SERVICE MANUAL



GL Kettle Service Manual

GS40ES • 40 Gallons, 151 Liters
GS60E • 60 Gallons, 227 Liters
GL80E • 80 Gallons, 303 Liters
GT100E • 100 Gallons, 379 Liters
GT125E • 125 Gallons, 473 Liters
GT150E • 150 Gallons, 568 Liters

- NOTICE -

This Manual is prepared for the use of trained Hobart 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 Hobart 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 Hobart Service Technician.

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1. GENERAL

INTRODUCTION

Gas fully jacketed stationary kettle. Kettle is mounted on 2" diameter legs with adjustable flanged feet. The kettle liner is constructed out of 316 Series stainless steel. Spring assist hinged stainless steel cover with condensate ring and drop down lift handle with heavy duty pivot assembly that includes a yolk style mount with tie bar. The dish shaped interior bottom is sloped to the front for a smooth product flow through a mounted, tapered, 2" plug type food product draw-off valve. Draw-off includes opening strainer. Graduated measuring rod. Furnished standard with a 15 PSI relief valve, vacuum relief valve, thermostat with a combination gas control valve and electronic ignition, low water cut-off control and a pressure limit switch and pressure gauge. CSA design certified. Classified by UL to NSF Standard #4. Meets ASME code.

INSTALLATION AND OPERATION

Refer to GS, GL, GT Fully Steam Jacketed Kettles I & O Manual.

SPECIFICATIONS

Refer to Specification Sheet.

Refer to Technical Data.

2. REMOVAL AND REPLACEMENT

CONTROL BOX COVER (TILTING)



⚠ WARNING

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

1. Disconnect supply power.
2. Remove control box cover mounting screws.



Fig. 1

3. Reverse procedure to install.
4. Turn kettle on.
5. Run a cycle.
6. Verify proper operation.

PILOT



⚠ WARNING

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



⚠ WARNING

Shut off the gas before servicing the unit and follow lockout / tagout procedures.

1. Remove burners (1, Fig. 2) on each side of pilot that is being removed.

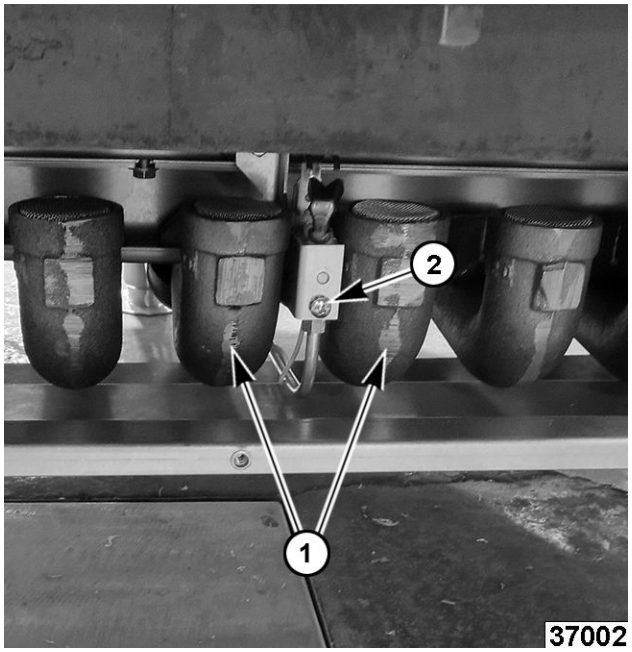


Fig. 2

2. Remove pilot mounting screw (2, Fig. 2) and remove pilot.
3. Reverse procedure to install.
4. Turn kettle on.
5. Run a cycle.
6. Check for leaks.

⚠ WARNING

All gas joints disturbed during servicing must be checked for leaks. Check with a soap and water solution (bubbles). Do not use an open flame.

7. Verify proper operation.

BURNERS & ORIFICES



⚠ WARNING

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



⚠ WARNING

Shut off the gas before servicing the unit and follow lockout / tagout procedures.

⚠ WARNING

All gas joints disturbed during servicing must be checked for leaks. Check with a soap and water solution (bubbles). Do not use an open flame.

1. Remove bottom cover mounting screws from underneath burners.

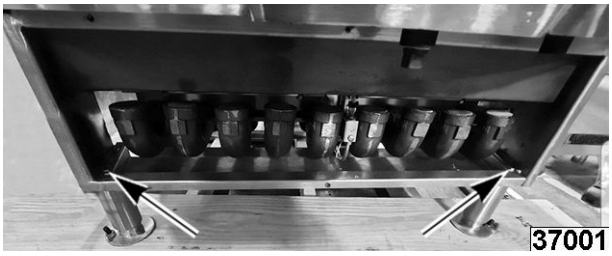


Fig. 3

2. Cut wire hangers to remove burner(s).

NOTE: Kettle shown upside down with bottom cover off for clarity in Fig. 4. Burner can be removed from underneath front of burners.

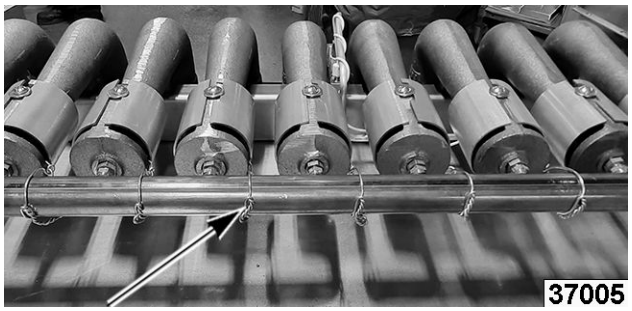


Fig. 4

3. Remove burner sleeve.



Fig. 5

4. Remove burner housing from orifice.



Fig. 6

5. Unscrew orifice.
6. Reverse procedure to install.

NOTICE

Set orifice at 3/16" gap for Natural or Propane gas.

7. Turn kettle on.
8. Run a cycle.
9. Check for leaks.

⚠ WARNING

All gas joints disturbed during servicing must be checked for leaks. Check with a soap and water solution (bubbles). Do not use an open flame.

10. Verify proper operation.

SITE GLASS GAUGE



⚠ WARNING

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

1. Turn kettle supply power off.
2. Remove both rods.



Fig. 7

3. Remove both knobs (1, Fig. 7).

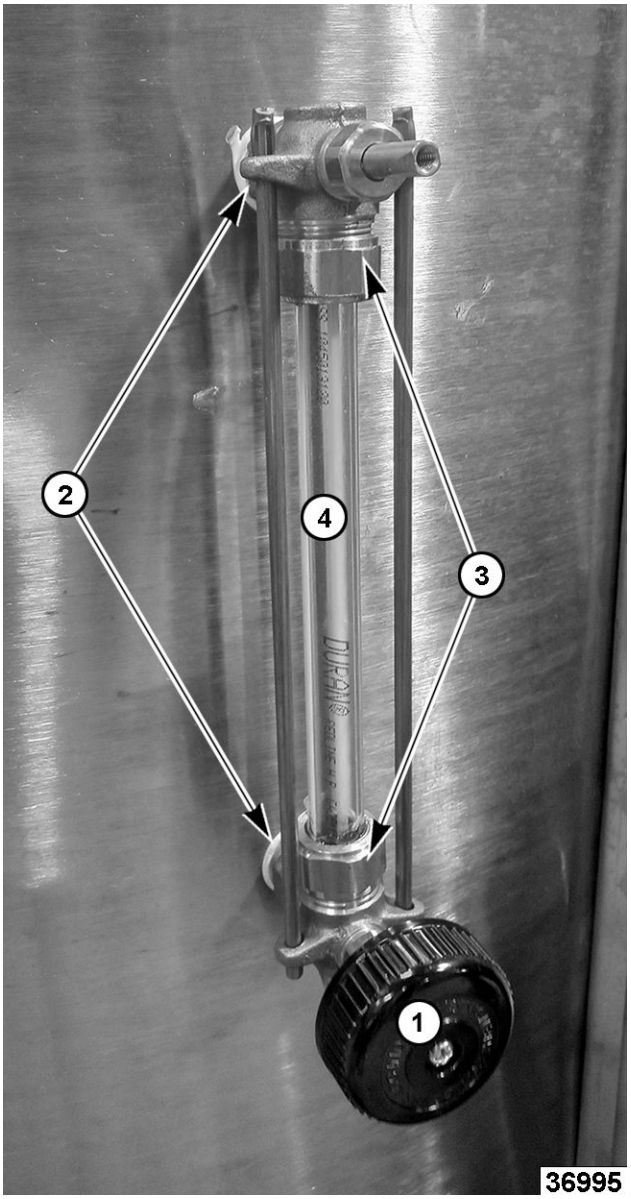


Fig. 8

4. Loosen gauge mounting nuts (2, Fig. 8).

NOTE: This will allow glass tube to slide up and down.

5. Turn bottom and top gauge fittings (3, Fig. 8) counterclockwise to back off glass gauge (4, Fig. 8).
6. Remove glass gauge.
7. Reverse procedure to install.
8. Turn kettle on.
9. Run a cycle.
10. Check for leaks if water or gas lines were disturbed.

⚠ WARNING

All gas joints disturbed during servicing must be checked for leaks. Check with a soap and water solution (bubbles). Do not use an open flame.

11. Verify proper operation.

DRAW-OFF VALVE

NOTE: There are two types of draw-off valve options.

Plunger Draw-Off Valve

1. Loosen nut (1, Fig. 9) to remove valve steam (2, Fig. 9).

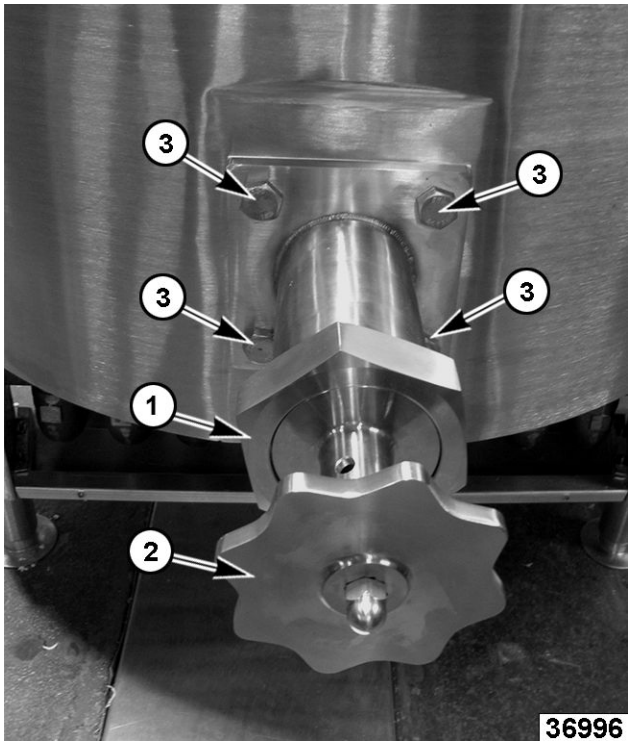


Fig. 9

2. Remove mounting bolts (3, Fig. 9).
3. Pull valve steam out to clean plunger.

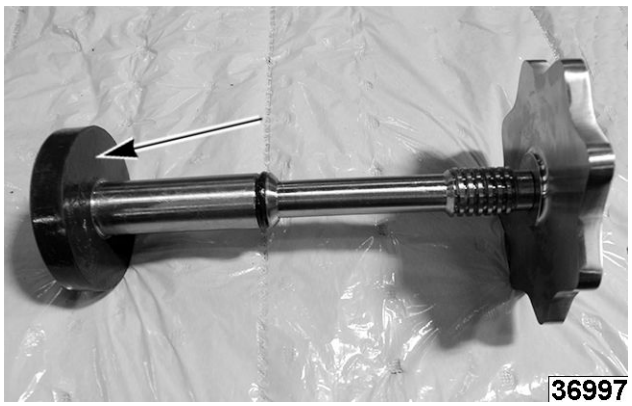


Fig. 10

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

Handle/Ball Draw-Off Valve

1. Lift up handle (1, Fig. 11).

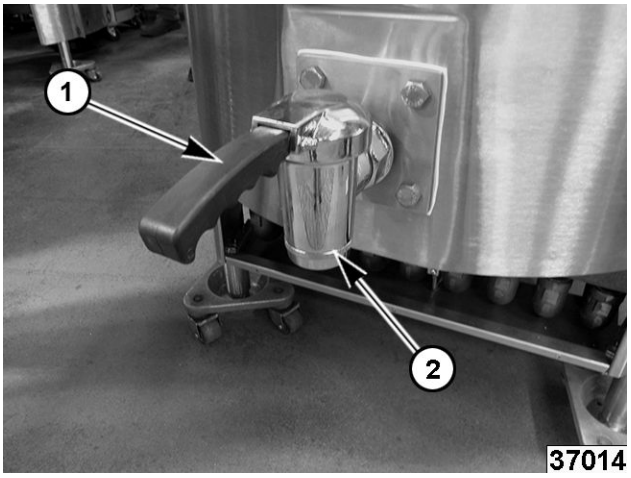


Fig. 11

2. Unscrew ring from bottom of ball valve.
3. Remove bolts from unit to remove valve.
4. Reverse procedure to install.
5. Turn kettle on.
6. Run a cycle.
7. Check for leaks.

⚠ WARNING

All gas joints disturbed during servicing must be checked for leaks. Check with a soap and water solution (bubbles). Do not use an open flame.

8. Verify proper operation.

GAS VALVE



⚠ WARNING

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



⚠ WARNING

Shut off the gas before servicing the unit and follow lockout / tagout procedures.

1. Remove gas line (1, Fig. 12) from gas valve.

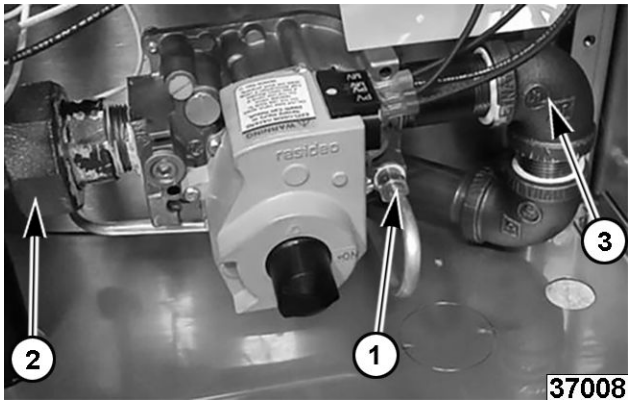


Fig. 12

2. Loosen the pipe union (2, Fig. 12).
3. Loosen pipe elbow (3, Fig. 12).
4. Pivot at pipe elbow (3, Fig. 12) to rotate gas valve outward.
5. Remove gas valve from pipe.
6. Reverse procedure to install.
7. Turn kettle on.
8. Run a cycle.
9. Check for leaks.

⚠ WARNING

All gas joints disturbed during servicing must be checked for leaks. Check with a soap and water solution (bubbles). Do not use an open flame.

10. Verify proper operation.

THERMOSTATIC AIR VENT AND PRESSURE RELIEF VALVE

⚠ WARNING

The steamer and its parts are hot. Use care when operating, cleaning or servicing the steamer. The cooking compartment contains live steam. Stay clear when opening each door.

The kettle cooks with atmospheric pressure. When the kettle is turned on and it starts to heat, the thermostatic air vent (1, Fig. 13) will start releasing steam and then close. The kettle will then build up pressure for cooking. When the kettle is shut down and starts to cool off it will pull the pressure into a vacuum. At this point, the ball (valve) inside the vacuum relief solenoid (2, Fig. 13) will open and allow air in to prevent the liner from collapsing. If the kettle builds up too much pressure (above the pressure switch preset value) the top of the pressure relief valve (3, Fig. 13) will open to release pressure. Steam and or moisture will be released from the top of the pressure relief valve when this happens.

NOTICE

The thermostatic air vent must be mounted in a vertical position to work properly as shown in.

NOTICE

The pressure relief valve spring may get weak and open prematurely if it has opened several times. This is a Kettle safety component and will need replaced if not working properly.

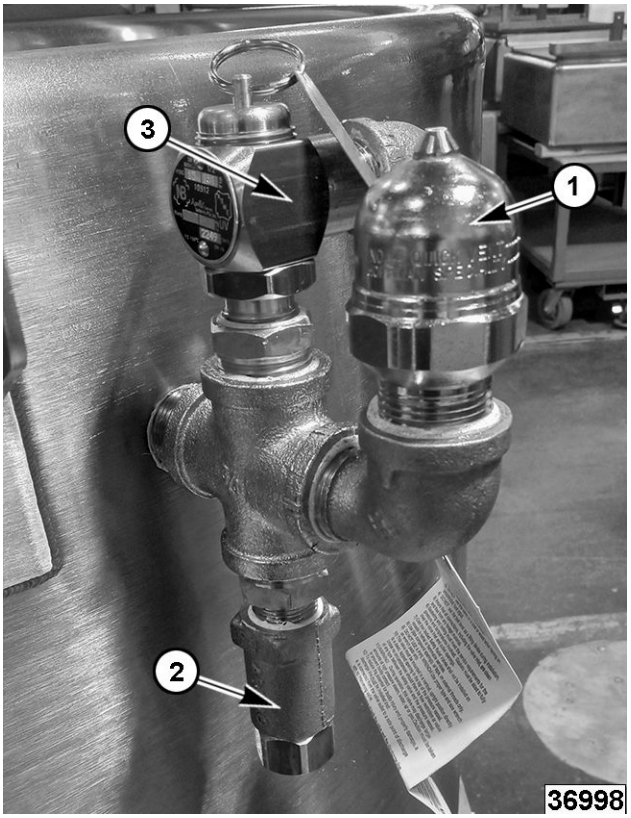


Fig. 13

Thermostatic Air Vent Removal

⚠ WARNING

The steamer and its parts are hot. Use care when operating, cleaning or servicing the steamer. The cooking compartment contains live steam. Stay clear when opening each door.



⚠ WARNING

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

1. Unscrew to remove.

2. Apply pipe thread sealant on threads.
3. Screw on and tighten with wrench on flats.
4. Verify proper operation.

Vacuum Relief Solenoid Removal

⚠ WARNING

The steamer and its parts are hot. Use care when operating, cleaning or servicing the steamer. The cooking compartment contains live steam. Stay clear when opening each door.



⚠ WARNING

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

1. Unscrew to remove.
2. Apply pipe thread sealant on threads.
3. Screw on and tighten with wrench on flats.
4. Verify proper operation.

Pressure Relief Valve Removal

⚠ WARNING

The steamer and its parts are hot. Use care when operating, cleaning or servicing the steamer. The cooking compartment contains live steam. Stay clear when opening each door.



⚠ WARNING

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

1. Remove elbow (1, Fig. 14) and adapter (2, Fig. 14) from pressure relief valve (3, Fig. 14).

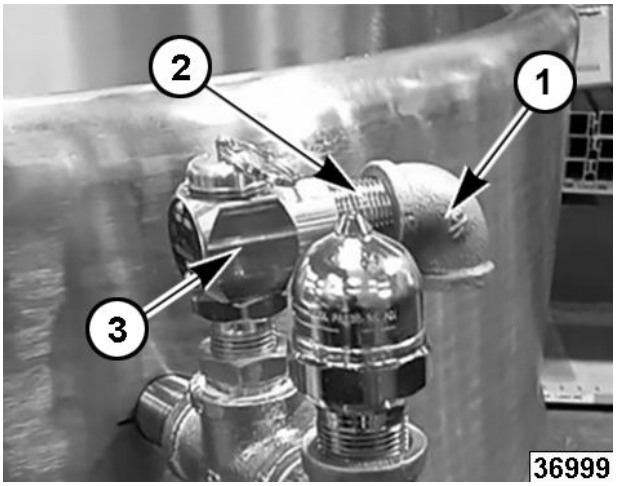


Fig. 14

2. Unscrew pressure relief valve from assembly.
3. Apply pipe thread sealant on threads.
4. Screw on and tighten with wrench on flats.
5. Install elbow and adapter to pressure relief valve.

NOTICE

The thermostatic air vent must be mounted in a vertical position to work properly as shown in Fig. 14.

6. Turn kettle on.
7. Run a cycle.
8. Check for leaks.

⚠ WARNING

All gas joints disturbed during servicing must be checked for leaks. Check with a soap and water solution (bubbles). Do not use an open flame.

9. Verify proper operation.

THERMOSTAT



⚠ WARNING

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



⚠ WARNING

Shut off the gas before servicing the unit and follow lockout / tagout procedures.

Removal

1. Remove CONTROL BOX COVER (TILTING).

2. Remove two screws underneath dial.
3. Note and disconnect wires.
4. Unscrew packing gland around capillary tube where it enters jacket.

Installation

1. Insert bulb first during installation.
2. Install packing gland around capillary tube and verify it is pressure tight.

NOTICE

Verify capillary tube is not bent sharply.

3. Connect wiring.
4. Install screws.
5. Install control box cover.
6. Connect supply power and gas.
7. Turn kettle on.
8. Run a cycle.
9. Check for leaks.

⚠ WARNING

All gas joints disturbed during servicing must be checked for leaks. Check with a soap and water solution (bubbles). Do not use an open flame.

10. Verify proper operation.

PRESSURE LIMIT SWITCH



⚠ WARNING

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



⚠ WARNING

Shut off the gas before servicing the unit and follow lockout / tagout procedures.

1. Remove CONTROL BOX COVER (TILTING).
2. Disconnect tubing (1, Fig. 15) from bottom of pressure limit switch.

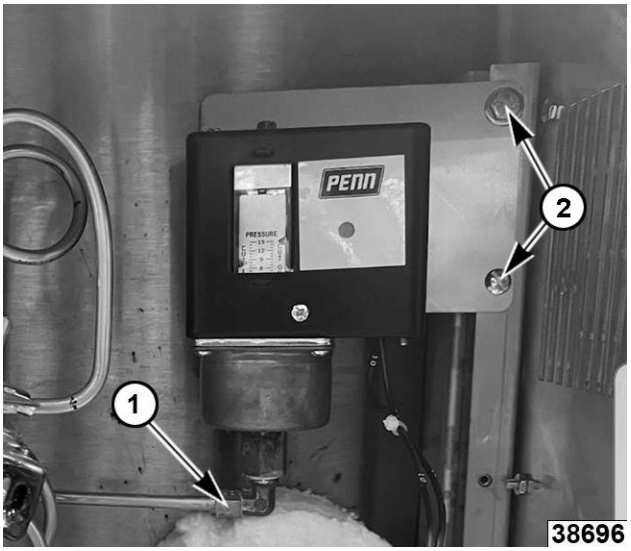


Fig. 15

3. Remove two screws with nuts (2, Fig. 15) from pressure limit switch mounting bracket.
4. Reverse procedure to install.
5. Turn kettle on.
6. Run a cycle.
7. Check for leaks.

⚠ WARNING

All gas joints disturbed during servicing must be checked for leaks. Check with a soap and water solution (bubbles). Do not use an open flame.

8. Verify proper operation.

Cut out and cut in pressure setting of the switch is shown on the dial and is adjustable at the top of case.

Adjust the cut out pressure setting first. If this adjustment is not obtained, replace the pressure limit switch.

Pressure limit switch is factory set to open at 15 psi and close at 6 psi.

LID REPLACEMENT

⚠ WARNING

Lid is under spring tension. Use 9/16" wrench for resistance when releasing tension. Behind the cover there is several holes in a disc. As you turn the wrench these holes will align with the pin hole. It will take three pin hole alignment moves to release the spring tension, and to adjust tension when installing.

Shown without cover in Fig. 16.



Fig. 16

1. Release spring tension.
   A. Place 9/16" wrench on flats (1, Fig. 17) and hold in place.

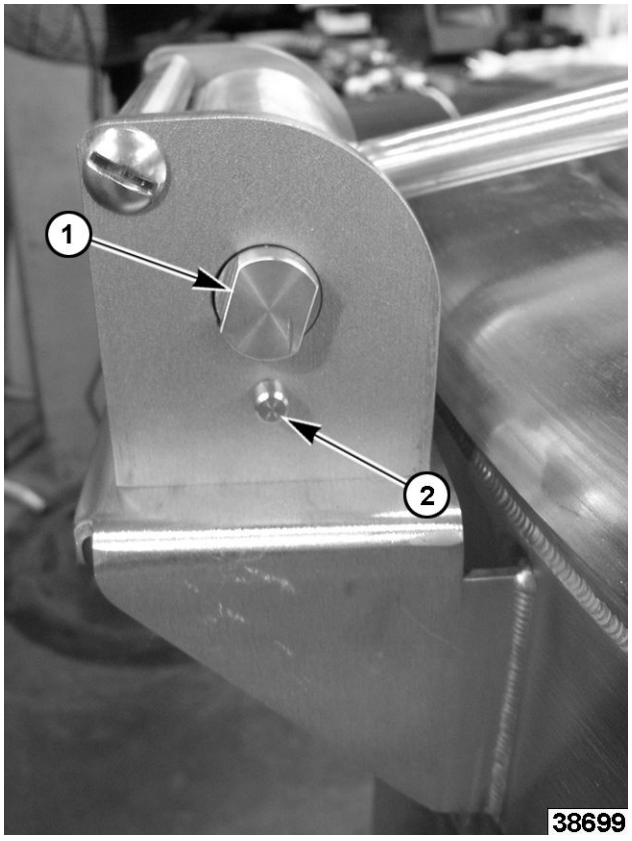


Fig. 17

   B. Partially pull pin (2, Fig. 17) out.
   C. Turn wrench until pin aligns with another hole and put pin back in.



Fig. 18

   D. Reposition 9/16" wrench on flats.
   E. Repeat Step 2 and Step 3 at least 2 to 3 times to remove all the spring tension.
2. Pull handle out of shaft.



Fig. 19

3. Reverse procedure to install.

⚠ WARNING

Align second hole from group of three holes with spring first when installing.



Fig. 20

4. Turn kettle on.
5. Run a cycle.
6. Check for leaks.

⚠ WARNING

All gas joints disturbed during servicing must be checked for leaks. Check with a soap and water solution (bubbles). Do not use an open flame.

7. Verify proper operation.

3. SERVICE PROCEDURES, TESTS AND ADJUSTMENTS

⚠ WARNING

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

KETTLE FLUSHING

⚠ WARNING

Steam may be hot. Verify unit has cooled off before opening Pressure Relief Valve Exhaust.

1. Remove pipe plug from water fill valve to open fill port.



Fig. 21

2. Insert a funnel into pressure relief valve open port. (1, Fig. 22).

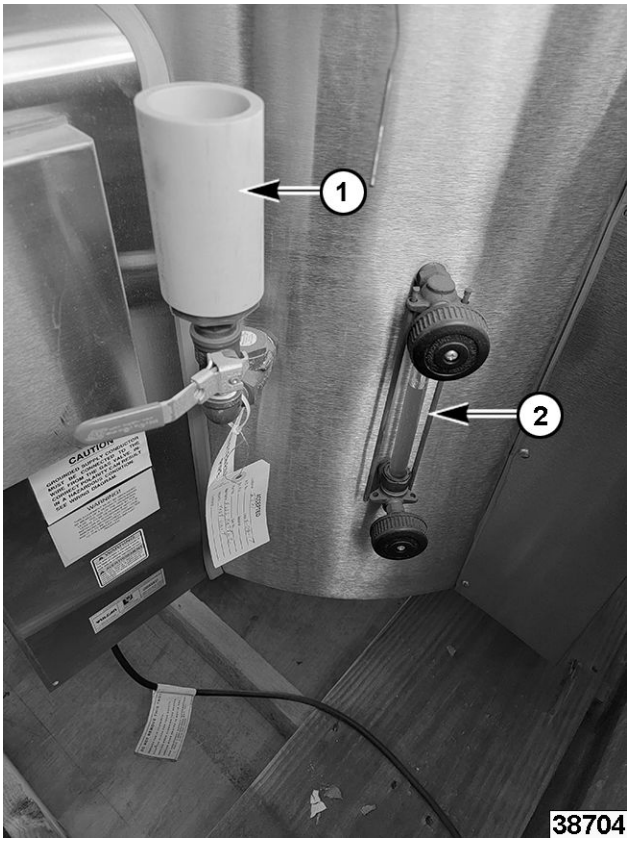


Fig. 22

3. Drain all water from kettle jacket by removing drain plug located by draw off valve. Water level gauge will show when jacket is empty. (2, Fig. 22)
4. Reinstall drain plug.
5. Add as much distilled water as possible to the kettle jacket to flush out all chlorine / chloramine.
6. Remove drain plug and fully drain kettle jacket.
7. Reinstall drain plug.
8. Repeat Step 5, Step 6 and Step 7.
9. Fill kettle jacket with 25% Dowfrost and fill the remainder with distilled water until sight glass reads half full.



Fig. 23

10. Install pressure relief valve on kettle.
11. Verify proper operation.

TEMPERATURE CONTROLLER TEST

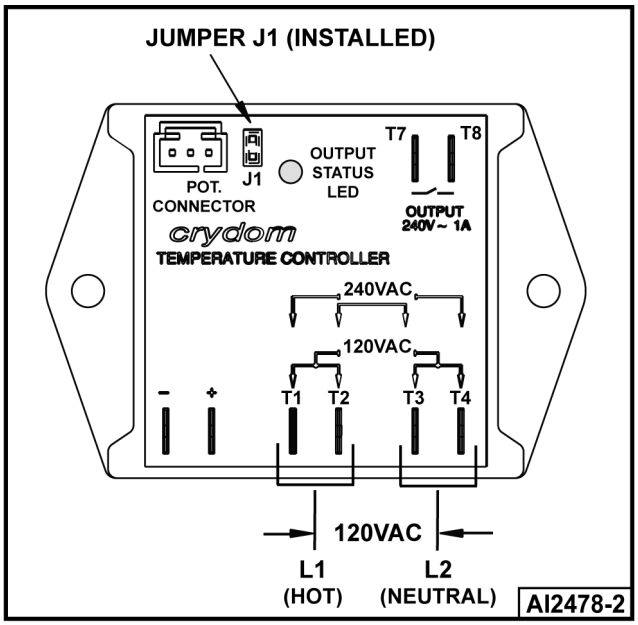


Fig. 24

1. Place kettle in full upright position (tilting models only).
2. Set temperature dial to lowest setting. Kettle must be below 110°F before verifying the potentiometer output to the controller is good over the full range of temperature dial travel.
3. Access temperature controller. Refer to: CONTROL BOX COVER (TILTING).
4. Check all lead wires for secure connections to the controller terminals. Wiring harness lead wires must be connected to T1-T2 and T3-T4 for proper input to controller.
5. Re-connect power to the machine.
6. Turn power switch on.
7. Verify temperature controller is receiving 120VAC at terminals T1-T3 and T2-T4 and machine is properly grounded.
8. Slowly turn temperature dial to the highest setting and monitor heat light over the full range of travel.
   A. Verify heat light (amber) comes on, blower motor comes on and transformer is powered (120VAC).

B. If the components listed above are functioning properly, then output from T8 on controller should be present. As long as transformer output voltage is correct (24VAC), heat circuit is powered and the ignition sequence to light the burner will start.

C. If heat light does not remain on or flashes momentarily as temperature setting is slowly increased, verify condition of potentiometer. Refer to:POTENTIOMETER TEST.

D. If heat light or blower motor is not coming on; or transformer is not powered.

1) Verify condition of thermocouple. Refer to: THERMOCOUPLE TEST.

NOTE: Temperature controller will de-energize internal relay and turn off the output status LED if the circuitry detects an open thermocouple. LED will begin to flash 3 times, pause, then repeat the flash sequence to indicate the open thermocouple condition.

2) Check lead wire connections at the component that is not functioning (heat light, blower motor or transformer).

3) Verify power at the component that is not functioning. If power is present, determine if the component is malfunctioning. If power is not present at any of the components, continue with procedure.

9. Disconnect lead wire from terminal T7 on the controller.

A. Verify 120VAC between lead wire from T7 and ground. If correct, re-connect lead wire to terminal T7 and continue with procedure.

B. If incorrect, check pressure switch (1PS) and water level controller (WLC LLCO).

10. Disconnect lead wire from terminal T8 on the controller.

A. Verify 120VAC between T8 and ground. If correct, output from controller is functioning properly.

B. If incorrect, install a replacement temperature controller and check for proper operation.

POTENTIOMETER TEST

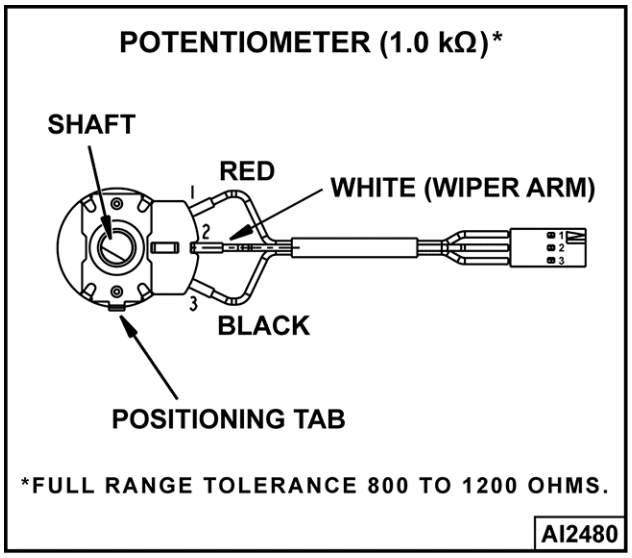


Fig. 25

1. Access control panel potentiometer by removing CONTROL BOX COVER (TILTING).
2. Turn potentiometer shaft fully counterclockwise to the lowest setting.
3. Set VOM to measure resistance.
4. Connect meter leads to the white and black lead wires on potentiometer terminals.

A. Resistance should measure approximately zero ohms.

5. Slowly turn potentiometer shaft clockwise over the full range of travel and monitor resistance change on the meter.

A. Resistance should measure 800 to 1200 ohms with shaft turned fully clockwise.

B. If the resistance value increased smoothly without sudden drops or spikes and the full travel resistance value is within tolerance then potentiometer is functioning properly.

C. If the resistance value did not increase smoothly but had drops or spikes over the full travel range then potentiometer is not functioning properly. Install a replacement potentiometer and check for proper operation.

THERMOCOUPLE TEST

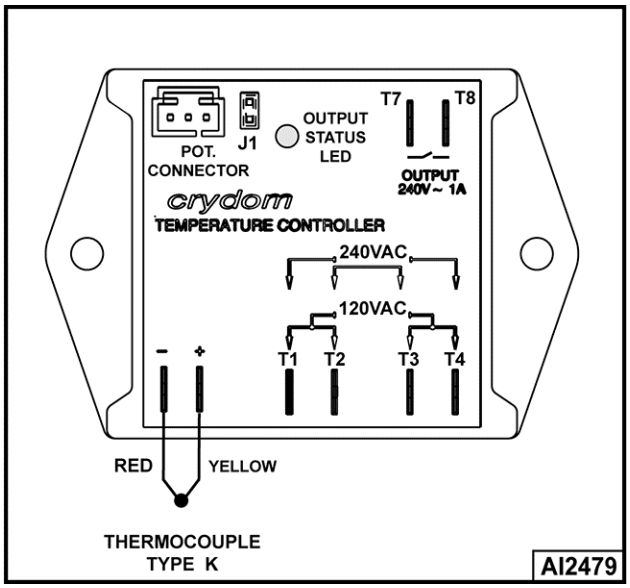


Fig. 26



⚠ WARNING

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

1. Access temperature controller. Refer to: CONTROL BOX COVER (TILTING)
2. Remove thermocouple lead wires from temperature 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.

TYPE K THERMOCOUPLE PROBE AND MILLIVOLT CHART	
TEMPERATURE	**MILLIVOLT**
100° F	1.521
150° F	2.667
200° F	3.820
250° F	4.925
300° F	6.094
350° F	7.207
400° F	8.316

SPARK IGNITION TEST

If ignition control module is not generating a spark or the spark is not sufficient to light kettle burner, perform the following test.

1ST GENERATION IGNITION MODULE SHOWN IN Fig. 27

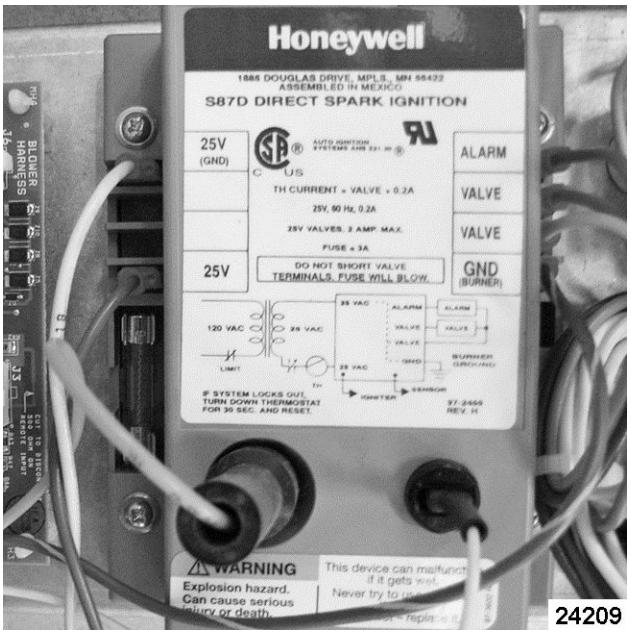


Fig. 27

2ND GENERATION IGNITION MODULE SHOWN IN Fig. 28

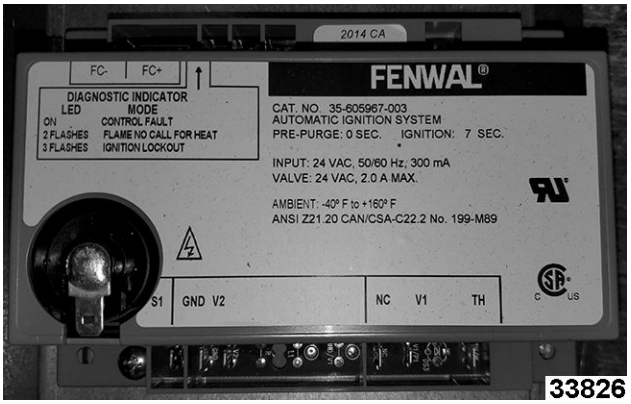


Fig. 28

1. Access ignition control module in CONTROL BOX COVER (TILTING).
2. Turn the on/off switch on and set the temperature dial to call for heat. Tilting models must be in the full upright position.
3. Verify the ignition control module is receiving 24VAC between terminals 25V & 25V GND.

A. If voltage is present, turn the on/off switch off and proceed to step 4.

B. If voltage is not present, see schematic diagram.

4. Disconnect power to the machine.
5. Verify all electrical connections (including ground) on the ignition control module are secure.
6. Verify ground connection on spark ignitor is clean and secure. The ground connection should have good metal to metal contact.
7. Remove spark ignitor and check the following:

   A. Inspect ceramic insulator on spark ignitor electrode for cracks or evidence of exposure to extreme heat, which can permit leakage to ground. If either of these conditions exists, then replace spark ignitor.

   B. Inspect spark ignitor electrode and ground rod for contaminates, or corrosion. Clean those surfaces as necessary.

   C. Spark gap between the spark ignitor electrode and ground rod should be approximately 1/8". If the gap is outside of this dimension, bend the spark ignitor electrode as necessary, to make the adjustment.

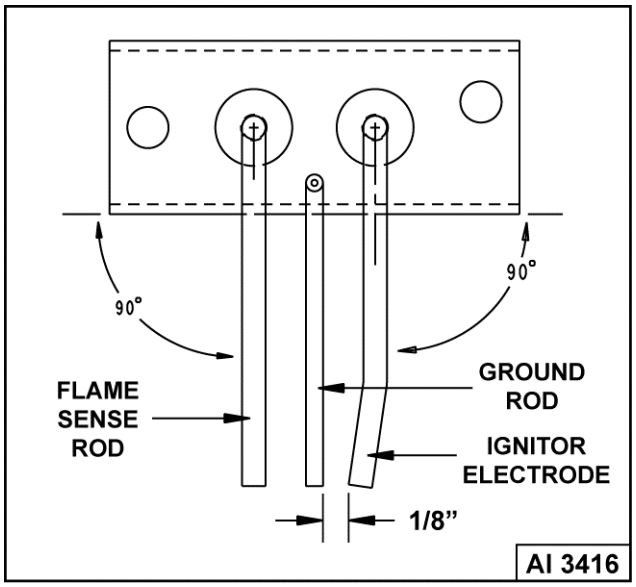


Fig. 29

   D. Check ignitor wire connection for tightness and damaged insulation. If ignitor wire appears to be damaged, then install a replacement ignitor wire.

8. Install spark ignitor and reconnect ignitor wire.

FLAME SENSE CURRENT TEST

NOTE: You must complete the SPARK IGNITION TEST prior to checking flame sense current.

If kettle burner lights but will not maintain flame, perform the following test.

1. Turn the on/off switch off.
2. Access ignition control module. Refer to: CONTROL BOX COVER (TILTING).

   1ST GENERATION IGNITION MODULE SHOWN IN Fig. 30

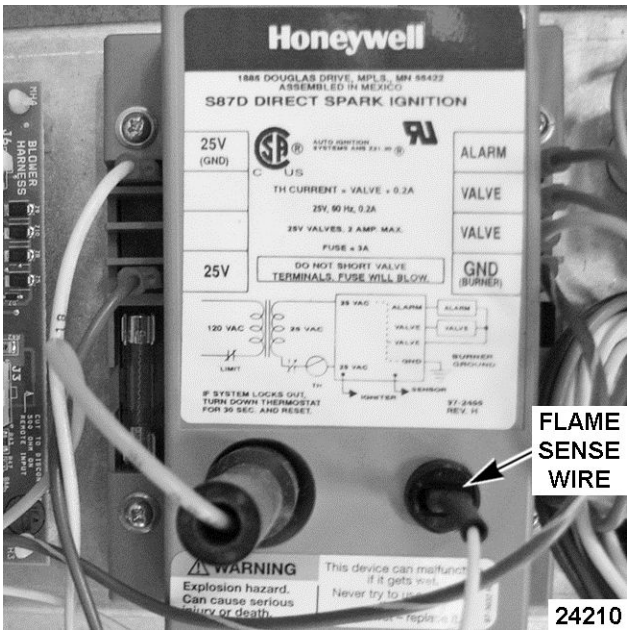


Fig. 30

   2ND GENERATION IGNITION MODULE SHOWN IN Fig. 31

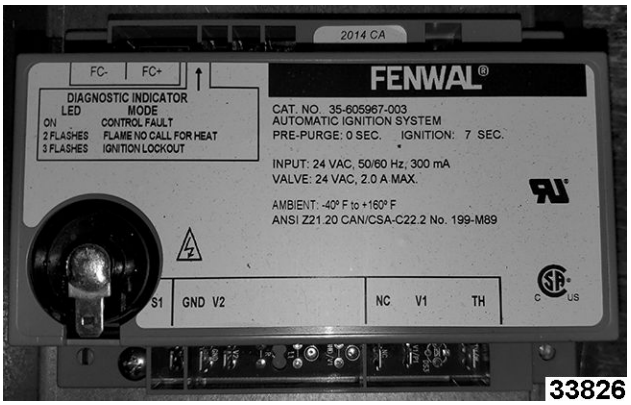


Fig. 31

3. Set VOM to micro amps scale (DC). Remove flame sense wire from ignition module and connect it to the black meter lead (-) and connect red meter lead (+) to flame sense terminal.

4. Turn on/off switch on and set the temperature dial to call for heat.
5. With kettle burner lit, meter reading should be above 1.5 micro amps (minimum) and steady.
   A. If reading is greater than or equal to 1.5 micro amps then flame sense current is within tolerance. Turn on/off switch off and reconnect flame sense wire.
   B. If reading is less than 1.5 micro amps and the condition of the spark ignitor and flame sense has been verified as good, turn on/off switch off. Install a replacement ignition control module and check for proper operation.

PILOT LIGHT & MAIN BURNER FLAME



⚠ 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.

⚠ WARNING

All gas joints disturbed during servicing must be checked for leaks. Check with a soap and water solution (bubbles). Do not use an open flame.

Lighting Pilot Light

CAUTION

Before lighting pilot, both burner and pilot much have been off at least 5 minutes.

1. Remove control panel cover.
   A. Remove cover lock screw.
   B. Lift panel.
   C. Pull out at bottom and lower.
2. Turn combination valve knob counterclockwise until its stops at "ON" position.
3. Turn master power switch on control panel to "ON" position.

NOTE: Pilot will begin sparking and the pilot will Light.

4. Verify pilot has been lit by viewing pilot flame through view port.

NOTE: Pilot Light will stay lit as long as master power switch is in the "ON" position.

5. Replace control panel cover and lock screw.

Shut-Down

1. Turn combination valve clockwise until it stops to make pilot and main burners inoperable.
2. Turn thermostat dial to "OFF" position.
3. Turn gas service valve to "OFF" position.

NOTICE

The following adjustments were factory set, but may require adjustments due to differences in gas, altitude and other variables.

Adjusting Pilot Flame

1. Remove front panel.
2. Verify visually the height of blue flame.
   - Pilot Blue Flame Size 3/8" to ½".
3. Locate combination control inside control box.
4. Remove screw cap and turn adjusting screw.
   - Counterclockwise - Increases Flame
   - Clockwise - Decreases Flame

Adjusting Main Burner Flame

1. Remove CONTROL BOX COVER (TILTING).
2. Turn combination control dial to "ON" from pilot.
3. Install control box cover.
4. Turn electrical power on.
5. Turn thermostat dial to "ON" and allow burners to operate.
6. Note flame on each burner. Adjust each air shutter to give a steady blue flame.

   Adjust Air Shutters

   A. Turn burners off.
   B. Pull burner forward and loosen shutter lock screw.
   C. Put burner back into position.
   D. Adjust shutter with burner operating.
   E. Tighten shutter lock screw.

Main Burner Air Supply

For efficient burner operation, it is important that a proper balance of gas volume and primary air supply is maintained, resulting in complete combustion.

Insufficient air supply resulting in a yellow streaming flame. The primary air supply is controlled by the air shutter on front of burner venturi.

Verify there is adequate air supply around the kettle. The burners are located underneath the kettle and must be kept clear of all obstruction and debris so the air openings into the combustion chamber are not blocked.

CALIBRATION THERMOSTAT

1. Turn thermostat dial to highest setting.
2. Allow burners to operate until **thermostat functions to shut them off**. **Note** jacket pressure as it reads on the pressure gauge **at the moment they shut off.**
   - If burner shuts off and jacket pressure reaches 12-13 psi, thermostat calibration is correct.
   - If psi is not 12-13, then recalibrate.
3. Remove thermostat dial by pulling it forward.
4. Turn small screw center of hollow dial shaft slightly.
   - Counterclockwise to Increase Pressure
   - Clockwise to Decrease Pressure
5. Check and repeat adjustment if necessary.

GAS PRESSURE REGULATING VALVE ADJUSTMENT

1. Remove CONTROL BOX COVER (TILTING).

NOTE:

5/64" Allen wrench is needed for adjustments.

2. Locate adjustment screw under the cap at the right rear of control dial.

   3 ½" W.C. for Natural Gas / 11" W. C. for Propane Gas
   - Turn screw clockwise to increase pressure.
   - Turn screw counterclockwise to decrease pressure.

THERMOSTAT CALIBRATION

NOTICE

The thermostat with its highest dial setting, should cut main burners off at a jacket pressure of 12 to 13 psi. Recalibration is indicated if thermostat with the highest setting fails to shut burners off before the pressure relief valve opens, or if it shuts the burners off before the jacket reaches 8 psi.

Recalibration

1. Remove and locate thermostat.
2. Remove dial by pulling forward.
3. Slightly turn small screw in center of hollow dial shaft.

4. FIRMWARE/SOFTWARE

FIRMWARE / SOFTWARE

Not applicable to this machine.

5. PROGRAMMING

PROGRAMMING

Not applicable to this machine.

6. ELECTRIC OPERATION

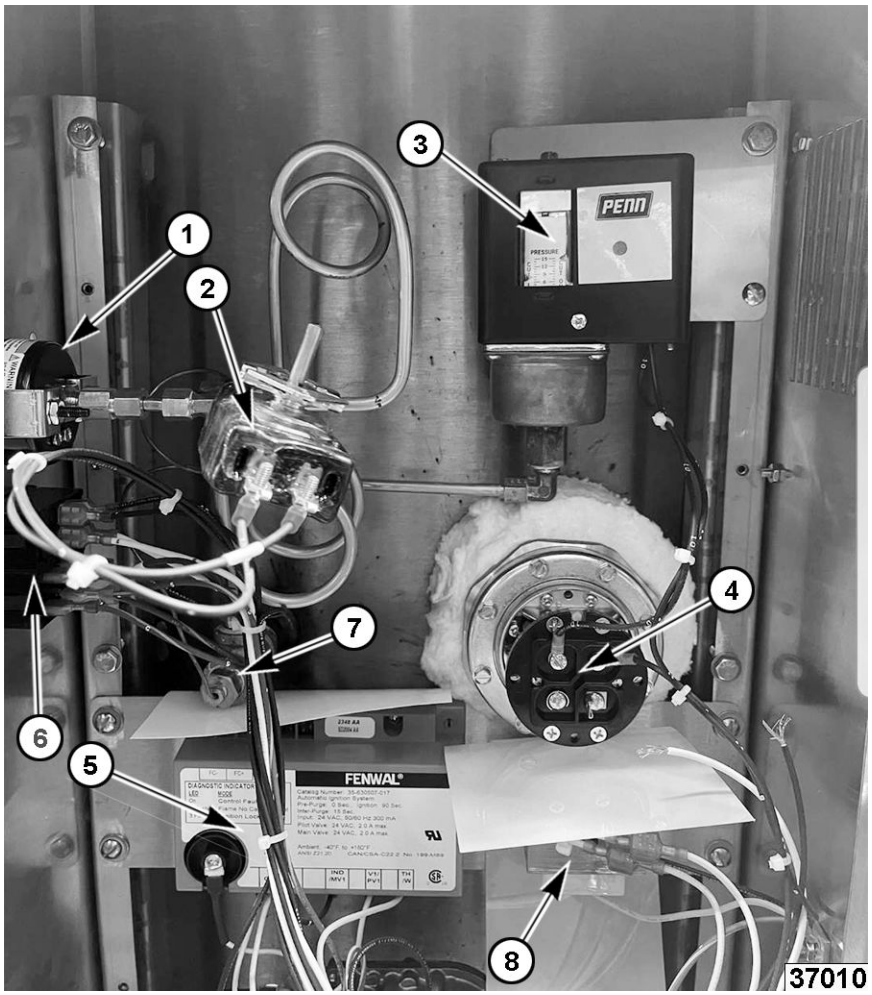
COMPONENT LAYOUT AND FUNCTION (FRONT)



Fig. 32

ITEM	DESCRIPTION	FUNCTION
1	Control Box	**NOTICE** Electrical components that operate the kettle are located inside the control box. User controls are located on the front of the control panel.
2	Drain/Relief Valve	Relieve liquids/condensation from kettle.
3	Burner Assembly	Burners for heating kettle.

COMPONENT LAYOUT AND FUNCTION (CONTROL BOX)



CONTROL BOX (INSIDE)

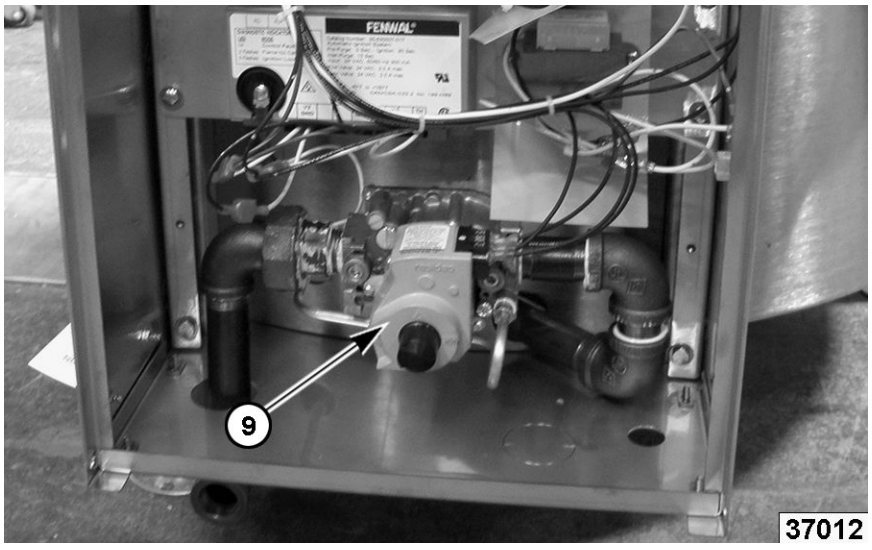
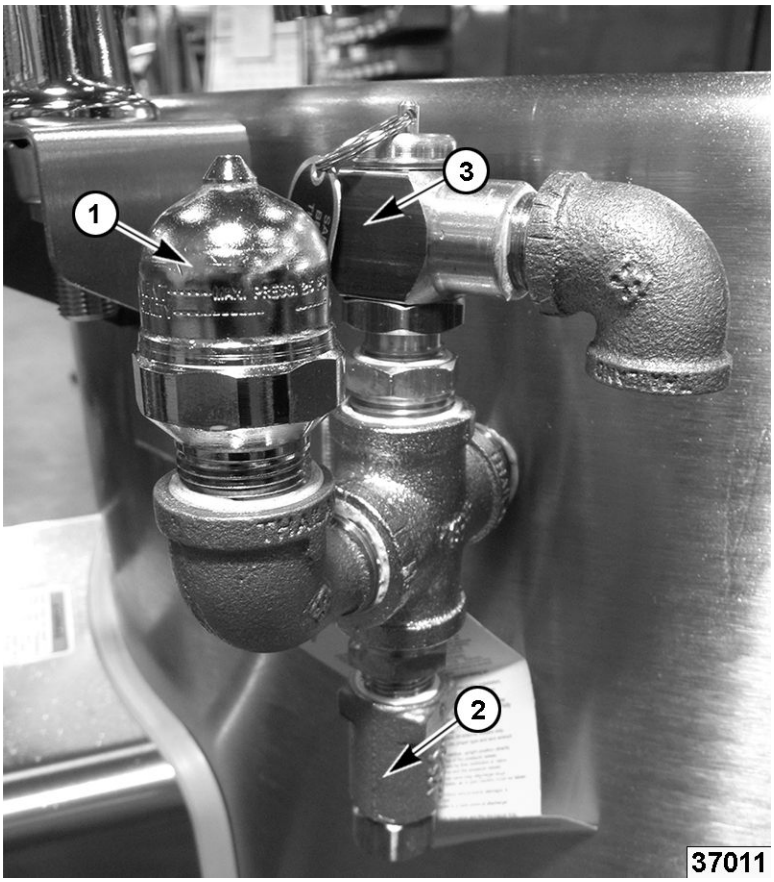


Fig. 34

ITEM	DESCRIPTION	FUNCTION
1	Pressure Gauge	Measures pressure in the kettle for cooking consistency and safety.
2	Potentiometer	Adjusts voltage output to circuit and measures electric potential.
3	Pressure Switch	Regulates pressure to ensure reservoir level remains stable.
4	Float Switch	Detects the level of liquid in the tank.
5	Ignition Module	Controls and monitors burner ignition. Energizes main valve coil and generates spark for burner ignition. Monitors the presence of flame. Includes an accessible fast acting 3 amp - 250v fuse to protect ignition module.
6	On/Off Power Switch	Controls 120VAC to kettle control circuit.
7	Thermostat (Temperature Controller)	Cycles power to blower motor (1MOT), heat lamp (3LT) and transformer (1T). Allows ignition control circuit to energize and light the burner to maintain set point temperature. An external set point potentiometer is used for temperature adjustments.
8	Transformer	Steps down the supply voltage to 24VAC (control circuit voltage).
9	Gas Valve	Regulates gas line supply pressure down to atmospheric pressure level and functions as a "zero pressure regulator". The dual solenoid valve (1 main; 1 safety backup) is attached at the air inlet on the blower motor housing. Gas valve receives power from ignition module.

COMPONENT LAYOUT AND FUNCTION (EXTERNAL SIDE COMPONENTS)



EXTERNAL SIDE COMPONENTS

ITEM	DESCRIPTION	FUNCTION
1	Thermostatic Air Vent	Releases air from kettle as it is building pressure. **NOTICE** Must be installed vertical to kettle to function properly.
2	Vacuum Relief Solenoid	During kettle cool down, the vacuum relief has a ball valve that allows air into kettle jacket to prevent wall from collapsing.
3	Pressure Relief Valve	Relieves high pressure from kettle.

7. SEQUENCE OF OPERATION

SEQUENCE OF OPERATION

Heating the Kettle

When the supply power is turned on for the kettle, it turns the potentiometer knob up which starts the spark igniter and opens orifice to pilot burner. The Spark ignites a flame which heats the flame sense rod. When flame sensor reaches set temperature, it sends a signal back to the ignition module and gas valve opens. Pilot light will stay lit until kettle is turned off.

NOTE: If sensor doesn't reach temperature within 90 seconds the ignition module will lock out. Cycle power off and back on to go through the ignition sequence.

User increases temperature on thermostat which will send the call for heat. Igniter will light, and once adequate flame is sensed, the gas valve will open. When gas valve opens, it will ignite the burners. Gas valve closes, shutting off gas flow to burner.

During initial startup air and steam will be released will be released from the thermostatic air vent. Once operating temperature has been reached the valve will close but will cycle periodically (releasing steam). Water will have to be added on occasion to maintain ½ sight glass. Frequency is dependent upon temperature that the kettle is being run at. Vulcan has no information regarding this frequency period (never tested).

As Kettle cools down below the set temperature, thermostat closes, and another cycle will start.

Pressurizing the Kettle

The Kettle is an atmospheric pressure system. As the unit is heating up, steam will be released from the thermostatic air vent. When the kettle reaches set temperature, the air vent will close and kettle will build pressure and cook.

Internal jacket pressure is maintained by the thermostatic air vent and the vacuum breaker. Vacuum is not established manually.

When kettle is shut down, it starts to cool down. The vacuum relief solenoid will start pulling into a vacuum. The ball pulls in to allow air into the jacket to prevent the liner in the unit from collapsing.

If too much pressure is built up, the pressure relief valve will open and release the pressure. If the pressure relief valve opens too many times, the spring can get weak, it will open prematurely and it will need to be replaced.

The thermostatic air vent must be mounted vertical to the kettle to work properly.

Maximum temperature is 242°F.

8. DIAGRAMS

WIRING DIAGRAMS

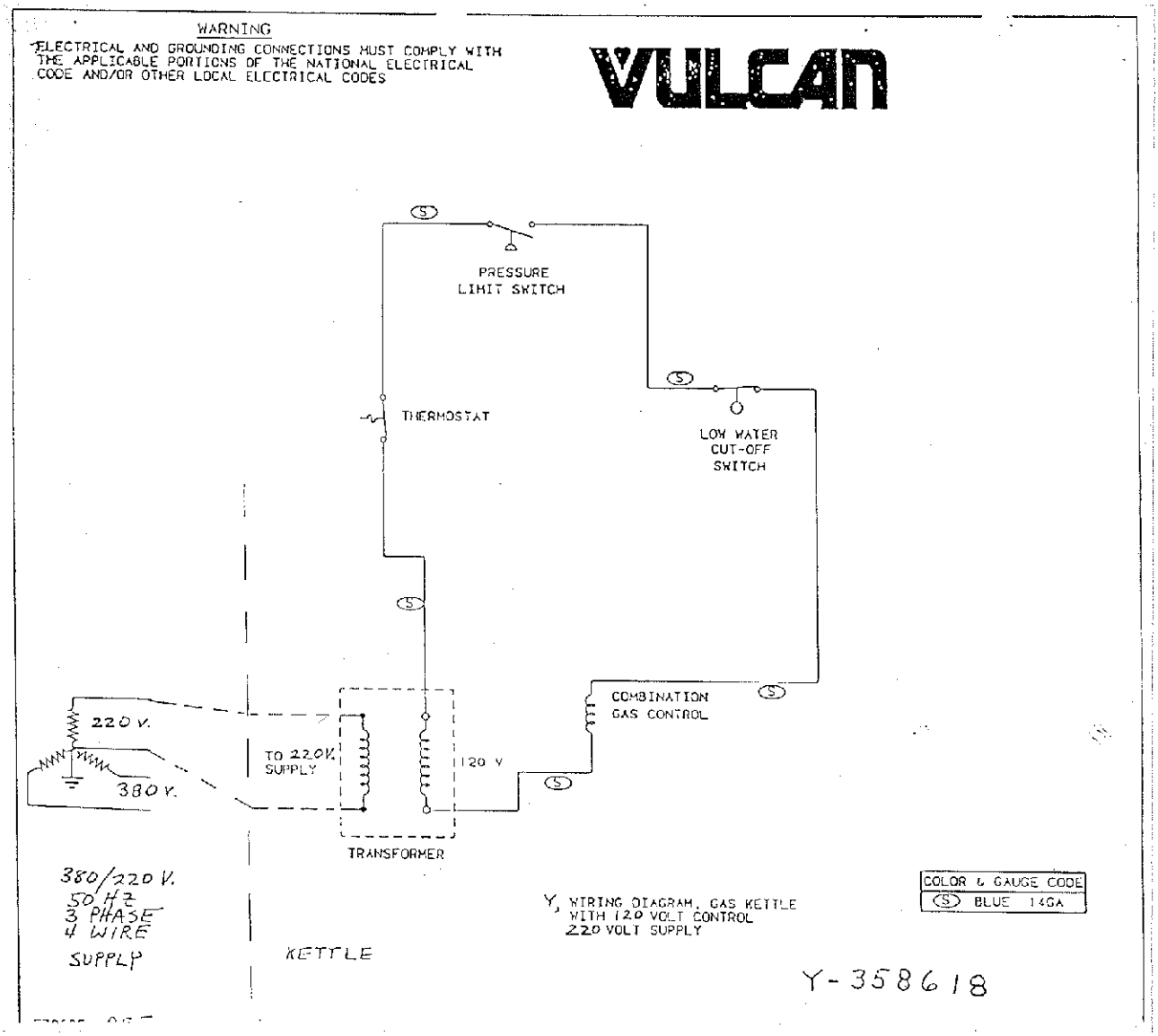


Fig. 36

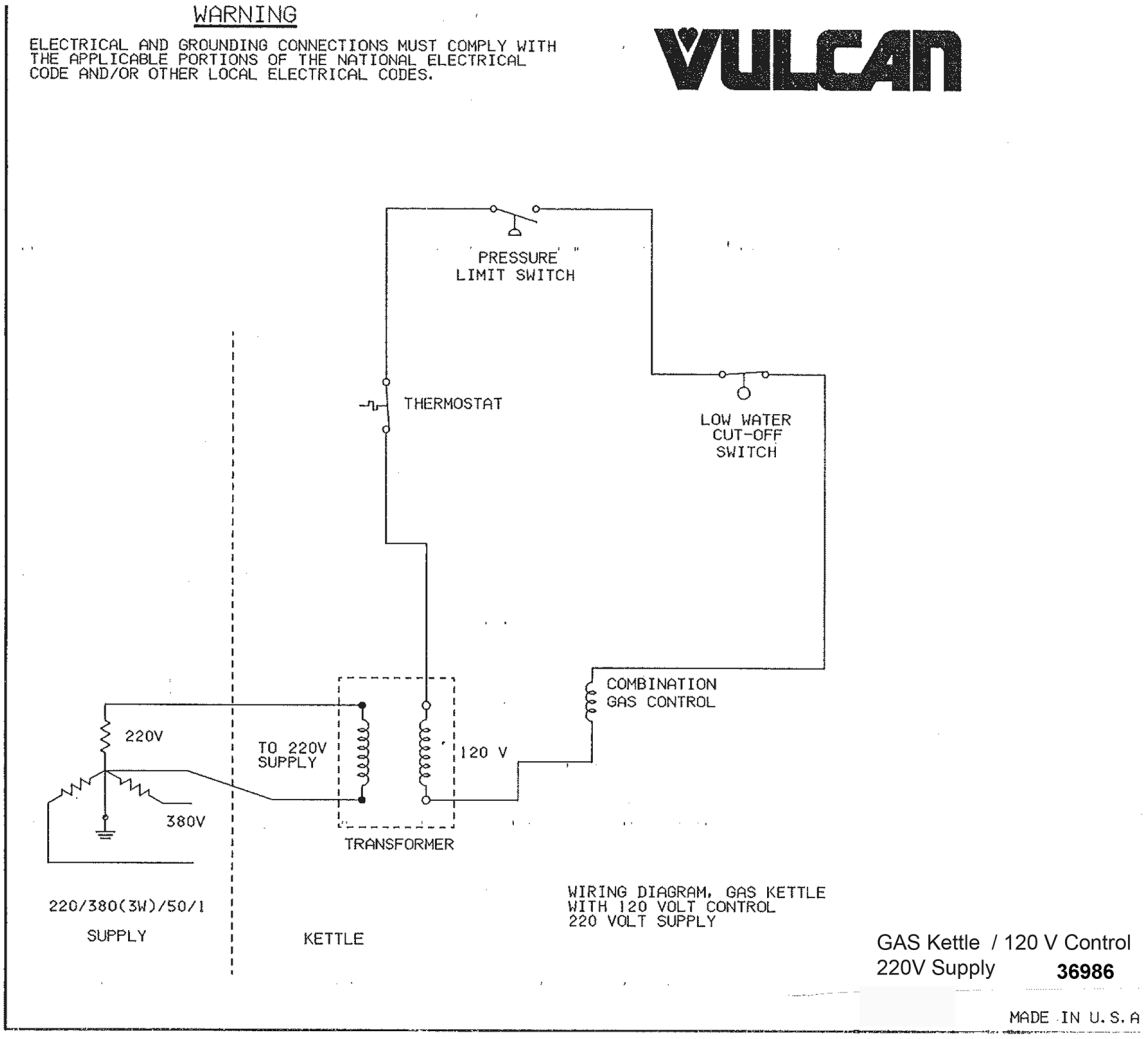

WARNING
ELECTRICAL AND GROUNDING CONNECTIONS MUST COMPLY WITH THE APPLICABLE PORTIONS OF THE NATIONAL ELECTRICAL CODE AND/OR OTHER LOCAL ELECTRICAL CODES.
VULCAN
PRESSURE LIMIT SWITCH
THERMOSTAT
LOW WATER CUT-OFF SWITCH
COMBINATION GAS CONTROL
220V
TO 220V SUPPLY
120 V
380V
TRANSFORMER
220/380(3W)/50/1
SUPPLY
KETTLE
WIRING DIAGRAM, GAS KETTLE WITH 120 VOLT CONTROL 220 VOLT SUPPLY
GAS Kettle / 120 V Control
220V Supply
36986
MADE IN U.S.A

Fig. 37

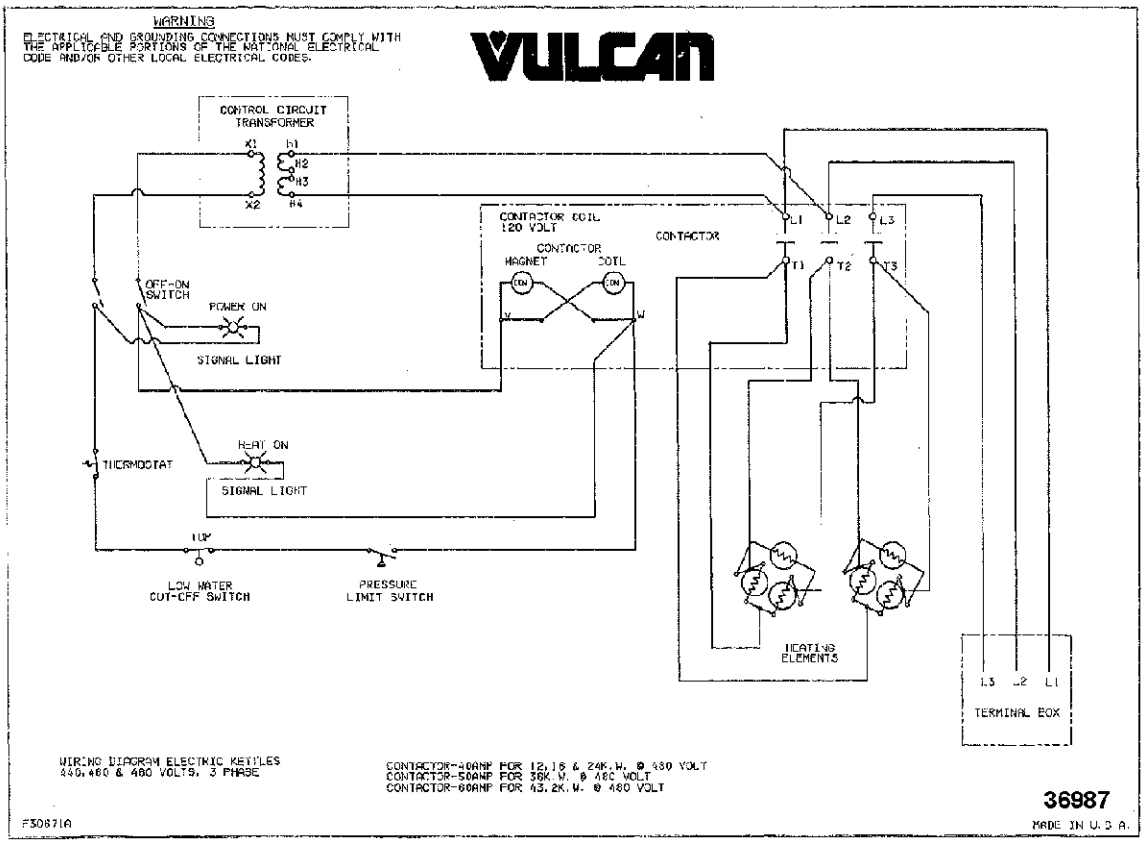

WARNING
ELECTRICAL AND GROUNDING CONNECTIONS MUST COMPLY WITH THE APPLICABLE PORTIONS OF THE NATIONAL ELECTRICAL CODE AND/OR OTHER LOCAL ELECTRICAL CODES.
VULCAN
CONTROL CIRCUIT TRANSFORMER
X1
H1
H2
H3
X2
H4
CONTACTOR COIL 120 VOLT
CONTACTOR
CONTACTOR MAGNET COIL
L1
L2
L3
T1
T2
T3
OFF-ON SWITCH
POWER ON
SIGNAL LIGHT
HEAT ON
THERMOSTAT
SIGNAL LIGHT
TOP
LOW WATER CUT-OFF SWITCH
PRESSURE LIMIT SWITCH
HEATING ELEMENTS
L3 L2 L1
TERMINAL BOX
WIRING DIAGRAM ELECTRIC KETTLES 440,480 & 480 VOLTS, 3 PHASE
CONTACTOR-40AMP FOR 12,18 & 24K.W. @ 480 VOLT
CONTACTOR-50AMP FOR 36K.W. @ 480 VOLT
CONTACTOR-60AMP FOR 43.2K.W. @ 480 VOLT
36987
F30671A
MADE IN U.S.A.

Fig. 38

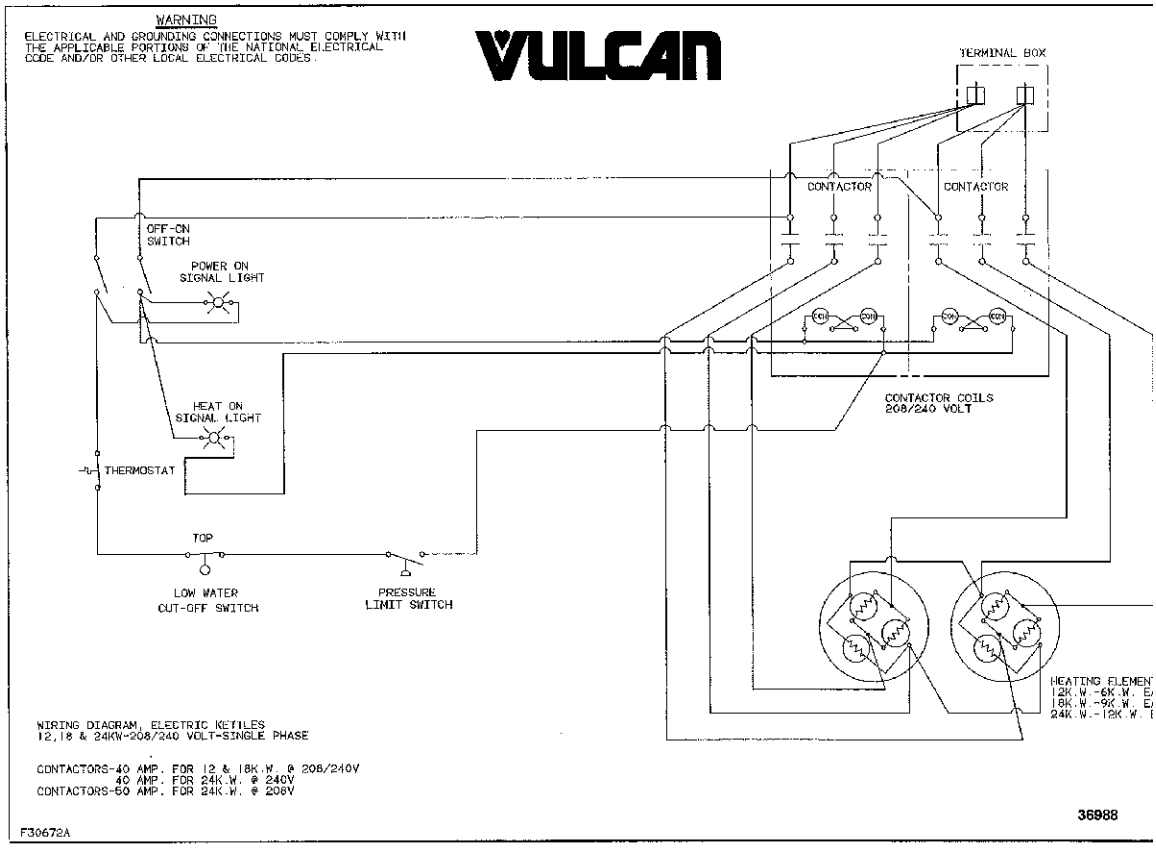

WARNING
ELECTRICAL AND GROUNDING CONNECTIONS MUST COMPLY WITH THE APPLICABLE PORTIONS OF THE NATIONAL ELECTRICAL CODE AND/OR OTHER LOCAL ELECTRICAL CODES.
VULCAN
TERMINAL BOX
CONTACTOR
CONTACTOR
OFF-ON SWITCH
POWER ON SIGNAL LIGHT
HEAT ON SIGNAL LIGHT
THERMOSTAT
CONTACTOR COILS 208/240 VOLT
TOP
LOW WATER CUT-OFF SWITCH
PRESSURE LIMIT SWITCH
HEATING ELEMENT
12K.W.-6K.W.
18K.W.-9K.W.
24K.W.-12K.W.
WIRING DIAGRAM, ELECTRIC KETTLES 12,18 & 24KW-208/240 VOLT-SINGLE PHASE
CONTACTORS-40 AMP. FOR 12 & 18K.W. @ 208/240V
40 AMP. FOR 24K.W. @ 240V
CONTACTORS-60 AMP. FOR 24K.W. @ 208V
36988
F30672A

Fig. 39

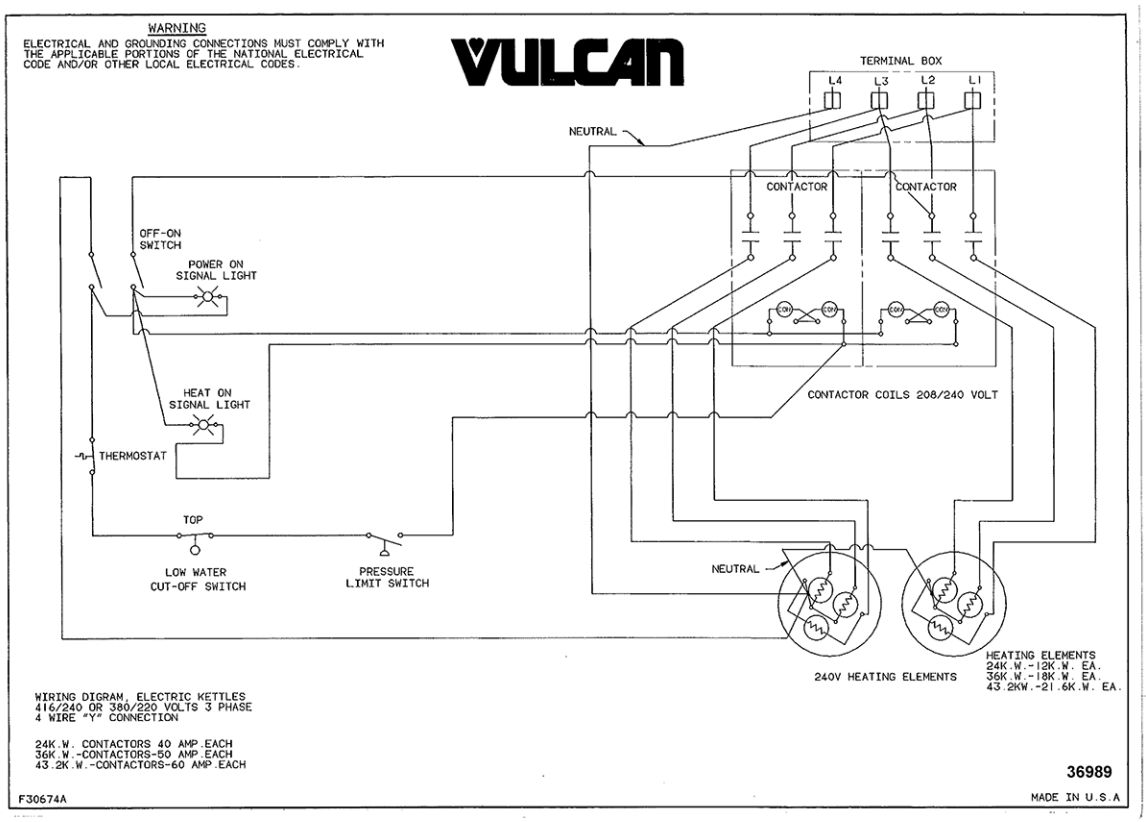

WARNING
ELECTRICAL AND GROUNDING CONNECTIONS MUST COMPLY WITH THE APPLICABLE PORTIONS OF THE NATIONAL ELECTRICAL CODE AND/OR OTHER LOCAL ELECTRICAL CODES.
VULCAN
TERMINAL BOX
L4 L3 L2 L1
NEUTRAL
CONTACTOR
CONTACTOR
OFF-ON SWITCH
POWER ON SIGNAL LIGHT
HEAT ON SIGNAL LIGHT
THERMOSTAT
CONTACTOR COILS 208/240 VOLT
TOP
LOW WATER CUT-OFF SWITCH
PRESSURE LIMIT SWITCH
NEUTRAL
240V HEATING ELEMENTS
HEATING ELEMENTS
24K.W.-12K.W. EA.
36K.W.-18K.W. EA.
43.2KW.-21.6K.W. EA.
WIRING DIGRAM, ELECTRIC KETTLES
416/240 OR 380/220 VOLTS 3 PHASE
4 WIRE "Y" CONNECTION
24K.W. CONTACTORS 40 AMP.EACH
36K.W.-CONTACTORS-50 AMP.EACH
43.2K.W.-CONTACTORS-60 AMP.EACH
36989
F30674A
MADE IN U.S.A

Fig. 40

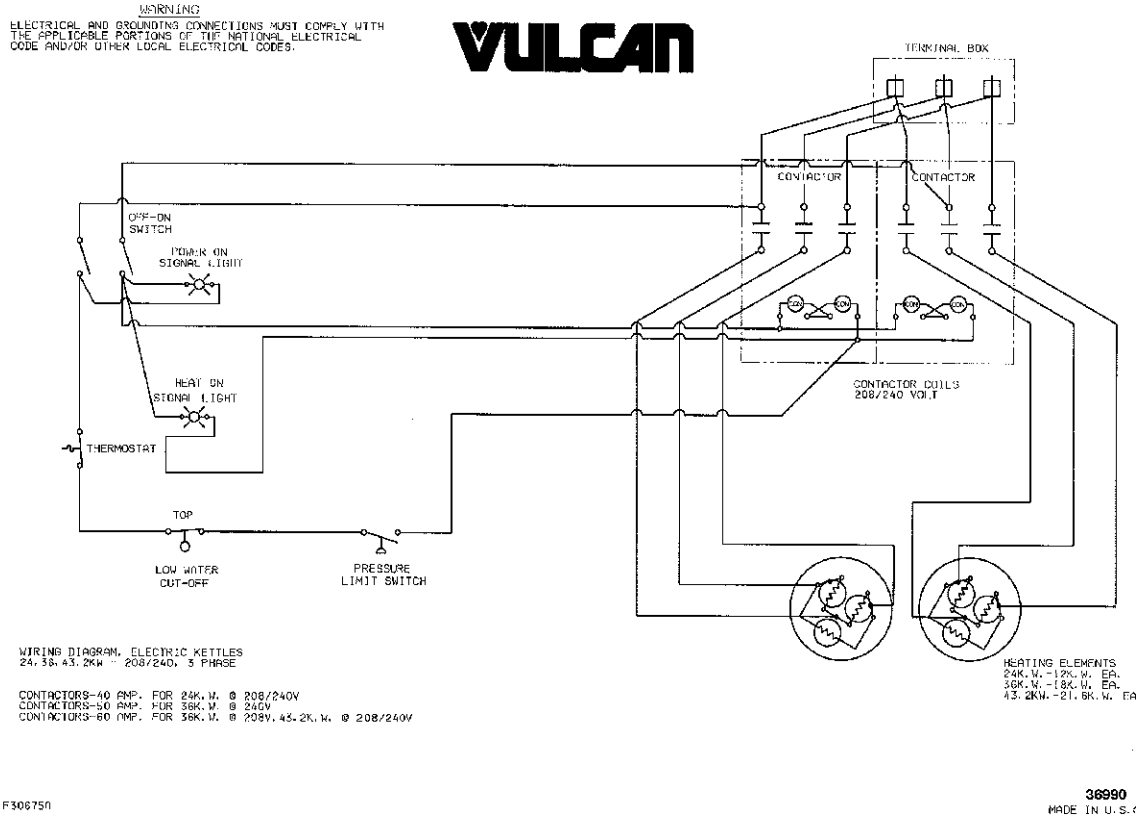

WARNING
ELECTRICAL AND GROUNDING CONNECTIONS MUST COMPLY WITH THE APPLICABLE PORTIONS OF THE NATIONAL ELECTRICAL CODE AND/OR OTHER LOCAL ELECTRICAL CODES.
VULCAN
TERMINAL BOX
CONTACTOR
CONTACTOR
OFF-ON SWITCH
POWER ON SIGNAL LIGHT
HEAT ON SIGNAL LIGHT
THERMOSTAT
CONTACTOR COILS 208/240 VOLT
TOP
LOW WATER CUT-OFF
PRESSURE LIMIT SWITCH
HEATING ELEMENTS
24K.W.-12K.W. EA.
36K.W.-18K.W. EA.
43.2KW.-21.6K.W. EA
WIRING DIAGRAM, ELECTRIC KETTLES
24, 36, 43.2KW - 208/240, 3 PHASE
CONTACTORS-40 AMP. FOR 24K.W. @ 208/240V
CONTACTORS-50 AMP. FOR 36K.W. @ 240V
CONTACTORS-60 AMP. FOR 36K.W. @ 208V, 43.2K.W. @ 208/240V
F30675A
36990
MADE IN U.S.A

Fig. 41

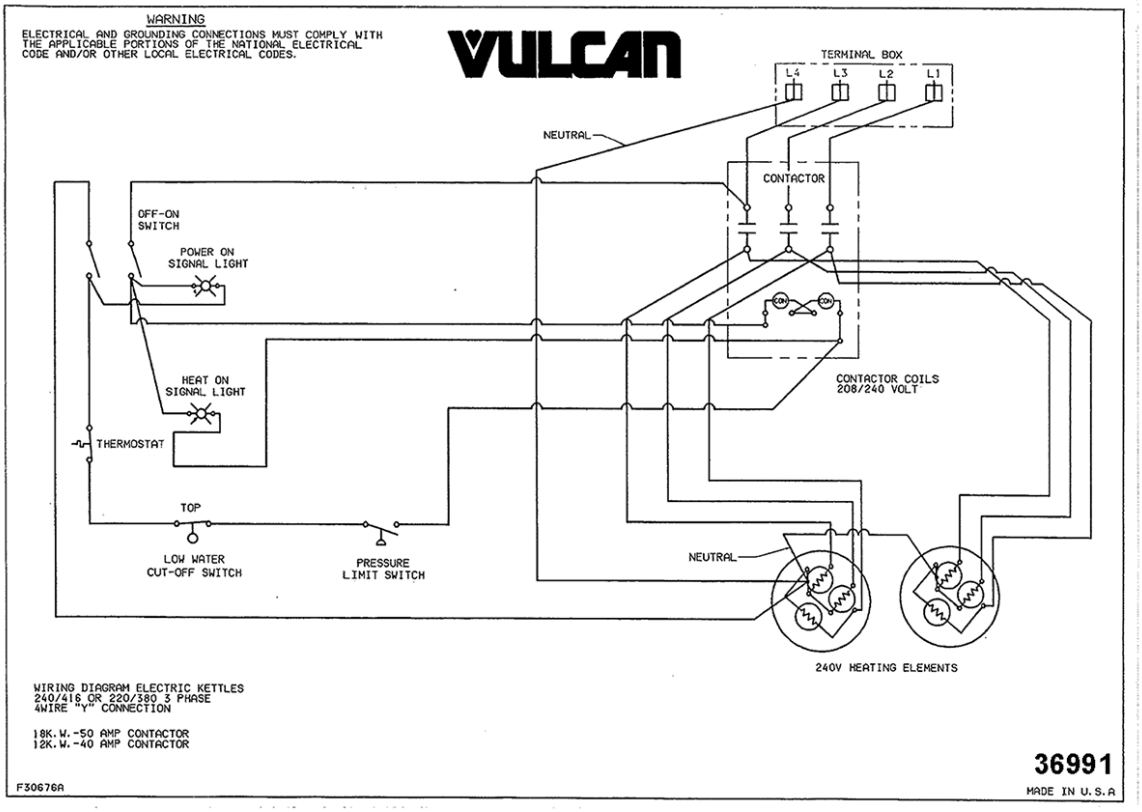

WARNING
ELECTRICAL AND GROUNDING CONNECTIONS MUST COMPLY WITH THE APPLICABLE PORTIONS OF THE NATIONAL ELECTRICAL CODE AND/OR OTHER LOCAL ELECTRICAL CODES.
VULCAN
TERMINAL BOX
L4
L3
L2
L1
NEUTRAL
CONTACTOR
OFF-ON SWITCH
POWER ON SIGNAL LIGHT
HEAT ON SIGNAL LIGHT
THERMOSTAT
TOP
LOW WATER CUT-OFF SWITCH
PRESSURE LIMIT SWITCH
CONTACTOR COILS 208/240 VOLT
NEUTRAL
240V HEATING ELEMENTS
WIRING DIAGRAM ELECTRIC KETTLES
240/416 OR 220/380 3 PHASE
4WIRE "Y" CONNECTION
18K.W.-50 AMP CONTACTOR
12K.W.-40 AMP CONTACTOR
36991
F30676A
MADE IN U.S.A

Fig. 42

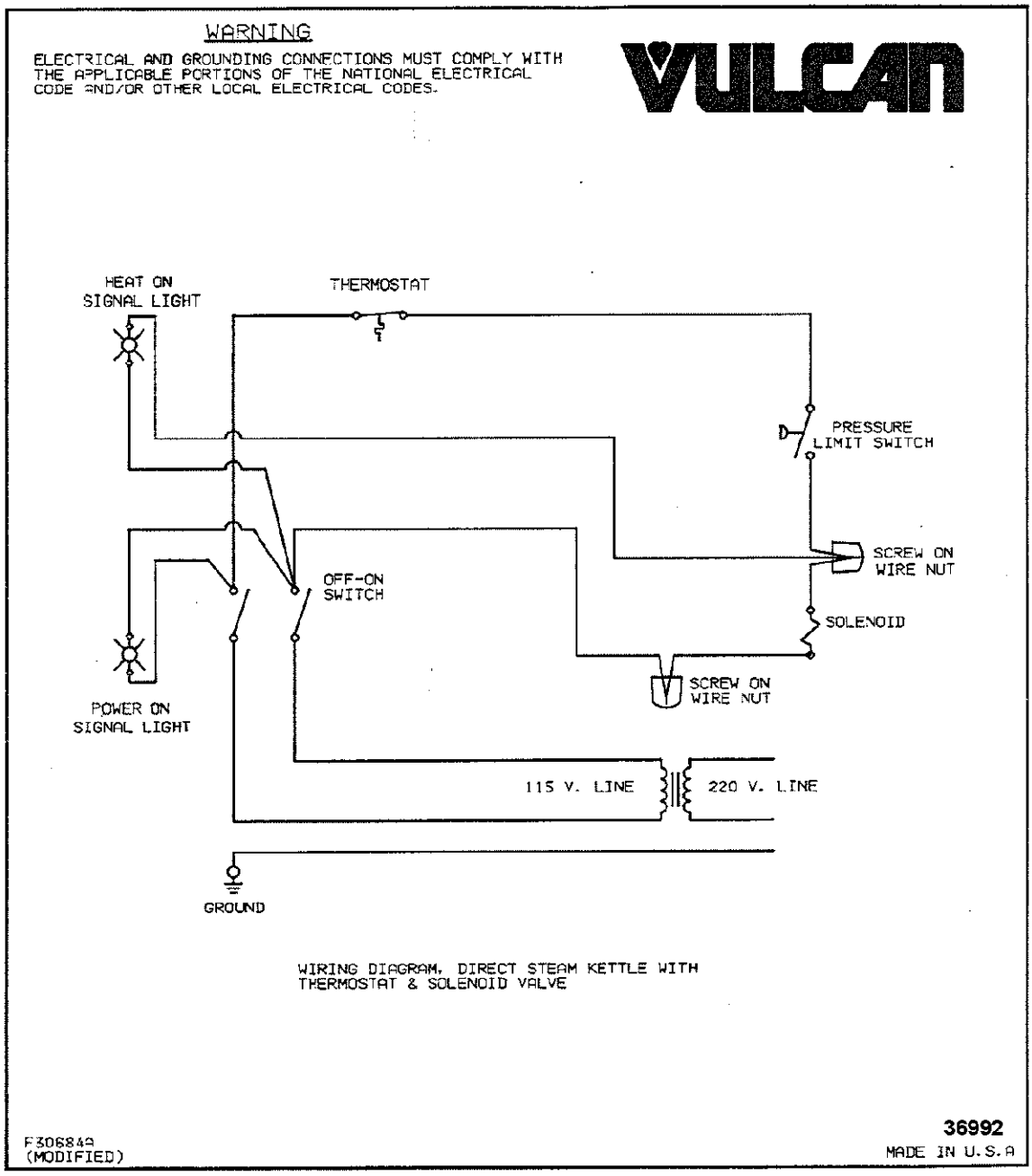

WARNING
ELECTRICAL AND GROUNDING CONNECTIONS MUST COMPLY WITH THE APPLICABLE PORTIONS OF THE NATIONAL ELECTRICAL CODE AND/OR OTHER LOCAL ELECTRICAL CODES.
VULCAN
HEAT ON SIGNAL LIGHT
THERMOSTAT
PRESSURE LIMIT SWITCH
SCREW ON WIRE NUT
OFF-ON SWITCH
SOLENOID
SCREW ON WIRE NUT
POWER ON SIGNAL LIGHT
115 V. LINE
220 V. LINE
GROUND
WIRING DIAGRAM, DIRECT STEAM KETTLE WITH THERMOSTAT & SOLENOID VALVE
F30684A (MODIFIED)
36992
MADE IN U.S.A

Fig. 43

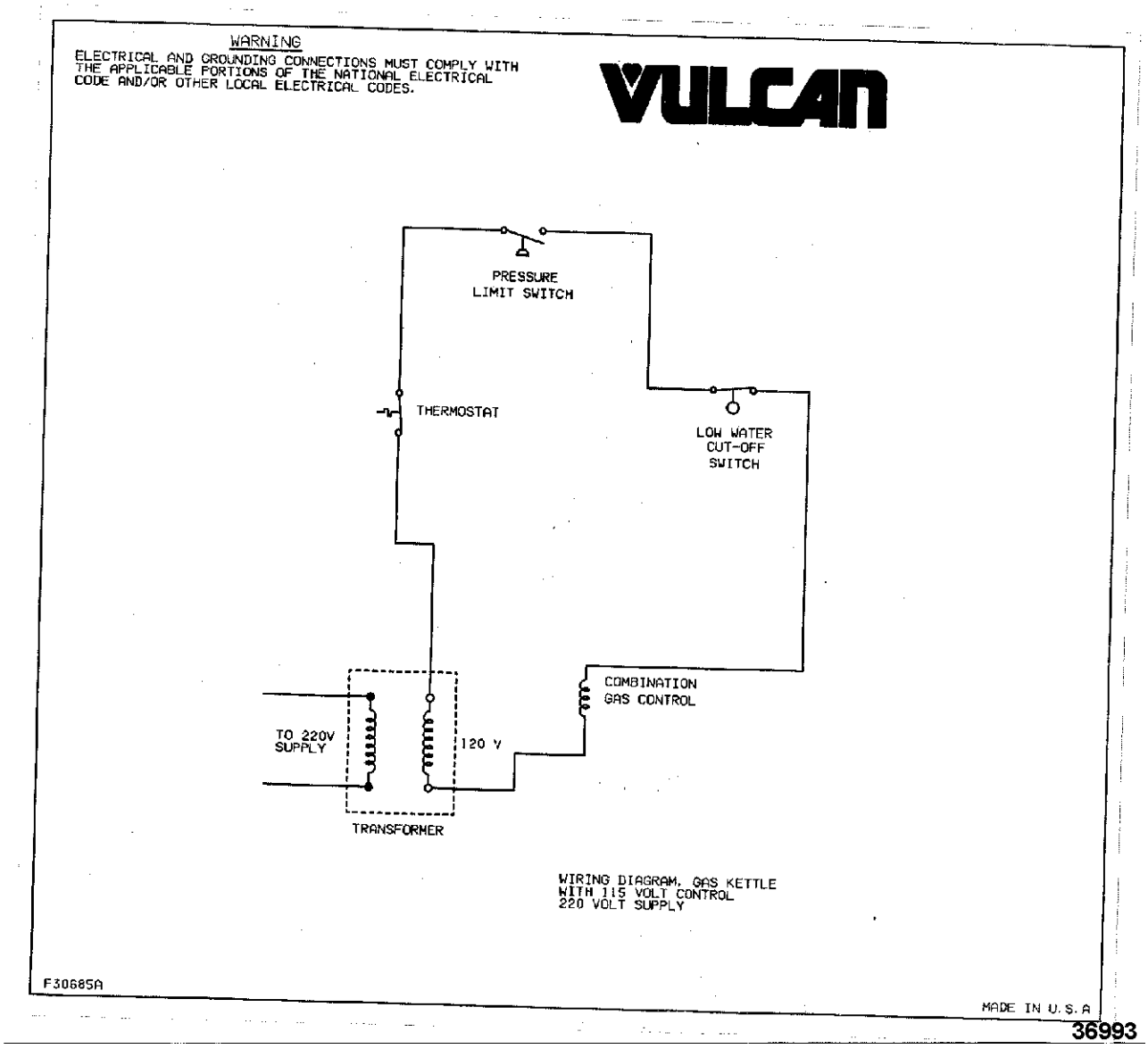

WARNING
ELECTRICAL AND GROUNDING CONNECTIONS MUST COMPLY WITH THE APPLICABLE PORTIONS OF THE NATIONAL ELECTRICAL CODE AND/OR OTHER LOCAL ELECTRICAL CODES.
VULCAN
PRESSURE LIMIT SWITCH
THERMOSTAT
LOW WATER CUT-OFF SWITCH
COMBINATION GAS CONTROL
TO 220V SUPPLY
120 V
TRANSFORMER
WIRING DIAGRAM, GAS KETTLE WITH 115 VOLT CONTROL 220 VOLT SUPPLY
F30685A
MADE IN U.S.A
36993

Fig. 44

9. TROUBLESHOOTING

STATIONARY & TILTING - GENERAL

K Series Gas Kettles (Stationary & Tilting)	
SYMPTOM	**POSSIBLE CAUSE**
Kettle does not heat, power light is lit, heat light is lit, ignition fail light is lit, low water light is not lit, blower motor is ON (high speed is default for blower if speed control malfunctions).	1. Gas supply is OFF. 2. Transformer (1T) output voltage is low. 3. Tilting models only - Gas shut-off valve (1SOL) not receiving power or malfunction. 4. Spark ignitor. A. Spark probe dirty or corroded (poor spark). B. Burner flame sense current too low - dirty or corroded probe or flame sense wire connection corroded. C. Wet insulation in burner area. 5. Ignition module malfunction (no sparking at ignitor). 6. Gas valve malfunction.
Kettle does not heat, power light is lit, low water light is lit, heat light is not lit, blower motor not ON.	1. Incorrect voltage to water level control (internal circuit protects board from voltages above 132VAC or below 108VAC). Check supply voltage to kettle. Verify polarity on incoming power supply to unit. 2. Fluid level in reservoir jacket below water level probe (LLCO). Check fluid level in sight glass. 3. Kettle jacket was refilled incorrectly with de-ionized or reverse osmosis (RO) water. Use distilled water only. **NOTE:** Add approximately 1/8 teaspoon of salt to jacket fluid. Lightly rinse fill port and close it. 4. Water level probe (LLCO) wiring connection malfunction; or probe coated (not sensing fluid) or probe malfunction. 5. Water level control malfunction.
Kettle does not heat, power light is lit, low water light is not lit, heat light is not lit, blower motor not ON.	1. Tilting models only - Tilt switch (2S) is open: Kettle not fully upright or switch not adjusted properly; or switch malfunction. 2. Pressure switch (1PAS) open or malfunction (fixed, not adjustable). 3. WLC malfunction (water level ok in sight glass). **NOTE:** LLCO LED is ON (probe sensing fluid). 4. Temperature sensor malfunction; potentiometer setting too low or malfunction; or temperature controller malfunction. 5. Interconnecting wiring malfunction.

K Series Gas Kettles (Stationary & Tilting)	
SYMPTOM	**POSSIBLE CAUSE**
Kettle does not heat, power light is not lit.	1. Kettle unplugged; main circuit breaker off; or incoming supply line fuse F1 open. 2. Supply voltage incorrect. 3. Ground fault receptacle (GFCI) is tripped. 4. Hood system with a power interrupt is not ON. 5. Power switch off or malfunction. 6. Interconnecting wiring malfunction.
Kettle heats up slow or will not boil product.	1. No vacuum in reservoir jacket when kettle is cold. 2. Pressure relief valve is not seated properly (leaking) or malfunction. 3. Fill port is not fully closed and leaking. 4. Jacket overfilled with fluid. 5. Gas supply line to kettle is undersized for the gas volume required. **NOTE:** Increase gas line size to 125% of kettle rated BTU input. 6. Low gas supply pressure. 7. Temperature sensor malfunction; or potentiometer malfunction; or temperature controller missing jumper on J1 or malfunction. **NOTE:** Controller LED is ON when output is closed. 8. Blower does not increase to high speed. A. Delay on make timer (1TMR) malfunction. B. Relay K1 malfunction (N.O. contacts remain open with coil energized - Provides high speed signal to blower speed control). C. Blower speed control - switches not set properly or control malfunction (no output voltage to blower: J6-1 (24VDC); J6-2 (COM); J6-4 (PWM - pulse width modulation speed signal, not measurable with VOM). D. Blower malfunction. 9. Gas valve not adjusted properly or malfunction.
Low water light is lit or Low water in sight glass.	1. Tilting models only - Kettle tilted (not level). 2. Fluid level in kettle jacket is low. 3. Pressure relief valve is not seated properly (leaking) or malfunction. 4. Fill port is not fully closed and leaking. 5. Kettle jacket was refilled incorrectly with de-ionized or reverse osmosis (RO) water. Use distilled water only. **NOTE:** Add approximately 1/8 teaspoon of salt to jacket water. Lightly rinse fill port and close it.

K Series Gas Kettles (Stationary & Tilting)	
SYMPTOM	**POSSIBLE CAUSE**
Kettle not heating (burner not lighting during trial for ignition or staying lit), heat light is lit, ignition fail light is ON, power light is lit, blower is ON (high speed is default for blower if speed control malfunctions). **NOTE:** If heat light is not lit but the blower is running, the light or wiring to the light may be malfunctioning.	1. Gas supply not on. 2. Tilting models only - Gas shut-off valve (1SOL) not receiving power or malfunction. 3. Ignition module not receiving power. 4. Unit not properly grounded and/or polarity of incoming power is incorrect on automatic ignition systems. 5. Low gas supply pressure. Factory set on pressure switch is open at 15 psi and close at 6 psi. 6. Spark ignitor. A. Spark probe dirty or corroded (poor spark). B. Burner flame sense current too low - dirty or corroded probe; or flame sense wire connection corroded. 7. Ignition module malfunction (no sparking at ignitor). 8. Blower speed control - switches not set properly or control malfunction (no output voltage to blower: J6-1 (24VDC), J6-2 (COM), J6-4 (PWM - pulse width modulation speed signal, not measurable with VOM). 9. Blower intake clogged or blower malfunction. 10. Gas valve not adjusted properly or malfunction. 11. Burner insulation wet.
Thermostatic air vent leaking or shooting out air and will not stop.	**⚠ WARNING** **Steam being released from relieving pressure will be hot. Stay clear when pulling open the relief valve.** 1. Pull relief valve handle and release some pressure. **NOTE:** If relief spring doesn't snap back into place, the spring is weak. 2. Check temperature control. Verify temperature isn't getting to hot while building up pressure. 3. Verify tap water isn't being used, clogging up air vent.
Blue / purple metallic debris escaping from the vent.	1. Caused by magnesium in the water (tap water has been introduced into the kettle) low PH, chlorine or chloramine (attacking the heating element on an electric kettle). Purge and refill with distilled water / Dowfrost.

POWER TILTING OPTION ONLY

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SYMPTOM	**POSSIBLE CAUSES**
Kettle will not raise.	1. Tilt switch (2S) open or malfunction. 2. Transformer 2T inoperative. 3. Power switch off or malfunction. 4. Tilt control switch malfunction (momentary on - raise). 5. Raise-enable relay (K3) malfunction. 6. K1 up relay malfunction. 7. DC motor controller - Fuses open or controller malfunction. 8. DC tilt motor inoperative. 9. Gear reducer malfunction.
Kettle will not tilt.	1. Transformer 2T inoperative. 2. Power switch off or malfunction. 3. Tilt motor switch malfunction (momentary on - tilt). 4. Down limit switch open or malfunction. 5. K2 down relay malfunction. 6. DC tilt motor controller - Fuses open or controller malfunction. 7. DC tilt motor inoperative. 8. Gear reducer malfunction.