



REMCOR®

IMI CORNELIUS REMCOR INC g 500 REGENCY DRIVE g GLENDALE HEIGHTS, IL 60139-2268

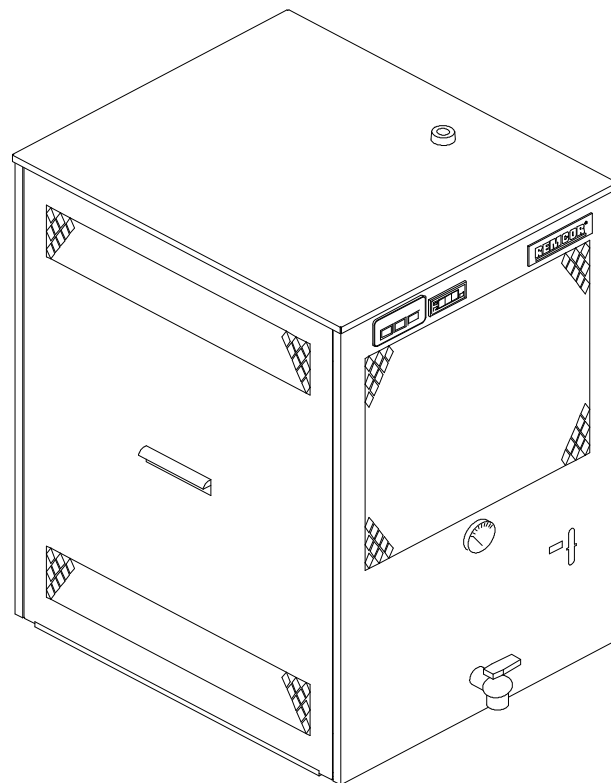
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CHILLER ("CH" SERIES)

Operator's Manual

Models: CH 951-A
CH 1500-A
CH 1502-A
CH 1503-A



Part No. 92266
December 5, 1995
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Revision C

THIS DOCUMENT CONTAINS IMPORTANT INFORMATION

This Manual must be read and understood before installing or operating this equipment

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GENERAL INFORMATION

INTRODUCTION

The REMCOR "CH" Series Recirculating Liquid Chiller is designed to provide an accurate, reliable, and user-friendly system for cooling a continuous flow of pure liquid and keep that liquid at a constant temperature in various closed loop or tank cooling applications.

The "CH" Series Chiller consists of an air-cooled refrigeration system housed in a sturdy sheet metal frame and cabinet. A standard pump and insulated liquid reservoir package provides a complete liquid cooling and circulating system.

The "CH" Series Chiller is designed to operate in a clean laboratory or industrial environment where ambient temperatures range from 40 to 100° F (5 to 38° C). With proper installation, operation, and maintenance, the "CH" Series Chiller will provide years of trouble free service.

UNPACKING AND INSPECTION

This unit was thoroughly inspected before leaving the factory and the carrier has accepted and signed for it. Any damage or irregularities should be noted at the time of delivery and immediately reported to the carrier. Request a written inspection report from the Claims Inspector to substantiate any necessary claims. In the event that an immediate replacement is necessary, please contact REMCOR Chiller Sales at 1-800-551-4423.

DESIGN DATA

Table 1. Design Data

	CH951	CH1500	CH1502	CH1503
Cooling Capacity:				
BTU/hr (W) at 80_F (27_C) and 70_F (21_C) Liquid Temperature.	12,000 (3,515)	18,000 (5,272)	18,000 (5,272)	18,000 (5,272)
Compressor Horsepower	1 (.746 kW)	1 1/2 (1.12 kW)	1 1/2 (1.12 kW)	1 1/2 (1.12 kW)
Electrical Data:	230/1/60	230/1/60	230/3/60	460/3/60
Voltage/Phase/Hertz/Amperage	11.0 Amps	13.0 Amps	16.4 Amps	10.0 Amps
Refrigerant Type:	R134a	R22	R22	R22
Reservoir Capacity	6.0 gallons (22.7 liters)	6.0 gallons (22.7 liters)	6.0 gallons (22.7 liters)	6.0 gallons (22.7 liters)
Physical Dimensions, Width ϕ Depth ϕ Height:	22 ϕ 26.5X1 ϕ 38.25 ϕ (56cm ϕ 67cm ϕ 97cm)	22 ϕ 26.5X1 ϕ 38.25 ϕ (56cm ϕ 67cm ϕ 97cm)	22 ϕ 26.5X1 ϕ 38.25 ϕ (56cm ϕ 67cm ϕ 97cm)	22 ϕ 26.5X1 ϕ 38.25 ϕ (56cm ϕ 67cm ϕ 97cm)
Fittings:				
Process Connections	3/4" FPT (S/S)	3/4" FPT (S/S)	3/4" FPT (S/S)	3/4" FPT (S/S)

CHILLER INSTALLATION

Location of Chiller

THE CHILLER MUST BE LOCATED NEAR A PROPERLY GROUNDED ELECTRICAL OUTLET. THE CIRCUIT SHOULD BE FUSED AND NO OTHER ELECTRICAL APPLIANCE SHOULD BE CONNECTED TO THE CIRCUIT. ALL ELECTRICAL WIRING MUST CONFORM TO NATIONAL AND LOCAL ELECTRICAL CODES.

The Chiller *must* be located in a well ventilated, indoor area where ambient temperatures will remain above 40_F (5_C) and will never increase above 100_F (38_C). To obtain optimum cooling capacity, the ambient temperature should be at or below 80_F (27_C).

It is very important that the air intake and discharge sides of the chiller are not obstructed by other free standing objects. A minimum of two feet of space on all four sides of the chiller will be sufficient to prevent air flow obstructions.

It is also important to direct any hot air discharge from other equipment away from the air intake side of the chiller. Condenser air entering the "CH" unit should be below 100°F (38°C). Condenser air temperatures above 100°F (38°C) can cause the high pressure safety control to shut down the unit.

Electrical Connections

All wiring must conform to the National Electric Code and any applicable local codes.

The "CH" unit must be PERMANENTLY wired by means of electrical conduit to a properly fused disconnect of proper amperage OR wired to a properly rated power cord and plugged into an outlet with the appropriate disconnect and amperage rating. The electrical junction box includes a four terminal strip for power supply connections. The DATA PLATE located beside the junction box indicates the phase, voltage and amperage of the chiller.

Process Connections

Follow standard plumbing practices and local codes in making liquid connections. The Chiller inlet and outlet connections are 3/4"-inch FPT couplings. It is recommended that 3/4"-inch I.D. or larger flexible hose and tube fittings be used as process connections. Lines should be routed with as few bends as possible. Prevent lines from running near radiators, hot water pipes, etc. Any lengths of tubing that are exposed to high ambient temperatures should be insulated to prevent condensation and/or significant liquid heat gain.

Once the system has been properly plumbed, it is important that the circulation system be filled with liquid. The reservoir can be filled by removing the fill port cap located on top of the Chiller. After ensuring that the drain is closed, fill the reservoir via the fill port with pure liquid until the liquid level sight glass on the front of the unit indicates "FULL". The fill port cap should then be replaced prior to operation.

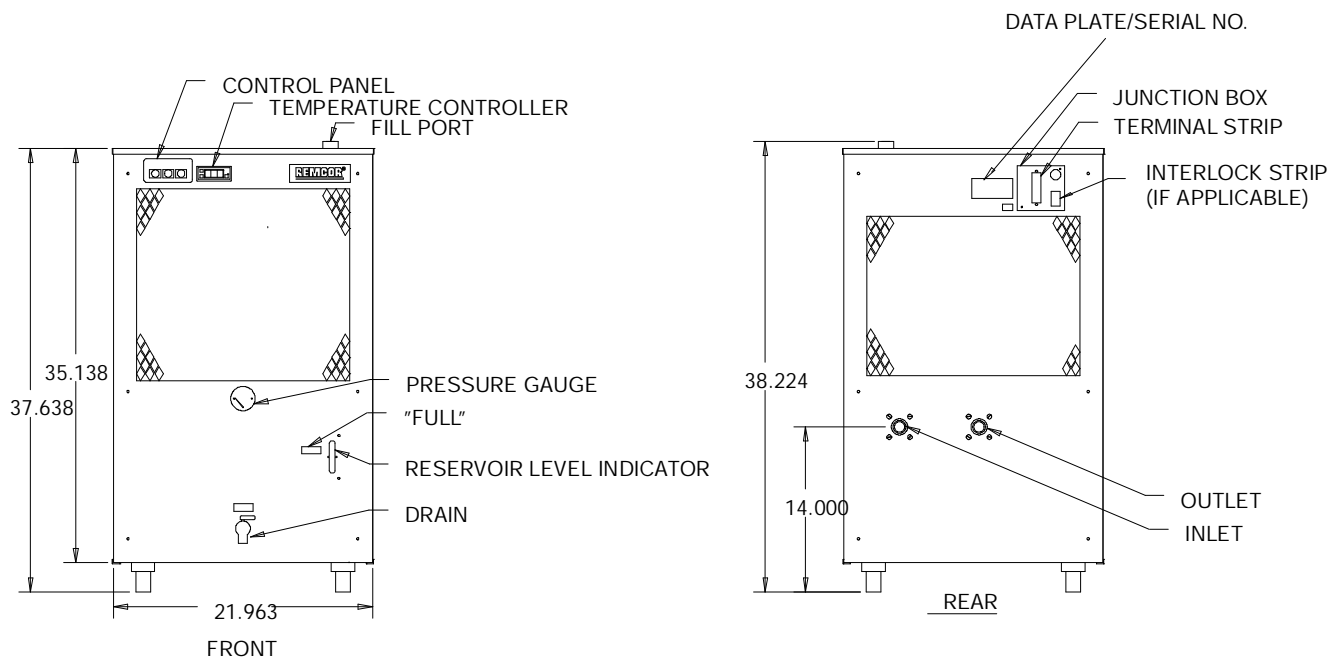


FIGURE 1. "CH" SERIES CHILLERS

Chiller Operation



WARNING: NEVER OPERATE THE CHILLER WITH THE PANELS REMOVED.

ALWAYS USE THE POWER SWITCH TO TURN OFF THE CHILLER WHEN IT IS NOT BEING USED.

ALWAYS ENSURE THAT ALL AIR INLETS AND OUTLETS ARE FREE FROM OBSTRUCTION.

BE SURE THAT THE RESERVOIR IS FILLED WITH FLUID PRIOR TO POWERING UP THE UNIT.

Process Liquid Flow

After ensuring that the system piping is free from obstruction, that all valves are open, and the reservoir is full, push the CONTROL POWER switch to the "ON" position. The pump should now be operating.

On three phase units such as the CH1502 and CH1503, it is important to check the pump rotation. Remove the left side panel, push the POWER button in, and observe the motor shaft. Make sure that the shaft is rotating in the direction of the arrow indicated on the pump housing. If the rotation is incorrect, reverse two of the three incoming power supply leads at the terminal strip.

NOTE: Running the pump in reverse for too long will result in permanent pump damage. The Phase Protection/3-Phase Monitor Option will prevent the pump from operating backwards. See the full description of the option for complete explanation.

All Chillers with pumps are supplied with a pressure regulating valve on the pump discharge. This valve is pre-set at the factory to ensure that system pressure does not exceed the capabilities of the pump motor and/or piping. If this valve requires adjustment, please contact the REMCOR Service Group for the proper setting procedure and pressures.

Once the flow has been established the thermostat can be programmed to the desired set-point.

Phase Protection / 3-Phase Monitor Option

The 3-Phase Monitor detects phase loss, low voltage, and phase reversal by continuously monitoring the 3-Phase power lines for abnormal conditions. When correct voltage and phase rotation are applied, the internal relay will energize. A fault condition will de-energize the relay. When the fault is corrected, the monitor will automatically reset. Both **Trip** and **Norm** condition indicators are provided on the relay to aid in adjustment and system trouble-shooting.

This control is located in the enclosure labeled "Monitor" on top of the electrical box.

Phase Protection / 3-Phase Option Adjustment

The following procedure will allow the 3-Phase Monitor to achieve a trip point just below the nominal phase-to-phase voltage, where the unit is applied.

Rotate the adjustment control fully clockwise, or until the red (Trip) indicator illuminated. Slowly rotate the adjustment control in a counter-clockwise direction, just until the green (Norm) indicator illuminates. At this point, the 3-Phase Monitor is the most sensitive to irregular power line conditions. If nuisance tripping occurs, turn the control slightly further counter-clockwise.

COOLING OPERATION

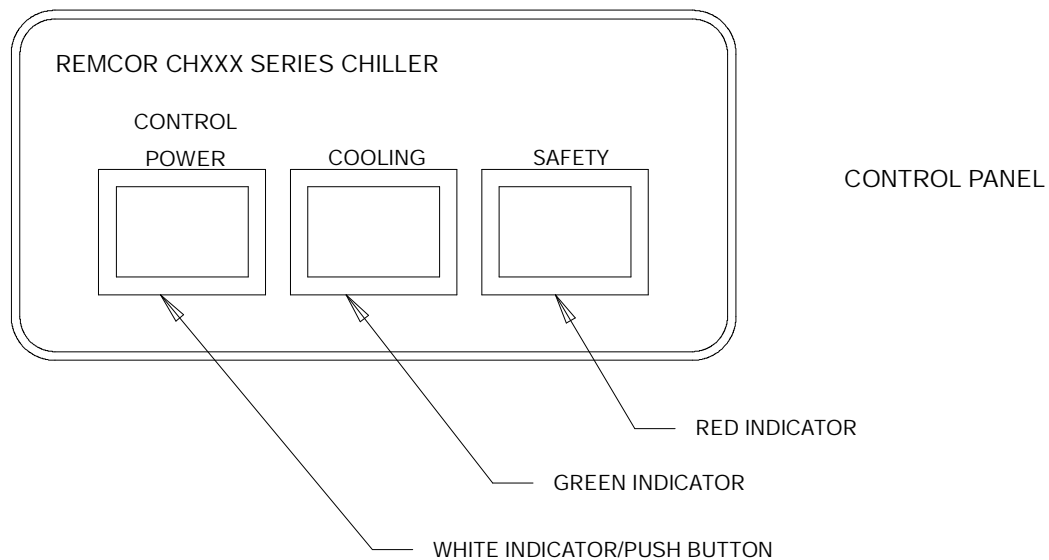


FIGURE 2. CONTROL PANEL

Temperature Indicator/Controller (Thermostat)

Combines a precise temperature control and easy programmability with a convenient LED temperature readout that indicates system liquid temperature (2°F Differential). To adjust thermostat, see next section.

1. CONTROL POWER SWITCH/LIGHT

A simple ON/OFF push-button that switches power to the 24 volt control circuit. When the switch is pressed, the white light on the push-button illuminates to indicate that Chiller Control Power is present. Light is no longer illuminated when button is returned to "OFF" position.

2. COOLING LIGHT

A green light that illuminates to indicate that the refrigeration system is operating. This light may cycle on and off in response to the thermostat or in response to HOT GAS BYPASS if the unit is equipped with the hot-gas bypass option.

3. SAFETY LIGHT

A red light that illuminates to indicate that a problem is present with the chiller. The safety light will illuminate under the following conditions:

- A. High Refrigerant Pressure
- B. Low Refrigerant Pressure
- C. Low Reservoir Level (Alarm also sounds)
- D. Low Evaporator Temperature

It is important to note that each of these conditions will shut down the "CH" unit. For additional protection to your equipment, some models are equipped with a LOW FLOW INTERLOCK which terminates power to your equipment in the event that liquid flow from the "CH" unit drops below 1.25 GPM.

START-UP

IT IS IMPORTANT THAT THE LIQUID LEVEL SIGHT GLASS READS "FULL". IN THE EVENT THAT THE RESERVOIR IS EMPTY, THE UNIT WILL REMAIN OFF UNTIL AN ADEQUATE LEVEL OF LIQUID IS ATTAINED. MAKE SURE CHILLER POWER IS "OFF" PRIOR TO FILLING RESERVOIR.

Push CONTROL POWER button IN. All alarm indicators should be extinguished and the Chiller system will cycle in order to maintain the established set-point. The Chiller is now ready for normal operation.

Thermostat Control

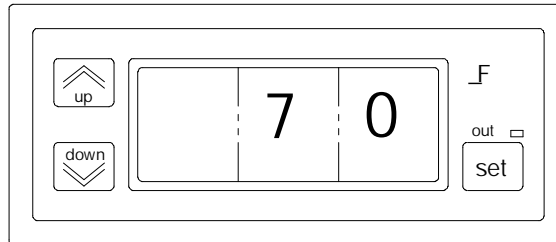


FIGURE 3. CH SERIES TEMPERATURE CONTROLLER

The following procedure should be followed to adjust the thermostat for any liquid cooling application:

1. Push the "SET" button located to the right of the digital display. This will display the current set-point programmed in the thermostat.
2. The set-point can only be adjusted while being displayed. To adjust the set-point, push the "UP" or "DOWN" button until the desired set point is displayed on the thermostat.
3. Once the desired set-point is displayed, wait several seconds and the thermostat will display the process liquid temperature. The set-point can be viewed at any time by pressing the "SET" button.

The parameter settings of the thermostat have been preset at the factory. The range of the thermostat is 40°F (5°C) to 100°F (38°C). If operation outside of this range is desired, please contact the REMCOR TECHNICAL SERVICE DEPARTMENT at 1-800-551-4423.

CHILLER MAINTENANCE



WARNING: Disconnect electrical power before performing any maintenance on the Chiller.

Condenser

On air cooled chillers, the CONDENSER FINS should be cleaned by blowing compressed air through the condenser from the fan side. Dirt and debris accumulate on the condenser fins over time, and this build up can severely reduce the performance of the Chiller. Cleaning of the CONDENSER FINS should be done approximately every three months, depending upon the cleanliness of your application.

Fan Motor

On air cooled chillers the condenser FAN MOTOR should be lubricated every 6 months with a few drops of SAE 10 oil.

Pump Motor

The PUMP MOTOR should be lubricated with thirty drops of SAE 20 oil once a year.

Circulation System

The CIRCULATION SYSTEM should be drained and flushed periodically to avoid build up and possible flow restriction caused by contaminants.

Filters/Strainers

The FILTER located inside of the unit at the inlet of the pump should be cleaned periodically depending on applications. If a reduction in flow or cavitation of the pump occurs, remove the in-line FILTER, back-flush it with water, rinse, and replace.

TROUBLESHOOTING



WARNING: Disconnect electrical power to the Chiller to prevent personal injury before attempting any internal maintenance. Only qualified personnel should service internal components or electrical wiring.

TROUBLE	PROBABLE CAUSE	REMEDY
CHILLER DOES NOT OPERATE, CONTROL POWER LIGHT "OFF"	A. No Power To Unit.	A. Check Main disconnect fuses, wiring, and power lead to unit.
	B. Defective Control Power Switch.	B. Replace Switch
	C. Defective Control Transformer.	C. Replace Transformer
	D. Wrong Voltage Supplied to Unit.	D. Supplied Voltage Must be within $\pm 10\%$ of nameplate rating.
	E. 3-Phase Monitor tripped.	E. Check for correct voltage level on each phase of incoming 3-phase power. Check for correct phase rotation.
PUMP DOES NOT OPERATE, BUT COOLING LIGHT IS "ON".	A. Line to or from Chiller is restricted.	A. Inspect lines and remove any obstructions.
	B. Internal or external filter is blocked with debris.	B. Remove filter, back-flush, and replace.
	C. Pump Contactor is defective.	C. Replace.
	D. Damaged pump motor or impeller.	D. Replace pump motor or impeller.
CHILLER DOES NOT COOL, AND COOLING LIGHT IS "OFF".	A. Thermostat is defective.	A. Replace Thermostat
PUMP RUNS, COMPRESSOR "SHORT CYCLES".	A. No process load on chiller.	A. Increase process load.
	B. Refrigerant is low.	B. Check refrigerant charge.
UNIT RUNS CONTINUOUSLY, BUT IS NOT COOLING PROCESS LIQUID ENOUGH.	A. Condenser is restricted.	A. Clean condenser.
	B. Unit low on refrigerant.	B. Call Service.
	C. Inefficient compressor.	C. Call Service.
	D. Unit is undersized for application.	D. Call REMCOR Chiller Sales Rep.

TROUBLE	PROBABLE CAUSE	REMEDY
CHILLER DOES NOT OPERATE, BUT COOLING LIGHT IS "ON" AND SAFETY LIGHT IS "ON".	A. Unit is operating under high pressure conditions.	A. Check for dirty condenser fins or obstruction of chiller air intake. Press high pressure manual reset switch.
	B. Unit is operating under low pressure conditions.	B. Check sight glass, if bubbles are seen, leak check unit and recharge with refrigerant. or If no bubbles are seen, replace defective TXV.
	C. Unit is operating under low level conditions.	C. Add liquid to reservoir via fill port. or If level is above switch, replace float switch.
	D. Unit is operating under low temperature conditions.	D. Low or no process liquid flow. Ensure that there is adequate flow through system plumbing. or Process liquid is too cold, below 35°F. Increase thermostat setting. or Defective thermostat, replace.

When servicing a REMCOR Chiller, it is important to note all information provided on the DATA PLATE located in the upper rear of the unit. If technical assistance is needed, the REMCOR Service Technician will need this information along with any description of the problem(s) you are encountering. The serial number and other information will also be required when ordering replacement parts and any other Warranty Claims.

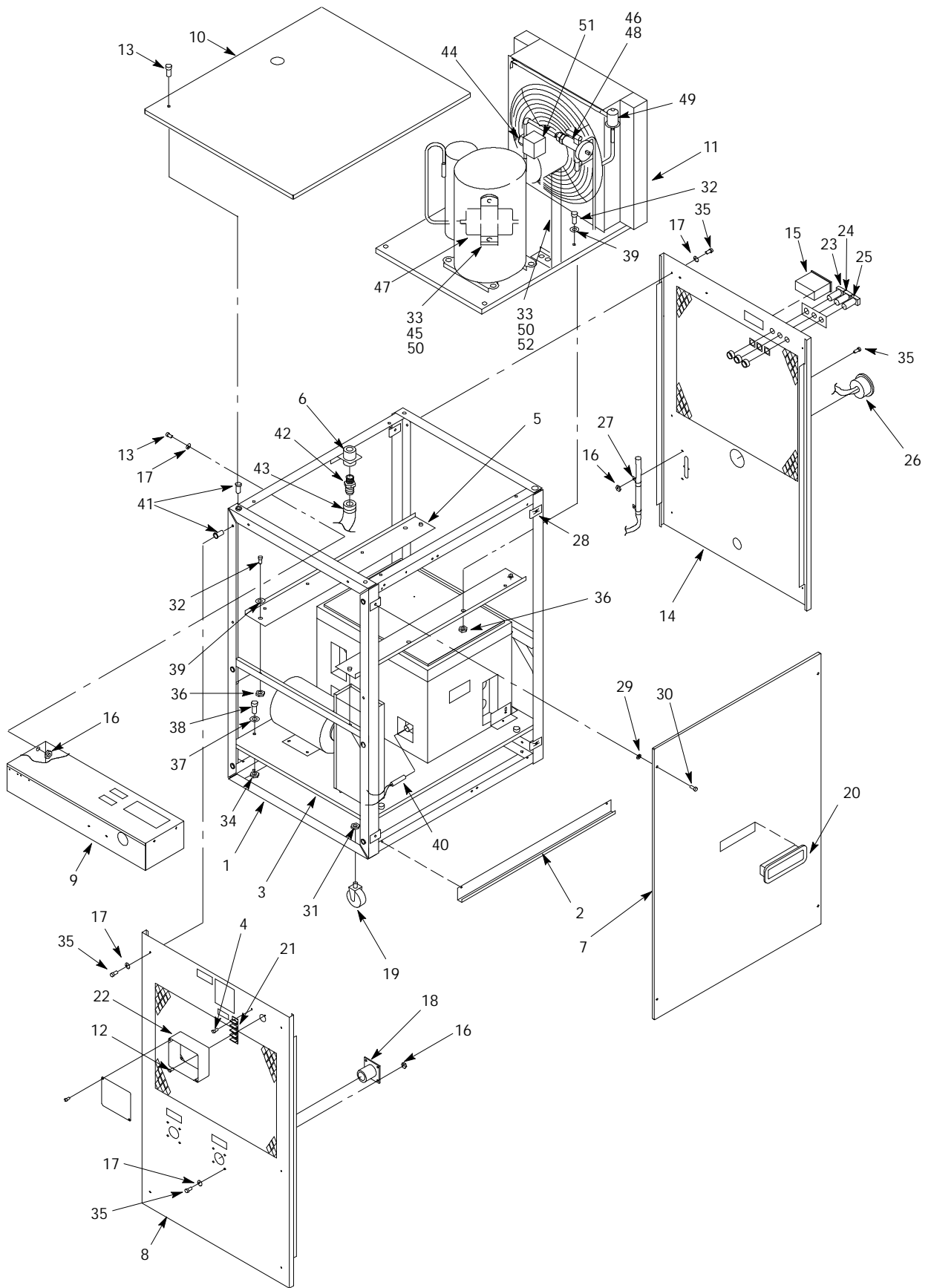


FIGURE 4. CABINET SECTION EXPLODED VIEW

CABINET SECTION

Index No.	Part No.	Qty	Name	Index No.	Part No.	Qty	Name
1	15166	1	Frame	23	32807	1	Indicator Light, Red, 24v
2	15207	2	Support Panel (CH 951)	24	32808	1	Indicator Light, Green, 24v
	15426	2	Support Panel (CH 1502)	25	32806	1	Switch, White, Lighted 24v
3	61170	1	Pump and Tank Ass'y (CH 951; See Figure 6)	26	71058	1	Gauge, Pressure (CH 951)
	61167	1	Pump and Tank Ass'y (CH 1502; See Figure 6)		70950	1	Gauge, Pressure (CH 1502)
4	70190	2	Screw, Hex Hd, No. 8-32 By 1/2-In. Long	27	70325	2	Clamp
5	15159	1	Support, Condenser	28	70951	8	Fastener, Clip On
6	15172	1	Fill Port Ass'y	29	70952	8	Retainer, Push On
7	15165	2	Panel, Side (CH 951)	30	70953	8	Screw, SI Hd, Fastener
	15427	2	Panel, Side (CH 1502)	31	70030	4	Nut
8	15164	2	Panel, Rear (CH 951)	32	70274	8	Screw, Cap Hex Hd, No. 5/16-18 By 3/4-In. Long
	15425	2	Panel, Rear (CH 1502)	33	70048	7	Lockwasher
9	33437	1	Electrical Box Ass'y (CH 951; See Figure 5)	34	70018	7	Hex Nut, 1/4-20
	33585	1	Electrical Box Ass'y (CH 1502; See Figure 5)	35	70171	20	Screw, Phil Hd, No.8-32 By 3/8-In. Long
10	15167	1	Lid (CH 951)	36	70028	12	Nut, 5/16-18
	15428	1	Lid (CH 1502)	37	70065	4	Lockwasher
11	61061	1	Condenser Ass'y (CH 951)	38	70268	4	Screw, CapHex Hd, 1/4-20 By 1-In. Long
	61168	1	Condenser Ass'y (CH 1502)	39	70070	8	Flatwasher
12	70217	4	Screw, Hex Hd, No. 8-32 By 1/2-In. Long	40	32588	1	Probe, Temperature
13	70178	6	Screw, Phil Hd, No. 8-32 By 1/2-In. Long	41	70877	14	Nutsert
14	15163	1	Panel, Front (CH 951)	42	51282	1	Adaptor, 3/4-MPT By 1/2-Barb
	15424	1	Panel, Front (CH 1502)	43	71042	1	Clamp, Hose
15	32386	2	Thermostat Control, 24v	44	60734	1	Solenoid Valve, Hot Gas
16	70076	14	Hex Nut, No. 8-32	45	70344	1	Bracket, Drier
17	70121	24	Lockwasher	46	70475	1	Clamp, TX Valve
18	28876	2	Coupling Ass'y	47	60686	1	Filter Drier
19	70778	4	Caster	48	61003	1	TX Valve
20	70923	2	Handle	49	60975	1	Valve, Auto Expansion
21	32452	1	Terminal Block	50	70032	5	Screw, Cap Hex Hd, 1/4-20 By 1/2-In. Long
22	31036	1	Electrical Box, 4-In.	51	33283	1	Coil, Solenoid 24v
				52	22850	1	Bracket, TX Valve

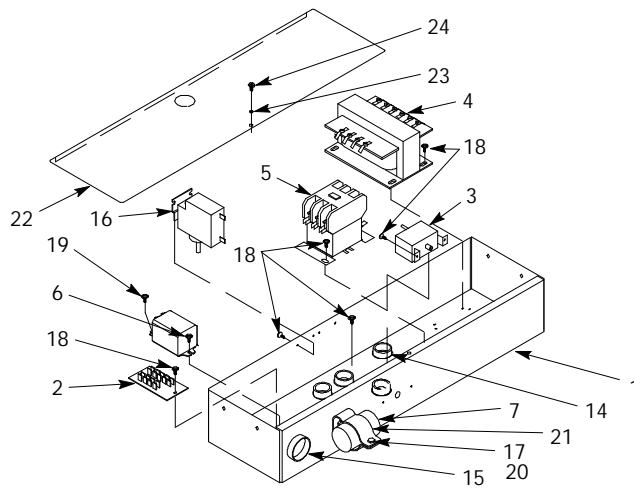


FIGURE 5. ELECTRICAL BOX ASSEMBLY EXPLODED VIEW

ELECTRICAL BOX ASSEMBLY

Item No.	Part No.	Qty.	Name	Item No.	Part No.	Qty.	Name
1	15269	1	Electrical Box	12	33577	1	Wire Harness, Hot Gas (CH 951; Not Shown)
2	309060	1	Terminal Board		33606	1	Wire Harness, Hot Gas (CH 1502; Not Shown)
3	31001	1	Thermostat	13	33578	1	Wire Harness, Thermostat (Not Shown)
4	32804	1	Transformer, 24V 50VA	14	50459	1	Heyco Bushing
5	32922	1	Contactor, Compressor	15	50767	1	Heyco Bushing
6	33082	1	Relay, 24V	16	60501	1	High Pressure Control
7	33339	1	Alarm, 24V	17	70018	2	Hex Nut, 1/4-20
8	33573	1	Wire Harness, Main Power (CH 951; Not Shown)	18	70190	11	Screw, Hex Washer Hd, No. 8-32 By 1/2-In. Long
	33607	1	Wire Harness, Main Power (CH 1502; Not Shown)	19	70215	6	Screw, SI Washer Hd, No. 8-32 By 1/4-In. Long
9	33574	1	Wire Harness, Condenser (CH 951; Not Shown)	20	70263	2	Screw, Cap Hex Hd, 1/4-20 By 3/4-In. Long
	33608	1	Wire Harness, Condenser (CH 1502; Not Shown)	21	70475	1	Clamp, Alarm
10	33575	1	Wire Harness, Alarm (Not Shown)	22	15270	1	Cover, Electrical Box
11	33576	1	Wire Harness, Switch (Not Shown)	23	70121	1	Lockwasher, No. 8
				24	70171	1	Screw, Phil Truss Hd, No. 8-32 By 3/8-In. Long

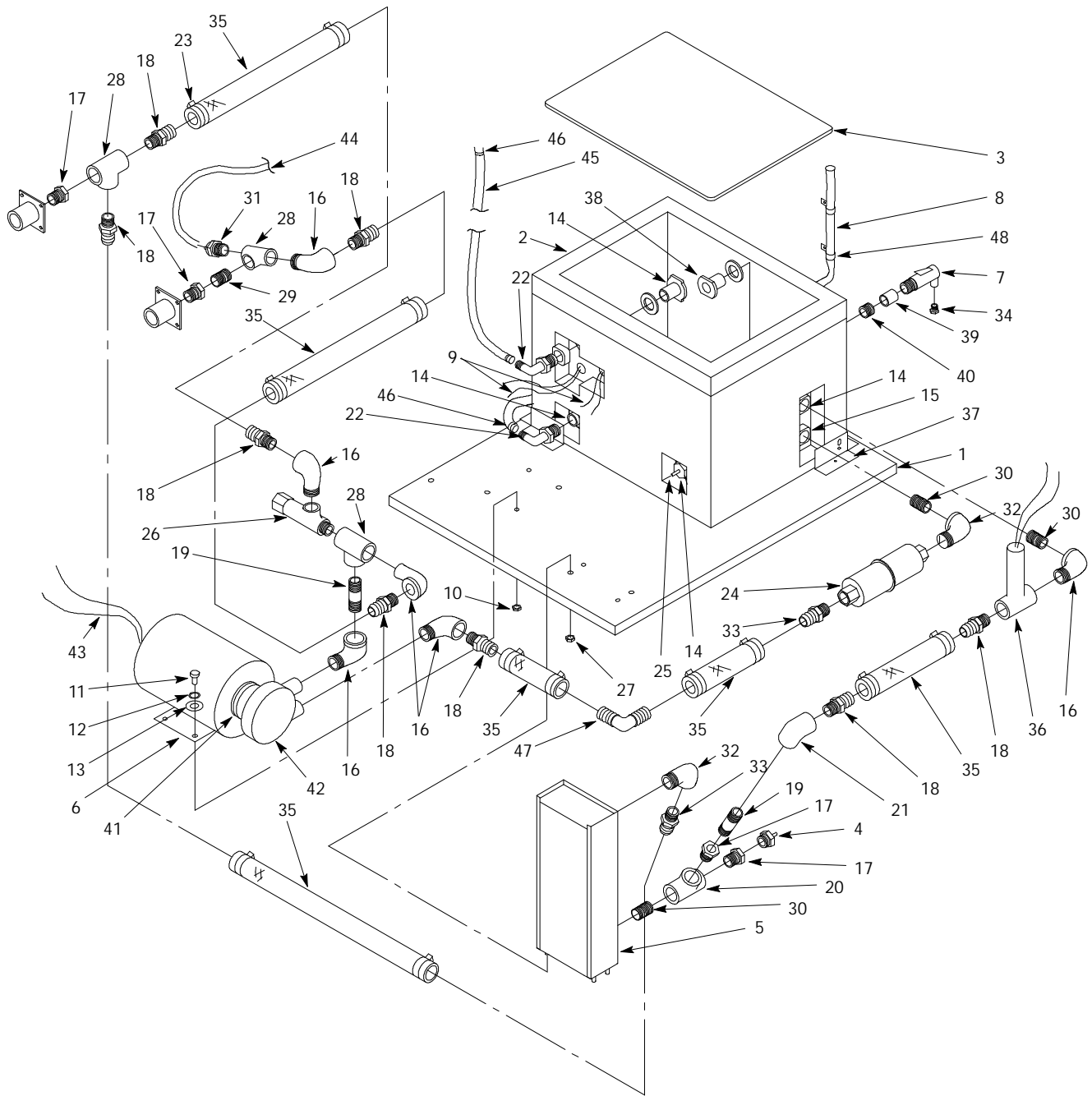


FIGURE 6. PUMP AND TANK ASSEMBLY

PUMP AND TANK ASSEMBLY

Item No.	Part No.	Qty.	Name	Item No.	Part No.	Qty.	Name
1	15162	1	Base	29	41473	1	Nipple, 1/2-NPT, Stainless Steel (CH 951)
2	53206	1	Tank		40902	1	Nipple, 1/2-NPT, Brass (CH 1502)
3	53192	1	Cover	30	41477	2	Nipple, 3/4-NPT, Stainless Steel (CH 951)
4	27866	1	Thermalwell		41442	3	Nipple, 3/4-NPT, Brass (CH 1502)
5	61169	1	Evaporator	31	41478	1	Fitting, 1/2-MPT, Stainless Steel (CH 951)
6	32382	1	Motor, Pump, 1/3 HP 115/230V		41495	1	Fitting, 1/2-MPT, Brass (CH 1502)
7	53223	1	PVC Valve	32	41467	2	Fitting, Elbow, 3/4-NPT, Stainless Steel (CH 951)
8	50351	1	Tube, .500 I.D. By 28-In. Long		41096	2	Fitting, Elbow, 3/4-NPT, Brass (CH 1502)
9	33159	2	Sensor, Low Level	33	41462	2	Fitting, Elbow, 3/4-NPT By 3/4-Barb, Stainless Steel (CH 951)
10	70028	4	Hex Nut, 5/16-18		40841	2	Fitting, Elbow, 3/4-NPT By 3/4-Barb, Brass (CH 1502)
11	70274	4	Screw, Cap, Hex Hd, No. 5/16-18 By 3/4-In. Long	34	51425	1	Plug, 1/4-MPT
12	70065	4	Lockwasher	35	53157	1	Tube, .750 I.D. By 3-In. Long
13	70070	4	Flatwasher		53157	1	Tube, .750 I.D. By 6-In. Long
14	50991	4	Bulkhead, 1/2 I.D.		53157	1	Tube, .750 I.D. By 7-In. Long
15	51842	1	Bulkhead, 3/4 I.D.		53157	1	Tube, .750 I.D. By 8-In. Long
16	41266	6	Elbow, 1/2-NPT, Stainless Steel (CH 951)		53157	1	Tube, .750 I.D. By 10 1/2-In. Long
	40904	6	Elbow, 1/2-NPT, Brass (CH 1502)		53157	1	Tube, .750 I.D. By 22-In. Long
17	41474	4	Bushing, Fitting, 3/4-NPT By 1/2-NPT, Stainless Steel (CH 951)	36	31971	1	Switch, Flow, Brass (CH 1502)
	41485	4	Bushing, Fitting, 3/4-NPT By 1/2-NPT, Brass (CH 1502)	37	26198	2	Bracket, Tank
18	41468	9	Fitting, 1/2-MPT By 3/4-Barb, Stainless Steel (CH 951)	38	51704	1	Fitting, 3/8-PVC
		8	Fitting, 1/2-MPT By 3/4-Barb, Brass (CH 1502)	39	53226	1	Fitting, Coupler, 3/8-PVC
19	41488	3	Fitting, 1/2-MPT, 2 1/2-In. Long, Stainless Steel (CH 951)	40	53225	1	Fitting, 3/8-PVC By 1 1/2-In. Long
	41444	2	Fitting, 1/2-MPT, 2 1/2-In. Long, Brass (CH 1502)	41	32385	1	Clamp, Pump to Motor
20	41476	1	Fitting, Tee, 3/4-NPT, Stainless Steel (CH 951)	42	32384	1	Pump (CH 951)
	41040	1	Fitting, Tee, 3/4-NPT, Brass (CH 1502)		32357	1	Pump (CH 1502)
21	41470	2	Fitting, Elbow, 1/2-NPT, Stainless Steel (CH 951)	43	30121	1	Electrical Cord
	41443	1	Fitting, Elbow, 1/2-NPT, Brass (CH 1502)	44	51350	1	Tube, .250 I.D. By 30-In. Long
22	51075	2	Elbow, 1/2-MPT By 1/2-Barb	45	50351	1	Tube, .500 I.D. By 25-In. Long
23	71045	10	Clamp, Tube	46	71042	3	Clamp, Tube
24	41438	1	Filter, Water	47	51280	1	Fitting, Elbow, 3/4-Barb (CH 1502)
25	24676	1	Thermowell	48	70325	2	Clip
26	41461	1	Bypass Valve, Stainless Steel (CH 951)				
	40645	1	Bypass Valve, Brass (CH 1502)				
27	70018	4	Hex Nut, 1/4-20				
28	41268	3	Tee, 1/2-FPT, Stainless Steel (CH 951)				
	40903	3	Tee, 1/2-FPT, Brass (CH 1502)				

WARRANTY

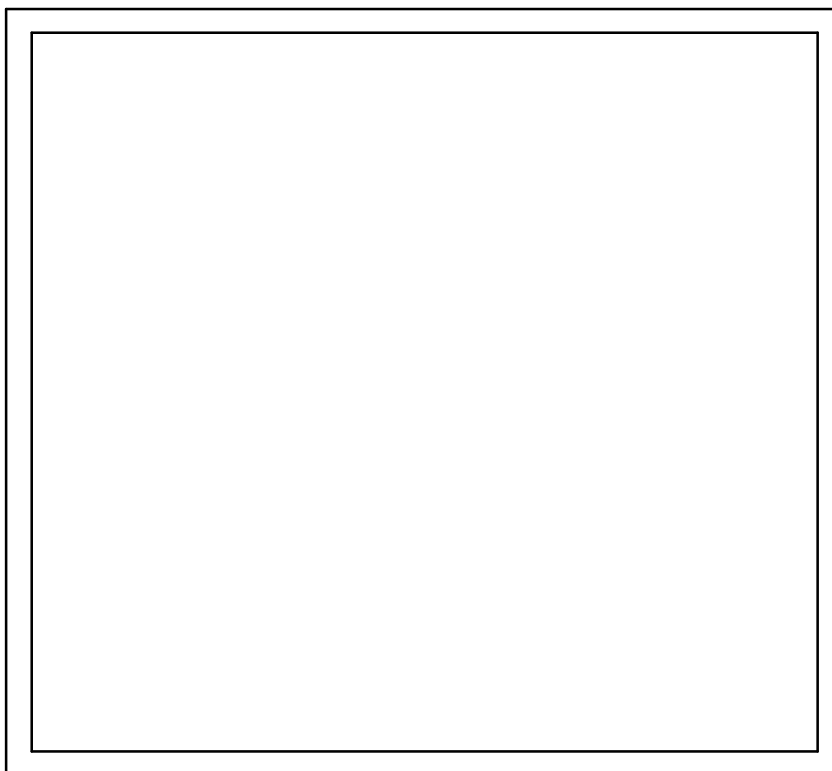
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