Scotsman Technical Training

CU50

Cube Ice Machine

Scotsman Ice Systems

Major Topics

- Overview
- Installation
- Start Up
- Sequence of Operation
- Maintenance
- Diagnostics
- Service Procedures

Scotsman Ice Systems

Models

- Two Base Models
  - Gravity Drain
  - Pump Drain
- 15” wide
- 50 lb capacity
- Stainless

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Reverse Door Swing

- Remove hinge pin
- Tip door forward, lift off
- Remove hinges
- Switch hinges top to bottom & left to right
- Place door on bottom pin
- Attach with top hinge pin

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Installation Prep

- Remove back panel
- Remove front service panel
- If needed, remove kickplate

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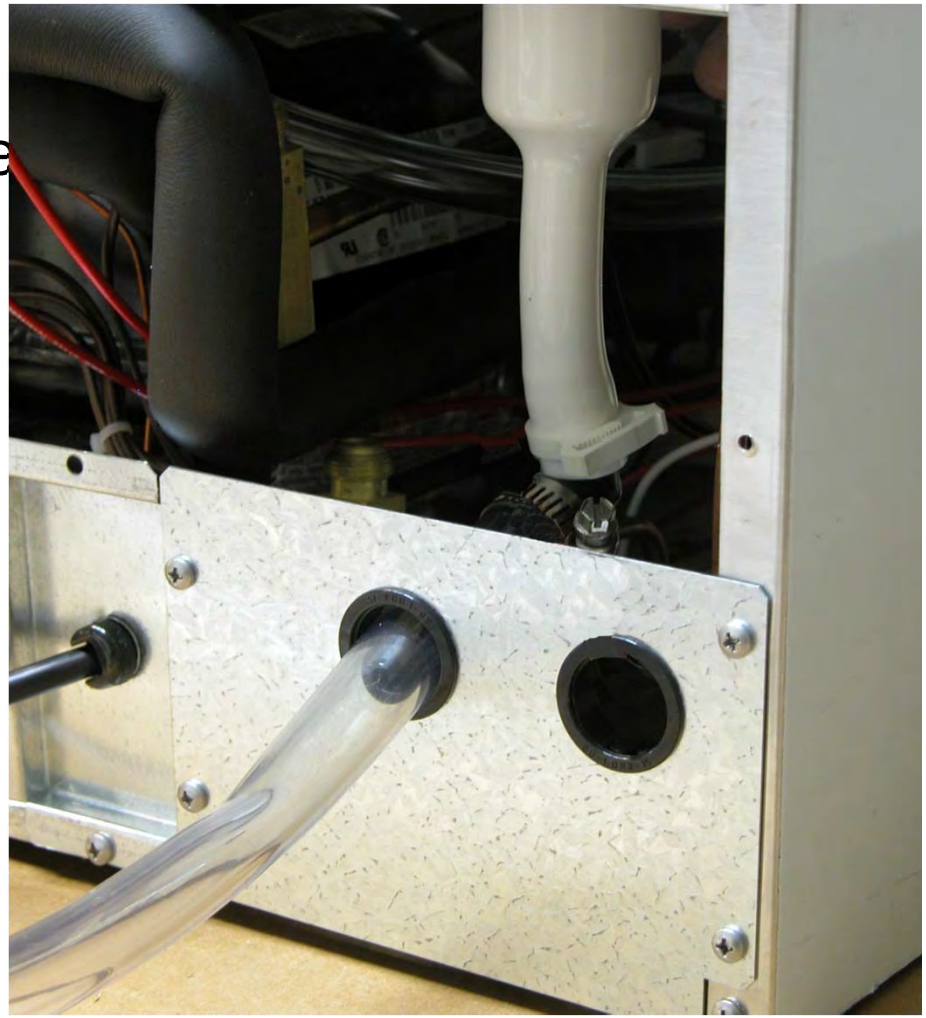
Installation – Free Standing Gravity Drain

- Route water supply tubing to inlet water solenoid valve
- Attach drain tubing to bin drain hose
  - Elbow and hose clamps
- Route drain tubing to building drain



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Installation – Built In Gravity Drain

- Plan the installation for machine removal
  - Coil of water supply tubing
  - Arrange the drain tubing so it does not kink when the machine is pushed into place
    - Recommended drain tube size is 5/8” ID, 7/8” OD plastic hose
    - Will connect to elbow on machine drain
    - Use 2-3 foot section of 5/8” OD copper to guide drain tube into cabinet while pushing unit back
    - Reach back to insert elbow into hose, secure with clamp

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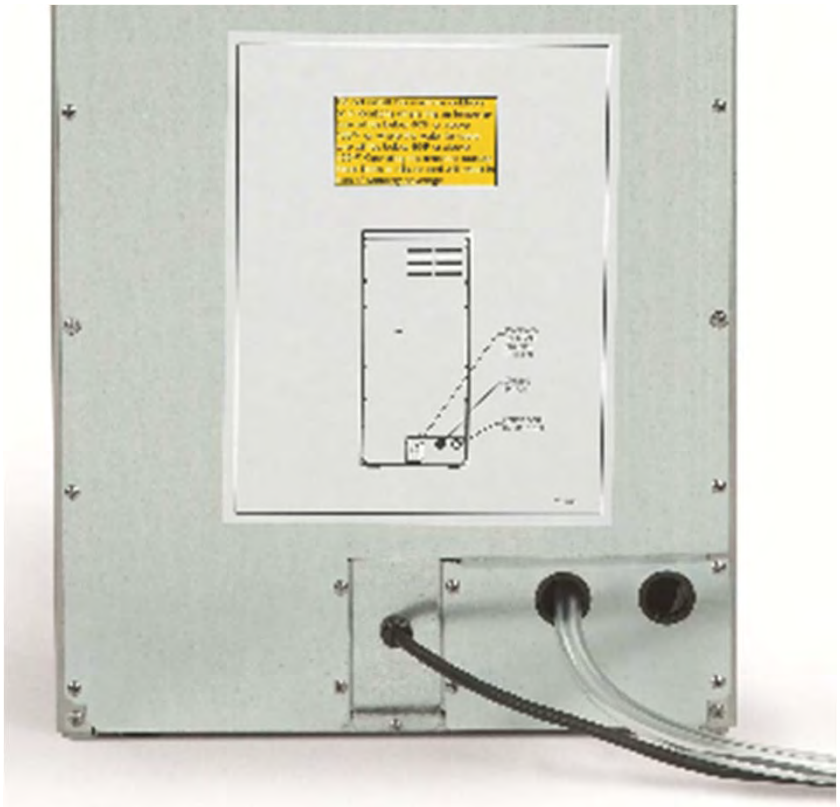
Installation – Built In Pump Drain

- Remove back panel
- Route water supply tubing to inlet water connection on solenoid valve
- Route drain hose to building drain



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Water Supply

Route Water Supply Tubing

¼” Compression Fitting

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Operation – Initial Start Up

- Remove shipping materials
- Connect water
- Check for leaks
- Connect power
- Push and release the On / Off button

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Sequence of Operation

- Inlet water solenoid valve opens to fill the reservoir
- Hot gas valve opens to equalize the system
- Compressor, fan and pump start
- Hot gas valve closes, freeze cycle begins
- Freeze cycle continues until evaporator temperature reaches a preset point - 0, which triggers a 10 minute (default) timer
- In 10 minutes the Harvest cycle begins

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Sequence of Operation - Harvest

- Hot gas valve opens
- Pump and Fan motor stop
- Inlet water valve opens and refills the reservoir
  - Fill time varies with evaporator temperature
    - Timed during a power restart or in clean cycle
- Harvest continues
  - When the evaporator temperature warms to a preset point – 50, a 20 second (default) timer starts
  - When the time expires, harvest ends

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Harvest Details

- 24 individual cubes per cycle
- Hot gas defrost with a water assist
- Water flows onto top of evaporator platen to
  - Warm up the platen & obtain a faster harvest
  - Remove heat from the water for the next cycle

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Control System

- Electronic controller
  - 12 volt power supply
  - Evaporator thermistor
  - Water quality sensor
  - Bin thermostat

- Operates
  - Compressor
  - Pump
  - Fan motor
  - Hot gas valve coil
  - Inlet water solenoid valve coil

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Mechanicals

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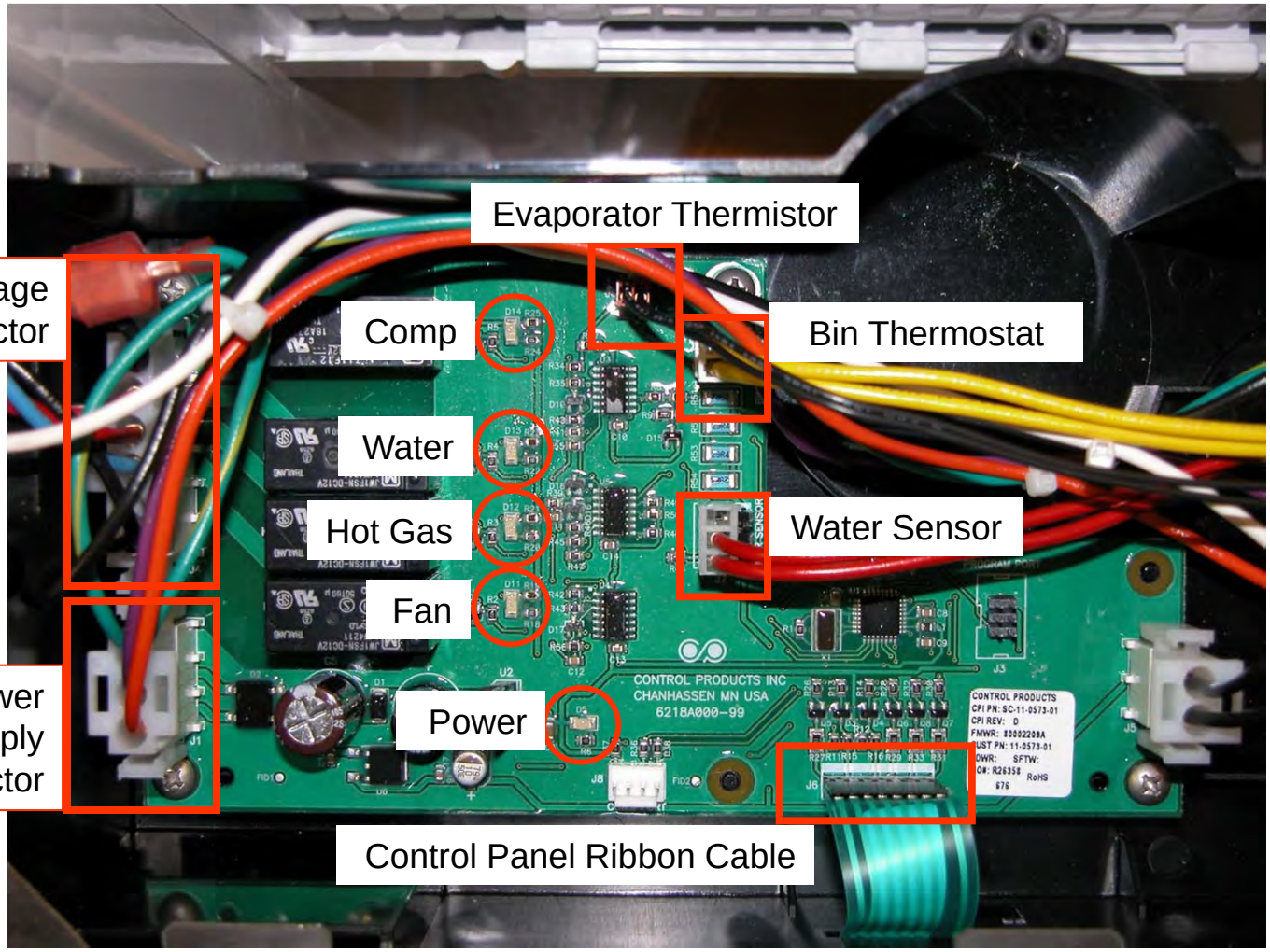
Controller



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Controls

On – Off Button

Green when set to ice making

Blinks Red if out of water

Yellow if its been 6 months since it was cleaned

Used in cleaning process

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Control Operation – Check Water

- Red blinking light indicates a lack of water
- Water must fill reservoir within 2 minutes
- Unit automatically re-tries filling the reservoir every 20 minutes

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Control Details

- Maximum freeze time: 60 minutes
  - Automatically harvests after 60 minutes of freeze
- Maximum harvest time: 6 Minutes
- Time between restarts: 4 minutes
- Power interruption restart:
  - Timed harvest cycle to clear ice

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Control Details – Water Sense

- Water conductivity varies by mineral content
  - More minerals = more conductivity
- Control system senses conductivity, varies water use to rinse more water if there is high conductivity, reducing mineral build up potential
- System is able to sense very clean water, such as RO water to 10 microSiemens/cm of conductivity

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Control Details – Ice Level

- Controlled by bin thermostat in cap tube / scoop holder
- When bin thermostat senses ice, contacts open, signaling controller to shut down
  - If suction line temperature is above preset point, unit shuts off
  - If suction line temperature is below preset point, unit operates until the end of the next harvest cycle, when it shuts off

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Bin Thermostat Adjustment

- Adjustment screw located behind cover
- Ambient compensation adjustment:
  - Rotate CW to raise ice level
  - Rotate CCW to lower ice level

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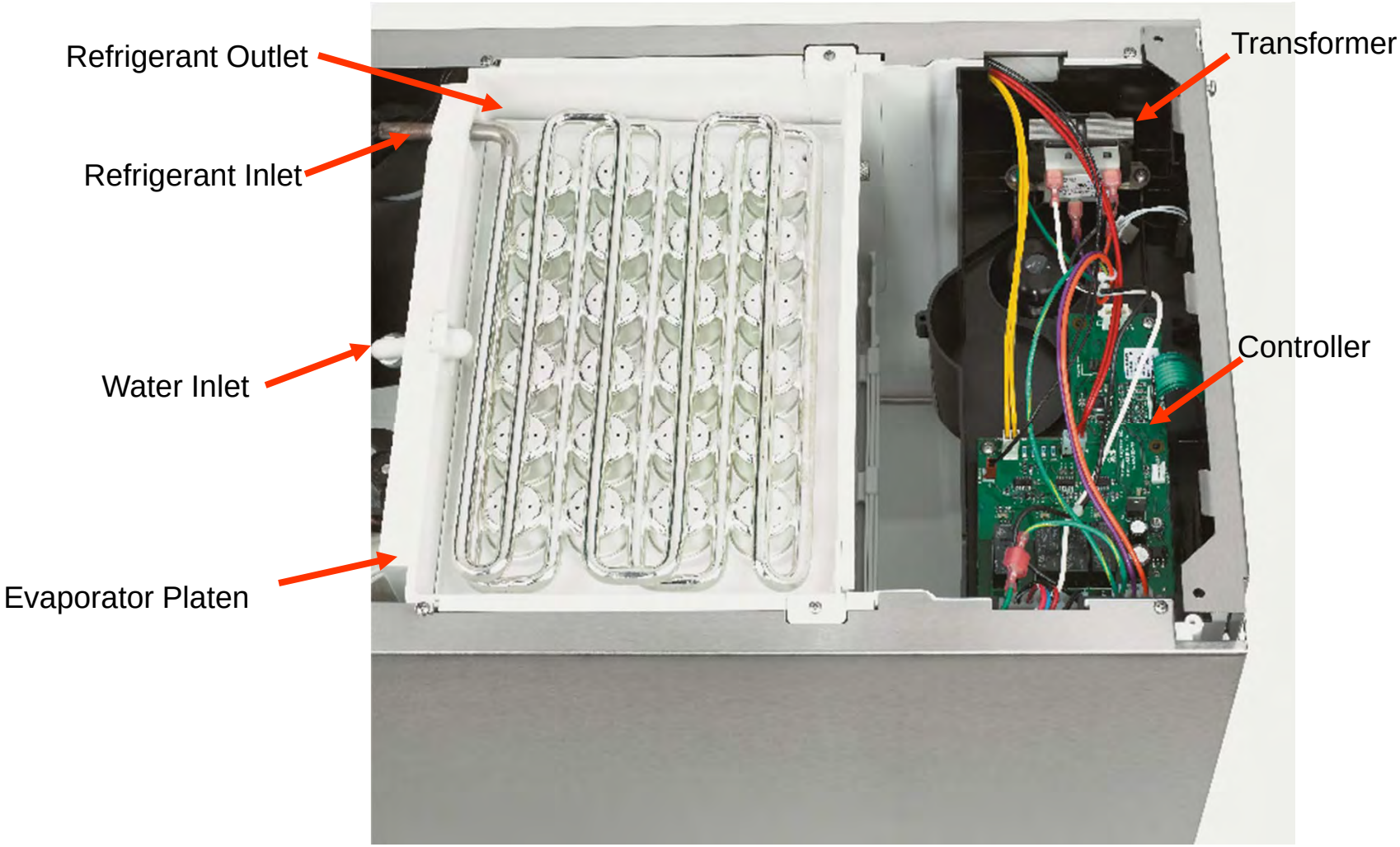
Mechanicals



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Mechanicals – Evaporator

- 24 copper cups

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Water Spray – 6 Jets

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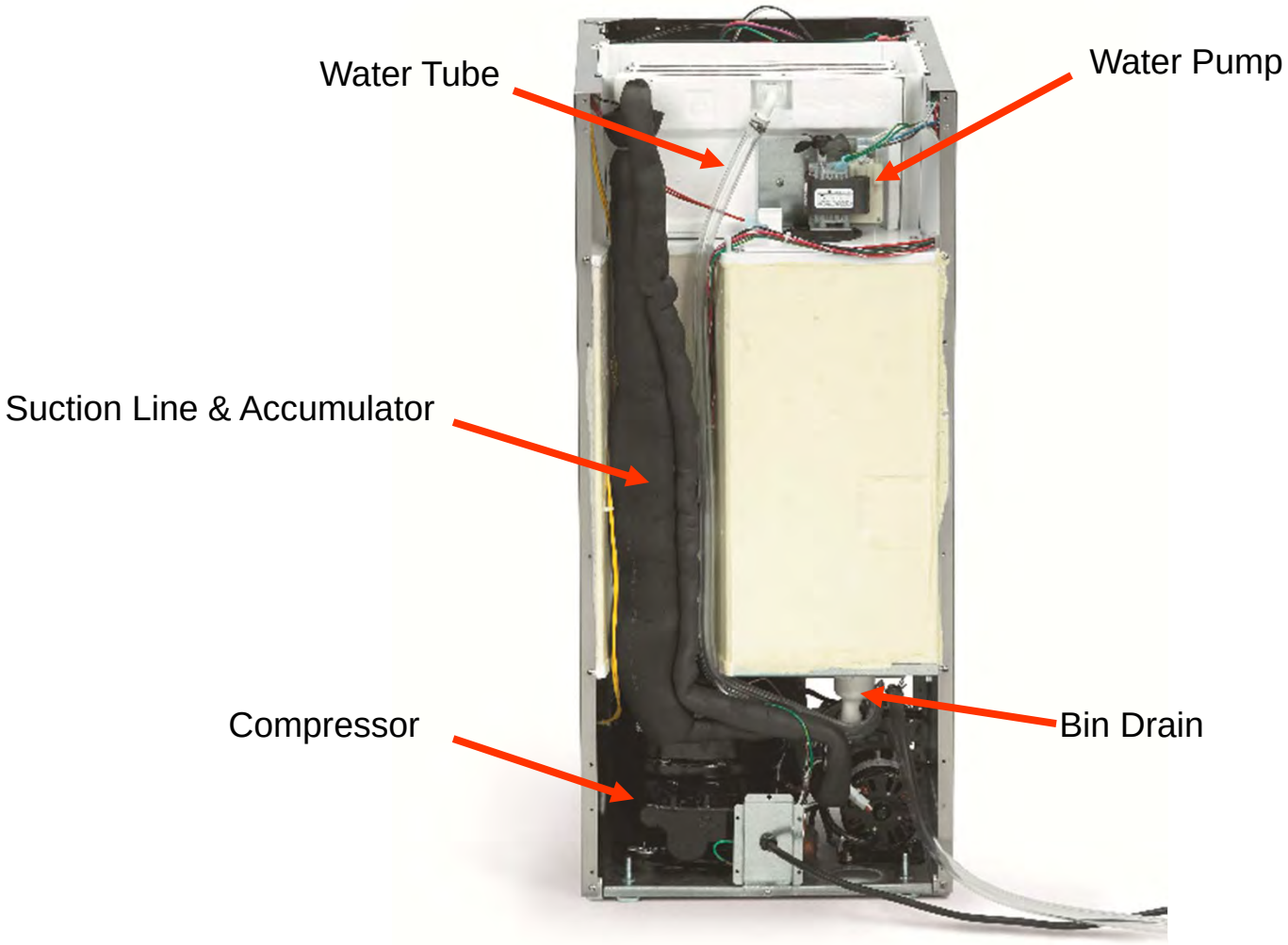
Mechanicals



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Mechanicals

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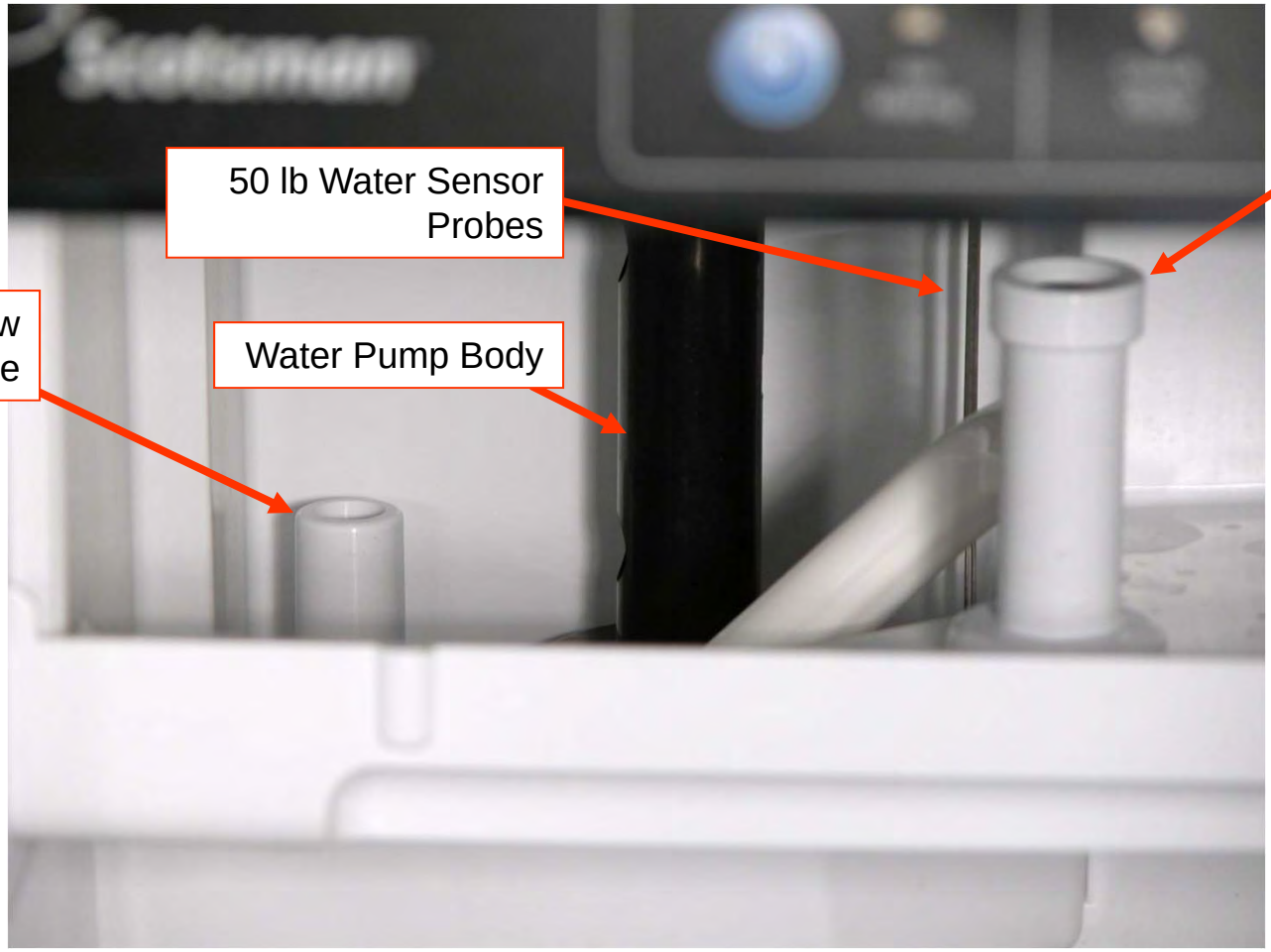
Mechanicals – In Reservoir



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Mechanicals

- Spray platform removable
  - Lift up to release platform from water inlet connection
  - Pull out

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Control Operation – Time to Clean

- Glowing yellow light comes on after 6 months of power up time
- Cleared by going through the cleaning process
  - Press and Hold the Clean button for 3 seconds

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Maintenance

- Air cooled condenser – service frequently when pets are in the house
  - Remove service panel
  - Remove kickplate
  - Vacuum condenser

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Maintenance

- Water System
  - Clean with scale remover
  - Check curtain
  - Check spray jet pattern
    - 6 jets
    - Platform lifts out

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50 lb Maintenance – Scale Remover

- Remove all ice
- Push and hold the On/Off button in for 3 seconds until the green light goes out
- Press and HOLD the both the Clean-Reset and On/Off buttons for 5 seconds. The Time to Clean light will blink on and off.

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Scale Remover - continued

- Pour in 8 ounces of Scotsman Scale Remover.
- Operate the machine for a half hour.
- Push and release the ON/OFF switch to start the rinsing process.
- Operate the machine for another half hour.
- Push and release ON/OFF to stop rinsing. Push ON/OFF to restart ice making.

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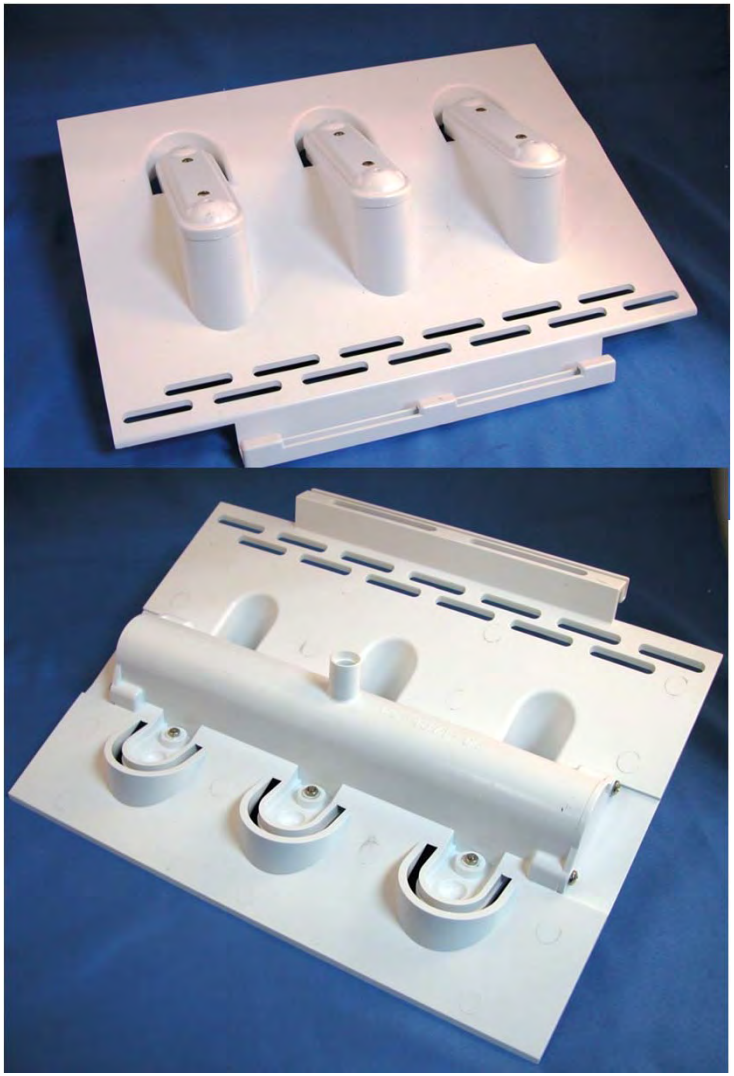
Maintenance

- Spray jet caps are removable – clean separately if needed
  - Remove spray platform
  - Remove nuts (7/32”)
  - Pull jet caps off



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Maintenance

- Clear nozzle of debris
- O-ring must be in correct position and undamaged

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Maintenance

- Optional: drain reservoir
  - Remove cap on bottom of reservoir
  - Clean cap of debris

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Service Diagnosis

- The Recipe for Ice:
  - Add **Water** – just the right amount
  - Apply strong amount of **Refrigeration** effect to take heat from the water & release the ice
  - Use an **Electrical System** to Operate and Control the machine to deliver ice when its needed
  - If an ingredient is missing or out of balance, performance will suffer – and you will be called!

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Service Diagnosis

- No ice, check:
  - Switched off – push & release ON/OFF button
  - Power to unit – on/off light on after switching on?
  - Bin thermostat – contacts open?
  - Water in reservoir – water light blinking?
    - If reservoir is empty, check water supply
    - If there is water to the unit, check inlet water solenoid valve

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Service Diagnosis

- No ice, water in reservoir, but no spray
  - Check water pump
- No ice, water in reservoir, sprays, ice forms but harvest cycle does not start
  - Check evaporator thermistor
  - Use ohmmeter, check resistance for the sensor's temperature
    - Measure suction line temperature closest to sensor
    - Check chart for proper Ohm reading at that temp
    - Example 1^{o} F = 82661 ohms – or use ice bath. 30 to 32K ohms at 32 degrees F.

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Service Diagnosis

- Makes ice, but cubes are mal-formed
  - Check for clogged / restricted spray jets
  - Check if running out of water before the end of the freeze cycle
    - Check for water leak
  - Clean as required

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Service Diagnosis

- Makes ice, but customer indicates low capacity
  - Check cycle time – 50 lb times:
    - 70 air, 50 water cycle time is about 20 minutes
    - 90 air, 70 water cycle time is about 28 minutes
    - 100 air, 100 water cycle time is about 45 minutes
      - If cycle time is long look for problem getting rid of the heat or too much heat load
  - Check drain
    - Restricted drain will cause water to back up into the storage bin and rapidly melt ice

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Service Diagnosis

- Makes ice, some (8-10) cubes are malformed
  - Check cycle time
    - 21+ minute freeze
    - 4-5 minute harvest
    - Cubes fully formed in evaporator, but are malformed when harvested
    - All the above indicates a low refrigerant charge

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Refrigeration System

- Normal Operating System
  - Suction pressure
    - Beginning freeze rapid pull down to: 20 PSIG
    - End of freeze: 1 - 2 PSIG
    - Harvest: increases from 30 to 55 PSIG
- Low charge
  - Suction pressure
    - Beginning freeze rapid pull down to: 10 PSIG
    - End of freeze: slight vacuum
    - Harvest – slow increase from 25 to 40 PSIG

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Service Diagnosis

- Makes ice, but cubes are shells
  - Check for shortage of water
  - If water supply is adequate, adjust cube size by changing freeze time
- Makes ice, but cubes are too large
  - Freeze cycle is too long
  - Adjust cube size
    - Change the freeze time

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Control Adjustments – Cube Size

1. Shut unit off

3. Push & release once to check setting

4. Push and release to change to next level repeat as needed

6. Push and release to resume ice making. Be sure restart is occurring.

Minutes	Ice making	Check water	Time to clean
Default	off	off	Off
+1	on	off	Off
+2	off	on	Off
+3	off	off	On
+4	on	on	On
-1	flash	off	Off
-2	off	flash	Off
-3	off	off	Flash
-4	flash	flash	flash

2. Hold in 5 sec or until Yellow light goes out

5. Push and release to confirm the displayed setting

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Service Diagnosis

- No ice, freezes, harvest begins but evaporator does not defrost
  - Hot gas valve not opening
  - Check coil, replace if open
  - Check voltage to coil, if 115 volts, and coil is not open, hot gas valve is stuck and must be replaced.

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Service Diagnosis

- Freezes ice, harvest begins, fan motor stops, pump stops, water valve opens, hot gas valve opens but will not harvest all cubes
  - Connected to very cold water
    - Harvest time set too short
    - Adjust harvest time

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Control Operation – Manual Harvest

1. Shut unit off

2. Push and Hold in for 5 seconds, then release.

3. Wait 5 - 20 seconds

4. Push and Hold in for 5 seconds, then release.

- All lights flash once.
- Ice Making Light switches ON
- The inlet water valve, hot gas valve and compressor will be on until harvest times out – 3 minutes.
- Machine shuts Off

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Control Adjustments – Harvest Time

1. Shut unit off
2. Hold in until blue light goes out
4. Push and release to confirm the displayed setting
5. Push and release to resume ice making

3. Push and release to change to next level

Seconds	Ice making	Check water	Time to clean
Default	Off	Off	Off
+10	On	Off	Off
+20	Off	On	Off
+30	Off	Off	On
+40	On	On	On
-10	Flash	Off	Off
-20	Off	Flash	Off
-30	Off	Off	Flash
-40	Flash	Flash	Flash

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Service Diagnosis

- Yellow Clean light is on
  - It’s been a long time since it was cleaned
  - Clean the machine per the published method, the light will go out
  - Or
  - Advise user to press and hold the clean button for 3 seconds

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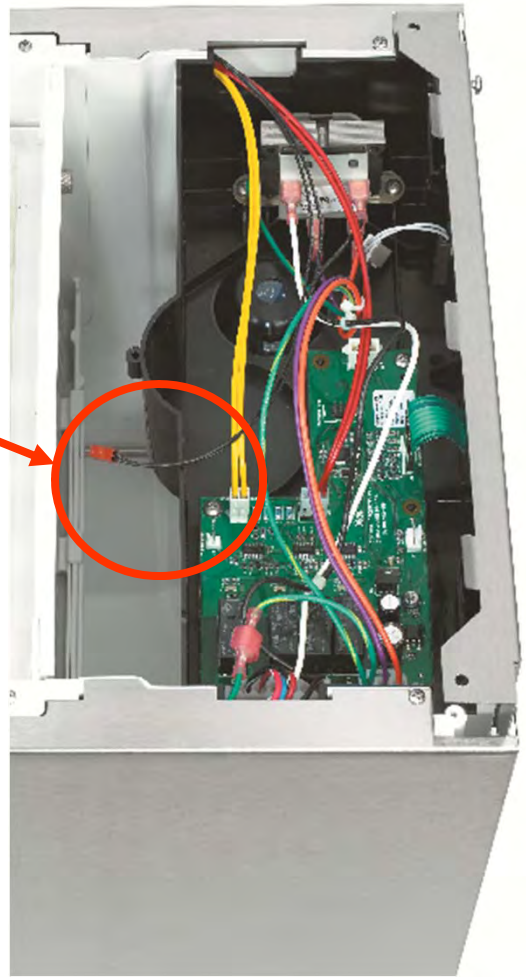
Service - Remove Cabinet

- Drain reservoir
- Disconnect water, power and drain
- Remove door
- Remove back panel
- Remove top panel
- Remove control box cover
- Disconnect thermistor at controller, pull wire to back of unit
- Remove curtain and hanger



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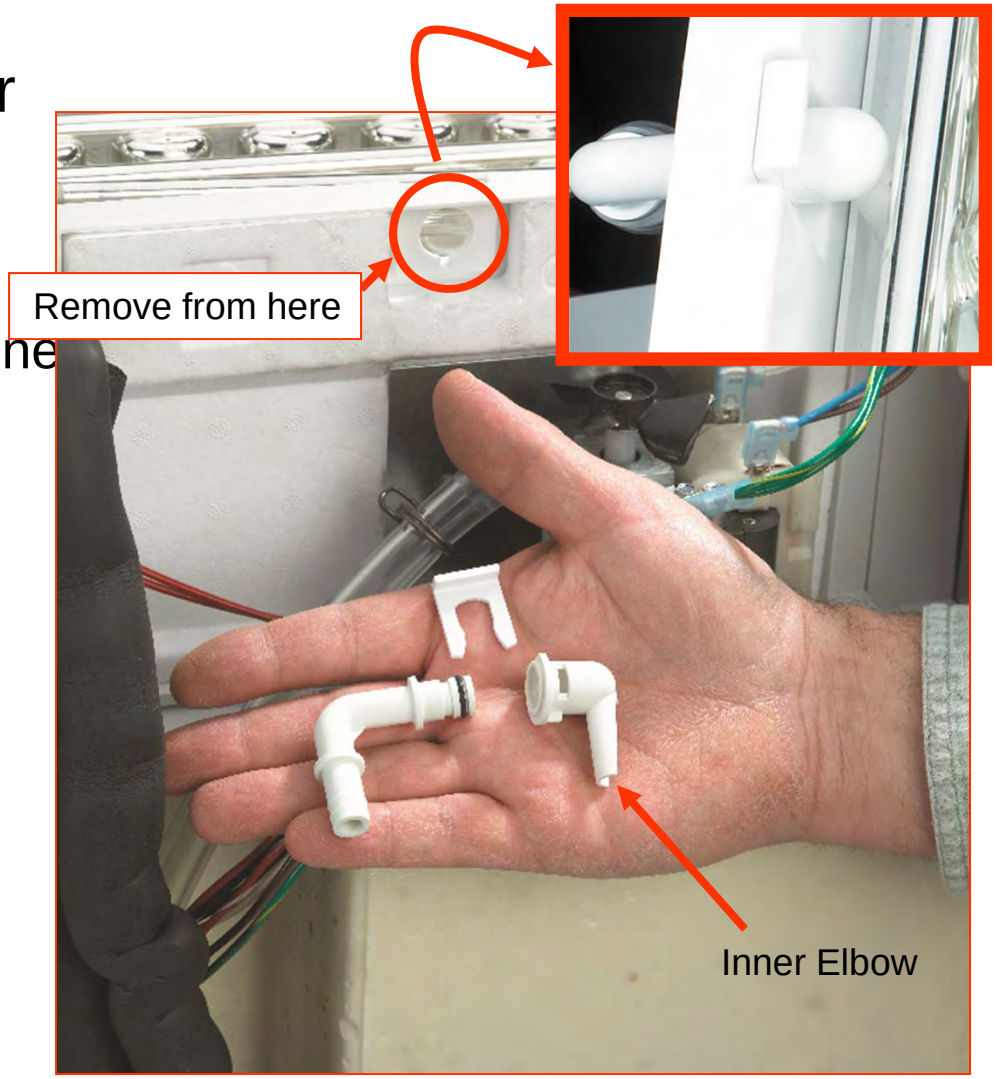
Service – Remove Cabinet

- Remove evaporator water inlet connection
  - Remove clip
  - Pull hose & elbow from inner elbow
  - Push inner elbow back
  - Rotate inner elbow up
  - Push out of wall



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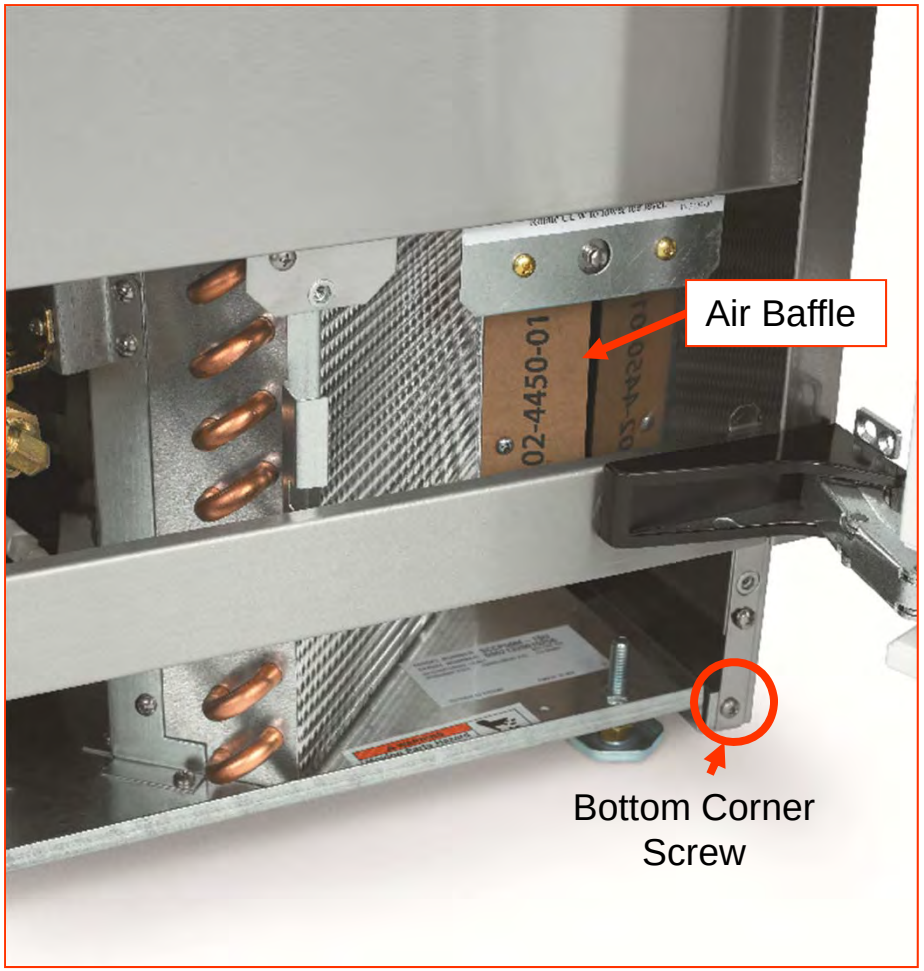
Service – Remove Cabinet

- Remove service panel
- Remove kickplate
- Remove air baffle
- Remove 4 bottom corner screws
- Pull bin thermostat cap tube from holder – handle carefully



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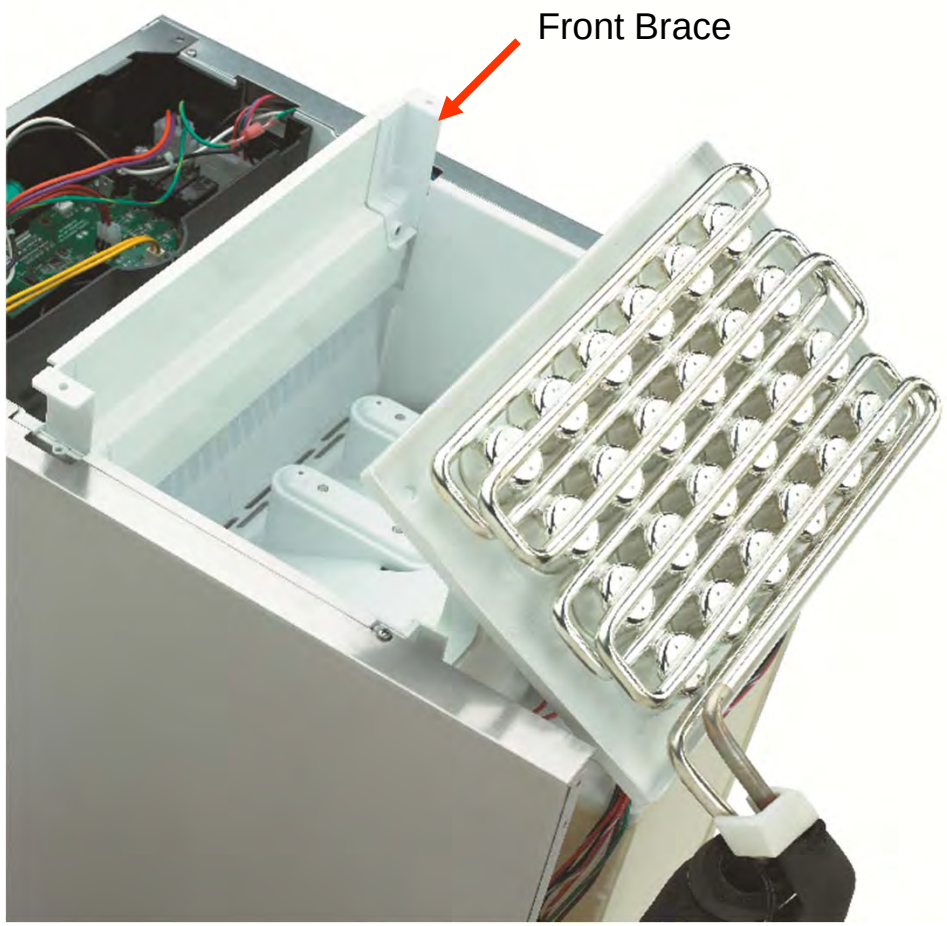
Service – Remove Cabinet

- Lift front brace up
- Separate the 7 wire harness connectors – located by suction line
- Tip evaporator & suction line assembly back enough to clear the cabinet



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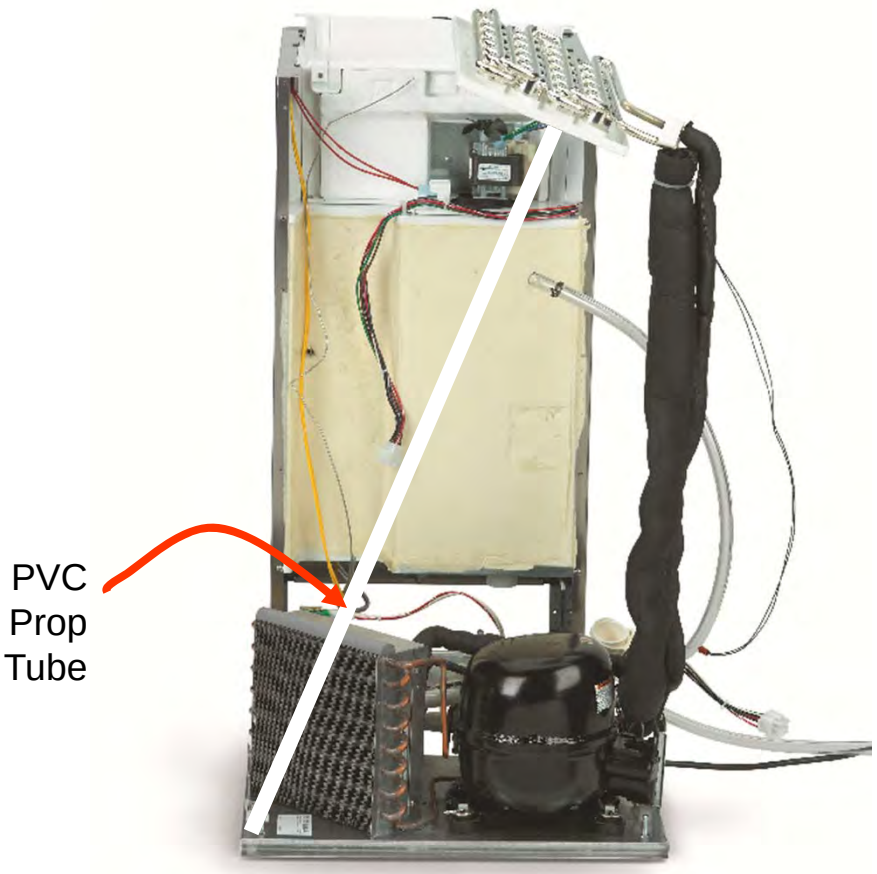
Service – Remove Cabinet

- Lift cabinet off of base
  - Pump, bin stat and controller go with cabinet
  - Support evaporator while cabinet is off
    - Use 3 foot ¾” PVC tube from evaporator cube cell to base



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Summary

- 15 inch cabinet
- Clear ice
- Individual cubes
- R-134a
- 50 lb - simple circuit board, limited complexity

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