SERVICE MANUAL

C24EA5-LWE SHOWN

C24EA-LWE SERIES COUNTERTOP STEAMER

C24EA3-LWE	**ML-152030**
C24EA5-LWE	**ML-152031**

- NOTICE -

This Manual is prepared for the use of trained Vulcan Service Technicians and should not be used by those not properly qualified.

This manual is not intended to be all encompassing. If you have not attended a Vulcan Service School for this product, you should read, in its entirety, the repair procedure you wish to perform to determine if you have the necessary tools, instruments and skills required to perform the procedure. Procedures for which you do not have the necessary tools, instruments and skills should be performed by a trained Vulcan Service Technician.

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GENERAL

INTRODUCTION

This manual is applicable to the models and ML numbers listed on the cover page. Procedures apply to all models unless specified otherwise.

LWE Series Steamers

The low water and energy use steamers (LWE) provide energy and water saving steam generation that meets ENERGY STAR® performance levels. The steamers feature an electronic PID Controller and Solid State Contactor that work together to "pulse" power to the heating elements during a cook cycle and reduce the amount electrical energy and water consumed.

Steam Cooking

Atmospheric steamers offer an efficient way to produce many foods in either small portions or larger batches. Atmospheric convection steam cooking will steam cook fresh foods or will steam defrost and cook frozen foods providing the maximum color, flavor and nutritional value with the least expenditure of energy and labor. The atmospheric steaming compartment allows the operator to open and close the door anytime during a cooking cycle. The generator element will shut off when the door is opened then re-start when the door is closed.

INSTALLATION, OPERATION AND MAINTENANCE

For detailed installation, operation and cleaning instructions refer to F35428 Installation & Operation Manual sent with each unit. The manual is also available online at www.vulcanequipment.com.

MODELS

Model Designations (based on 2.5 inch pan depth)
C24EA3-LWE three pan capacity and professional controls*
C24EA5-LWE five pan capacity and professional controls*
NOTE: (*) Low Water & Energy (LWE) models do not use a super heater as due other countertop models with professional controls.

SPECIFICATIONS

NOTE: All C24EA LWE steamers are shipped pre-wired for 208/50/60/3 or 480V/50/60/3 operation. 208V 3 phase is an unbalanced load and the value listed for amperage is the maximum on any leg. The steamer can be field converted from 208V/50/60/3 electrical service by disconnecting the fourth heating element wires to the contactors. See WIRING DIAGRAM - HEATING ELEMENTS for proper connections. If field converting, check transformer for proper voltage setting. **The LWE units are not designed to operate on single phase**.

ELECTRICAL SPECIFICATIONS											
MODEL	TOTAL kW	Hz.	3 PHASE AMPERAGE								
			208V			240V			480V		
			L1	L2	L3	L1	L2	L3	L1	L2	L3
C24EA3-LWE	8.5	50/60	27.1	27.1	17.7	20.5	20.5	20.5	10.2	10.2	10.2
C24EA5-LWE	15.0	50/60	47.9	47.9	31.3	36.1	36.1	36.1	18.0	18.0	18.0

WATER SUPPLY REQUIREMENTS	
Supply pressure should be	20-60 psig
In line strainer for supply line (Supplied)	—
Hardness*	less than 3 grains
Silica	less than 13 ppm
Total Chlorine	less than 0.1 ppm
PH range	7 to 8
Undissolved Solids	less than 5 microns
NOTE: *17.1 ppm = 1 grain of hardness.	

NOTICE Chlorine and Chloramine above levels of 0.1 ppm will cause permanent damage to the steam generator and cooking compartment. Contact water filter system manufacturer to ensure this requirement is met.

Hardness above 4 grains/gal should be treated by water conditioner, water softener or in-line treatment.

Water Conditioning

It is recommended that a local water treatment specialist be consulted before the installation of any steam generating equipment.

Furnishing the steam generator with properly conditioned water to reduce scale formation is important. Scale formation will reduce steam output, cause premature component failure and shorten equipment life. Most water supplies contain scale producing minerals such as calcium and magnesium. As steam is generated, the minerals remain and dissolve into the remaining water. As the concentration of these minerals increases past a certain point, they precipitate from the water and coat the inside of the tank, heating elements, thermostat bulbs and water level probes. Because of the high temperature of these surfaces, the precipitated minerals bake onto them and become very difficult to remove.

This phenomenon causes several problems:

1. Reduces the heat transfer efficiency of the heaters.
2. Causes premature failure of the heaters.
3. Water level probes will give false readings.
4. Thermostat bulbs will sense temperature incorrectly.

These problems are common to any manufacturer's steamer regardless of design, but they can all be prevented by furnishing the steam generator tank with properly conditioned water.

Other chemical properties in water supplies can also affect good steam generation and vary from within each state and locality.

The water level probes in the steam generator tank use ions in the water to detect the water level. **Do not use fully** demineralized or de-ionized water since it is non-conductive and the water level cannot be detected.

NOTE: The use of strainers or filters will not remove minerals from the water.

Steamers that operate over a long period of time without the benefit of properly conditioned water, which have developed a heavy scale build up, should be cleaned before connecting to a conditioned water supply.

LUBRICATION AND SEALANT

Component	Type
Heating Element Screws	Never Seez®
Door Handle Sliding Bracket	Lubriplate® 630AA
Rotary Shaft Seal (timer)	Petrogel, lubricant
All NPT Fittings	Loctite® 565™, pipe thread sealant,
Door Striker Threads	Loctite® 271™, thread sealer
Door Housing Screw Threads	Loctite® 242™, thread sealer

TOOLS

- Standard set of hand tools.
- Pipe thread sealant.
- VOM with ability to measure micro amp current.

  VOM with minimum of NFPA-70E CAT III 600V, UL/CSA/TUV listed. Sensitivity of at least 20,000 ohms per volt. Meter leads must also be rated at CAT III 600V.
- Clamp on type amp meter for measuring heating element current.

Special

- Torque Wrench - Capable of measuring 70 in-lb.
- RTV 109 Silicone Sealant or equivalent for use when replacing door gasket.
- High temperature aluminum foil tape for use when securing insulation around cooking compartment.
- Anti-static kit for handling electronic circuit boards (purchase locally).
- Pressure Gauge Assembly for use when checking and adjusting pressure switch:
  - Pressure Gauge - 0 to 15 psi, 1/4" NPT, recommended Grainger Part No. 36TW02 or equivalent for steamers with non-adjustable pressure switch.
  - Low Pressure Gauge - 0 to 5 psi, 1/4" NPT, recommended Grainger Part No. 2C641 or equivalent for steamers with adjustable pressure switch.
  - Water Hose to Pipe Coupling - 3/4" FGHT x ½" FNPT- swivel type, double female brass, Grainger Part No. 4KG87 or equivalent.
  - Reducer Bushing - ½" MNPT x 1/4" FNPT brass, Grainger Part No. 6AYW8, package of 10 or single bushing equivalent (purchase locally).

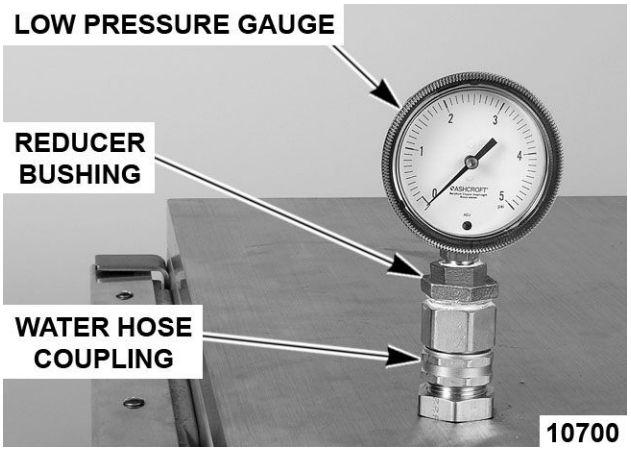


Fig. 1

COVERS AND PANELS

RIGHT AND LEFT SIDE PANELS

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

NOTE: Removal of left side panel is identical to the procedure for the right side panel.

1. Remove screws (qty. 2) from the bottom of panel being removed.

Fig. 2

2. Pull bottom of panel out and slide down to clear top cover.
3. Reverse procedure to install.

TOP COVER

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

1. Remove screws Fig. 3 (qty. 2) securing top cover to rear panel.

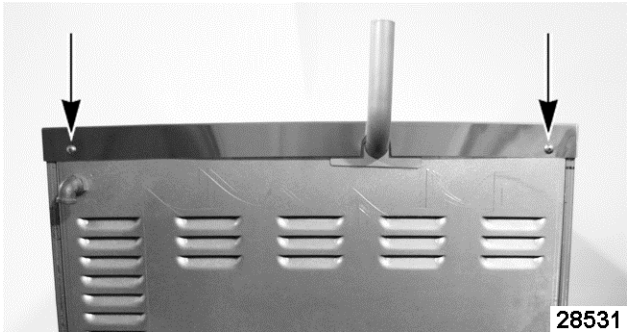


Fig. 3

2. Lift top cover at the rear to access vent hose Fig. 4 then remove clamp securing hose to vent tube.

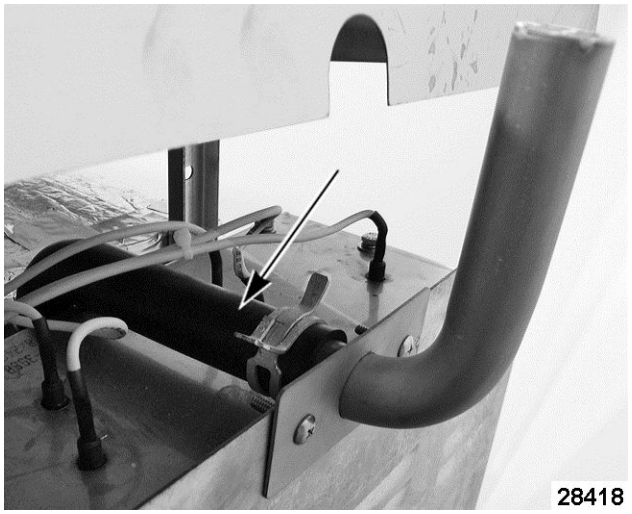


Fig. 4

3. Remove RIGHT AND LEFT SIDE PANELS.
4. Remove mounting hardware [1] Fig. 5 securing top cover to front panel. The mounting hardware is located on both sides of the cooking compartment.
5. Disconnect the delime hose [2] Fig. 5 from delime port fitting.

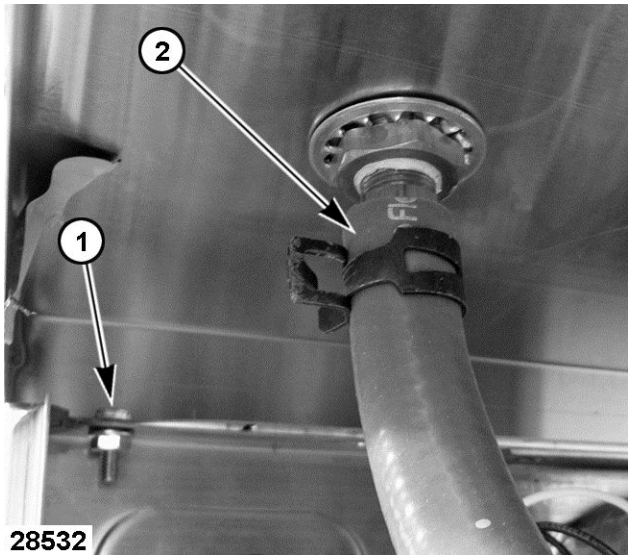


Fig. 5

6. Lift top cover off machine.
7. Reassemble parts removed in reverse order.

REAR PANEL

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

1. Remove screws Fig. 6 (qty. 4) securing the top cover to rear panel and the rear panel to steamer frame.

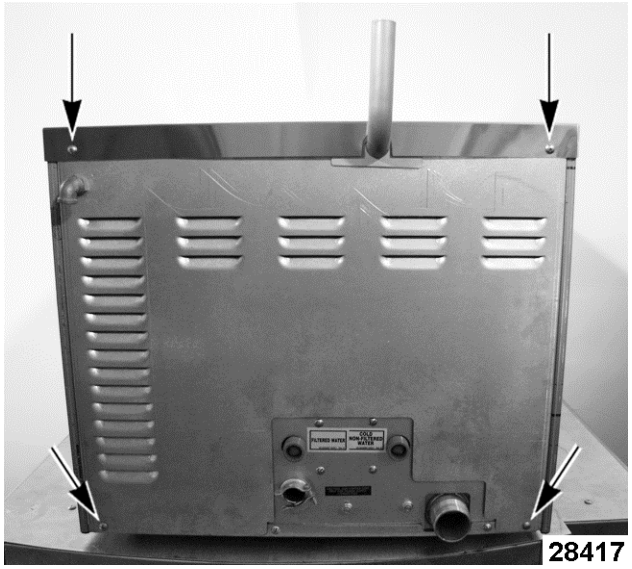


Fig. 6

NOTE: If water or drain connections interfere with rear panel removal, turn off water supply and disconnect from machine.

2. Remove RIGHT SIDE PANEL.
3. Disconnect vacuum relief hose Fig. 7 from fitting on rear panel.

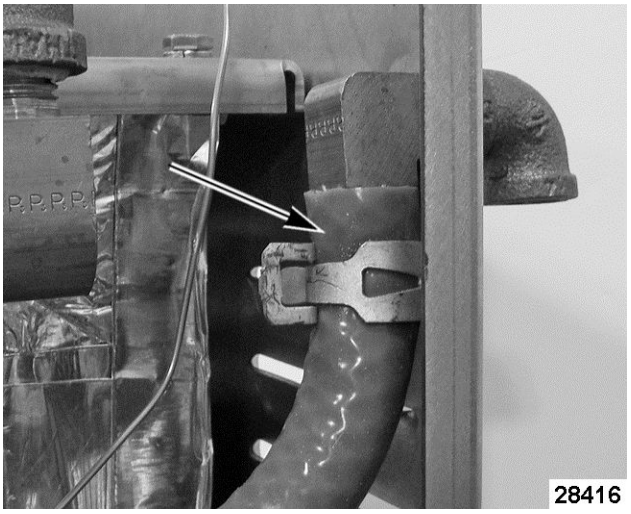


Fig. 7

4. Lift top cover at the rear to access vent hose Fig. 8 then remove clamp securing hose to vent tube.

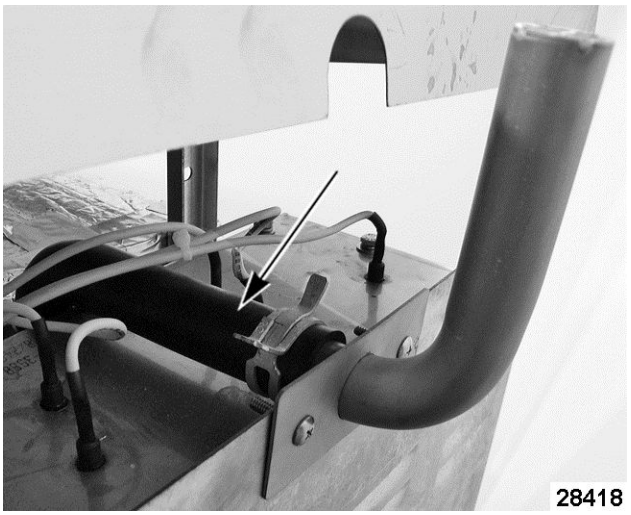


Fig. 8

5. Remove rear panel from machine.
6. Reassemble parts removed in reverse order.

DOOR

REMOVAL

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

1. Close door.
2. Remove LEFT SIDE PANEL.
3. Remove nuts from upper hinge located inside front panel.

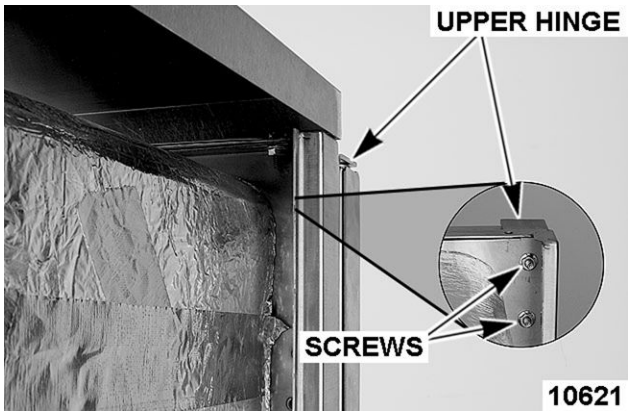


Fig. 9

4. Open door slightly, and while holding door, pull upper hinge away from front panel. Open door slightly, and while holding door, pull upper hinge away from front panel.
5. Pull upper hinge out of upper door hinge bushing.
6. Lift door assembly up and off lower door hinge.
7. Reinstall parts removed in reverse order of removal.
8. Check door for fit and proper sealing of gasket.

GASKET

1. Open door.
2. Remove the shoulder screws and pan pusher bracket from gasket plate.

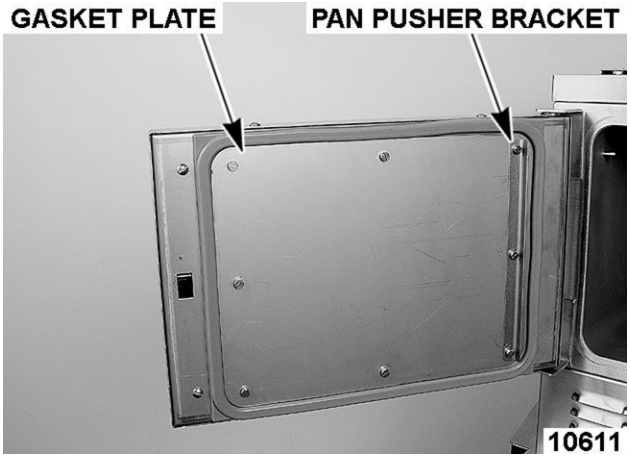


Fig. 10

3. Remove gasket plate.
4. Remove gasket from inner door panel.
5. Remove RTV from bottom part of inner door panel. Apply new RTV 109 to bottom of door where shown when assembling gasket to door.

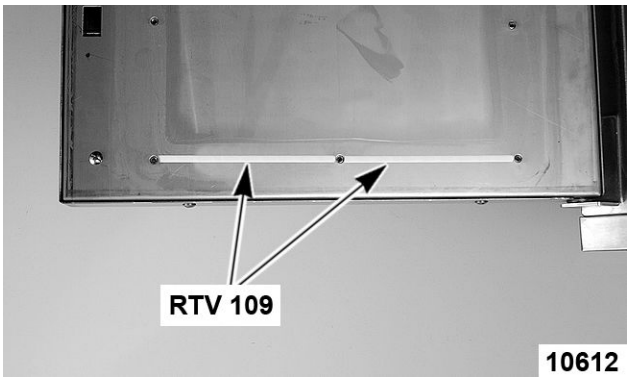


Fig. 11

6. Place a small amount of RTV109 into the inner door panel gasket screw holes before assembly.
7. Position the new gasket on gasket plate and reverse procedure to install.

DOOR HANDLE

Removal

1. Open door.
2. Remove screws (qty. 4) from the top and bottom of door assembly.
3. Pull outer door housing away from inner door panel starting at the hinge side of door to separate the door halves.

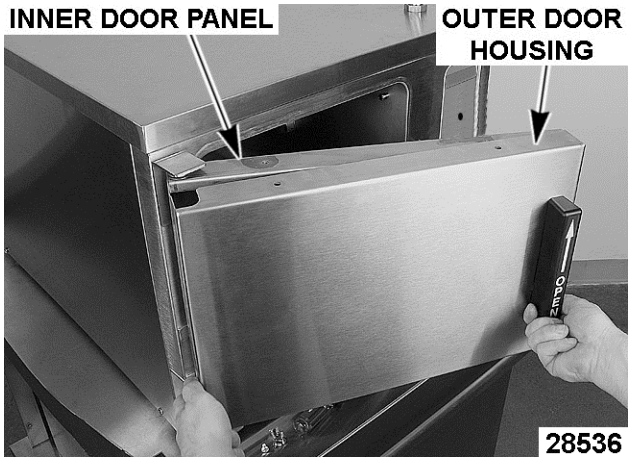


Fig. 12

NOTE: The smaller radius of the step spacers fit into the slots of the outer door housing and is used to provide clearance for handle operation.

4. Remove lock nuts and stepped spacers from threaded studs of door handle.

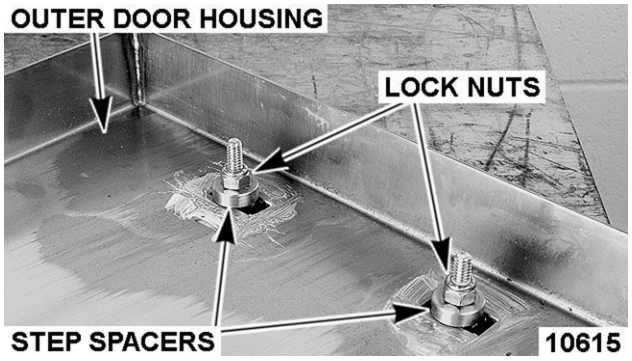


Fig. 13

Installation

1. Apply Lubriplate 630AA around slots of outer door housing where the step spacers contact housing.
2. Install door handle into outer door housing such that hinge side of door housing is to the left and arrow on handle is pointed upward.
3. Install step spacer with smaller radius toward handle and door housing. Smaller radius is a slip fit with outer door housing slot.

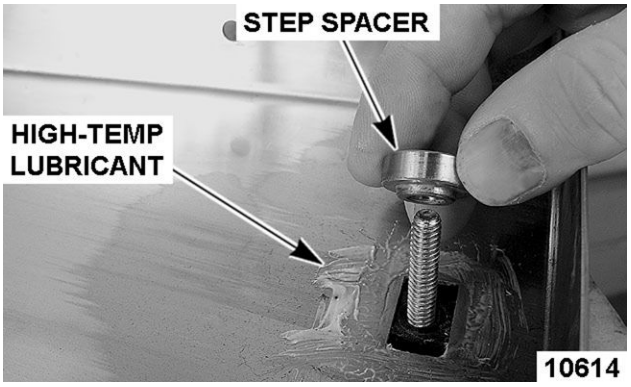


Fig. 14

4. Install lock nuts and tighten until no gap exists between handle, step spacer and lock nut. Do not over-tighten lock nuts.
5. Close inner door panel so that latch mechanism engages striker on front panel.
6. Install outer door housing onto inner door panel.
7. Align the top and bottom screw holes of outer door housing with inner door panel.

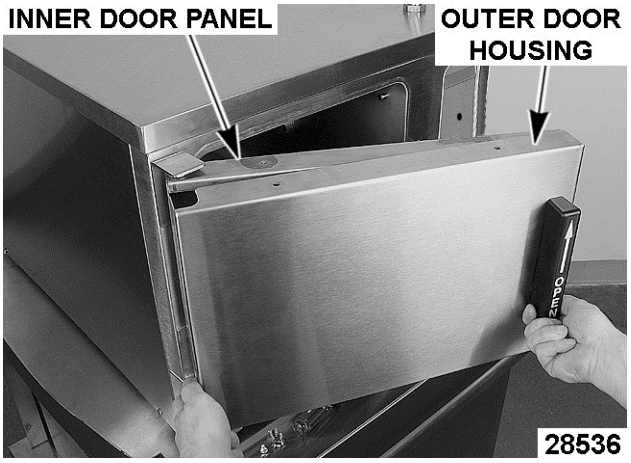


Fig. 15

8. Apply Loctite 242 to threads of screws before assembling.
9. Install screws to secure door halves together.
10. Check opening and closing operation of door.

LATCH ASSEMBLY

Removal and Disassembly

1. Separate outer door housing assembly from inner door panel as outlined under DOOR HANDLE.
2. Remove screws securing latch assembly to inner door panel and remove latch mechanism.

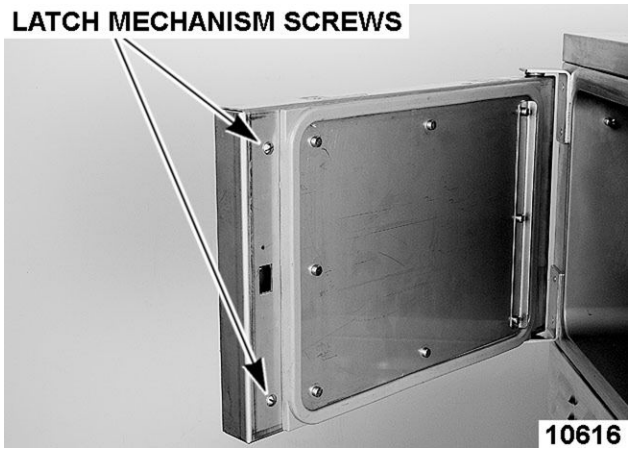


Fig. 16

3. Remove E-clip from latch assembly pins and pull pins from latch mechanism.

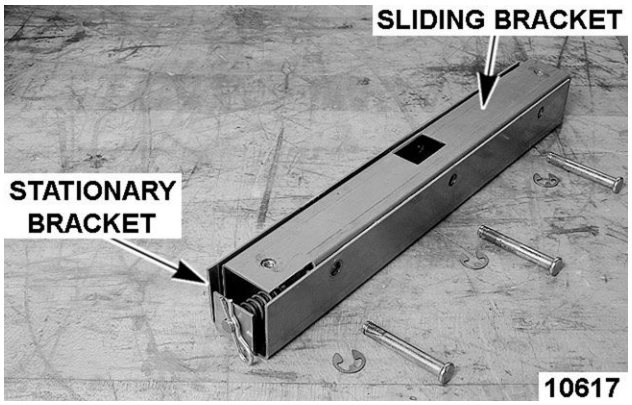


Fig. 17

4. Remove retaining pin from spring pin.
5. Separate sliding bracket from stationary bracket.

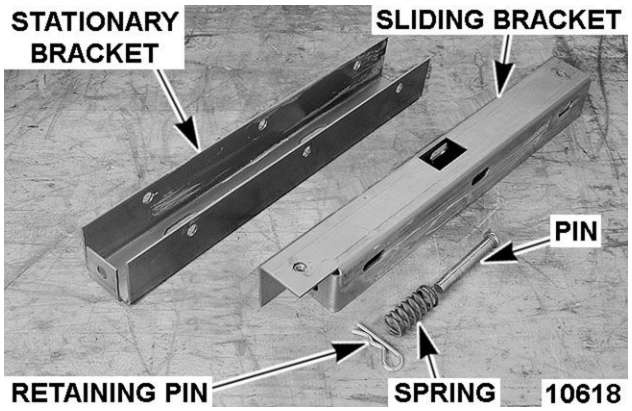


Fig. 18

Assembly

1. Apply Lubriplate 630AA to sides of sliding bracket.
2. Insert spring pin into bottom of sliding bracket.
   A. Place spring over spring pin.
3. Assemble sliding bracket into stationary bracket.
4. While holding head of spring pin against bottom of sliding bracket, insert spring pin into keeper hole in bottom of stationary bracket.

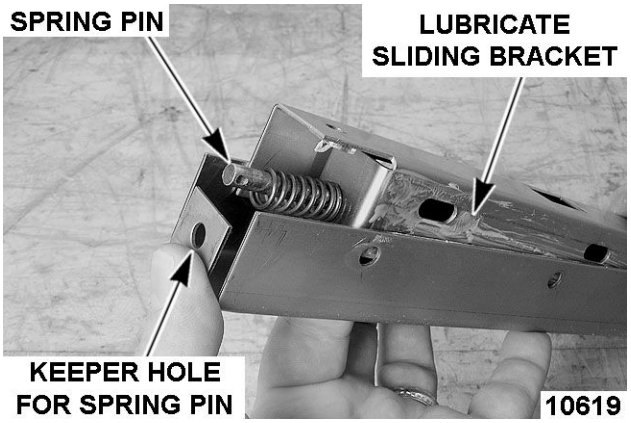


Fig. 19

   A. Secure spring pin in place with retaining pin.

NOTE: Install pins such that heads of pins will be facing inward toward hinge side of inner door panel when latch assembly is installed.

5. Install pins to assemble stationary and sliding brackets together.
   A. Secure pins into position with E-clip.

Installation

1. Install latch assembly onto inner door panel with spring pin toward bottom of door panel.
   A. Apply Loctite 271 to threads of screws before assembly and secure latch assembly to inner door panel.

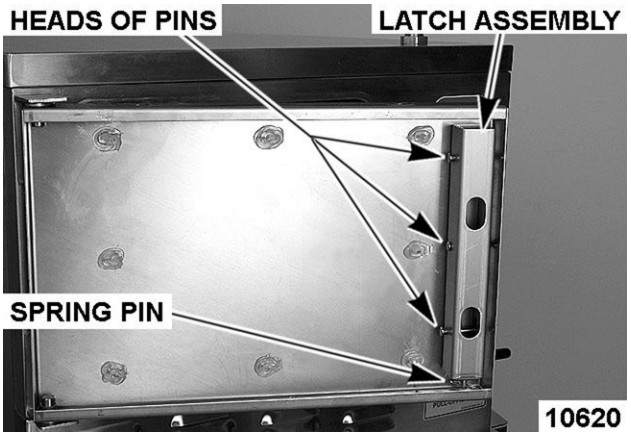


Fig. 20

2. Install outer door housing assembly as outlined in DOOR HANDLE.
3. Check opening and closing operation of door.

4. Check steamer for proper operation and leaks around door seal.

HINGE BEARINGS

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

1. Close door.
2. Remove LEFT SIDE PANEL.
3. Remove nuts from upper hinge located inside front panel.
4. Open door slightly, and while holding door, pull upper hinge away from front panel.

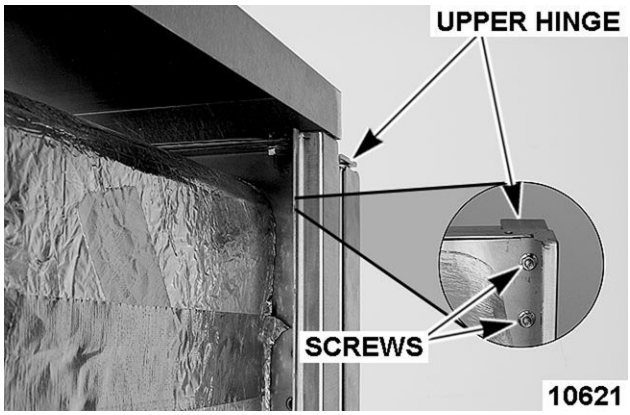


Fig. 21

5. Pull upper hinge out of upper door hinge bearing.
6. Lift door assembly up and off lower door hinge.
7. Pry hinge bearing out from door assembly.
8. Remove outer door housing.

NOTICE Do not drive bearing into place. The inner door panel could be damaged. Press bearing into position.

NOTE: When replacing door hinge bearings, replace both hinge bearings.

9. Position replacement hinge bearing over hinge opening in door assembly.

Fig. 22

   A. Press hinge bearing fully into door assembly using a C-clamp or equivalent.

10. Reassemble parts removed in reverse order.
11. Check door for fit and proper door gasket sealing.

DOOR LATCH ADJUSTMENT

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

NOTICE Should the steamer door jam and cannot be opened, do not force or pry the door as damage will occur.

Opening a Jammed Door

1. Lift up on bottom of door at the handle end to disengage latch.
   A. If door does not open, remove RIGHT SIDE PANEL.
   B. Locate the striker [1] Fig. 23 that catches on door latch beside front panel of steamer.

Fig. 23

C. Remove the mounting nut and lockwasher [1] Fig. 24 from striker to release it from the front panel.

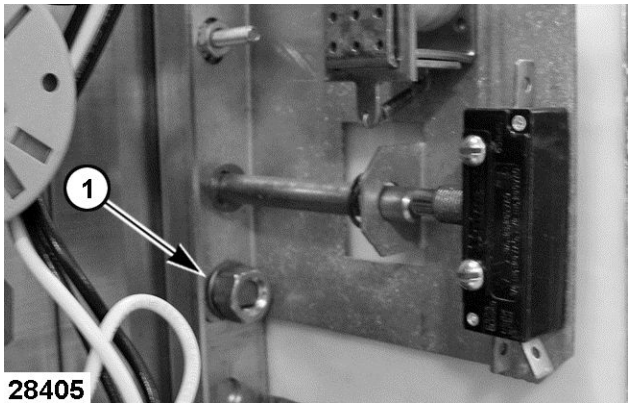


Fig. 24

D. Open door.

2. Remove striker.
3. Remove any burrs on striker that may cause latch to stick.
4. Apply Loctite 271 to threads of striker.
5. Reinstall striker with slot pointing upward. Hand tighten striker nut then perform Adjustment for proper door latching.

Adjustment

1. With striker installed and the mounting nut ready to be tightened, close door to center the striker in front panel mounting hole.
2. Open door and check striker slot for horizontal alignment. The slot on striker must be kept horizontal in order for door latch to catch properly and latch.
3. Once proper slot alignment has been set, hold striker close to its base then tighten the striker nut.

NOTICE Do not damage striker slot when tightening or door may not latch properly.

NOTE: Do not over-tighten nut. If over-tightened, striker may turn and change alignment.

4. Check door latching for proper operation.

NOTE: If door does not open easily, add shims between striker and cabinet front. When adding shims make certain that door gasket seals properly and steamer does not leak. Remove shims as necessary until leaking stops.

DRAIN BOX

REMOVAL AND REPLACEMENT

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Disconnect the drain plumbing from drain box outlet fitting at the rear of steamer.
3. Remove RIGHT AND LEFT SIDE PANELS.
4. Disconnect condensate thermostat wires [1] Fig. 25.
   A. Remove condensate thermostat [2] Fig. 25 from drain box. Retain for use on replacement drain box.
5. Disconnect drain water cooling solenoid hose [3] Fig. 25 and cooking compartment drain hose [4] Fig. 25 from drain box.

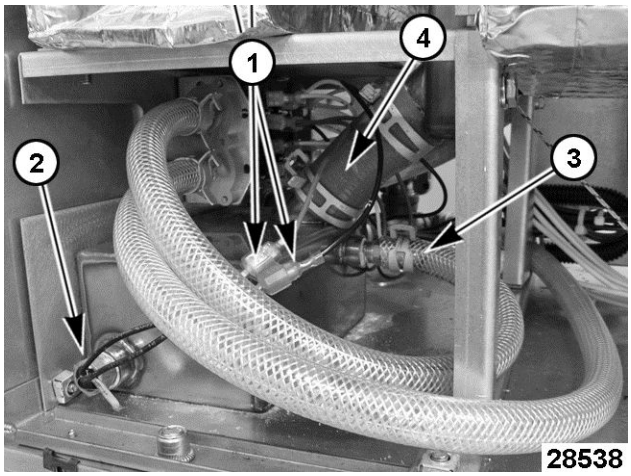


Fig. 25

6. Access steam generator drain hose Fig. 26 from right side of machine and disconnect from drain box.

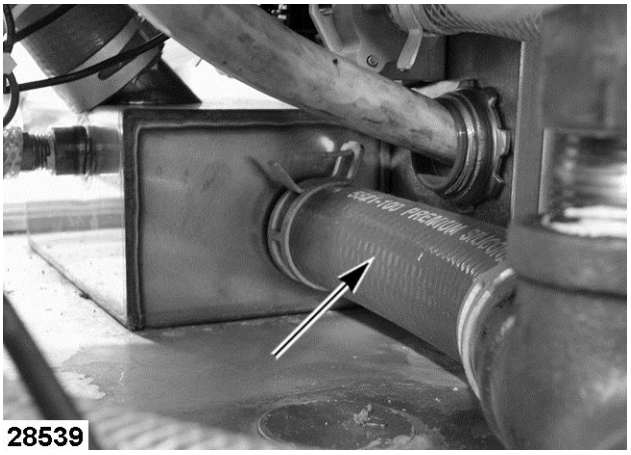


Fig. 26

7. Remove mounting nuts Fig. 27 (qty. 2) securing drain box to valve cabinet bracket at rear of steamer.

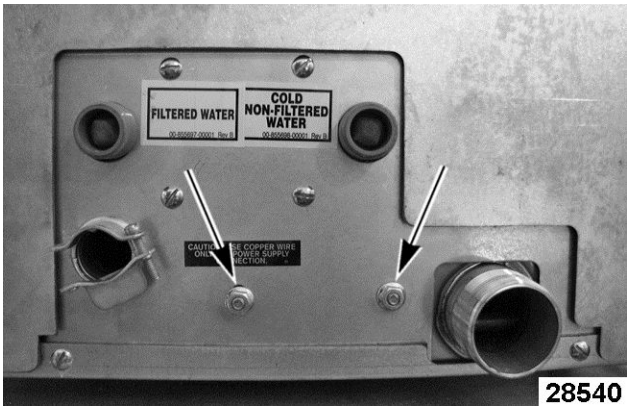


Fig. 27

8. Remove drain box from steamer.
9. Remove hose barb fitting for the drain water cooling solenoid hose from drain box. Retain for use on replacement drain box.
10. Reassemble parts removed in reverse order.

NOTE: When installing condensate thermostat and hose barb fitting, apply thread sealant to pipe threads.

11. Check steamer for proper operation and leaks around condensate thermostat and hose connection points.

COOKING COMPARTMENT

REMOVAL AND REPLACEMENT

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

NOTE: The cooking compartment and front panel are constructed as an assembly and cannot be separated.

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Remove and TOP COVER.
3. Remove DOOR from steamer.
   A. Remove lower hinge from compartment front panel.
4. Remove TIMER, INDICATOR LIGHT ASSEMBLY, ON/OFF SWITCH and STRIKER as outlined in each procedure.
5. Remove mounting nut [1] Fig. 28 securing the top of door switch assembly [2] Fig. 28 to compartment front panel.

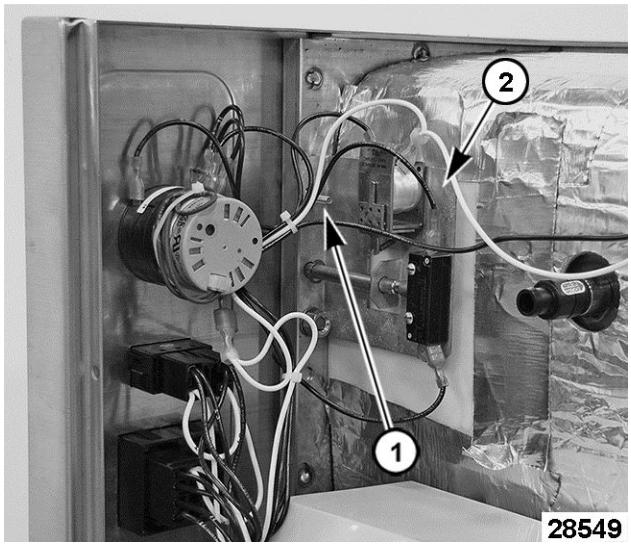


Fig. 28

6. Remove the vacuum breaker [1] Fig. 29 from cooking compartment.
7. Disconnect steam hose [2] Fig. 29 from the steam port inlet fitting on cooking compartment.
   A. Remove the steam port inlet fitting. Retain for reuse.

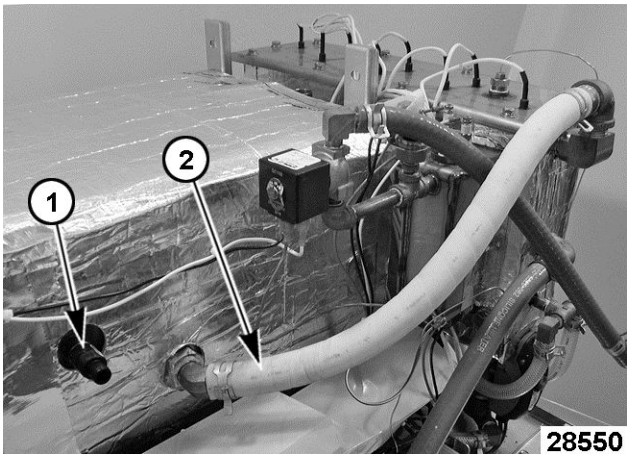


Fig. 29

8. Disconnect compartment drain hose [1] Fig. 30 from rear of cooking compartment [2] Fig. 30.

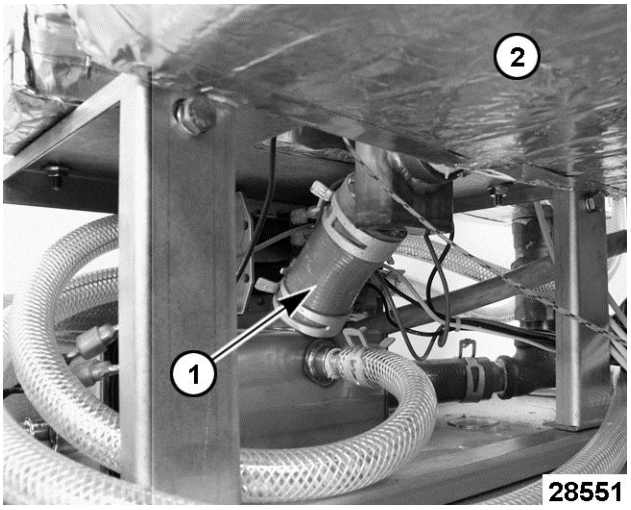


Fig. 30

9. Remove bolts securing cooking compartment front panel to louvered panel below it. Three of the bolts are located on the controls side and one bolt on the opposite side.

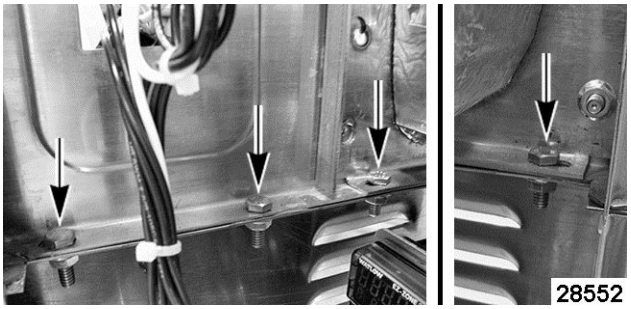


Fig. 31

10. Remove vent hose [1] Fig. 32 from sensor tube [2] Fig. 32.

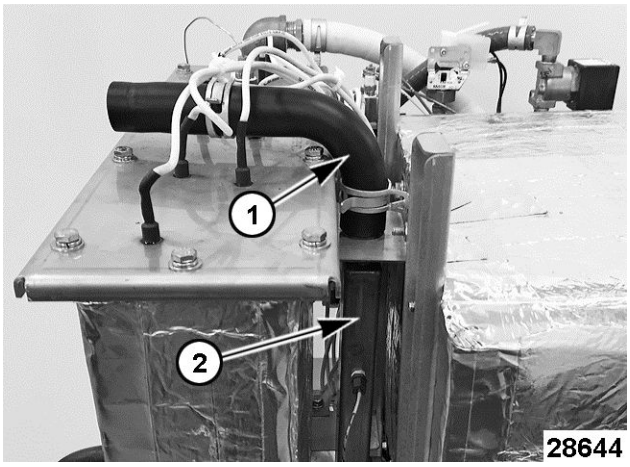


Fig. 32

11. Remove SENSOR PROBE from sensor tube.
    A. Remove sensor probe fitting from sensor tube. Retain for reuse.
12. Remove mounting nuts [1] Fig. 33 (qty. 4) securing rear of cooking compartment to the vertical mounting brackets [2] Fig. 33.

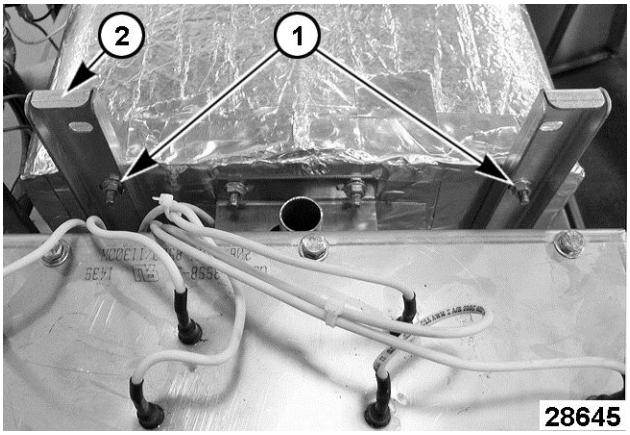


Fig. 33

13. Remove cooking compartment assembly from steamer frame.
14. Remove mounting nuts (qty. 2) securing sensor tube bracket to cooking compartment. Retain sensor tube bracket for reuse.
15. Remove insulation from old cooking compartment and install it around the replacement cooking compartment. Secure using high temperature aluminum foil tape.
16. Reinstall parts removed in reverse order.
17. Check DOOR LATCH ADJUSTMENT.

THERMOSTATS

HOLD THERMOSTAT

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Remove RIGHT SIDE PANEL.
3. Disconnect electrical lead wires [1] Fig. 34 from hold thermostat.
4. Remove hold thermostat [2] Fig. 34 from steam generator tank.

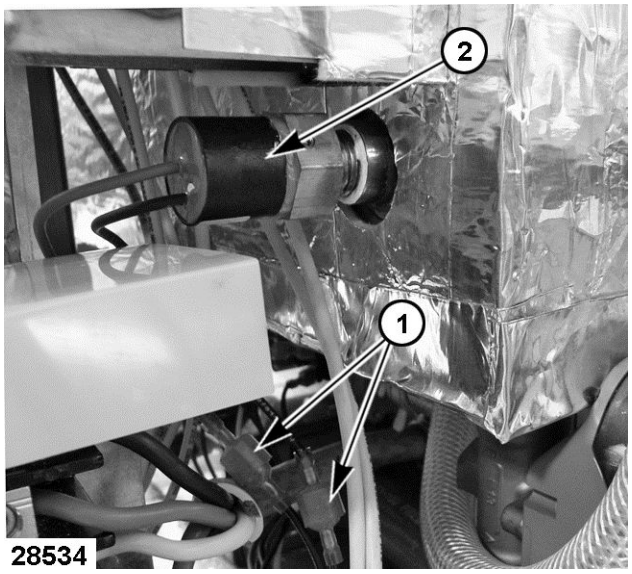


Fig. 34

NOTE: Apply Loctite 565 to threads of hold thermostat before assembly.

5. Reassemble parts removed in reverse order of removal.
6. Check steamer for proper operation and leaks around hold thermostat.

HIGH-LIMIT THERMOSTAT

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

Removal

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Remove RIGHT AND LEFT SIDE PANELS and TOP COVER.
3. Access HEATING ELEMENT.
4. Note mounting position of capillary bulb [1] Fig. 35 on heating element then compress the spring clamp [2] Fig. 35 to remove bulb from heating element.
5. Fully loosen the small capillary tube compression nut [3] Fig. 35 and slide it away from heating element.
6. Remove large capillary tube mounting nut [4] Fig. 35 from heating element plate and slide it away from heating element.

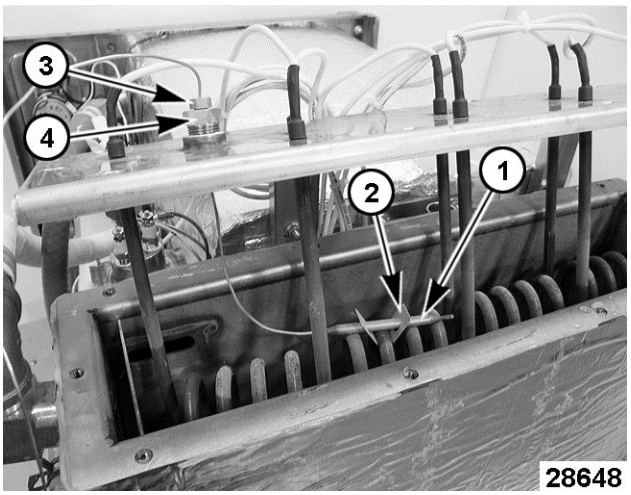


Fig. 35

7. Pull capillary bulb through mounting hole in heating element plate.
8. Disconnect electrical wiring from high-limit thermostat.
9. Remove high-limit thermostat [1] Fig. 36 from mounting bracket.

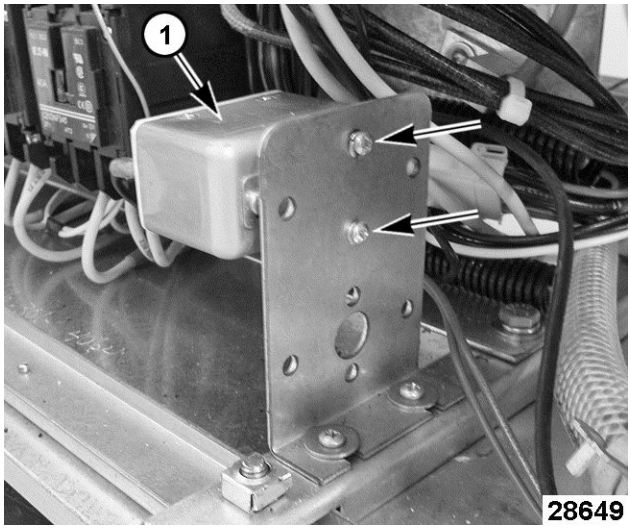


Fig. 36

Installation

1. Insert capillary bulb through large capillary tube mounting nut.
   A. Route capillary bulb through the mounting hole in heating element plate.
   B. Position capillary bulb [1] Fig. 37 at the second bank of heating elements then secure the bulb to heating element using spring clamp [2] Fig. 37. Position bulb so that it is centered across heating elements.
2. Apply pipe thread sealant to threads of large capillary tube mounting nut then install nut to heating element plate.
   A. Pull excess capillary tubing out of heating element through large capillary tube mounting nut. Route capillary tube such that there are no sharp bends or kinks.
   B. Tighten small capillary tube compression nut into the large capillary tube mounting nut.

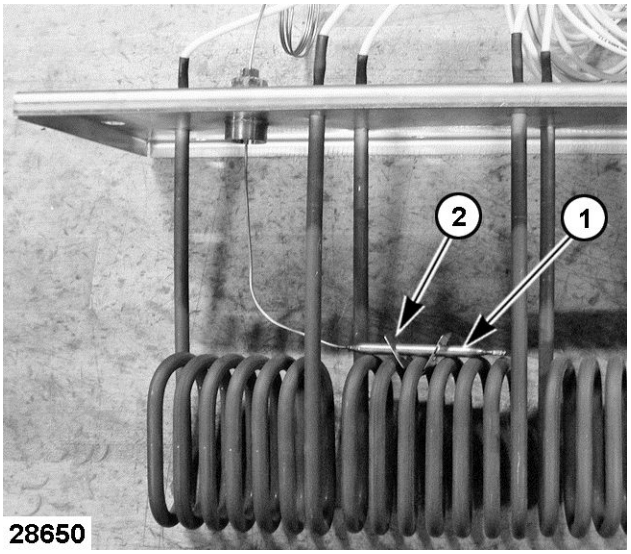


Fig. 37

NOTE: Install a new gasket when reassembling steam generator tank. Temporarily secure gasket in place with RTV 109.

3. Reinstall remaining parts removed in reverse order.
4. Torque heating element screws to 70 in-lb following the heating element tightening sequence as found under HEATING ELEMENT.
5. Check steamer for proper operation and leaks around heating element gasket and small capillary tube compression nut.

CONDENSATE THERMOSTAT

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Remove LEFT SIDE PANEL.
3. Disconnect condensate thermostat wires.

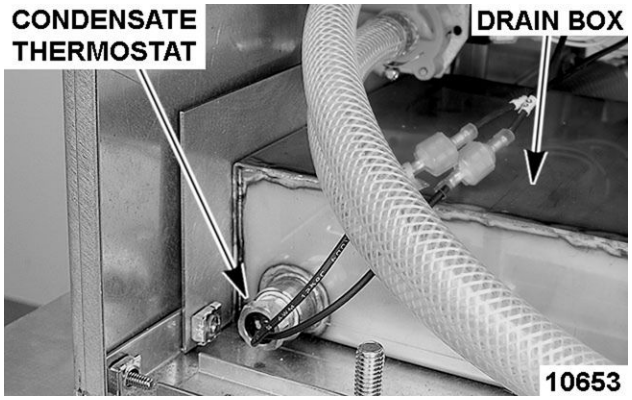


Fig. 38

4. Remove condensate thermostat from drain box.
5. Reassemble parts removed in reverse order of removal.

NOTE: When installing condensate thermostat, apply thread sealant to pipe threads.

6. Check steamer for proper operation and leaks around condensate thermostat.

TIMER

REMOVAL AND REPLACEMENT

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

NOTE: When the timer reaches zero, an external buzzer will sound and steam will stop entering the cooking compartment. The steamer has extra components to utilize the constant steam setting allowing the steamer to operate continuously.

1. Remove RIGHT SIDE PANEL.
2. Note electrical connections then disconnect wiring to timer.

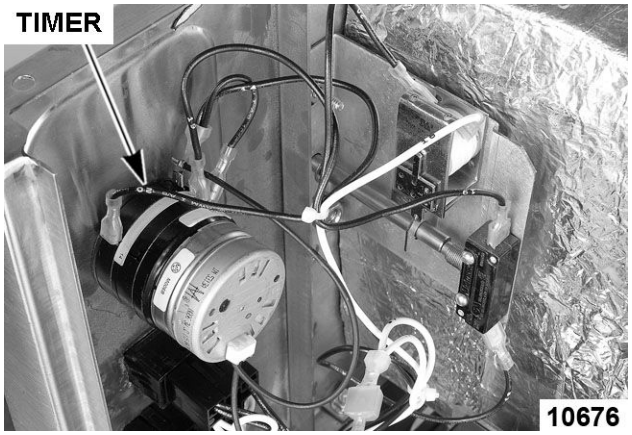


Fig. 39

3. Pull knob from timer shaft.
   A. Remove rotary shaft seal from timer shaft then remove timer from front panel.
   B. Inspect rotary shaft seal. Replace if damaged, worn or signs of moisture migration into control area around timer shaft is evident.

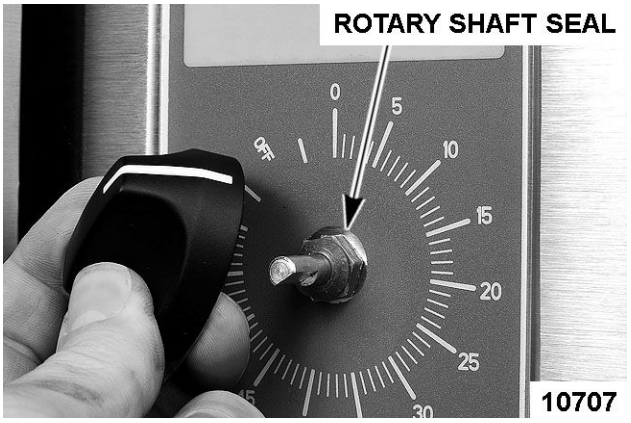


Fig. 40

4. Apply a small amount of Petrogel under rotary shaft seal.
5. Reverse procedure to install.
6. Check steamer for proper operation.

SOLID STATE CONTACTOR, PID CONTROLLER AND SENSOR PROBE

SOLID STATE CONTACTOR

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

Removal & Replacement

1. Remove LEFT SIDE PANEL.
2. Note load wire locations [1] Fig. 41 and disconnect from solid state contactor.
3. Disconnect control signal wires [2] Fig. 41 and ground wire [3] Fig. 41 from solid state contactor.
4. Disconnect wires [4] Fig. 41 from cooling fan terminals.

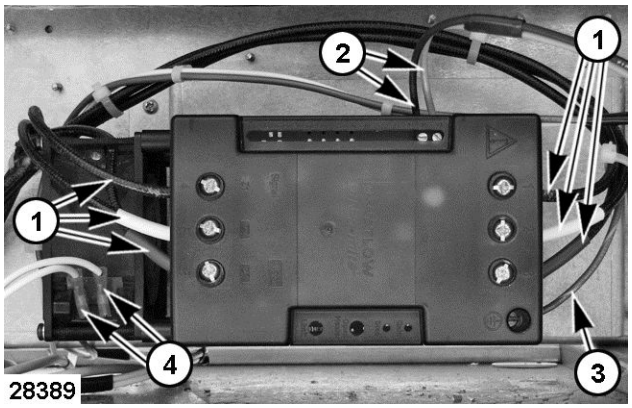


Fig. 41

5. Remove screws Fig. 42 (qty. 4) securing solid state contactor to mounting plate. The left screws are easily accessible through the space between the cooling fan and solid state contactor.

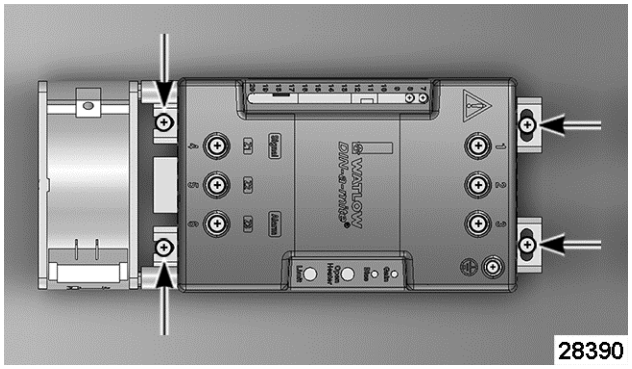


Fig. 42

6. Reverse procedure to install and check for proper operation.

PID CONTROLLER

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

Removal and Replacement

1. Remove LEFT SIDE PANEL.
2. Remove screws [1] Fig. 43 (qty. 3) securing solid state contactor mounting bracket [2] Fig. 43 to the rear of electrical panel [3] Fig. 43.

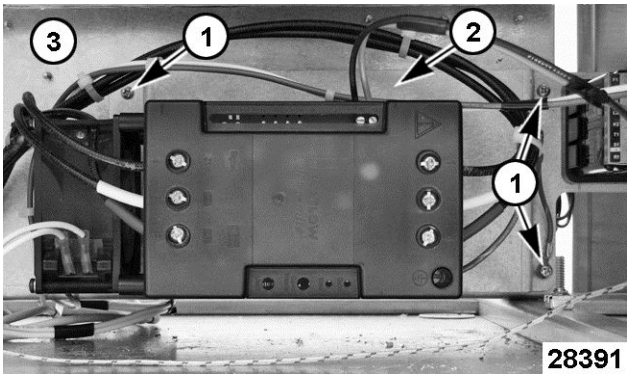


Fig. 43

3. Pull the assembly away from electrical panel to access PID Controller.
4. Lift the locking tabs [1] Fig. 44 on both sides of the mounting collar to unlatch them from the ridges [2] Fig. 44 on PID controller. Use a 1.5" putty knife or equivalent thin tool underneath each locking tab to hold the teeth away from ridges. Slide the mounting collar away from the mounting bracket [3] Fig. 44 as shown.

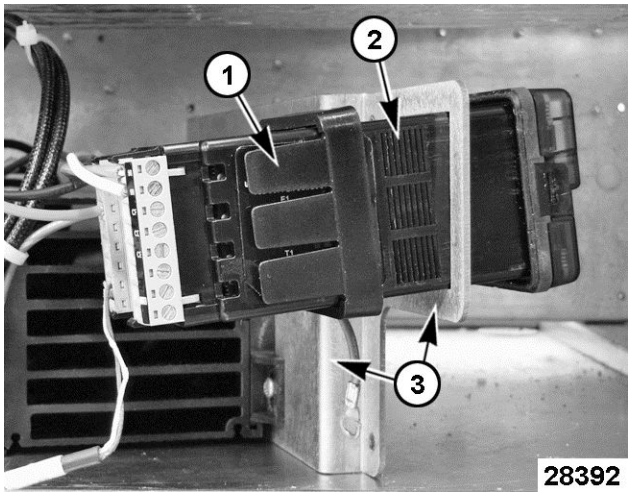


Fig. 44

5. Lift the locking tabs [1] Fig. 45 on PID controller to unlatch the wire connection strips then remove the strips [2] Fig. 45 from PID controller as shown.

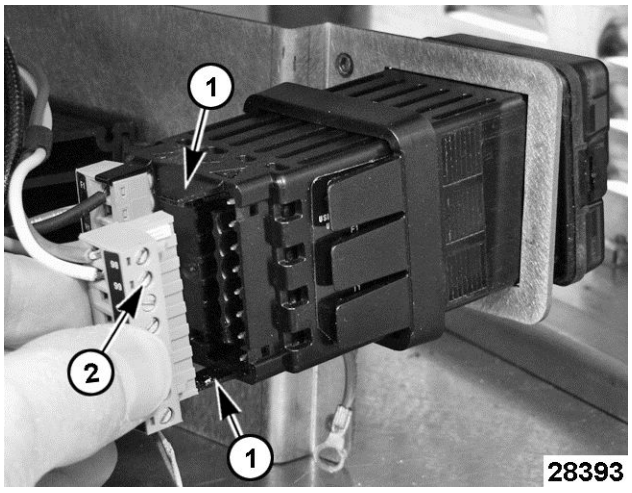


Fig. 45

6. Slide mounting collar off the PID controller then remove the controller from panel.
7. Re-assemble in reverse order and check for proper operation.

NOTE: When installing, insert the PID controller into panel opening, slide mounting collar over controller and push it up against mounting bracket to engage locking tabs and secure the controller.

Diagnostic Test

The PID controller governs the operation of Solid State contactor (3CON) to provide power at the load contacts on the Regulating contactor (2CON) to power the heating elements. The PID controller and regulating contactor (2CON) are powered at the same time through K1 relay contacts during initial heating or timed cooking. See SCHEMATIC DIAGRAM.

When powered, the PID controller performs a self-diagnostic test and displays the program version such as "13.00" for several seconds then enters operation mode. If controller passes diagnostic test, the display reverts to the actual sensor probe temperature in the top of the display, turns ON the output signal to solid state contactor (if temperature is below set point) and heating begins. The set point temperature is displayed at the bottom of the display.

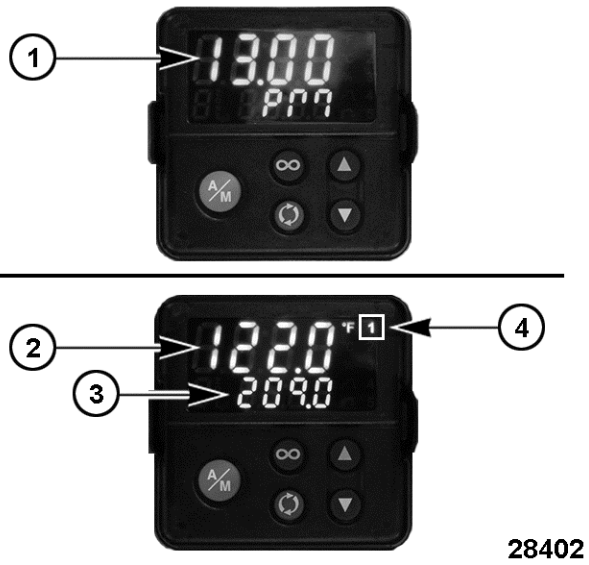


Fig. 46

PID CONTROLLER DISPLAY	
Item No.	**Description**
1	Program version during power on/self-diagnostics test.
2	Sensor probe temperature inside sensor tube (°F or °C).
3	Set point temperature - Highest operational temperature setting for sensor tube.
4	Output number 1 - Output is active when displayed. If blinking, power is being pulsed to heating elements.

If PID controller or the sensor probe is malfunctioning, an error code will display.

Error codes

- If the error code displayed is **Er.i1**, check sensor probe (thermocouple) as outlined under Sensor Probe Test.
- If a different error code is displayed, note the code then contact the appropriate Technical Support department for further instructions.

- If display is not coming ON and the water level and temperature conditions have been met, check wiring connections and power to the PID controller.

PID Operation Check

- Verify the output number "1" appears in the top right corner of display when PID controller is powered and the temperature in sensor tube is below set point (209°F).
- Number "1" indicates the output signal to the solid state contactor (3CON) is ON.
- Number "1" constantly displayed indicates solid state contactor is ON 100%.
- Number "1" blinking indicates solid state contactor is turning ON/OFF to pulse power to the heating elements.
- Pulsing of power to the heating elements begins when the sensor tube temperature reaches approximately 180°F.

SENSOR PROBE

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

Removal and Replacement

1. Remove LEFT SIDE PANEL.
2. Disconnect sensor probe wires Fig. 47 from PID controller at lead wire connections.

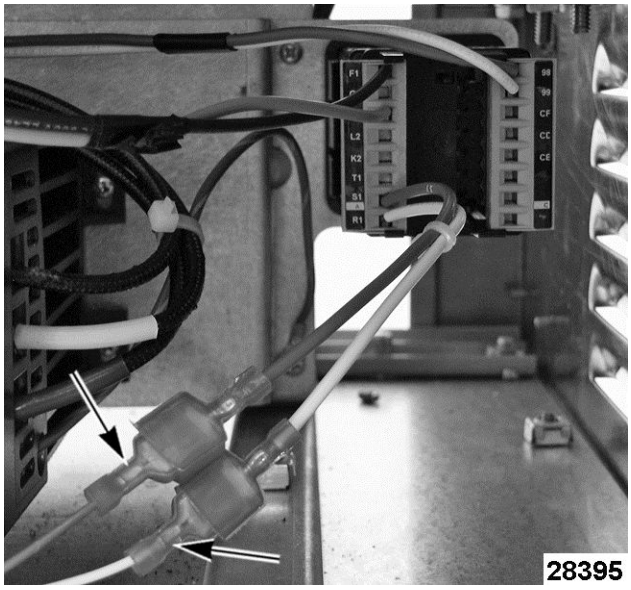


Fig. 47

3. Remove sensor probe [1] Fig. 48 from sensor tube [2] Fig. 48.

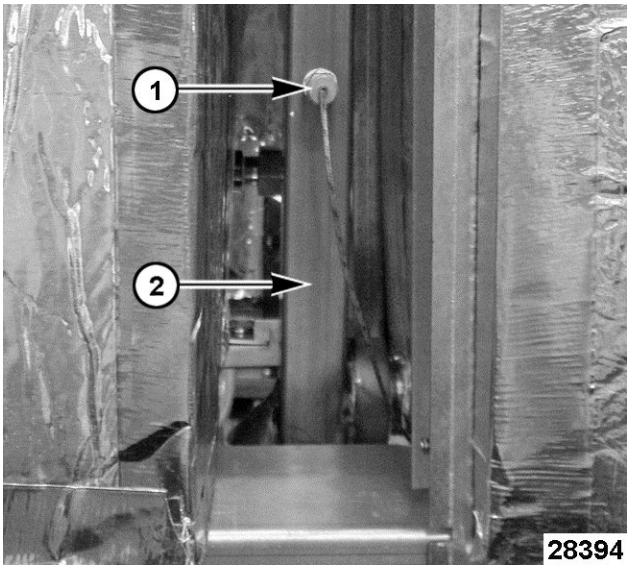


Fig. 48

4. Reverse procedure to install and check for proper operation.

NOTE: Apply pipe thread sealant to probe threads.

Sensor Probe Test

NOTE: The sensor probe is a J type thermocouple and the lead wires are polarity sensitive. The negative lead (red) must be connected to S1 for proper operation of the PID Controller.

1. Access SENSOR PROBE wires connected to PID controller.
2. Remove sensor probe wires from PID controller.
3. Check thermocouple for a measurable resistance (approximately 5 to 10 ohms at room temperature). If meter reads an overload (OL) condition (open), or zero ohms (short) replace the thermocouple and check temperature controller for proper operation.

HEATING ELEMENT

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

REMOVAL AND REPLACEMENT

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Remove RIGHT SIDE PANEL and TOP COVER.
3. Note heating element wire connection points then disconnect heating element lead wires from Limiting contactor [1] Fig. 49 and Regulating contactor [2] Fig. 49.

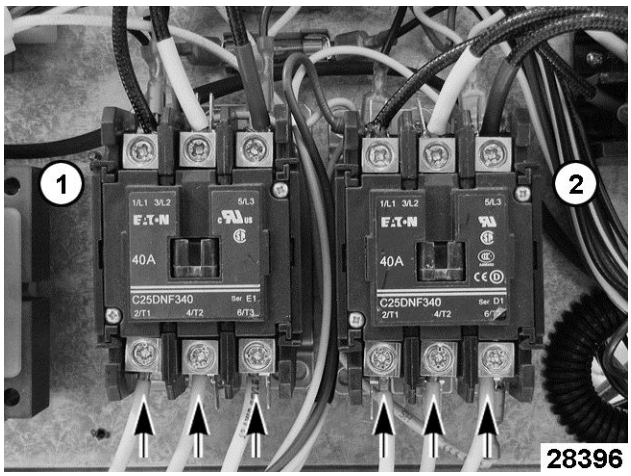


Fig. 49

4. Remove vent hose [1] Fig. 50 from sensor tube and vent tube.

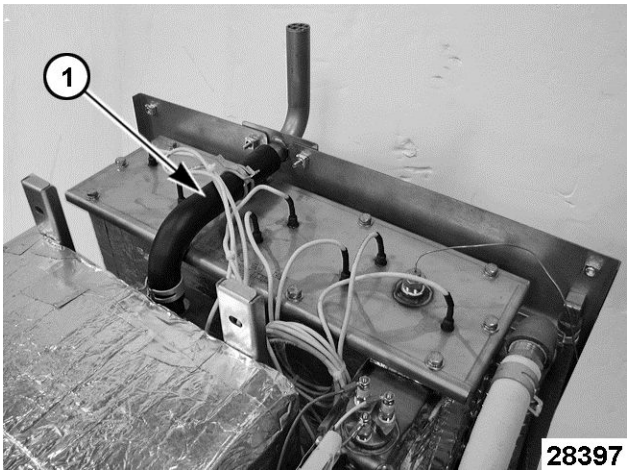


Fig. 50

5. Position high-limit thermostat capillary tube [1] Fig. 51 to facilitate heating element removal. Avoid creating sharp bends or kinks in the capillary tube.
6. Remove screws and lock washers [2] Fig. 51 (qty.10) securing heating element [3] Fig. 51 to tank.

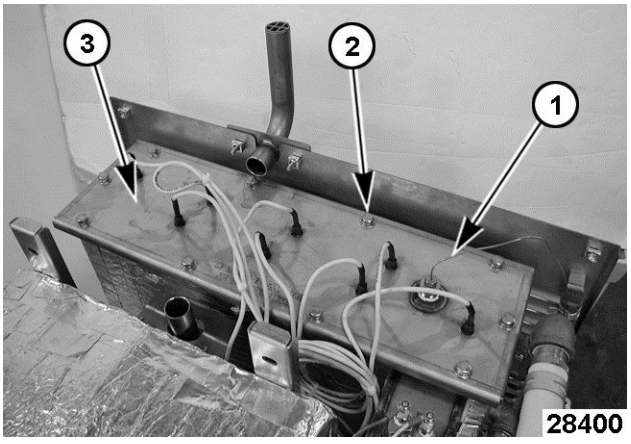


Fig. 51

7. Pull heating element out of steam generator tank.
8. Note mounting position of high-limit bulb then remove bulb from heating element.
   A. Remove high-limit capillary tube compression fitting [1] Fig. 52 then remove high-limit capillary tube and bulb [2] Fig. 52 from heating element.

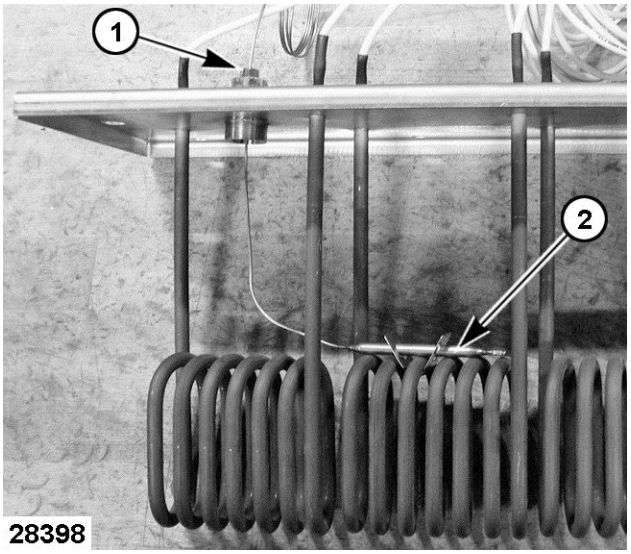


Fig. 52

NOTE: Install a new gasket when reassembling steam generator tank. Temporarily secure gasket in place with RTV 109.

9. Remove gasket from steam generator tank.
   A. Clean remaining sealant from top lip of steam generator tank.

NOTE: Refer to HIGH-LIMIT THERMOSTAT for proper placement of capillary bulb.

10. Reassemble parts removed in reverse order of removal. Tighten heating element screws evenly to 70 in-lbs. Follow tightening sequence pattern as shown in Fig. 53 (top view of heating element shown).

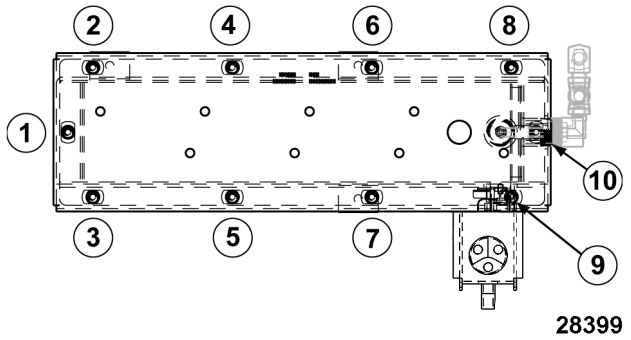


Fig. 53

11. Check steamer for proper operation and leaks around heating element.

DIAGNOSTIC CHECKS

⚠ WARNING Certain procedures in this section require electrical test or measurements while power is applied to the machine. Exercise extreme caution at all times and follow Arc Flash procedures. If test points are not easily accessible, disconnect power and follow Lockout/Tagout procedures, attach test equipment and reapply power to test.

1. Check voltage across heating element wires at Limiting (1CON) and Regulating (2CON) contactor load terminals and verify against data plate voltage as outlined in the steps below. See WIRING DIAGRAM - HEATING ELEMENTS for connections.
   A. Voltage should be measured after PID controller has energized solid state contactor (3CON) during initial heat up (longest ON time); or during temperature recovery after door has been opened to allow cooking compartment to cool down then closed (timer must be on).
   B. When temperature in the sensor tube (vent) reaches approximately 180°F, the PID controller will signal the solid state contactor (3CON) to begin pulsing power to the heating elements to reduce energy use. If voltage is measured during the pulsing state, the meter readings will not be steady for a good reading.
2. If voltage is correct, check current draw (step 3). If voltage is not correct, check the following:
   A. Voltage supply to steamer at terminal block.
   B. Fuses or breakers blown.
   C. Power to contactor coils (Limiting 1CON) (Regulating 2CON).
   D. Limiting (1CON) or Regulating (2CON) contactors not pulling in. (Mechanical).
   E. Solid State Contactor (3CON) not energized by PID controller to provide power to the load contacts on regulating contactor (2CON).
      1) Verify PID controller operation as outlined under Diagnostic Test.

2) Check control signal wiring between PID controller and solid state contactor (3CON); and ensure ground wire is connected to solid state contactor (3CON). See WIRING DIAGRAM - HEATING ELEMENTS for connections.

3) Verify LED (green) [1] Fig. 54 on Solid State contactor (3CON) is lit during heating. LED will be constantly lit during initial heat up and temperature recovery after door has been opened to allow cooking compartment cool down then closed (timer must be on and door closed). LED will blink to indicate Solid State contactor (3CON) is pulsing power to the load contacts on regulating contactor (2CON).

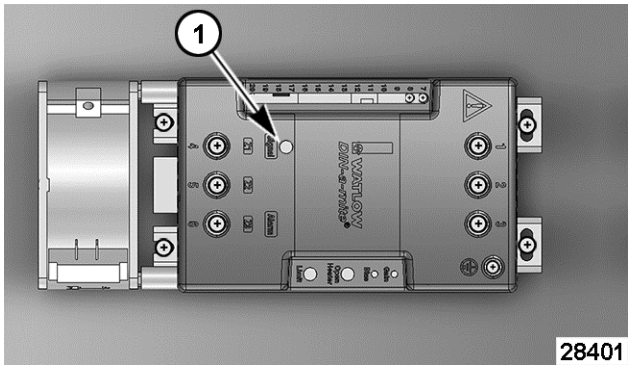


Fig. 54

3. Check current draw (amps) through heating element lead wires using an amp clamp meter and compare them to the values listed in table as outlined in the steps below.

   A. Full load amps should be measured when PID controller has energized solid state contactor (3CON) during initial heat up (longest ON time); or during temperature recovery after door has been opened to allow cooking compartment cool down then closed (timer must be on).

   B. When temperature in the sensor tube (vent) reaches approximately 180°F, the PID controller will signal the solid state contactor (3CON) to begin pulsing power to the heating elements to reduce energy use. If current draw is measured during the pulsing state, the meter readings will not be steady for a good reading.

4. If current is correct, then heating element is ok. If current is not correct, check element resistance (step 5).

5. Disconnect power to machine.

6. Remove one lead wire of each heating element from the Regulating contactor (2CON) (T1, T2, T3). Check individual element resistance between heating element lead wire and load terminal on Limiting contactor (1CON) using a VOM. Compare resistance readings to the values in table below. See WIRING DIAGRAM - HEATING ELEMENTS for connections.

   A. If resistance readings are not correct, replace heating element as outlined under REMOVAL AND REPLACEMENT.

NOTE: Values in table are nominal. Tolerance is ±10 %.

7. Check steamer for proper operation.

Notes on Heating elements connected per machine voltage listed in table below:

- *All four heating elements are connected.
- **Three heating elements connected (fourth element is not connected).
- ***Heating elements of 480V machines are connected in Wye configuration for 277V across each element.

MODEL	VOLTAGE	TOTAL kW	CURRENT PER ELEMENT	RESISTANCE PER ELEMENT (OHMS)
3 Pan	208*	8.5	10.2	20.3
3 Pan	240**	8.5	11.8	20.3
3 Pan	480Y/277***	8.5	10.2	27.1
5 Pan	208*	15	18.1	11.5
5 Pan	240**	15	20.9	11.5
5 Pan	480Y/277***	15	18.0	15.4

WATER LEVEL CONTROL COMPONENTS

WATER LEVEL CONTROL - OPERATION

Low Level Cut-Off & Differential Control

The steamer is equipped with three water level sensing probes (high, low and low level cut-off) and a water level control board Fig. 55. The water level control board performs two functions: 1) Provide low level cut-off protection to shut off the heat source in case the water level drops below the low level cut-off (LLCO) probe. 2) Perform as a differential level control to maintain the water level between the low and high water level probes.

The water level control (WLC) board has input voltage (120VAC) across terminals 11 and 12 which powers the primary side of the transformer. See schematic diagram of the water level control circuit Fig. 56. On one side of the transformer secondary, power is provided to the control by a series path through chassis ground (terminal 10). The other side of the transformer secondary (12VAC) is attached to the probe that directs power to the other side of WLC board relay coils (LLCO and HL) and to the inverse latching relay (ILR) electronic circuit on the WLC board. As water enters the generator, it becomes part of the WLC board circuit. When the water level in the generator reaches a probe, that circuit is completed.

The inverse latching relay of the WLC board is de-energized, leaving the ILR-1 (N.O.) and ILR-2 (N.C.) contacts in their shelf state.

When the main power switch is turned on, power is supplied to the WLC board which energizes the high level (HL) relay, closes HL-1 normally open contacts, and illuminates the HL relay LED. With the HL-1 contacts closed, the fast fill solenoid is energized and water begins filling the generator.

When the water level reaches the low level cut-off (LLCO) probe, the LLCO relay is energized and illuminates the LLCO LED. With the LLCO-1 contacts closed, the heat source can be energized provided the auxiliary control(s) in the heating circuit are satisfied. The LLCO relay will remain energized and its LED will stay lit until the water level in the generator drops below the LLCO probe.

When the water level reaches the low level (LL) probe, power to terminal 2 on the WLC board is present but no switching occurs.

After the water level reaches the high level (HL) probe, the inverse latching relay of the WLC board is energized and locked through the low level probe (LL) and ILR-1 contacts. With ILR-2 contacts open, HL relay is de-energized and the HL LED goes out. With the HL-1 contacts open, the fast fill solenoid is de-energized, stopping the flow of water into the generator.

When the water level drops below the low level (LL) probe, power is removed from the inverse latching relay, the HL relay energizes through ILR-2 and HL contacts change state. The slow fill solenoid is energized through HL-1 to refill the generator and the HL LED is lit. The HL relay and LED will toggle on and off during a cooking cycle as needed.

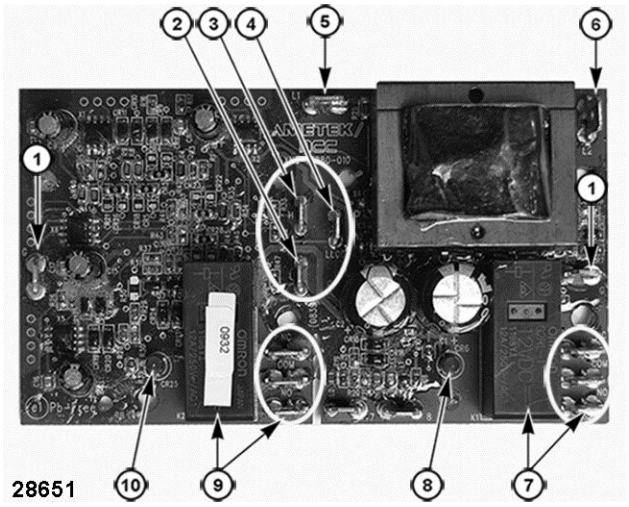


Fig. 55

Item No.	Description
1	Ground
2	Low Level (L) Probe Connection
3	High Level (H) Probe Connection
4	Low Level Cut-Off (LLCO) Probe Connection
5	L1 Incoming Voltage
6	L2 Incoming Voltage
7	Relay (LLCO) and Contacts
8	LLCO LED
9	Relay (HL) and Contacts
10	HL LED (Fill)

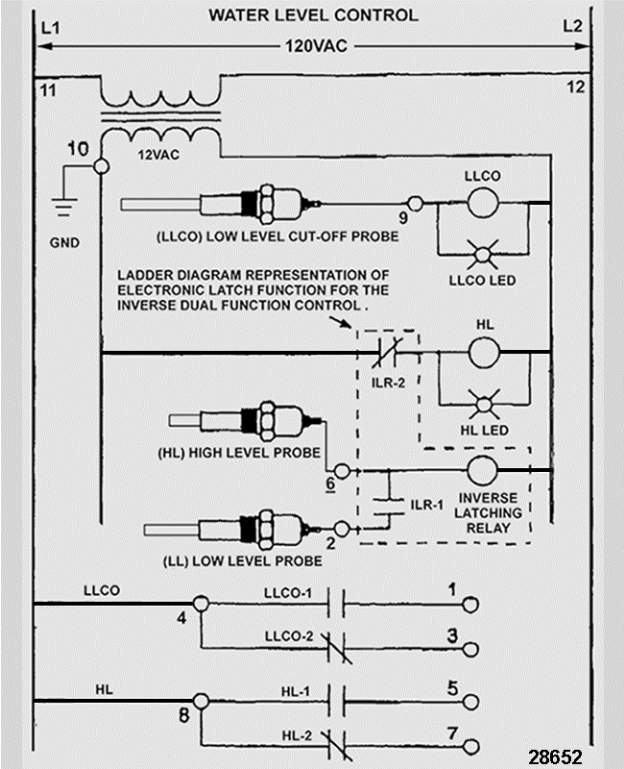


Fig. 56

WATER LEVEL CONTROL BOARD

⚠WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

NOTICE Certain components in this system are subject to damage by electrostatic discharge during field repairs. A field service grounding kit is available to prevent damage. The field service kit must be used anytime the control board is handled.

1. Remove RIGHT SIDE PANEL.
2. Squeeze tab on plastic standoff to release circuit board from standoff. Water level control board is secured with pins in five locations.

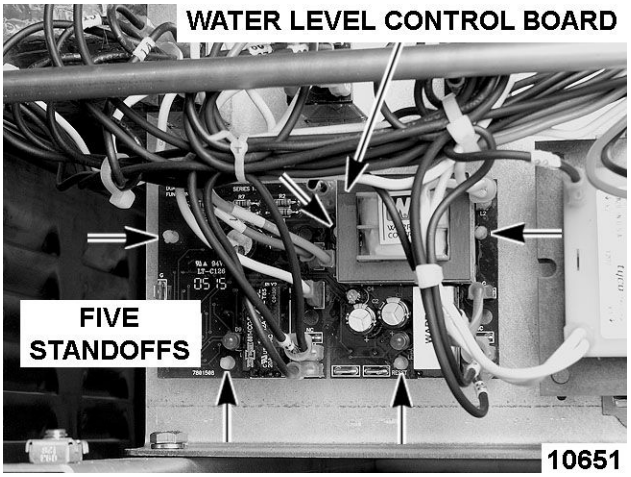


Fig. 57

3. Note electrical wiring connection points then disconnect lead wires from water level control board (WLC). Refer to the machine wiring diagram when installing water level control board.
4. Reassemble parts and wiring removed in reverse order of removal.
5. Check steamer for proper operation.

WATER LEVEL PROBES

⚠WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

1. Remove RIGHT SIDE PANEL and TOP COVER.
2. Note location of wires then disconnect from water level probes [1] high level, [2] low level, [3] low level cut off as shown in Fig. 58.
3. Remove probes from probe housing assembly.

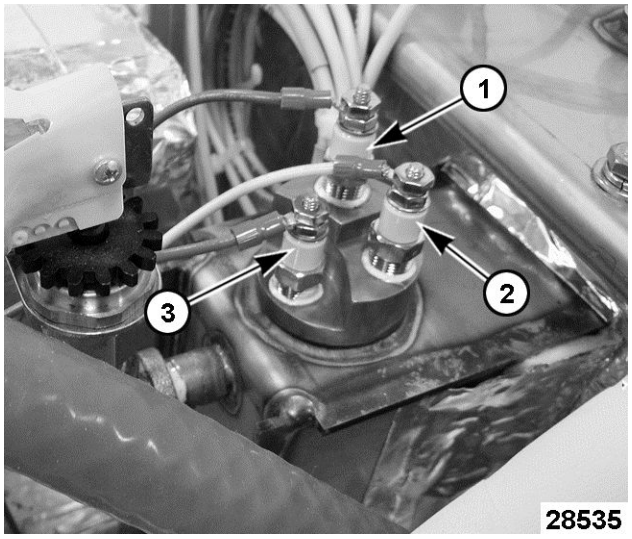


Fig. 58

WATER LEVEL PROBE ELECTRICAL CONNECTIONS			
Item Number	**Water Level Controller**	**Wiring**	**Water Level Probe**
1	H	# 5A - Blue	HL - High Level Probe
2	L	# 6B - Yellow	LL - Low Level Probe
3	LLCO	# 7C - Red	LLCO - Low Level Cut Off
4 (not shown)	G (ground connection at tank)	# 8 - Green	Ground

NOTE: Probes should be cleaned thoroughly. Remove all accumulated deposits from insulator using a soft cloth. Do not use anything abrasive on insulators. If probes are dirty, delime steam generator tank after assembling.

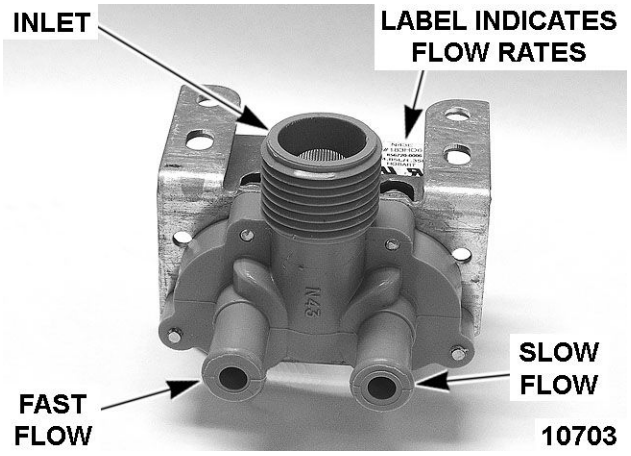
NOTE: When installing, apply thread sealant to pipe threads.

4. Reverse procedure to install.
5. Check for proper operation.

FILTERED AND NON-FILTERED WATER SOLENOID VALVES

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

NOTE: The filtered and non-filtered water solenoid valves are constructed as dual water valve assemblies. To differentiate between the fast and slow fill valves, hold the dual water valve assembly with the inlet up and the outlets facing forward. The fast flow valve is the left valve and the slow flow valve is the right valve. The two dual assemblies used on the steamer have different flow rates and should not be interchanged.



DUAL WATER VALVE

DUAL WATER VALVE FLOW RATES			
Valve Type	**Machine Type**	**Flow Rate (GPM)**	
		Fast Flow Valve	**Slow Flow Valve**
Fill (Filtered Water)	3 & 5 Pan	4.8	.15
Condensate (Non-Filtered Water)	3 - Pan	4.8	.75
	5 - Pan	4.8	1.35

Filtered Water Solenoid Valve

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Disconnect the incoming filtered water hose to machine.
3. Remove the REAR PANEL.

4. Remove the screws securing the solenoid valve to the back plate.

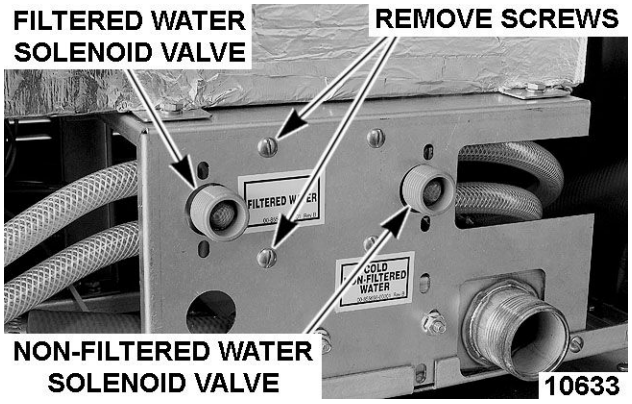


Fig. 60

5. Pull solenoid valve toward right side of machine enough to access electrical connections.
   A. Note connection points of electrical wires then disconnect wires from solenoid valve.
   B. Disconnect hoses from solenoid valve then remove solenoid valve from steamer.

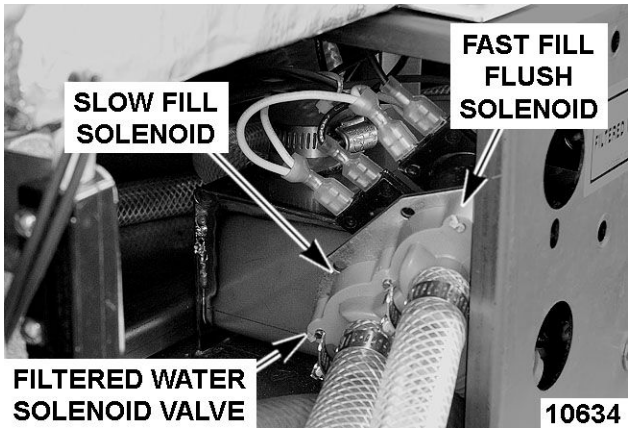
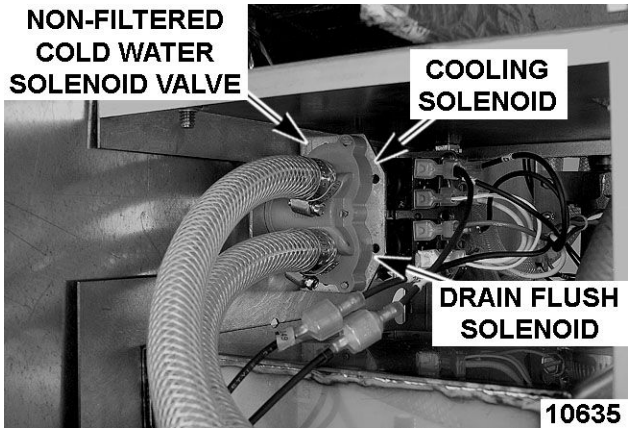


Fig. 61

6. Reassemble parts removed in reverse order of removal.
7. Verify that the filtered water supply is connected to the input of the filtered water solenoid valve.
8. Check steamer for leaks and proper operation.

Non-Filtered Cold Water Solenoid Valve

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Disconnect incoming water hose to non-filtered cold water solenoid valve.
3. Remove LEFT SIDE PANEL.
4. Note connection points of electrical connections then disconnect wiring from solenoid valve.



VIEW FROM LEFT SIDE OF STEAMER

5. Remove the screws securing non-filtered cold water solenoid valve to back plate.
6. Note hose connections to solenoid valve then disconnect hoses from valve.
   A. Remove solenoid valve from steamer.
7. Reassemble parts removed in reverse order of removal.
   A. Connect the outputs of the non-filtered water cooling solenoid to the drain box and Tee mounted to the drain valve under the steam generator.
8. Verify that the filtered water supply is connected to the input of the filtered water solenoid valve.
9. Check steamer for leaks and proper operation.

MOTORIZED DRAIN VALVE

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

1. Turn steamer off by using the on/off switch on the front panel of steamer.
   A. Allow steamer to complete drain cycle.
   B. If motorized drain valve has malfunctioned and the tank will not drain normally, refer to Drain Tank Manually.

Drain Tank Manually

1. Turn off water supply to steamer.

2. Disconnect power to steamer allowing time for water in steam generator tank to cool to 140°F before attempting to manually open drain valve.
3. Remove RIGHT SIDE PANEL.
4. Locate the motorized drain valve [1] Fig. 63 found at lower right side of steam generator tank.

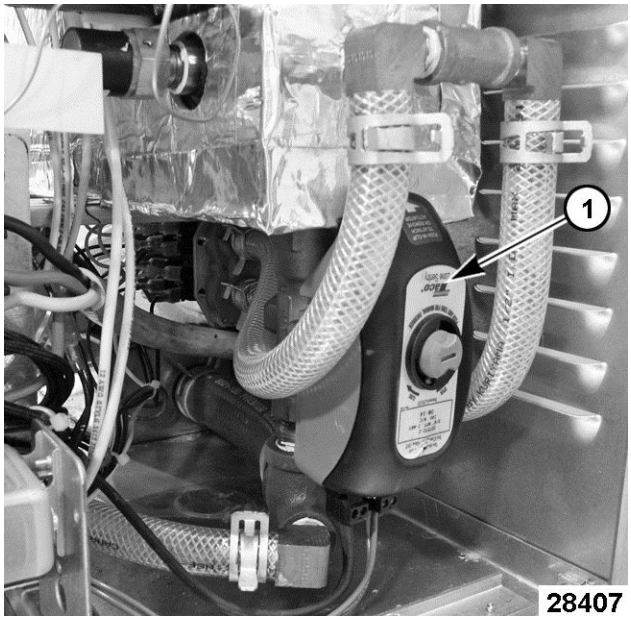


Fig. 63

5. Push in on the manual drain override knob to disengage the gear set.
   A. Rotate knob 90° CCW [1] Fig. 64 to manually open the drain valve. Turning knob such that the slot in knob is in a vertical orientation indicates the drain valve is open. If slot in knob is in a horizontal orientation, the drain valve is closed.

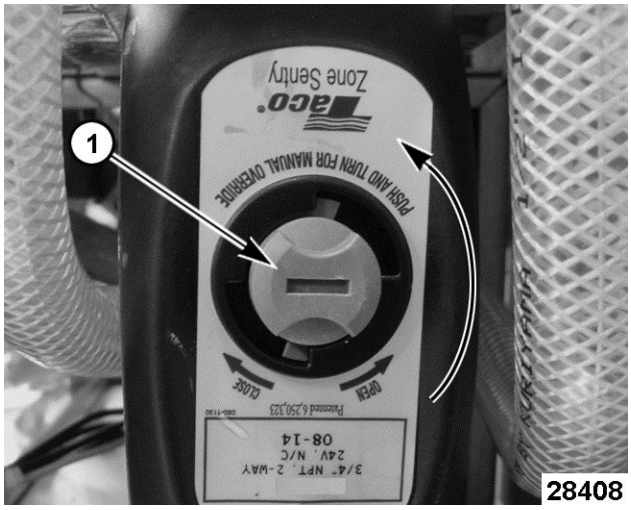


Fig. 64

   B. Return manual drain override knob to the closed position by rotating the knob 90° CW (slot in horizontal position).

Removal

1. Turn off water supply to steamer.
2. Remove the RIGHT SIDE PANEL and REAR PANEL for added accessibility.
3. Press in on spring catch [1] Fig. 65 and hold down to release from locking posts on the valve body then lift motorized control assembly [2] Fig. 65 off the valve.

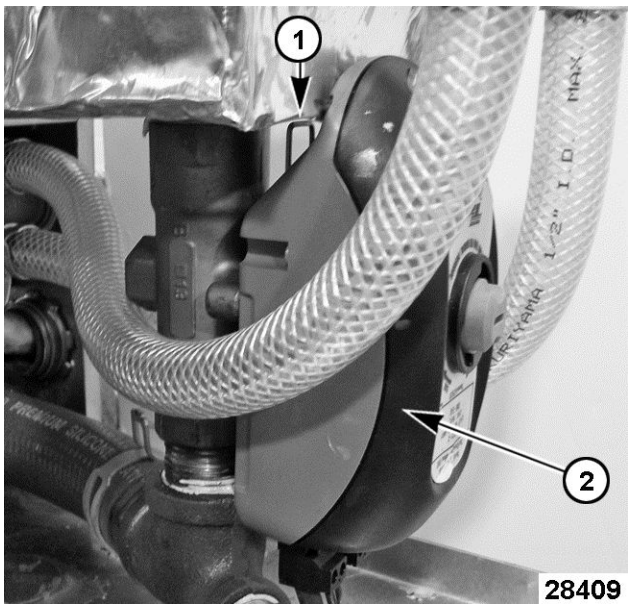


Fig. 65

4. Note location of electrical connections then disconnect electrical wiring from motorized control assembly.

NOTE: The two electrical plugs on the motorized control assembly are identical. If the electrical wiring is not connected correctly, the motorized drain valve will not function.

5. Disconnect the drain flush hose [1] Fig. 66 and drain hose [2] Fig. 66 from the Tee fittings located below drain valve.

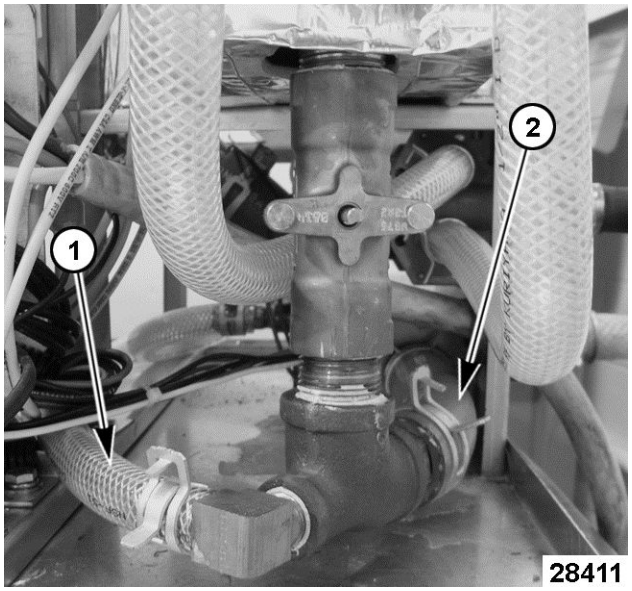


Fig. 66

6. Remove drain valve body from steam generator tank.
7. Separate the Tee and pipe nipple from drain valve body for installation on replacement motorized drain valve.
8. Reassemble parts removed in reverse order. Apply pipe thread sealant to threads of plumbing connections.

NOTE: When installing motorized control assembly, manually turn flat of "D" shaped stem down to close the drain valve [1] Fig. 67 and align with "D" shape fitting on motorized control assembly [2] Fig. 67. Install motorized control assembly in the closed position (slot in manual knob horizontal). If motorized drain valve is in the open position (slot in manual knob vertical) when power is applied to the steamer and the power switch is on, motorized drain valve will not close and the fill water will flow through the tank and into the drain.

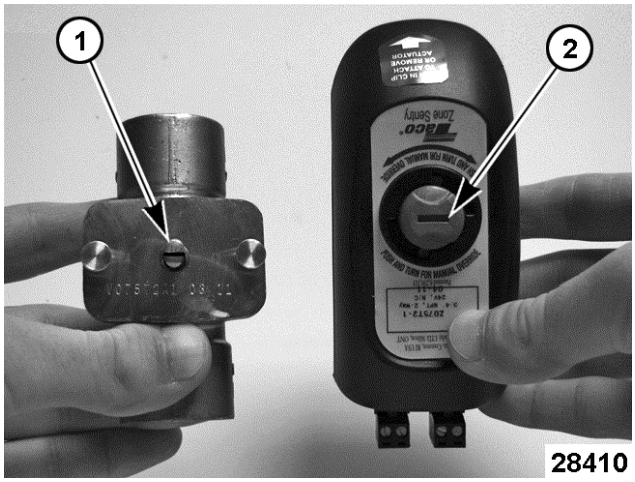


Fig. 67

9. Verify On/Off switch is in the off position and the motorized drain valve is closed before applying power to steamer.

NOTE: When power is applied and power switch is off the steamer will enter a drain cycle.

10. Check steamer for proper operation and leaks around drain valve.

SWITCHES, LIGHTS, BUZZER AND SOLENOIDS

ON/OFF SWITCH

⚠WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

1. Remove RIGHT SIDE PANEL.
2. Locate the on/off switch [1] Fig. 68 mounted to the front panel.

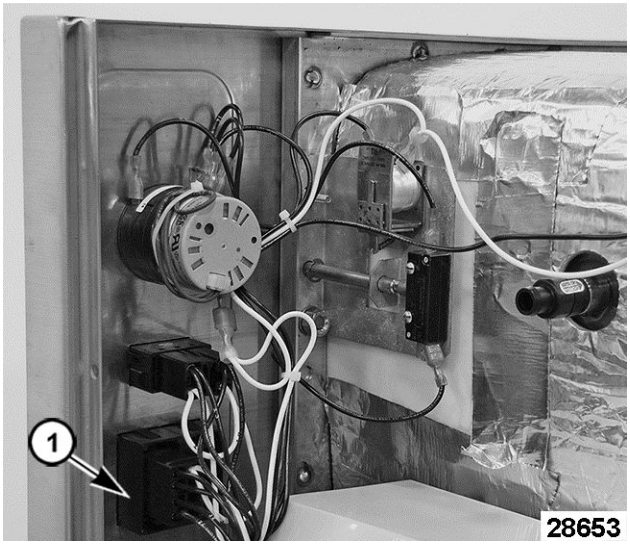


Fig. 68

3. Disconnect electrical plug from switch.
4. Remove switch from front panel.
5. Reassemble parts removed in reverse order.

INDICATOR LIGHT ASSEMBLY

⚠WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

NOTE: The indicator light assembly contains the green ready lamp and red cook lamp.

1. Remove RIGHT SIDE PANEL.
2. Locate the indicator light assembly [1] Fig. 69 mounted to front panel.

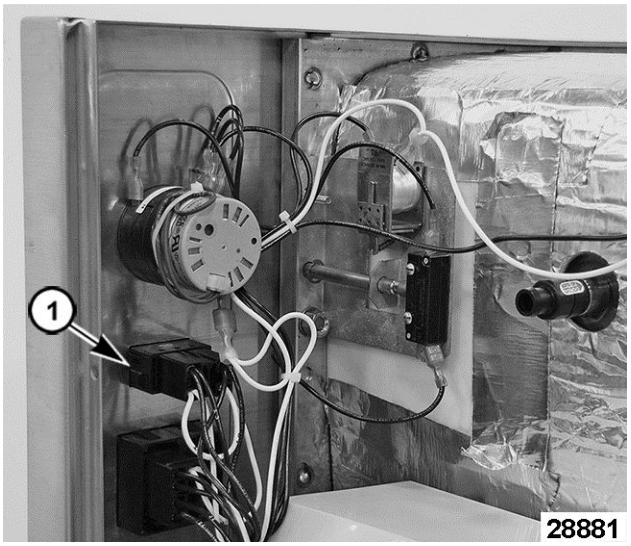


Fig. 69

3. Disconnect electrical plug from indicator lights.
4. Remove indicator light assembly from the front panel.
5. Reassemble parts removed in reverse order.

DOOR SWITCH

⚠WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

Removal

1. Remove RIGHT SIDE PANEL.
2. Open cooking compartment door.
3. Note wiring connections and disconnect electrical wiring from switch.

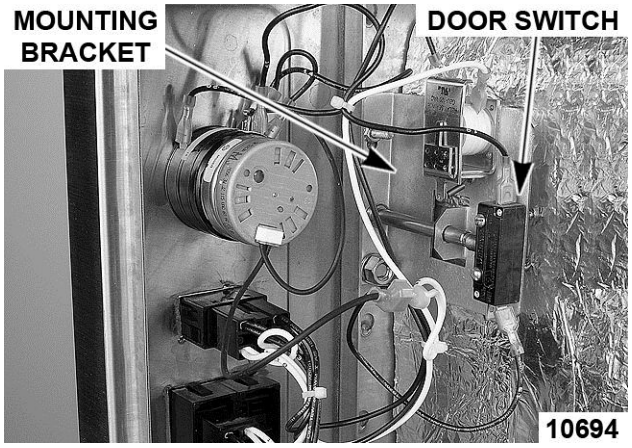


Fig. 70

4. Remove switch from door switch mounting bracket. Retain hardware.

Installation

1. Verify E-clip is installed on door switch linkage in groove nearest front panel (if two grooves in linkage are present).

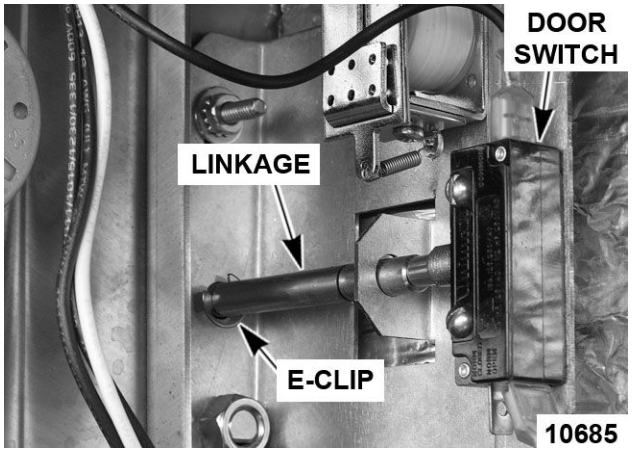


Fig. 71

2. Loosely install door switch onto door switch mounting bracket.
   A. Close door.
   B. Push switch up against switch linkage as far as possible.
   C. Tighten switch mounting hardware.
3. Check door switch operation.
   A. Set meter to measure resistance and place meter leads across the COMMON and NORM OPEN terminals of switch. With door closed, meter should indicate a closed circuit.
   B. Open door. Meter should indicate an open circuit as door is opened.
4. Check steamer for proper operation.
5. Reinstall RIGHT SIDE PANEL.

PRESSURE SWITCH (NON-ADJUSTABLE)

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

NOTE: Steamers built June 2015 and later.

Removal

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Remove RIGHT SIDE PANEL.
3. Locate pressure switch [1] Fig. 72 in the piping that extends from the water level probe housing.

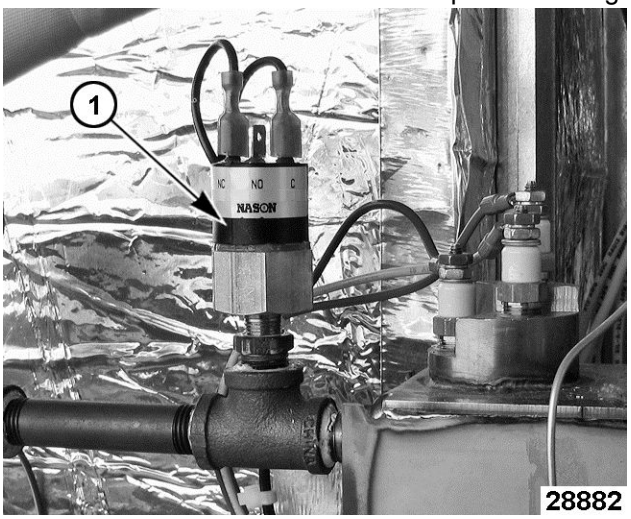


Fig. 72

4. Disconnect electrical wiring to pressure switch.
5. Remove pressure switch from piping.
6. Reassemble parts removed in reverse order.
   A. Apply pipe thread sealant to threads of pressure switch before installation.
7. Check for proper operation.

Check

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Remove RIGHT SIDE PANEL.

NOTE: Pressure can be checked using the small air pocket that exists between the delime port cap and water level probe housing in the delime hose. Make certain that no leaks exist in generator tank or pressure gauge fittings.

NOTE: When temperature in the sensor tube (vent) reaches approximately 180°F, the PID controller will signal the solid state contactor (3CON) to begin pulsing power to the heating elements to reduce energy use.

3. Remove cap from delime port [1] Fig. 73 and install pressure gauge [2] Fig. 73. See TOOLS.

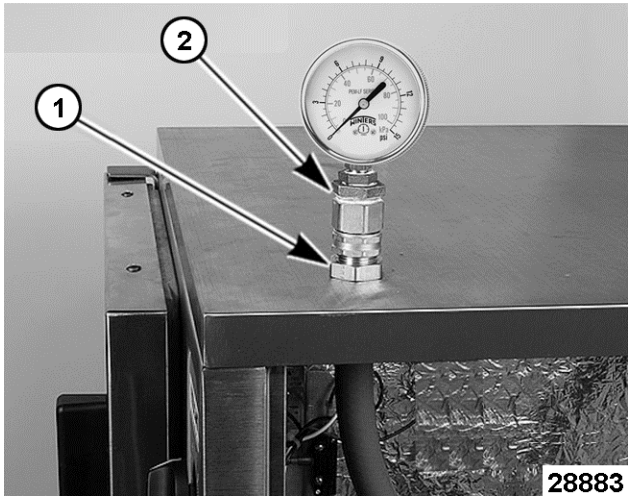


Fig. 73

4. Close cooking compartment door.
5. Turn steamer on.
   A. Set timer for approximately 10 minutes.
   B. Wait for full steam production to stabilize. Monitor the temperature display on the PID controller. After the temperature passes 195°F, wait approximately 5 minutes then continue with procedure.
   C. Observe pressure gauge Fig. 74 as steam is being generated. Gauge should level out at approximately 1.25 to 2.0 psi, but will oscillate with respect to fill water entering generator tank.

NOTE: Operating pressures will vary slightly between steamer being serviced and gauge used.

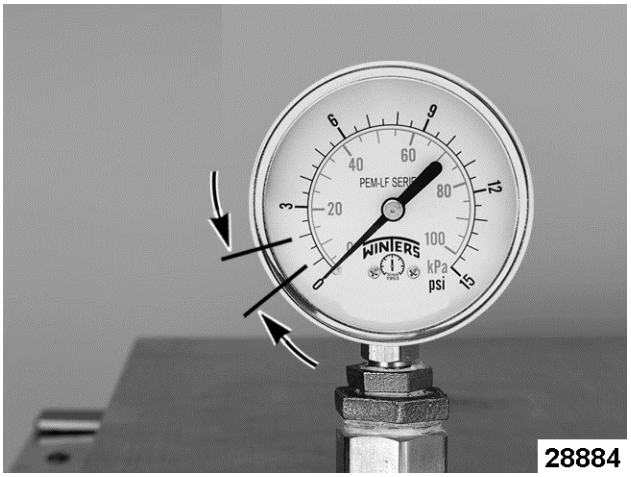


Fig. 74

6. While observing pressure gauge, *temporarily* clamp steam outlet hose to close it off. Use adjustable plyers or other method for clamping hose.

NOTE: If pressure should rise above 6.0 psi when performing check, release clamp on steam outlet hose. Pressure switch is malfunctioning and should be replaced.

NOTE: With steam outlet house clamped off, the temperature in sensor tube will drop rapidly. The PID controller will call for heat and energize the solid state contactor at 100% ON time until clamp is released and sensor tube temperature approaches 180°F to begin pulsing power to heating elements again.

   A. Listen for the Limiting and Regulating contactors to release indicating that pressure switch contacts have opened. The correct range for pressure switch cut out is between 4.0 to 6.0 psi.
   B. Release clamp from steam outlet hose. Listen for switch contacts to close (contactors will energize) and record pressure reading.
   C. Repeat clamping of steam outlet hose a total of three times to find the average cut-out pressure.
   D. If cut-out pressure pressure is outside range listed, install a replacement pressure switch.
   E. If cut-out pressure is within specifications, turn steamer off. Allow time for steamer to drain.

7. Remove test gauge and reinstall delime cap.

PRESSURE SWITCH (ADJUSTABLE)

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

⚠ WARNING Certain procedures in this section require electrical test or measurements while power is applied to the machine. Exercise extreme caution at all times and follow Arc Flash procedures. If test points are not easily accessible, disconnect power and follow Lockout/Tagout procedures, attach test equipment and reapply power to test.

NOTE: Steamers built before June 2015.

Removal

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Remove RIGHT SIDE PANEL.
3. Locate pressure switch [1] Fig. 75 in the piping that extends from the water level probe housing.

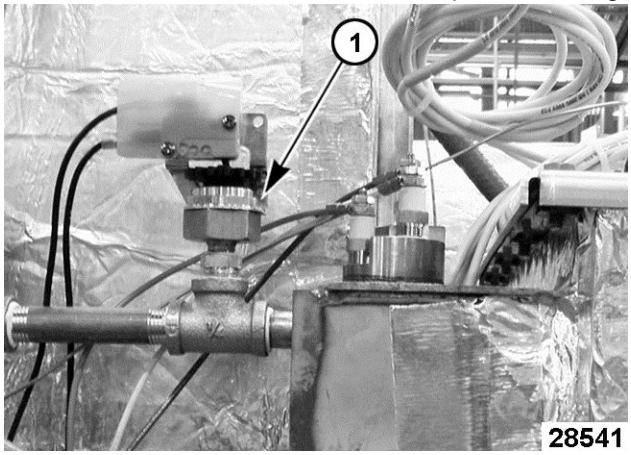


Fig. 75

4. Disconnect electrical wiring to pressure switch.
5. Remove pressure switch from piping.
6. Reassemble parts removed in reverse order.
   A. Apply pipe thread sealant to threads of pressure switch before installation.
   B. Verify Mylar™ cover [1] Fig. 76 is in position covering electrical connections.

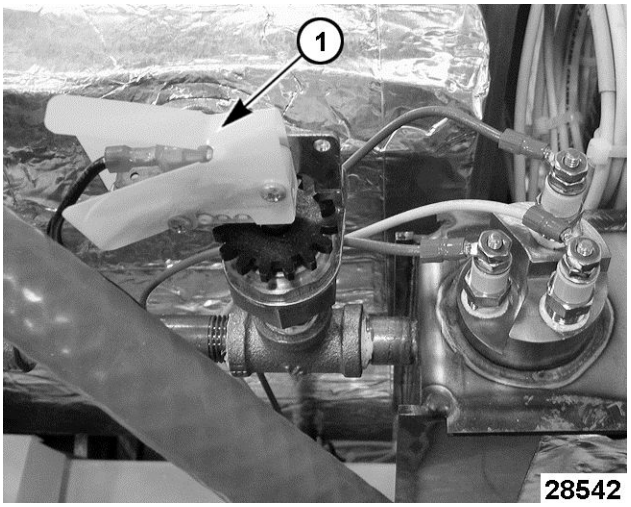


Fig. 76

NOTE: Refinement of pressure switch cut out setting is found under Adjustment. Always check and adjust pressure switch setting whenever pressure switch is being serviced.

   C. If pressure switch is being replaced, make an initial pressure switch setting by aligning the top surface of adjustment wheel [1] Fig. 77 with the 5 psi reference scale mark [2] Fig. 77 on pressure switch.

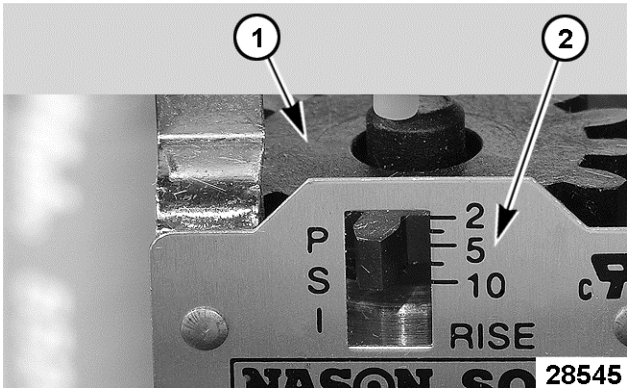


Fig. 77

7. Perform pressure switch Check.

NOTE: Pressure can be checked with the small air pocket that exists between the delime port cap and water level probe housing in the delime hose. Make certain that no leaks exist in generator tank or pressure gauge fittings.

NOTE: When temperature in the sensor tube (vent) reaches approximately 180°F, the PID controller will signal the solid state contactor (3CON) to begin pulsing power to the heating elements to reduce energy use.

Check

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Remove RIGHT SIDE PANEL and TOP COVER.
3. Place top cover on top of steamer to enable viewing of pressure switch scale from hinge side of steamer. Connect delime hose to delime port fitting.
4. Remove cap from delime port [1] Fig. 78 and install pressure gauge [2] Fig. 78. See TOOLS.

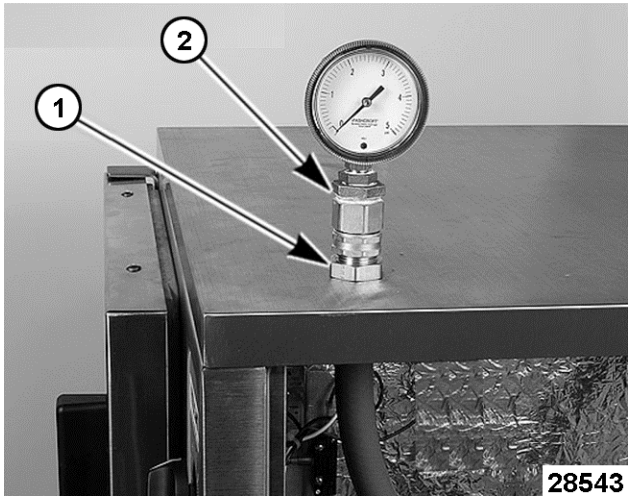


Fig. 78

5. Close cooking compartment door.
6. Mark one tooth of pressure switch adjustment wheel Fig. 79 and make a second mark straight down onto the body of pressure switch to aid in identifying position of wheel.

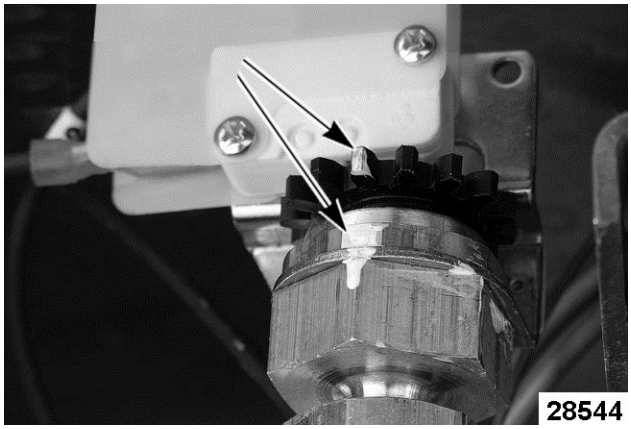


Fig. 79

7. Turn steamer on.
   A. Set timer for approximately 10 minutes.
   B. Wait for full steam production to stabilize. This is accomplished by allowing approximately five cycles of fill to occur once steam is being produced by the generator tank. Observe LED on water control board to count cycles.

NOTE: Operating pressures will vary slightly between steamer being serviced and gauge used.

   C. Observe pressure gauge Fig. 80 once steam begins to be generated. Gauge should level out at approximately 1.25 to 2.0 psi, but will oscillate with respect to fill water entering generator tank.

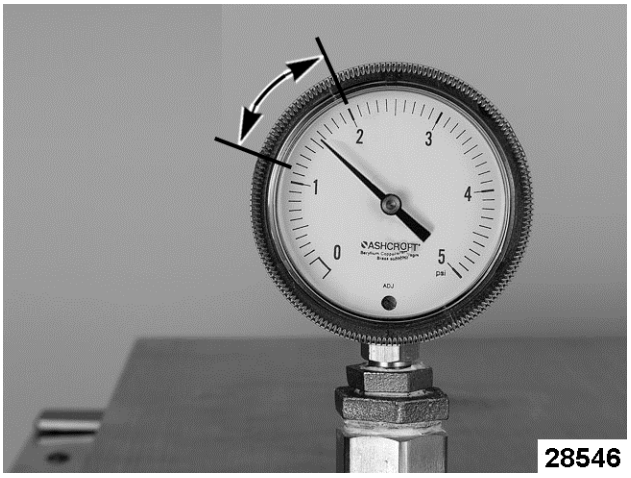


Fig. 80

NOTE: If pressure should rise above 5.0 psi when performing check, release clamp on steam outlet hose. Pressure switch is out of tolerance and must be adjusted. Refer to Adjustment for procedure.

NOTE: With steam outlet house clamped off, the temperature in sensor tube will drop rapidly. The PID controller will call for heat and energize the solid state contactor at 100% ON time until clamp is released and sensor tube temperature approaches 180°F to begin pulsing power to heating elements again.

8. While observing pressure gauge, temporarily clamp steam outlet hose to close it off. Use adjustable plyers or other method for clamping hose.
   A. Listen for the Limiting and Regulating contactors to release indicating that pressure switch contacts have opened. The correct range for pressure switch cut out is between 4.5 to 4.7 psi.
   B. Release clamp from steam outlet hose. Listen for switch contacts to close (contactors will energize) and record pressure reading.

C. Repeat clamping of steam outlet hose a total of three times to find the average cut-out pressure.

D. If pressure is outside tolerance (4.5 to 4.7 psi), adjustment is necessary. Refer to Adjustment.

E. If cut-out pressure is within specifications, turn steamer off. Allow time for steamer to drain.

9. Remove test gauge and reinstall delime cap.

Adjustment

1. Allow full steam production to stabilize. This is accomplished by allowing approximately five cycles of fill to occur once steam is being produced by the generator tank. Observe LED on water control board to count cycles.

NOTE: Make small incremental adjustments (1/8 turn of toothed adjustment wheel) when adjusting cut-out pressure.

2. Referring to cut-out pressure recorded in Check procedure, turn adjustment wheel [1] Fig. 81 to bring cut-out pressure into tolerance.

   A. From looking down on pressure switch:

      1) Turn adjustment wheel CCW [2] Fig. 81 to decrease cut-out pressure.

      2) Turn adjustment wheel CW [3] Fig. 81 to increase cut-out pressure.

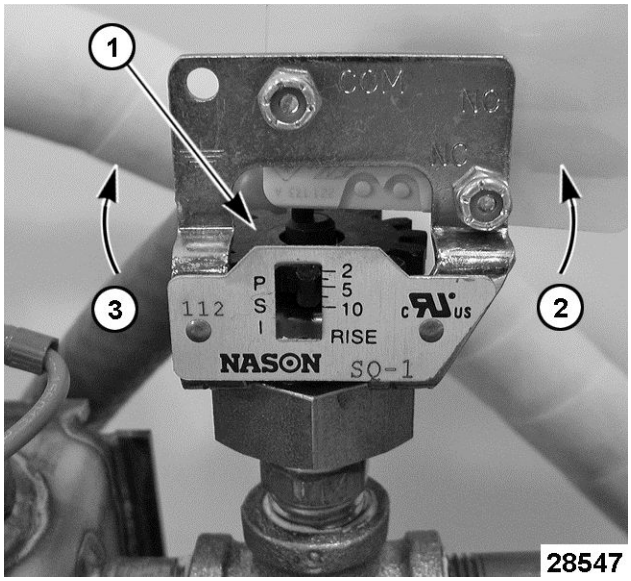


Fig. 81

   B. Check cut-off pressure after making adjustment. Repeat Check and Adjustment as necessary until cut-out pressure is within 4.5 to 4.7 psi.

VACUUM RELIEF SOLENOID

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.

   A. Turn off water supply.

2. Remove RIGHT SIDE PANEL.

3. Locate vacuum relief solenoid [1] Fig. 82 in the plumbing line that extends from water level probe housing.

4. Disconnect hose [2] Fig. 82 from solenoid valve.

5. Disconnect electrical wiring [3] Fig. 82 from solenoid coil.

6. Remove retaining clip [4] Fig. 82 securing coil to valve body then remove coil and spring washer.

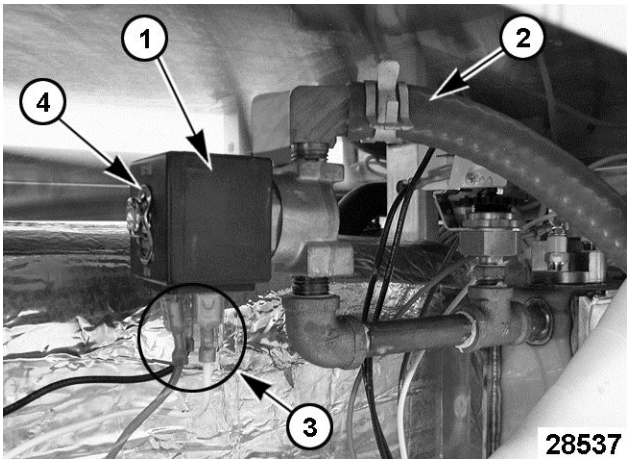


Fig. 82

7. Rotate valve body clockwise to remove from the pipe nipple in the plumbing line.

8. Note orientation of hose barb elbow at the top of valve body then remove pipe fittings from valve body for use on replacement valve.

9. Reassemble parts removed in reverse order.

NOTE: Apply thread sealant to threads of piping before assembly.

NOTE: When installing, position valve body with the direction arrow pointing down so the outlet (OFF) side of valve body is connected to the water level probe housing plumbing line.

10. Check for proper operation.

BUZZER

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

1. Remove RIGHT SIDE PANEL.
2. Locate the buzzer [1] Fig. 83 mounted to the door switch mounting bracket.

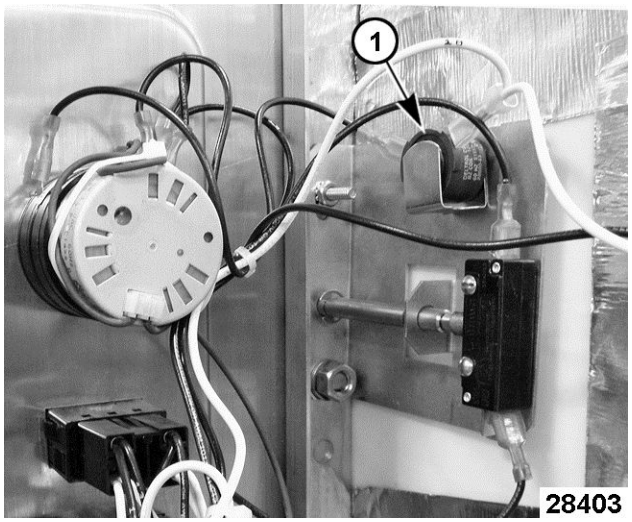


Fig. 83

3. Disconnect electrical wiring from the buzzer and door switch.
4. Remove the mounting nut and lockwasher securing door striker [1] Fig. 84 and the door switch mounting bracket to front panel.
5. Remove the remaining mounting nut and lockwasher [2] Fig. 84 securing door switch mounting bracket to front panel then remove door switch mounting bracket with electrical components attached.

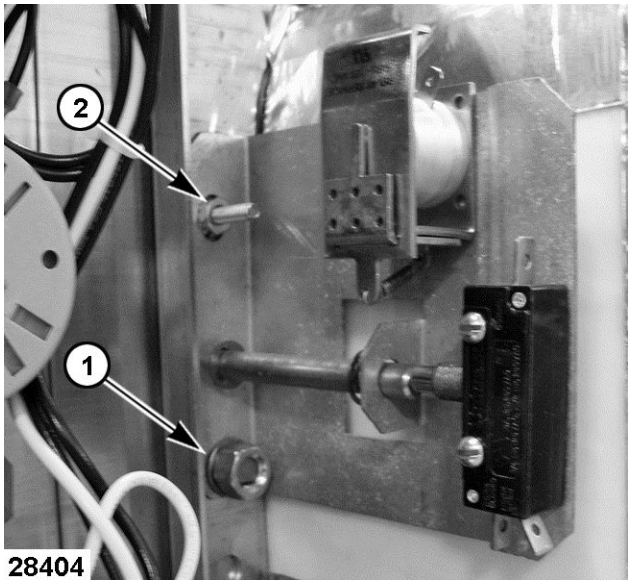


Fig. 84

6. Remove buzzer from door switch mounting bracket.
7. Reassemble parts removed in reverse order. Perform DOOR LATCH ADJUSTMENT.

STEAM GENERATOR TANK

⚠ WARNING Disconnect the electrical power to the machine and follow lockout / tagout procedures.

REMOVAL AND REPLACEMENT

1. Turn off machine to drain steam generator tank. Allow steamer to complete drain cycle.
   A. Turn off water supply.
2. Remove RIGHT PANEL, TOP COVER and REAR PANEL.
3. Disconnect the fill hoses (fast & slow) [1] Fig. 85 from water inlet fittings on steam generator tank. Remove pipe tee [2] Fig. 85 from generator tank and retain for reuse.

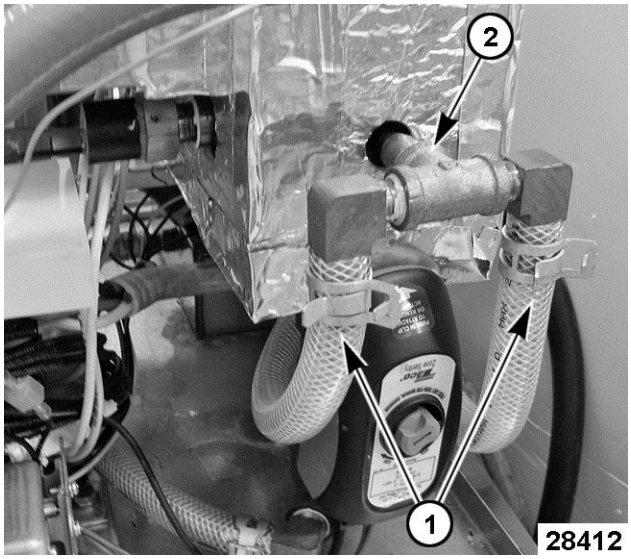


Fig. 85

4. Remove HOLD THERMOSTAT from steam generator tank.

NOTE: It is not necessary to disconnect the electrical wiring to the motorized drain valve in order to remove the motor from valve.

5. Remove drain valve motor as outlined under MOTORIZED DRAIN VALVE.
6. Disconnect drain flush hose [1] Fig. 86 and drain hose [2] Fig. 86 from the pipe tee fittings located below the drain valve.

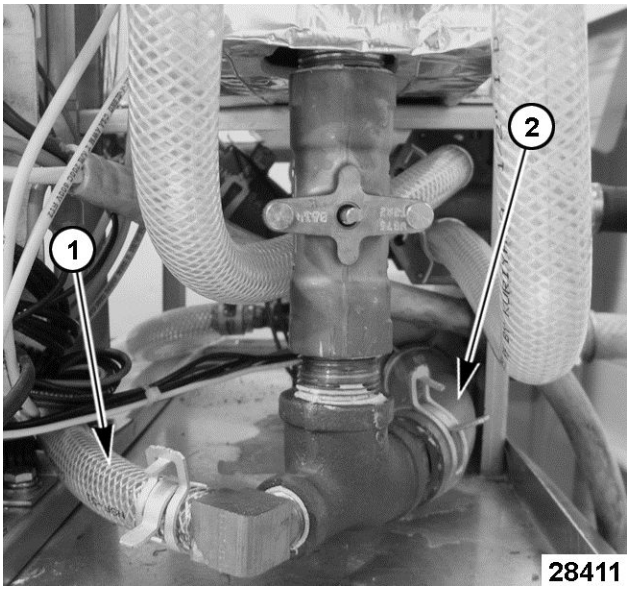


Fig. 86

7. Remove drain valve as outlined under MOTORIZED DRAIN VALVE.
8. Disconnect steam outlet hose [1] Fig. 87 from steam generator tank.
9. Remove delime hose [2] Fig. 87 from steam generator tank.
10. Remove hose [3] Fig. 87 from the vacuum relief solenoid.

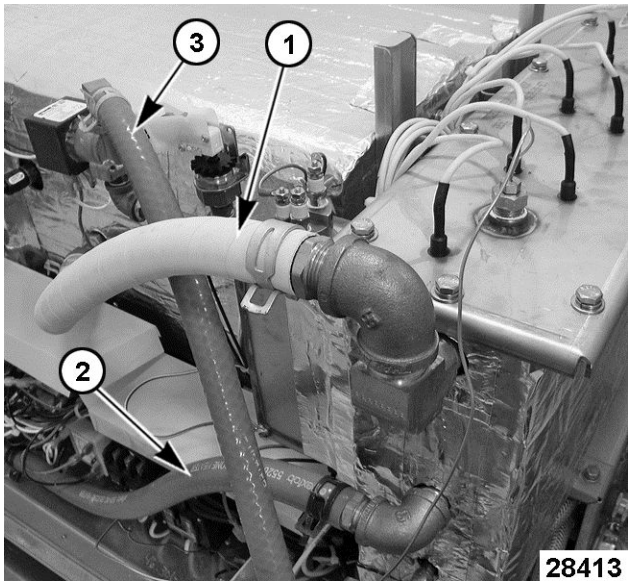


Fig. 87

NOTE: It is not necessary to remove high-limit capillary tube from heating element or disconnect heating element wires when removing steam generator tank. When lifting the heating element out of steam generator tank, flip the element over and place it on top of cooking compartment with the top surface of the mounting plate toward rear of machine.

11. Remove HEATING ELEMENT.
12. Remove steam outlet elbow fittings [1] Fig. 88 from steam generator tank.
13. Remove elbow fitting [2] Fig. 88 for the delime hose from steam generator tank and retain for reuse.

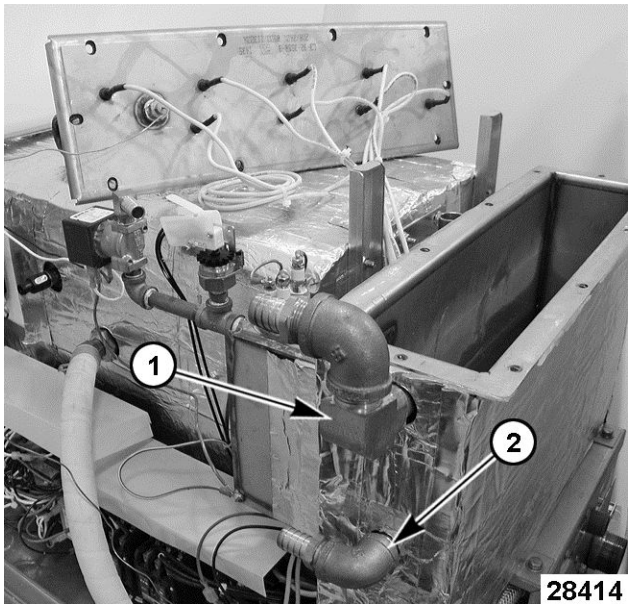


Fig. 88

14. Remove VACUUM RELIEF SOLENOID and PRESSURE SWITCH (NON-ADJUSTABLE) from the piping that extends from the water level probe housing.
15. Remove WATER LEVEL PROBES from probe housing.
16. Remove piping that extends from the water level probe housing and retain for reuse.
17. Remove gasket from steam generator tank and discard the gasket.

NOTE: Install a new gasket when reassembling steam generator tank. Temporarily secure gasket in place with RTV 109.

A. Clean remaining sealant from top lip of steam generator tank.

18. Remove bolts Fig. 89 (qty. 3) securing steam generator tank to the machine frame (3rd bolt - opposite side of tank). Remove tank from machine.

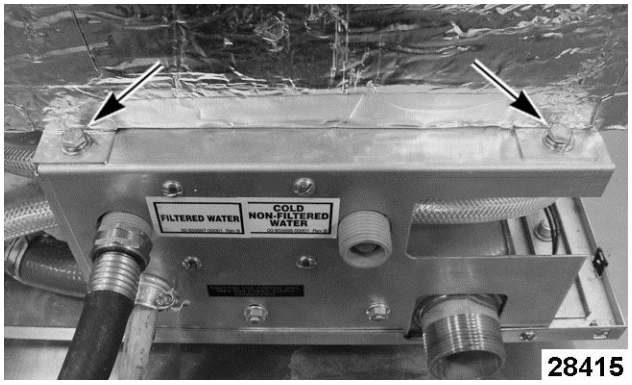


Fig. 89

19. When installing steam generator tank, install insulation around tank sides and on the bottom. Secure into position using high temperature aluminum foil tape.
20. Reinstall parts removed in reverse order of removal. Apply thread sealant to all pipe threads connected to the steam generator tank.
21. Torque heating element bolts and follow tightening sequence as outlined under HEATING ELEMENT.
22. Check steamer for proper operation. Inspect plumbing connections and gasket seal on steam generator tank for leaks.

ELECTRICAL OPERATION

COMPONENT FUNCTION

PID Controller	Monitors input signal from temperature sensor mounted in the sensor tube and regulates solid state contactor (3CON) as needed to maintain tank temperature for steam generation. On initial startup, the controller keeps the solid state contactor energized at 100% until temperature sensor approaches set point then begins pulsing power to the contactor as needed to maintain tank temperature.
Temperature Sensor	J type thermocouple mounted in the sensor tube (vent). Provides input signal to PID controller.
Solid State Contactor (3CON)	Modulates power to the tank heaters (through regulating contactor 2CON) when signaled by the PID controller.
Contactor, Limiting (1CON)	Connects one side of heating elements to incoming power. Energized whenever WLC (LLCO) coil is energized and the high limit thermostat and pressure switch are both closed.
Contactor, Regulating (2CON)	Connects one side of heating elements to power. On constantly during cooking cycle.
Drain Valve, Motorized (Ball type)	Motorized control for opening and closing drain valve.
Element, Heating	Located in steam generator tank. Heats water to produce steam.
Fuse, (1FU)	Slow blow 4A fuse. Located on primary side of main transformer. Protects control circuitry from over-currents.
Fuse, (2FU)	Slow blow 4A fuse. Located on primary side of main transformer. Protects control circuitry from over-currents.
Light (3LT), Power	Amber (AM) colored light. On when power switch is on (internal to power switch).
Light (2LT), Cook	Red (RD) colored light. On when hold thermostat is satisfied and door is closed and timer is set.
Light (1LT), Ready	Green (GN) colored light. On when hold thermostat is satisfied. Latches on when hold thermostat is satisfied.
Water Level Control (WLC) Board	Controls water level by monitoring conditions of the 3 water level probes H, L and LLCO.
Probe (H)	High water level probe connected to internal latch relay circuit of the water level control board. Water must reach this level before internal latch relay is energized.
Probe (L)	Low water level probe connected to internal latch relay circuit of the water level control board.
Probe (LLCO)	Low Level Cut-Off (LLCO) probe. Controls power to heating and timer circuitry. Controls fast fill solenoid.
Relay (K1)	Controlled by hold thermostat. Enables timer circuit.
Relay (K2), LLCO	Low Level Cut-Off (LLCO) external relay. Only energized during drain. Controls Flush, Fast Fill and Vacuum Relief solenoids.
Relay (K3), Drain Relay	Controlled by Time Delay Relay. Only energized during drain cycle. Controls WLC board and LLCO relay K2 during the drain cycle. Disables heating and timer circuitry.
Relay (K4)	Latches Ready light on.

Relay, Time Delay	Controlled by the power switch. Output becomes active for 90 seconds when power switch is turned to off. Only used during drain cycle.
Solenoid (1SOL), Cooling	Controlled by the condensate thermostat. Mixes cold water with hot condensate water from cooking chamber to reduce water temperature at drain.
Solenoid (2SOL), Flush	On only during drain cycle. Mixes cold water with tank water before entering drain box. Keeps drain hose clear of debris.
Solenoid (3SOL), Fast Fill	Initial tank fill at a fast rate. Used during last stage of drain cycle to flush drain opening free of debris.
Solenoid (4SOL), Slow Fill	Secondary tank fill at a slow rate to prevent tank temperature from dropping rapidly. Energized as necessary during operation to replenish water in tank.
Solenoid (5SOL), Vacuum Relief	Provides open air line for vacuum relief during drain cycle to prevent cooking chamber flex.
Switch (1S), Power . . .	Two position rocker switch that controls machine steam and drain operations. Internal power light (3LT) indicates when switch is on.
Switch (2S), Door	Plunger activated, switch is wired in series with timer. When switch is closed and timer is set to a time or constant, regulating contactor will be energized 100% of the time once ready light is on (hold thermostat satisfied).
Switch (1PAS), Pressure	Pressure cut-out protection. Cuts off electrical energy to the controls circuit if pressure rises above the upper tolerance level for the switch.
Thermostat (1TAS), Condensate	Monitors temperature of water entering the facility drain system. Controls the cooling solenoid during cooking operation and the cooling and flush solenoids during drain cycle (135°F cut-in).
Thermostat (2TAS), High-Limit	Protects against heating element over temperatures generally caused by tank boiling dry. A capillary tube device. Bulb is mounted directly to the heating element and high-limit body is mounted to a bracket on the frame rail (257°F cut-out).
Thermostat (3TAS), Hold	Controls temperature of water in steam generator tank to 195°F (closes at 195°F).
Timer (1TR)	Used for timed cook cycles from 0 to 60 minutes. Professional models have a CONSTANT position for continuous steam operation.
Transformer (1T), Main	Step down transformer from line voltage to control voltage level (120 VAC).
Transformer (2T), Drain	Provides 24 VAC for motorized drain valve during drain cycle.
Buzzer	Creates audible signal when timed cook cycle is complete.

COMPONENT LOCATION

Electrical Control Panel - Front

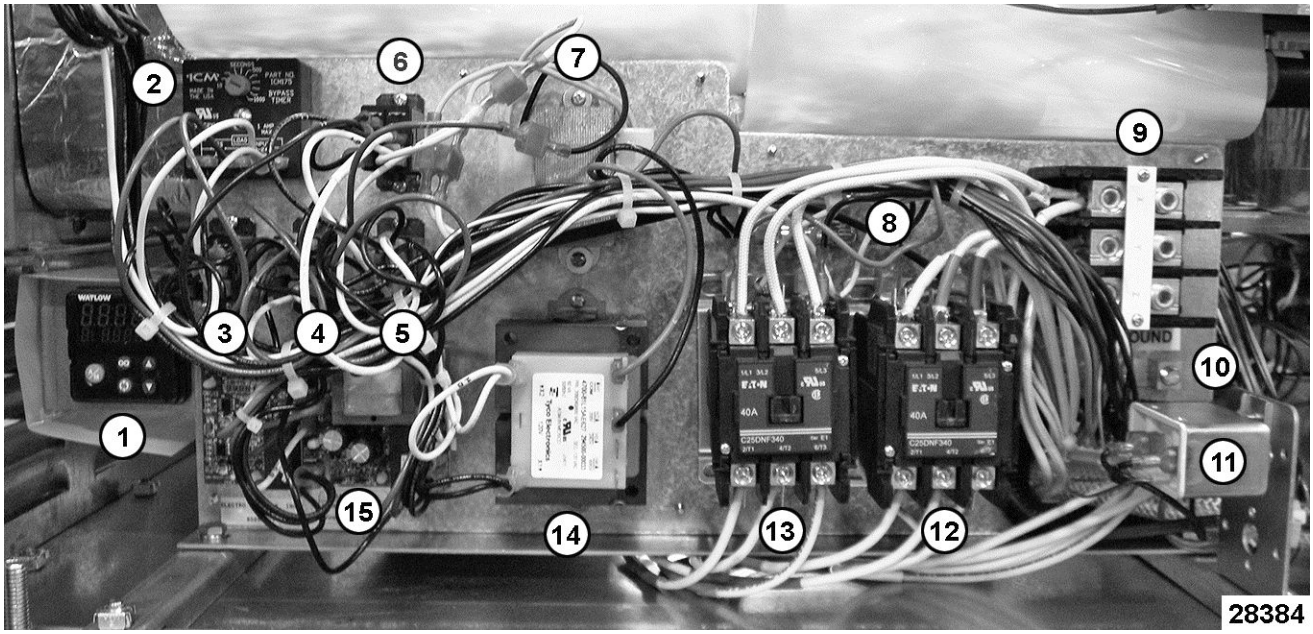


Fig. 90

ITEM NO.	DESCRIPTION
1	PID Controller
2	Time Delay Relay (TDR)
3	Relay, K1
4	Relay, K2
5	Relay, K3
6	Relay, K4
7	Transformer (2T), Drain (120V in, 24V out)
8	Fuses (1FU & 2FU)
9	Terminal Block, Line Service
10	Ground Lug
11	Thermostat (2TAS), High Limit
12	Contactor (2CON), Regulating
13	Contactor (1CON), Limiting
14	Transformer (1T), Main (Line voltage in, 120V out)
15	Water Level Control (WLC) Board

Electrical Control Panel - Rear

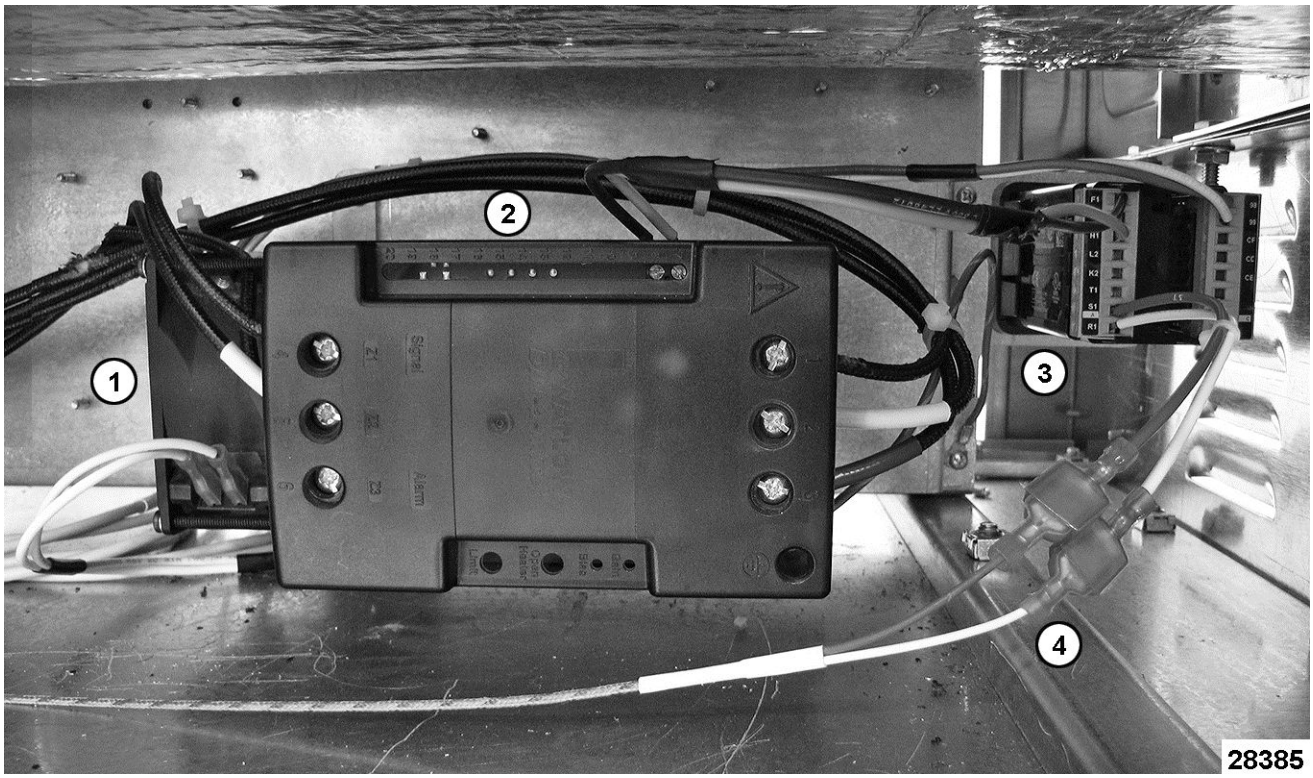


Fig. 91

ITEM NO.	DESCRIPTION
1	Cooling Fan (supplied with Solid State Contactor)
2	Solid State Contactor
3	PID Temperature Controller
4	Sensor Probe Connection, J Type Thermocouple

Water Level Control Board

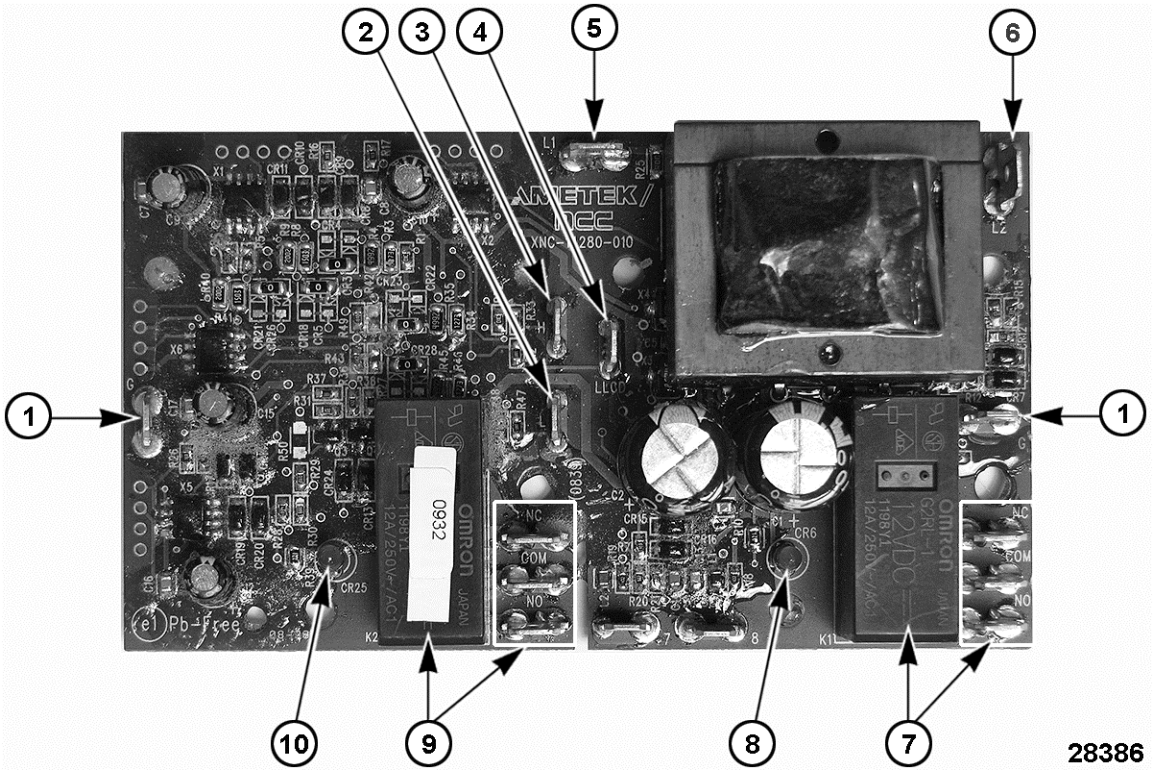


Fig. 92

ITEM NO.	DESCRIPTION
1	Ground
2	Low Level (L) Probe Connection
3	High Level (H) Probe Connection
4	Low Level Cut-Off (LLCO) Probe Connection
5	L1 Incoming Voltage
6	L2 Incoming Voltage
7	Relay (LLCO) and Contacts
8	LLCO LED (remains lit when low water level is satisfied)
9	Relay (HL) and Contacts (remains lit when calling for water)
10	HL LED (Fill)

Front Panel

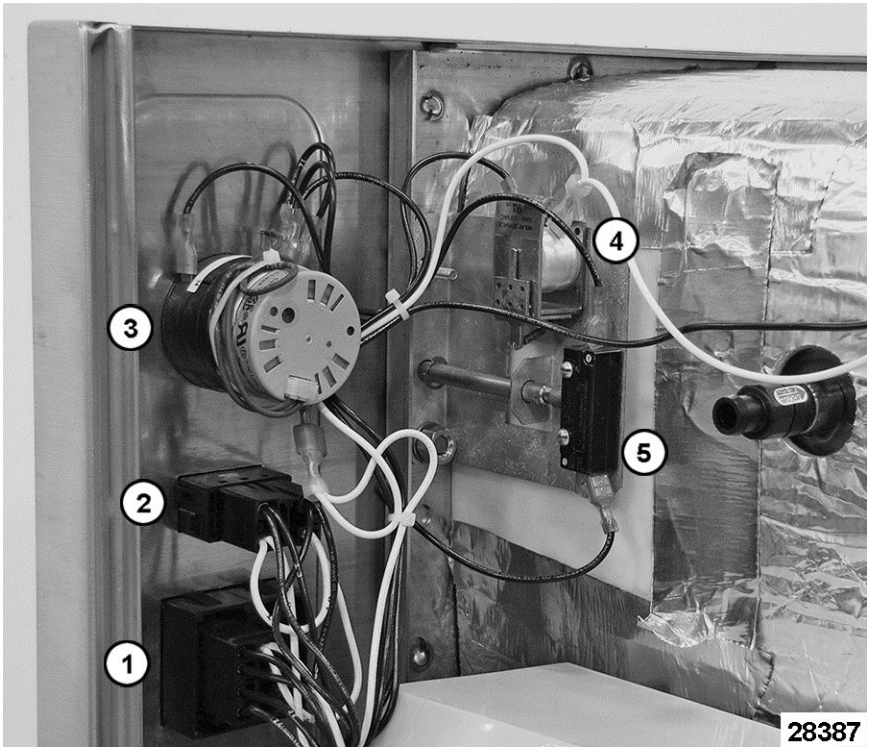


Fig. 93

ITEM NO.	DESCRIPTION
1	Power Switch
2	Indicator lights
3	Timer
4	Buzzer
5	Door Switch

Steam Generator - Controls Side & Rear

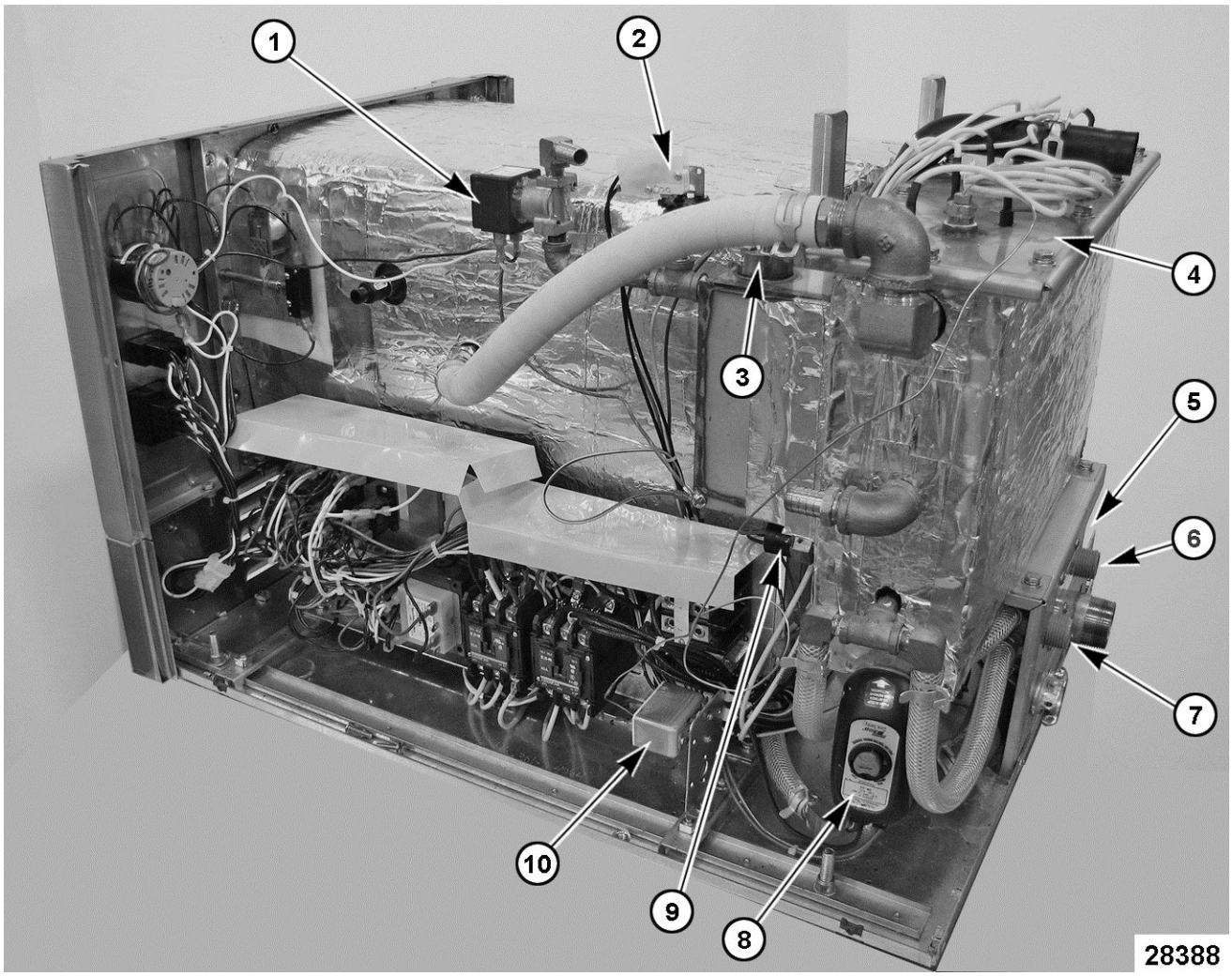


Fig. 94

ITEM NO.	DESCRIPTION
1	Vacuum Relief Solenoid
2	Pressure Switch
3	Water Level Probes
4	Heating Element
5	Condensate Thermostat (out of view)
6	Non-Filtered Water Solenoid Valve
7	Filtered Water Solenoid Valve
8	Motorized Drain valve
9	Hold Thermostat
10	High Limit Thermostat

Sensor Probe (Thermocouple)

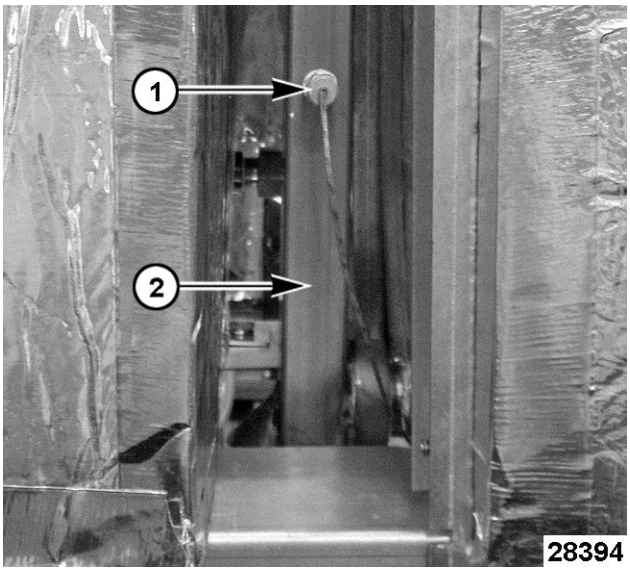


Fig. 95

ITEM NO.	DESCRIPTION
1	Sensor probe (J type thermocouple) (left side of steamer)
2	Sensor tube

SEQUENCE OF OPERATION

Refer to the correct wiring diagram for model being serviced when reviewing sequence of operation.

NOTE: If power switch is set to off when service voltage is applied, steamer will enter the timed drain cycle.

1. Conditions
   - A. Steamer connected to correct voltage.
     - 1) 120VAC potential across X1 & X2 on secondary side of main transformer (1T).
   - B. Steamer connected to water supply with correct water requirements.
   - C. Power switch is in off position.
     - 1) Time delay relay timed out. Timer has no output on terminal 1.
   - D. Condensate thermostat (1TAS) open.
   - E. High limit thermostat (2TAS) closed.
   - F. Pressure switch (1PAS) closed.
   - G. Hold thermostat (3TAS) open.
   - H. Drain closed and steam generator tank (referred to as tank) is empty.
   - I. Steamer door open.
   - J. Timer is off.
   - K. Water level control (WLC) and tank properly grounded.
   - L. PID controller and Solid State contactor (3CON) are off.
2. Power switch (1S) is turned on.
   - A. Power light (3LT - Amber) illuminates.
   - B. X1 potential to L1 of WLC board.
     - 1) 120VAC across L1 & L2 of WLC board.
     - 2) High level coil (HL) energized on WLC board. HL LED on WLC board lights.
   - C. Fast Fill Solenoid (3SOL) energized through N.C. contacts K3-1/5, N.C. contacts WLC (LLCO) and N.C. contacts K2-5/1. Tank begins to fill with water.
3. Water level reaches Low Level Cut-Off (LLCO) probe.
   - A. LLCO coil is energized. LLCO LED on WLC board lights.
   - B. LLCO N.C. contacts open de-energizing Fast Fill Solenoid.

C. LLCO N.O. contacts close enabling timer and heating element circuits.

4. Limiting contactor coil (1CON) and cooling fan on the Solid State Contactor energize through N.C K3-6/2 contacts.
5. Regulating contactor coil (2CON) and power to the PID controller energize through N.C. contacts K1-1/5.
6. Temperature measured in the sensor tube (vent) is below PID controller set point. PID controller signals solid state contactor (3CON) to modulate power to the heating elements through regulating contactor (2CON) load contacts. Tank water heats.
7. Tank water reaches 195°F. Hold thermostat (3TAS) contacts close.
   A. Slow Fill Solenoid (4SOL) is energized through closure of hold thermostat (3TAS) and closed WLC (HL) N.O. contacts. Tank continues to fill.
   B. Relay K1 energizes.
      1) Timer circuit is enabled through closure of N.O. contacts K1-6/4 and K1-5/3.
         a. Relay K4 energizes - Latch circuit is completed by closure of N.O. contacts K4-5/3.
         b. Ready light (1LT - green) lights.
      2) Regulating contactor (2CON) and PID controller de-energized when K1-1/5 N.C. contacts open.
         a. The PID controller governs the operation of the solid state contactor (3CON) and provides power to the load contacts on the regulating contactor (2CON) to power the heating elements. Temperature in tank is maintained at 195°F (min) by the hold thermostat and PID controller set point temperature of 209°F (max).
8. Water level reaches Low level (L) probe.
   A. No action. The internal latching relay (ILR-1) contacts are open.
9. Water level reaches high level (H) probe.
   A. Internal latching relay (ILR) coil on WLC board energizes.
   B. High level (HL) coil de-energized by ILR-2 contacts opening.
   C. Slow Fill Solenoid (4SOL) de-energized by opening of HL contacts on WLC board.
   D. HL LED on WLC board turns off.
10. Timer knob set to CONSTANT for continuous steam operation or Timer knob is turned to a timed setting.
   A. Power (120VAC) present to Door Switch wire #19.
   B. If Timer is set to a timed setting, Timer motor is energized through closure of N.O. contacts K1-6/4. Count down time begins when door is closed.
11. Steamer door is closed.
   A. Door Switch (2S) contacts close. Cook light (2LT - Red) illuminates.
   B. Regulating contactor and PID controller remain energized as long as door is closed and Timer is set to CONSTANT or time remains on timed cycle.
   C. Steam flows from the steam generator into the cooking compartment to begin cooking product. Uncondensed steam flows out of the cooking compartment through the compartment drain and up the sensor tube (vent) where the temperature sensor is mounted. The temperature sensor output is monitored by the PID controller.

      As temperature in sensor tube approaches set point, the PID controller signals the Solid State Contactor (3CON) to reduce power to the steam generator heating elements, limiting the production of excess steam (un-absorbed energy). Reduced power to the heating elements is achieved by the PID controller signaling the Solid State Contactor to pulse voltage to heating elements.
12. Under some conditions, the temperature of condensate exiting the cooking compartment and entering the drain box may exceed 135°F. When this occurs:
   A. Condensate thermostat closes and energizes cooling solenoid (1SOL). Condensate is cooled in drain box before entering facility drain system.
13. Door opened during timed cook cycle.
   A. Timer continues count down until time equals zero even if steamer door is opened.
   B. Regulating contactor (2CON) and PID controller de-energize. Tank heat turns off.

1) Cook light turns off.

14. Time reaches zero.
    A. Buzzer is energized through N.O. contacts K1-6/4 and Timer - 11/14.
        1) Buzzer remains energized until timer knob is turned to OFF, new time or CONSTANT is selected or steamer is turned off.
15. Power Switch (1S) pushed to off.
    A. Power (3LT), Cook (2LT) and Ready (1LT) lights turn off.
    B. Time delay relay is energized through terminals 2 & 3. Output (120VAC) on terminal 1 for 90 seconds.
    C. Time delay relay output energizes K3 coil.
        1) X1 potential to L1 of WLC board through N.O. contacts K3-3/5.
        2) Relay K2 coil energized through WLC N.O. contacts LLCO and N.O. contacts K3-6/4.
        3) Heating element and timer control circuits are disabled by opening of N.C. contacts K3-6/2.
    D. Power (120VAC) across primary of drain transformer (2T). Motorized drain valve energized. Drain valve opens and tank begins to drain.
        1) Drain valve N.O. contacts close.
    E. Power removed from PID controller. Solid State contactor (3CON) de-energized.
16. Condensate Thermostat (1TAS) reaches 135°F, contacts close. Drain water temperature is regulated through condensate thermostat.
    A. Cooling Solenoid (1SOL) energized through closure of Condensate Thermostat contacts.
    B. Flush Solenoid (2SOL) energized through closure of N.O. contacts K2-3/5 and drain valve N.O. contacts.
17. Tank water level drops below L probe.
    A. Internal latching relay (ILR) de-energizes.
        1) High level coil (HL) energized on WLC board. HL LED on WLC board lights.
18. Tank water level drops below LLCO probe.
    A. Relay K2 de-energized through opening of WLC board LLCO N.O. contacts.
    B. Vacuum Relief Solenoid (5SOL) energized through N.C. contacts K2-2/6.
    C. Fast Fill Solenoid (3SOL) energized through WLC (LLCO) N.C. contacts and N.C. contacts K2-5/1.
    D. Flush Solenoid (2SOL) remains energized through WLC (LLCO) N.C. contacts.
19. Time Delay Relay time elapses.
    A. Power (120VAC) removed from output of Time Delay Relay terminal 1.
        1) All Solenoids, coils and WLC board are de-energized.
        2) Motorized drain valve de-energized. Drain valve closes.

ELECTRICAL SYMBOLS DIAGRAM

LEGEND OF ELECTRICAL SYMBOLS


TERMINAL BLOCK (TB)


FUSE (FU)


SWITCH, SPDT


SWITCH, N.O.

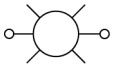

THERMOSTAT, N.O.


PRESSURE SWITCH, N.C.


CONTACTS, N.C.

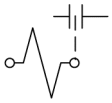

CONTACTS, N.O.


WATER PROBE ASSEMBLY

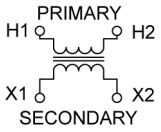

LAMP
AM = AMBER
GN = GREEN
RD = RED

TIME DELAY RELAY

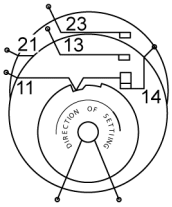
SOLENOID (SOL)


DRAIN VALVE, MOTORIZED

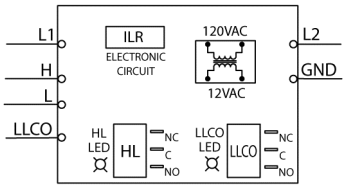

COIL, RELAY (K) OR CONTACTOR



TRANSFORMER (T)



TIMER (TR)



WATER LEVEL CONTROL BOARD (WLC)

N.C. = NORMALLY CLOSED
N.O. = NORMALLY OPEN

AI3904

Fig. 96

WIRING DIAGRAM - HEATING ELEMENTS

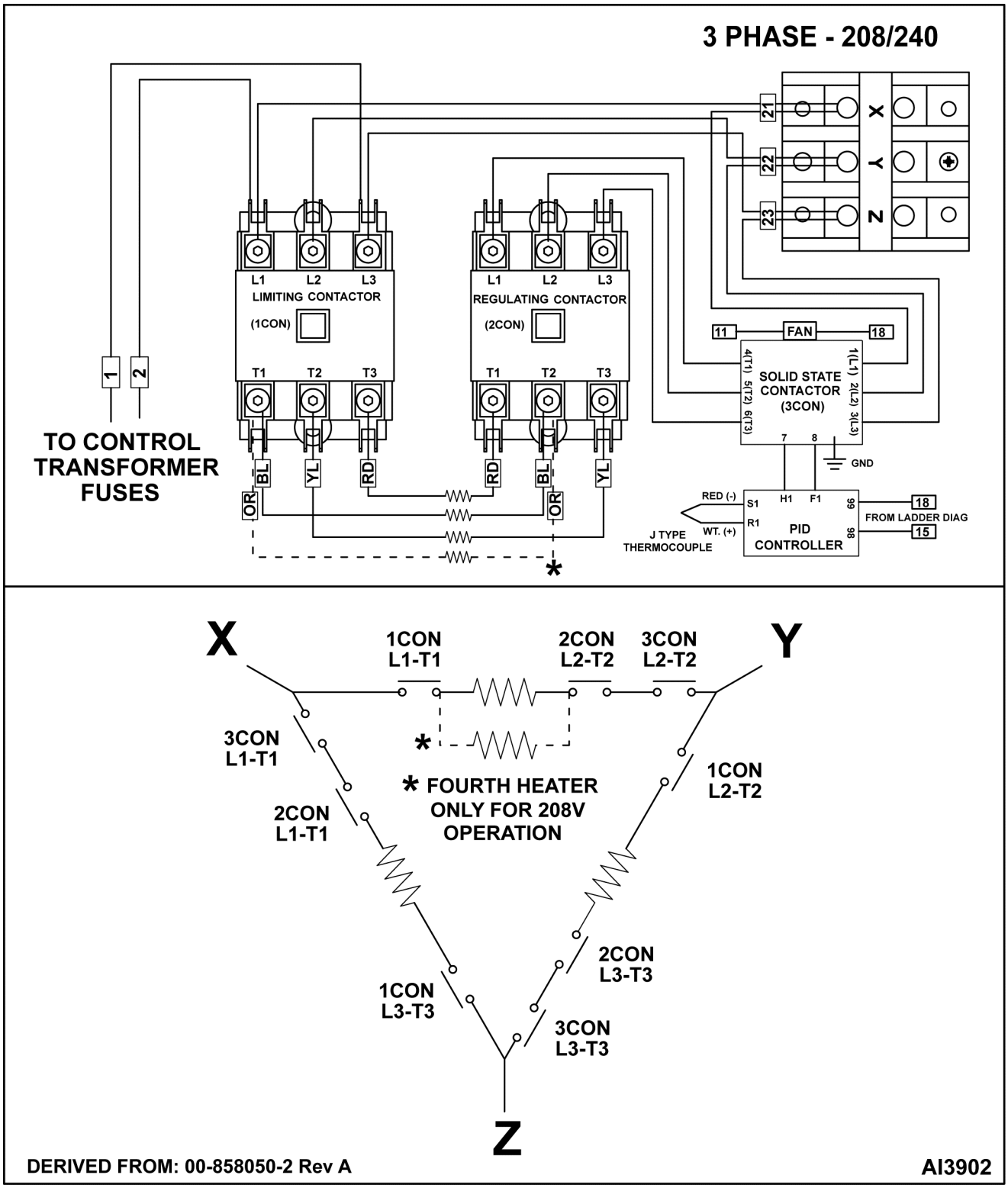


Fig. 97

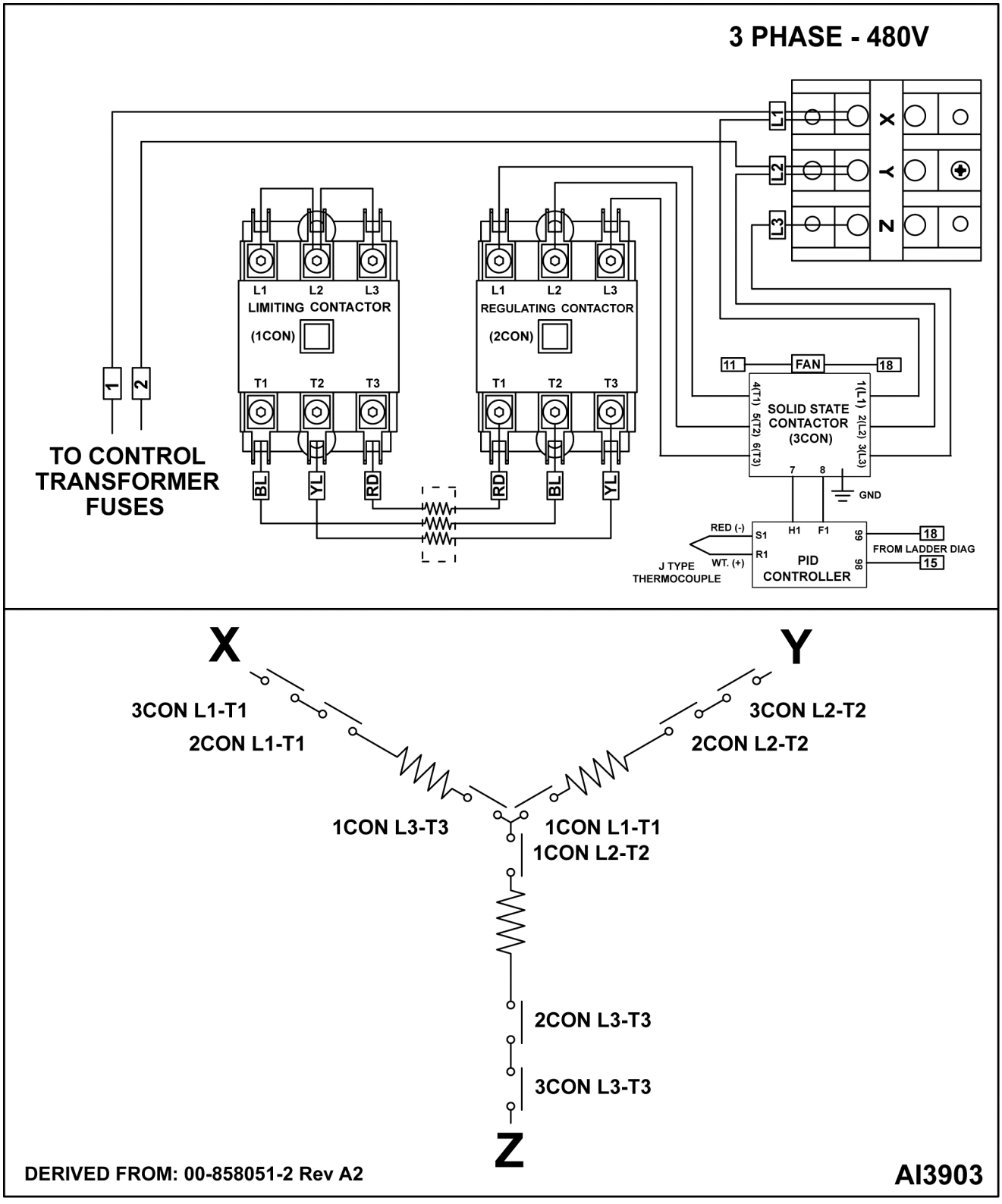

3 PHASE - 480V
L1
L2
L3
X
Y
Z
LIMITING CONTACTOR
(1CON)
REGULATING CONTACTOR
(2CON)
T1
T2
T3
1
2
TO CONTROL TRANSFORMER FUSES
BL
YL
RD
11
FAN
18
SOLID STATE CONTACTOR (3CON)
4(T1) 5(T2) 6(T3)
1(L1) 2(L2) 3(L3)
7
8
GND
RED (-)
WT. (+)
J TYPE THERMOCOUPLE
S1
R1
H1
F1
99
98
PID CONTROLLER
FROM LADDER DIAG
15
X
Y
3CON L1-T1
2CON L1-T1
3CON L2-T2
2CON L2-T2
1CON L3-T3
1CON L1-T1
1CON L2-T2
2CON L3-T3
3CON L3-T3
Z
DERIVED FROM: 00-858051-2 Rev A2
AI3903

Fig. 98

SCHEMATIC DIAGRAM

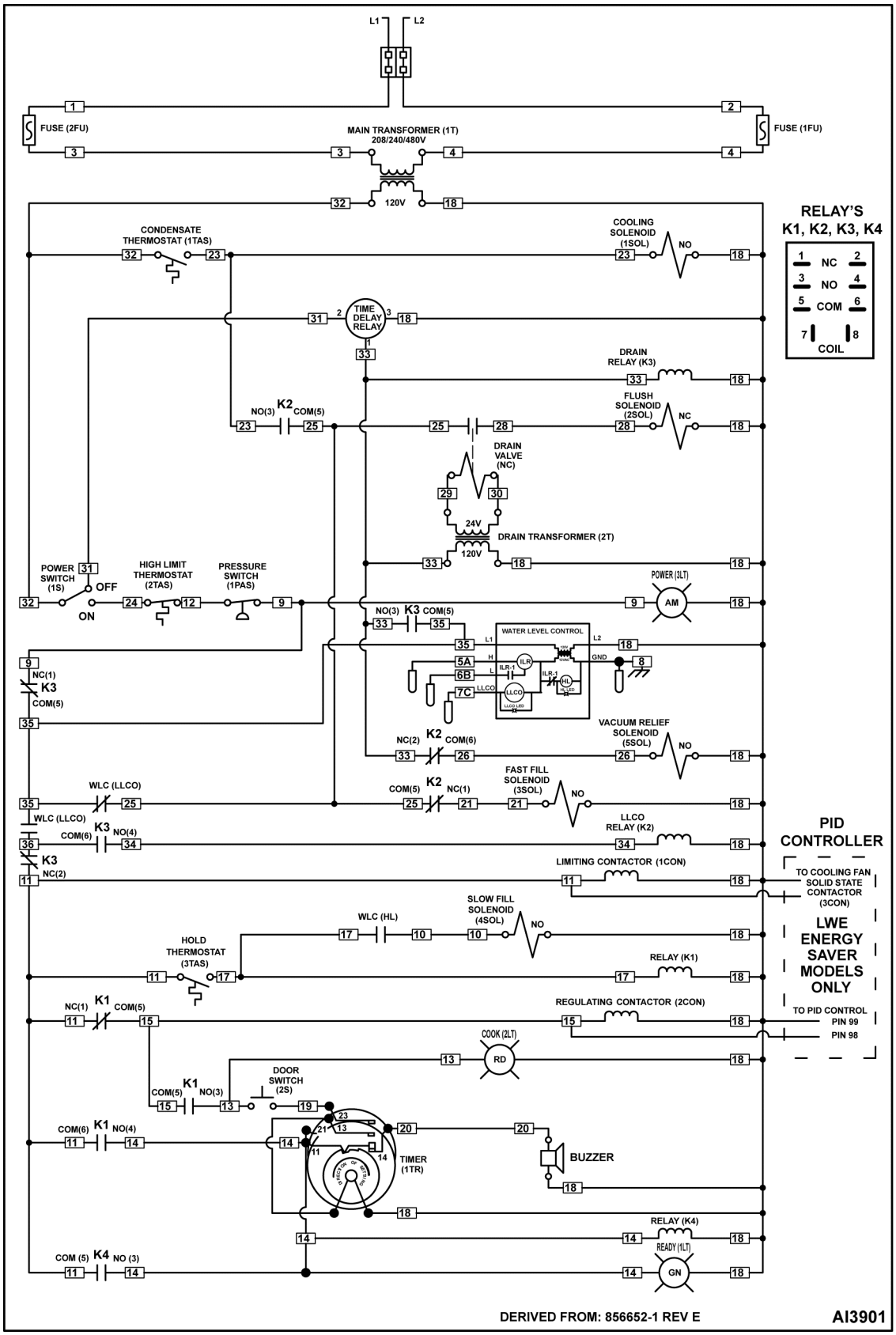


Fig. 99

TROUBLESHOOTING

TROUBLESHOOTING

NOTE: The PID controller performs a self-diagnostics test and displays program version such as "13.00" when initially powered then reverts to the actual sensor probe temperature in the top display. If PID controller or sensor probe is malfunctioning, an error code should display. If the code displayed is **Er.i1**, perform Sensor Probe Test (thermocouple). If a different code is displayed, note the code and contact the appropriate Technical Support department for further instructions.

SYMPTOM	POSSIBLE CAUSES
Compartment leaks water or steam around door.	1. Unit not level. 2. Compartment drain screen obstructed. 3. Drain line obstructed, undersized, exceeds 6 feet or not to an open gap drain. 4. High water pressure to steamer (exceeds 60 psi). 5. Door gasket worn or damaged. Refer to GASKET for removal procedure.
Cold water condenser not operating properly.	1. Flush Solenoid (2SOL) inoperative or plugged. 2. Lack of water supply. 3. Condensate thermostat (1TAS) stuck open. 4. Cooling Solenoid (1SOL) valve inlet screen clogged or malfunction.
Steam generated inside cooking compartment when timer is off.	1. Cycling thermostat (2TAS) or related heat control circuitry malfunction. 2. Relay K1 malfunction.
Water or steam leaking inside panels.	1. Steam generator gasket not sealing. 2. Loose clamps around steam hose or hose malfunction; or loose steam line plumbing connections. 3. Cooking compartment or steam generator malfunction.
Tank water level too high.	1. Slow fill solenoid (4SOL) or fast fill solenoid (3SOL) does not shut off. 2. High level probe malfunction (open circuit). 3. Water level control board inoperative (WLC).
Tank does not fill.	1. Water supply not on. 2. Slow fill solenoid (4SOL) or fast fill solenoid (3SOL) not being energized or plugged. 3. Water level control board malfunction (WLC). 4. Water level probes shorted to ground.

SYMPTOM	POSSIBLE CAUSES
Heat coming on without water in tank. (No error message on PID display)	1. Dirty low level cut-off probe (shorted to ground) or low level cut-off probe wire grounded. 2. Limiting (1CON) or Regulating Contactor (2CON) malfunction. 3. WLC- LLCO contacts stuck closed. Water level controller (WLC) malfunction.
Steamer will not heat.	1. No incoming voltage (circuit breaker tripped or fuses open). 2. Tank not filled (supply water off; fast fill solenoid clogged or malfunction). 3. Power switch malfunction. 4. Water Level Control malfunction. 5. Relay (K1) malfunction. 6. High-limit thermostat open (2TAS). 7. Heating elements inoperative (open circuit). 8. PID controller not calling for heat to energize Solid State contactor (3CON). A. Sensor probe open or disconnected from PID controller. Display cycles between: 1) Top row "**----**" and "**Er.i1**". 2) Bottom row "**Attn**" and "**0.0**". B. Solid state contactor (3CON) malfunction. 9. Limiting contactor (1CON) or regulating contactor (2CON) malfunction. 10. Hold thermostat open (3TAS). 11. Relay (K3) malfunction. 12. Water too pure for probes to properly conduct electricity.
Timer motor does not run.	1. Relay K1-6/4 contacts not closing. 2. Timer malfunction.
Water running out of drain during fill.	1. Motorized drain valve stuck open. 2. Time delay relay malfunction. 3. Condensate thermostat (1TAS) malfunction.
Door not closing properly.	1. Door latch assembly. 2. Striker adjustment.
Door won't open.	1. Latch won't release. Refer to Adjustment.
Buzzer not operating.	1. Timer malfunction. 2. Buzzer malfunction.