

DIY Glycol Chiller Frankenchiller Part I



4/15/2022

Independent Together

Outline

- Objective
- Fermentation Temp Control options
- Glychol Chiller Overview
- The Build (Frankenchiller Part I)
- Fermenter Chilling Cost
- Summary/Results
- Next steps (Frankenchiller Part II)

The Objective

- Controlled temperature fermentation
 - Ales
 - Lager
- Optionally – Cold Crash
- My requirement- Have the ability to independently cool up to 4 fermenters

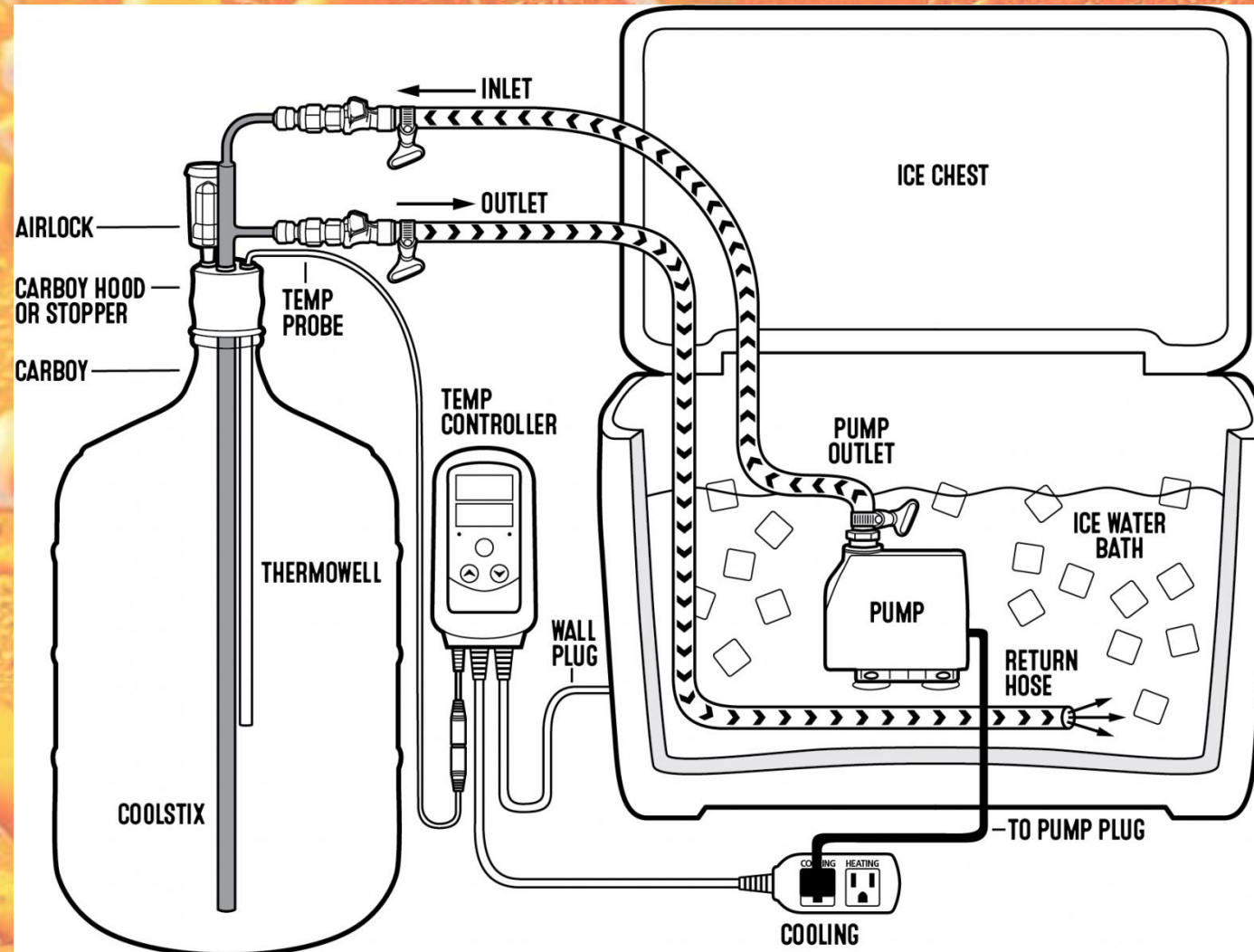
Approaches to Controlling Fermentation Temperatures

- Environmental Temperature Control
 - Cold/Temp Controlled Room – i.e. Garage, basement room
 - Cooled/Temp Controlled Chamber
 - Converted fridge or freezer
 - Lager room
- Direct Contact Control
 - The wort is in direct contact with a cooled surface
 - Jacketed Fermenter – Commercial use
 - Coil, rod etc. placed in the fermenter.
 - Note – There are solid state options that will perform this function as well.

Direct Contact Chilling Components

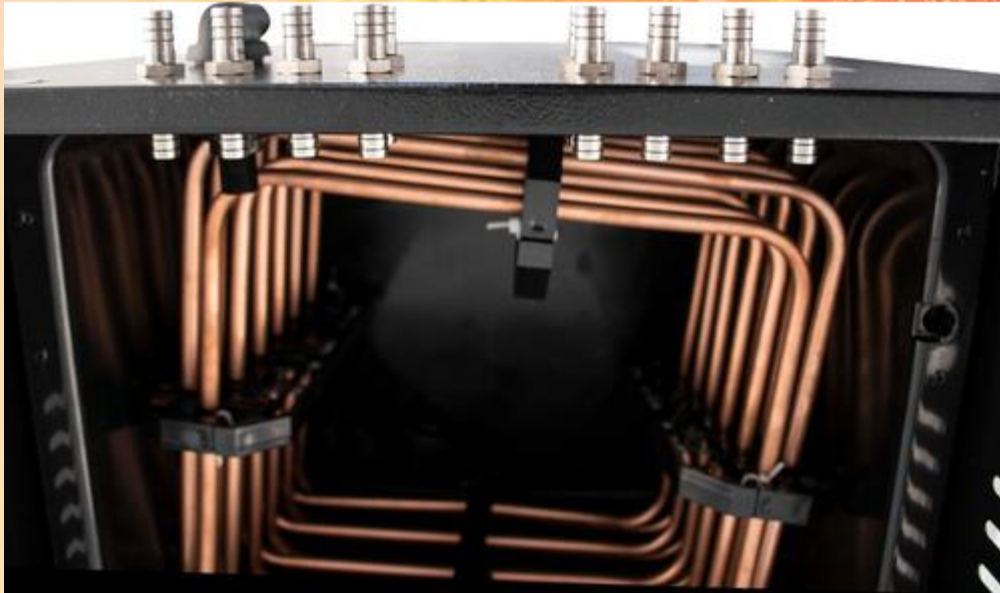
- The Chiller
 - Refrigeration unit
 - Glycol Chamber
 - Temp Control device (InkBird)
 - Propylene Glycol (Food Grade)
- Fermenter Temp Control (for each fermenter)
 - Pump
 - Temp control device
 - Coil, rod etc.
 - Or a jacketed fermenter

Direct Cooling Concept



Commercial Chilling Options

- Range from \$800 to \$1000
- All these units are only chillers
- Typically 3000 BTU with 1.5 to 3 gallon capacity



The DIY FrankenChiller - Components

- Refrigeration – Window AC Unit
 - 5000 BTU
 - Analogue controls preferred
- Ice Chest – the glycol chamber
 - Big enough to fit the Evaporator Coil
- Temp Control unit
 - InkBird or equivalent
- Aquarium Circulation Pump
 - Circulate the glycol in the chamber



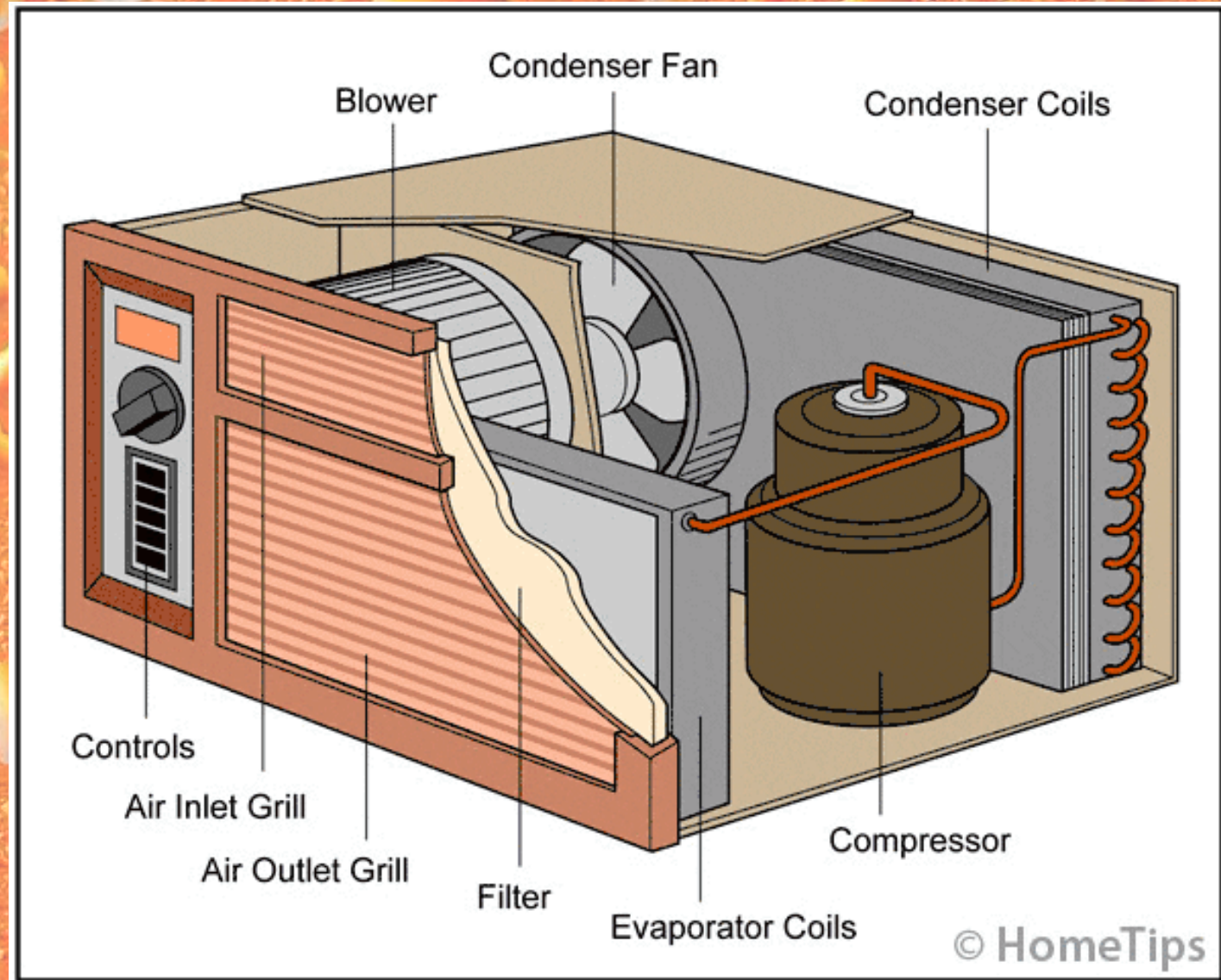
Build Instructions

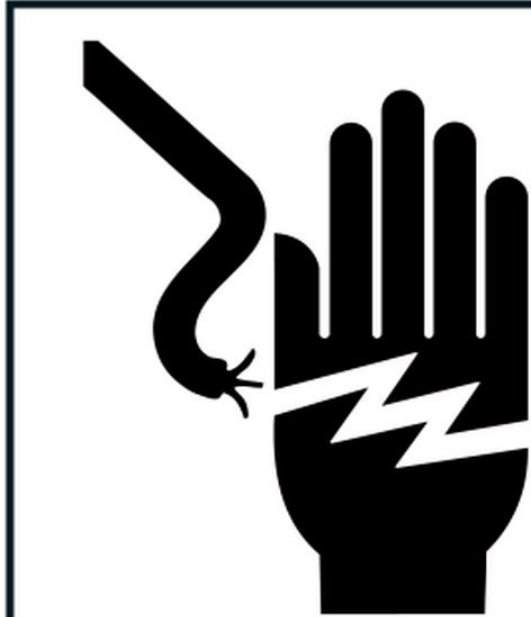
- Test and then prep the AC unit
 - Remove housing, grills etc.
 - Remove the blower and shroud
 - Bypass the Thermostat
 - Re-orient the Evaporator Coil
- Modify the Ice Chest
- Install the Circulation pump
- Clean up Wiring
- Connect the Pump and AC unit to your temp control.
- Optional: Build a cabinet or something to put your chiller on.

Test and then prep the AC unit

- Window AC Unit 101

COLD SIDE





DURAMARK



WARNING

High voltage.

Hazard of severe electrical shock or burn.

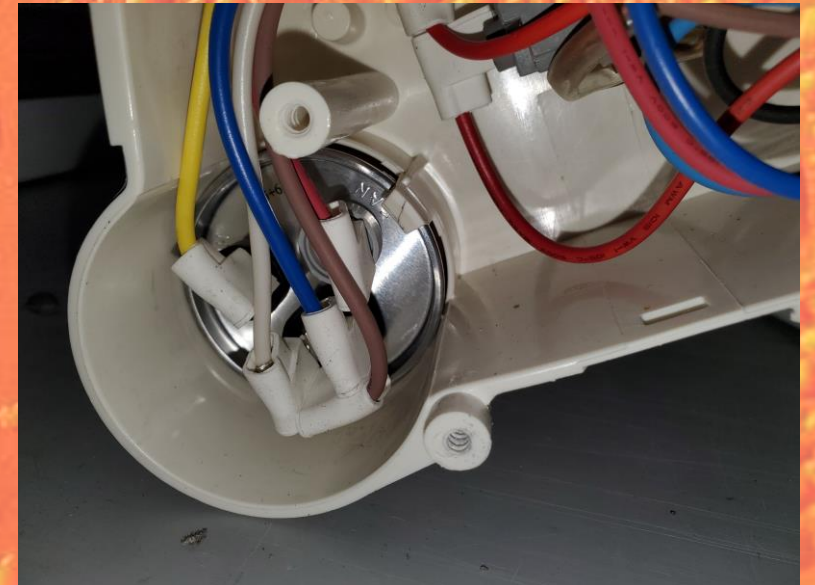
De-energize this unit before removing this cover.

D00388M

Warning

The Start/Run Capacitor will retain energy after power is disconnected. Use caution when handling. If you need to remove any of these connections, research how to safely discharge the capacitor before handling.

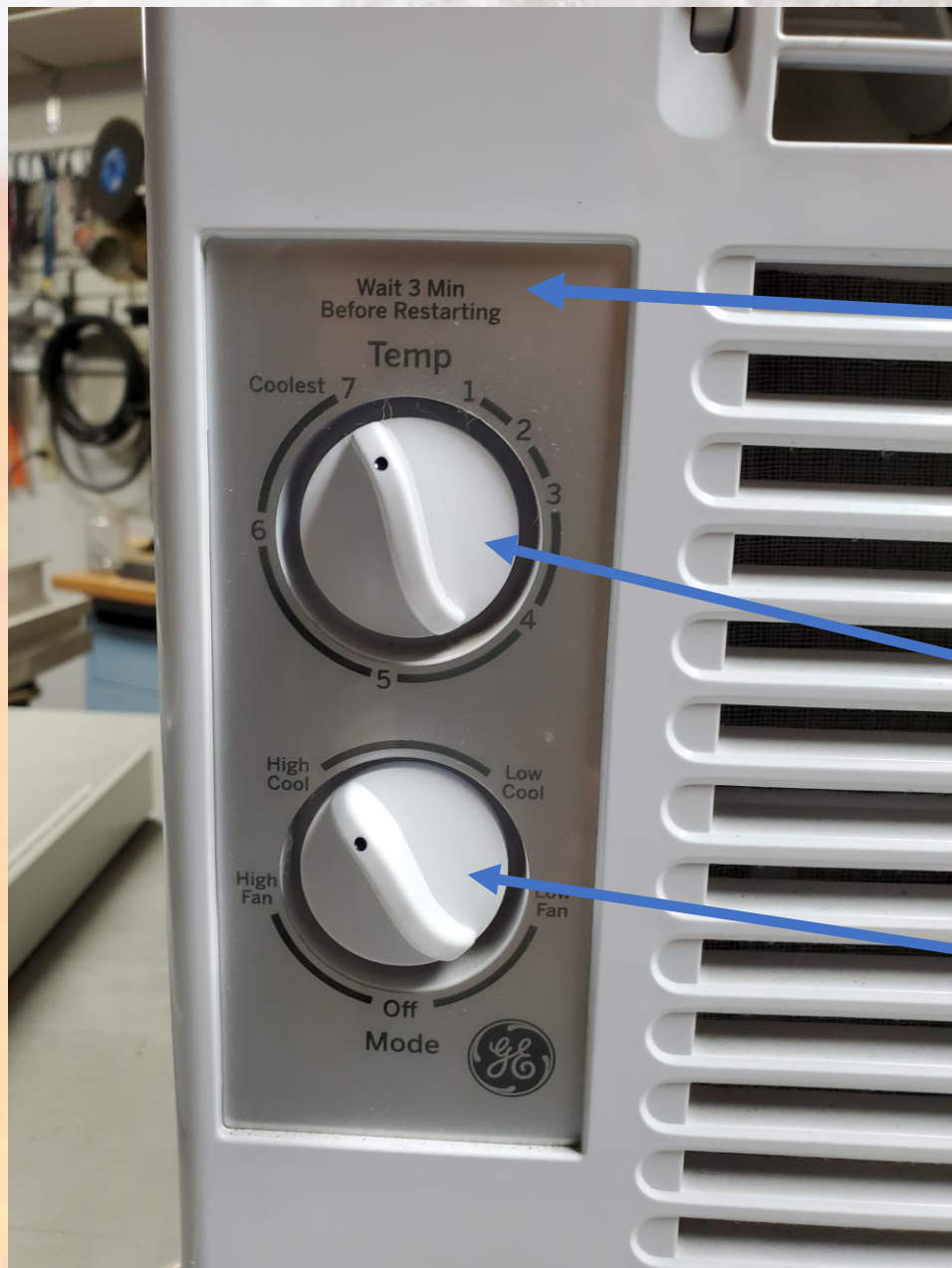
**Ensure unit is unplugged
before removing the cover to
the AC unit**



Test and then prep the AC unit



**Progress
Gage**

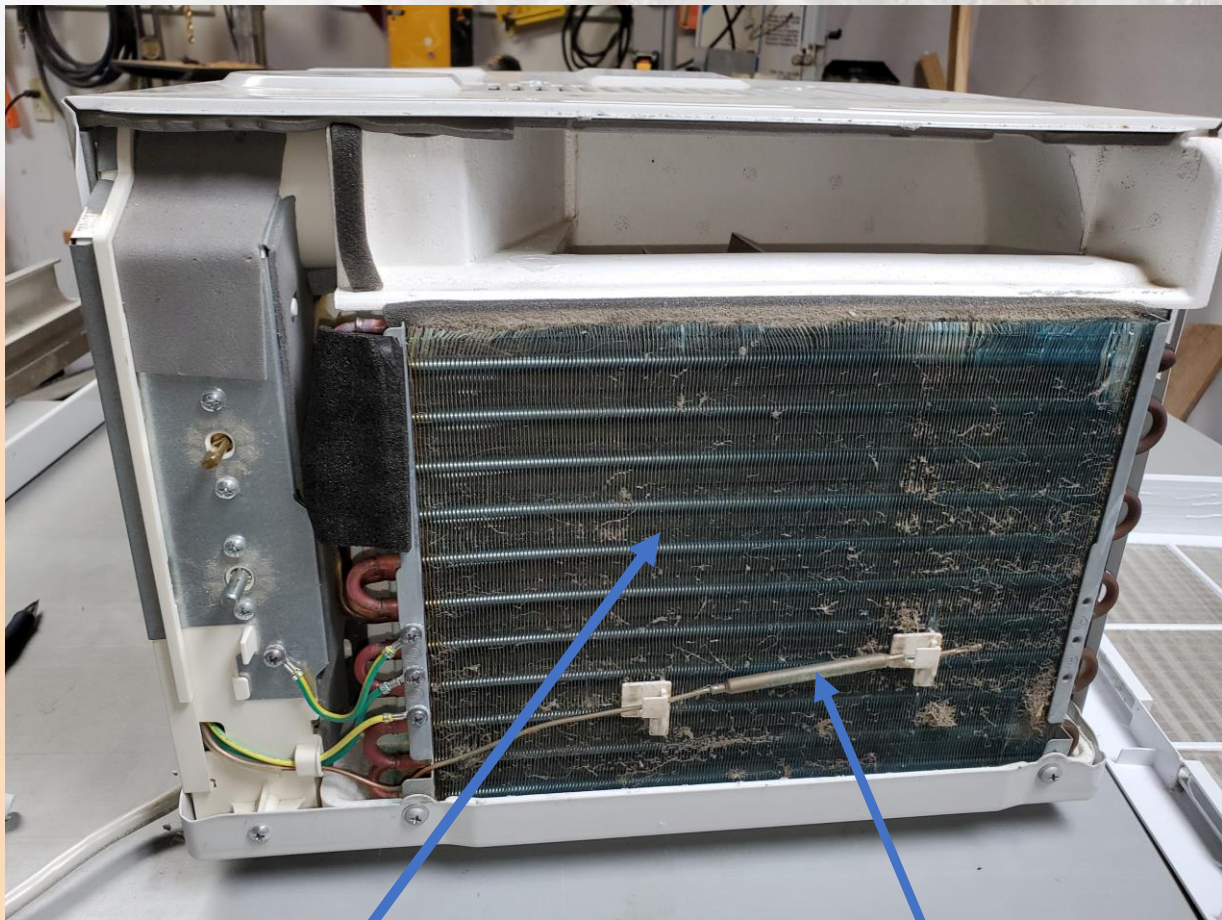


**Minimum
compressor
delay when
you program
your Ink Bird**

**Bypass
and
remove**

Keep





Condenser Coil

Thermostat



Compressor

Compressor

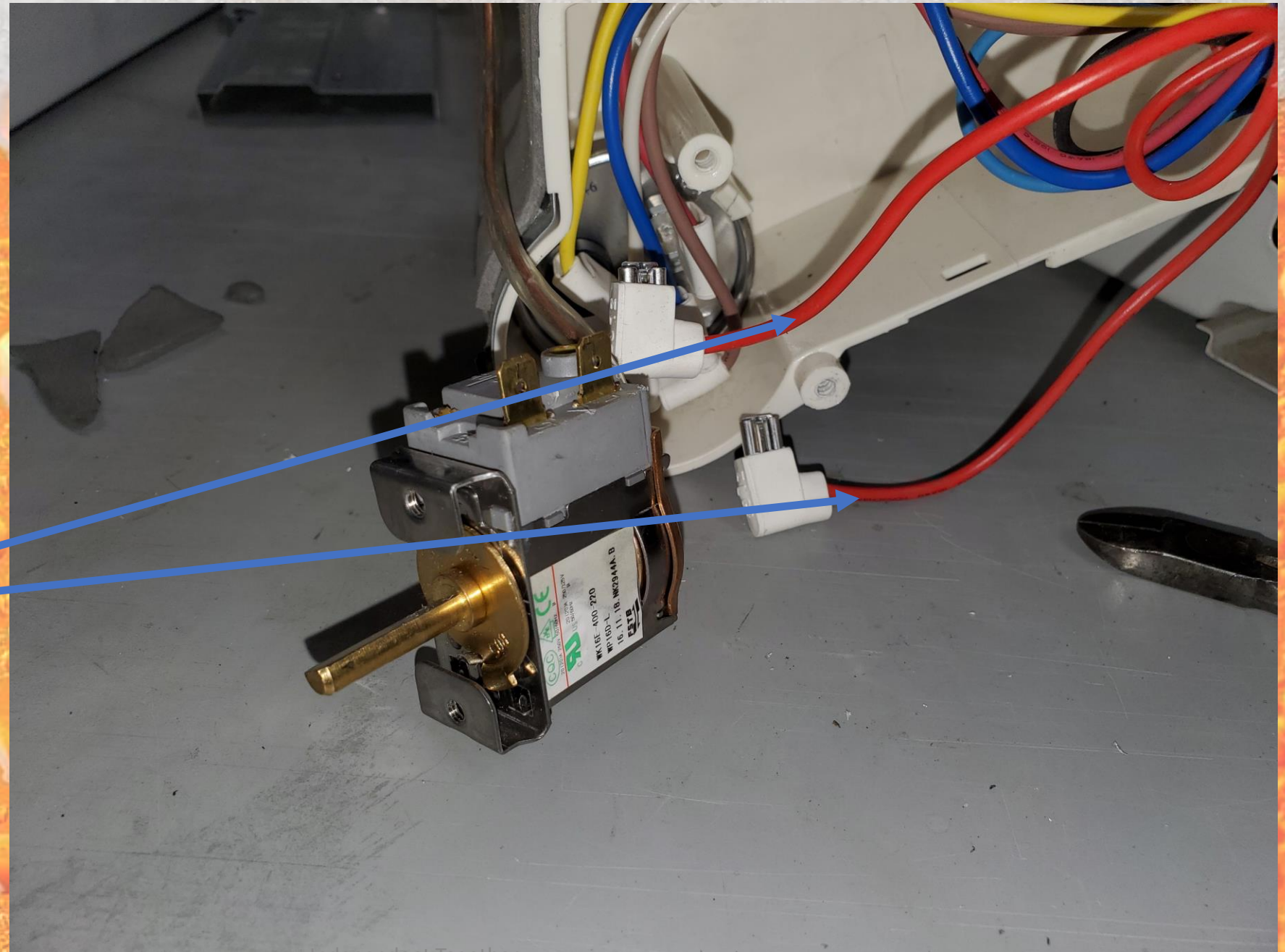
Start/Run
Capacitor

Blower



Bypass Thermostat

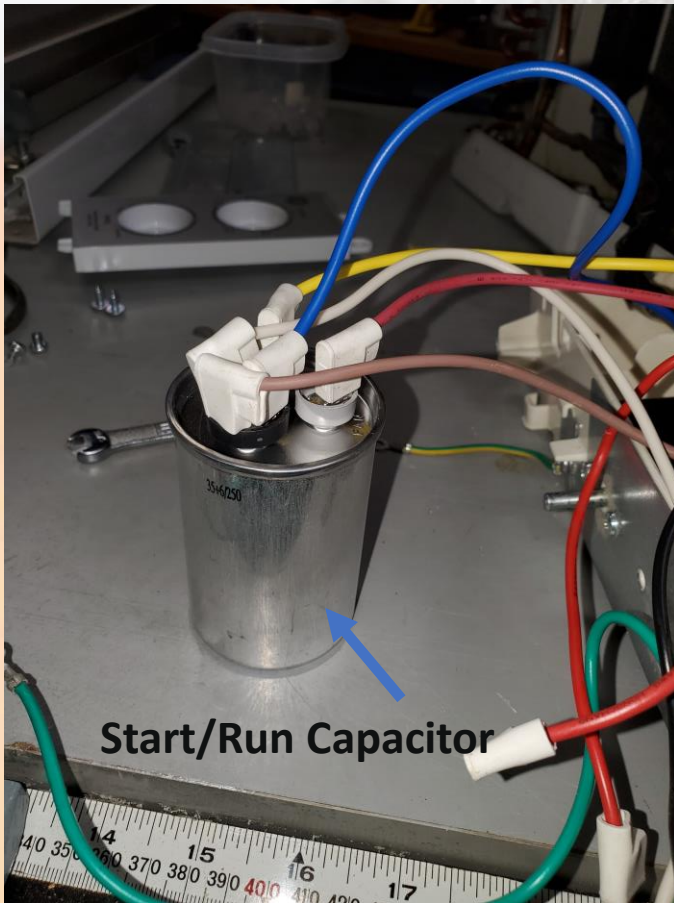
**Wire nut
these two red
wires together**





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Start/Run Capacitor

Warning: Handle with care. Do not touch terminals. Can discharge current even when not energized because it holds a charge for some time after the power is turned off.

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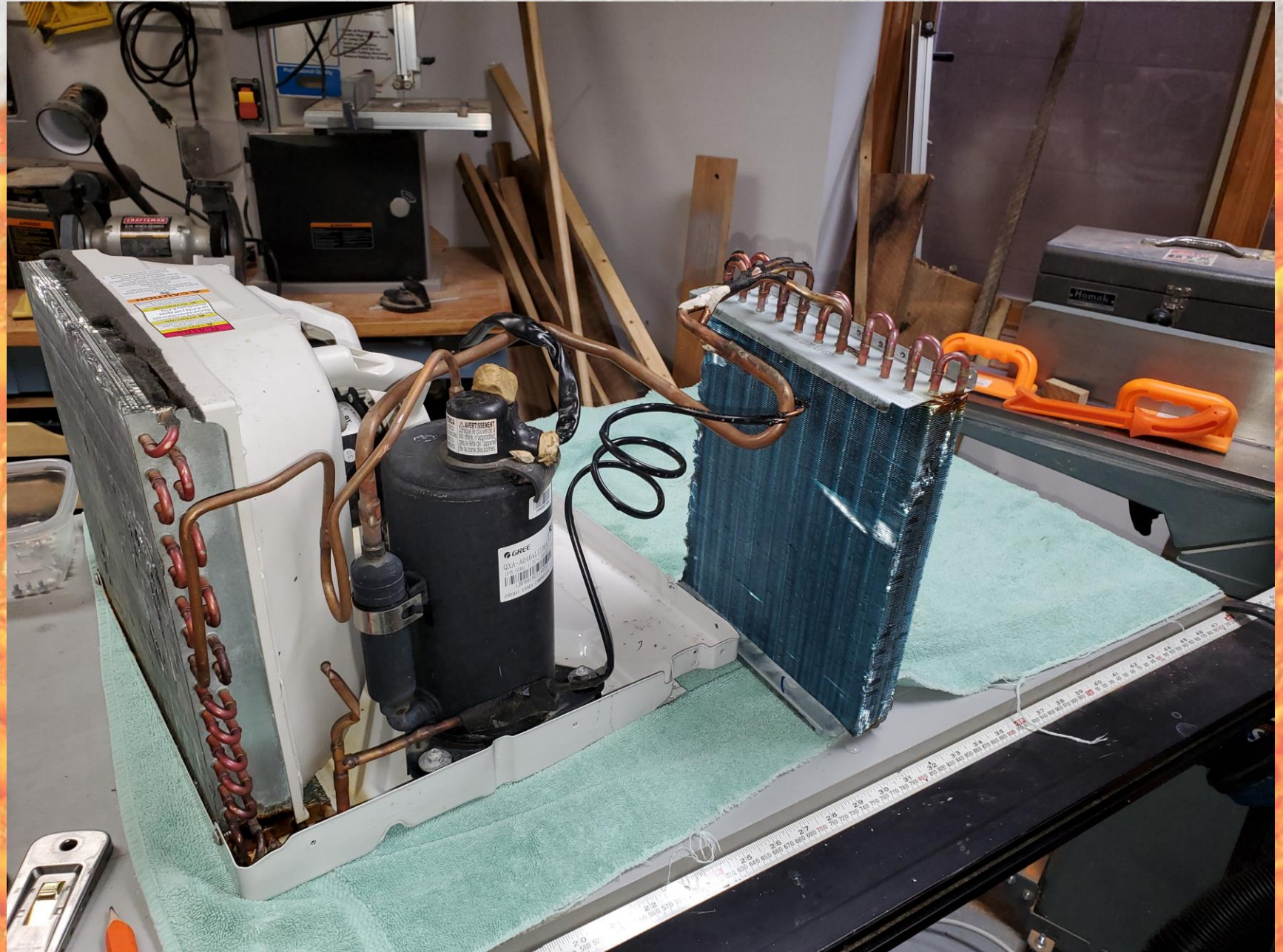


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Pretty good progress

**Re-Orient
Evap Coil**

**Move VERY
Slowly**



Modify the Ice Chest



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Feet to support the coil



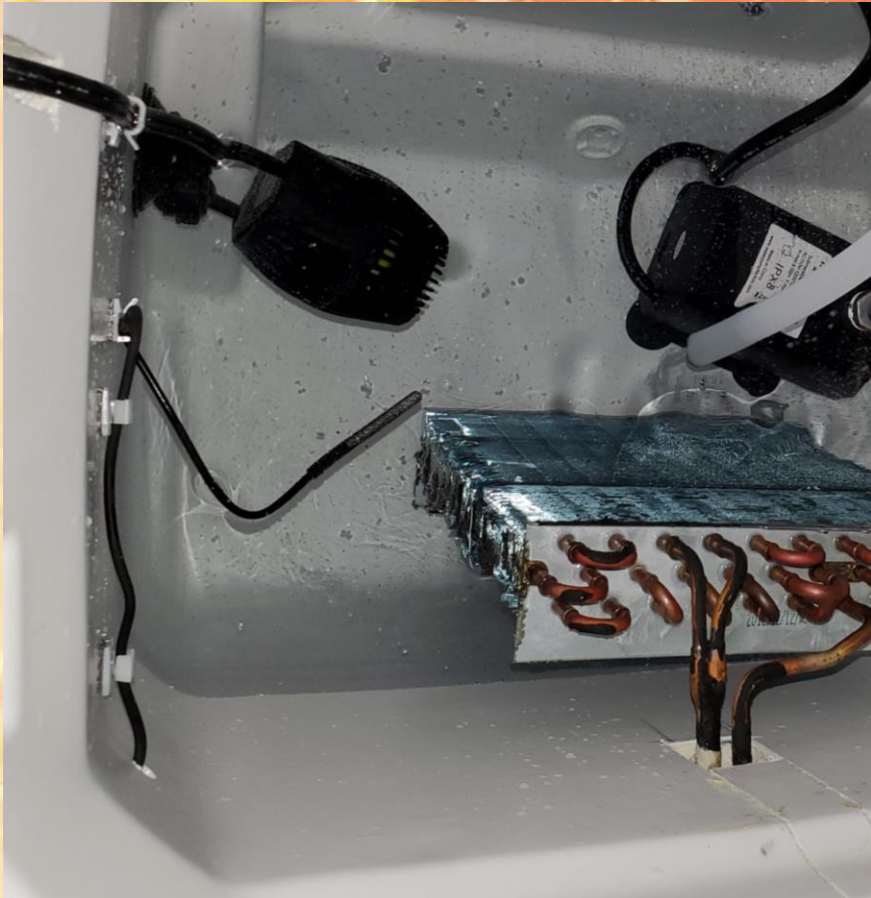
Platform Build



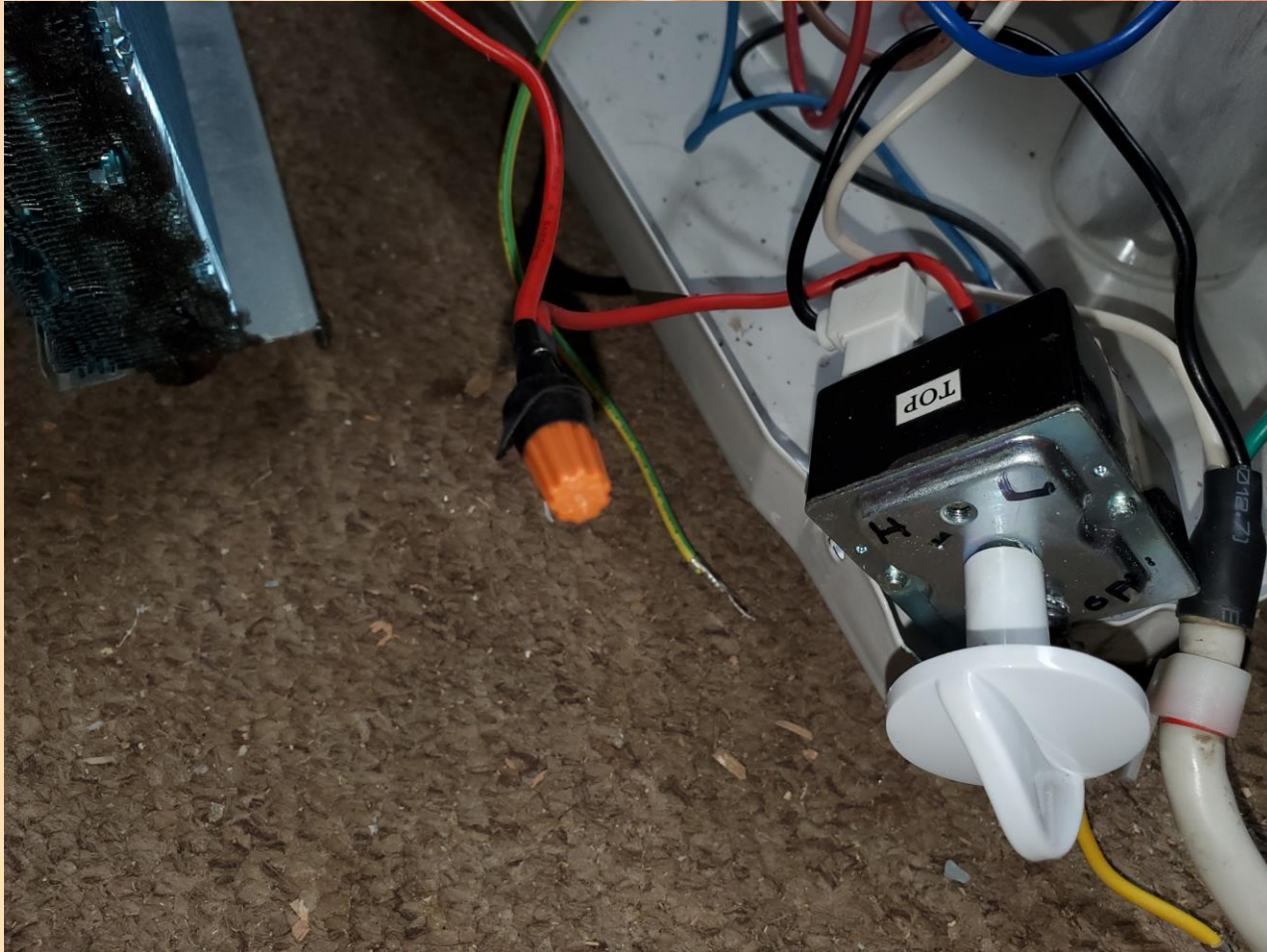
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Circulation Pump Installation



Clean Up Wiring



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Install Temp Controller

**Controls
circulation pump
and AC unit**



Test Run

- Filled the Glycol Chamber with a 28% Glycol mixture.
- Total was 7 Gallons of mixture.
- Covered approx. 60% of the Coil





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Test Results

- Starting temp was 74 Degrees F.
- Set temp was 20 Degrees F.
- Took 1 hour to get to set temp
- AC unit was set to HIGH



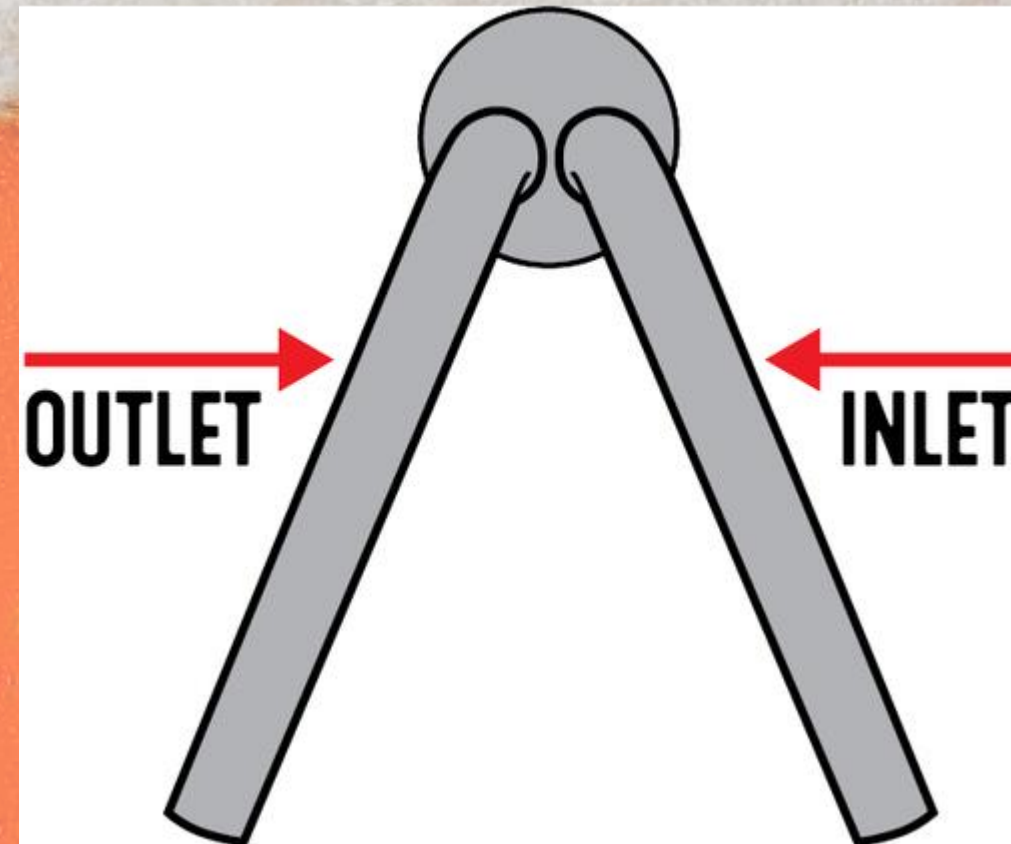
Cost Summary (Chiller only)

Item	Cost	Notes
Window AC Unit	\$40	GE, 5K BTU, analog. Found on marketplace
Ice Chest (50 QT)	\$36	Coleman, Walmart
Inkbird controller	\$35	Amazon
Wave Maker	\$13	Amazon
Plywood	\$28	3/4 inch.
Wheels	\$20	
2x3 Stud	\$13	
120v Plug	\$4	to shorten the AC cord
1 to 3 adapter	\$4	to power both the wave maker and AC
	\$193	Total for Chiller

Cooling the Fermenter

- Purchased a Universal Cool Stix kit
 - Cool Stix (1")
 - Thermowell
 - Pump 1300 GPH
 - Temp Controller
 - Fittings, Hose, Clamps and Grommets
- Total cost \$149 (MoreBeer)

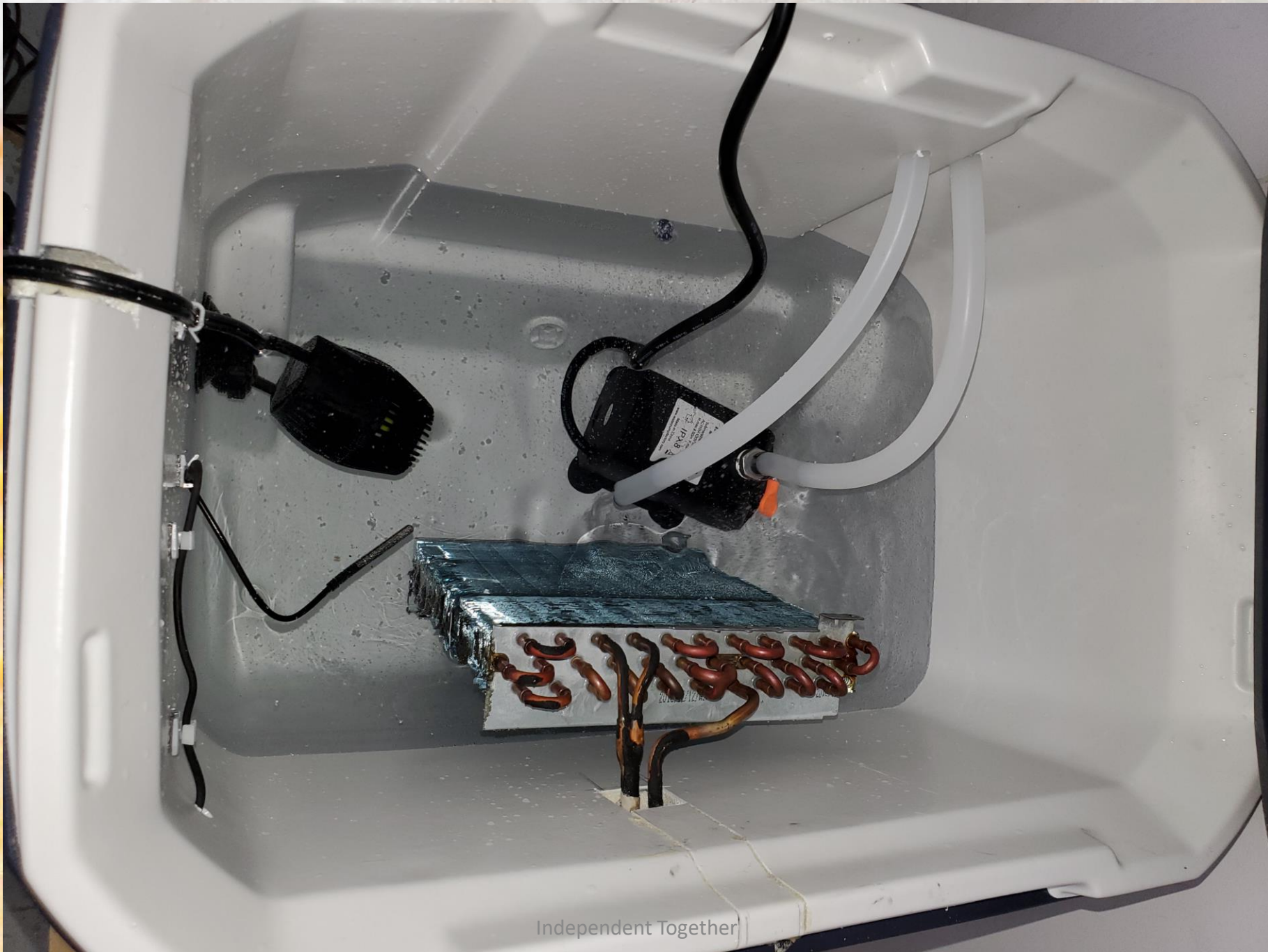






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Fermenter Cooling Test Run

- Starting temp: 78 Degrees F
- Finish Temp: 55 Degrees F
- Time: 3 Hours
- Have not done a crash test yet.

First Use



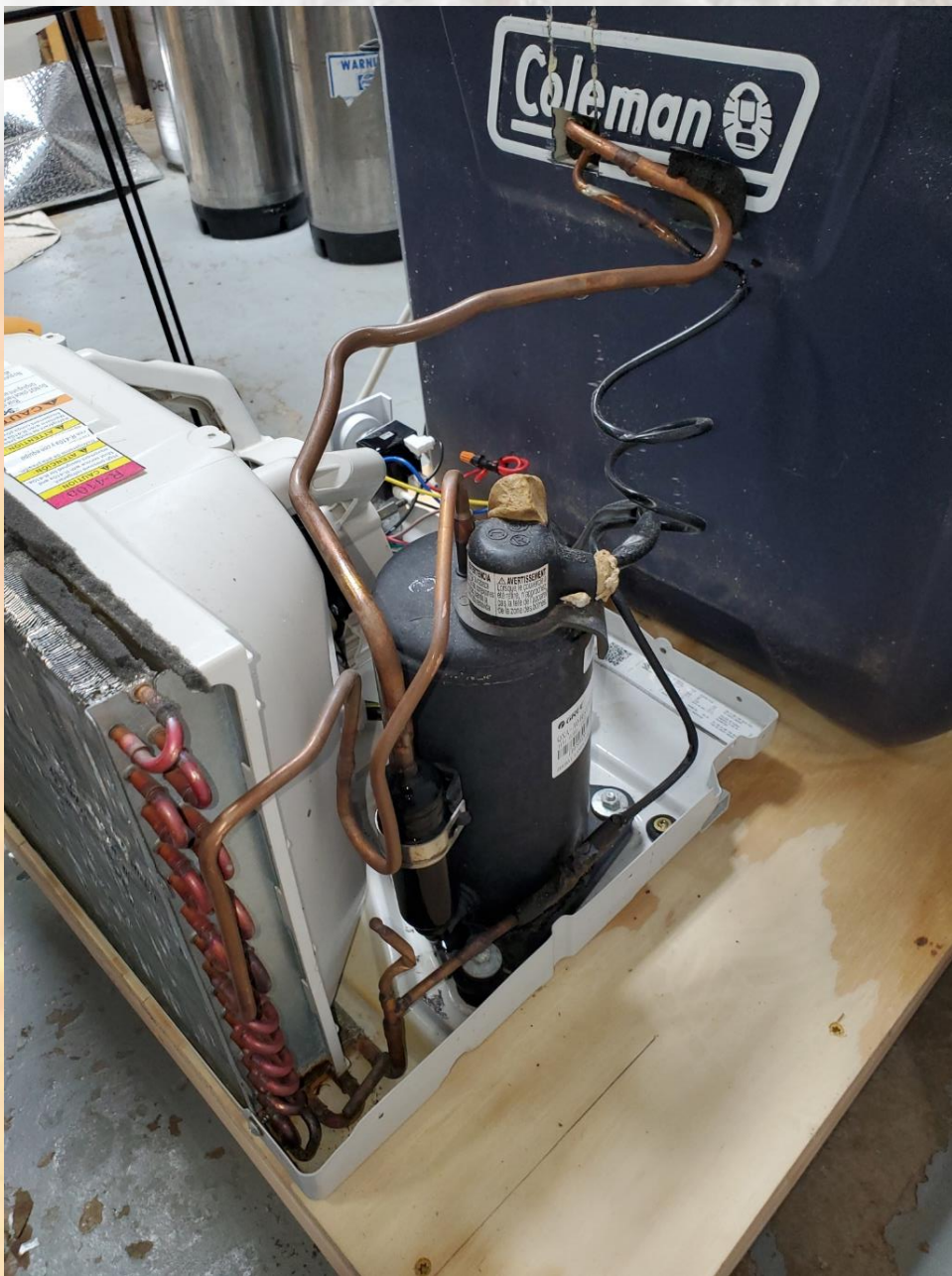
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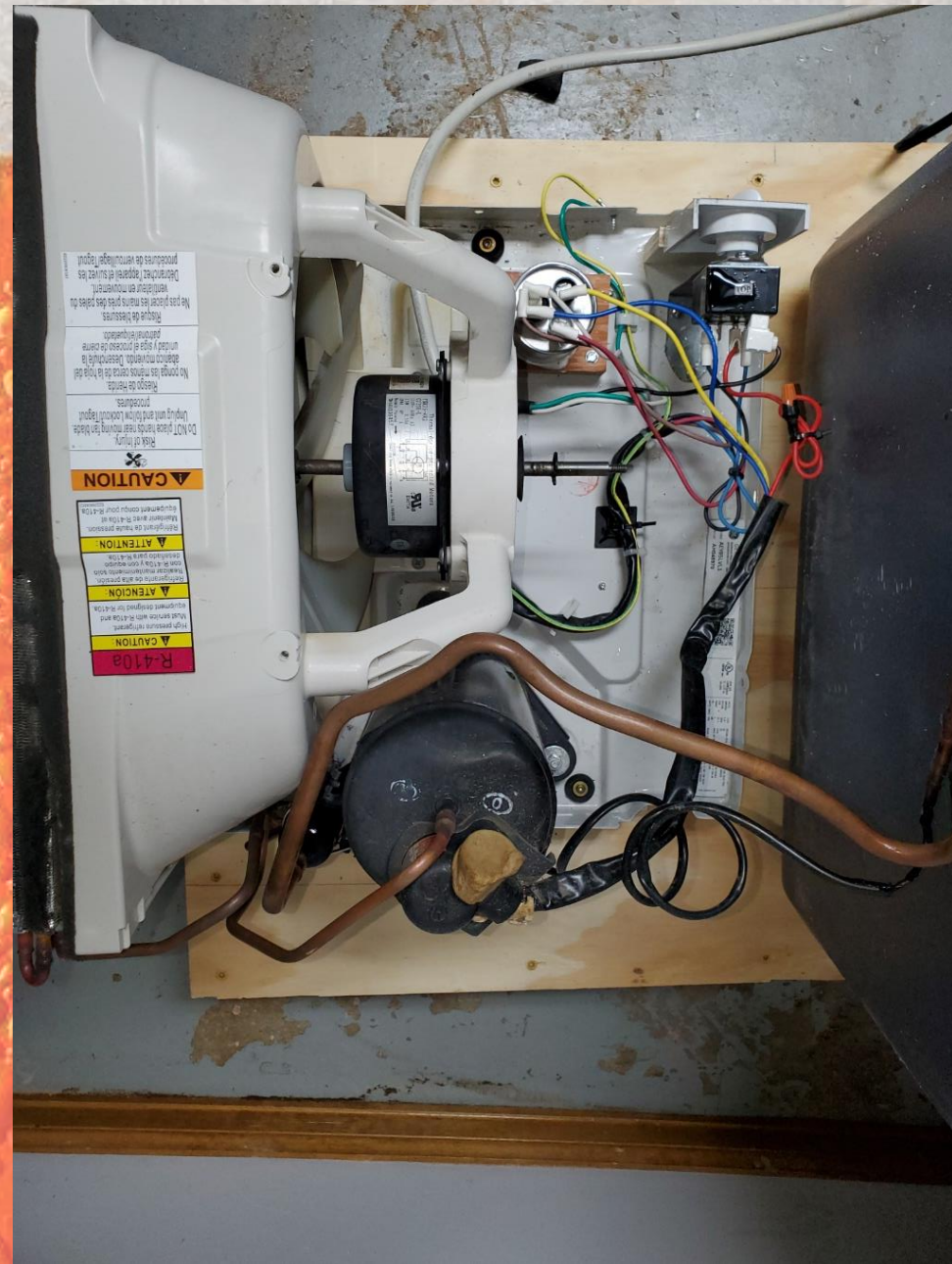


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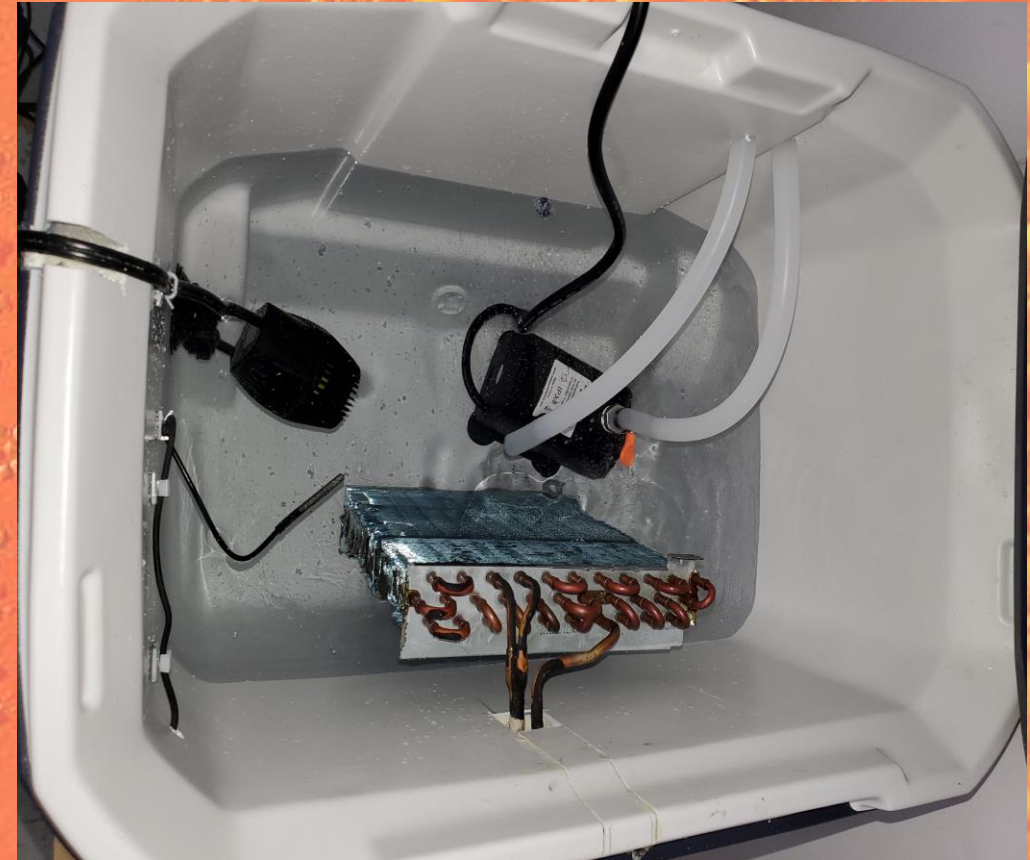
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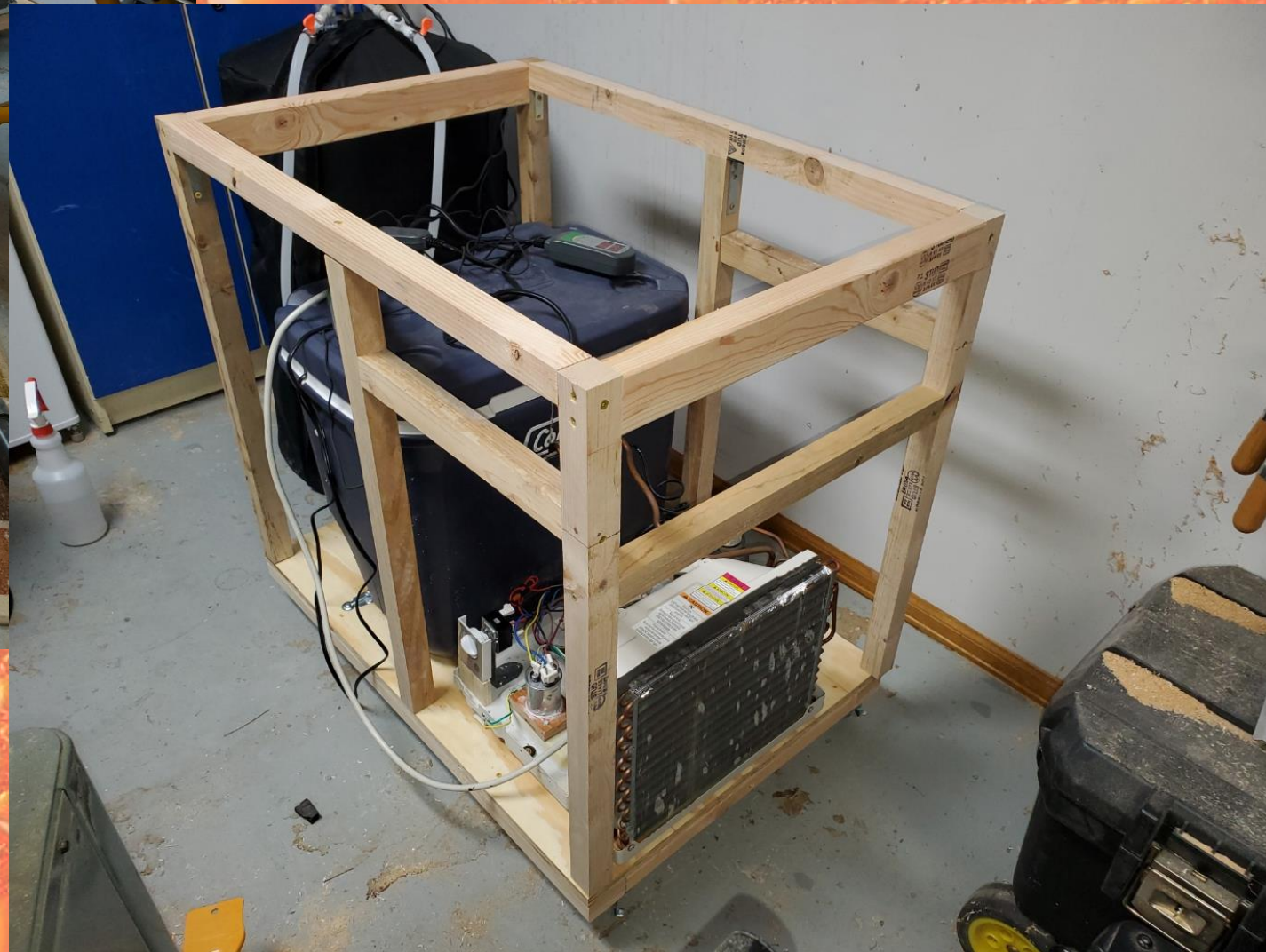
Additional Thoughts (What I've Learned)

- Glycol is EXPENSIVE. \$40 per gallon. I used two.
- Capacity (number of fermenters) will be limited by cooler real estate
- Buy and extra Ink Bird
- Build time is approx. 8 hours.
- A full Cool Stix is heavy. Needed a zip tie to keep it from falling into the fermenter



FrankenChiller Part II (The Cabinet Build)

- Objective: Build a cabinet around chiller.
- Must be able to support two fermenters on top
- Add bulkheads for the Pumps
- Switch to built-in ITC-1000 controllers
- Add a drawer for storage
- Design/wire for three concurrent fermenters



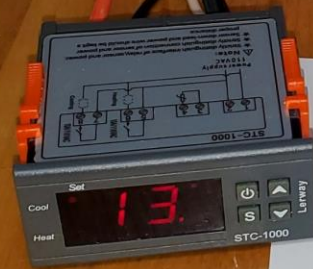
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Fahrenheit/Celsius Temperature Conversion Table

Fahrenheit	Celsius	Fahrenheit	Celsius	Fahrenheit	Celsius	Fahrenheit	Celsius
-47.2	-44	-7.6	-22	32	0	71.6	22
-45.4	-43	-5.8	-21	33.8	1	73.4	23
-43.6	-42	-4	-20	35.6	2	75.2	24
-41.8	-41	-2.2	-19	37.4	3	77	25
-40	-40	-0.4	-18	39.2	4	78.8	26
-38.2	-39	1.4	-17	41	5	80.6	27
-36.4	-38	3.2	-16	42.8	6	82.4	28
-34.6	-37	5	-15	44.6	7	84.2	29
-32.8	-36	6.8	-14	46.4	8	86	30
-31	-35	8.6	-13	48.2	9	87.8	31
-29.2	-34	10.4	-12	50	10	89.6	32
-27.4	-33	12.2	-11	51.8	11	91.4	33
-25.6	-32	14	-10	53.6	12	93.2	34
-23.8	-31	15.8	-9	55.4	13	95	35
-22	-30	17.6	-8	57.2	14	96.8	36
-20.2	-29	19.4	-7	59	15	98.6	37
-18.4	-29	21.2	-6	60.8	16	100.4	38
-16.6	-27	23	-5	62.6	17	102.2	39
-14.8	-26	24.8	-4	64.4	18	104	40
-13	-25	26.6	-3	66.2	19	105.8	41
-11.2	-24	28.4	-2	68	20	107.6	42
-9.4	-23	30.2	-1	69.8	21	109.4	43

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Platform Alternative

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