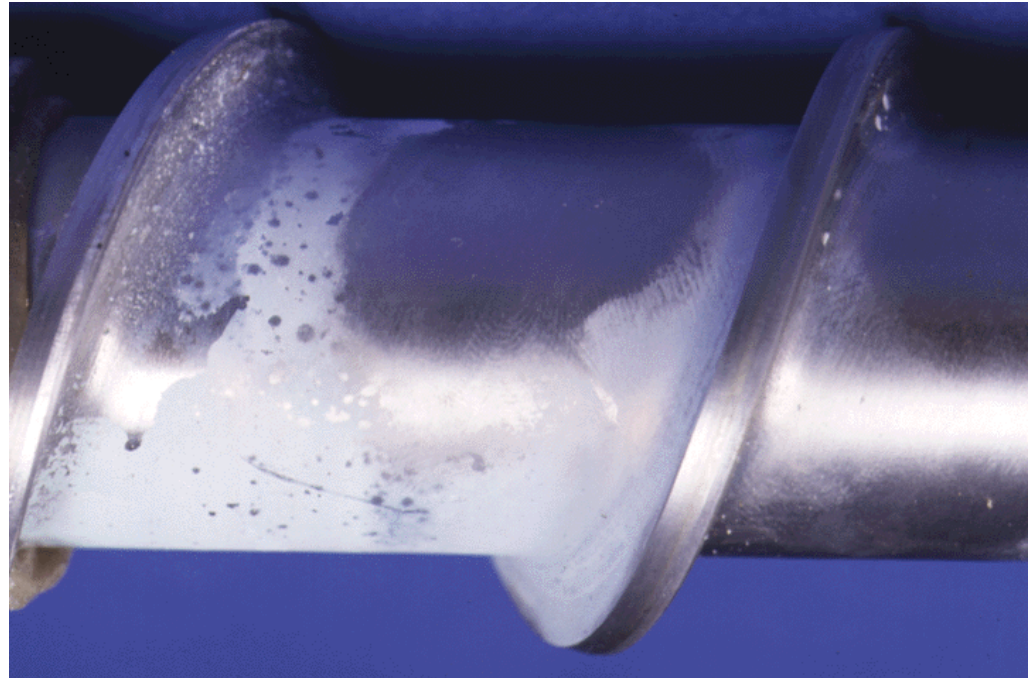


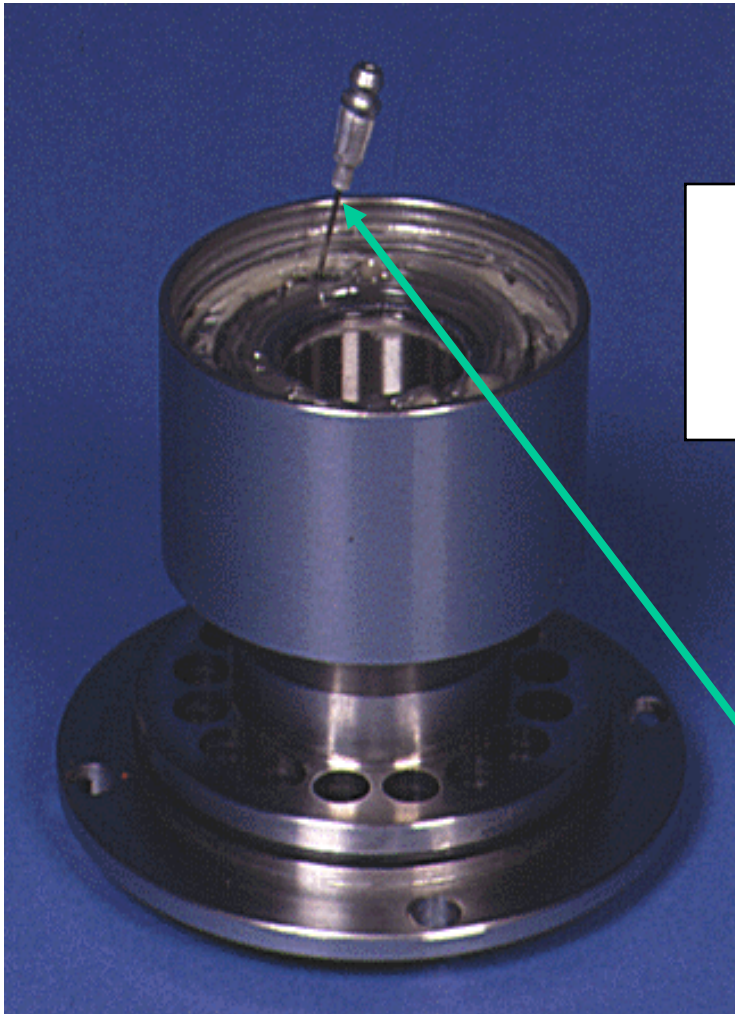
- NEVER Pour Ice Machine Cleaner Directly into the Reservoir!
  - Mix it: 8 ounces to 3 quarts
- Drain Reservoir & Evaporator
  - Unit OFF, pour cleaning mixture in reservoir
  - Soak for 15 minutes
- Start machine & pour balance of cleaning mixture in the reservoir

- Stubborn Stains Must Be Sanded Out
  - Sand Vertically

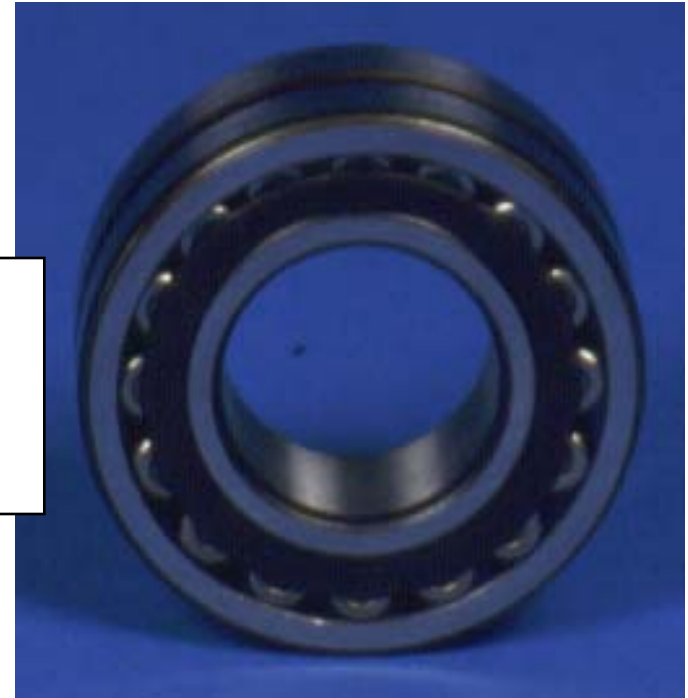


- The Auger Must Be Free of Scale
  - Wet Auger Might Appear OK
  - Let it Dry to See Scale





Grease  
the  
Bearing



Needle part number 02-3559-01  
Grease part number A36808-001

<b>Symptom</b>	<b>Probable Cause</b>	<b>Possible Solution</b>
Does Not Start	No Water	Check Board for Lights and Reservoir for Water, Restore Water
	No Power	Check Board for Lights
	Prior No Lights	Check Transformer
	Current No Lights	Check Hi and Low Pressure Cut Outs

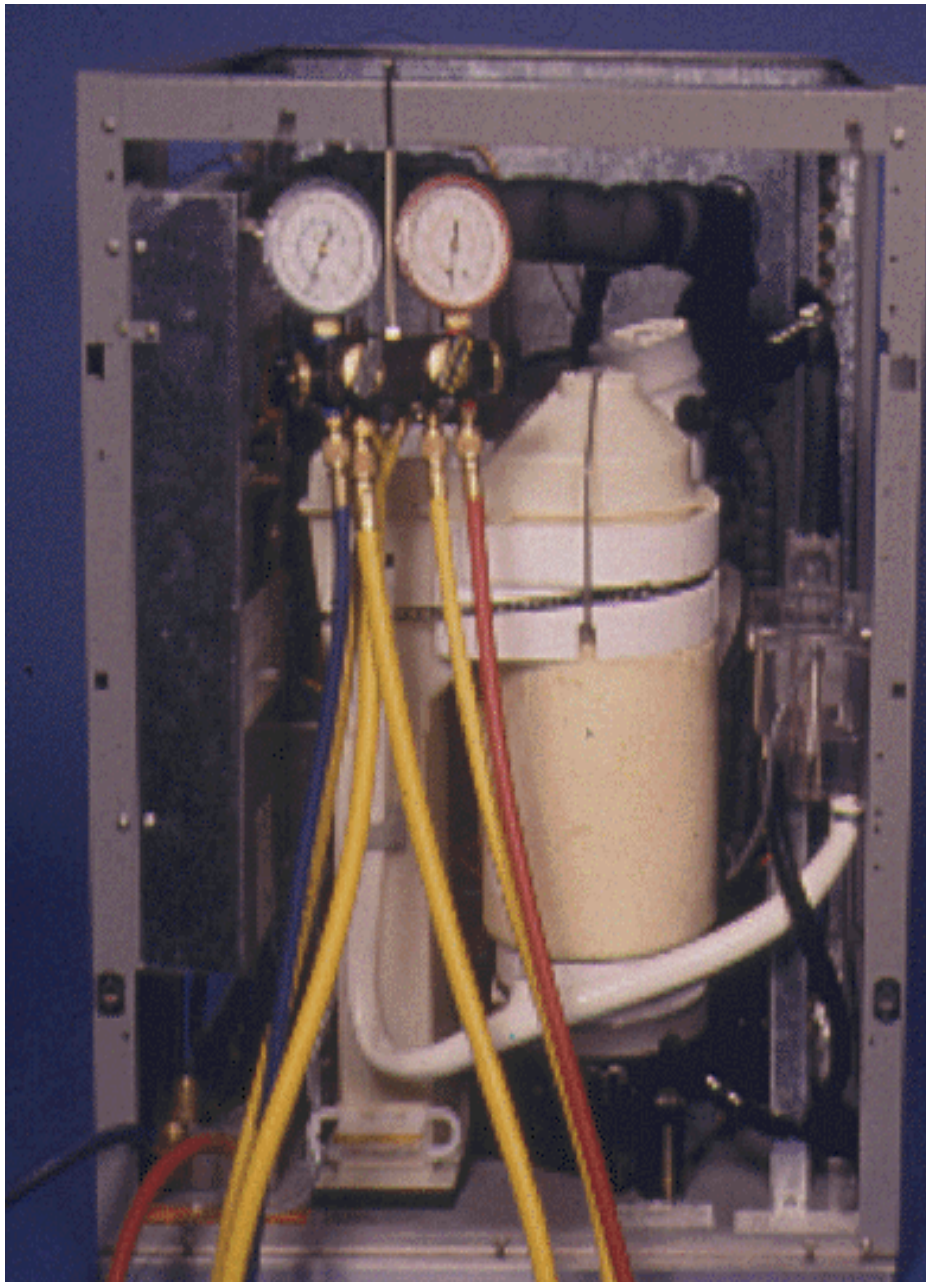
<b>Symptom</b>	<b>Probable Cause</b>	<b>Possible Solution</b>
Does Not Start	Bin Controls Dirty	Check Board for Bin Full or Empty Light
	Current: Bin Full Light is OFF	Clean Bin Controls
	Prior: Bin Empty Light is ON	

Symptom	Probable Cause	Possible Solution
No Ice	Auger Motor Will Not Start	Check Service Light on AutoSentry Board
	Service Light Blinking or Steady	Check Auger for Binding
	No Power to Auger Motor	Check relay

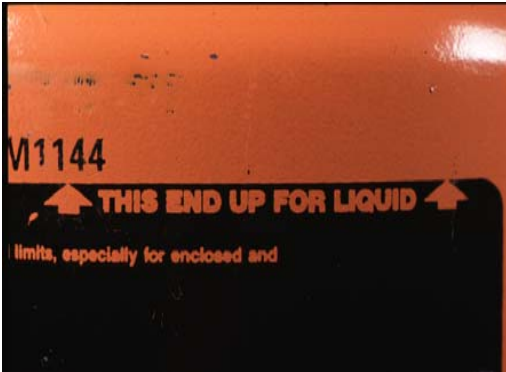
Symptom	Probable Cause	Possible Solution
Auger Motor ON, No Ice	Compressor OFF	Check for Power to Contactor Coil
		Check Compressor
		Prior models, check motor switch
	Compressor ON	Check if auger is turning



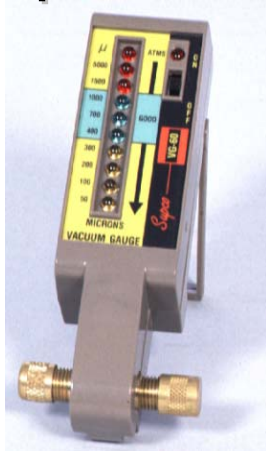
- Motor and Gear Reducer Kits
  - Motor Only
  - or Gear Case with Gears & Oil
  - or Complete Case & Motor
  - or Individual Gears
  - or Case Cover with output shaft
  - or Case Bottom



FME/NME R-404A Machines  
Refrigeration System Pressures  
Discharge: 240 - 300 PSIG  
(Water Cooled set at 245 PSIG)  
Suction: 32 - 35 PSIG)



Liquid Charge



Evacuate to 300 microns

## R-404A



Weigh In Charge



HFC Leak Detectors



Use Nitrogen Purge

- Stainless steel augers, evaporators and bearing retainers
- Photo-electric eye bin controls
- Water level sensor
- Double flight auger
- Self-aligning top bearing
  - R-404A refrigerant