

OWNER'S MANUAL

MODULAR STEAM COIL BOILER

MODELS:

- M24SC
- M36SC



MARKET FORGE
INDUSTRIES INC.
An Employee Owned Company

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INTRODUCTION

Polished stainless steel cabinet base shall be of modular design to match other Market Forge cooking equipment, and equipped with 6" 152mm stainless steel legs, adjustable bullet feet, reinforced stainless steel counter-top and stainless steel lift-off front panel.

Stainless steel steam coil generator equipped for operation at 15 PSI (1kg/cm^2). Unit shall include as standard an automatic drain, cold water condenser, automatic water level control, low water cut off, pressure control, air vent, and a safety relief valve.

Steam generator shall be National Board Registered, and shall be suitable for installation tight against a non-

combustable wall. Steam generator shall be ASME constructed of 15 PSI operation.

Steam generator shall be automatically filled with cold water and brought to pressure when heat and water switches are turned on and automatically drain under pressure shall automatically condense exhausted steam into water before releasing it to drain.

OPERATION:

Unit equipped for operation with minimum incoming pressure of 20 PSI (1.4kg/cm^2) and a maximum incoming pressure of 50 PSI (3.5kg/cm^2), producing a minimum output of 2.6 BHP and 88 pounds of steam per hour.

INSTALLATION

WARNING: Read before opening the shipping containers. Do not at any time lay the equipment down on its back, side, top or front. To do so may damage the equipment and invalidate the warranty.

RECEIVING INSTRUCTIONS:

Inspect the equipment before signing the bill of lading. The equipment supplied was tested and inspected before shipment. The carrier accepted it as complete and without damage.

This merchandise became your property when it was accepted by the carrier at the factory. Market Forge cannot assume responsibility for loss or damage during transit. For this reason, you should immediately inspect for visible and concealed damage or shortages before signing for shipment as follows:

1. Count the number of cartons and packages received to be sure they coincide with the bill of lading.
2. Visually check all cartons for external damage.
3. Remove all cartons from their skids to examine equipment for concealed damage. The carton is nailed and strapped to the skid. It will be necessary to cut the straps and pry off the container.
4. After inspection, replace the cartons over the equipment on the skids to protect and secure the equipment until it is ready for installation.
5. Sign for shipment if all is in order. Note shortages, external and concealed damage, if any, on the bill of lading before accepting a partial or damaged shipment.
6. If necessary, contact the carrier immediately to file a claim. All claims must be filed by the receiver.

7. Do not remove the cartons or the skids from the cooking equipment until the unit has been transported through the building to the actual set-up location. The cartons should remain on the equipment as protection against dents and scratches.

SETTING IN PLACE:

Installing legs:

Some models are shipped without legs. A separate carton will contain the legs. If your model is received this way be sure to follow the installation instruction sheet packed with the legs.

Leveling:

In order for the boiler to drain correctly it is important to use a level on cabinet top, both left and right and front-to-back. If not level adjust feet. On compartment cookers check interior shelves to be level.

Panels and Doors:

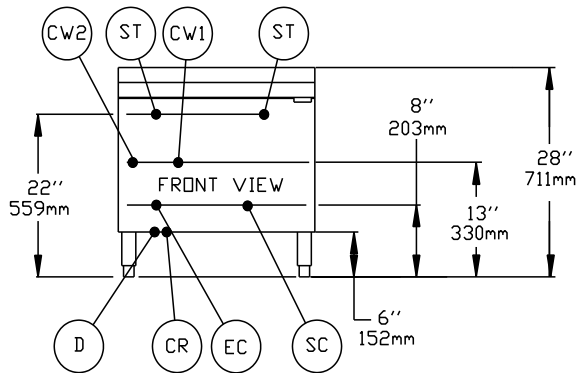
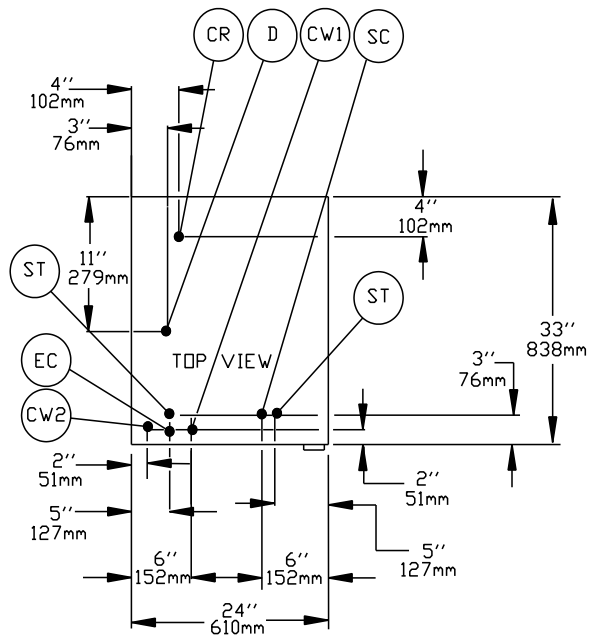
Panels and doors for the cabinet may be shipped separate. Refer to installation instructions enclosed with panels and doors for method of attaching. It is recommended that panels and doors be installed after mechanical connections are made to avoid damage.

IMPORTANT INFORMATION ON STEAM COIL STEAM GENERATORS TO STEAM FITTER:

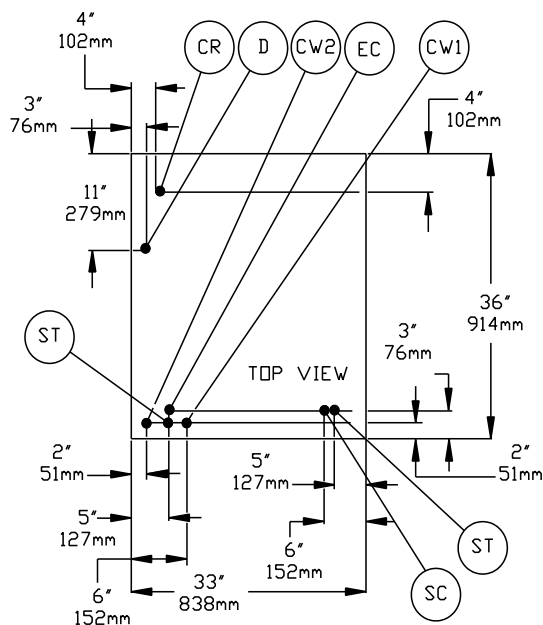
The use of steam coil operated equipment is increasing, and it is important that you are aware of both the advantages and the limitations of this equipment.

A steam coil generator assures a supply of clean steam, and is generally recommended when steam is available

INSTALLATION



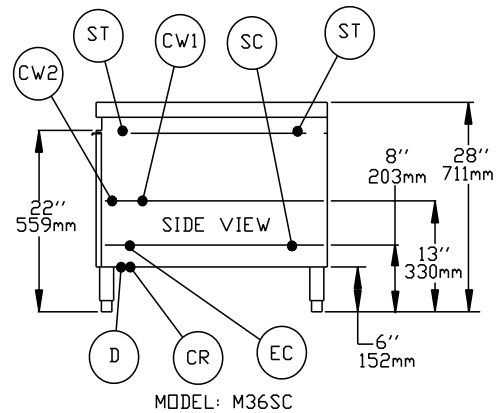
MODEL: M24SC



SERVICE CONNECTIONS

Steam Coil Operated

SC	Steam Supply - 1/2" (13mm) IPS connection for incoming steam at a minimum pressure of 20 PSI (1.4kg/cm ²) and a maximum pressure of 50 PSI (3.5kg/cm ²).
CW1	Cold Water - 3/8" (10mm) NPT for cold water to boiler. Cold water lines will have a maximum of 50 PSI (3.5kg/cm ²) and a minimum of 25 PSI (1.8 kg/cm ²) water pressure (Water may be filtered).
CW2	Cold Water - 3/8" (10mm) NPT for cold water to condenser. Cold water lines will have a maximum of 50 PSI (3.5kg/cm ²) and a minimum of 25 PSI (1.8 kg/cm ²) water pressure.
EC	Electrical Connection - 120 Volt AC, 60 Hz, 2 Amps, 1/2 (13mm) conduit connection or equivalent. Use wire suitable for at least 90°C.
CR	Condensate Return - 1/2 (13mm) IPS condensate return from steam generator connected to condensate return line.
ST	Steam Take-off - Connection for operation of adjacent steam powered equipment.



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but not, considered clean enough to come in contact with food. Toxic steam generator cleaning compounds are often used to clean steam generators, and this is usually the reason for not recommending direct connected cookers.

It is very important that a minimum of 15 PSI be available in the incoming steam line if a steam coil steam generator is to be installed for use with a 5 PSI compartment cooker. If the equipment connected to the steam generator operates at 15 PSI, minimum incoming pressure must be 30 PSI, except in the case of a single Steam-It, which can be operated on an incoming pressure of 20 PSI. Maximum recommended incoming steam pressure is 50 PSI. *(the table below)* shows Boiler Horse Power (BHP) generated by our steam coil boilers at various incoming pressures. One (1) BHP is required for each cooking compartment in "A" and "W" models. A jet cooker requires 3 BHP and a Steam-It 112 BHP. It is not necessary to include steam requirements for kettles, as kettles may be direct connected since the steam does not come into contact with the food.

TABLE 1:

Pressure maintained on incoming Steam line	BHP OUTPUT	
	Steam generator set at 15 PSI	Steam generator set at 5 PSI
15 PSI	--	3.5
20 PSI	8	4.0
30 PSI	3.4	(Max. BHP available regardless of incoming pressure)
35 PSI	4.0	

Please note that a steam coil boiler set at 5 PSI will generate more boiler horsepower than one set at 15 PSI. This is because the greater temperature differential between the steam on the incoming line and the steam generated in the steam generator, the greater the BHP available. For proper cooking results you must have sufficient steam flow. Both pressure and volume are important. This relates to pipe size and steam supply to the steam coil steam generator.

BOILER HORSEPOWER & STEAM FLOW INFORMATION:

Recommended boiler horsepower and steam flow in pounds per hour (**Note:** one boiler horsepower 34.5 lbs. of steam per hour. Do not confuse steam pressure with steam flow).

TABLE 2:

	Delivered Boiler H.P.	Steam Flow Lbs. Steam Per Hour
Compartment Steam Cookers <i>(per compartment)</i>	1	34.5
Steam Jacketed Kettles <i>(Per 20 gallons)</i>	1	34.5
Direct Connect Steam-It	1/2	17.25

TABLE 3:

Follow of steam in pipe, in pounds of steam per inch.

Line pressure in lbs. per square inch (PSI)	Pipe Size in inches					
	1/2	3/4	1	1 1/4	1 1/2	2
5	60	110	200	390	550	970
10	70	125	220	430	610	1075
15	75	135	240	470	665	1170
20	80	145	255	505	715	1255
25	85	155	270	530	740	1300
30	90	165	285	565	800	1400
40	100	185	320	615	885	1550
50	108	200	345	680	965	1680
60	114	214	368	730	1030	1800
70	120	226	390	770	1095	1910

Capacities are based on allowing a pressure drop of 2 PSI in a length of pipe equal to 240 diameters of pipe. For example *(Figure 1)* in one-inch pipe at the steam flows shown, there would be a pressure drop of 2 PSI in 240 inches, *(20 Feet)* of straight run.

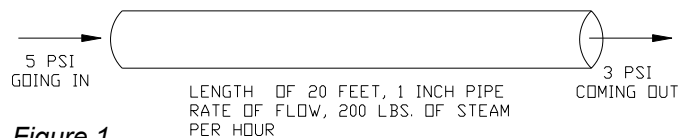
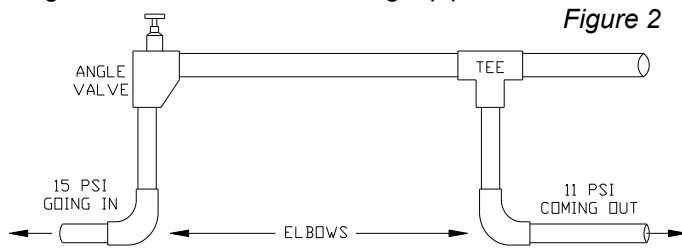


Figure 1

If the rate of flow is increased, the pressure drop will be greater. If the rate of flow is decreased the pressure drop will be less. Elbows, valves and other fittings cause greater pressure drop. In determining proper pipe size at a given line pressure to deliver the desired rate of steam flow and pressure at the steam cooker, it is necessary to know not only the actual length of pipe run, but also the equivalent length of run. Each fitting or value causes resistance equal to a certain length of straight pipe. This equivalent length must be added to the actual length of 20 feet of 20 inches of pipe with two elbows, an angle valve and side outlet tee. Table 5 on page 4 shows that to determine the equivalent length of run we must add 2.2 feet for each of the elbows, 12 feet for the angle valve and 5 feet for the side outlet tee, giving us an equivalent

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length of run of 41.4 feet of straight pipe.



Actual run 20 feet. Equivalent run 41.4 feet. Rate of flow 240 pounds of steam per hour.

TABLE 4: Resistance of fittings expressed in terms of equivalent length of straight pipe. (*Measurements are in feet*)

Pipe Size	Standard Elbow	Side Outlet Tee	Gate Valve	Globe Valve	Angle Valve
1/2"	1.3'	3'	0.3'	14'	7'
3/4"	1.8'	4'	0.4'	18'	10'
1"	2.2'	5'	0.5'	23'	12'
1 1/4"	3.0'	6'	0.6'	29'	15'
1 1/2"	3.5'	7'	0.8'	34'	18'
2"	4.3'	8'	1'	46'	22'

TABLE 5: Temperature (°F) of steam at various altitudes and pressures.

Altitude	5 PSI	10 PSI	15 PSI
Sea Level	227	240	250
2,000 feet	224	237	248
5,000 feet	220	234	245
10,000 feet	213	228	240

Rule-of-thumb Conversion Information

1 BHP - approximately 10 kW.

1 BHP - approximately 34,000 BTU

These conversions are easily remembered approximations. In making conversions, the efficiency of the steam generator must be considered. A gas steam generator with an input of 34,000 BTU and operating at 50% efficiency will deliver 1/2 BHP.

STEAM FITTER & PLUMBER:

Steam Connection:

It is recommended that whenever possible the steam input to the steam generator be a separate line from the source of supply. If the steam generator must be piped to a line which also supplies other steam consuming devices the pipe size and pressure will have to be verified as to capacity.

SUGGESTED STEAM CONNECTIONS:

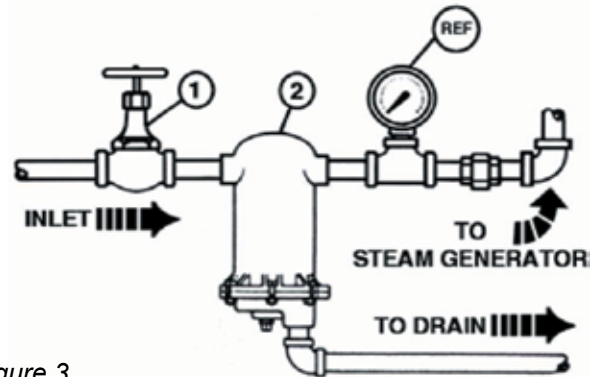


Figure 3

ITEM	DESCRIPTION	PART #
1	3/4" Globe Valve	10-2821
2	Ball Float Trap	10-5336
3	Pressure Gauge	-----

Figure 3 shows a recommended system of the installation which includes the following equipment: A globe valve, for shut off, a ball float trap which assures that the steam supply is clean and dry, and a pressure gauge to measure inlet pressure from the source of supply. *Note: If steam supply line has an extremely high excess amount of condensate, it may be necessary to install two ball float traps.*

IMPORTANT: Before making final connection, blow out the steam line to remove all dirt, scale, packing, etc., that may be accumulated during pipe fittings.

If condensate coming out of the coil is to be returned to the customer's steam generator, disconnect the condensate tubing from the main drain and connect it to the optional condensate return fitting (*See page 2 for location of this connection*).

SETTING OF STEAM GENERATOR PRESSURE CONTROL SWITCHES (on models before 1979):

To be sure steam generator pressure control switches are set properly, use the following procedure:

1. Start steam generator and allow it to build up pressure - 5 or 15 pounds.
2. Release pressure into cooking chamber by turning on unit.
3. Shut off cooking unit and let steam generator build back up to pressure. Check the steam pressure gauge. If pressure is within 10% of recommended operating pressure the pressure control switches are adjusted properly and the unit is operating satisfactorily.
4. Steam generator pressure switches are factory set

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and should not be adjusted unless absolutely necessary. If pressure is found to be other than above, proceed as follows.

- Remove front cover from modular control box.
- With screwdriver adjust pressure switches (A) and (B). Steam coil steam generators used to generate steam for a Steam-Irt, Steam Cooker or Kettle which operate at 15 PSI should be set as follows: Switch (A) should be steam at 12 PSI and switch (B) should be set at 20 PSI. If 15 pounds steam generator is used for 5 pounds operation, follow above instructions and then refer to *"adjusting watts 3/4" pressure reducing valve"*.
- Steam coil steam generator used to generate steam for compartment type steam cooker which operates at 5 PSI should be set as follows: Switch (A) should be set at 5 PSI and switch (B) at 10 PSI.
- Dial C is the differential dial and should always be set at 1 PSI on both switch (A) and (B).
- The cold water condenser thermostat (Dial D) is provided as standard equipment with all automatic drain steam generators. This thermostat is preset at the factory for 140°F and should not be re-adjusted in the field.

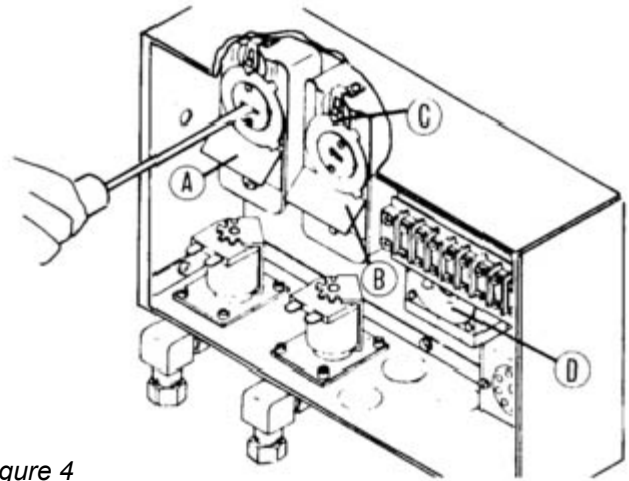


Figure 4

NOTE: On either model steam generators, adjustments of the pressure control switches may be done with a screwdriver as shown. Later model steam generators require the use of a special wrench, which may be obtained from Market Forge.

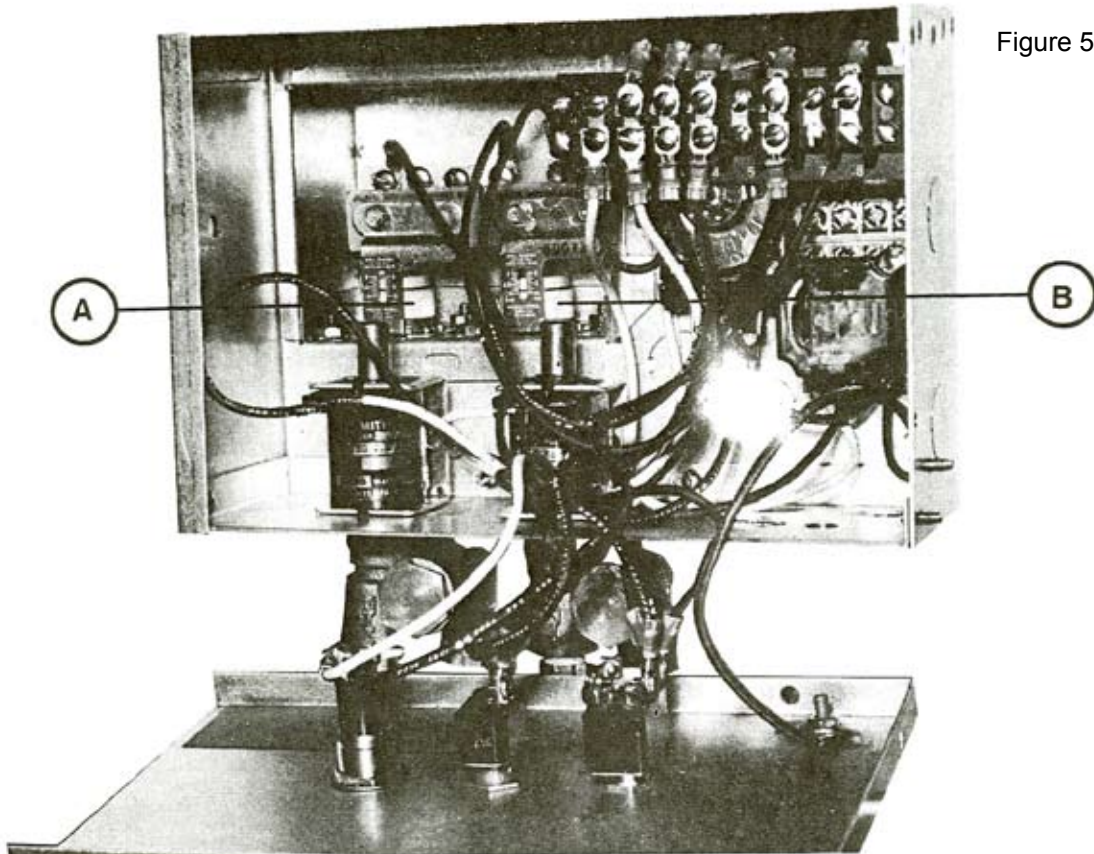


Figure 5.

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PRESSURE CONTROL SWITCH ADJUSTMENT

(on models after 1979): Refer to figure 5 on page 5.

If generator fails to maintain steam pressure in operating range, pressure control switch may require adjustment.

1. Start generator and allow pressure to build up to operating level - 15 PSI.
2. Check generator pressure gauge. If gauge indicates 12 to 14 PSI, pressure control switches are properly adjusted.
3. If generator does not come on when pressure gauge reads 12 PSI and does not go off when pressure gauge reads 14 PSI, proceed as follows:
 - Remove screws and lift front cover off control box. **WARNING: Because power must be on to adjust pressure switches, be sure to protect against electrical shock.**
 - Hand adjust operating pressure control switch (A) and high limit pressure control switch (B) by turning adjusting nut (*Knurled knob*) clockwise to raise and counterclockwise to lower actuation point. Switch (A) should be set so that generator comes on when generator pressure gauge reads 12 PSI and goes off when gauge reads 14 PSI. Switch (B) should be set so that generator will shut off if pressure reaches 15 PSI. If 15 pounds steam generator is used for 5 pounds operation, follow above instructions and refer to "adjusting watts 3/4" pressure reducing valve".
 - The actuation valve (differential) is factory set and can not be changed.
 - The cold water condenser thermostat is pre-set at the factory for 130°F and should not be changed.
 - Repeat steps 1 through 3. If 12 to 14 PSI generator pressure gauge operation, adjustment is correct. If proper adjustment can not be made, consult "trouble-shooting guide on page .
 - After making adjustments, replace cover on control box.

WATER LEVEL CONTROL (on models before 1984):

The water level control used by Market Forge is a float type switch with a float ball inside the boiler. The water level control is equipped with two micro-switches which turn the water supply on and off and the power supply on and off (refer to figure 6).

Micro-switch (A) prevents the source of power from coming on until there is an adequate supply of water in the boiler. Micro-switch (B) shut off water supply when the water level has reached 2/3 full as viewed in the gage glass.

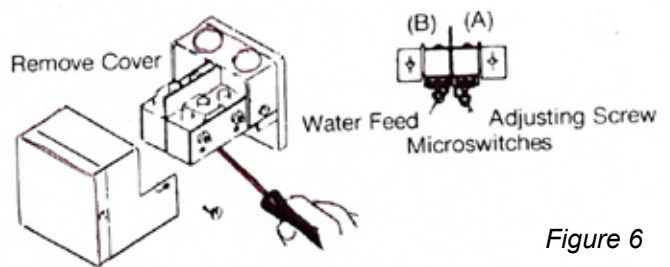


Figure 6

CAUTION: Before removing cover disconnect 115V power supply. When the boiler is full, water level should reach 2/3 full in gauge glass and the water feed should shut off. If this is not correct, remove cover to water level control and adjust micro-switch (B). To adjust, loosen lock nut and turn screw clockwise to raise level and counterclockwise to lower level.

If no water is visible in gauge glass and power comes on when water switch is reset, this indicates that:

1. Micro-switch (A) is out adjustment and must be readjusted. To adjust, remove cover to water level control, loosen lock nut and turn adjusting screw clockwise. Continue this adjustment so that heat does not come on until the gauge glass is 2/3 filled with water.
2. Use ohmmeter across to check for proper continuity through micro-switches.

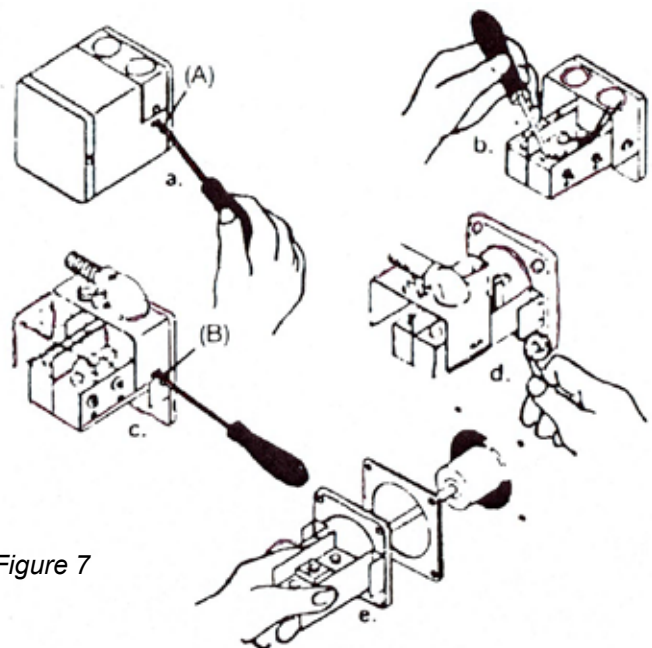


Figure 7

DISASSEMBLY INSTRUCTIONS: Refer to Figure 7.

Remove water level control as follows:

1. Remove the two screws (A) on either side and remove the cover.
2. Disconnect the 4 initial wires from their terminal posts to simplify reassembly.

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- Remove the two screws (B) on either side of housing. The housing, with all external wiring still attached, may then be removed to one side.
- With an allen set screw wrench remove the set screws at the four corners of the mounting plate.
- Pull out and remove the complete float assembly and gasket from the boiler.
- Clean the internal boiler parts of the water level control. Use a tooth brush to clean the bellows. If the deposits are excessive, a flat blade putty knife may be used to clear accumulations from between the bellows fins. However, care should be used not to rupture them or twist bellows out of alignment. When satisfied that the complete float switch assembly is clean and that the bellows are free to operate properly, reinstall assembly into the boiler using a new gasket to establish a firm seal. First, be sure that surfaces contacting the gasket are completely clean. Reverse the disassembly steps to reinstall into the boiler
- CAUTION:** Be sure to check adjustments as shown.

WATER LEVEL CONTROL (on models after 1984):

CAUTION: Before removing cover, disconnect power supply. The McDonnell-Miller Water Level Control is not adjustable. If not functioning properly, entire water level control must be replaced.

TO REMOVE WATER LEVEL CONTROL:

- Remove cover from terminals.
- Disconnect wires.
- Remove screws from retaining collar.
- Remove retaining collar.
- Screw water level control out of boiler.

To install water level control, reverse above instructions making sure the top of the water level control has "TOP" is upright before tightening retaining screws.

WATTS PRESSURE REDUCING VALVE - 3/4":

The watts pressure reducing valve is designed to operate at 7 to 50 PSI source of steam pressure and reduce this to 5 PSI for delivery to your cooker. To provide adequate pressure regulation, this unit may be equipped with this valve. Installation must be made from your source steam supply, through the pressure reducing valve and into the manifold input of the steam cooker.

Operation of Watts Pressure Reducing Valve - 3/4": (Refer to Figure 8) Steam enters the valve at the inlet port and passes up-ward through the seat (8) into the discharge side of the valve. As pressure in the discharge side increases, it forces the diaphragm (2) upward,

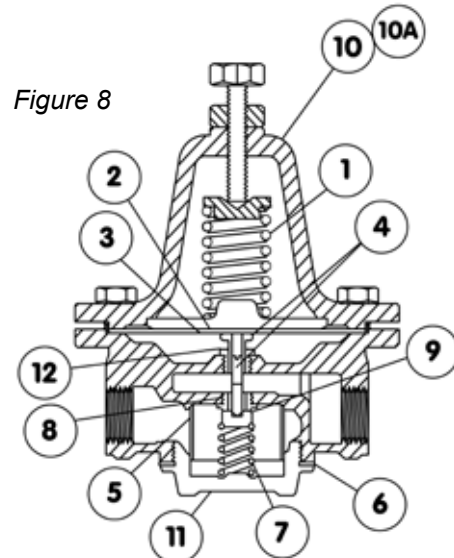


Figure 8

WATTS PRESSURE REDUCING VALVE - 3/4"

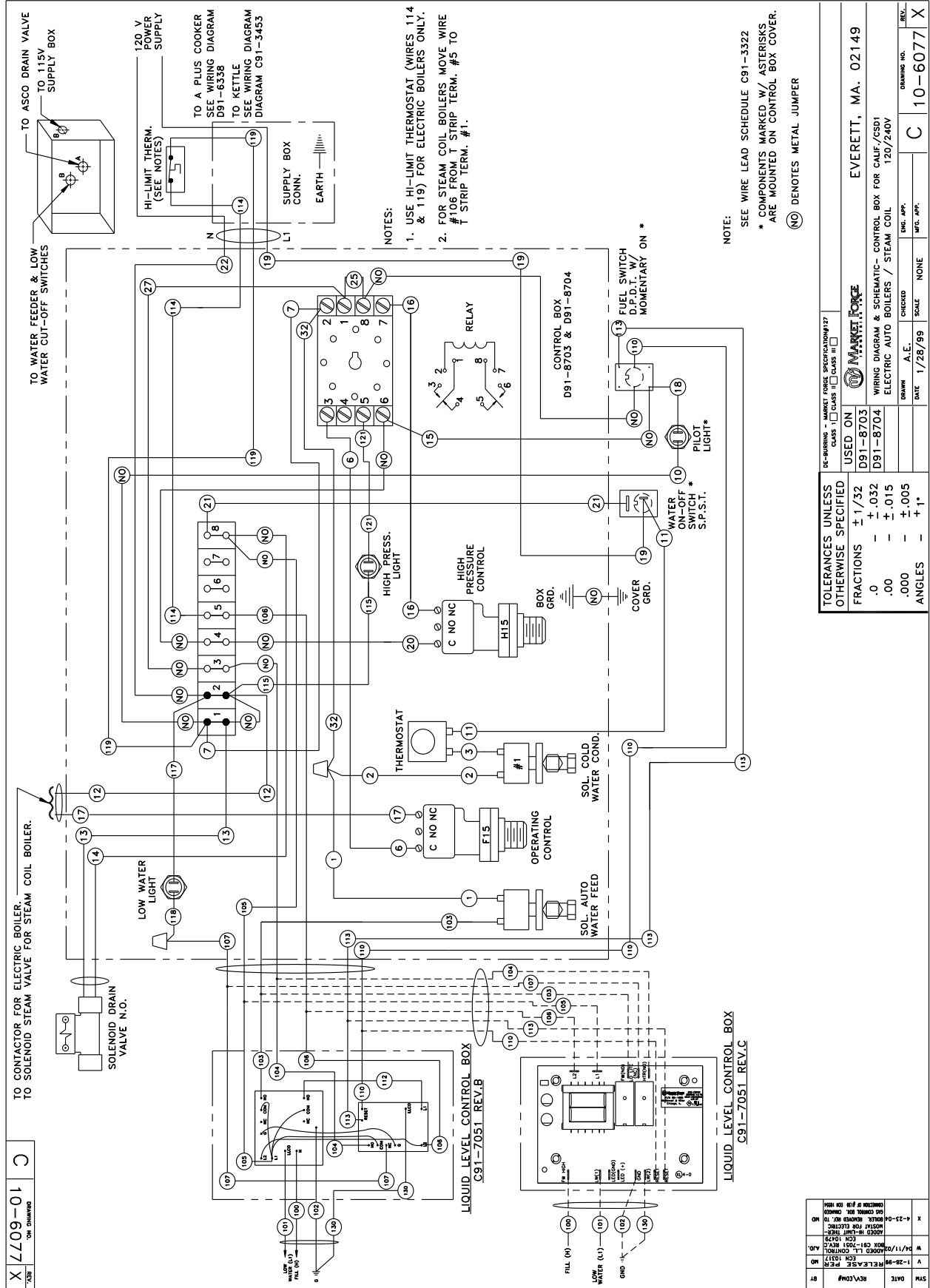
ITEM	PART #	DESCRIPTION
1	10-1083	ADJUSTING SPRING
2	10-1082	DISPHRAGM
3	10-1075	DISPHRAGM GASKET
4	10-1076	DISPHRAGM BUTTON STEM ASSY.
5	10-1077	STRAINER
6	10-1078	BOTTOM PLUG
7	10-1079	BOTTOM SPRING
8	10-1080	SEAT
9	10-1081	DISC ASSY.
10	10-1033	3/4" COMPLETE VALVE - ENAMELED
--	10-1034	3/4" COMPLETE VALVE - CHROME

overcoming the tension of the adjusting spring (1) and closing valve. As the pressure drops, the adjusting spring forces the diaphragm down, reopening the valve. Where demand and initial pressures are fairly constant, the valve opens to the proper position and maintains the desired reduced pressure.

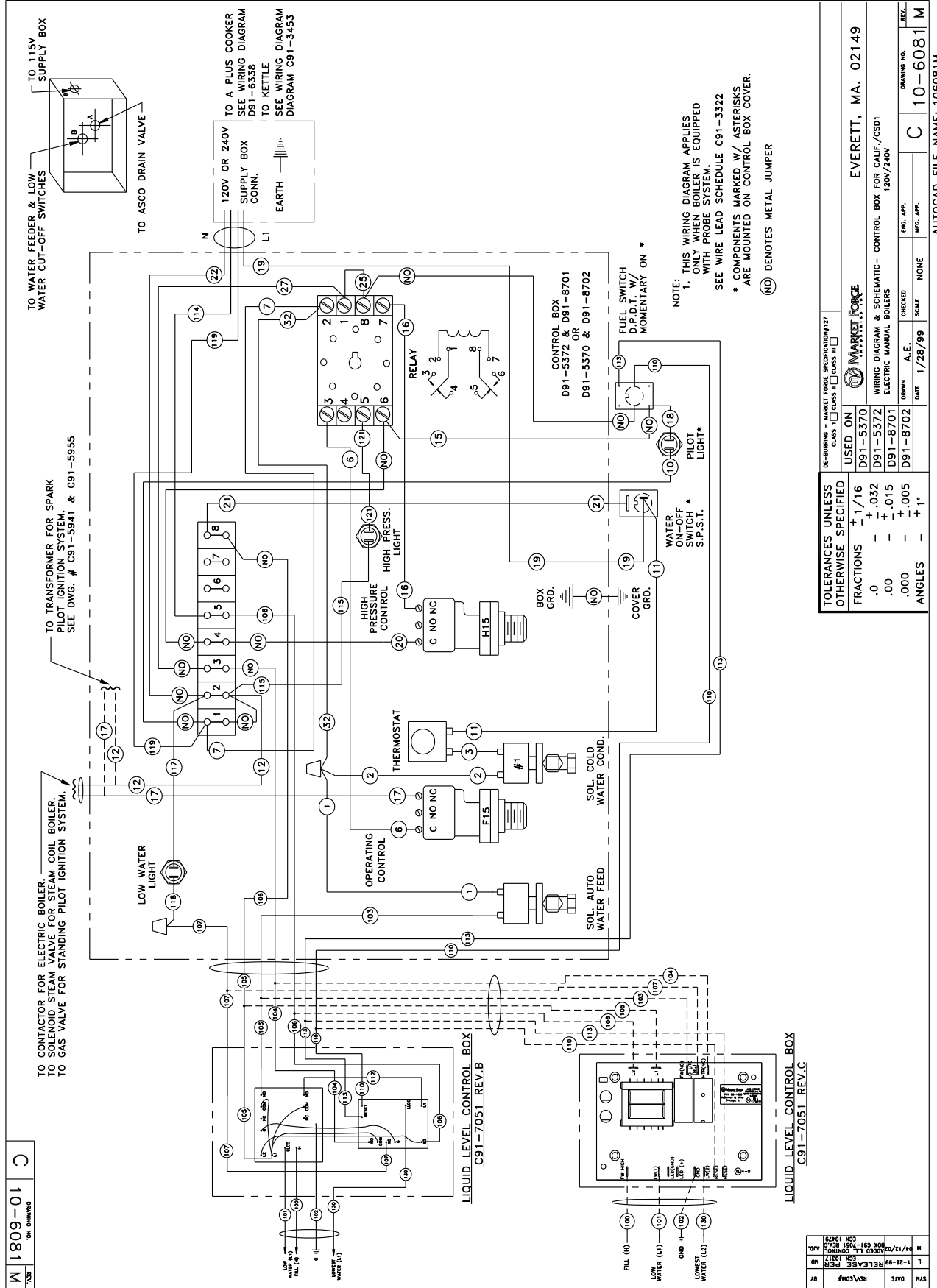
Adjusting Watts Pressure Reducing Valve - 3/4":

- Release the adjusting screw enough to release all tension on adjusting spring (1).
- Turn steam on slowly. The turn adjusting screw clockwise just enough to allow the valve to open slightly. Allow generator to operate in this manner several minutes.
- Turn adjusting screw down slowly, at intervals, until reduced pressure reaches the desired point (5 PSI).
- Tighten adjusting screw lock nut.
- If chattering noise should occur turn adjusting screw located in bottom half of valve body clockwise or counterclockwise until chattering stops.

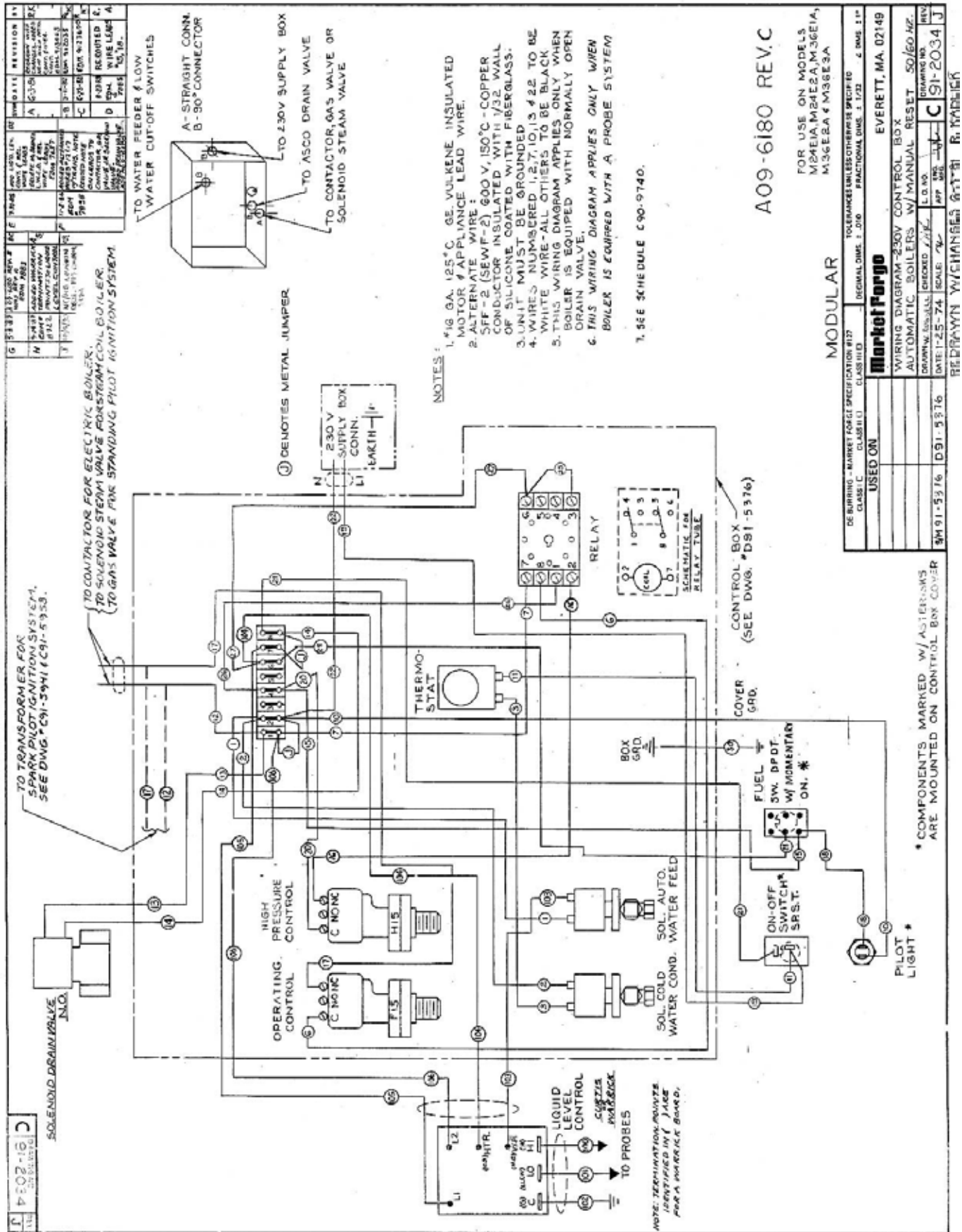
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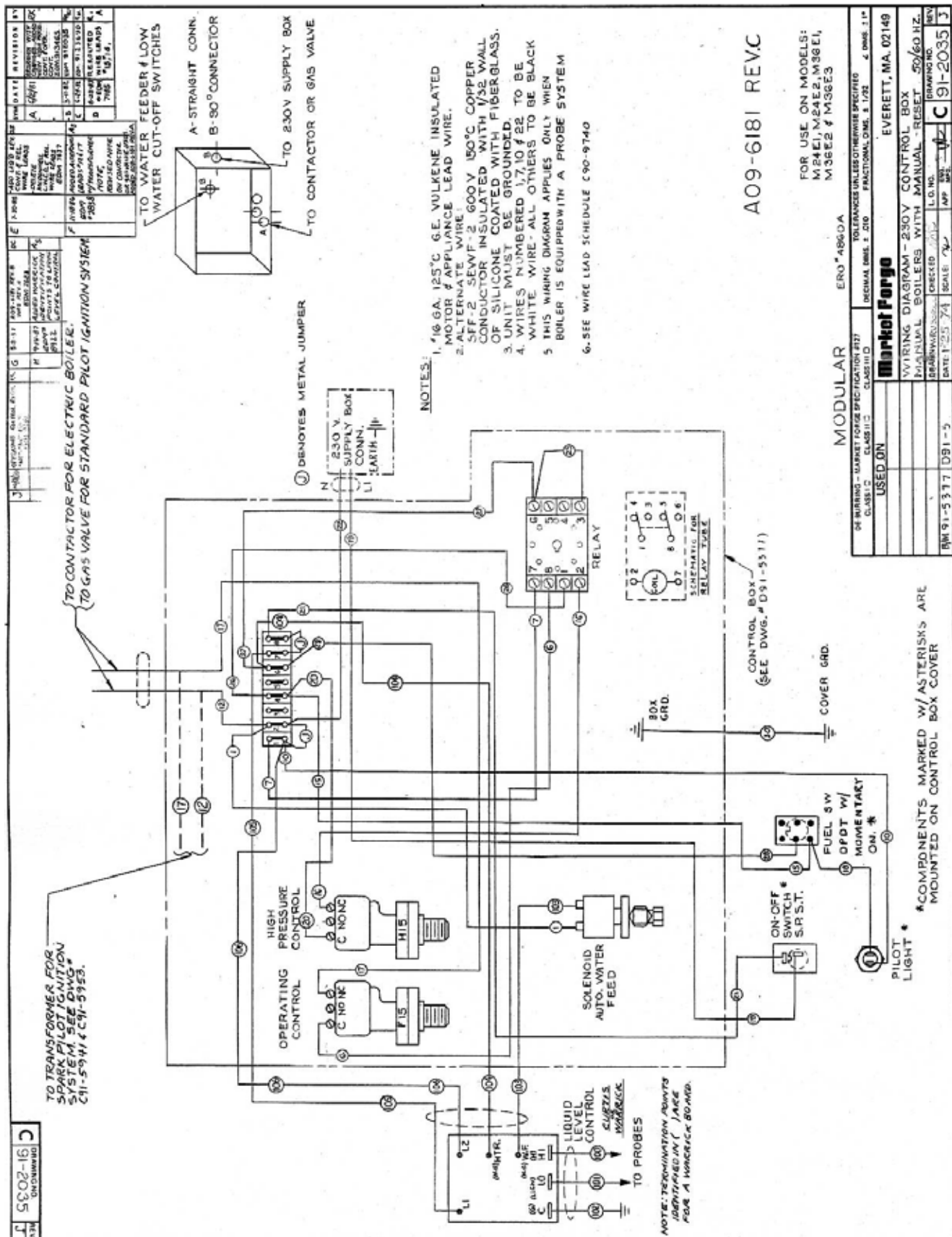
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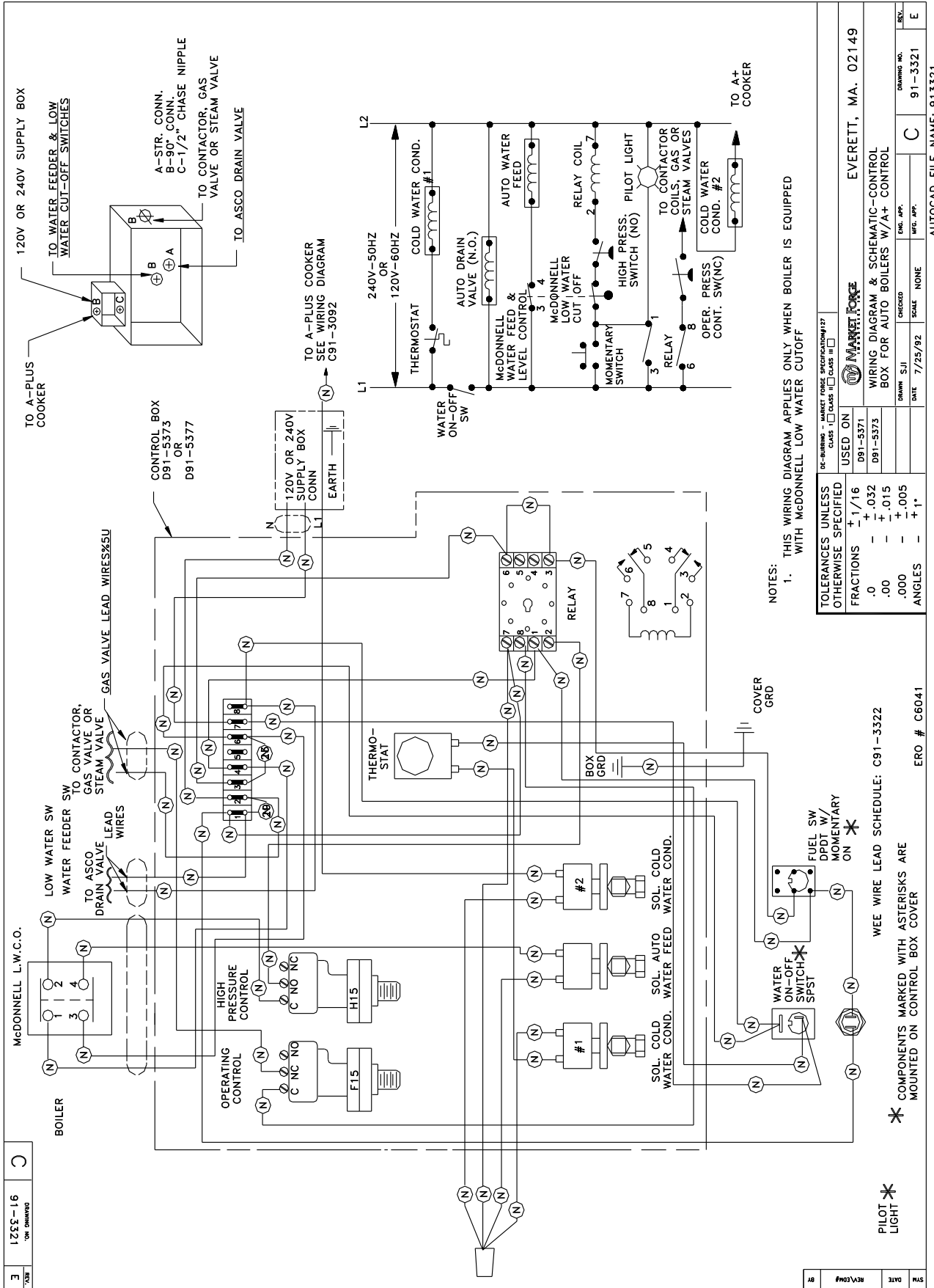
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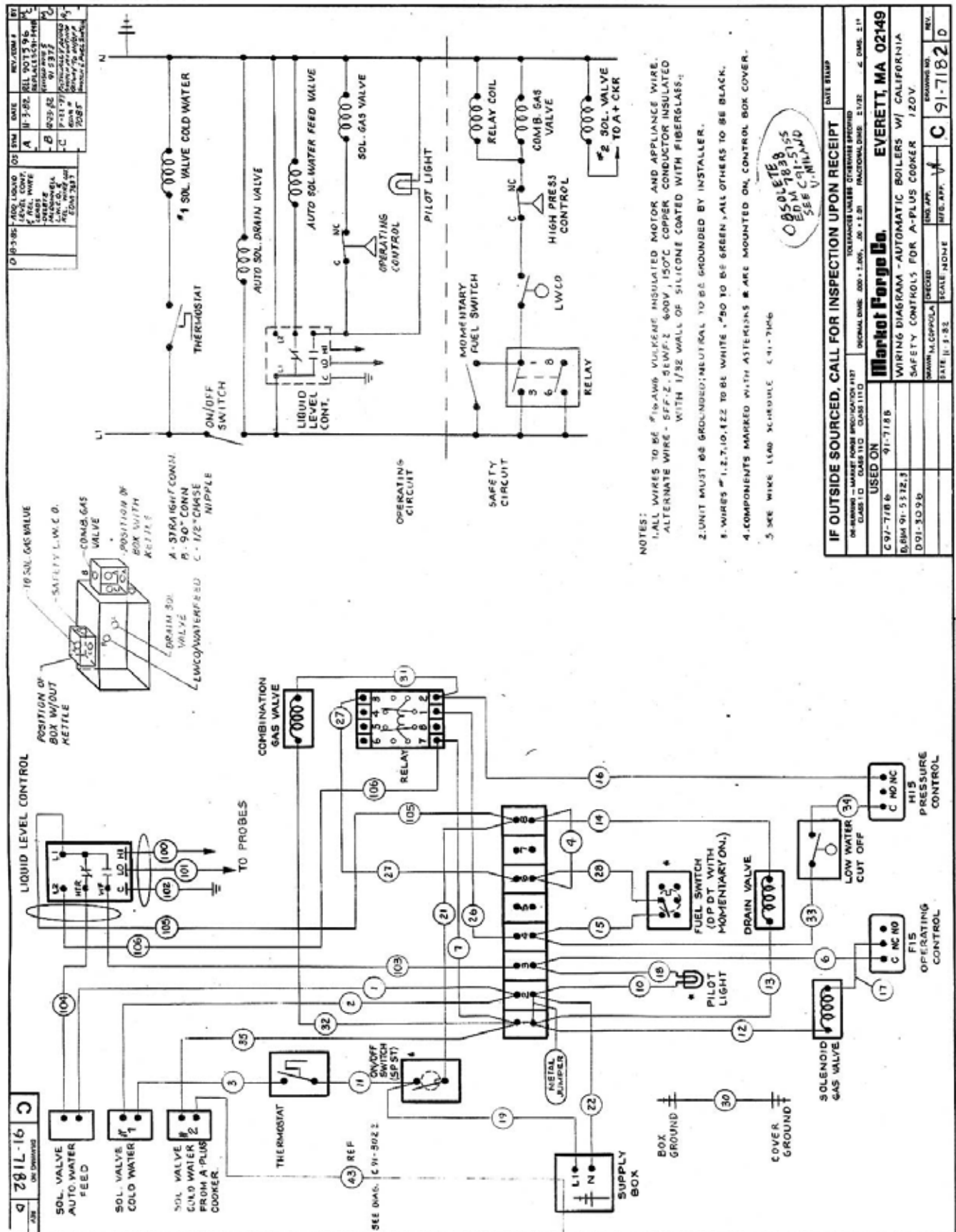
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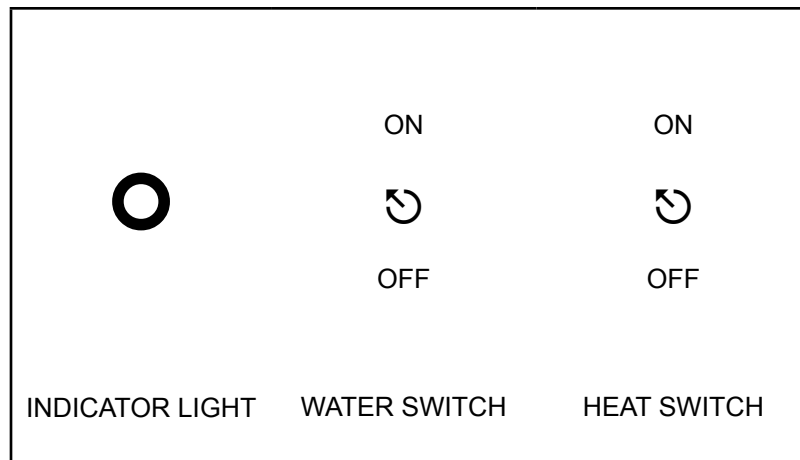
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OPERATION



WARNING:
DO NOT HOSE DOWN UNIT AS IT CONTAINS ELECTRICAL COMPONENTS.

START UP:

There are two methods of draining steam generators; one is automatic and the other is manual. To determine which method the unit has, open cabinet doors and there will be a control box with two switches and an indicator light. Instructions labeled on the control box will identify the steam generator as being automatic or manual.

AUTOMATIC DRAIN: *First check to be sure that:*

- Water and heat switches are in the off position.
- Water supply valve is open.
- Electricity is connected to all units.
- That steam is turned on.
- Then proceed with Daily Operating Instructions.

DAILY OPERATING INSTRUCTIONS:

1. Slip water switch on.
2. Wait until gauge glass is 2/3 full.
3. Then flip water switch off and back on immediately. Indicator light will come on. This is necessary to manually reset the unit.
4. Flip heat switch on. This heats the water.

UNITS MANUFACTURED AFTER 1983, EQUIPPED WITH “MOMENTARY” HEAT SWITCH:

Daily Operating Instructions:

1. Flip water switch on.
2. Wait 6 minutes for water to fill in boiler, gauge glass should read 2/3 full.
3. Flip heat switch on and release back on immediately, indicator light will come on, this is necessary to manually reset the unit. This also turns on the heat.

Daily Shut Down for units Manufactured after 1983:

Flip heat and water switches to off. Indicator light will go out and steam generator will go out and steam generator will automatically drain.

Manual Drain Steam Generator for units Manufactured after 1983: First check to be sure that:

- Water and heat switches are off.
- Water supply valve is open.
- Electricity is connected to all units.
- That steam is turned on.
- Then proceed with daily operating instructions.

TROUBLE-SHOOTING

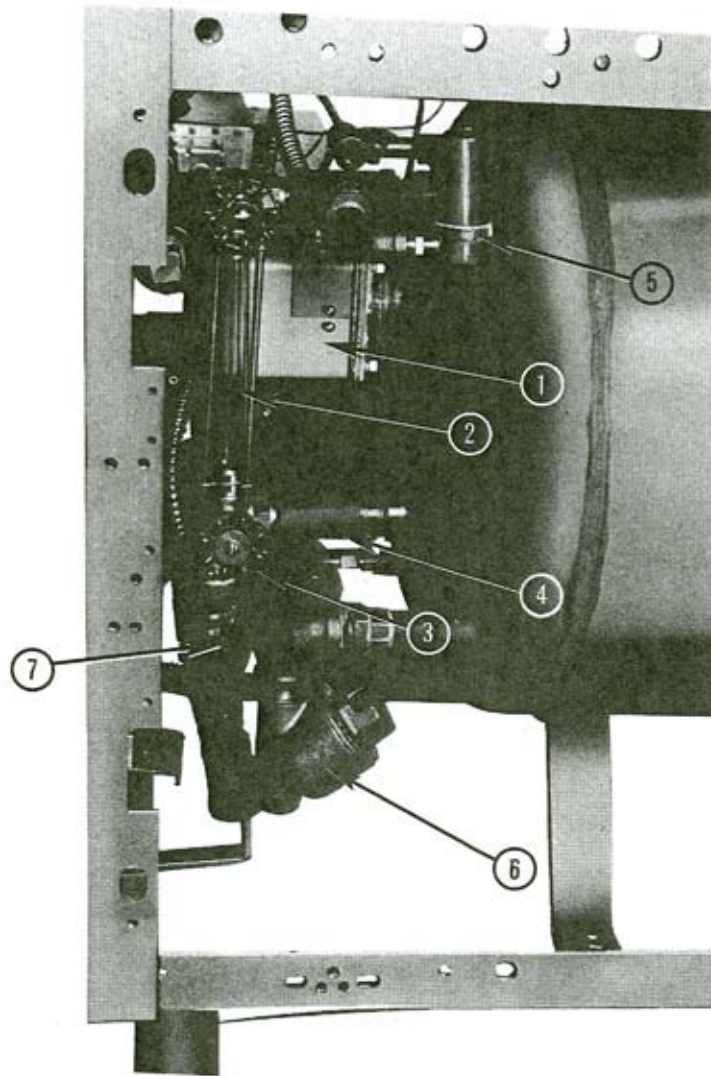
TROUBLE-SHOOTING GUIDE:

BOILER FAILS TO REACH FULL OPERATING PRESSURE OF 5 OR 15 POUNDS.	
<ol style="list-style-type: none"> 1. PRESSURE GAUGE READS INACCURATELY. 2. PRESSURE CONTROL AND HIGH LIMIT CONTROL SWITCHES ARE OUT OF ADJUSTMENT. 3. SAFETY VALVE NOT SEATING PROPERLY. 4. WATER LEVEL TOO HIGH. 5. STEAM TRAP ON UNITS RECEIVING STEAM FROM BOILER NOT CLOSING SUFFICIENTLY AFTER VENTING. 6. AIR VENT AND VACUUM BREAKER NOT VENTING PROPERLY. 7. INSUFFICIENT STEAM SUPPLY. 	<ol style="list-style-type: none"> 1. REPLACE. 2. FOLLOW INSTRUCTIONS FOR ADJUSTING. 3. CLEAN OR REPLACE. 4. ADJUST WATER LEVEL CONTROL. A) CHECK WATER FEED VALVE FOR STICKING. B) CLEAN OR REPLACE. 5. REPLACE ELEMENT IN STEAM TRAP OF UNIT BEING FED STEAM FROM BOILER. 6. REPLACE. 7. SEE INSTRUCTIONS ON STEAM ADJUSTMENTS.
BOILER FAILS TO CUT OFF AFTER REACHING OPERATING PRESSURE.	
<ol style="list-style-type: none"> 1. DEFECTIVE STEAM GAUGE READING. 2. PRESSURE SWITCH SET TOO HIGH OR DEFECTIVE. 3. STEAM SOLENOID VALVE FAILS TO CUT OFF WHEN DEMANDS OF PRESSURE SWITCH HAVE BEEN MET. 	<ol style="list-style-type: none"> 1. SHUT DOWN BOILER AND RELIEVE ALL PRESSURE. STEAM GAUGE INDICATOR SHOULD RETURN TO ZERO. IF DEFECTIVE, REPLACE. 2. ADJUST OR REPLACE IF DEFECTIVE. 3. REPLACE STEAM SOLENOID VALVE.
SAFETY VALVE BLOWS OFF PREMATURELY.	
<ol style="list-style-type: none"> 1. PRESSURE SET TOO HIGH. 2. PRESSURE GAUGE READS INCORRECTLY. 3. LIME OR DIRT ON SEAT OF VALVE. 4. WEAK SPRING IN VALVE. 	<ol style="list-style-type: none"> 1. READJUST. 2. REPLACE. 3. CLEAN. 4. REPLACE.
BOILER BUILDS UP TO PRESSURE, SHUTS DOWN AND FAILS TO COME BACK ON.	
<ol style="list-style-type: none"> 1. HIGH LIMIT SWITCH SET TOO LOW OR OPERATING PRESSURE CONTROL SWITCH SET TOO HIGH. 	<ol style="list-style-type: none"> 1. READJUST. REPLACE IF DEFECTIVE.
BOILER CUTS OUT AFTER 10-15 MINUTES OF OPERATION.	
<ol style="list-style-type: none"> 1. DEFECTIVE TIME DELAY RELAY. 2. POOR SOLDER CONNECTIONS ON RELAY SOCKET. 	<ol style="list-style-type: none"> 1. REPLACE RELAY. 2. RESOLDER CONNECTIONS ON RELAY SOCKET.
AIR VENT AND VACUUM BREAKER LEAKING.	
<ol style="list-style-type: none"> 1. NOT CLOSING. 	<ol style="list-style-type: none"> 1. REPLACE.
COLD WATER CONDENSER DOES NOT FUNCTION.	
<ol style="list-style-type: none"> 1. MAIN WATER LINE SHUT OFF. 2. THERMOSTAT OUT OF ADJUSTMENT OR DEFECTIVE. 3. LOOSE CONNECTION. 4. SOLENOID VALVE DEFECTIVE. 	<ol style="list-style-type: none"> 1. TURN ON. 2. READJUST FOR PROPER OPERATION OR REPLACE OF DEFECTIVE. 3. TIGHTEN. 4. CHECK COIL FOR CONTINUITY, IF OPEN REPLACE.
PRESSURE REDUCING VALVE CANNOT BE ADJUSTED.	
<ol style="list-style-type: none"> 1. DIRTY SCREEN AND SEAT. 2. DISC ASSEMBLY DEFECTIVE. 3. DIAPHRAGM RUPTURED. 	<ol style="list-style-type: none"> 1. CLEAN. 2. REPLACE. 3. REPLACE.
PRESSURE REDUCING VALVE DOESN'T LET SUFFICIENT STEAM INTO COMPARTMENT.	
<ol style="list-style-type: none"> 1. DIRTY STRAINER SCREEN. 	<ol style="list-style-type: none"> 1. CLEAN OR REPLACE.
PRESSURE REDUCING VALVE VIBRATES OR HUMS.	
<ol style="list-style-type: none"> 1. ADJUSTMENT OR SENSITIVITY ADJUSTER. 	<ol style="list-style-type: none"> 1. READJUST.
PRODUCT IN COOKER DOES NOT COOK PROPERLY ON FIRST CYCLE.	
<ol style="list-style-type: none"> 1. AIR VENT AND VACUUM BREAKER IS CLOSING TOO SOON. 	<ol style="list-style-type: none"> 1. PREHEAT COOKING COMPARTMENTS AND VENT AIR INTO COMPARTMENT.

TROUBLE-SHOOTING

SOLENOID STEAM VALVE FAILS TO OPEN.	
1. LACK OF POWER TO UNIT. 2. DIRTY SEAT IN SOLENOID VALVE. 3. INOPERABLE SOLENOID VALVE.	1. CHECK 110V POWER SUPPLY. 2. CLEAN VALVE. 3. CHECK COIL. REPLACE IF NECESSARY.
WATER DOES NOT ENTER BOILER.	
1. WATER MAIN SHUT OFF. 2. POWER NOT REACHING SOLENOID WATER FEEDER. 3. DEFECTIVE WATER MICROSWITCH IN WATER LEVEL CONTROL BOX OR LOOSE CONNECTION. 4. WATER LEVEL CONTROL MICROSWITCH OUT OF ADJUSTMENT. 5. DIRT OR LIME ON SEAT OF RIGHT SOLENOID VALVE IN CONTROL BOX. 6. DEFECTIVE SOLENOID COIL ON RIGHT VALVE IN CONTROL BOX. 7. DEFECTIVE WATER SWITCH TOGGLE SWITCH ON CONTROL BOX.	1. TURN ON. 2. CHECK MAIN FUSE AND IF 115V IS PRESENT AT WATER FEEDER. 3. CHECK CONTINUITY OR LOOSE CONNECTION, REPLACE LEFT SWITCH IF DEFECTIVE. 4. FOLLOW INSTRUCTIONS FOR READJUSTING LEFT MICROSWITCH. IF ADJUSTING OR CLEANING DOES NOT REMEDY, REPLACE. 5. CLEAN VALVE STEAM AND LINE STRAINER. 6. CHECK COIL FOR CONTINUITY, REPLACE IF DEFECTIVE. 7. CHECK CONTINUITY, REPLACE IF DEFECTIVE.
WATER ENTERS BOILER VERY SLOWLY.	
1. DIRTY STRAINER SCREEN ON RIGHT SOLENOID VALVE. 2. DIRT OR LIME ON SEAT OF RIGHT VALVE.	1. CLEAN OR REPLACE STRAINER SCREEN. 2. CLEAN VALVE SEAT.
INDICATOR LIGHT, ON CONTROL BOX, DOES NOT LIGHT WHEN WATER SWITCH IS MANUALLY RESET.	
1. INDICATOR LIGHT DEFECTIVE. 2. TIME DELAY RELAY LOOSE OR DEFECTIVE.	1. REPLACE. 2. CHECK FOR GOOD CONNECTIONS, IF DEFECTIVE, REPLACE.
BOILER OVERFILLS WITH WATER.	
1. WATER LEVEL CONTROL OUT OF ADJUSTMENT. 2. SOLENOID VALVE FAILS TO CLOSE.	1. FOLLOW INSTRUCTIONS FOR READJUSTING. IF READJUSTING DOES NOT REMEDY, REPLACE MICROSWITCHES. CLEAN OR REPLACE ENTIRE UNIT. 2. CLEAN SEAT AND STRAINER VALVE.
BOILER FAILS TO BUILD UP ANY PRESSURE WHEN WATER LEVEL IS PROPER AND HEAT SWITCH IS TURNED ON.	
1. CHECK TO SEE THAT STEAM IS TURNED ON AND COMING TO UNIT. 2. CHECK TO SEE THAT SOLENOID VALVE IS OPERABLE. 3. CURRENT FLOW IS BROKEN AT WATER LEVEL CONTROL (ASCERTAIN WITH CONTINUITY CHECK). 4. CURRENT FLOW IS BROKEN AT PRESSURE CONTROL OR HIGH LIMIT CONTROL SWITCHES DUE TO DEFECT (ASCERTAIN WITH CONTINUITY CHECK).	1. TURN ON. 2. CHECK SOLENOID VALVE. 3. CHECK FOR VOLTAGE THRU SIDE OF MICROSWITCH, REPLACE IF DEFECTIVE. 4. READJUST TO PROPER SETTING, REFER TO INSTRUCTION FOR READJUSTMENT, REPLACE IF DEFECTIVE.
WATER LEVEL IN GAUGE GLASS FLUCTUATES UP AND DOWN.	
1. TOP SHUT OFF ON WATER GAUGE IS CLOSED.	1. OPEN.

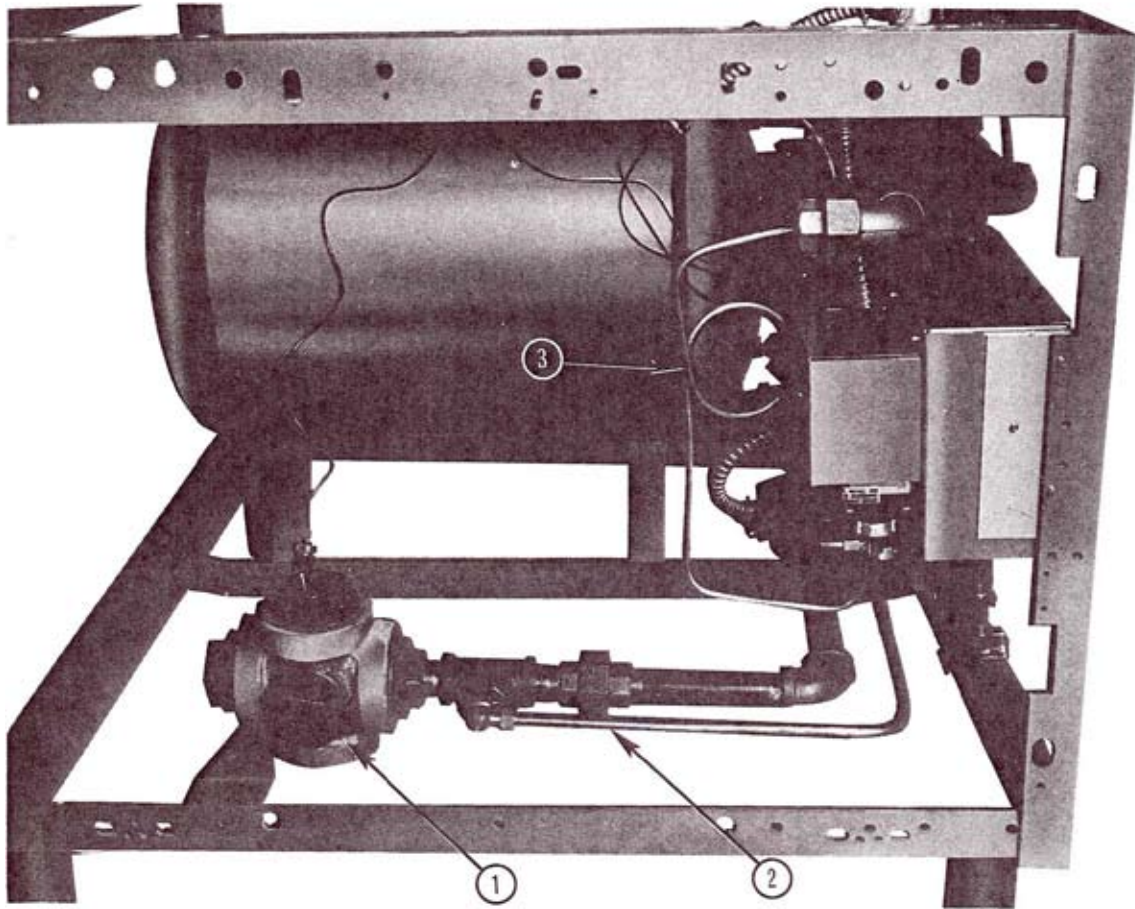
ILLUSTRATED PARTS



WATER LEVEL AND STEAM CONTROL

ITEM	PART #	DESCRIPTION
1	09-4887	McDONNELL LOW WATER CUT OFF (ON UNITS AFTER 1984)
1A	90-8929	MARKET FORGE LOW WATER CUT OFF (ON UNITS BEFORE 1984)
2	10-4612	GAUGE GLASS
3	10-4576	GAUGE GLASS ASSY WITH GAURDIAN RODS - R. H.
4	10-3474	COUPLING, PLAIN, R. H. SCREWED 1/2"
5	10-4556	AIR VENT
6	91-3311	REWORKED STEAM TRAP
7	10-5785	HAYS SOLENOID STEAM VALVE NC 115V
7A	10-6452	HAYS SOLENOID STEAM VALVE NC 240V

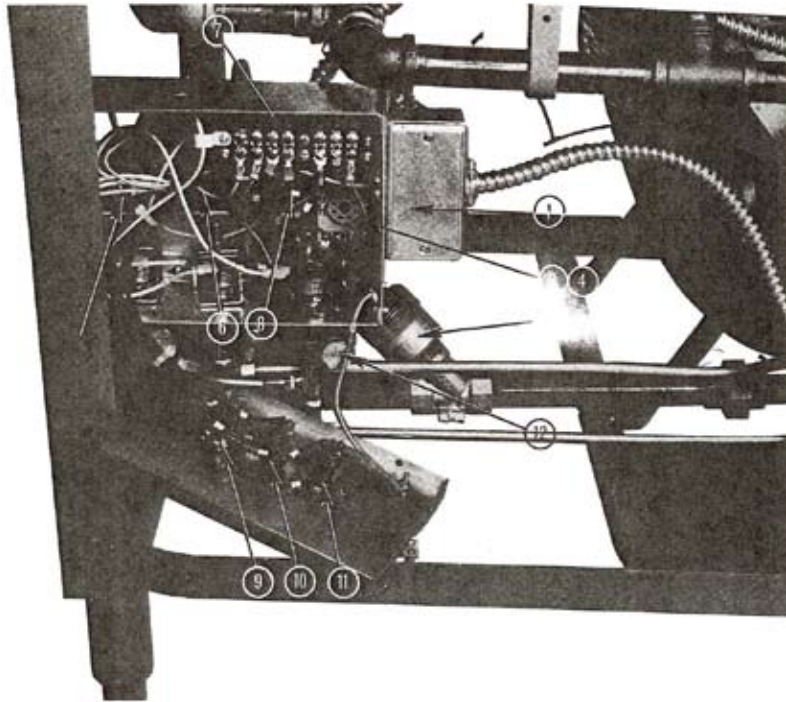
ILLUSTRATED PARTS



PLUMBING

ITEM	PART #	DESCRIPTION
1	91-3312	DRAIN SUB ASSY
2	91-2119	DRAIN LINE - STEAM TRAP TO DRAIN TERMINAL 36" CABINET
2A	91-2118	DRAIN LINE - STEAM TRAP TO DRAIN TERMINAL 24" CABINET
3	91-2115	ANTI-SYPHON PRESSURE SWITCHES - 36" CABINET
3A	91-2114	ANTI-SYPHON PRESSURE SWITCHES - 24" CABINET

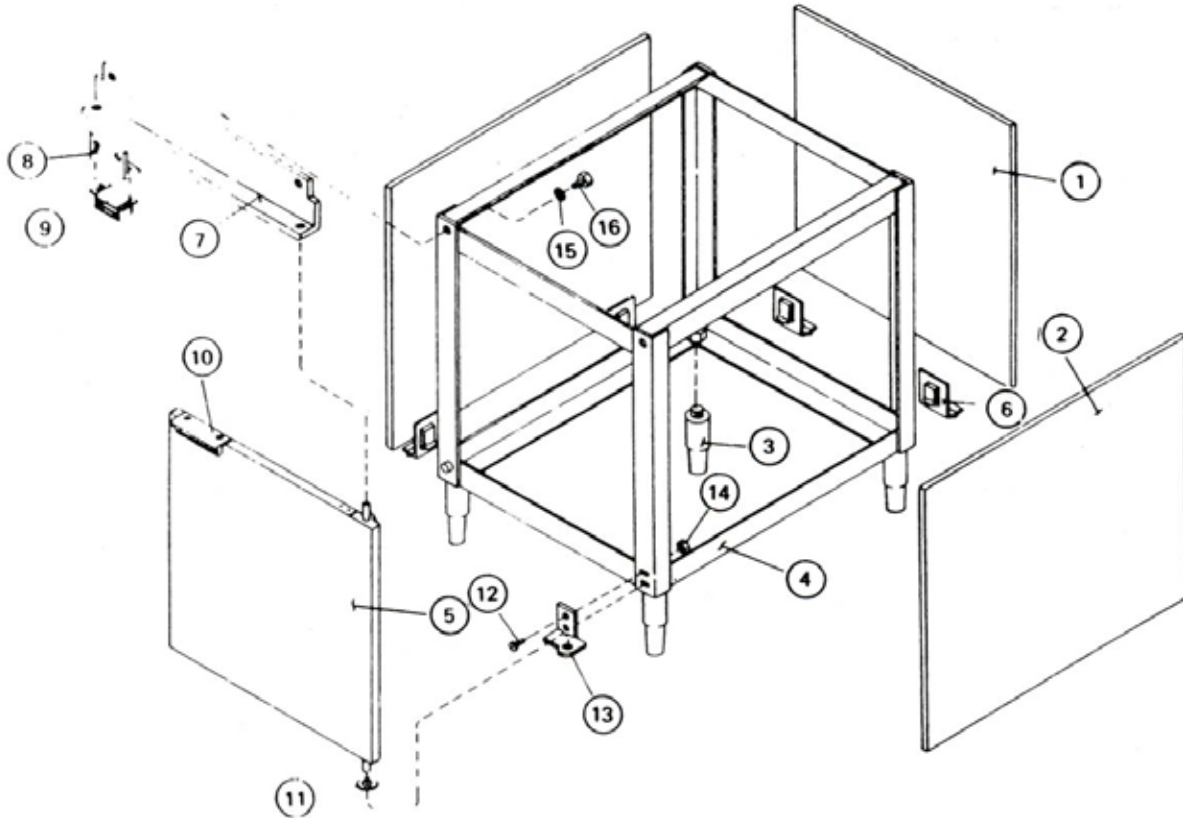
ILLUSTRATED PARTS



CONTROL BOX

ITEM	PART #	DESCRIPTION
1	91-5374	120V CONTROL BOX ASSY
1A	91-5373	120V CONTROL BOX ASSY, FOR USE WITH A-PLUS COOKER ONLY
1B	91-5376	230V CONTROL BOX ASSY
1C	91-5371	230V CONTROL BOX ASSY, FOR USE WITH A-PLUS COOKER ONLY
2	10-5163	HANDY BOX
2A	10-5164	HANDY BOX COVER
3	10-4634	RELAY TIME DELAY 120V
3A	10-6970	RELAY TIME DELAY 240V SOCKET RELAY
4	10-6512	SOCKET RELAY
5	10-8411	SWITCH PRESSURE BARKSDALE E15-F15-PLS
6	10-8410	SWITCH PRESSURE BARKSDALE E15-H15-PLS
--	91-6085	PRESSURE SWITCH ASSY, ITEMS 5 + 6
7	10-5184	STRIP TERMINAL
8	10-4653	THERMOSTAT
6	10-6169	PILOT LIGHT
10	10-5022	SPST SWITCH
11	10-5484	DPDT SWITCH
12	10-0865	VALVE SOLENOID 240V
12A	10-1026	VALVE SOLENOID 120V
13	10-1311	VALVE SOLENOID N . O . 115V
13A	10-0864	VALVE SOLENOID N . O . 240V, 60 Hz, 220V, 50/60 Hz
13B	10-7342	VALVE SOLENOID N . O . 240V, 50 Hz

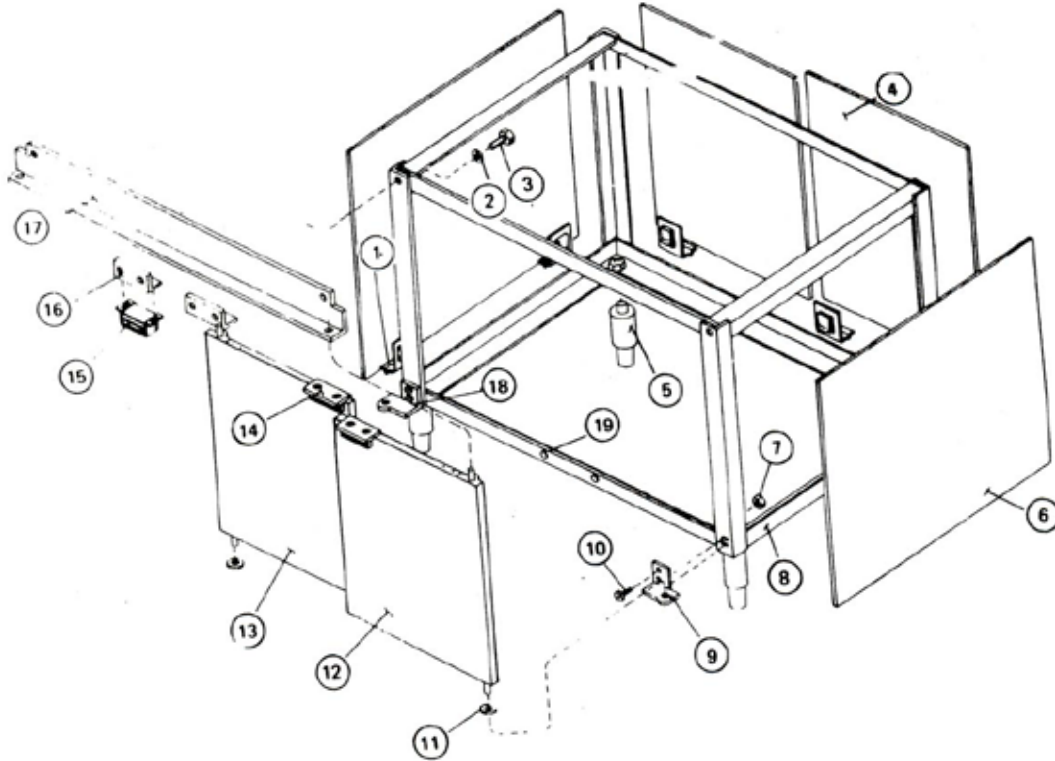
ILLUSTRATED PARTS



24" CABINET

ITEM	PART #	DESCRIPTION
1	90-2657	REAR PANEL STAINLESS STEEL
--	90-2658	REAR PANEL ENAMEL
2	90-2661	SIDE PANELS RIGHT AND LEFT STAINLESS STEEL
--	90-2659	SIDE PANELS RIGHT AND LEFT ENAMEL
--	90-2662	SIDE PANELS RIGHT AND LEFT STAINLESS STEEL (GAS MODEL)
--	90-2660	SIDE PANELS RIGHT AND LEFT ENAMEL (GAS MODEL)
3	10-0631	LEG
4	90-8974	ASSY, 24" x 33" MODULAR FRAME
5	90-2993	DOOR ASSY, STAINLESS STEEL
--	90-2996	DOOR ASSY, ENAMEL
6	90-2663	PANEL MTG, BRACKET
7	10-0493	FEATURE STRIP
8	90-3210	BRACKET - MAGNETIC CATCH
9	10-5561	MAGNETIC CATCH
10	90-9057	DOOR HANDLE
11	10-2422	SPECIAL WASHER
12	10-1869	NO 10-32 x 1/2" FLAT HEAD SCREW
13	10-0454	CABINET HINGE RIGHT BOTTOM
14	90-3185	DOUBLE WASHER
15	10-2511	WASHER
16	10-2147	HEX NUT

ILLUSTRATED PARTS



36" CABINET

ITEM	PART #	DESCRIPTION
1	90-2663	PANEL MTG, BRACKET
2	10-2511	WASHER
3	10-2147	HEX NUT
4	90-2657	REAR PANEL STAINLESS STEEL
--	90-2658	REAR PANEL ENAMEL
5	10-0631	LEG
6	90-2661	SIDE PANELS RIGHT AND LEFT STAINLESS STEEL
--	90-2659	SIDE PANELS RIGHT AND LEFT ENAMEL
--	90-2662	SIDE PANELS RIGHT AND LEFT STAINLESS STEEL (GAS MODELS)
--	90-2660	RIDE PANELS RIGHT AND LEFT ENAMEL (GAS MODELS)
7	90-3185	DOUBLE WASHER
8	90-9023	ASSY, 36" x 33" MODULAR FRAME
9	10-0454	CABINET HINGE R. BOTTOM
10	10-1869	NO 6-32 x 1/2" ROUND HEAD MACHINE SCREW
11	10-2422	WASHER
12	90-9070	DOOR ASSY, ENAMEL
13	90-9062	DOOR ASSY, STAINLESS STEEL
14	90-9057	DOOR HANDLE
15	10-5561	MAGNETIC LATCH
16	90-3210	BRACKET MAGNETIC LATCH
17	10-0494	FEATURE STRIP
18	10-0453	CABINET HINGE LEFT BOTTOM
19	10-0257	STEM BUMPER