



**K SERIES GAS KETTLES  
2/3 JACKETED  
CUSTOMER  
MAINTENANCE  
MANUAL**

**SPECIFICATION SHEETS  
INSTALLATION / OPERATION MANUAL  
ADDITIONAL RESOURCES  
SERVICE MANUAL  
HOBART SERVICE PARTS STORE  
CATALOG OF REPLACEMENT PARTS**

## S T E A M

**VULCAN****KGLT SERIES  
GAS FLOOR MOUNTED  
TILTING 2/3 JACKETED KETTLE**

Model K60GLT



ANSI/NSF Standard #4

**SPECIFICATIONS**

Gas self-contained, stainless steel fully insulated, 2/3 jacketed floor mounted tilting steam kettle. Ellipsoidal bottom kettle liner formed and fully welded type 316 and type 304 stainless steel exterior with (1/4 x 5/8 inch 20 gallons) (3/8 x 1 inch 40 gallons and greater) heavy bar rim, embossed gallon/liter markings. 50 psi (3.4 kg/cm<sup>2</sup>) steam jacket rating. Stainless steel splash proof enclosure for controls, self-locking tilt mechanism and faucet bracket. Controls include a power switch, power "on" light, solid state temperature control with graduated warm, simmer and boil setting, vacuum/pressure gauge, pressure relief valve, low water light and low water shut-off. Gas control with combination gas valve with internal regulator, flame failure and gas type is field convertible. High efficiency Power Burner Heating System (64% to 68% efficiency). Kettle tilts forward 95° to completely empty. Tubular stainless steel legs with removable section and flanged feet. Steam jacket permanently filled with treated, distilled water. 110-120V, 50-60 Hz, 5A, with 6 foot cord and three-prong grounding plug.

UL Certified to ANSI Z83.11/CSA 1.8. Certified to NSF Standard #4. Meets ASME.

**SPAN GAS TECHNOLOGY ENABLES FIELD ADJUSTABLE TO PROPANE GAS AND ALTITUDE.**

- K20GLT** 100,000 BTU/hr., 20 gallon true working capacity
- K40GLT** 100,000 BTU/hr., 40 gallon true working capacity
- K60GLT** 100,000 BTU/hr., 60 gallon true working capacity

**STANDARD FEATURES**

- Gas self-contained, stainless steel, 2/3 jacketed floor mounted tilting steam kettle.
- Ellipsoidal bottom kettle liner formed and fully welded standard type 316 and type 304 stainless steel exterior.
- Heavy bar rim (1/4 x 5/8 inch 20 gallons) (3/8 x 1 inch 40 gallons and greater).
- Embossed gallon/liter markings.
- 50 psi (3.4 kg/cm<sup>2</sup>) steam jacket rating.
- Stainless steel enclosure for "water resistant" controls, self-locking tilt mechanism and faucet bracket.
- Controls include a power switch, power "on" light, solid state temperature control, vacuum/pressure gauge, pressure relief valve, low water light and lower water shut-off.
- Elevation from sea level to 8,999 feet standard.
- Kettle tilts forward 95° to completely empty.
- Tubular stainless steel legs with flanged feet.
- One year limited parts and labor warranty.

**OPTIONS**

- Two inch bolt on compression tangent draw-off valve with perforated strainer.
- Two inch bolt on plug tangent draw-off valve with perforated strainer.
- Three inch bolt on compression tangent draw-off valve with perforated strainer increases height of kettle.
- Security facility package:
  - a. Security type fasteners with tack welds.
  - b. Controls protected with lockable cover.
- Stainless steel protector for the draw-off valve with chain.
- Second year extended limited parts and labor warranty.

**ACCESSORIES (Packaged & Sold Separately)**

- Spring assist hinged stainless steel cover with condensate ring and drop down lift handle.
- Pouring lip strainer.
- Clean-up kit, includes draw-off brush, clean-up brush and paddle scrapper with 40" handle.
- Stainless steel 48" whip.
- Non-perforated strainer to prevent food from entering the draw-off tube during cooking.
- (12") (18" double jointed) single pantry lead-free faucet.
- (12") (18" double jointed) double pantry lead-free faucet.
- Double pantry washdown hose with 16" add-on lead-free faucet with vacuum breaker.
- Double pantry washdown hose with lead-free vacuum breaker.
- Double pantry pot filler with lead-free vacuum breaker.

**VULCAN**

a division of ITW Food Equipment Group LLC

P.O. Box 696 ■ Louisville, KY 40201 ■ Toll-free: 1-800-814-2028 ■ Local: 502-778-2791 ■ Quote &amp; Order Fax: 1-800-444-0602



# KGLT SERIES GAS FLOOR MOUNTED TILTING 2/3 JACKETED KETTLE

### SERVICE CONNECTIONS

- Electrical Connection:** 110-120V, 50-60 Hz, 5A, with 6 foot cord and three-prong grounding plug.
- Gas Connection:** 3/4" NPT supply line required.

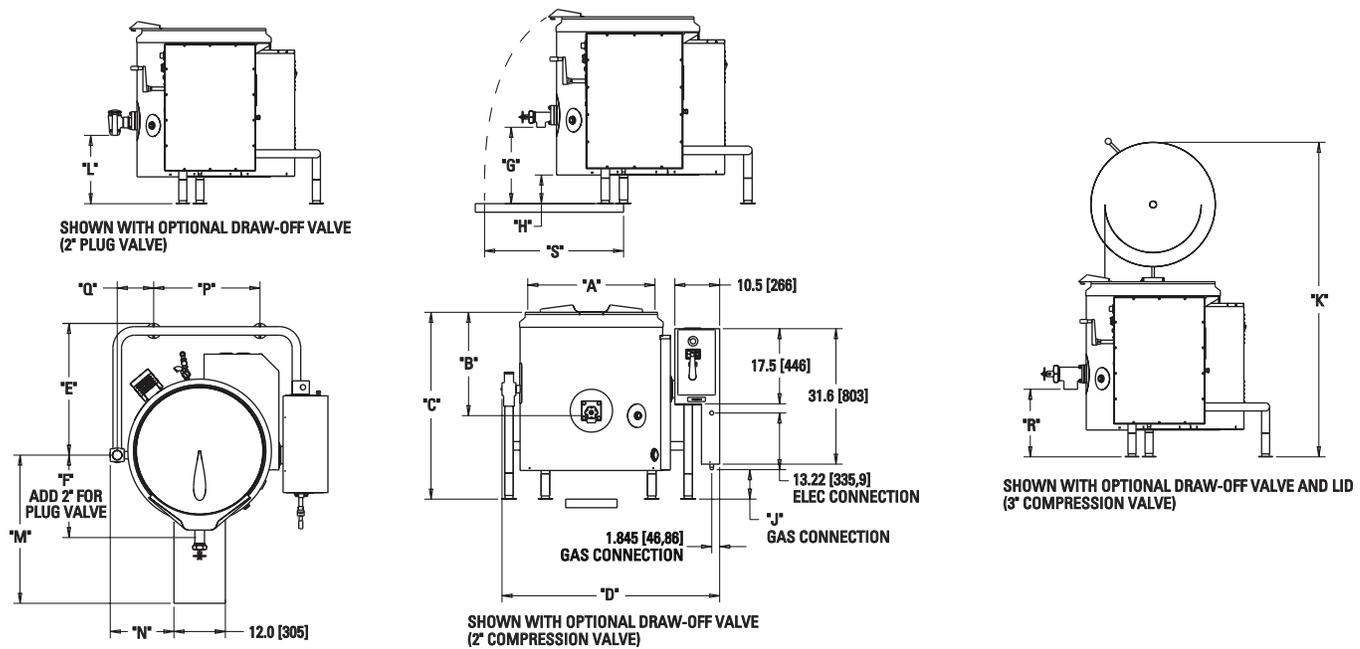
### TRUE WORKING CAPACITIES (in 4 oz. servings)

80 quarts/20 gallons/76 liters/640 servings  
 120 quarts/40 gallons/152 liters/1,280 servings  
 160 quarts/60 gallons/228 liters/1,920 servings

### NOTE:

- Dimensions which locate the above connections have a tolerance of + or -3" (+ or -75mm). Normal dimensions are in inches. Dimensions in ( ) are in millimeters.
- Installation of backflow preventers, vacuum breakers and other specific code requirements is the responsibility of the owner and installer. It is the responsibility of the owner and installer to comply with local codes.
- Do not use plastic drains.
- Do not connect this unit to a ground-fault circuit-interrupter (GFCI) 125-volt, single-phase, 15- and 20-ampere receptacle. Electronic burner ignition systems are prone to nuisance tripping and possible ignition failure.
- This appliance is manufactured for commercial installation only and is not intended for home use.

EMBOSSED GALLON/LITER MARKINGS		
20-GALLON	40-GALLON	60-GALLON
20 - 76	40 - 151	60 - 227
18 - 68	35 - 132	55 - 209
16 - 61	30 - 114	50 - 189
14 - 53	25 - 95	45 - 171
12 - 46	20 - 76	40 - 151
10 - 38	15 - 57	35 - 132
		25 - 95
		20 - 76



MODEL	TRUE WORKING CAPACITY	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S
K20GLT	20 gallons	21.8	15.3	38.3	42.7	26.8	16.0	21.4	8.1	6.9	67.1	20.7	28.0	10.8	16.7	8.5	20.4	25.0
	76 liters	554	389	973	1085	681	406	544	206	175	1704	526	711	274	424	216	518	635
K40GLT	40 gallons	25.8	21.2	39.9	46.8	28.8	18.1	17.1	6.6	6.9	71.0	16.3	31.3	12.8	20.8	8.5	16.1	29.4
	152 liters	655	538	1013	1189	732	460	434	168	175	1803	414	795	325	528	216	408	747
K60GLT	60 gallons	29.7	24.1	43.6	50.8	30.8	19.3	17.8	6.7	6.9	78.3	17.0	34.6	14.9	24.8	8.5	16.8	32.7
	227 liters	754	612	1107	1290	782	490	452	170	175	1989	432	879	378	630	216	427	831



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NOTE: In line with its policy to continually improve its products, Vulcan reserves the right to change materials and specifications without notice.



# INSTALLATION & OPERATION MANUAL

## GAS 2/3 JACKETED STATIONARY AND TILTING KETTLES

### MODELS

<i>K20GL</i>	<i>ML-136090</i>
<i>K40GL</i>	<i>ML-136091</i>
<i>K60GL</i>	<i>ML-136092</i>
<i>K20GLT</i>	<i>ML-136094</i>
<i>K40GLT</i>	<i>ML-136095</i>
<i>K60GLT</i>	<i>ML-136096</i>



*K40GL*

For additional information on Vulcan-Hart or to locate an authorized parts and service provider in your area, visit our website at [www.vulcanequipment.com](http://www.vulcanequipment.com)

## IMPORTANT FOR YOUR SAFETY

THIS MANUAL HAS BEEN PREPARED FOR PERSONNEL QUALIFIED TO INSTALL GAS EQUIPMENT, WHO SHOULD PERFORM THE INITIAL FIELD START-UP AND ADJUSTMENTS OF THE EQUIPMENT COVERED BY THIS MANUAL.

POST IN A PROMINENT LOCATION THE INSTRUCTIONS TO BE FOLLOWED IN THE EVENT THE SMELL OF GAS IS DETECTED. THIS INFORMATION CAN BE OBTAINED FROM THE LOCAL GAS SUPPLIER.

### IMPORTANT

IN THE EVENT A GAS ODOR IS DETECTED, SHUT DOWN UNITS AT MAIN SHUTOFF VALVE AND CONTACT THE LOCAL GAS COMPANY OR GAS SUPPLIER FOR SERVICE.

### FOR YOUR SAFETY

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS OR LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

**⚠ WARNING** IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE PROPERTY DAMAGE, INJURY OR DEATH. READ THE INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS THOROUGHLY BEFORE INSTALLING OR SERVICING THIS EQUIPMENT.

IN THE EVENT OF A POWER FAILURE, DO NOT ATTEMPT TO OPERATE THIS DEVICE.

RETAIN THIS INSTRUCTION MANUAL FOR FUTURE REFERENCE

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# INSTALLATION, OPERATION AND MAINTENANCE OF KGL AND KGLT SERIES GAS KETTLES

SAVE THESE INSTRUCTIONS FOR FUTURE USE

## GENERAL

Vulcan gas 2/3 jacketed kettles are produced with quality workmanship and material. Proper installation, usage and maintenance will result in many years of satisfactory performance. It is suggested that you thoroughly read this entire manual and carefully follow all of the instructions provided.



Model K40GL



Model K40GLT

MODEL CHART			
Model	Gallons	Quarts	Liters
K20GL & K20GLT	20	80	76
K40GL & K40GLT	40	160	152
K60GL & K60GLT	60	240	228

# INSTALLATION

## UNPACKING

This kettle was inspected before leaving the factory. The transportation company assumes full responsibility for safe delivery upon acceptance of the shipment.

Immediately after unpacking, check for possible shipping damage. If kettle damage is found, save the packaging material and contact the carrier within 15 days of delivery. Freight damage is not covered under Vulcan Warranty.

## INSTALLATION CODES AND STANDARDS

In the United States, Vulcan kettles must be installed in accordance with:

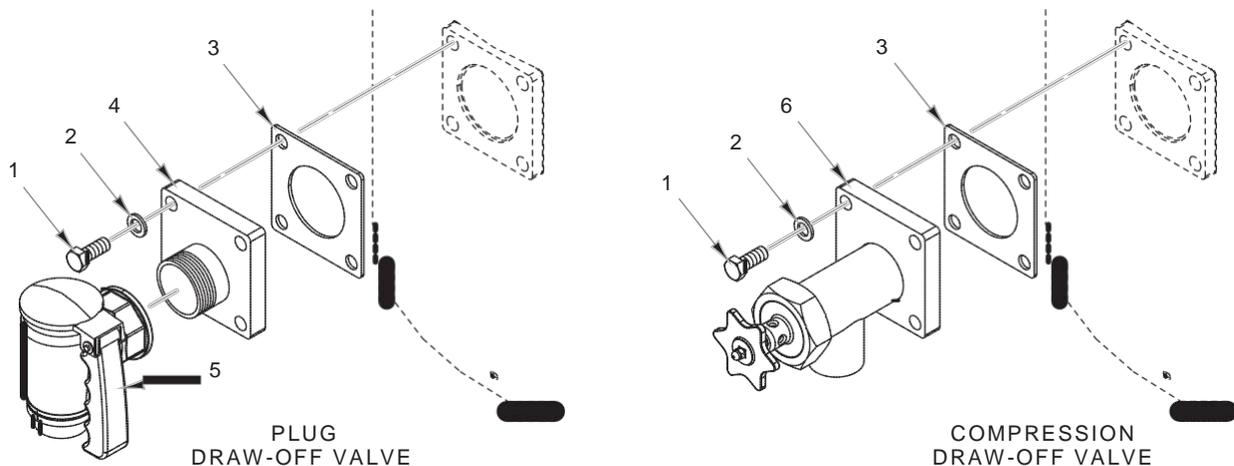
1. State and local codes.
2. National Fuel Gas Code, ANSI-Z223.1 (latest edition). Copies may be obtained from the American Gas Association, Inc.; 1515 Wilson Blvd.; Arlington, VA 22209.
3. National Electrical Code, ANSI/NFPA-70 (latest edition).
4. NFPA Standard NFPA-96, *Vapor Removal from Cooking Equipment*, latest edition, available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

In Canada, Vulcan kettles must be installed in accordance with:

1. Local codes.
2. CAN/CGA-B149.1 National Fuel Gas Code (latest edition), available from the Canadian Gas Association; 178 Rexdale Blvd.; Etobicoke, Ontario; Canada M9W 1R3.
3. CSAC22.2 No. 3 Canadian Electrical Code (latest edition), available from the Canadian Standards Association, 178 Rexdale Boulevard, Etobicoke, Ontario, Canada M9W1R3

## DRAW-OFF VALVES

Install the draw-off valve, if equipped. Install items 1 thru 5 for the plug style valve or items 1 thru 3 and item 6 for the compression style valve.



## GAS KETTLES

### GAS CONNECTIONS

**NOTICE** Gas supply connections and any pipe joint compound must be resistant to the action of propane gases.

Codes require that a gas shutoff valve be installed in the gas line ahead of the kettle.

Connect the gas supply line to the gas valve on the kettle. Make sure the pipes are clean and free of obstructions, dirt and piping compound.

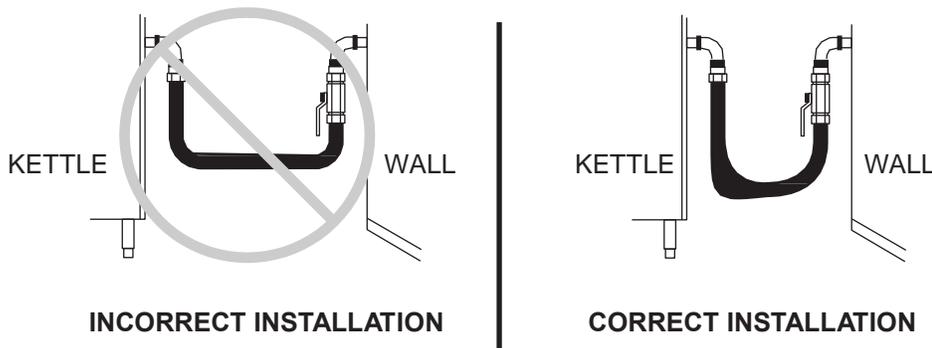
The gas line must be capable of delivering gas to the kettle without excessive pressure drop at the rate specified on the nameplate. Suggested gas supply line pressure is 7" Water Column (1.75 kPa) for natural gas and 11" Water Column (2.75 kPa) for propane. Burner manifold pressure is (-)1.4" Water Column (0.350kPa) for natural gas and (-)1.4" Water Column (0.350 kPa) for propane.

The proper sizing and installation of the gas connection is important for the machine to operate within its design specifications. In some installations, the gas supply may not be sufficient enough to allow all the gas equipment to operate properly at peak loads; or when other equipment with a high BTU/hr. input requirement is operating. The connection to the machine becomes even more important in this type of location. Flexible gas connectors with quick disconnect or swivel fittings (when used) and gas connectors beyond the length necessary will reduce the BTU/hr. flow capacity to the machine.

**NOTE:** Do not use corrugated stainless steel tubing for commercial gas equipment supply connections.

**NOTE:** A straight gas connection is the ideal condition for the rated BTU/hr. flow capacity of the connector. If a straight connection is not possible and a flexible gas connector is used, do not twist, kink or excessively flex the connector beyond a U shape. Flexing the gas connector as described will restrict gas flow or may damage the connector.

Changing a flexible gas connector may raise the BTU/hr. flow capacity enough to allow the machine to operate within its design specifications. (i.e. Removing the quick disconnect fitting, installing a shorter gas connector or installing a larger diameter gas connector.) An alternative may be to move the equipment to a different gas supply location in the kitchen. (i.e. Closer to the main supply into the kitchen or away from other equipment with high BTU/hr. input requirements.)



**⚠ WARNING** Prior to lighting, check all joints in the gas supply line for leaks. Use soap and water solution. Do not use an open flame.

After piping has been checked for leaks, all piping receiving gas should be fully purged to remove air.

## Gas Connection Data

FLEXIBLE GAS CONNECTORS BTU/hr. FLOW CAPACITY <sup>1, 2</sup>								
	LENGTH <sup>3</sup>				LENGTH <sup>3</sup>			
	End Fittings - (1) Quick Disconnect & (1) Threaded				End Fittings - Both Threaded			
ID	36"	48"	60"	72"	36"	48"	60"	72"
1/2"	77,000	68,000	60,000	55,000	120,000	106,000	93,000	86,000
3/4"	218,000	180,000	158,000	139,000	256,000	225,000	198,000	175,000
1"	379,000	334,000	294,000	279,000	512,000	451,000	397,000	350,000
1 1/4"	615,000	541,000	476,000	419,000	946,000	833,000	733,000	645,000

1. Flow rating BTU/hr. 0.64 SP. GR @ 0.5 inch W.C. pressure drop.
2. BTU/hr. flow capacities are based on Dormont Mfg. Co. Supr-Safe gas line connectors and are provided for reference. Additional quick disconnect fittings, swivels, or manual shut off valves will reduce the BTU/hr. flow capacities listed in this table. If other flexible gas connectors are used, check the manufacturer's specifications for BTU/hr. flow capacities. Supr-Safe is a registered trademark of the Dormont Manufacturing Company.
3. The maximum length for a flexible gas connector is 72" per National Fuel Code standards.

BLACK IRON PIPE BTU/hr. FLOW CAPACITY <sup>1, 2, 3</sup>						
Natural Gas	Nominal Inside Diameter of Pipe					
Pipe Length	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
15'	76,000	172,000	345,000	750,000	1,220,000	2,480,000
30'	52,000	120,000	241,000	535,000	850,000	1,780,000
45'	43,000	99,000	199,000	435,000	700,000	1,475,000
60'	38,000	86,000	173,000	380,000	610,000	1,290,000
75'		77,000	155,000	345,000	545,000	1,120,000
90'		70,000	141,000	310,000	490,000	1,000,000

1. Flow rating BTU/hr. 0.64 SP. GR @ 0.3 inch W.C. pressure drop.
2. BTU/hr. flow capacities are based on Schedule 40 pipe, include a tolerance for pressure losses in gas piping systems are provided for reference.
3. Count each 90° elbow as 3' of gas pipe for the purpose of calculating total pipe length.

**TESTING THE GAS SUPPLY SYSTEM**

When gas supply pressure exceeds 1/2 psig (3.45 kPa), the kettle and its individual shutoff valve must be disconnected from the gas supply piping system.

When gas supply pressure is 1/2 psig (3.45 kPa) or less, the kettle should be isolated from the gas supply system by closing its individual manual shutoff valve.

## GAS KETTLES

### GAS AND ALTITUDE CONVERSION

The kettle can be field converted to propane gas or for operation at altitudes above 2000ft elevation. A manometer that reads in 1/100" WC and portable combustion analyzer are required.

#### Natural gas to Propane gas conversion:

1. Remove the right side controls compartment side panel.
2. Locate the gas combination valve located in the bottom of the controls compartment.
3. Turn S1 screw located right of manifold pressure port (Fig. 1) clockwise to completely close position. Then turn counter clockwise 10 turns.
4. Pressure at inlet port should be between 11" and 13" WC.
5. Turn the unit on.
6. Fill the unit half way with cold water.
7. Run the unit for ½ hour to burn off any residue in combustion chamber.
8. Using the combustion analyzer check the flue gases. If the analyzer reads Co Free Air the combustion gases should not exceed 0.04 % or 400 PPM. If the analyzer does not read Co Free verify the Co reading is below 100 PPM. If the reading is above, verify your settings and retest. If readings are still high, call tech support at the number located on the front of this manual.
9. Attach the conversion data plate located in the bottom of the controls compartment with rivets provided. The plate is to be mounted next to the kettle's factory data plate.
10. Replace the controls compartment panel.

#### Propane gas to Natural gas conversion:

1. Remove the right side controls compartment side panel.
2. Locate the gas combination valve located in the bottom of the controls compartment.
3. Turn S1 screw located right of manifold pressure port (Fig. 1) clockwise to completely close position. Then turn counter clockwise 16 turns.
4. Pressure at inlet port should be between 5" and 10.5" WC.
5. Turn the unit on.
6. Fill the unit half way with cold water.
7. Run the unit for ½ hour to burn off any residue in combustion chamber.
8. Using the combustion analyzer check the flue gases. If the analyzer reads Co Free Air the combustion gases should not exceed 0.04 % or 400 PPM. If the analyzer does not read Co Free verify the Co reading is below 100 PPM. If the reading is above verify your settings and retest. If readings are still high call tech support at the number located on the front of this manual.
9. Attach the conversion data plate located in the bottom of the controls compartment with rivets provided. The plate is to be mounted next to the kettle's factory data plate.
10. Replace the controls compartment panel.

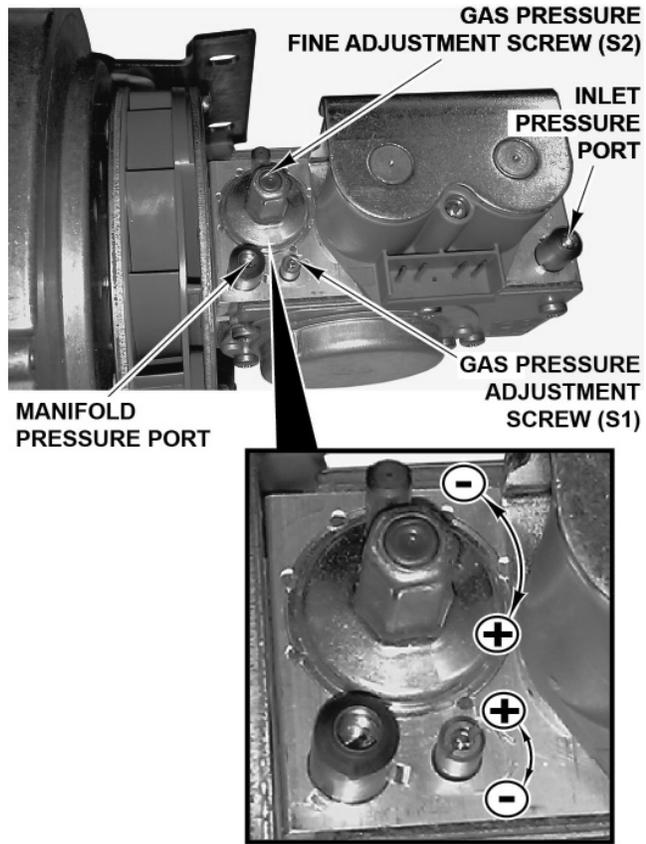


Fig. 1

**Altitude:**

1. Remove the right side controls compartment side panel.
2. Locate the gas combination valve located in the bottom of the controls compartment.
3. Turn S2 screw (Fig. 1) (using 5/64" Allen wrench), ½ turn clock wise
4. Turn the unit on.
5. Try five (5) times igniting the burner, if burner fails to ignite repeat step 3.
6. Inlet pressure setting:
  - a. Natural Gas: 5-7" WC
  - b. Propane: 11-13" WC
7. Fill the unit half way with cold water.
8. Run the unit for ½ hour to burn off any residue in combustion chamber.
9. Using the combustion analyzer check the flue gases. If the analyzer reads Co Free Air the combustion gases should not exceed 0.04 % or 400 PPM. If the analyzer does not read Co Free verify the Co reading is below 100 PPM. If the reading is above verify your settings and retest. If reading is still high call tech support at the number located on the front of this manual.
10. Replace the controls compartment panel.

**FLUE**

DO NOT obstruct the flow of flue gases from the flue located on the rear of the kettle. It is required that the flue gases be ventilated to the outside of the building through a ventilation system installed by qualified personnel. The flue on the kettle should not be directly connected to any ventilation system. From the termination of the flue to the filters of the hood venting system, a minimum clearance of 18" (116 cm) must be maintained.

Information on the construction and installation of ventilating hoods may be obtained from Vapor Removal from Cooking Equipment, NFPA-96 (latest edition), available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

**FAUCET BRACKET**

A bracket is provided for mounting a faucet on the kettle; this would allow the addition of water to the kettle for the convenience of the food preparer. A faucet is available as an accessory.

**NOTE:** Do not use tap water from faucet to fill kettle jacket. Refer to Jacket Water & Jacket Water Treatment.

**ELECTRICAL CONNECTION**

**⚠ WARNING** Electrical and grounding connections must comply with the applicable portions of the national electrical code and/or other local electrical codes.

**Electrical Grounding Instruction**

This appliance is equipped with a three-prong (grounding) plug for your protection against shock hazard and should be plugged directly into a properly grounded three-prong receptacle. Do not cut or remove the grounding prong from this plug.

**⚠ WARNING** Disconnect the electrical power to the machine and follow lockout / tagout procedure, before cleaning or servicing..

All kettles are supplied with a 120 Volt power cord.

**GAS KETTLES**

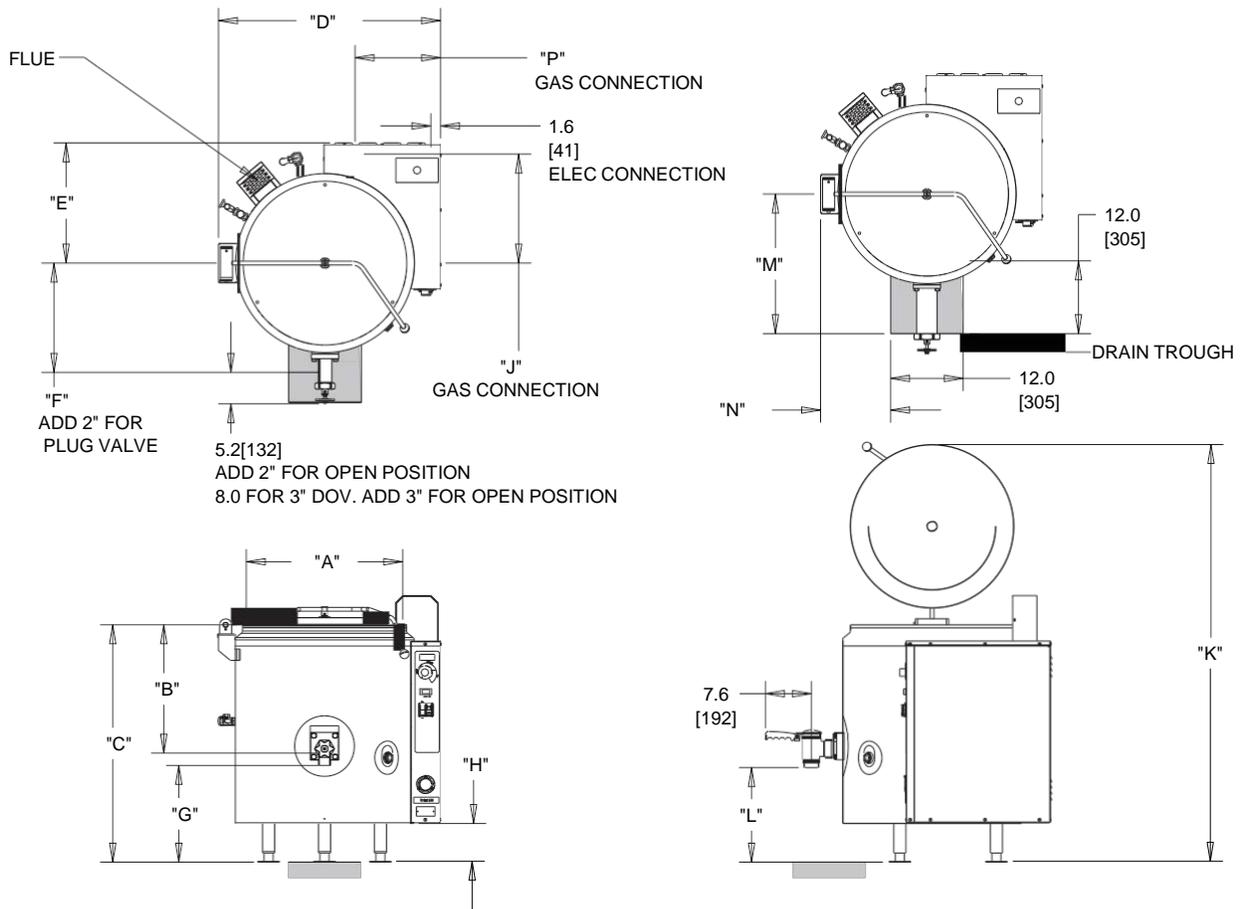
**LOCATION**

Position the kettle in its final location. Check that there are sufficient clearances for operating and servicing the kettle, and for proper clearance of the cover when raised. Keep the kettle free and clear from all combustible substances. Minimum clearance from combustible and non-combustible construction is 2" (5.0 cm) at the rear and 6" (15.2 cm) at each side.

The kettle draw off valve should be located near a floor drain.

Do not obstruct the flow of air into and around the kettle. This air flow is necessary for proper combustion of gases and for ventilation of the kettle. Provisions for ventilation and incoming air supply for the equipment in the room must be in accordance with the National Fuel Gas Code ANSI Z223.1 (latest edition).

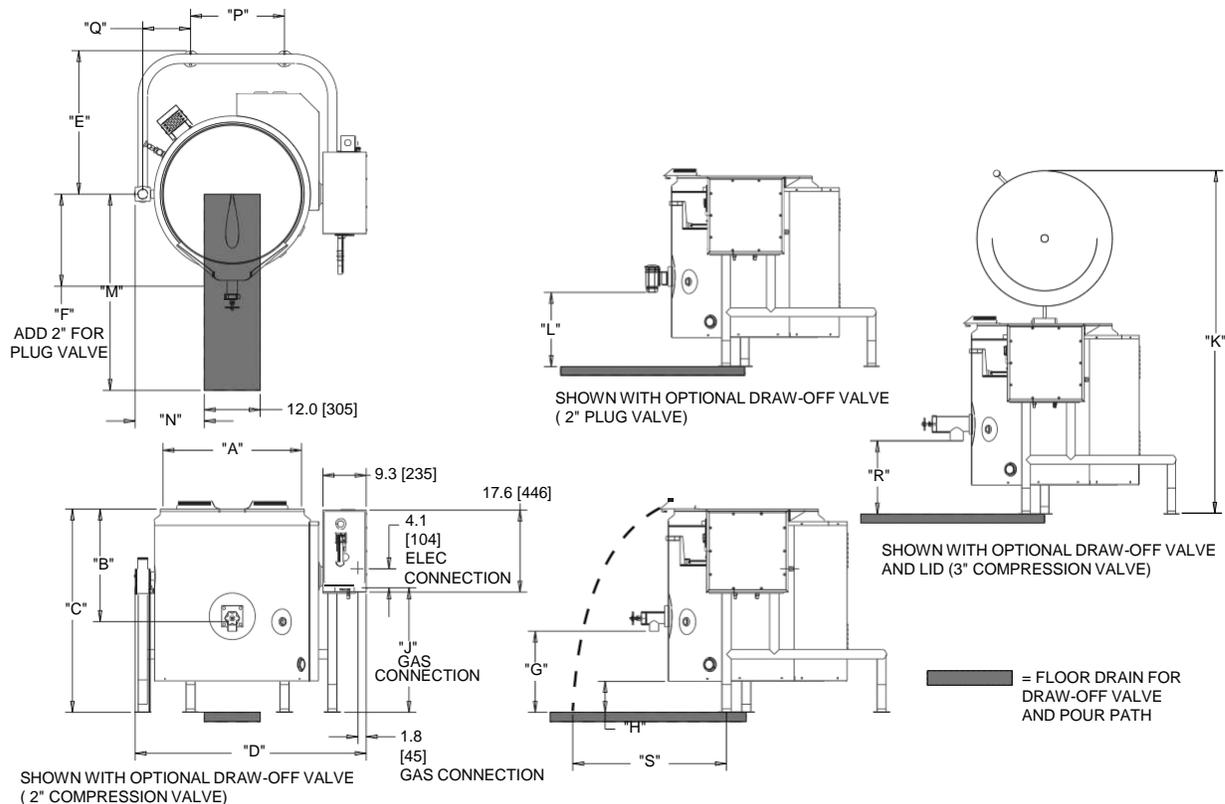
**Stationary Kettle**



■ = FLOOR DRAIN FOR DRAW-OFF VALVE

MODEL	TRUE WORKING CAPACITY	A	B	C	D	E	F	G	H	J	K	L	M	N	P
K20GL	20 gallons	21.6 in.	15.2 in.	36.8 in.	32.7 in.	18.6 in.	15.6 in.	19.5 in.	6.4 in.	17.0 in.	32.6 in.	19.2 in.	20.9 in.	8.3 in.	14.6 in.
	76 liters	549 mm	386 mm	935 mm	831 mm	472 mm	396 mm	495 mm	163 mm	432 mm	828 mm	488 mm	531 mm	211 mm	371 mm
K40GL	40 gallons	26 in.	21.2 in.	39.2 in.	36.7 in.	19.8 in.	17.8 in.	16.0 in.	6.4 in.	18.0 in.	69.0 in.	15.6 in.	23.0 in.	11.6 in.	14.1 in.
	152 liters	660 mm	538 mm	996 mm	932 mm	503 mm	451 mm	406 mm	163 mm	457 mm	1753 mm	396 mm	584 mm	295 mm	358 mm
K60GL	60 gallons	29.5 in.	24.2 in.	39.5 in.	40.9 in.	21.7 in.	19.8 in.	16.6 in.	6.0 in.	19.9 in.	76.6 in.	16.2 in.	26.5 in.	13.8 in.	13.7 in.
	227 liters	749 mm	615 mm	1003 mm	1039 mm	551 mm	502 mm	422 mm	152 mm	505 mm	1946 mm	411 mm	673 mm	351 mm	348 mm

### Tilting Kettle



MODEL	TRUE WORKING CAPACITY	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S
K20GLT	20 gallons	21.6	15.2	38.3	41.8	25.8	16	21	8.2	22.3	67.1	20.7	28	11	15	9.4	20	28
	76 liters	549	386	973	1062	655	406	533	208	566	1704	526	711	279	381	239	508	711
K40GLT	40 gallons	25.8	21.2	39.9	45.1	28.8	17.75	16.7	7.3	23	71	16	33	12.8	18.8	9.6	15.7	32
	152 liters	655	538	1013	1146	732	451	424	185	584	1803	406	838	325	478	244	399	813
K60GLT	60 gallons	29.5	23.9	43.7	49.6	30.8	20.4	17.6	6.8	26.7	78.7	17.2	36	14.8	21	10.3	16.9	36
	227 liters	749	607	1110	1260	782	518	447	173	678	1999	437	914	376	521	262	429.3	914

### LEVELING

Place a spirit level on the rim of the kettle with the cover open. Turn the feet in or out to level the kettle in both the left-to-right and front-to-rear directions.

### BEFORE FIRST USE

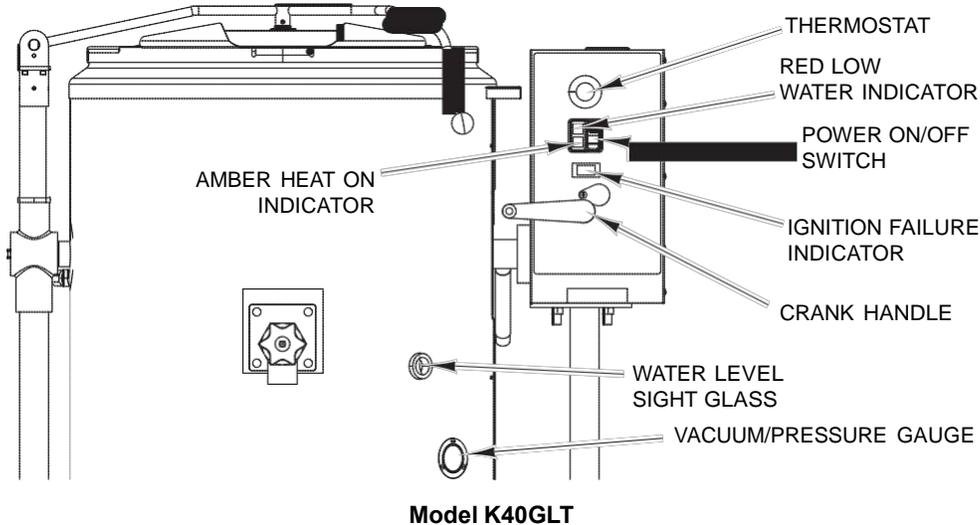
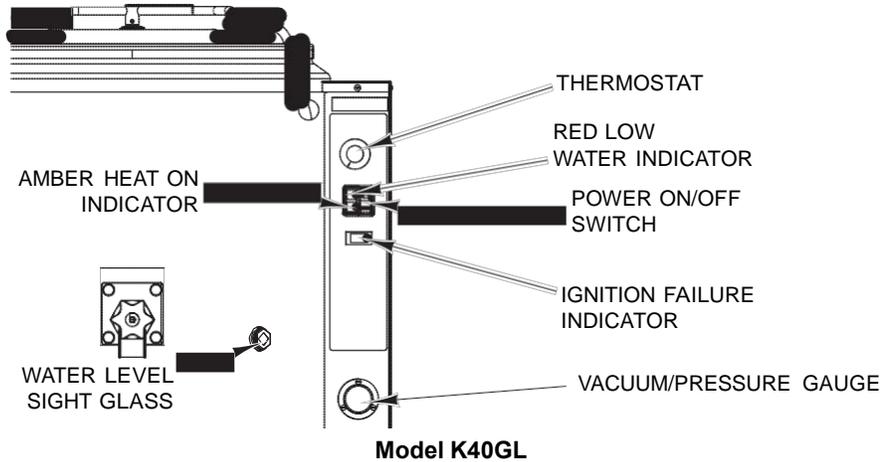
Use a non-corrosive, grease-dissolving commercial cleaner to clean the protective metal oils from all surface parts and the interior of the kettle. Follow the cleaner manufacturer's directions. Rinse thoroughly with warm water to remove all traces of the cleaner. Drain the kettle's interior cooking area. Wipe dry with a clean cloth.

# OPERATION

**⚠ WARNING** The kettle and its parts are hot. Use care when operating, cleaning or servicing the kettle.

## CONTROLS AND INDICATORS

Control	Function
Vacuum/Pressure Gauge	Indicates the vacuum (in inches) and pressure (in PSI) inside the kettle jacket.
Thermostat	Regulates kettle temperature from warm to rolling boil.
Low Water Indicator (Red)	When lit, indicates insufficient water in the kettle jacket and the sensing probe has interrupted power supply to the controls and to the burners.
Power ON/OFF Switch	Controls power to the kettle.
Power ON indicator (Amber)	When lit, indicates machine on/powering.
Heater Light (Amber)	When lit, indicates the burner is turned on.
Ignition Failure Indicator (Red)	When lit, indicates the burner has failed to ignite.
Water Level Sight Glass	Visually shows the water level in the jacket.
Crank Handle	Rotate the crank handle to tilt.



**BEFORE OPERATION**

1. Check Gauge Pressure – should read 20-30 In. Hg. below zero when cold. (Higher reading indicates air in jacket. See Venting instructions.)
2. Check to make sure gas supply valve is turned on.
3. Check water level in sight glass. Water level should be in the middle of the sight glass. If level is less than  $\frac{1}{4}$  of the sight glass or the low water light is illuminated, water must be added to the jacket (See Jacket Water Level.) Do not over fill.
4. Check the flue at the rear of the kettle for any obstructions before operating.

**NOTE:** Use only distilled water to refill the jacket. Refilling the kettle with tap water will damage the kettle jacket and void the warranty.

**OPERATION**

1. Turn power switch to the “ON” position and set thermostat to maximum.
2. The heat light will illuminate.
3. If ignition failure light is illuminated then turn the power switch to the “OFF” position.
4. Wait five minutes then turn the power switch to the “ON” position.

**Preheat**

1. Set the thermostat to Simmer/Boil and wait until the heat light cycles off.

**Cooking**

1. Verify that the draw-off valve is closed.
2. Set thermostat to desired cooking temperature, warm, simmer, or boil.

**NOTE:** Food products with milk or egg base should be placed into a cold kettle before cooking. Avoid sudden contact of these food products to a hot kettle surface because they stick to the surface.

3. Pour the food to be cooked into the kettle.

**Tilting**

1. Set the thermostat to the minimum.
2. Turn power switch off.
3. Rotate the crank handle clockwise to tilt or counter clockwise to return.

**DAILY SHUT DOWN**

1. Set thermostat to minimum and turn the power switch off.
2. Clean and dry kettle thoroughly.

**EXTENDED SHUT DOWN**

1. Turn manual gas supply valve off.
2. Disconnect power from the kettle.

## GAS KETTLES

### VENTING

While the kettle is cold, check the vacuum/pressure gauge. The gauge should be in the vacuum zone measuring between 20 to 30 in. Hg (84 to 100kPa). If not, there is air in the jacket and it must be removed by venting for proper heating. Perform the venting procedure located in the Maintenance section of this manual.

### RESERVOIR JACKET WATER LEVEL CHECK

During use, the reservoir water level must be maintained high to cover the entire heating zone. If the low water light is illuminated during use, perform the Filling the Reservoir Jacket procedure located in the Maintenance section of this manual.

### TILTING KETTLES

The low water indicator light (red) should not be lit when kettle is in upright position during operation. This light indicates that the burner has been automatically shut off by the kettle's safety circuitry. It is, however, normal for the low water light (red light) to come on when the kettle is in a tilted position.

### OPERATING DATA

MODEL NO.	GALLONS OF WATER		BURNER INPUT BTU/HR	HEAT UP TIME-MINUTES	
	WORKING CAPACITY	JACKET CHARGE		EMPTY TO 5 PSI	2/3 FULL 130°F RISE
K20GLT/K20GLT	20	7	100,000	10	20
K40GLT/K40GLT	40	7	100,000	10	40
K60GL/K60GLT	60	8	100,000	15	60

# STAINLESS STEEL EQUIPMENT CARE AND CLEANING

(Supplied courtesy of NAFEM. For more information, visit their web site at [www.nafem.org](http://www.nafem.org))

## Contrary to popular belief, stainless steels ARE susceptible to rusting.

Corrosion on metals is everywhere. It is recognized quickly on iron and steel as unsightly yellow/orange rust. Such metals are called “active” because they actively corrode in a natural environment when their atoms combine with oxygen to form rust.

Stainless steels are passive metals because they contain other metals, like chromium, nickel and manganese that stabilize the atoms. 400 series stainless steels are called ferritic, contain chromium, and are magnetic; 300 series stainless steels are called austenitic, contain chromium and nickel; and 200 series stainless, also austenitic, contains manganese, nitrogen and carbon. Austenitic types of stainless are not magnetic, and generally provide greater resistance to corrosion than ferritic types.

With 12-30 percent chromium, an invisible passive film covers the steel’s surface acting as a shield against corrosion. As long as the film is intact and not broken or contaminated, the metal is passive and stain-less. If the passive film of stainless steel has been broken, equipment starts to corrode. At its end, it rusts.

## Enemies of Stainless Steel

There are three basic things which can break down stainless steel’s passivity layer and allow corrosion to occur.

1. Mechanical abrasion
2. Deposits and water
3. Chlorides

**Mechanical abrasion** means those things that will scratch a steel surface. Steel pads, wire brushes and scrapers are prime examples.

**Water** comes out of the faucet in varying degrees of hardness. Depending on what part of the country you live in, you may have hard or soft water. Hard water may leave spots, and when heated leave deposits behind that if left to sit, will break down the passive layer and rust stainless steel. Other deposits from food preparation and service must be properly removed.

**Chlorides** are found nearly everywhere. They are in water, food and table salt. One of the worst chloride perpetrators can come from household and industrial cleaners.

## So what does all this mean? Don’t Despair!

Here are a few steps that can help prevent stainless steel rust.

### 1. Use the proper tools.

When cleaning stainless steel products, use non-abrasive tools. Soft cloths and plastic scouring pads will not harm steel’s passive layer. Stainless steel pads also can be used but the scrubbing motion must be in the direction of the manufacturers’ polishing marks.

### 2. Clean with the polish lines.

Some stainless steel comes with visible polishing lines or “grain.” When visible lines are present, always scrub in a motion parallel to the lines. When the grain cannot be seen, play it safe and use a soft cloth or plastic scouring pad.

### 3. Use alkaline, alkaline chlorinated or non-chloride containing cleaners.

While many traditional cleaners are loaded with chlorides, the industry is providing an ever-increasing choice of non-chloride cleaners. If you are not sure of chloride content in the cleaner used, contact your cleaner supplier. If your present cleaner contains chlorides, ask your supplier if they have an alternative. Avoid cleaners containing quaternary salts; it also can attack stainless steel and cause pitting and rusting.

## GAS KETTLES

### 4. Treat your water.

Though this is not always practical, softening hard water can do much to reduce deposits. There are certain filters that can be installed to remove distasteful and corrosive elements. To insure proper water treatment, call a treatment specialist.

### 5. Keep your food equipment clean.

Use alkaline, alkaline chlorinated or non-chloride cleaners at recommended strength. Clean frequently to avoid build-up of hard, stubborn stains. If you boil water in stainless steel equipment, remember the single most likely cause of damage is chlorides in the water. Heating cleaners that contain chlorides have a similar effect.

### 6. Rinse, rinse, rinse.

If chlorinated cleaners are used, rinse and wipe equipment and supplies dry immediately. The sooner you wipe off standing water, especially when it contains cleaning agents, the better. After wiping equipment down, allow it to air dry; oxygen helps maintain the stainless steel's passivity film.

### 7. Never use hydrochloric acid (muriatic acid) on stainless steel.

### 8. Regularly restore/passivate stainless steel.

Job	Cleaning Agent	Comments
Routine cleaning	Soap, ammonia, detergent, Medallion	Apply with soft cloth or sponge.
Fingerprints and smears	Arcal 20, Lac-O-Nu Ecoshine	Provides barrier film
Stubborn stains and discoloration	Cameo, Talc, Zud, First Impression	Rub in direction of polish lines.
Grease and fatty acids, blood, burnt-on foods	Easy-off, DeGrease It Oven Aid	Excellent removal on all finishes
Grease and Oil	Any good commercial detergent	Apply with soft cloth or sponge.
Restoration/Passivation	Benefit, Super Sheen	

## Review

1. Stainless steels rust when passivity (film-shield) breaks down as a result of scrapes, scratches, deposits and chlorides.
2. Stainless steel rust starts with pits and cracks.
3. Use the proper tools. Do not use steel pads, wire brushes or scrapers to clean stainless steel.
4. Use non-chlorinated cleaners at recommended concentrations. Use only chloridefree cleaners.
5. Soften your water. Use filters and softeners whenever possible.
6. Wipe off cleaning agent(s) and standing water as soon as possible. Prolonged contact causes eventual problems.

To learn more about chloride-stress corrosion and how to prevent it, contact the equipment manufacturer or cleaning materials supplier.

Developed by Packer Engineering, Naperville, Ill., an independent testing laboratory.

# CLEANING

**⚠ WARNING** The kettle and its parts are hot. Use care when operating, cleaning or servicing the kettle.

**⚠ WARNING** Disconnect the electrical power to the machine and follow lockout / tagout procedure, before cleaning or servicing..

**NOTICE** Never spray the exterior of the kettle or control box with water under any condition. Failure to comply will void the warranty.

The kettle interior and exterior should be thoroughly washed after each use when a different food is to be cooked next or when cooking is completed for the day. If the unit is used continuously through the day, it should be cleaned and sanitized once every 12 hours.

Empty the kettle. Close draw-off valve and add water to the kettle for cleaning to prevent residue from drying and sticking to the inside of the kettle.

- Never use harsh or corrosive cleaning chemicals.
- Never scrape the inside of the kettle with abrasive cleansers, metal tools or steel scouring pads, which will scratch the surface, spoil the appearance and make it more difficult to thoroughly clean.
- Add mild, non-chlorine, non-chloride, and non-bleach detergent and scrub the kettle interior with a nylon brush.
- Loosen stuck-on food by allowing it to soak at a low temperature setting.
- Thoroughly rinse the interior and dry with a soft cloth.
- Rinse the exterior and dry with a soft cloth.

## COMPRESSION DRAW-OFF VALVE CLEANING INSTRUCTIONS

### Daily After Use

Remove draw-off valve stem assembly for cleaning (Fig. 2).

1. Turn the valve handle counterclockwise until it stops.
2. Pull the valve handle back until it stops.
3. Turn large hex nut counterclockwise until the valve stem assembly is loose.
4. Pull the assembly straight out of the valve body.
5. Remove wing nut and handle. Unscrew valve stem from bonnet.
6. Wash valve body and stem assembly with mild soap and water, and then rinse. Make sure all food residue is removed from inside valve body.
7. Leave assembly apart to air dry.

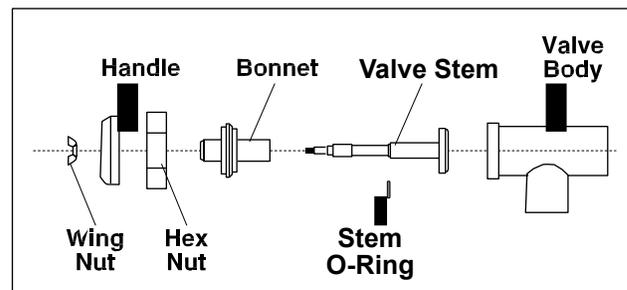


Fig. 2

Install draw-off valve assembly:

1. Apply PetroGel lubricant to valve stem threads, O-Ring, rubber plug face and large hex nut threads.
2. Thread the valve stem into bonnet till valve stem can be pulled through bonnet.
3. Insert valve stem into valve body.
4. Install large hex nut hand tight.
5. Install valve handle, lock washer and wing nut onto the valve stem.
6. Turn valve handle clockwise until closed. Do not overtighten.

**GAS KETTLES**

**PLUG VALVE CLEANING INSTRUCTIONS**

**Daily After Use**

Remove draw-off valve plug for cleaning (Fig. 3).

1. Unscrew the retaining ring and remove it and the bottom washer.
2. Pull the valve plug straight up to remove from valve body.
3. Wash valve body, plug, washer and retaining ring with mild soap and water, and then rinse.
4. Leave assembly apart to air dry.

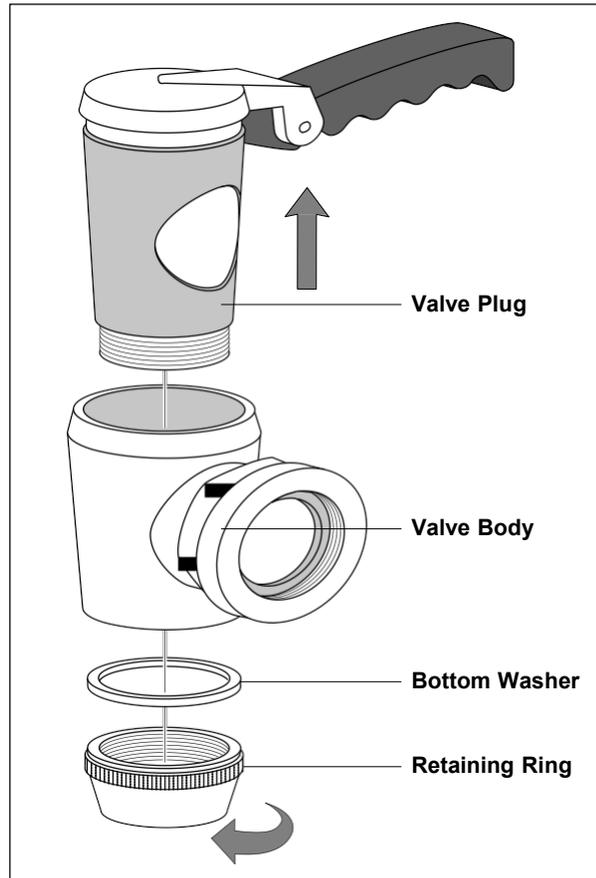
Care should be taken not to scratch, ding or dent the valve plug to prevent valve leakage.

If multiple kettles are in use, care should be taken to keep each plug separate and returned to its original valve body.

Install draw-off valve plug.

1. Apply PetroGel lubricant to valve plug face.
2. Holding the valve handle, slide the plug down into the valve body.
3. Install the bottom washer, making sure to align the key with the groove in the valve plug.
4. Install the retaining ring and hand tighten.

If the valve is hard to open, then the ring has been overtightened.



**Fig. 3**

# MAINTENANCE

**⚠ WARNING** The kettle and its parts are hot. Use care when operating, cleaning or servicing the kettle.

## VENTING

When cold, the pressure gauge vacuum measuring zone should be between 20 to 30 In. Hg (84 to 100kPa). If the vacuum indicator is not within this range, perform the following:

1. Ensure that the water level in the jacket is approx. 1/2 in the sight glass.
2. With the kettle empty, place the power switch to the ON position.
3. Set the temperature control to the max heat setting. Let the kettle heat until the jacket pressure reaches 10 PSI.

**⚠ WARNING** Hot steam. The kettle and its parts are hot. Use care when operating, cleaning or servicing the kettle.

4. Pull the pressure relief valve lever to relieve pressure for 10 seconds. Allow valve to snap shut to seal.
5. Turn kettle off and let cool. Check for a correct vacuum reading of 20 to 30 In. Hg (84 to 100kPa). If the reading is not correct, repeat steps 1 through 3.

## FILLING THE RESERVOIR JACKET

Use ionized distilled water with sodium (no tap water). Equipment failure caused by inadequate water quality is not covered under warranty. To fill the reservoir jacket, perform the following:

1. Set the thermostat and power switch to OFF position.
2. Release any pressure by lifting the lever on the pressure relief valve.
3. Insert a funnel into the fill valve and fill the jacket with water and anti-freeze mix until water level in the sight glass is 1/2 full.
4. Turn on the kettle.

If the low water light turns on, turn off the unit and repeat steps 3 and 4. If low water light is off, follow the venting procedure (see VENTING) to vent air from reservoir.

## SHUTDOWN

Turn the thermostat dial to the OFF position. Turn power switch off. For extended shutdown, close the gas shutoff valve.

## SERVICE

To obtain service and parts information concerning this unit, contact the Vulcan-Hart Service Agency in your area (refer to listing supplied with the kettle), or contact the Vulcan-Hart Service Department at the address or phone number shown on the front cover of this manual.

Parts and service are also available at [www.vulcanequipment.com](http://www.vulcanequipment.com).

## TROUBLESHOOTING

Problem	Possible Causes / Suggested Corrective Action
Will Not Turn On, no power light	Kettle is not plugged in / Plug in power cord.
	Power switch is off / Turn on power switch.
	Circuit Breaker tripped / Reset Breaker
	Ground Fault Receptacle is tripped / Reset Ground Fault Receptacle
	Hood system with power interrupt is not on / Turn on hood system.
	Tilt kettle not in the fully lower position / Lower kettle with crank to the level position
	Note: If the kettle still does not come ON verify that there is power at the receptacle by plugging in another electrical device such as a lamp. If the device does not come ON call an electrician or maintenance personnel. If the alternate device does come ON, call your authorized Vulcan Servicer.
Low Water Light On or Low water in Sight Glass	Water level to low / Fill jacket per instructions in this manual.
	Relief valve is not seated and leaking / With no pressure on gauge, lift lever on relief valve and allow it to snap closed, refill jacket per instructions in this manual
	Fill port is not fully closed and leaking / Close tightly fill port valve, refill jacket per instructions in this manual.
	Jacket was refilled with deionized water / Add a pinch of salt to jacket water.
Not Heating, Ignition Fail Light Is On	Gas Supply Valve is off / Turn on gas valve
	Combo Valve is off / Turn on combo valve
	Quick connect hose not connected or fully inserted / Connect quick connect hose or push connector in till quick connect snaps and locks.
	Gas line, flex hose, or quick connect undersize and not delivering enough gas / Increase gas line size to 125% of kettle rated BTU input.
	Gas supply pressure to low / Have plumber Increase gas supply pressure
Kettle not in vacuum when cold or will not boil when up to pressure	Air in jacket / Vent per instructions in this manual.
	Relief valve is not seated and leaking / With no pressure on gauge, lift lever on relief valve and allow it to snap closed, vent jacket per instructions in this manual
	Fill port is not fully closed and leaking / Close tightly the fill port valve, vent jacket per instructions in this manual.
	Note: If the kettle jacket continues to loose vacuum or requires frequent refilling of the jacket call your authorized Vulcan Servicer.



Following you will find instructions on how to shut down your Vulcan cooking equipment for an extended period, and how to safely restart equipment after idle.

Always refer to the procedures as instructed in the Installation & Operation manual for your specific model. Manuals may be found by visiting the Vulcan website and clicking on RESOURCES at the top right of the home page.

Always remember that cooking equipment and its parts are hot. Use care when operating, cleaning or performing maintenance.

For additional product resources, please visit <https://www.vulcanequipment.com/>.

## STEAM EQUIPMENT

### EXTENDED SHUTDOWN PROCEDURE

#### All Equipment:

1. Be sure the unit is turned off.
2. Disconnect or turn off utilities such as gas, electric, water, and steam.

#### Steamers:

1. De-lime steam generator per Installation & Operation manual.
  - a. We recommend scale release P/N 854893-13. 1 Bag for Counter Steamers and 2 for Floor Steamers.
2. Clean steamer per NAFEM cleaning instruction found in the Installation & Operation manual.
3. Leave the door cracked open

#### Fully Jacketed Steam Kettles:

1. Drain kettle vessel water. Drain plug located below and behind draw off valve.
2. Clean kettle per NAFEM cleaning instructions found in Installation & Operation manual.

#### Direct Steam Kettles, Braising Pans, and Direct Steam Steamers:

1. Clean unit per NAFEM cleaning instruction found in Installation & Operation manual.

#### 2/3 Electric and Gas Kettles:

1. Clean unit per NAFEM cleaning instructions found in Installation & Operation manual.
2. If corrosion is present clean affected area with Scotch Brite.
3. If the pressure gauge is not reading 25 to 30 IN/Hg of vacuum, then reestablish vacuum per instructions on control panel overlay or in the Installation & Operation manual.



Model C24EO3  
Shown with optional stand



## **STEAM EQUIPMENT (CONTINUED)**

### **RESTART FROM EXTENDED SHUTDOWN**

#### **All Equipment:**

1. Turn on the ventilation hood and check operation.
2. Make sure the equipment's utilities such as gas, electric, water, and steam are turned back on.
3. If power to electric or gas steamers was disconnected, allow the steamer to sit for 15 minutes before turning on the steamer's power switch.

#### **Steamers:**

1. Change water filtration system cartridge.
2. Delime steam generator per Installation & Operation manual.
3. Clean steamer per NAFEM cleaning instruction found in the Installation & Operation manual.
4. If corrosion is present, clean affected area with Scotch Brite.

#### **Fully Jacketed Steam Kettles:**

1. Drain kettle vessel water. Drain plug located below and behind draw off valve
2. Refill with only distilled water.
3. Add 2 oz. of rust inhibitor P/N 00-833651.
4. Clean steamer per NAFEM cleaning instruction found in Installation & Operation manual.
5. If corrosion is present clean affected area with Scotch Brite.

#### **Direct Steam Kettles, Braising Pans, and Direct Steam Steamers:**

1. Clean unit per NAFEM cleaning instruction found in Installation & Operation manual.
2. If corrosion is present, clean affected area with Scotch Brite.

#### **2/3 Electric and Gas Kettles:**

1. Clean unit per NAFEM cleaning instruction found in Installation & Operation manual.
2. If corrosion is present clean affected area with Scotch Brite.
3. If the pressure gauge is not reading 25 to 30 IN/Hg of vacuum, then reestablish vacuum per instructions on control panel overlay or in the Installation & Operation manual.



Model K6ETT  
*Shown with optional stand and faucet*



K40GL Shown

24183

## K Series Gas Kettles 2/3 Jacketed Stationary and Tilting

K20GL	ML-136090
K40GL	ML-136091
K60GL	ML-136092
K20GLT	ML-136094
K40GLT	ML-136095
K60GLT	ML-136096

### - 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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# SERVICE UPDATES

## SERVICE UPDATES

### September 2020

- Updated TOOLS.
- Updated SPECIFICATIONS.
- Updated ELECTRICAL PANEL COMPONENTS.
- Updated THERMOCOUPLE TEST.
- Updated VENTING.
- Updated FILLING THE RESERVOIR JACKET.
- Added BLOWER INLET PRESSURE CHECK 2ND GENERATION STARTING AT SN 46-3028412.
- Updated STATIONARY & TILTING - GENERAL.
- Updated STATIONARY & TILTING - GENERAL.

### October 2017

- Updated FILLING THE RESERVOIR JACKET.
- Updated GAS VALVE/BLOWER INLET PRESSURE CHECK (108W).

# GENERAL

## INTRODUCTION

### General

The procedures in this manual apply to all models unless otherwise specified. The pictures and illustrations are of a model K40GLT floor model tilting kettle unless otherwise noted. All information and specifications contained in this manual are based on the latest product information available at the time of printing.

### K Series - Tilting Kettles

The tilting kettles models are offered with a manual tilt mechanism as standard and are available with an optional power tilt to automatically lower and raise the kettle. Kettles with the power tilt option can still be operated manually using the crank handle as needed.

### K Series - Floor Model Kettles

The 2/3 jacketed gas kettles are self contained. The lower two thirds of the kettle bowl is a double wall stainless steel construction that provides a reservoir for a solution of heat transfer fluid and distilled water for improved heating of the kettle contents. The kettles are used to prepare a variety of liquid or semi-liquid food products such as soups, stews and sauces.

## MODELS COVERED

All K Series kettles are mounted to the floor using legs with flanged feet for anchoring.

Model	Type	Gallons	Quarts
K20GL	Stationary	20	80
K40GL	Stationary	40	160
K60GL	Stationary	60	240
K20GLT	Tilting	20	80
K40GLT	Tilting	40	160
K60GLT	Tilting	60	240

## CONTROL PANEL

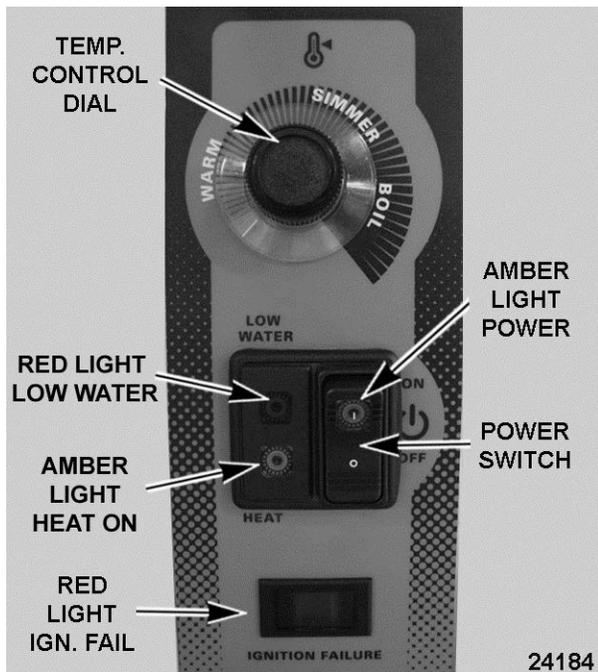


Fig. 1

## TOOLS

### Standard

- Standard set of hand tools.
- Pipe thread sealant (must be resistant to the action of propane gases).
- VOM with an AC current tester (meter sensitivity should be at least 20,000 ohms per volt).
- Temperature meter (thermocouple type) for checking kettle temperature.
- Manometer capable of reading at least 16" W.C. of gas pressure.
- Container that is capable of holding at least 8 gallons of drained reservoir jacket fluid.

### Special

- Torque wrench capable of tightening combustion chamber mountings nuts to 30 ft-lbs.
- 36mm socket to remove sight glass for jacket fluid draining.
- Requires U-inclined (Grainger P/N 3T294) or digital (Grainger P/N 1XFW2) manometer for measuring gas pressures and blower air pressures.

- Heat transfer fluid. Can be ordered from [www.chemworld.com](http://www.chemworld.com) Refer to [FILLING THE RESERVOIR JACKET](#) for volumes.
- Distilled water only for re-filling of the jacket (purchase locally). Refer to [FILLING THE RESERVOIR JACKET](#) for volumes.
- Drill Pump.

## SPECIFICATIONS

### Electric

- 120VAC / 60HZ / 1 phase.
- 5 amp rating.
- Supplied with 6 foot power cord and 3-prong grounding plug (proper ground required).

**NOTE:** Machines with electronic ignition systems should be connected to a standard 120VAC electrical outlet rather than a ground fault circuit interrupter (GFCI) if possible. Machines connected to certain GFCI circuits may repeatedly nuisance trip the GFCI. If the machine must be connected to a GFCI, use Part No. 913053 (Pass and Seymour) approved by engineering for use with electronic ignition systems.

### Gas Supply

#### **NOTICE**

The gas supply pressure must not exceed 14" WC ( $\frac{1}{2}$  PSI). Pressures higher than 14" WC will damage the equipment's gas controls and is not covered under warranty. If the supply pressure exceeds 14" WC an additional supply line regulator rated for the supply line pressure (inches WC), nominal pressure (OUT), and gas flow for the kettle BTU rating must be installed.

Span gas technology enables "field adjustable manifold pressure" from natural to propane gas or propane to natural. All kettles shipped for natural gas at sea level atmospheric pressure. Requires a U-Inclined or digital manometer. See [TOOLS](#).

Refer to [F35461 Installation & Operation Manual](#) for specific instructions on GAS CONNECTIONS and GAS AND ALTITUDE ADJUSTMENTS. A combustion analyzer is required for gas type conversions and altitude adjustments as outlined in these procedures.

<b>GAS SUPPLY PRESSURES</b>				
<b>GAS TYPE</b>	<b>Manifold (in W.C.)</b>	<b>NOMINAL (in W.C.)</b>	<b>MIN (in W.C.)</b>	<b>MAX (in W.C.)</b>
Natural	Low Speed * - 0.27 to 0.30	7	5	10.5
	High Speed - 1.91 to 1.98			
Propane	Low Speed * - 0.27 to 0.30	11	11	13
	High Speed - 1.91 to 1.98			
<p><b>* Low Speed – Blower operates at low speed during trial for ignition (approximately 7 seconds). Ignition is successful and burner lights. Blower switches to high speed for normal operation approximately 8 seconds later (total time delay of 15 sec. to high speed) and runs until set point temperature is satisfied. Cycle repeats upon call for heat.</b></p>				

### **Kettle Rating**

All models listed on front cover have an input BTU rating of 100,000 BTU/HR.

## **OPERATION, CLEANING AND MAINTAINENCE**

Refer to [F35461 Installation & Operation Manual](#) for specific instructions. The manual includes:

- A page from the Stainless Steel Care and Cleaning Guide for proper care and cleaning of stainless steel.
- Draw-Off Valve and Plug Valve disassembly & cleaning instructions.

# REMOVAL AND REPLACEMENT OF PARTS

## CONTROL BOX COVER (TILTING)

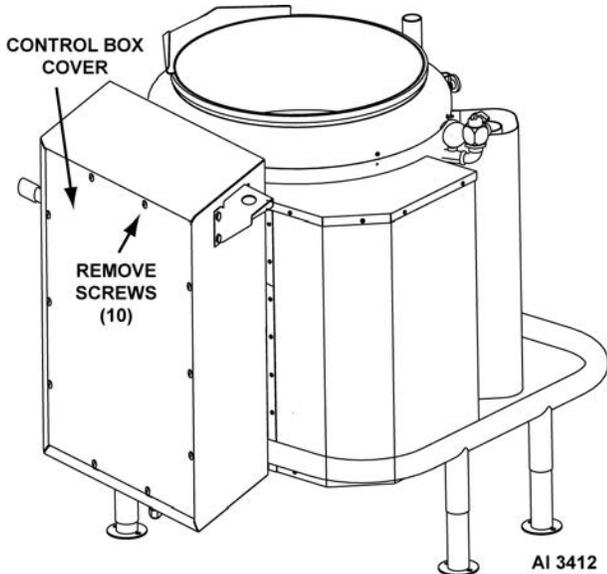


**⚠ WARNING**

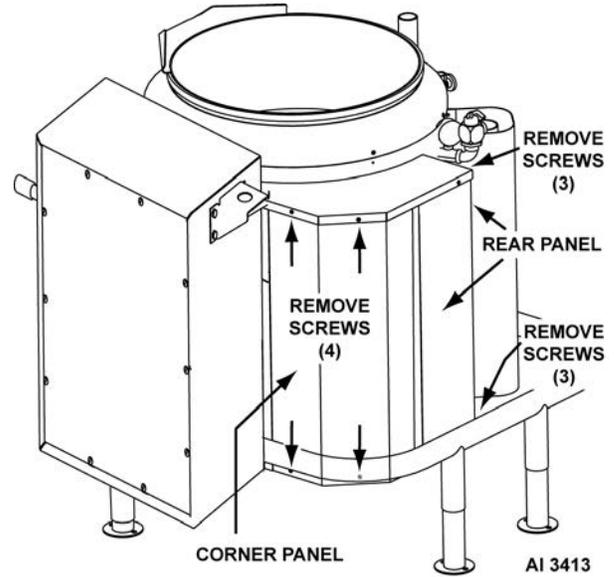
Disconnect the electrical power to the machine and follow lockout / tagout procedures.

**NOTE:** Remove screws from cover where indicated.

**NOTE:** On kettles with manual tilt or power tilt option, the control box height is now taller (as shown) to accommodate additional tilt components. The cover is held in place using the same number of screws.



K20GLT Manual Tilt Shown



K20GLT Manual Tilt Shown

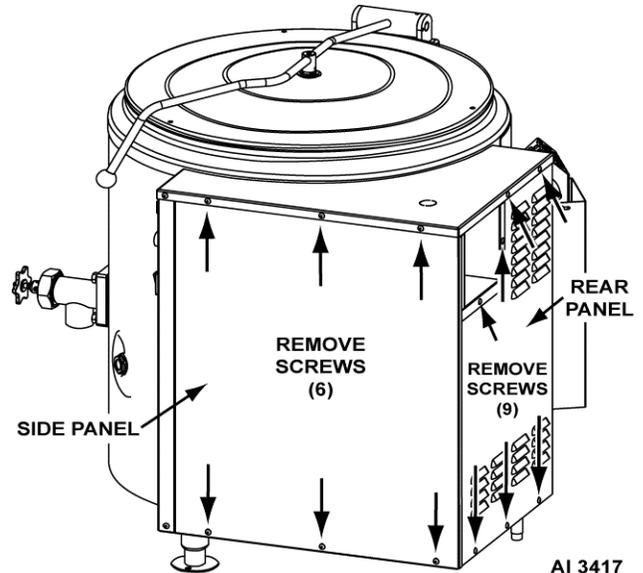
## SIDE & REAR PANELS (STATIONARY)



**⚠ WARNING**

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

**NOTE:** Remove screws from panel where indicated.



K20GL Shown

## CORNER & REAR PANELS (TILTING)



**⚠ WARNING**

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

**NOTE:** Remove screws from panel where indicated.

## BOTTOM COVER

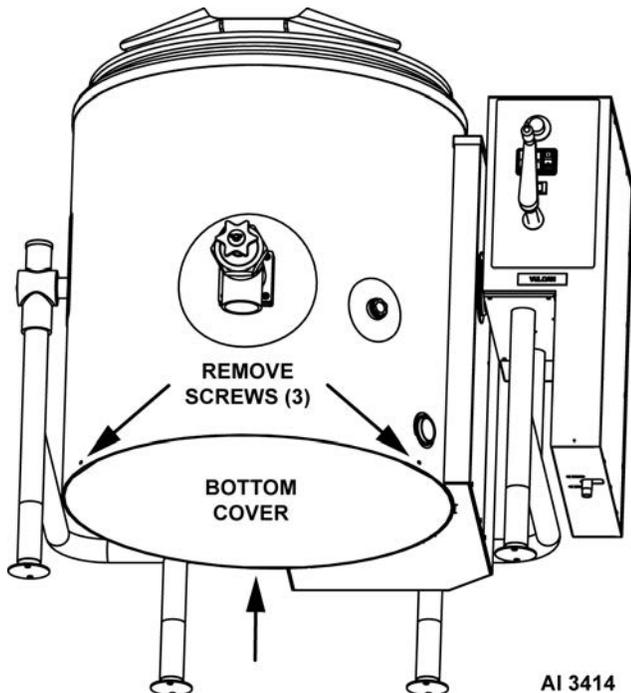


**⚠ WARNING**

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

**NOTE:** Remove screws from cover where indicated.

- Tilting models - tilt kettle to empty contents and gain access to bottom components.
- Stationary models - use draw off valve to empty contents.
- Raise the kettle for easier access to the bottom components as necessary. Support the kettle in some manner (2x4 blocks etc.) while work is being performed.



**K20GLT Manual Tilt Shown**

## ELECTRICAL PANEL COMPONENTS



**⚠ WARNING**

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

**NOTE:** Pictures show the electrical panel components for a tilting kettle (control box & kettle

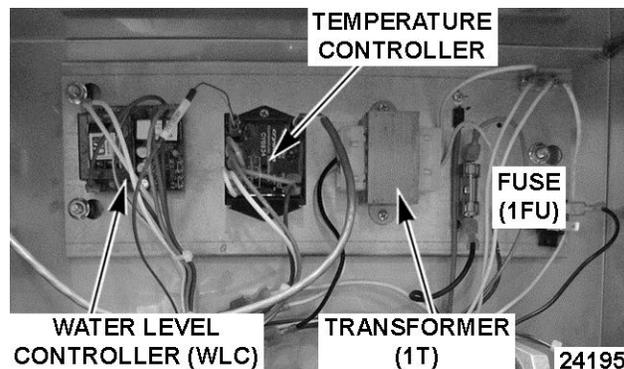
control area). On a stationary kettle, all the electrical panel components are mounted in the kettle control area.

### CONTROL BOX (TILTING)

1. Remove CONTROL BOX COVER (TILTING).
2. Disconnect lead wires from component being replaced.
3. Remove screws securing the component to panel.
4. Reverse procedure to install and check for proper operation.

**NOTE:** Ensure J1 jumper is installed on temperature controller.

#### Control Box - K Series Tilting Kettle (Fig. 6)



**Fig. 6**

### KETTLE CONTROL AREA

1. Remove CORNER PANEL (TILTING) or SIDE PANEL (STATIONARY).
2. Disconnect lead wires from component being replaced.
3. Remove fastener securing the component to panel.
  - A. If installing blower speed control, ensure switches SW1, SW2 & SW4 are properly set as shown in Blower Speed Control - Switch Settings picture in this procedure.
4. Reverse procedure to install and check for proper operation.

#### Kettle Control Area - K Series Tilting Kettles

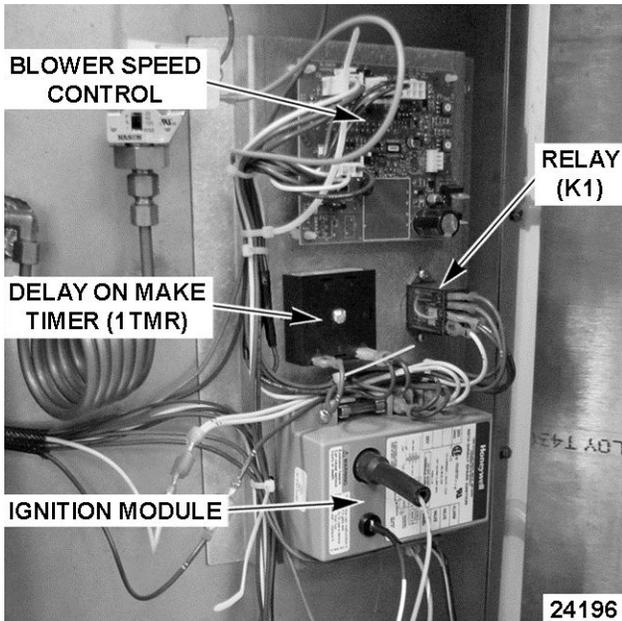


Fig. 7

**2ND GENERATION IGNITION MODULE SHOWN IN Fig. 8**

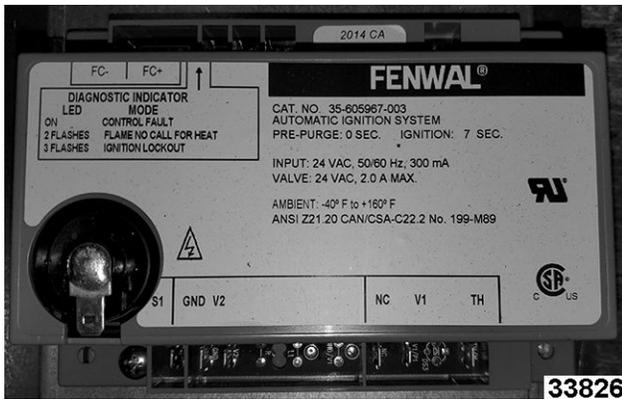


Fig. 8

**Blower Speed Control - Switch Settings 1st Generation Motor (Baldor High Fire and Low Fire Settings Shown in Fig. 9)**

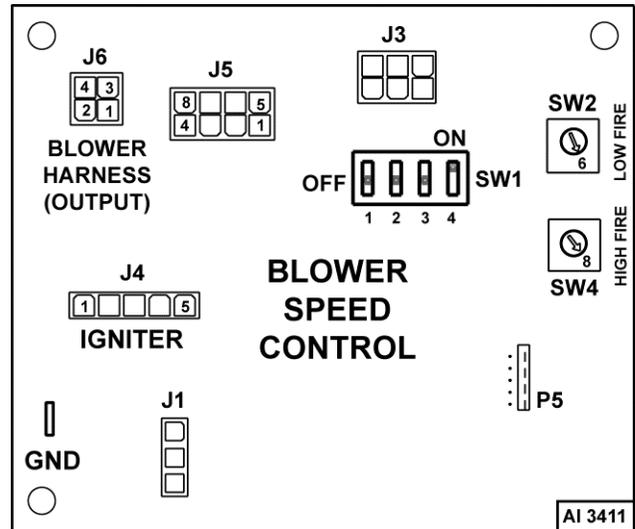


Fig. 9

**Blower Speed Control - Switch Settings 2nd Generation Motor (High Fire and Low Fire Settings Shown in Fig. 10)**

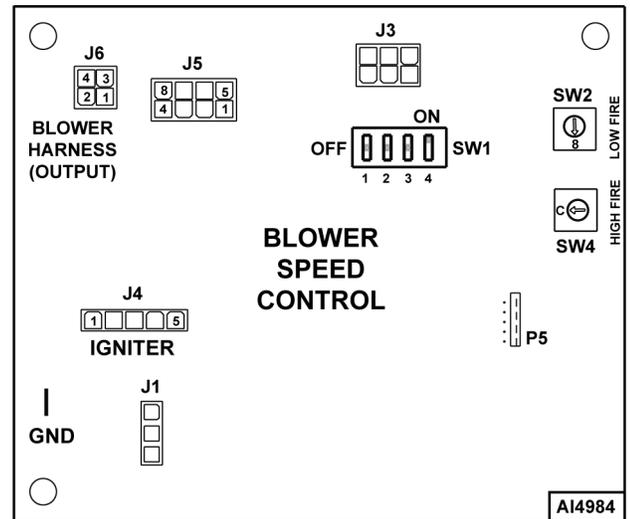


Fig. 10

**PRESSURE SWITCH (1PAS)**



**WARNING**

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

1. Open pressure relief valve until reservoir jacket is completely vented.
2. Remove CORNER PANEL (TILTING) or SIDE PANEL (STATIONARY).
3. Remove pressure switch from tubing.
4. Reverse procedure to install.

5. Remove air from reservoir jacket as outlined under VENTING procedure.
6. Check for proper operation.

**NOTE:** Pressure switch is set to open at 38-42 PSI.

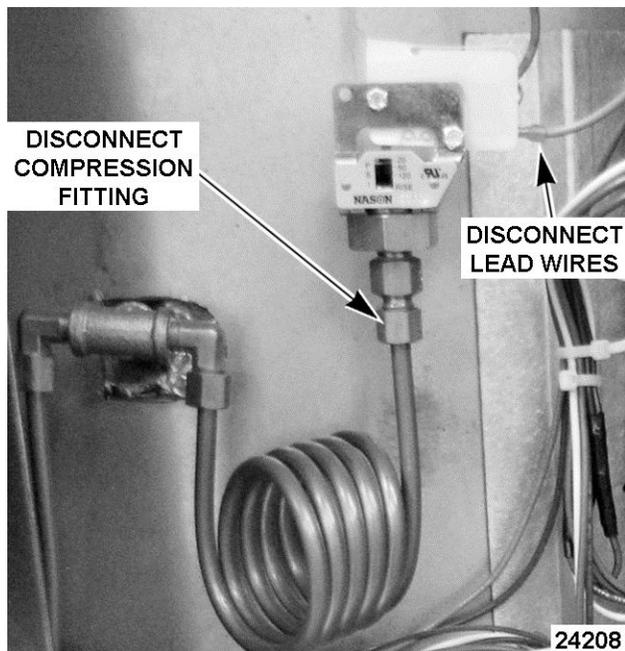


Fig. 11

## 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.

**⚠ 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 CORNER & REAR PANELS (TILTING) or SIDE & REAR PANELS (STATIONARY).
2. Remove electrical connector from gas valve.
3. Disconnect gas line from gas valve.
4. Remove gas valve from blower.

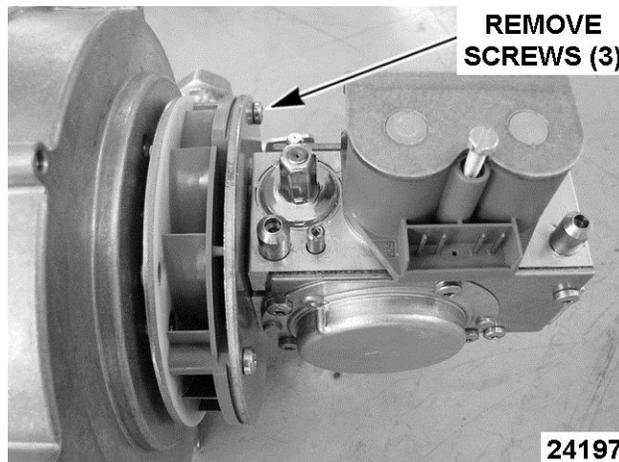


Fig. 12

5. Remove piping from gas valve inlet and install on replacement valve. Ensure the factory tags that are wired to the piping remain installed.

**NOTE:** Replacement gas valve contains valve plate, orifice and o-ring already assembled. The gas valve/blower design allows natural and propane gas kettles to use the same orifice size. Labels for gas type are also included.

**⚠ WARNING**

Clean pipe threads and apply thread sealant that is suitable for use with propane gas.

6. Reverse procedure to install.
7. Affix the appropriate gas label (natural or propane) on top of gas valve.
8. Perform GAS VALVE/BLOWER INLET PRESSURE CHECK (108W).

## BLOWER



**⚠ WARNING**

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

1. Remove GAS VALVE from blower.
2. Remove BOTTOM COVER.
3. Separate burner manifold compression fitting on gas supply tube (feeding burner).

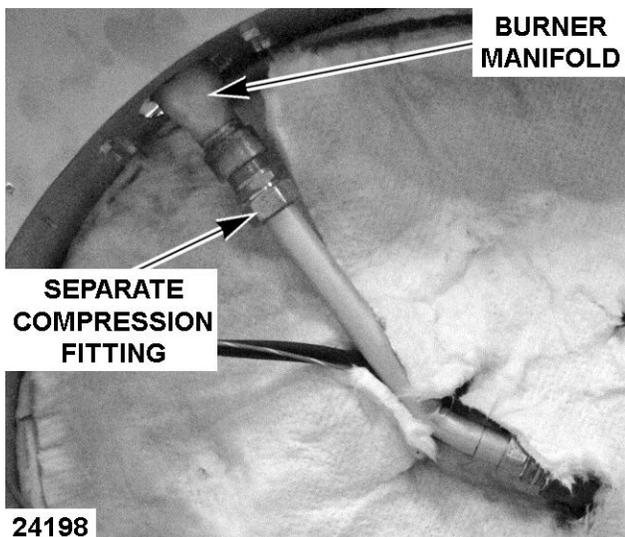


Fig. 13

4. Remove electrical connectors (2) from blower.
5. Remove blower from kettle at burner manifold.

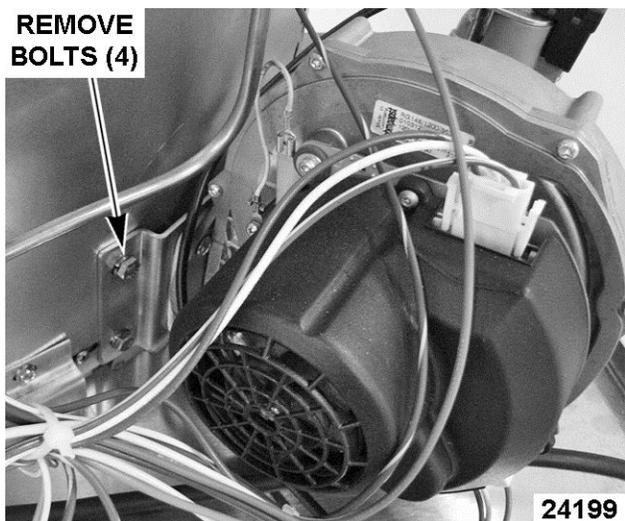


Fig. 14

- A. Remove blower from burner manifold (4 screws).
- B. Remove swirl plate (3 screws) and blower plate (2 screws) from blower intake.

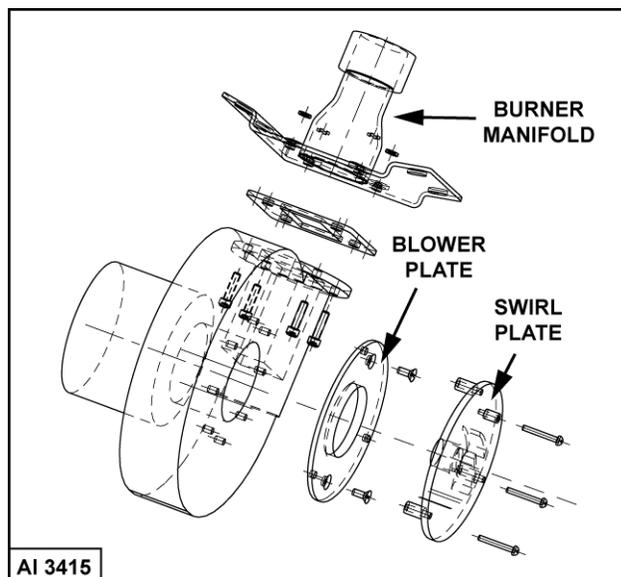


Fig. 15

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

**NOTE:** Install replacement blower gasket as necessary.

## BURNER



**⚠ 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.
2. Remove clips securing insulation to bottom of kettle.
  - A. Gently remove insulation and save for reuse.
3. Disconnect spark ignitor lead wires at the ignition module.
4. Separate compression nuts on gas supply tube.

- Loosen gas manifold mounting nuts and remove gas supply tube from the fittings.

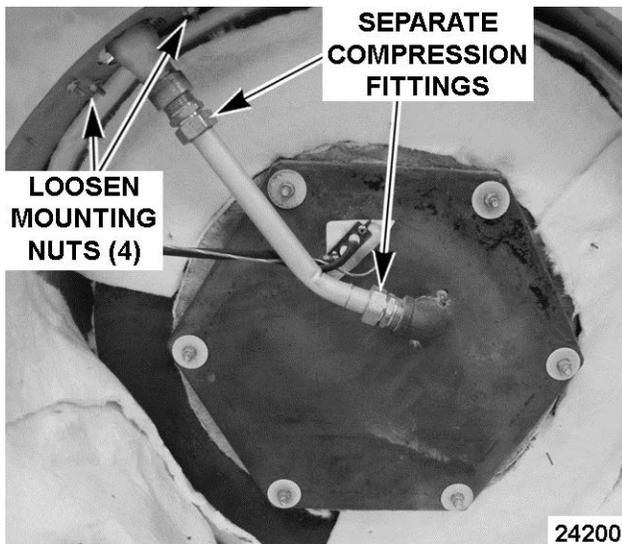


Fig. 16

- Remove combustion chamber cover from bottom of kettle.

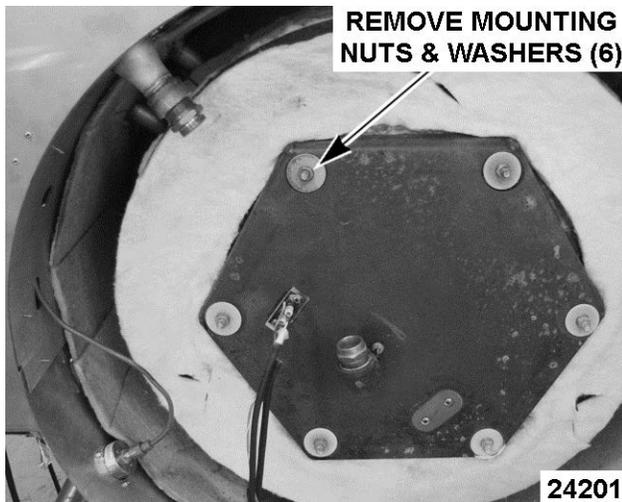


Fig. 17

- Note alignment of pipe elbow connected to burner. Remove elbow from burner.
- Remove burner from combustion chamber cover.

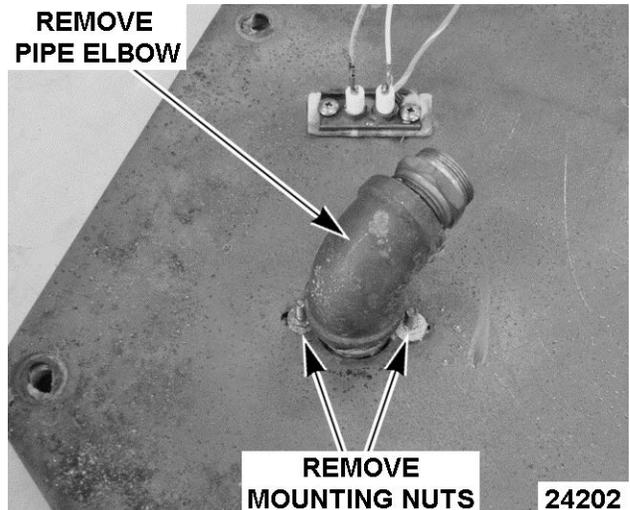


Fig. 18

- Reverse procedure to install replacement burner and check for proper operation.

**⚠ WARNING**

Apply pipe thread sealant to burner threads that is suitable for use with propane gas.

**NOTE:** Torque mounting nuts for combustion chamber cover to 30 ft-lb.

**SPARK IGNITOR**



**⚠ WARNING**

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

- Remove CONTROL BOX COVER (TILTING) or CORNER PANEL (STATIONARY).
- Disconnect spark ignitor lead wires at ignition module.
- Remove BOTTOM COVER.
- Remove clips holding insulation against combustion chamber cover.
- Remove spark ignitor from combustion chamber cover.

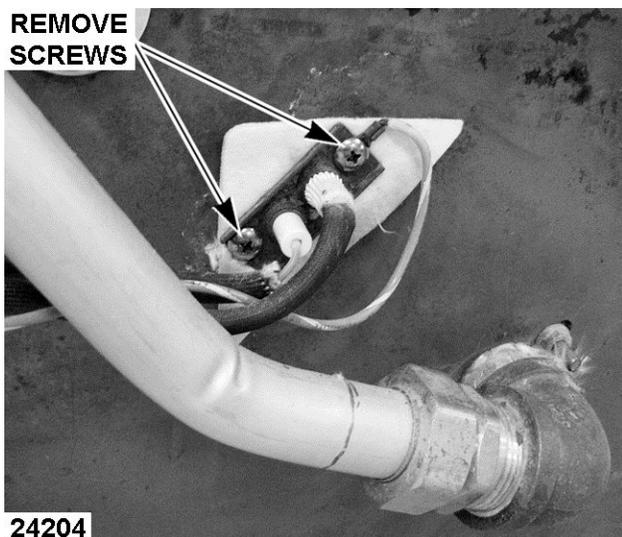


Fig. 19

6. Ensure spark gap between ignitor electrode and ground rod is approximately 1/8". If necessary, adjust as outline under SPARK IGNITION TEST Step 8C.
7. Reverse procedure to install and check for proper operation.

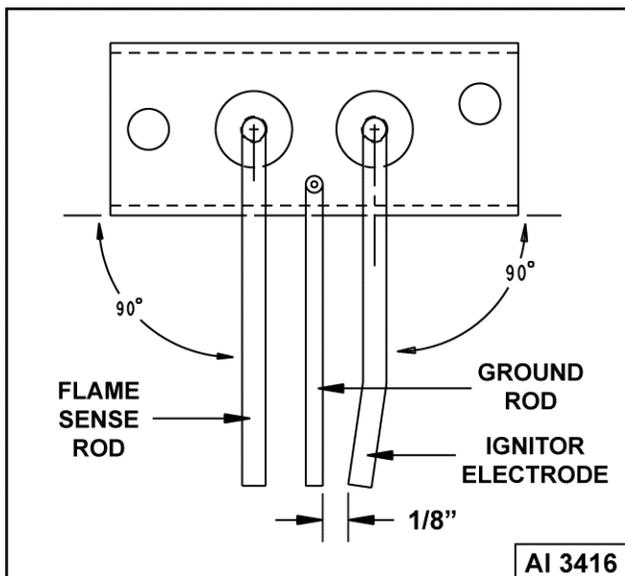


Fig. 20

## GAS SHUT-OFF VALVE (1SOL) - TILTING MODELS ONLY



### ⚠ WARNING

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



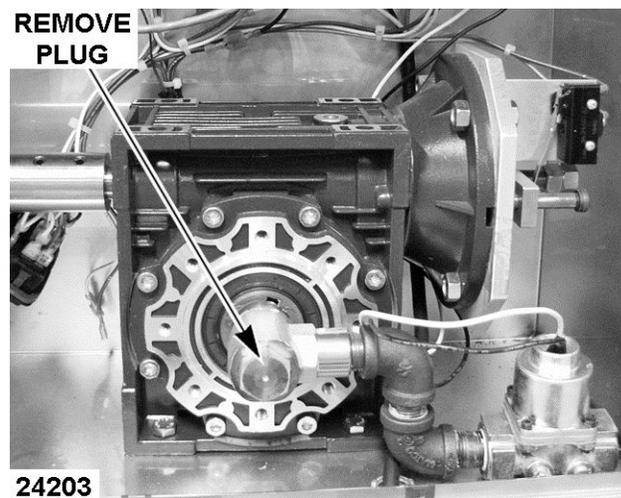
### ⚠ WARNING

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 CONTROL BOX COVER (TILTING).
2. Disconnect lead wires for gas shut-off valve (1SOL) at terminal strip in control box.
3. Remove piping from inlet side of valve.
4. Remove threaded plug (NPT) from the 1/2" swivel fitting secured to end of pivot shaft.



K20GLT Manual Tilt Shown

5. Remove gas shut-off valve from control box.
6. Remove piping from outlet side of valve.
7. Reverse procedure to install replacement gas shut-off valve and check for proper operation.

### ⚠ WARNING

Clean pipe threads and apply thread sealant that is suitable for use with propane gases.

## GEAR REDUCER - MANUAL TILTING MODELS



### ⚠ 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. Place kettle in the fully upright position and remove crank handle.
2. Support kettle from the bottom in some manner (2x4 etc). Raise it slightly to take the kettle arm weight off gear reducer.
3. Remove GAS SHUT-OFF VALVE (1SOL) - TILTING MODELS ONLY.
4. Remove tilt switch (2S) from bracket leaving the lead wires connected.
5. Remove bolts securing gear reducer and control box to kettle frame.

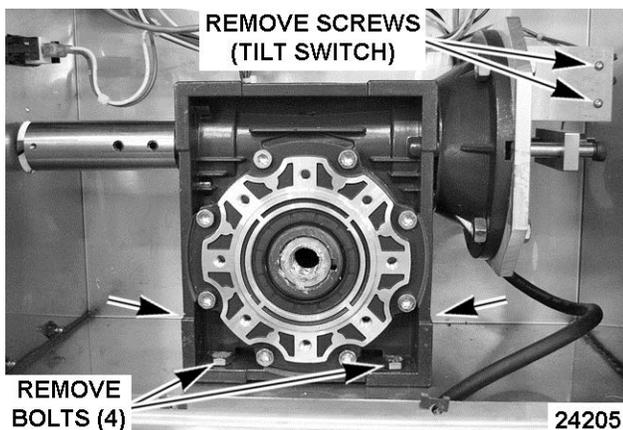


Fig. 22

6. Pull gear reducer away from kettle by working it off the kettle arm until free. Note that the kettle arm is keyed.

**NOTE:** Control box can be moved as necessary for ease of gear reducer removal.

7. Remove reducer shaft extension from gear reducer shaft.

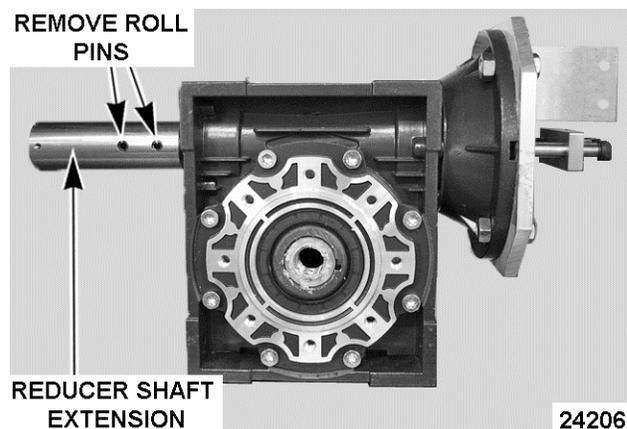


Fig. 23

8. Remove positive stop plate from gear reducer. Note that the positive stop shaft is keyed.

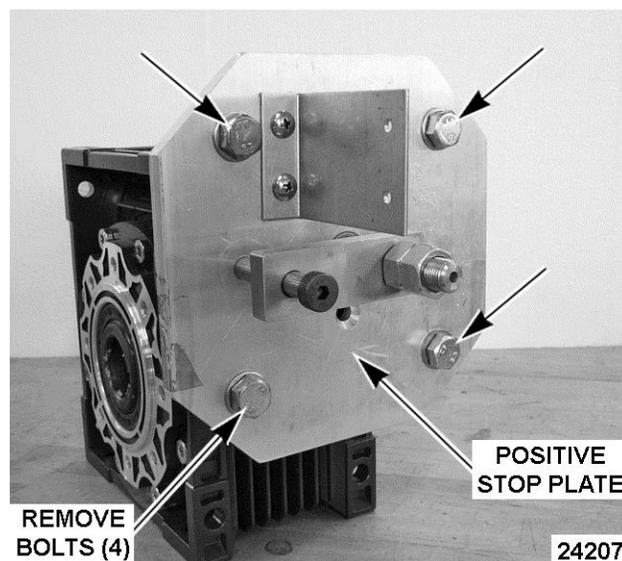


Fig. 24

9. Reverse procedure to install replacement gear reducer.
10. Perform KETTLE TILT ADJUSTMENT - MANUAL TILTING MODELS to check for proper operation.

## ELECTRICAL PANEL COMPONENTS - POWER TILTING OPTION ONLY



### ⚠ WARNING

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

1. Remove CONTROL BOX COVER (TILTING).
2. Disconnect lead wires from component being replaced.
3. Remove screws securing the component to panel.
4. Reverse procedure to install and check for proper operation.

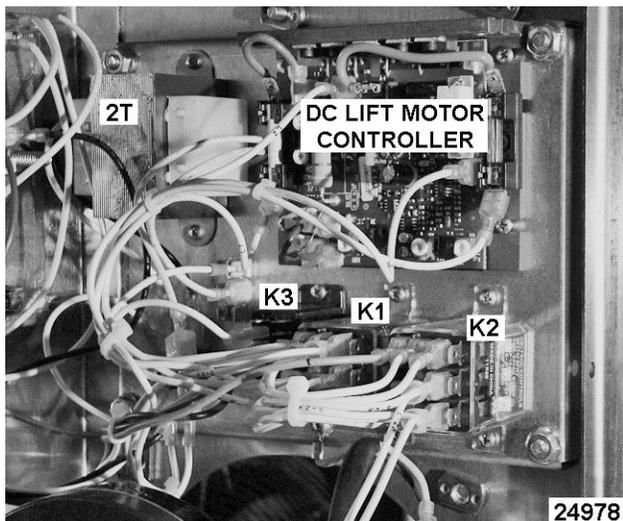


Fig. 25

## TILT SWITCH (2S) - POWER TILTING OPTION ONLY



### ⚠ WARNING

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

1. Place kettle in the fully upright position.
2. Remove CONTROL BOX COVER (TILTING).
3. Note lead wire locations and disconnect from tilt switch (2S).
4. Remove adjustment screws (2) securing switch bracket to mounting plate.

5. Remove mounting nuts and screws (2) securing tilt switch (2S) to bracket.
6. Reverse procedure to install tilt switch (2S).
7. Perform TILT SWITCH (2S) ADJUSTMENT - POWER TILTING OPTION ONLY.

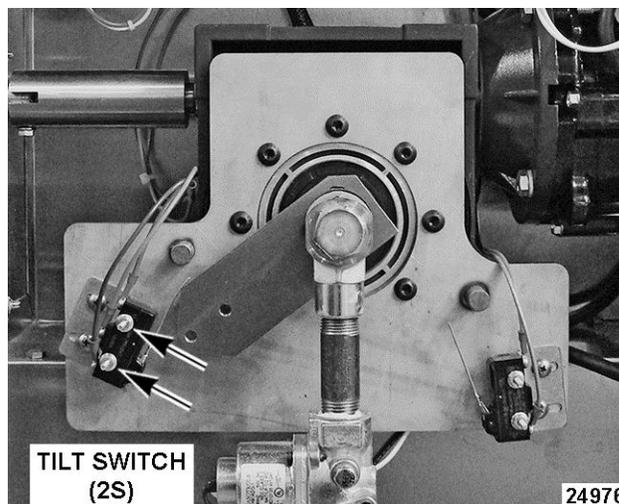


Fig. 26

## DOWN LIMIT SWITCH (3S) - POWER TILTING OPTION ONLY



### ⚠ WARNING

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

1. Place kettle in the fully upright position.
2. Remove CONTROL BOX COVER (TILTING).
3. Note lead wire locations and disconnect from down limit switch (3S).
4. Remove adjustment screws (2) securing switch bracket to mounting plate.
5. Remove mounting nuts and screws (2) securing down limit switch (3S) to bracket.
6. Reverse procedure to install down limit switch (3S).
7. Perform DOWN LIMIT SWITCH (3S) ADJUSTMENT - POWER TILTING OPTION ONLY.

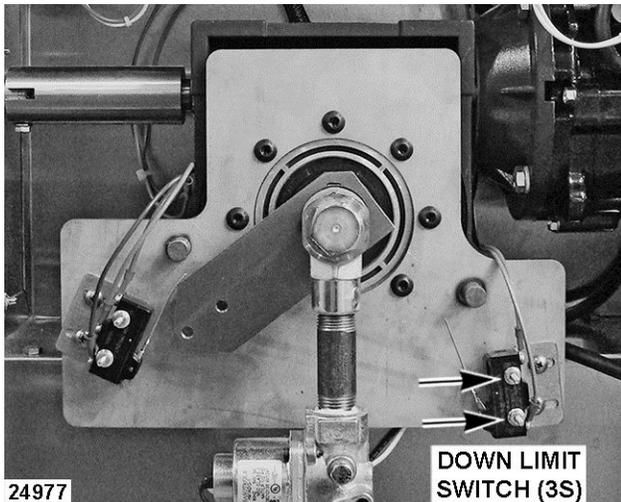


Fig. 27

**DC TILT MOTOR - POWER TILTING  
OPTION ONLY**



**WARNING**

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

1. Remove CONTROL BOX COVER (TILTING).
2. Remove motor cover from rear of control box.

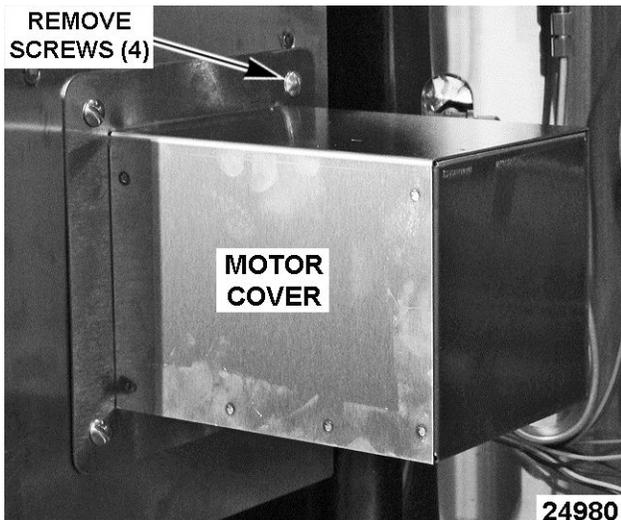


Fig. 28

3. Disconnect DC tilt motor lead wires (2) at quick disconnect terminals. The wires are labeled MTR positive (+) and MTR negative (-).
4. Disconnect motor ground wire.
5. Remove motor mounting bolts and lock washers from gear reducer flange.

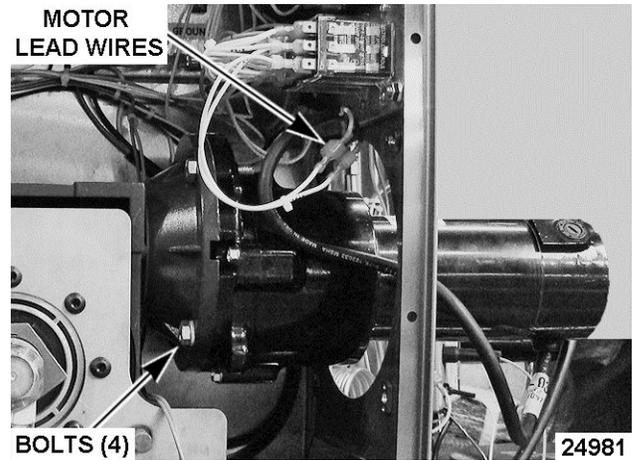


Fig. 29

6. Remove motor from gear reducer.
7. To install:
  - A. With drive key on shaft, install motor to gear reducer.
  - B. Re-connect motor lead wires.
  - C. Replace motor cover and control box cover.
8. Check for proper operation.

**GEAR REDUCER - POWER TILTING  
OPTION ONLY**



**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. Place kettle in the fully upright position.
2. Support kettle from the bottom in some manner (2x4 etc.). Raise it slightly to take the kettle pivot shaft weight off gear reducer.
3. Remove TILT SWITCH (2S) - POWER TILTING OPTION ONLY leaving the lead wires connected.

4. Remove DOWN LIMIT SWITCH (3S) - POWER TILTING OPTION ONLY leaving the lead wires connected.
5. Remove GAS SHUT-OFF VALVE (1SOL) - TILTING MODELS ONLY.
6. Remove DC TILT MOTOR - POWER TILTING OPTION ONLY.
7. Loosen set screw securing arm to kettle pivot shaft (keyed).
8. Remove e-clip securing arm to kettle pivot shaft. Note orientation and remove arm from kettle pivot shaft.

**NOTE:** If installed, note the number of washers in front of and behind the arm on the kettle pivot shaft for re-assembly.

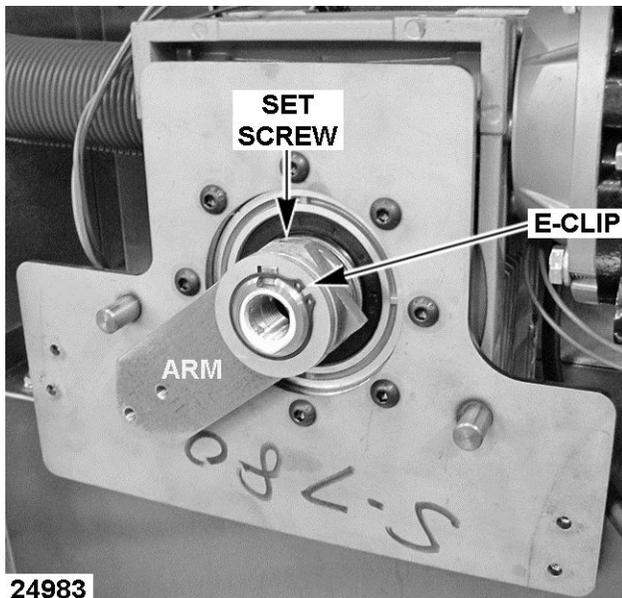


Fig. 30

9. Remove switch mounting plate screws (8) from gear reducer and lift plate away from gear reducer.

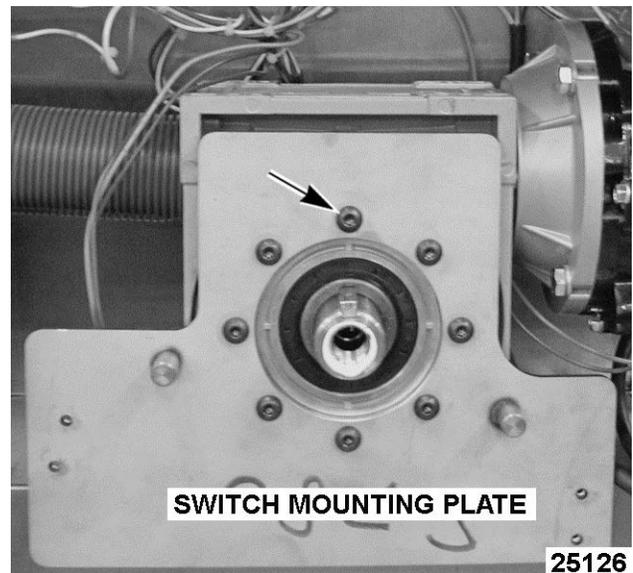


Fig. 31

10. Lift spacer ring off gear reducer. Retain for use on replacement gear reducer.

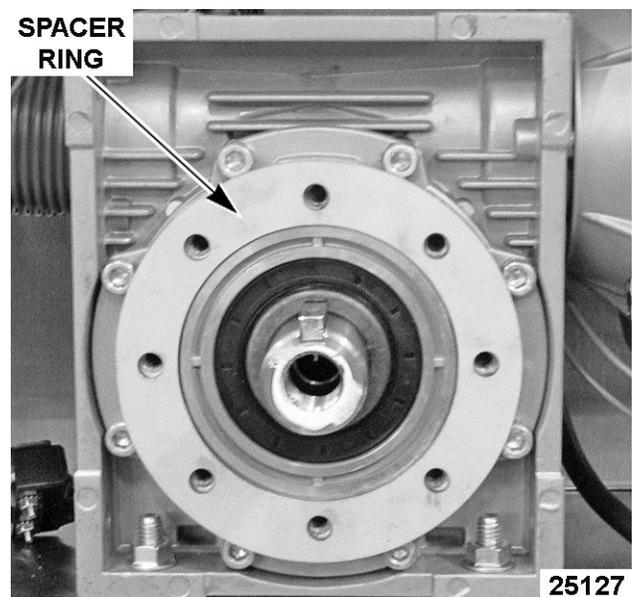


Fig. 32

11. Remove bolts (4) securing gear reducer and control box to kettle frame.

**NOTE:** A one piece nut plate assembly may be installed at the rear of gear reducer in place of individual mounting nuts to ease assembly.

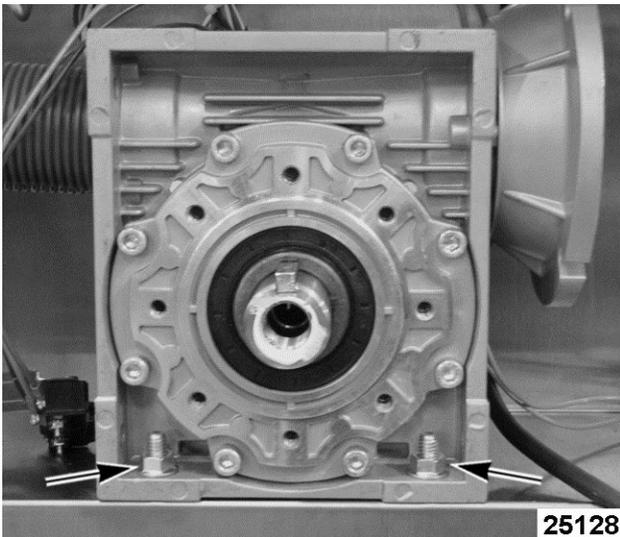


Fig. 33

12. Pull gear reducer away from kettle by working it off the kettle pivot shaft until free. Retain key for use on replacement gear reducer.

**NOTE:** Control box can be moved as necessary for ease of gear reducer removal.

13. Remove reducer shaft extension from gear reducer shaft (2 roll pins). Retain for use on replacement gear reducer.

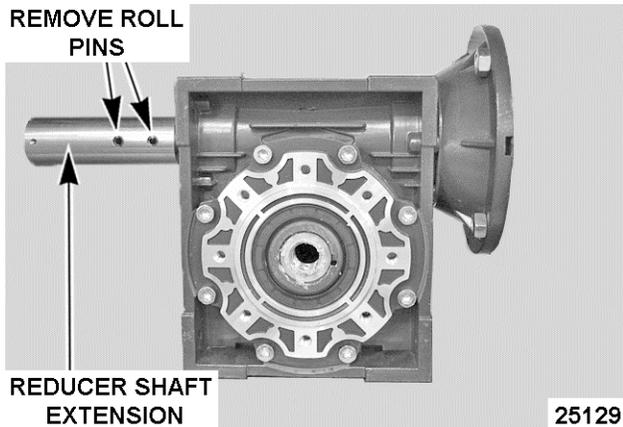


Fig. 34

14. Reverse procedure to install replacement gear reducer.
15. Perform TILT SWITCH (2S) ADJUSTMENT - POWER TILTING OPTION ONLY and DOWN LIMIT SWITCH (3S) ADJUSTMENT - POWER TILTING OPTION ONLY.

# SERVICE PROCEDURES 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.

## TEMPERATURE CONTROLLER TEST

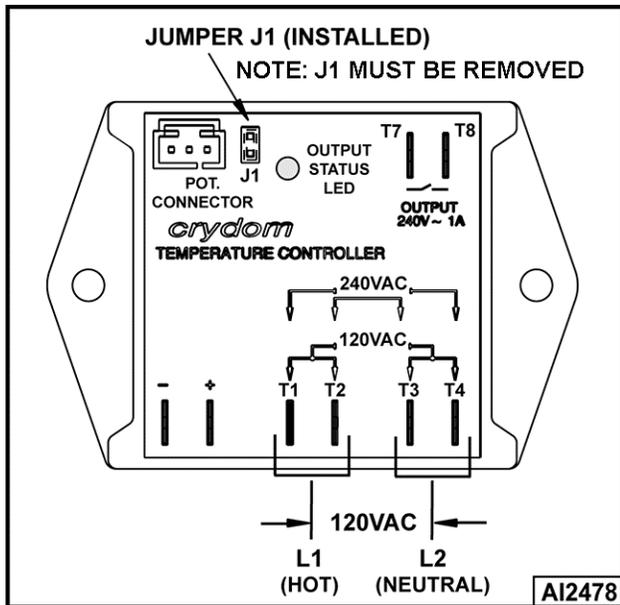


Fig. 35

- Place kettle in full upright position (tilting models only).
- 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.
- Access the temperature controller as outlined in ELECTRICAL PANEL COMPONENTS.
- 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.
- Re-connect power to the machine.
- Turn power switch on.
- Verify temperature controller is receiving 120VAC at terminals T1-T3 and T2-T4 and machine is properly grounded.
- Slowly turn temperature dial to the highest setting and monitor heat light over the full range of travel.

- Verify heat light (amber) comes on, blower motor comes on and transformer is powered (120VAC).
- 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.
- If heat light does not remain on or flashes momentarily as temperature setting is slowly increased, verify condition of potentiometer as outlined under POTENTIOMETER TEST.
- If heat light or blower motor is not coming on; or transformer is not powered.
  - Verify condition of thermocouple as outlined under 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.

- Check lead wire connections at the component that is not functioning (heat light, blower motor or transformer).
  - 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.
- Disconnect lead wire from terminal T7 on the controller.
    - Verify 120VAC between lead wire from T7 and ground. If correct, re-connect lead wire to terminal T7 and continue with procedure.
    - 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.

- 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.

### POTENTIOMETER TEST

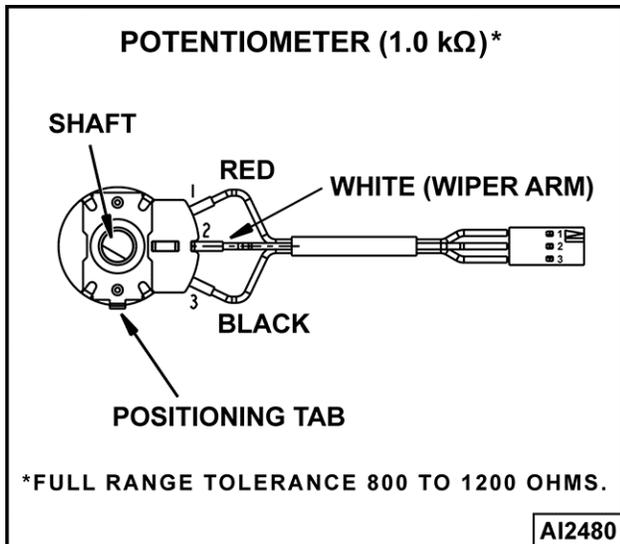


Fig. 36

1. Access control panel potentiometer by removing CORNER PANEL (TILTING) or SIDE PANEL (STATIONARY).
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.

### THERMOCOUPLE TEST

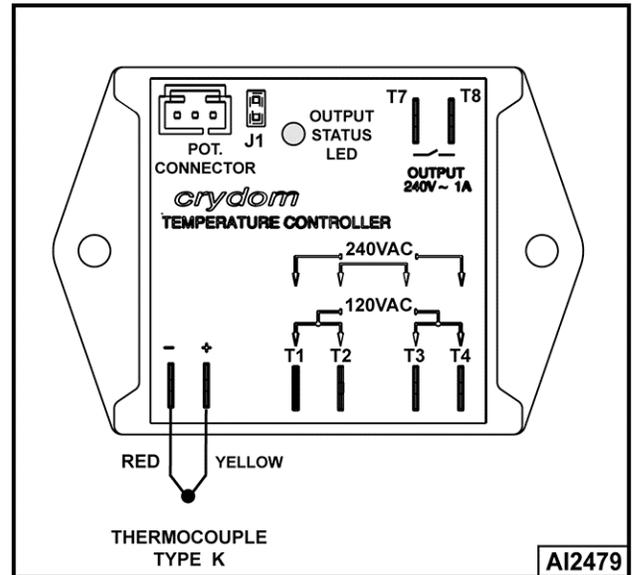


Fig. 37



#### WARNING

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

1. Access temperature controller as outlined in ELECTRICAL PANEL COMPONENTS.
2. Remove thermocouple lead wires from temperature controller.
3. Check the 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

TYPE K THERMOCOUPLE PROBE AND MILLIVOLT CHART	
TEMPERATURE	MILLIVOLT
300° F	6.094
350° F	7.207
400° F	8.316

**VENTING**

**NOTE:** This procedure outlines venting the reservoir jacket to remove air for proper heat transfer to kettle contents.

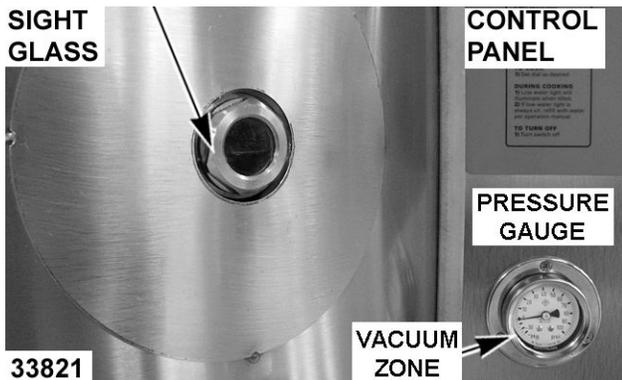


Fig. 38

1. With kettle at room temperature, verify pressure gauge is in vacuum zone and reading 25 to 30 in. Hg.

**NOTICE**

If vacuum is below minimum listed, air must be removed from reservoir jacket. Continue with procedure to vent as necessary.

2. Place kettle in full upright position (tilting models only).
3. Verify water level.

**NOTICE**

If Low water light is lit on control panel, add distilled water. Refer to FILLING THE RESERVOIR JACKET.

4. Turn power switch on.
5. Set temperature dial to highest setting. Allow kettle to heat until the jacket pressure reaches 10 PSI.

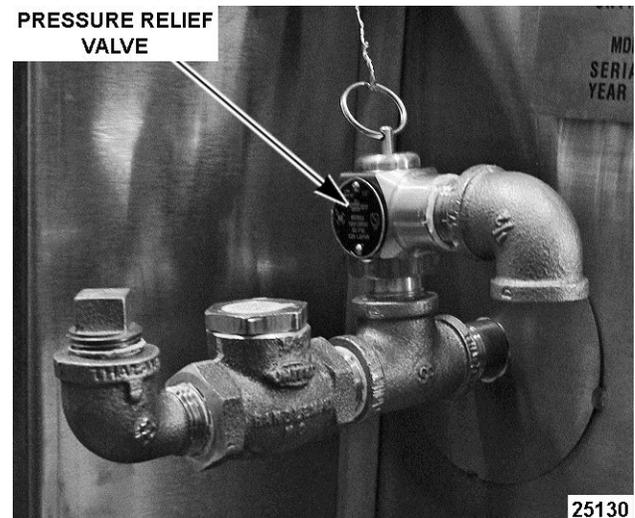
**WARNING**

**Pressure Relief Valve Exhaust. DO NOT connect to building water, gas, or steam supply. DO NOT block or restrict.**

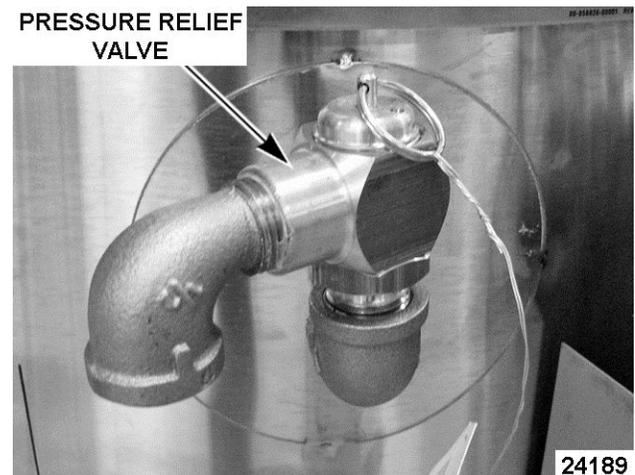
**WARNING**

**Hot steam. The kettle and its parts are hot. Use care when operating, cleaning or servicing the kettle.**

6. Open pressure relief valve for approximately 10 seconds. Allow valve to snap shut to seal.



Current Construction



Previous Construction

7. Turn power switch off and allow kettle to cool (room temperature).

Verify pressure gauge reading is within correct vacuum range.

- A. If reading is below minimum listed or will not maintain proper vacuum, check all threaded fittings extending from the kettle couplings for leaks and tightness.

- 1) Check pressure relief valve for leaks from poor valve seating or built up debris. Manually operate valve several times to reseal. Allow valve to snap shut to seal. Repeat venting procedure.
- 2) If pressure relief valve is malfunctioning, install a replacement and check for proper operation.

## FILLING THE RESERVOIR JACKET

**NOTE:** The reservoir water level must be maintained high enough to keep contact with the water level probe (LLCO). If low water light comes on during use, the visible level may be below the water level probe and must be replenished before heating can continue. The low water light will come on when kettle is tilted (tilting models only).

### NOTICE

When filling reservoir jacket, use only distilled water and heat transfer fluid. The ratio is 67% distilled water and the 33% heat transfer fluid.

**NOTE:** Jacket fill port plumbing: A pipe elbow and pipe plug are installed on current construction kettles to open the fill port. A manual valve with knob was installed on previous construction kettles to open the fill port.

### Partial Refill

1. Place kettle in full upright position (tilting models only).
2. Turn power switch on.

### NOTICE

If Low water light is lit on control panel, continue with procedure to refill.

3. Set temperature dial to lowest setting.

### ⚠ WARNING

**Pressure Relief Valve Exhaust. DO NOT connect to building water, gas, or steam supply. DO NOT block or restrict.**

### ⚠ WARNING

**Hot steam. The kettle and its parts are hot. Use care when operating, cleaning or servicing the kettle.**

4. Open pressure relief valve until reservoir jacket is completely vented. Allow valve to snap shut to seal.

5. If installed, open the manual valve on the fill port for the reservoir jacket at back of kettle.

- A. Remove pipe plug from the valve/pipe elbow to open the fill port.
- B. Insert funnel into the fill port and slowly add water until the level in the sight glass is 1/3 full. Low water light should be off (LLCO probe is satisfied). As necessary, vent the air from the jacket as outlined below:

- 1) If pressure relief valve is installed at a separate location from the fill port (two different openings in the jacket), open the pressure relief valve to provide a vent for the jacket air to escape and aid in filling. Allow valve to snap shut to seal.

- 2) If pressure relief valve and fill port are installed on the same plumbing assembly (single opening to the jacket), access the Pressure Switch (1PS), remove the compression nut from fitting near the tee and pull the tubing from the fitting.

- C. Turn power switch off.

6. Close manual valve (if installed) to prevent leaks. Hand tighten only.
7. Clean pipe plug threads and apply thread sealant. Install pipe plug into valve/pipe elbow opening to close the fill port. Tighten to prevent leaks.
8. Turn power switch on and verify low water light is not lit.
  - A. If low water light is lit, see Possible Causes for Low Water Light Lit in TROUBLESHOOTING.
  - B. If low water light problem is still not resolved see Possible Causes for Kettle Does Not Heat in TROUBLESHOOTING.
9. Remove air from reservoir jacket as outlined under VENTING.
10. Check kettle for proper operation.

**Complete Draining and Refill**



**⚠ WARNING**

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

**⚠ WARNING**

**Pressure Relief Valve Exhaust. DO NOT connect to building water, gas, or steam supply. DO NOT block or restrict.**

**⚠ WARNING**

**Hot steam. The kettle and its parts are hot. Use care when operating, cleaning or servicing the kettle.**

**NOTE:** Appearance of fluid will no longer be clear after usage in kettle.

1. Set temperature dial to lowest setting.
2. Open pressure relief valve until reservoir jacket is completely vented. Allow valve to snap shut to seal.
3. Remove pressure relief valve from kettle to vent the jacket and facilitate draining. Retain for reuse.
4. Remove draw-off valve or plug valve from kettle (stationary models only).
5. Place container under kettle to catch fluid and position it below the sight glass.
6. Remove sight glass using 36mm socket.
  - A. Stationary Models - It is recommended to use a drill pump to drain.
  - B. Tilting Models - Turn crank handle clockwise to tilt the kettle forward.
7. After draining is complete, place kettle in full upright position.
  - A. Install sight glass and tighten it to seal the internal O-ring to prevent leaks.
8. To Refill.
  - A. With kettle in full upright position.
  - B. If installed, open the manual valve on the fill port for the reservoir jacket at back of kettle.
  - C. Remove pipe plug from valve/pipe elbow to open the fill port.

- D. Insert funnel into the fill port and slowly add mixture of water and heat transfer fluid to the reservoir jacket. Fill the jacket according to the volumes listed in the table below. The level in the sight glass should be 1/3 full.

RESERVOIR JACKET VOLUME			
Model	Total Fluid Volume (GAL)	Water (GAL)	Heat Transfer Fluid (GAL)
K20GL, K20GLT	7.0	4.0	2.75
K40GL, K40GLT	6.0	3.75	2.25
K60GL, K60GLT	9.25	6.00	3.25

9. Close manual valve (if installed) to prevent leaks. Hand tighten only.
10. Clean pipe plug threads and apply thread sealant. Install pipe plug into valve/pipe elbow opening to close the fill port. Tighten to prevent leaks.
11. Install pressure relief valve to kettle.
12. Install draw-off valve or plug valve to kettle (stationary models only).
13. Re-connect power.
14. Turn power switch on and verify low water light is not lit.
  - A. If low water light is lit, see Possible Causes for Low Water Light Lit in TROUBLESHOOTING.
  - B. If low water light problem is still not resolved see Possible Causes for Kettle Does Not Heat in TROUBLESHOOTING.
15. Remove air from reservoir jacket as outlined under VENTING.
16. Check kettle for proper operation and leaks.

## BLOWER INLET PRESSURE CHECK ENDING AT SN 46-3028411

MANIFOLD PRESSURE  
PORT SCREW

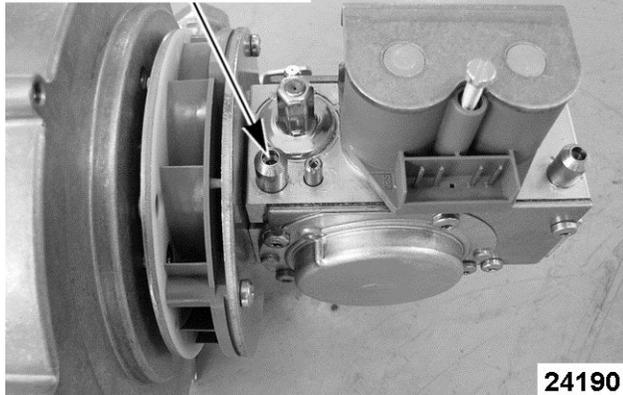


Fig. 41

1. Remove CORNER & REAR PANELS (TILTING) or SIDE & REAR PANELS (STATIONARY) to access blower & gas valve.
2. Remove electrical connector from gas valve.
3. Open manifold pressure port. Turn screw 1 to 2 turns CCW.
4. Attach U inclined manometer hose to manifold pressure port.
5. Turn Kettle on.
6. Measure blower vacuum pressure.
  - A. Blower low speed (during trial for ignition, 7 sec) - Vacuum pressure reading should be 0.27" W.C. to 0.30" W.C.
  - B. Blower high speed (15 sec. time delay) - Vacuum pressure should be 1.91" W.C. to 1.98" W.C.
  - C. If vacuum pressure reading is outside of the values stated above, check blower air inlet for debris buildup/obstructions. If found, turn power switch off. Remove debris and retest.
  - D. If vacuum pressure results are the same after retest, replace blower. Perform GAS VALVE/BLOWER INLET PRESSURE CHECK (108W).

## BLOWER INLET PRESSURE CHECK 2ND GENERATION STARTING AT SN 46-3028412

1. Remove CORNER & REAR PANELS (TILTING) or SIDE & REAR PANELS (STATIONARY) to access blower and gas valve.
2. Remove electrical connector from gas valve.
3. Open manifold pressure port. Turn screw 1 to 2 turns counter clockwise (1, Fig. 42).

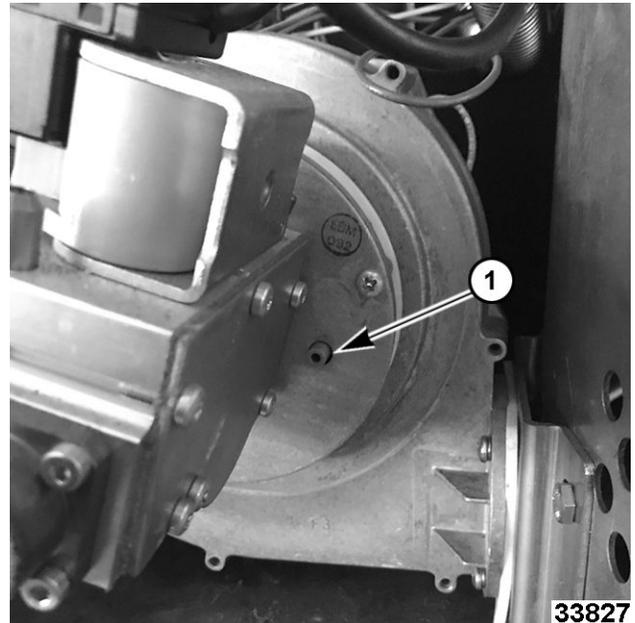


Fig. 42

4. Attach U inclined manometer hose to manifold pressure port.
5. Turn Kettle on.
6. Set-up burner with combustion analyzer.
  - A. Set motor speed control board settings of .06°F for Low Fire and 19°F for High Fire.
  - B. Turn adjustment screw on the gas valve counterclockwise 10 turns for propane or 15 turns for natural gas.
  - C. Turn temperature control to BOIL and turn on power switch to initiate ignition series.
  - D. After 10 minute warmup, begin sampling flue gas with a calibrated analyzer. (natural gas / propane).
    - Verify CO<sub>2</sub> reading is 10% - 12% (natural gas / propane).

- Verify combustion analyzer reports CO air free of less than 50 ppm. If not, turn adjustment screw counterclockwise to lower CO.
7. Measure blower vacuum pressure.
    - A. Blower low speed (during trial for ignition, 7 sec) - Vacuum pressure reading should be 0.06" W.C.
    - B. Blower high speed (15 sec. time delay) - Vacuum pressure should be .19" W.C.
    - C. If vacuum pressure reading is outside of the values stated above, check blower air inlet for debris buildup/obstructions. If found, turn power switch off. Remove debris and retest.
    - D. If vacuum pressure results are the same after retest, replace blower. Perform GAS VALVE/BLOWER INLET PRESSURE CHECK FOR 2ND GENERATION STARTING AT SN 46-3028412.

3. Attach slack tube manometer hose to inlet pressure port.
4. Attach U inclined manometer hose to manifold pressure port.
5. Turn kettle on.
6. Measure blower vacuum pressure.
  - A. Blower low speed (during trial for ignition, 7 sec.) - Vacuum pressure reading should be 0.27" W.C. to 0.30" W.C.
  - B. Blower high speed (15 sec. time delay) - Vacuum pressure should be 1.91" W.C. to 1.98" W.C.
  - C. If vacuum pressure reading is outside of the values stated above, check blower air inlet for debris buildup / obstructions. If found, turn power switch off. Remove debris and retest.
7. Reconnect power and turn gas supply on.

**GAS VALVE/BLOWER INLET PRESSURE CHECK (108W)**



**WARNING**

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

NOTE: Wattage is listed on blower label.

**MANIFOLD PRESSURE PORT SCREW**      **INLET PRESSURE PORT SCREW**

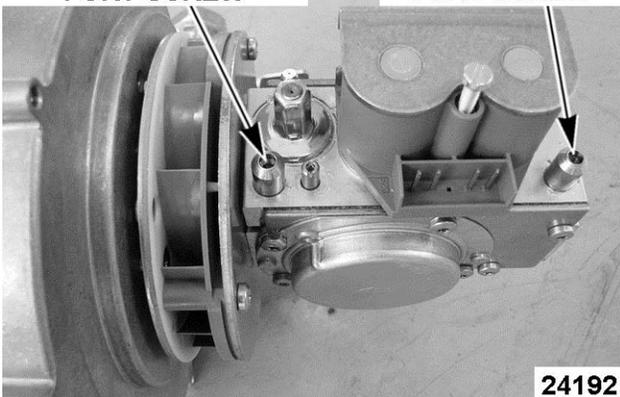


Fig. 43

1. Remove CORNER & REAR PANELS (TILTING) or SIDE & REAR PANELS (STATIONARY) to access blower & gas valve.
2. Open **inlet** pressure port. Turn screw 1 to 2 turns CCW.

**NOTE:** If static line pressure exceeds 14" W.C. (½ psig) the customer must supply and install a line pressure regulator to reduce the pressure below the maximum allowable for the valve.

8. Turn Kettle on.
9. Verify inlet pressure is 5-7" W.C. (natural) and 11-13" W.C. (propane). Refer to: Fig. 45.

**NOTICE**

If inlet pressure is excessive, contact the local gas supply company to adjust incoming line pressure.

10. Verify combustion blower motor speed, control board settings.
  - High Fire = F (1, Fig. 44)
  - Low Fire = 9 (2, Fig. 44)

**NOTE:** The head of the arrow cut out in the center will designate the rotary switch setting.

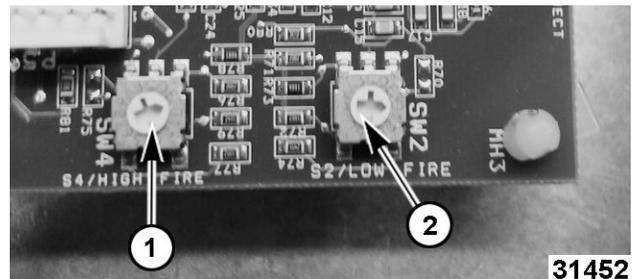


Fig. 44

**To Adjust:**

1. Turn S2 gas pressure (Fig. 45) fine adjustment screw 1/4 turn (CW to increase; CCW to decrease).
2. Turn power switch off then back on and check pressure readings. Repeat adjustment as required.
  - A. If unable to achieve correct pressure, then replace GAS VALVE. Preset S2 - gas pressure fine adjustment screw on the replacement valve. Turn screw fully *clockwise* until it stops.

Natural - Turn screw 15 turns *counterclockwise*.

Propane - Turn screw 9 turns *counterclockwise*.

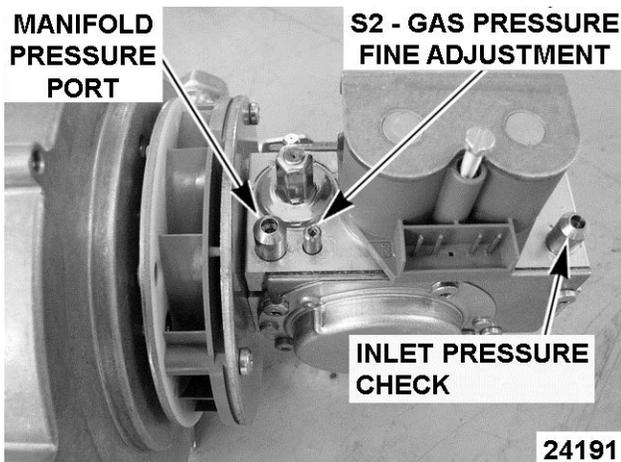


Fig. 45

**GAS VALVE/BLOWER INLET PRESSURE CHECK (130W)**



**WARNING**

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

**NOTE:** This check is for K series gas kettle models, K20GL, K20GLT, K40GL, K40GLT, K60GL, K60GLT with serial number 463023802 to present and built on 5/10/17 or after.

1. Remove CORNER & REAR PANELS (TILTING) or SIDE & REAR PANELS (STATIONARY) to access blower & gas valve.
2. Open inlet pressure port. Turn screw 1 to 2 turns CCW.

3. Attach slack tube manometer hose to inlet pressure port.
4. Attach U inclined manometer hose to manifold pressure port.
5. Turn kettle on.
6. Measure blower vacuum pressure.
  - A. Blower low speed (during trial for ignition, 7 sec.) - Vacuum pressure reading should be 0.27" W.C. to 0.30" W.C.
  - B. Blower high speed (15 sec. time delay) - Vacuum pressure should be 1.91" W. C. to 1.98" W.C.
7. Verify incoming gas line to kettle is a 3/4" ID commercial gas line.
8. Verify incoming gas supply line pressure is 7" Water Column (natural gas) and 11" Water Column (propane).

**NOTICE**

If inlet pressure is excessive, contact the local gas supply company to adjust incoming line pressure.

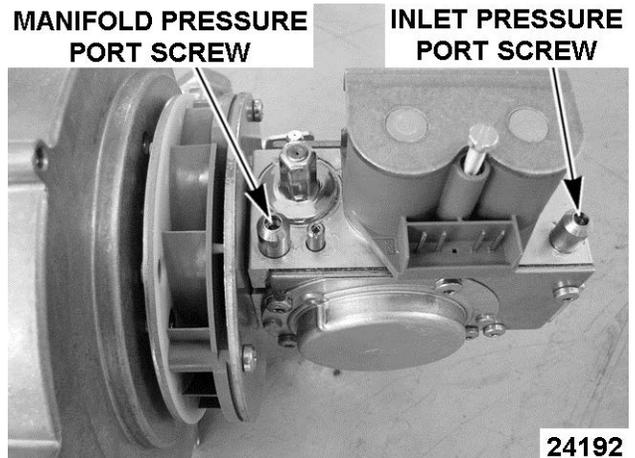


Fig. 46

9. Verify combustion blower motor speed, control board settings.

**NOTE:** The head of the arrow cut out in the center will designate the rotary switch setting. "F" and "8" are designations on the potentiometer.

- High Fire = F (1, Fig. 47)
- Low Fire = 8 (2, Fig. 47)

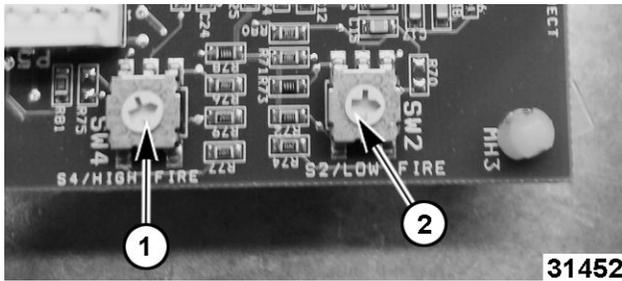


Fig. 47

10. Turn fine adjustment screw on gas valve clockwise all the way in. (Fig. 48)
11. Adjust gas valve fine adjustment screw for type of gas. (Fig. 48)
  - A. If unable to achieve correct pressure, then replace GAS VALVE. Preset S2 - gas pressure fine adjustment screw on the replacement valve. Turn screw fully clockwise until it stops.
    - **Propane:** Turn fine adjustment screw on gas valve counterclockwise 9 turns.
    - **Natural Gas:** Turn fine adjustment screw on gas valve counterclockwise 15 turns.

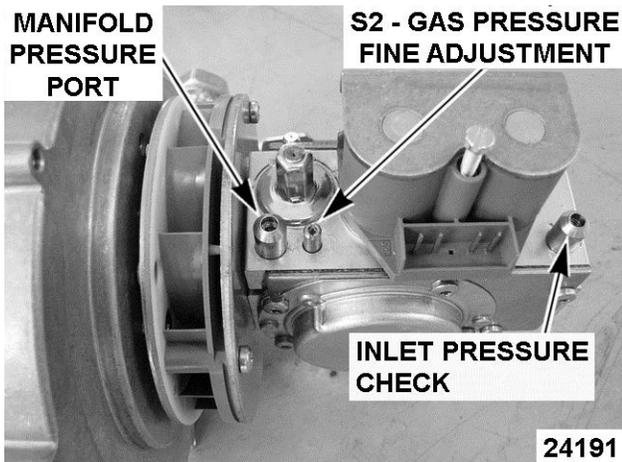


Fig. 48

12. Turn temperature control to “**BOIL**” and turn on power switch to initiate ignition series.
13. After a warmup of 10 minutes begin sampling flue gas with a calibrated analyzer.

**NOTICE**

Flue gasses must be checked with a combustion analyzer. Combustion limits are listed below. If the burner system fails to meet these requirements, please call Steam Technical Support immediately. Insert sampling probe into flue discharge, located towards the rear of kettle. Ensure the probe is inserted in such a way that the sample gas is not diluted. Place the probe 1-2 inches below the discharge.

14. Make further adjustments to fine adjustment screw if needed to obtain CO<sub>2</sub> reading of 10.5% to 12.0% (Natural Gas) or 12.0% to 13.5% (propane).
15. Verify combustion analyzer reports CO air free of less than 400ppm (.04%). If not, turn fine adjustment screw CW to lower CO.

**GAS VALVE/BLOWER INLET  
PRESSURE CHECK FOR 2ND  
GENERATION STARTING AT SN  
46-3028412**



**WARNING**

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

NOTE: Wattage is listed on blower label.

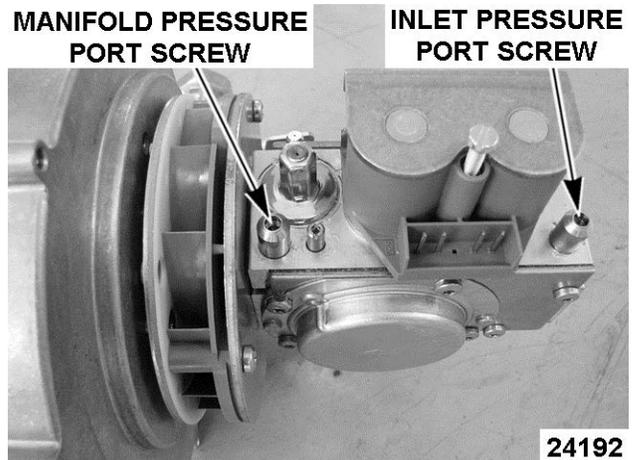


Fig. 49

1. Remove CORNER & REAR PANELS (TILTING) or SIDE & REAR PANELS (STATIONARY) to access blower & gas valve.
2. Open inlet pressure port. Turn screw 1 to 2 turns CCW.

3. Attach slack tube manometer hose to inlet pressure port.
4. Attach U inclined manometer hose to manifold pressure port.
5. Turn kettle on.
6. Measure blower vacuum pressure.
  - A. Blower low speed (during trial for ignition, 7 sec.) - Vacuum pressure reading should be 0.27" W.C. to 0.30" W.C.
  - B. Blower high speed (15 sec. time delay) - Vacuum pressure should be 1.91" W.C. to 1.98" W.C.
  - C. If vacuum pressure reading is outside of the values stated above, check blower air inlet for debris buildup / obstructions. If found, turn power switch off. Remove debris and retest.

7. Reconnect power and turn gas supply on.

**NOTE:** If static line pressure exceeds 14" W.C. (½ psig) the customer must supply and install a line pressure regulator to reduce the pressure below the maximum allowable for the valve.

8. Turn Kettle on.
9. Verify inlet pressure is 5-7" W.C. (natural) and 11-13" W.C. (propane).

**NOTICE**

If inlet pressure is excessive, contact the local gas supply company to adjust incoming line pressure.

10. Verify combustion blower motor speed, control board settings.
  - High Fire = F (1, Fig. 50)
  - Low Fire = 9 (2, Fig. 50)

**NOTE:** The head of the arrow cut out in the center will designate the rotary switch setting.

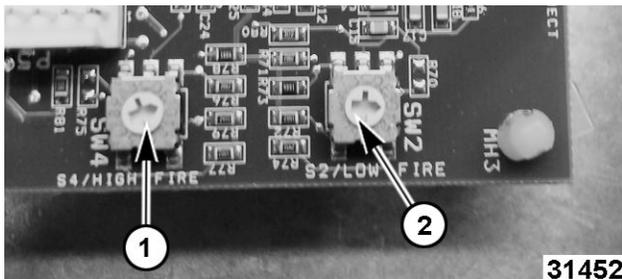


Fig. 50

**To Adjust:**

1. Turn S2 gas pressure fine adjustment screw 1/4 turn (CW to increase; CCW to decrease).

2. Turn power switch off then back on and check pressure readings. Repeat adjustment as required.
  - A. If unable to achieve correct pressure, then replace GAS VALVE. Preset S2 - gas pressure fine adjustment screw on the replacement valve. Turn screw fully *clockwise* until it stops.  
 Natural - Turn screw 15 turns *counterclockwise*.  
 Propane - Turn screw 9 turns *counterclockwise*.

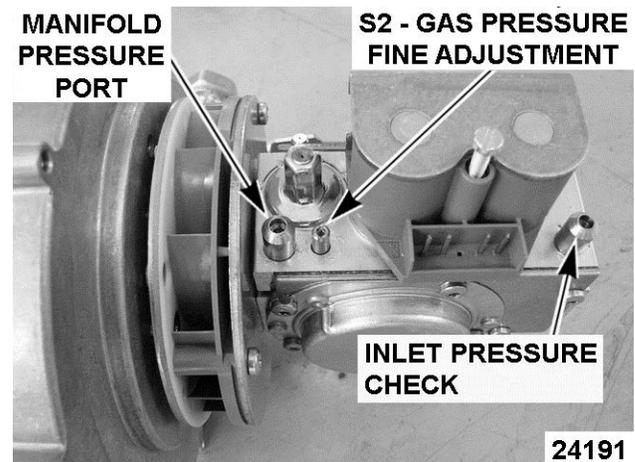


Fig. 51

**SPARK IGNITION TEST**

If the 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. 52**

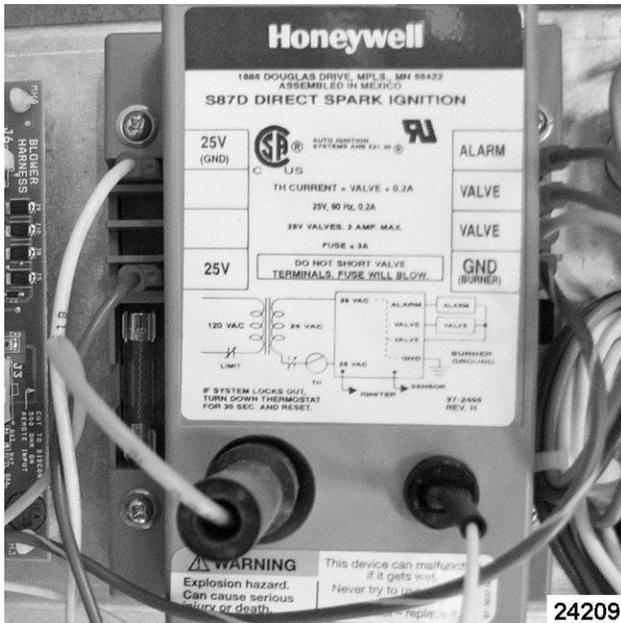


Fig. 52

**2ND GENERATION IGNITION MODULE SHOWN IN Fig. 53**

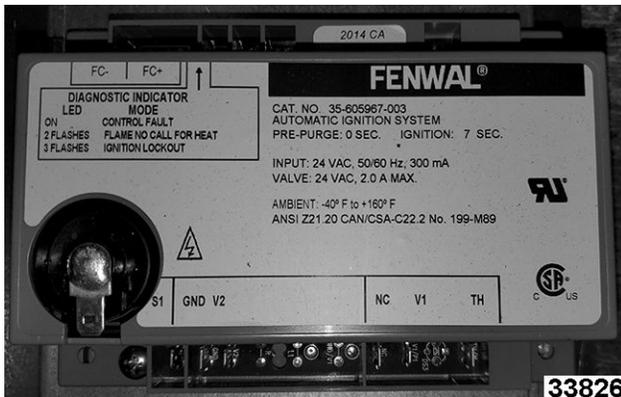


Fig. 53

1. Access ignition control module in KETTLE CONTROL AREA.
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. Access SPARK IGNITOR.
7. Verify the ground connection on spark ignitor is clean and secure. The ground connection should have good metal to metal contact.
8. Remove spark ignitor and check the following:
  - A. Inspect the 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 install a replacement spark ignitor.
  - B. Inspect the spark ignitor electrode and ground rod for contaminants, 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.

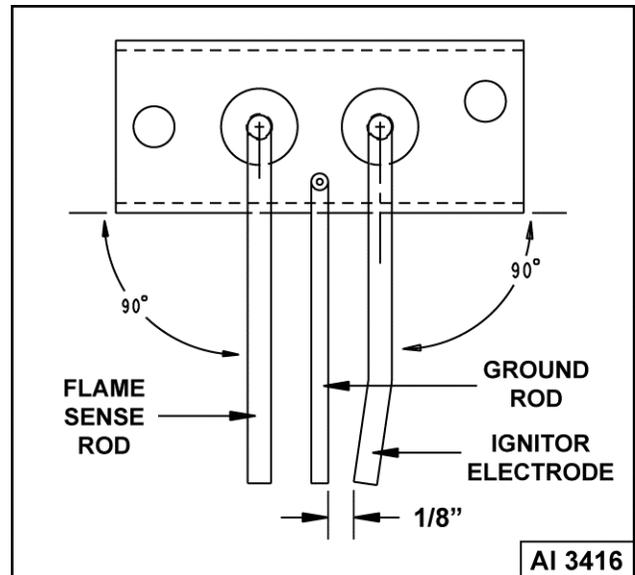


Fig. 54

- D. Check the ignitor wire connection for tightness and damaged insulation. If the ignitor wire appears to be damaged, then install a replacement ignitor wire.
9. Install spark ignitor and reconnect ignitor wire.

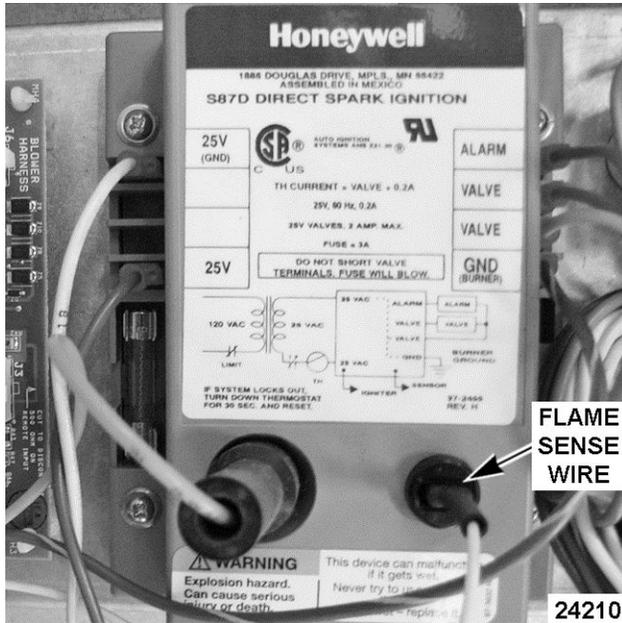
**FLAME SENSE CURRENT TEST**

**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.

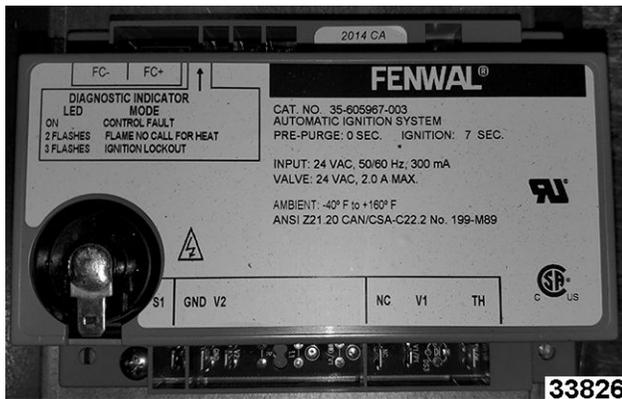
1. Turn the on/off switch off.
2. Access ignition control module in KETTLE CONTROL AREA.

**1ST GENERATION IGNITION MODULE SHOWN IN Fig. 55**



**Fig. 55**

**2ND GENERATION IGNITION MODULE SHOWN IN Fig. 56**



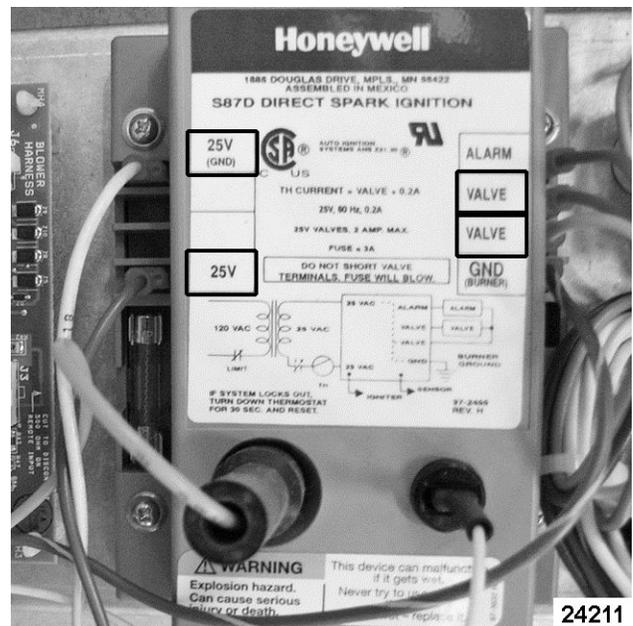
**Fig. 56**

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.

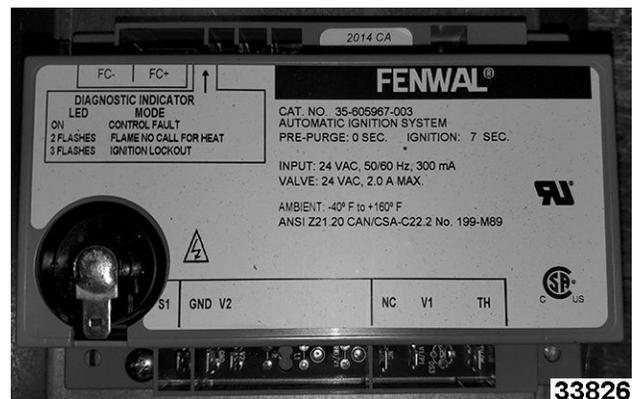
**IGNITION CONTROL MODULE TEST**

**1ST GENERATION IGNITION MODULE SHOWN IN Fig. 57**



**Fig. 57**

**2ND GENERATION IGNITION MODULE SHOWN IN Fig. 58**



**Fig. 58**

1. Access ignition control module in KETTLE CONTROL AREA.
2. Turn the on/off switch on and set the temperature dial to call for heat.
  - A. Power (1LT) light and heat light (3LT) come ON.
3. Ignition control module is energized and trial for ignition starts (6 seconds).
  - A. Verify 24VAC between terminals 25V & 25V GND. If voltage is not present, check transformer (1T) output voltage.
4. Spark voltage is sent from spark terminal to the spark ignitor electrode and sparking begins. At the same time, the ignition module contacts close to energize gas valve coils, allowing gas flow to the burner. The kettle burner will light, burner flame is sensed and spark voltage from spark terminal is removed (sparking stops).
  - A. Verify 24VAC between terminals valve and valve. If voltage is not present, replace ignition control module and check for proper operation.
5. As long as the temperature controller is calling for heat and the ignition control module is sensing a sufficient flame sense current, the valve contacts will remain closed.

**NOTE:** If kettle burner does not immediately light, the ignition control module continues sparking for 6 seconds, then locks out power to the gas valve (main valve remains closed). The ignition fail light comes ON. The module remains locked out until the on/off switch is cycled to reset the system and re-start the ignition trial cycle.

## TILT SWITCH (2S) ADJUSTMENT - MANUAL TILTING MODELS

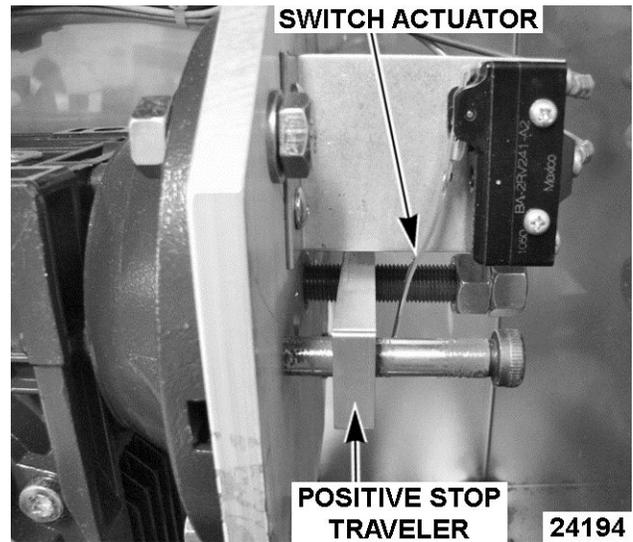


Fig. 59

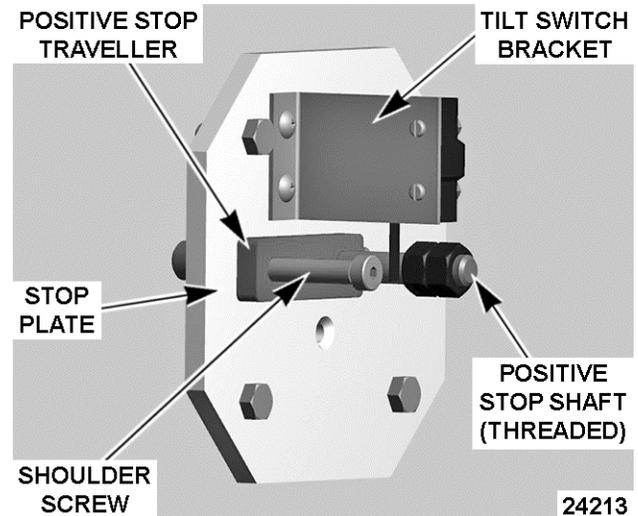
1. Remove CONTROL BOX COVER (TILTING) to access Tilt Switch (2S).
2. Kettle tilt operation - The switch actuator should be operated by the positive stop traveler when the kettle is fully upright.
3. If adjustment is necessary, bend the switch actuator to obtain the proper tilt switch operation.
  - A. Kettle fully upright - Tilt switch should be operated (N.O. held closed).
  - B. Kettle tilted approximately 10 degrees - Tilt switch should be un-operated (open).

## KETTLE TILT ADJUSTMENT - MANUAL TILTING MODELS

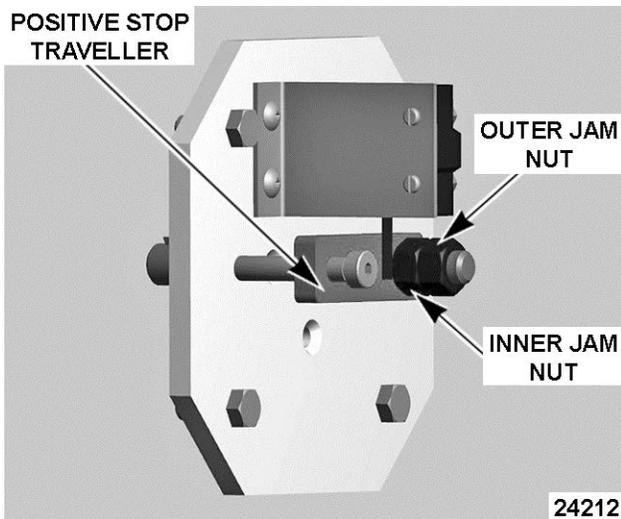
**NOTE:** Perform this procedure whenever the kettle is not returning to a horizontal position when upright, or when kettle is not tilting past 90° to empty contents.

1. With kettle fully upright, the top of kettle should be horizontal when viewed from either side.
2. Turn crank handle clockwise to tilt the kettle until it stops. Kettle should be tilted past 90° to allow contents to drain.
3. If adjustment is necessary, continue with procedure.
4. Remove CONTROL BOX COVER (TILTING).
5. Return kettle to fully upright position.

- A. The inner jam nut should be in solid contact with positive stop traveller.
- B. To adjust upright position (horizontal):
  - 1) Loosen outer jam nut 2 to 3 turns counterclockwise and turn the inner jam nut in the same direction and amount.
  - 2) Turn crank handle to position the top of kettle horizontally.
  - 3) Turn inner jam nut clockwise until it stops against the positive stop traveller. Tighten outer jam nut to secure the stop position.
- C. Turn crank handle to verify operation. Repeat adjustment as necessary.



**Kettle Fully Tilted - Traveller Contacts Stop Plate**



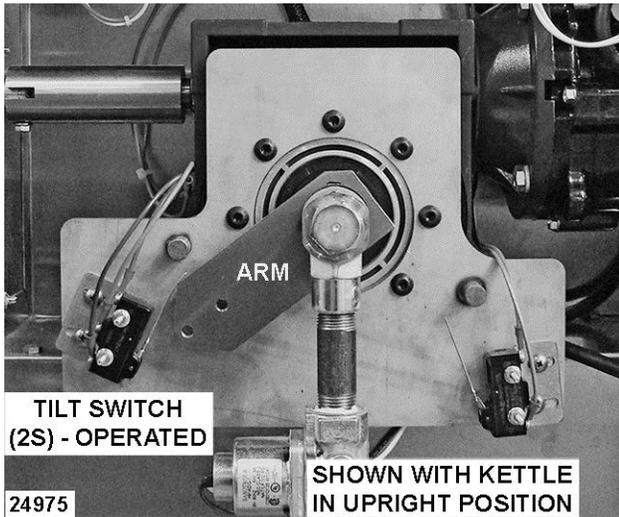
**Kettle Fully Upright - Traveller Contacts Inner Jam Nut**

- 3) Turn crank handle clockwise to tilt the kettle. The kettle should be tilted past 90° to empty its contents. The adjustment range is 92 to 95 degrees.
- 4) Turn positive stop traveller on the positive stop shaft (threaded) until it contacts the stop plate.
- 5) Adjust position of positive stop traveller as needed to align the shoulder screw mounting hole to the threaded hole in stop plate. Install shoulder screw.
- 6) Turn crank handle to verify operation. Repeat adjustment as necessary.
- 7) Install tilt switch bracket.

7. Install control panel cover.

- 6. Fully tilt the kettle until crank handle stops.
  - A. Verify positive stop traveller is in solid contact with stop plate.
  - B. To adjust fully tilted position:
    - 1) Remove shoulder screw from stop plate.
    - 2) Remove tilt switch bracket from stop plate.

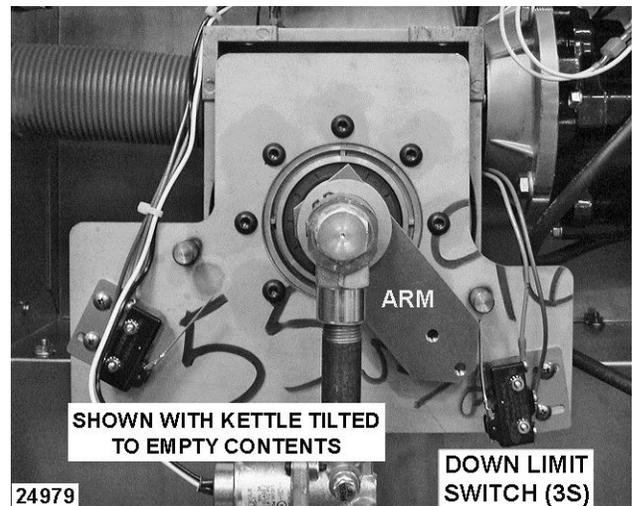
## TILT SWITCH (2S) ADJUSTMENT - POWER TILTING OPTION ONLY



**Fig. 62**

1. Remove CONTROL BOX COVER (TILTING) to access Tilt Switch (2S).
2. Kettle tilt operation - The switch actuator should be operated by the arm when the kettle is fully upright to open the N.C. contacts and stop travel.
3. If adjustment is necessary, loosen the tilt switch mounting bracket screws (2) and position the switch to obtain the proper tilt switch operation. The mounting bracket holes are slotted to allow for adjustment.
  - A. Kettle fully upright - Tilt switch should be operated (N.O. held closed).
  - B. Kettle tilted approximately 10 degrees - Tilt switch should be un-operated to remove power from control circuit through the N.O. contacts. The N.C. contacts should be closed to energize K3 and allow kettle to be raised when tilt motor switch is operated.
4. Tighten switch mounting bracket screws and check for proper operation.

## DOWN LIMIT SWITCH (3S) ADJUSTMENT - POWER TILTING OPTION ONLY



**Fig. 63**

1. Remove CONTROL BOX COVER (TILTING) to access Down Limit Switch (3S).
2. Kettle tilt operation - The switch actuator should be operated by the arm when the kettle is tilted past 90° to open the switch contacts and stop travel. The adjustment range is 92 to 95 degrees.
3. If adjustment is necessary, tilt kettle as described above and stop travel.
  - A. Loosen the down limit switch mounting bracket screws (2) and position the switch to obtain the proper down limit switch operation. The mounting bracket holes are slotted to allow for adjustment.
4. Tighten switch mounting bracket screws and check for proper operation.

## DC TILT MOTOR CONTROLLER TEST - POWER TILTING OPTION ONLY

1ST GENERATION CONTROLLER BOARD  
SHOWN IN Fig. 64

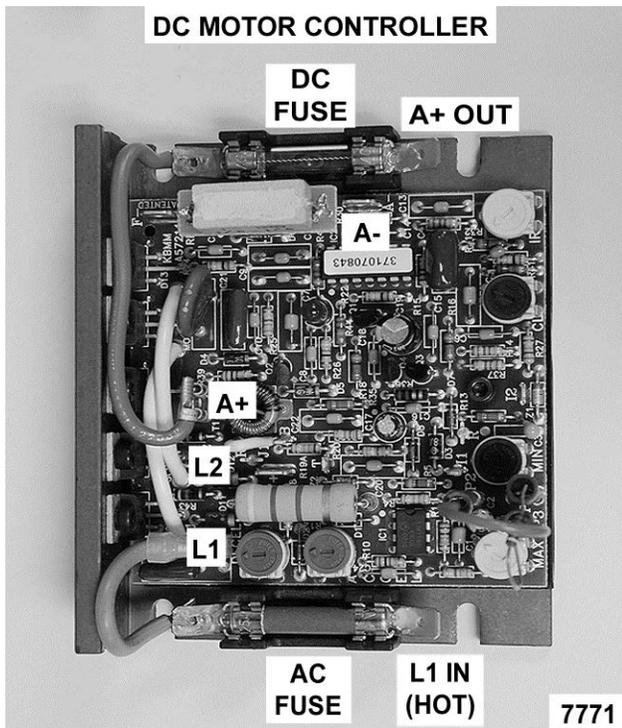


Fig. 64

**2ND GENERATION CONTROLLER BOARD SHOWN IN Fig. 65**

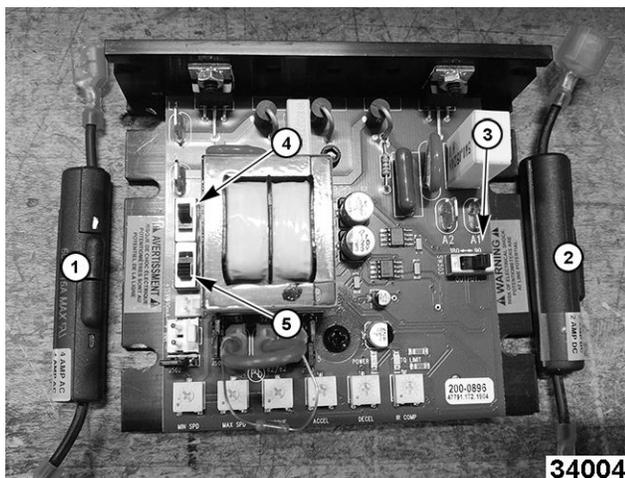


Fig. 65

- Fuse - 1, Fig. 65, 4 amp AC.
- Fuse - 2, Fig. 65, 2 amp DC.
- Switches
  - 4 and 5 switches shown in are both set at 115V.
  - 3 switch shown in Fig. 65 should be set at 90.

**Trimpots 2nd Generation Controller Board in Fig. 66**

- 1) MIN SPD set to 5 o'clock.

- 2) MAX SPD set to 5 o'clock.
- 3) TORQUE set to 5 o'clock.
- 4) ACCEL set to 12 o'clock.
- 5) DECEL set to 12 o'clock.
- 6) IR COMP set to 12 o'clock.



Fig. 66

1. Access DC tilt motor controller. Refer to: ELECTRICAL PANEL COMPONENTS - POWER TILTING OPTION ONLY.  
Set VOM to measure AC volts and connect meter leads at L1 & L2 on controller.
2. Turn power switch on.
3. Verify 120VAC at L1 & L2 on controller when the tilt motor switch (momentary) is operated to lower and raise kettle.
  - A. If voltage is present but kettle does not raise & lower, proceed to Step 5.
  - B. If voltage is not present refer to POWER TILTING OPTION ONLY.
4. Disconnect power to machine.
5. Set VOM to measure DC volts and connect VOM leads to terminals A + (positive) & A - (negative) on controller.
6. Re-connect power to the machine.
7. Verify 90VDC (approximate) from DC tilt motor controller when the tilt motor switch (momentary) is operated to raise & lower pan.
  - A. If voltage is present but pan does not raise, refer to POWER TILTING OPTION ONLY.

B. If voltage is not present and DC fuse is ok, turn power switch off and disconnect power to machine.

8. Install a replacement DC tilt motor controller and check for proper operation.

## SETTING RESISTOR ON CONTROLLER SPEED BOARD

### Dial in Resistor

1. Turn all dial settings (white squares) on board all the way to the left.
2. Dial in all settings (Fig. 67).
  - 1) MIN SPD set to 12 o'clock.
  - 2) MAX SPD set to 11 o'clock.
  - 3) TORQUE set to 11 o'clock.
  - 4) ACCEL set to 1 o'clock.
  - 5) DECEL set to 1 o'clock.
  - 6) IR COMP set to 12 o'clock.



Fig. 67

# ELECTRICAL OPERATION

## COMPONENT FUNCTION (STATIONARY & TILTING MODELS)

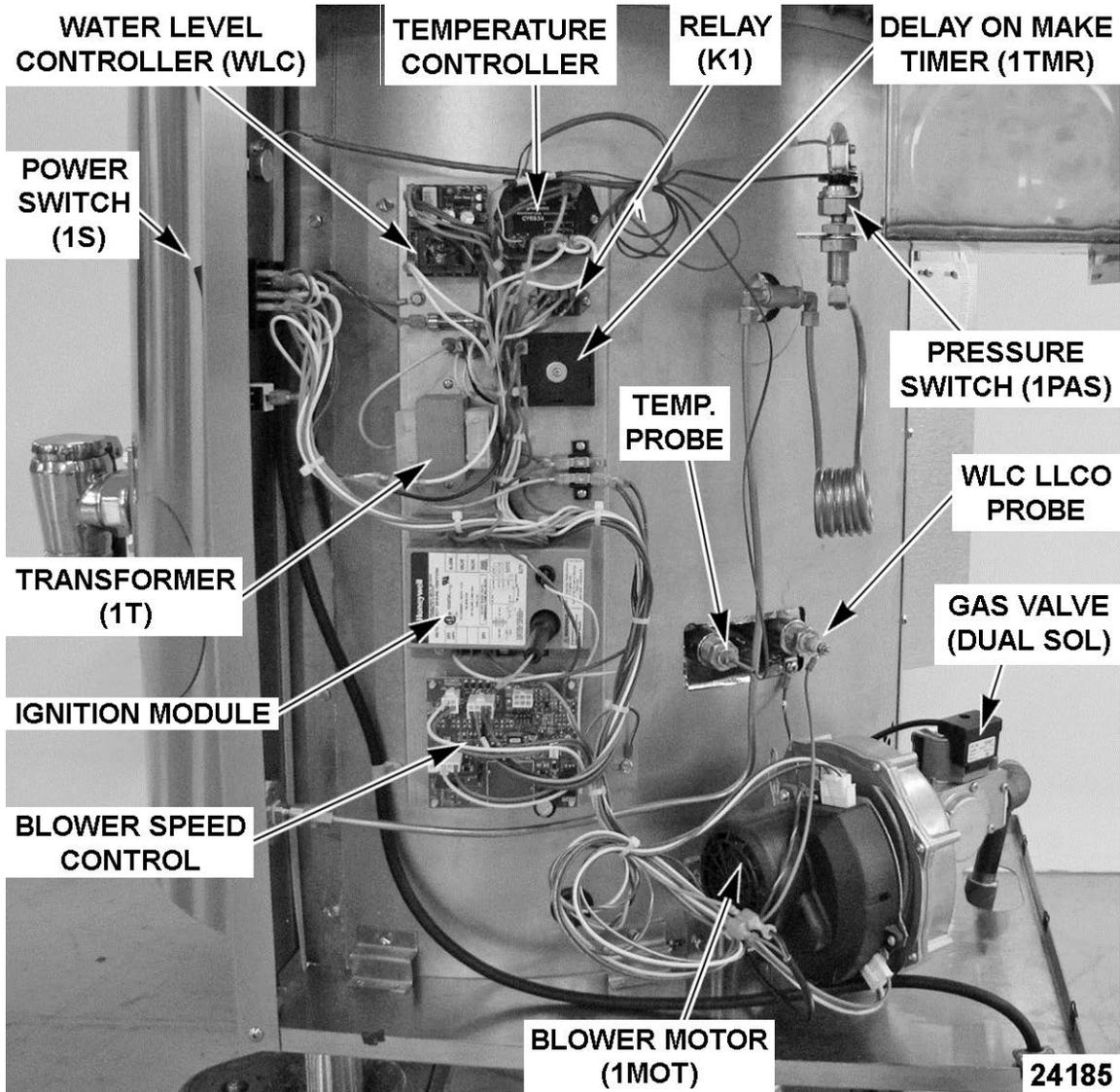
<b>Water Level Control (WLC LLCO) .....</b>	Low water level control. Monitors condition of the WLC LLCO water level probe. Protects kettle from a low water condition in the reservoir jacket.
<b>Probe, Water Level (LLCO) .....</b>	Low Level Cut-Off (LLCO) probe connected to WLC (LLCO). Controls power to heating circuit.
<b>Fuse, (1FU) .....</b>	Time delay 4 amp - 250v fuse. Located on L1 of machine supply power. Protects control circuitry from over-currents.
<b>Switch (1PAS), Pressure .....</b>	Pressure cut-out protection for the reservoir jacket. Range is 38 to 42 PSI. Removes power from control circuit if pressure in the jacket rises above switch setting.
<b>Transformer (1T) .....</b>	Steps down the supply voltage to 24VAC (control circuit voltage).
<b>Switch (1S), Power ...</b>	Controls 120VAC to kettle control circuit
<b>Switch (2S), Tilt .....</b>	Tilting models only. N.O. switch contacts are held closed when kettle is in the upright position and will open to remove power from control circuit when kettle is tilted. With kettle tilted, the N.C. switch contacts return to the closed position and energize K3 raise-enable relay coil.
<b>Temperature Controller .....</b>	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.
<b>Gas Shut-Off Valve (1SOL) .....</b>	Tilting models only. Additional solenoid valve to shut off the gas supply and remove line pressure on the special gas line fittings that run through gear box (when kettle is not in use). This increases seal life on the special fittings.
<b>Timer (1TMR), Delay on Make .....</b>	Provides a 15 second delay before energizing relay K4.
<b>Relay, K4 .....</b>	Relay contacts provide 24VAC input signal to blower speed control connector pins (J5.4 or J5.3) for blower motor low and high speed operation.
<b>Relay, Raise-Enable, K3 .....</b>	Power tilting option only. Allows kettle to raise when the tilt switch (2S) is un-operated ( kettle tilted) and K3 raise-enable N.O. contacts are closed. K3 relay coil is energized through the N.C. contacts on tilt switch (2S).
<b>Blower Speed Control .....</b>	Controls blower motor speed via a 24VDC pulse width modulation (PWM) signal to the blower motor. 24VAC voltage signal to the control and the control's switch settings (S1, SW2 & SW4) determine low speed or high speed blower operation.
<b>Blower Motor (1MOT) .....</b>	Draws gas from the gas valve outlet into the blower housing for the gas/air mixture delivered to the burner.
<b>Gas Valve .....</b>	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.
<b>Ignition Module .....</b>	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.
<b>Ignitor/Flame Sense .....</b>	Ignites the gas burner and senses the presence of flame. The flame presence generates a micro-amp flame sense current that is rectified to the ignition module.
<b>Light (1LT), Power ....</b>	Amber (AM) colored light. On when power switch is on.

- Light (2LT), Low Water** ..... Red (RD) colored light. On when water level in the reservoir jacket drops below water level (LLCO) probe.
- Light (3LT), Heat** ..... Amber (AM) colored light. On when temperature controller is calling for heat.
- Ignition Fail (4LT)** ..... Amber (RD) colored light. On when burner does not light.

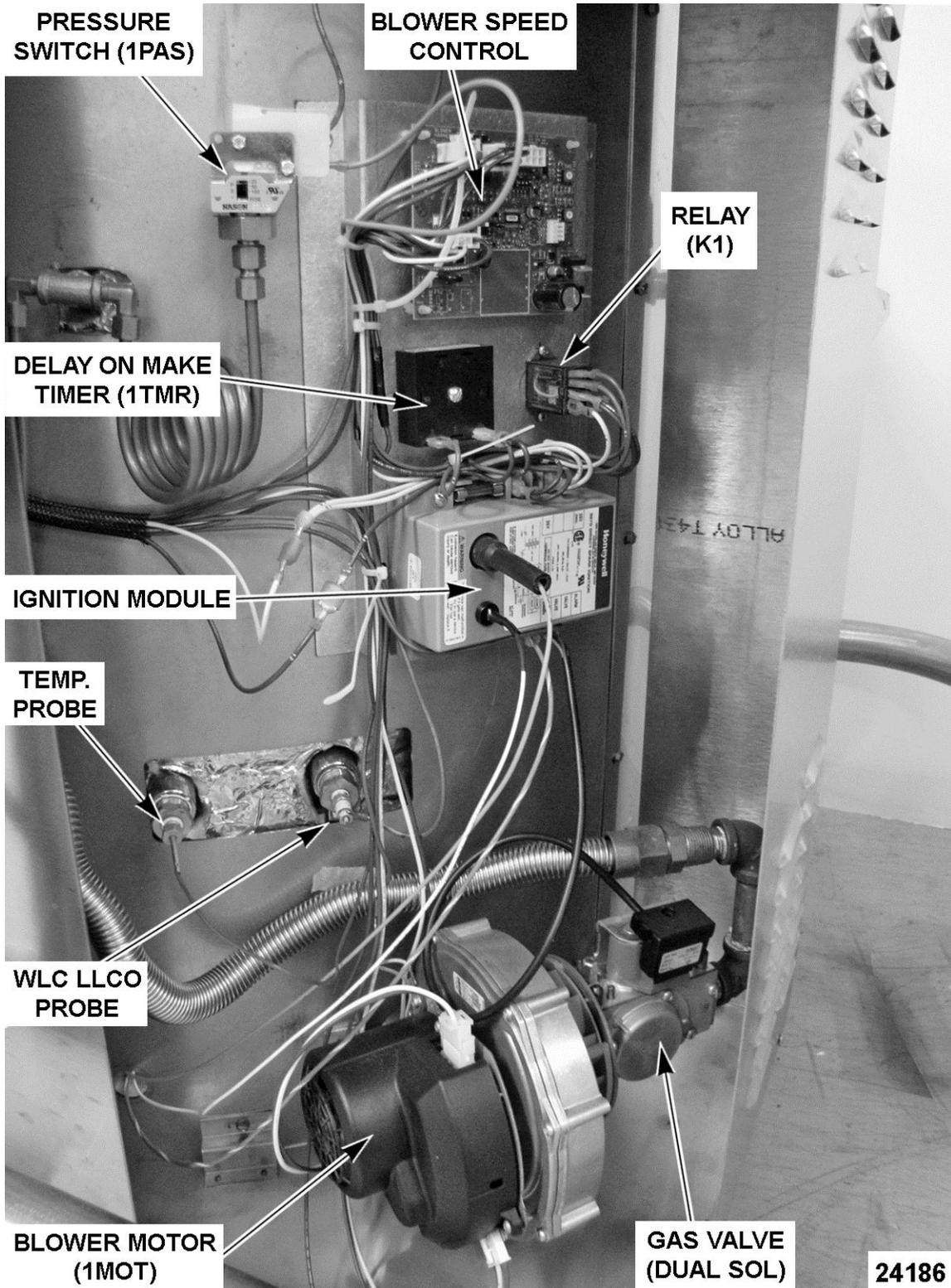
**COMPONENT FUNCTION (POWER TILTING OPTION)**

- DC Tilt Motor Controller** ..... Controls DC tilt motor operation to tilt the kettle and provides motor acceleration control each time the controller is powered. The controller outputs approximately 90VDC to power the motor.
- DC Tilt Motor** ..... Operates gear reducer to tilt the kettle. When the correct voltage polarity is applied through K1 contacts, motor rotates CW to raise the kettle. When reverse voltage polarity is applied through K2 contacts, motor rotates CCW to tilt the kettle. Rotation direction as viewed from shaft end.
- Transformer (2T)** ..... Steps down supply voltage to 24VAC (power tilt circuit voltage).
- Tilt Motor Switch (Momentary On/Off/On)** ..... Energizes K1 relay coil thru K3 raise-enable contacts (N.O.) to raise the kettle. Energizes K2 relay coil thru down limit switch contacts (N.C.) to tilt the kettle. The switch positions are: Center neutral (starting) position off; Momentary on - tilt kettle; Momentary on - raise kettle.
- Down Limit Switch** .... N.C. contacts function as down limit switch to remove power from K2 relay coil when kettle is fully tilted (travel stops).
- K1 "Up" Relay (3PDT)** ..... Supplies power to motorized tilt circuit to raise the kettle when 24VAC coil is energized.
- K2 "Down" Relay (3PDT)** ..... Supplies power to motorized tilt circuit to tilt the kettle when 24VAC coil is energized by the tilt control switch. The voltage polarity to the DC motor is reversed through K2 contacts to turn motor CW and tilt the kettle.

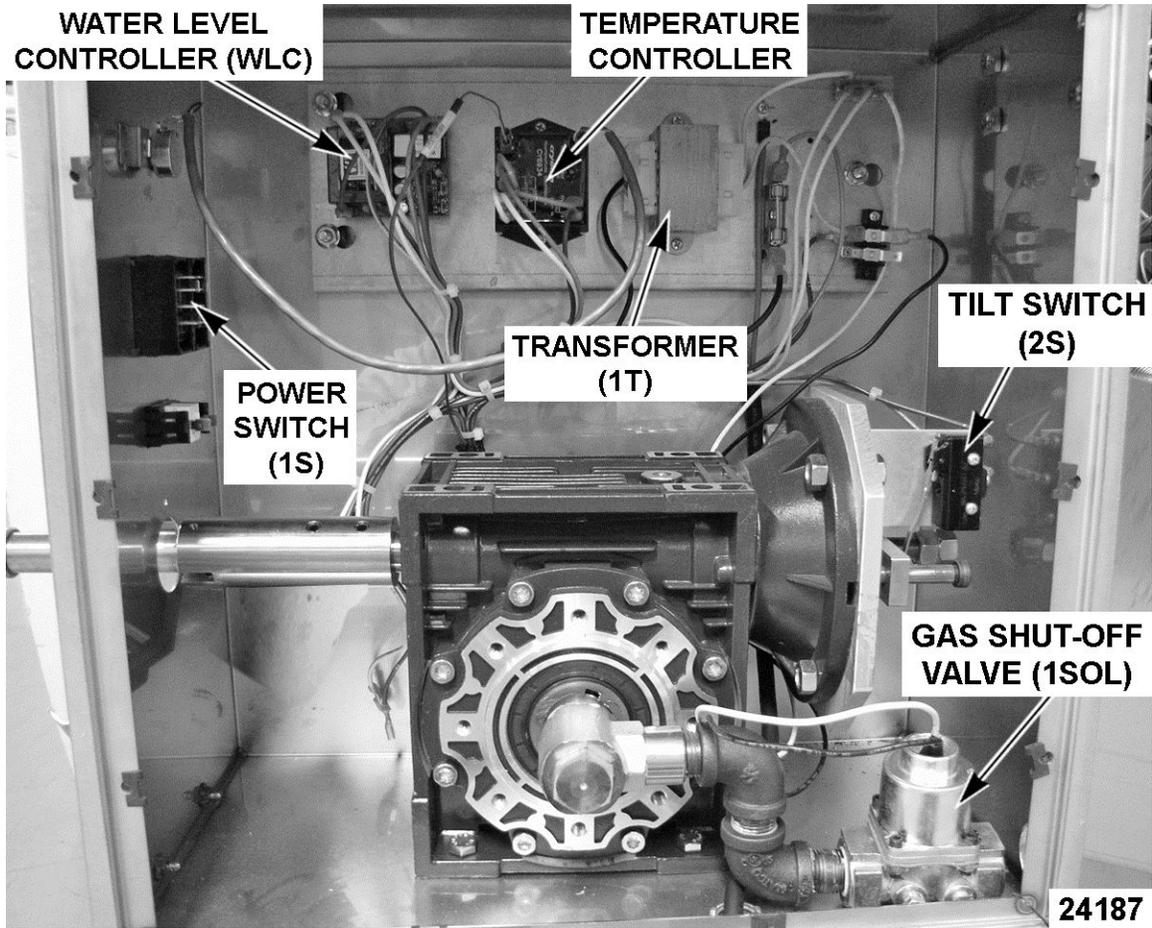
**COMPONENT LOCATION (STATIONARY & TILTING MODELS)**



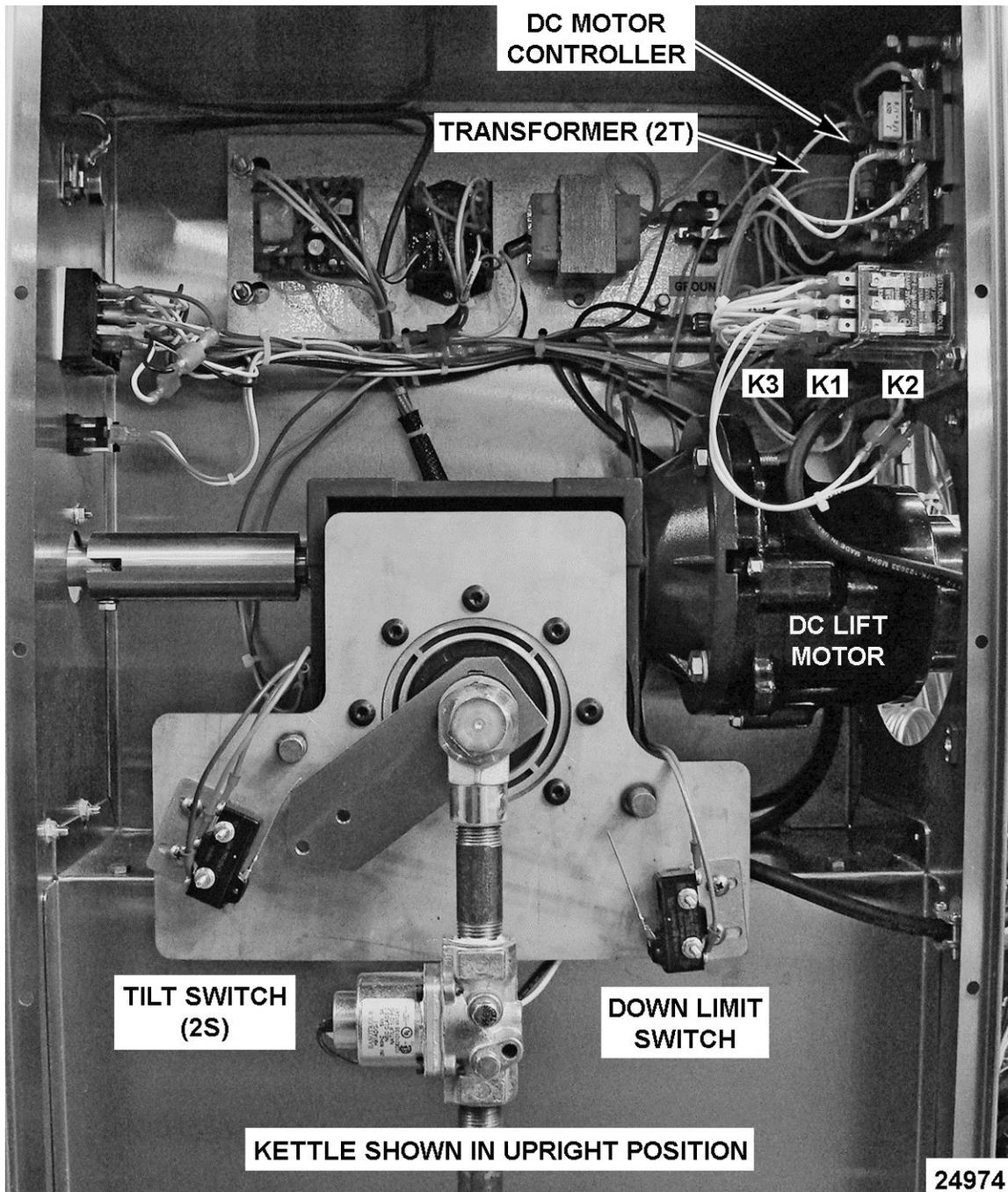
**K Series Stationary Gas Kettle - Controls Side**



K Series Tilting Gas Kettle - Controls Side



K Series Manual Tilt Gas Kettle - Control Box Area



K Series Gas Kettle with Power Tilt Option - Control Box Area

## SEQUENCE OF OPERATION (KETTLE CONTROL CIRCUIT)

Refer to Schematic diagram [AI3537](#) for stationary and manual tilting kettle models. Kettles with Power Tilt, refer to Sequence of Operation - Power Tilt Option and schematic diagram [AI3538](#).

1. Conditions.

- A. Kettle connected to 120VAC supply and is properly grounded.
- B. Kettle connected to correct gas supply and the supply is on.
- C. Power switch (1S) and light (1LT) (amber) are off.
- D. Low water light (2LT) (red) is off.

- E. Tilt switch (2S) operated, N.O. contacts held closed (kettle in the full upright position - tilting models only).
  - F. Pressure switch (1PAS) N.C. contacts are closed.
  - G. Temperature dial at lowest setting (potentiometer fully CCW).
    - 1) Internal relay N.O. contacts are open.
  - H. Kettle at room temperature.
2. Power switch ON.
- A. Power provided to the power tilt circuit (kettles with power tilt option only).
  - B. Power light (1LT) (amber) comes on.
  - C. 120VAC to water level controller through tilt switch (2S) N.O. contacts, held closed (tilting models only) and pressure switch (1PAS) N.C. contacts.
3. Water level control (WLC) energized.
- A. WLC LLCO probe satisfied (fluid in kettle reservoir jacket at proper level).
    - 1) LLCO LED comes on.
  - B. WLC LLCO N.C. contacts open. Low water light (2LT) (red) remains off.
  - C. WLC LLCO N.O. contacts close.
    - 1) 120VAC to temperature controller.
4. Set the temperature dial to call for heat (warm/simmer/boil).
- A. 120VAC output from T8 on temperature controller.
    - 1) Heat light (3LT) (amber) comes on.
    - 2) Blower motor (1MOT) energized.
    - 3) 120/24VAC transformer (1T) primary energized.
5. 24VAC is output from transformer (1T) secondary to heating circuit.
- A. Gas shut-Off Valve (1SOL) energized (tilting models only).
  - B. Delay on make timer (1TMR) is energized and begins 15 second count down before output from timer is turned on (will energize relay K4).

**NOTE:** Relay K4 contacts provide the 24VAC input voltage signal to the blower speed control to select blower motor speed (low or high). The blower speed control (J6.4) sends a corresponding 24VDC pulse width modulation (PWM) output signal to the blower motor for low or high speed operation.

- C. Blower speed control powered at connector J5.4 for blower motor low speed operation through K4 N.C. contacts. Blower at low speed.
  - D. Ignition module energized and trial for ignition begins. The module generates spark at ignitor and energizes the dual gas valve coils to open the valves and provide gas for the gas/air mixture to light the burner.
  - E. Burner lights and kettle heating begins. As long as the ignition control module senses a burner flame, the ignition module will continue to power the gas valve.
    - 1) If burner flame is not sensed within 7 seconds, ignition module stops sparking, de-energizes gas valve coils and enters lockout mode.
    - 2) If lockout, ignition fail light (4LT) (red) comes on.
  - F. Time expires on delay on make timer (1TMR). Timer output turns on and relay K4 is energized.
    - 1) K4 N.C. contacts open and remove power from blower speed control at connector J5.4 (low speed blower operation).
    - 2) K4 N.O. contacts close and apply power to blower speed control at connector J5.3 (high speed blower operation). Blower at high speed.
6. Kettle heat cycles with the temperature controller.
7. On tilting models only, when kettle is tilted to empty contents the tilt switch (2S) N.O. contacts open to remove power from control circuit. Tilt switch (2S) contacts will close when the kettle is returned to full upright position and resume normal operation.
- A. Power light (1LT) (amber) remains on.
8. Kettle heating will continue to cycle with the temperature controller until the temperature dial is turned fully CCW or power switch is turned OFF.

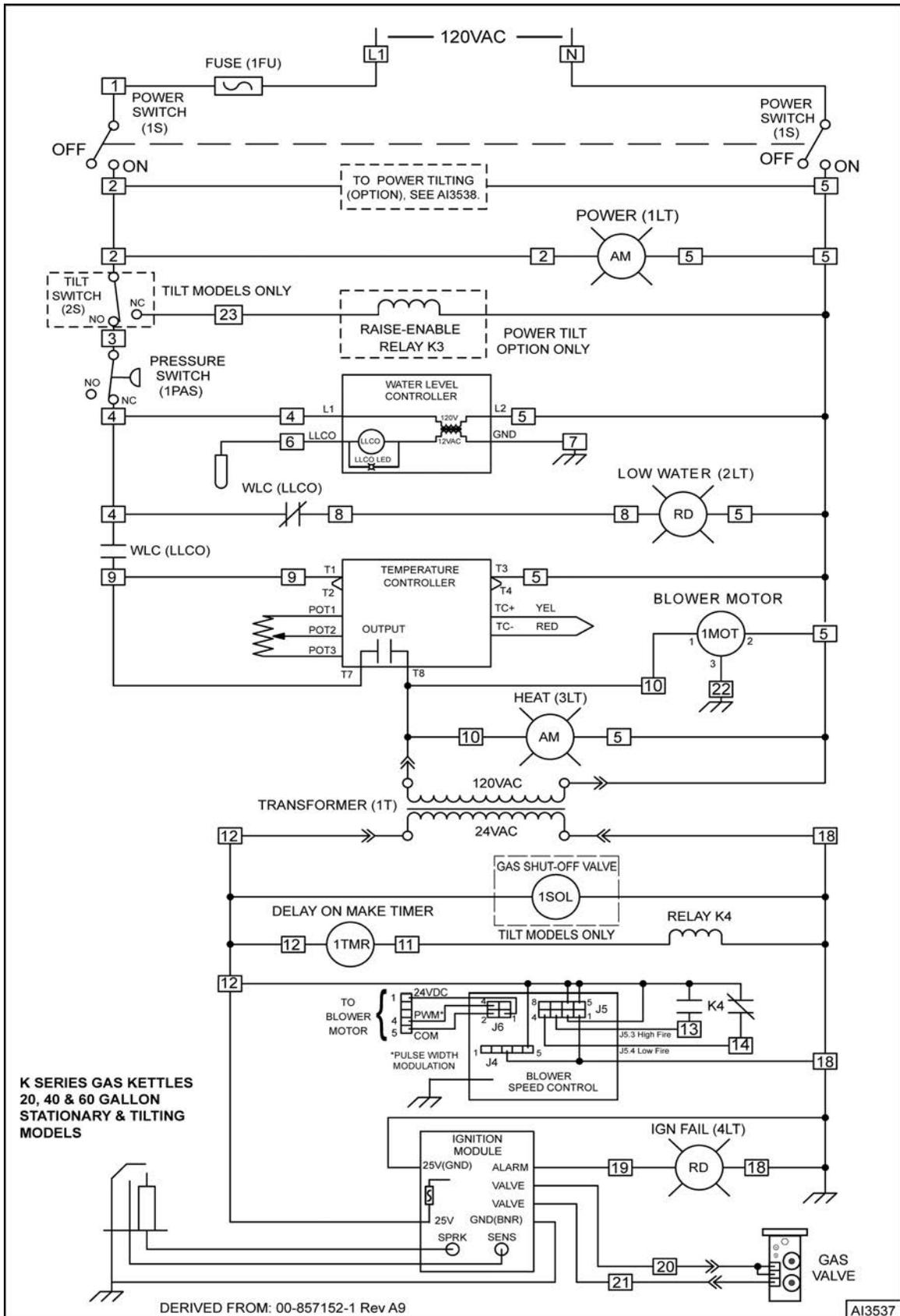
## SEQUENCE OF OPERATION (POWER TILTING OPTION)

Refer to schematic diagram AI3538 for power tilting option and AI3537 for the main control circuit diagram that includes Tilt Switch (2S) and Raise-Enable relay (K3).

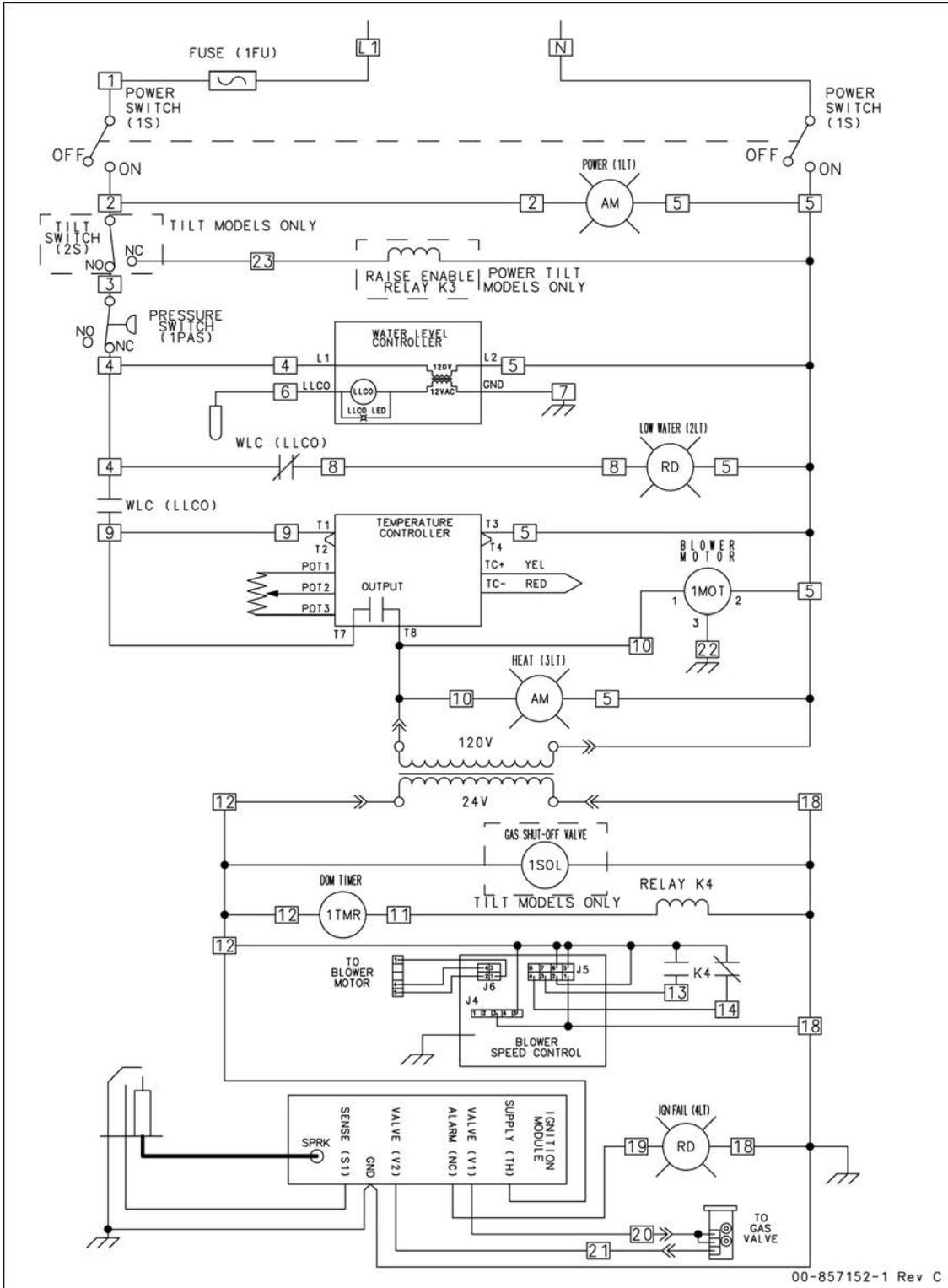
1. Conditions.
    - A. 120VAC to kettle, polarity is correct, and is properly grounded.
    - B. Power switch off.
    - C. Tilt motor switch off (center position).
    - D. Kettle in the upright position.
    - E. Tilt switch (2S) operated, N.O. contacts held closed (kettle arm engages switch actuator).
    - F. K3 raise-enable relay N.O. contacts are open (raise-enable relay coil is de-energized).
    - G. Down limit switch N.C. contacts closed.
  2. Power switch on.
    - A. Power light (1LT) (amber) comes on.
    - B. 120/24VAC transformer (2T) energized. Power to tilt motor switch common terminal.
- NOTE:** If the temperature dial is set to call for heat, the ignition trial starts and module begins sparking at ignitor.
3. Operate tilt motor switch to tilt the kettle (momentary on - tilt).
    - A. K2 down relay coil is energized through down limit switch N.C. contacts.
      - 1) K2 4/7 N.O. contacts close.
      - 2) K2 9/6 N.O. contacts close.
      - 3) K2 8/5 N.O. contacts close.
    - B. 120VAC to DC tilt motor controller through K2 4/7 N.O. contacts.
      - 1) 90VDC output is activated at terminals A + (positive) and A - (negative). DC tilt motor powered through K2 9/6 N.O. contacts, K2 8/5 N.O. contacts and kettle tilts.
    - C. Kettle tilted approximately 10° and tilt switch (2S) is un-operated (kettle arm disengages from switch actuator). 2S contacts change position from N.O. to N.C.
  4. Kettle reaches full tilt position at approximately 95° and the down limit switch is operated. The down limit switch N.C. contacts open and K2 relay coil is de-energized.
    - A. The three sets of K2 N.O. contacts return to the open position. Power is removed from the DC motor controller, the DC tilt motor and kettle travel stops.
  5. Operate tilt motor switch to return the kettle upright (momentary on - raise).
    - A. K1 up relay coil is energized through raise-enable (K3) closed contacts.
      - 1) K1 4/7 N.O. contacts close.
      - 2) K1 9/6 N.O. contacts close.
      - 3) K1 8/5 N.O. contacts close.
    - B. 120VAC to DC tilt motor controller through K1 4/7 N.O. contacts.
      - 1) 90VDC output is activated at terminals A + (positive) and A - (negative). DC tilt motor powered through K1 9/6 N.O. contacts, K1 8/5 N.O. contacts and kettle raises.
      - 2) After the kettle leaves full tilt position, the down limit switch is un-operated and the switch contacts return to N.C. position. The direction of kettle travel can then be reversed (if needed) by tilt motor switch.
  6. Kettle reaches full upright position, the tilt switch (2S) is operated (kettle arm engages switch actuator). 2S contacts change position from N.C. to back to N.O.
    - A. With 2S N.O. contacts closed - power restored to control circuit and heating resumes.
    - B. With 2S N.C. contacts open - Raise enable-relay coil (K3) is de-energized and K3 N.O. contacts open. K1 up relay coil is de-energized.

- C. The three sets of K1 N.O. contacts return to the open position. Power is removed from the DC motor controller, the DC tilt motor and kettle travel stops.

**SCHEMATIC DIAGRAM (STATIONARY & TILTING MODELS)**



**Fig. 72**



00-857152-1 Rev C

K SERIES GAS KETTLES 20, 40, & 60 GALLON STATIONARY & TILTING MODELS

DERIVED FROM: 00-857152-1 REV. C

AI4768

Fig. 73

**SCHEMATIC DIAGRAM (POWER TILTING OPTION)**

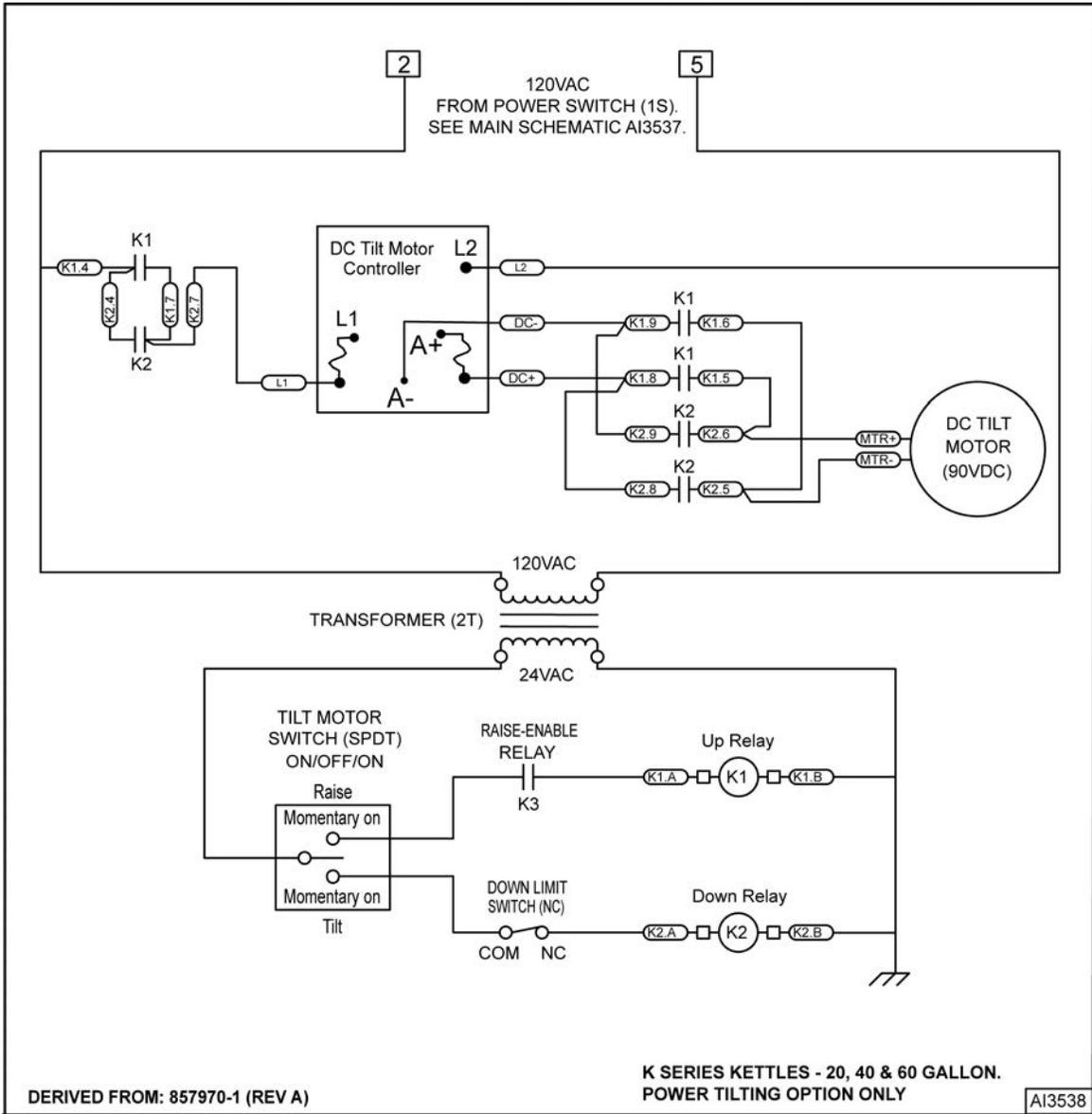


Fig. 74

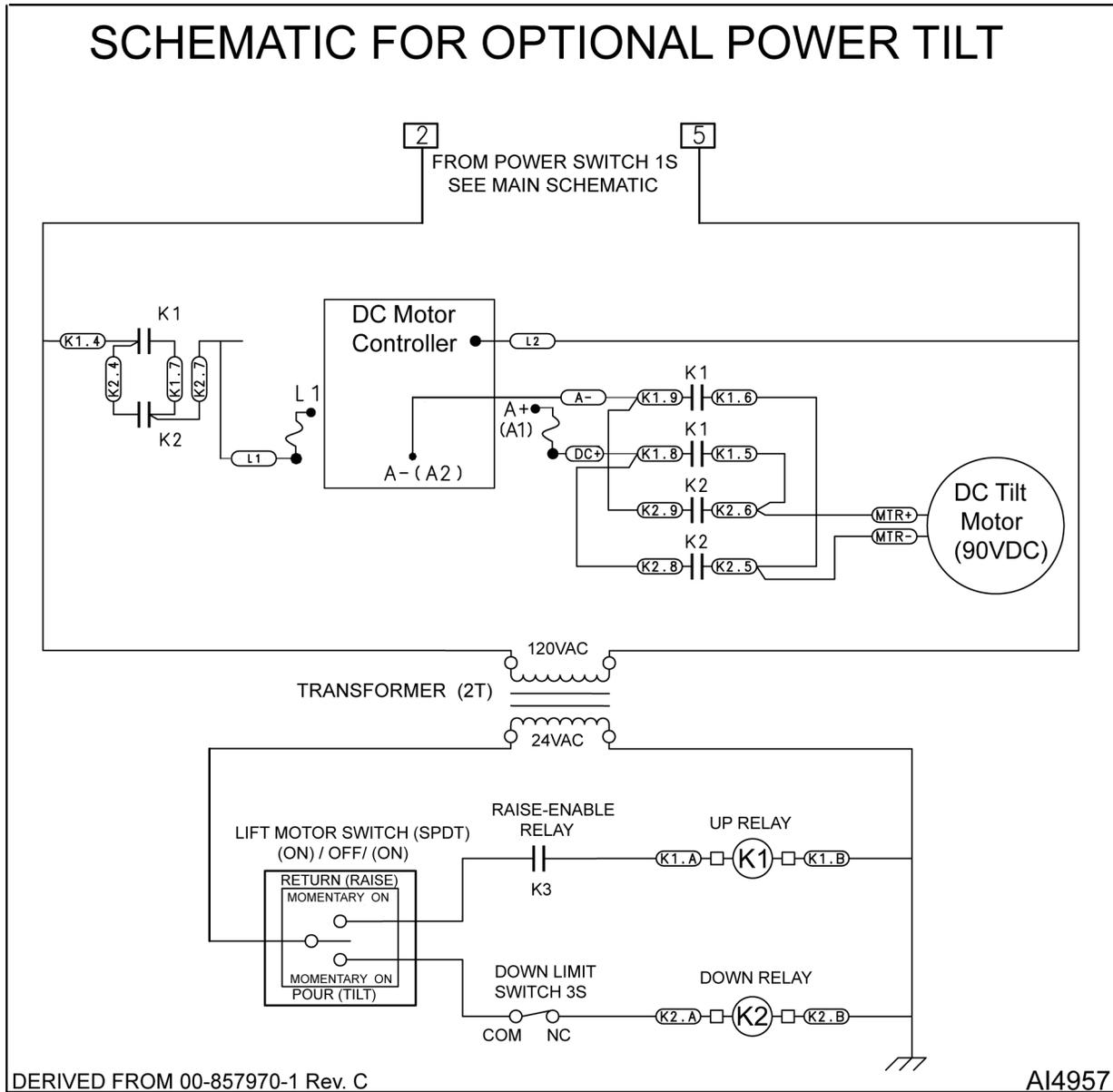


Fig. 75

# 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).	<ol style="list-style-type: none"> <li>Gas supply is OFF.</li> <li>Transformer (1T) output voltage is low.</li> <li>Tilting models only - Gas shut-off valve (1SOL) not receiving power or malfunction.</li> <li>Spark ignitor. <ol style="list-style-type: none"> <li>Spark probe dirty or corroded (poor spark).</li> <li>Burner flame sense current too low - dirty or corroded probe or flame sense wire connection corroded.</li> <li>Wet insulation in burner area.</li> </ol> </li> <li>Ignition module malfunction (no sparking at ignitor).</li> <li>Gas valve malfunction.</li> </ol>
Kettle does not heat, power light is lit, low water light is lit, heat light is not lit, blower motor not ON.	<ol style="list-style-type: none"> <li>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.</li> <li>Fluid level in reservoir jacket below water level probe (LLCO). Check fluid level in sight glass.</li> <li>Kettle jacket was refilled incorrectly with deionized or reverse osmosis (RO) water. Use distilled water only. <b>NOTE:</b> Add approximately 1/8 teaspoon of salt to jacket fluid. Lightly rinse fill port and close it.</li> <li>Water level probe (LLCO) wiring connection malfunction; or probe coated (not sensing fluid) or probe malfunction.</li> <li>Water level control malfunction.</li> </ol>
Kettle does not heat, power light is lit, low water light is not lit, heat light is not lit, blower motor not ON.	<ol style="list-style-type: none"> <li>Tilting models only - Tilt switch (2S) is open: Kettle not fully upright or switch not adjusted properly; or switch malfunction.</li> <li>Pressure switch (1PAS) open or malfunction (fixed, not adjustable).</li> <li>WLC malfunction (water level ok in sight glass). <b>NOTE:</b> LLCO LED is ON (probe sensing fluid).</li> <li>Temperature sensor malfunction; potentiometer setting too low or malfunction; or temperature controller malfunction.</li> <li>Interconnecting wiring malfunction.</li> </ol>

<b>K Series Gas Kettles (Stationary &amp; Tilting)</b>	
<b>SYMPTOM</b>	<b>POSSIBLE CAUSE</b>
Kettle does not heat, power light is not lit.	<ol style="list-style-type: none"> <li>1. Kettle unplugged; main circuit breaker off; or incoming supply line fuse F1 open.</li> <li>2. Supply voltage incorrect.</li> <li>3. Ground fault receptacle (GFCI) is tripped.</li> <li>4. Hood system with a power interrupt is not ON.</li> <li>5. Power switch off or malfunction.</li> <li>6. Interconnecting wiring malfunction.</li> </ol>
Kettle heats up slow or will not boil product.	<ol style="list-style-type: none"> <li>1. No vacuum in reservoir jacket when kettle is cold.</li> <li>2. Pressure relief valve is not seated properly (leaking) or malfunction. See <u>VENTING</u>.</li> <li>3. Fill port is not fully closed and leaking.</li> <li>4. Jacket overfilled with fluid.</li> <li>5. Gas supply line to kettle is undersized for the gas volume required. <b>NOTE:</b> Increase gas line size to 125% of kettle rated BTU input.</li> <li>6. Low gas supply pressure.</li> <li>7. Temperature sensor malfunction; or potentiometer malfunction; or temperature controller missing jumper on J1 or malfunction. <b>NOTE:</b> Controller LED is ON when output is closed.</li> <li>8. Blower does not increase to high speed.                             <ol style="list-style-type: none"> <li>A. Delay on make timer (1TMR) malfunction.</li> <li>B. Relay K1 malfunction (N.O. contacts remain open with coil energized - Provides high speed signal to blower speed control).</li> <li>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).</li> <li>D. Blower malfunction.</li> </ol> </li> <li>9. Gas valve not adjusted properly or malfunction.</li> </ol>
Low water light is lit or Low water in sight glass.	<ol style="list-style-type: none"> <li>1. Tilting models only - Kettle tilted (not level).</li> <li>2. Fluid level in kettle jacket is low.</li> <li>3. Pressure relief valve is not seated properly (leaking) or malfunction. See <u>VENTING</u>.</li> <li>4. Fill port is not fully closed and leaking.</li> <li>5. Kettle jacket was refilled incorrectly with deionized or reverse osmosis (RO) water. Use distilled water only. <b>NOTE:</b> Add approximately 1/8 teaspoon of salt to jacket water. Lightly rinse fill port and close it.</li> </ol>

<b>K Series Gas Kettles (Stationary &amp; Tilting)</b>	
<b>SYMPTOM</b>	<b>POSSIBLE CAUSE</b>
<p>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).</p> <p><b>NOTE:</b> If heat light is not lit but the blower is running, the light or wiring to the light may be malfunctioning.</p>	<ol style="list-style-type: none"> <li>1. Gas supply not on.</li> <li>2. Tilting models only - Gas shut-off valve (1SOL) not receiving power or malfunction.</li> <li>3. Ignition module not receiving power.</li> <li>4. Unit not properly grounded and/or polarity of incoming power is incorrect on automatic ignition systems.</li> <li>5. Low gas supply pressure.</li> <li>6. Spark ignitor.                         <ol style="list-style-type: none"> <li>A. Spark probe dirty or corroded (poor spark).</li> <li>B. Burner flame sense current too low - dirty or corroded probe; or flame sense wire connection corroded.</li> </ol> </li> <li>7. Ignition module malfunction (no sparking at ignitor).</li> <li>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).</li> <li>9. Blower intake clogged or blower malfunction.</li> <li>10. Gas valve not adjusted properly or malfunction.</li> <li>11. Burner insulation wet. Refer to <u>BURNER</u>.</li> </ol>

**POWER TILTING OPTION ONLY**

<b>POWER TILTING OPTION ONLY</b>	
<b>SYMPTOM</b>	<b>POSSIBLE CAUSES</b>
<p>Kettle will not raise.</p>	<ol style="list-style-type: none"> <li>1. Tilt switch (2S) open or malfunction.</li> <li>2. Transformer 2T inoperative.</li> <li>3. Power switch off or malfunction.</li> <li>4. Tilt control switch malfunction (momentary on - raise).</li> <li>5. Raise-enable relay (K3) malfunction.</li> <li>6. K1 up relay malfunction.</li> <li>7. DC motor controller - Fuses open or controller malfunction.</li> <li>8. DC tilt motor inoperative.</li> <li>9. Gear reducer malfunction.</li> </ol>

<b>POWER TILTING OPTION ONLY</b>	
<b>SYMPTOM</b>	<b>POSSIBLE CAUSES</b>
Kettle will not tilt	<ol style="list-style-type: none"> <li>1. Transformer 2T inoperative.</li> <li>2. Power switch off or malfunction.</li> <li>3. Tilt motor switch malfunction (momentary on - tilt).</li> <li>4. Down limit switch open or malfunction.</li> <li>5. K2 down relay malfunction.</li> <li>6. DC tilt motor controller - Fuses open or controller malfunction.</li> <li>7. DC tilt motor inoperative.</li> <li>8. Gear reducer malfunction.</li> </ol>

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# **VULCAN**

## *CATALOG OF REPLACEMENT PARTS*

### *K SERIES GAS KETTLES*

#### **Stationary Kettles**

ML-136090      K20GL  
ML-136091      K40GL  
ML-136092      K60GL

#### **Tilting Kettles**

ML-136094      K20GLT  
ML-136095      K40GLT  
ML-136096      K60GLT

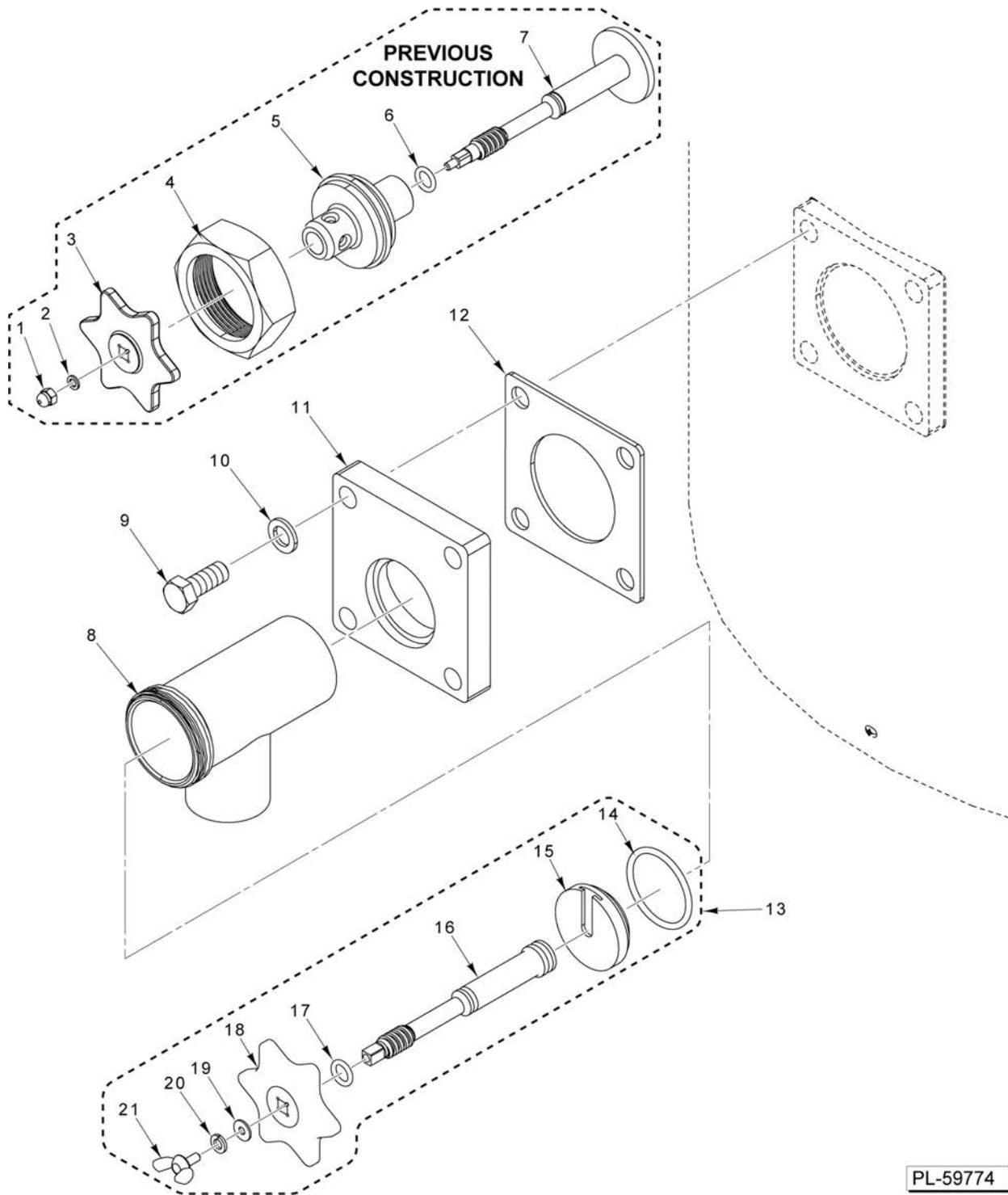


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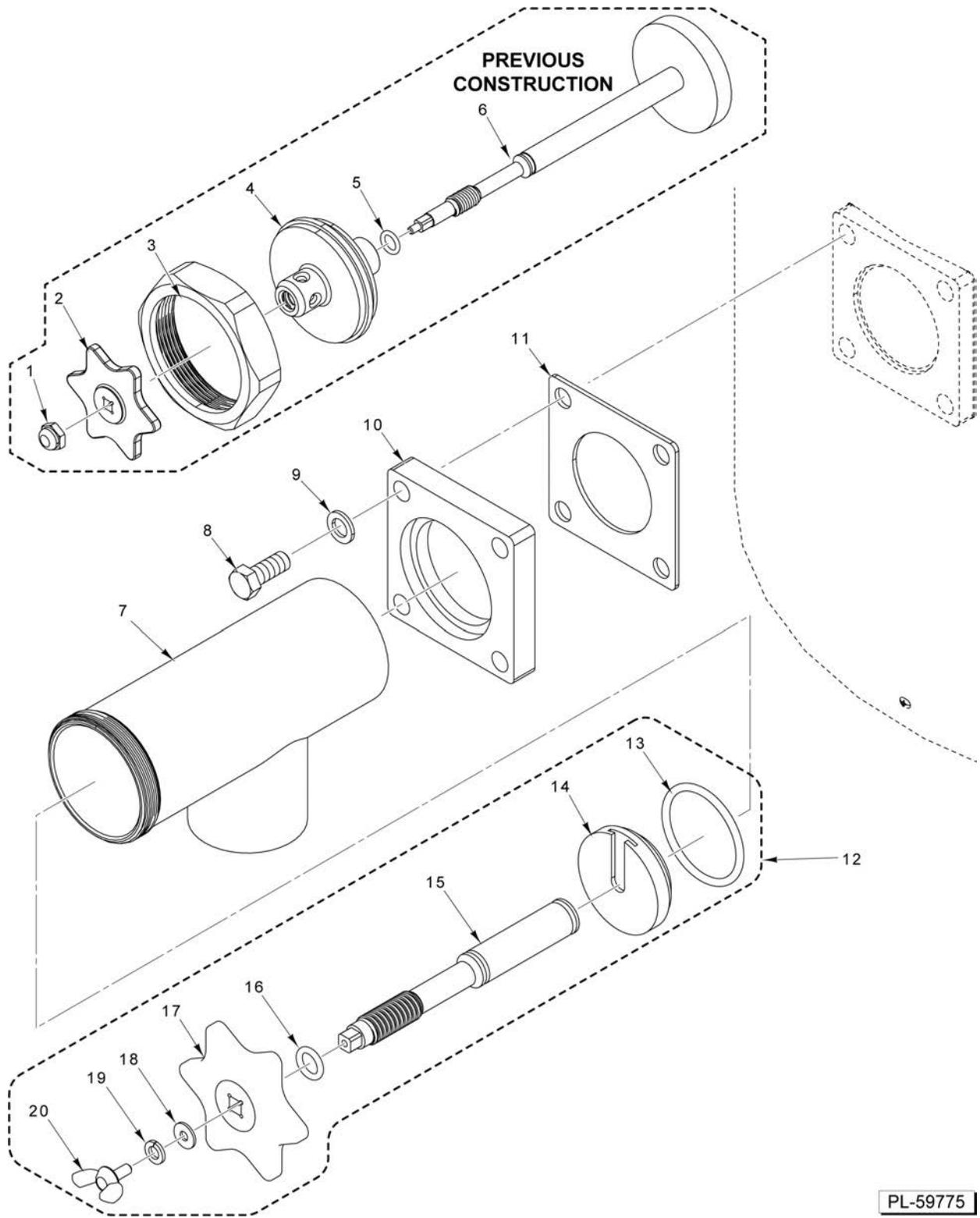
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### DRAW-OFF VALVE ASSEMBLY (2 INCH)

ILLUS. PL-59774	PART NO.	NAME OF PART	AMT.
1	00-856213-00008	Nut (Previous Construction).....	1
2	00-856213-00009	Washer (Previous Construction).....	1
3	00-856213-00005	Handle (Previous Construction).....	1
4	00-856213-00004	Nut - Hex (Previous Construction).....	1
5	00-856213-00006	Retainer (Previous Construction).....	1
6	00-856213-00007	O-Ring (Previous Construction).....	1
7	00-856213-00003	Disc & Stem Assy. (Previous Construction).....	1
8	00-856213-00002	Valve Body (2 In.).....	1
9	SC-041-44	Cap Screw 1/2-13 x 1-1/4 Hex Hd. (SST).....	4
10	WL-006-35	Lockwasher 1/2 Light.....	4
11	00-856570-00002	Plate - Valve Mounting (2 In.).....	1
12	00-855830-00001	Gasket - Draw-Off Valve.....	1
13	00-857918-00001	Plunger - Stem (Incls. Items 14 thru 21) (Current Construction).....	1
14	00-857918-00004	O-Ring - Nylon (Current Construction).....	1
15	00-857918-00003	Seal - Nylon (2 In.) (Current Construction).....	1
16	00-857918-00002	Stem (Current Construction).....	1
17	00-857918-00005	O-Ring (Current Construction).....	1
18	00-857918-00006	Handle (Current Construction).....	1
19	00-857918-00009	Flatwasher (Current Construction).....	1
20	00-857918-00008	Lockwasher (Current Construction).....	1
21	00-857918-00007	Wingnut (Current Construction).....	1

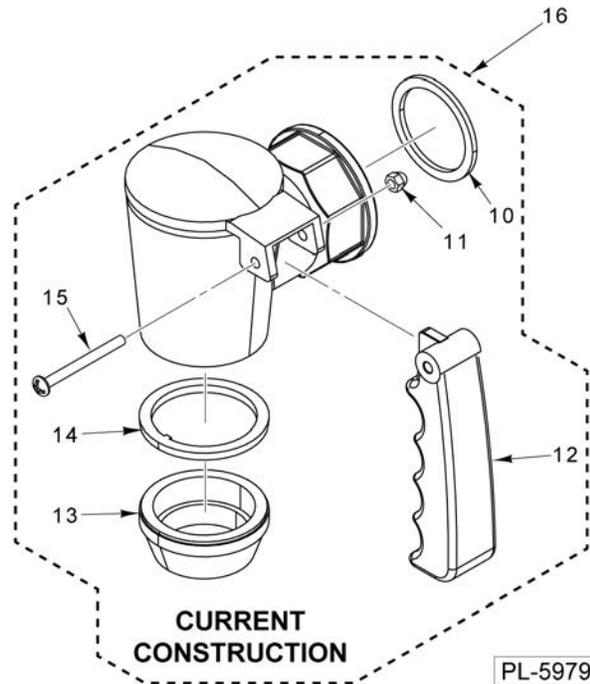
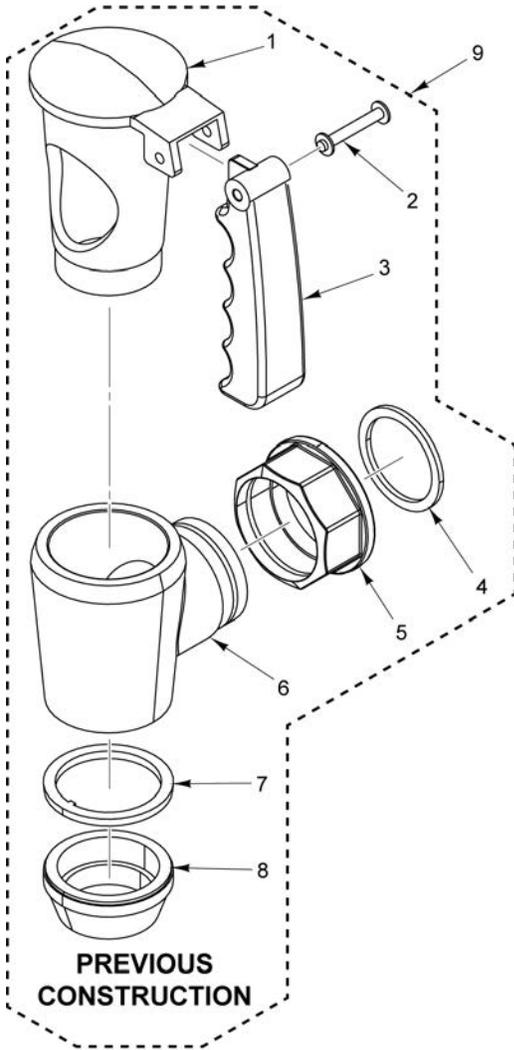


**DRAW-OFF VALVE ASSEMBLY  
(3 INCH)**

### DRAW-OFF VALVE ASSEMBLY (3 INCH)

ILLUS. PL-59775	PART NO.	NAME OF PART	AMT.
1	00-359996-00007	Nut - Acorn (Previous Construction).....	1
2	00-359996-00005	Handle (Previous Construction).....	1
3	00-359996-00004	Hex Nut (Previous Construction).....	1
*4	00-857977-00003	Retainer (Previous Construction).....	1
5	00-359996-00006	O-ring (Previous Construction).....	1
6	00-359996-00002	Disc and Stem Assembly (Previous Construction).....	1
7	00-359996-00001	Valve Body, 3".....	1
8	SC-041-44	Cap Screw 1/2-13 x 1-1/4 Hex Hd. (SST).....	4
9	WL-006-35	Lockwasher 1/2 Light.....	4
10	00-856570-00001	Plate - Valve Mounting (3 In.).....	1
11	00-855830-00001	Gasket - Draw-Off Valve.....	1
12	00-857919-00001	Stem Plunger Assy. (3 In.) (Incls. Items 13 thru 20) (Current Construction).....	1
13	00-857919-00004	O-Ring (Current Construction).....	1
14	00-857919-00003	Seal, Nylon 3 In. (Current Construction).....	1
15	00-857919-00002	Stem (Current Construction).....	1
16	00-857919-00005	O-Ring (Current Construction).....	1
17	00-857919-00006	Handle (SST) (Current Construction).....	1
18	00-857919-00009	Washer - Flat (SST) (Current Construction).....	1
19	00-857919-00008	Washer - Lock (SST) (Current Construction).....	1
20	00-857919-00007	Screw - Wing M6 x 12 (SST) (Current Construction).....	1

\* Call for Price and Availability



PL-59795

**PLUG VALVE  
(2 INCH)**

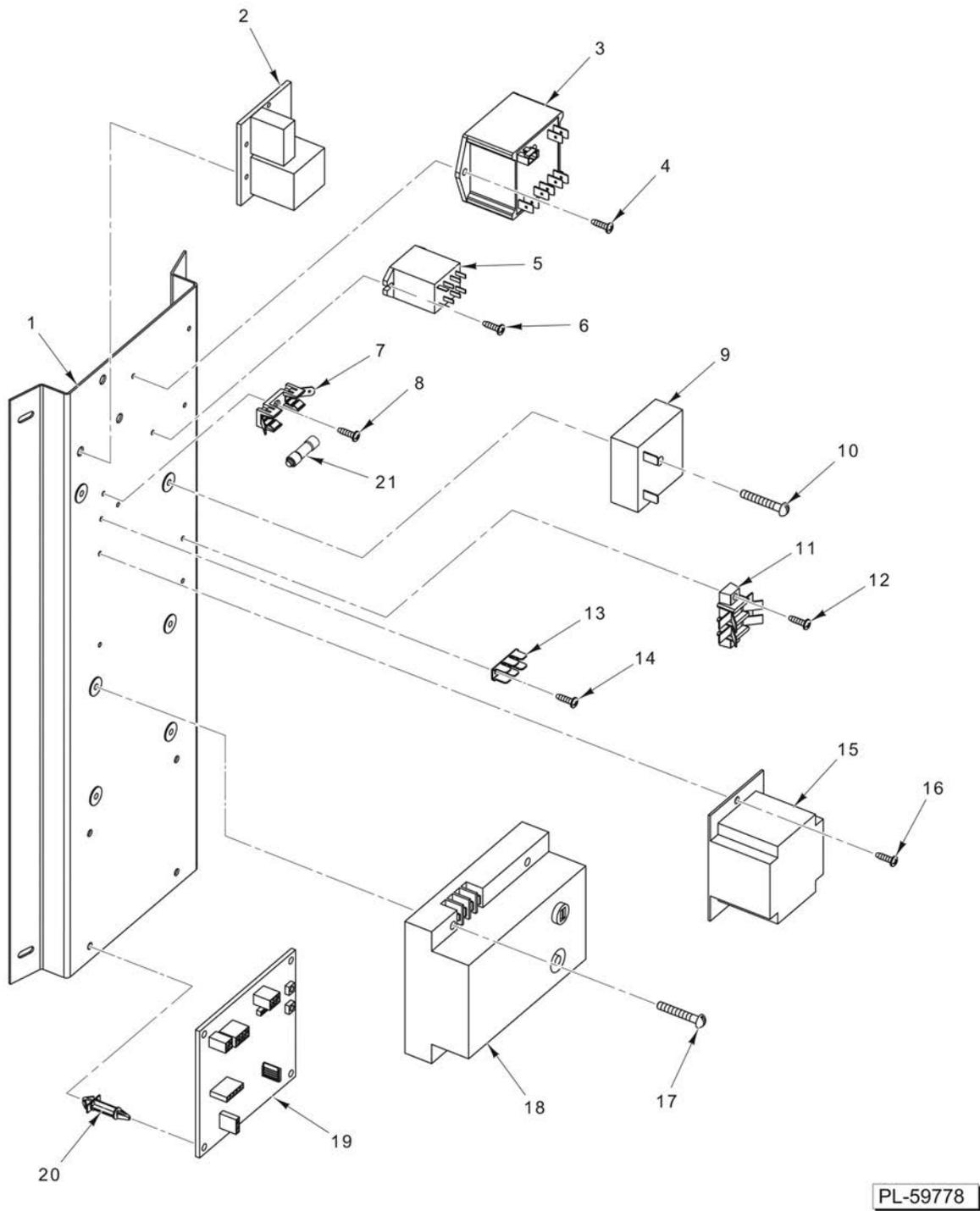
**PLUG VALVE  
(2 INCH)**

ILLUS. PL-59795	PART NO.	NAME OF PART	AMT.
1	00-857547-00004	Plug - Valve (Draw-Off) (Previous Construction).....	1
2	00-857547-00007	Pin - Retaining (Previous Construction).....	1
3	00-857547-00006	Handle - Athermic (Previous Construction).....	1
4	00-857170-00009	Gasket - Coupling (Previous Construction).....	1
5	00-857547-00003	Coupling - Valve (Draw-Off) (Previous Construction).....	1
6	00-857547-00002	Valve Body (Draw-Off) (Previous Construction).....	1
7	00-857547-00005	Washer (Previous Construction).....	1
8	00-857547-00008	Ring - Metal (Previous Construction).....	1
9	00-857547-00001	Draw-Off Valve Assy. (2 In., Plug Type) (Incls. Items 1 thru 8) (Previous Construction) .....	1
10	00-858268-00009	Gasket (Current Construction).....	1
11	00-858268-00010	Nut, M6 (SST) (Current Construction).....	1
12	00-858268-00006	Handle (Current Construction).....	1
13	00-858268-00003	Nut, Valve Plug (Current Construction).....	1
14	00-858268-00004	Washer (Current Construction).....	1
15	00-858268-00007	Screw M6 x 50 (Current Construction).....	1
16	00-858268-00001	Draw-Off Valve Assy. 2 In. (Incls. Items 10 thru 15) (Current Construction).....	1



**CONTROL PANEL (STATIONARY)**

ILLUS.	PART NO.	NAME OF PART	AMT.
PL-59777			
1	00-855969-00001	Light - Indicator (Red) (24 VAC).....	1
2	00-856678-00001	Gasket.....	1
3	00-855797-00005	Switch Assy. (Power with Indicator Lights).....	1
4	00-854647-00001	Knob - Control.....	1
5	00-854693-00001	Shaft - Rotary Seal.....	1
6	00-855831-00001	Overlay - Gas Kettle.....	1
7	00-957916-00003	Nameplate - Small (Vulcan).....	1
8	NS-047-28	Nut - LOCK SP 3/16 STUD (PALNUT SK188008).....	2
9	00-857389-00001	Potentiometer.....	1
10	NS-047-98	Lock Nut 8-32 Hex.....	2
11	00-856119-00001	Bracket - Offset.....	1
12	NS-011-07	Nut 6-32 Hex (SST).....	3
13	00-856083-00001	Gauge - Pressure (Panel Mount).....	1
14	SC-129-39	Mach. Screw 6-32 x 5/16 Slotted Oval Hd. (SST).....	3
15	00-855884-00001	Panel - Control (K20GL).....	1
16	00-856040-00001	Panel - Control (K40GL).....	1
17	00-856122-00001	Panel - Control (K60GL).....	1
18	FP-086-36	Fitting - Tube (1/4).....	1

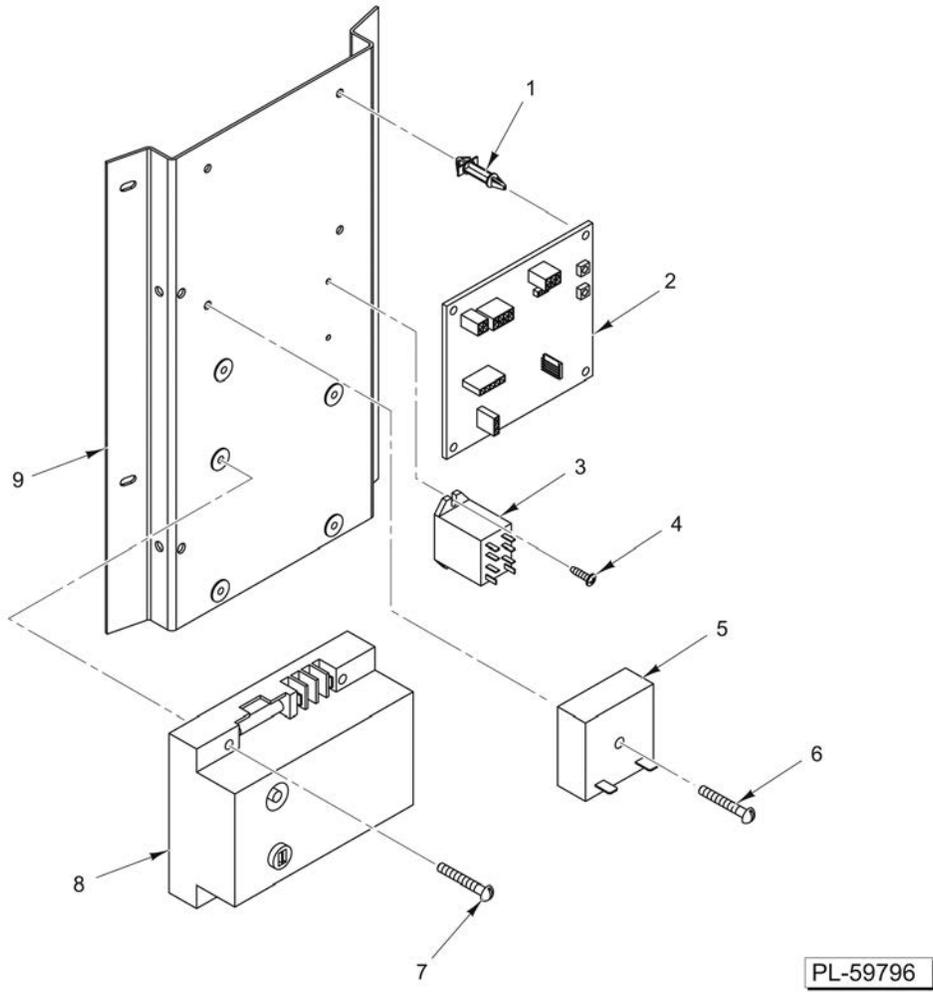


PL-59778

**ELECTRICAL COMPONENTS (STATIONARY)**

**ELECTRICAL COMPONENTS (STATIONARY)**

ILLUS.	PART NO.	NAME OF PART	AMT.
PL-59778			
1	00-855863-00001	Bracket - Ignition Module.....	1
2	00-844070-00001	Control - Low Water.....	1
3	00-857112-00001	Controller - Temperature.....	1
4	SD-019-29	Self-Tapping Screw 6-20 x 1/2 Phil. Pan Hd., Type B.....	2
5	00-416535-00004	Relay - Filter - Fill Valve S.P.D.T. 24 V. Coil.....	1
6	SD-019-29	Self-Tapping Screw 6-20 x 1/2 Phil. Pan Hd., Type B.....	2
7	00-856677-00001	Block - Fuse (20 Amp., 300 V.).....	1
8	SD-019-29	Self-Tapping Screw 6-20 x 1/2 Phil. Pan Hd., Type B.....	1
9	00-855973-00001	Relay - Time Delay.....	1
10	SC-125-46	Mach. Screw 8-32 x 1-1/4 Phil. Truss Hd. (SST).....	1
11	00-854707-00002	Block - Terminal (2-Pole).....	1
12	SD-019-29	Self-Tapping Screw 6-20 x 1/2 Phil. Pan Hd., Type B.....	2
13	00-419317	Terminal - Stationary.....	1
14	SD-019-29	Self-Tapping Screw 6-20 x 1/2 Phil. Pan Hd., Type B.....	2
15	00-411500-00012	Transformer (120 VAC, 24 V., 40 VA).....	1
16	SD-019-29	Self-Tapping Screw 6-20 x 1/2 Phil. Pan Hd., Type B.....	2
17	SC-125-46	Mach. Screw 8-32 x 1-1/4 Phil. Truss Hd. (SST).....	4
18	00-913169	Kit - Ignition Module.....	1
19	00-855867-00001	Board-Blower Control, universal (EBM).....	1
20	00-857060-00001	Standoff - Board.....	4
21	FE-024-94	Fuse - Time Delay (4.0 Amp.).....	1

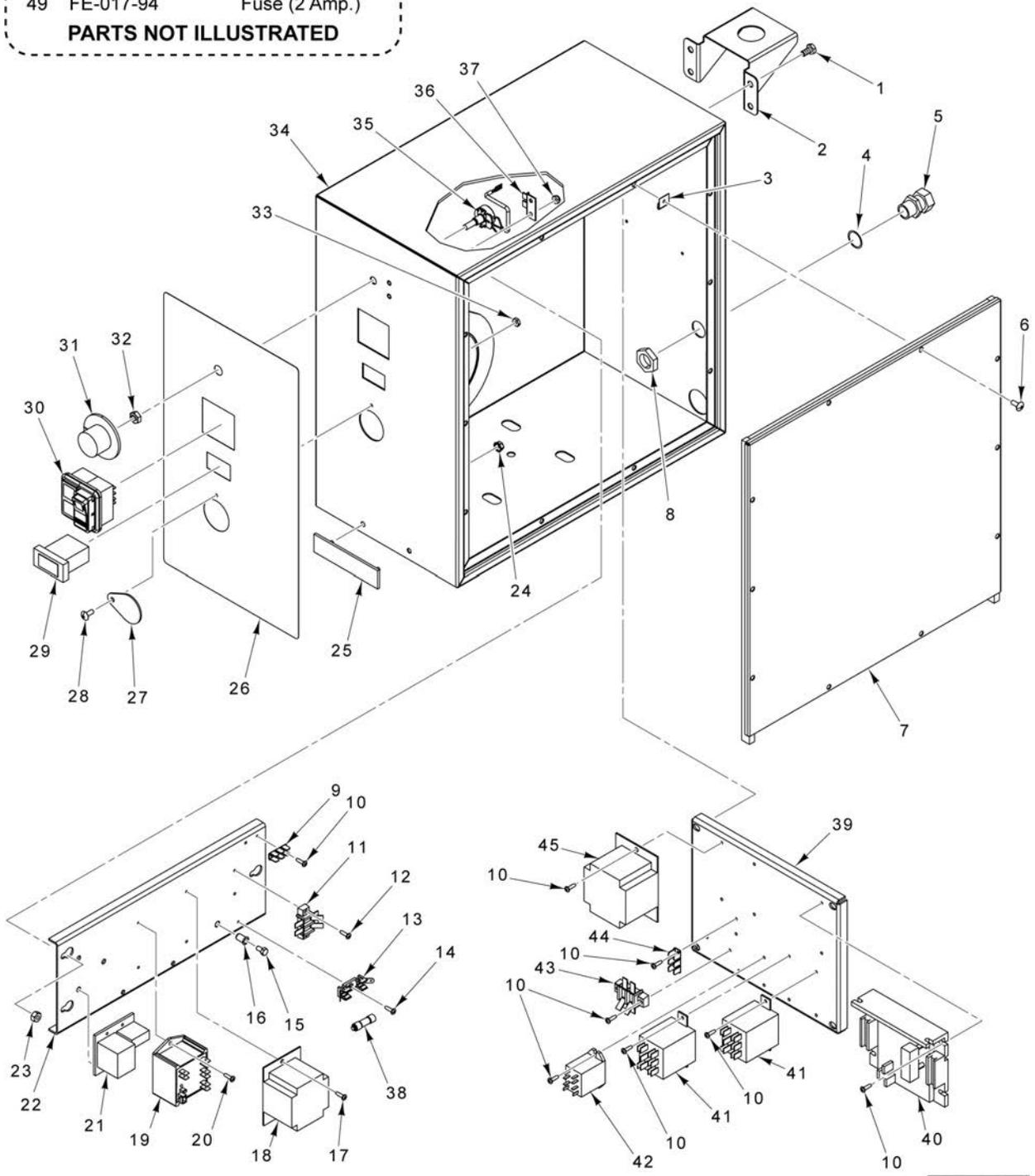


**ELECTRICAL COMPONENTS (TILTING)**

**ELECTRICAL COMPONENTS (TILTING)**

<b>ILLUS.</b>	<b>PART NO.</b>	<b>NAME OF PART</b>	<b>AMT.</b>
<b>PL-59796</b>			
1	00-857060-00001	Standoff - Board.....	4
2	00-855867-00001	Board-Blower Control, universal (EBM).....	1
3	00-416535-00004	Relay - Filter - Fill Valve S.P.D.T. 24 V. Coil.....	1
4	SD-019-29	Self-Tapping Screw 6-20 x 1/2 Phil. Pan Hd., Type B.....	2
5	00-855973-00001	Relay - Time Delay.....	1
6	SC-125-46	Mach. Screw 8-32 x 1-1/4 Phil. Truss Hd. (SST).....	1
7	SC-125-46	Mach. Screw 8-32 x 1-1/4 Phil. Truss Hd. (SST).....	4
8	00-913169	Kit - Ignition Module.....	1
9	00-856954-00001	Bracket - Ignition Module.....	1

- |    |                 |                   |
|----|-----------------|-------------------|
| 46 | 00-913102-00399 | Kit - Board Assy. |
| 47 | FE-027-24       | Holder - Fuse     |
| 48 | FE-027-94       | Fuse (4 Amp.)     |
| 49 | FE-017-94       | Fuse (2 Amp.)     |
- PARTS NOT ILLUSTRATED**

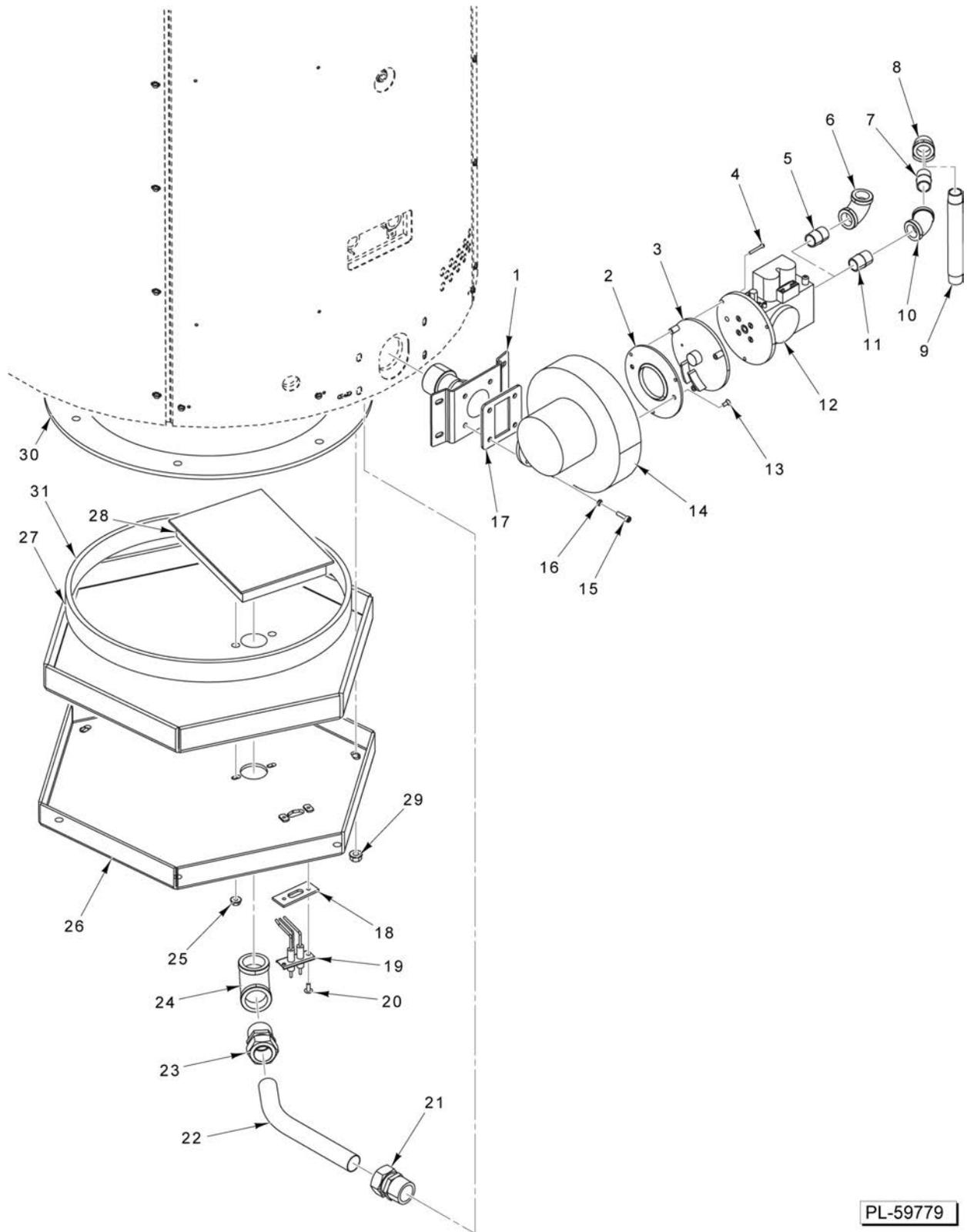


PL-59782

**CONTROL PANEL AND ELECTRICAL COMPONENTS (TILTING)**

## CONTROL PANEL AND ELECTRICAL COMPONENTS (TILTING)

ILLUS.	PART NO.	NAME OF PART	AMT.
PL-59782			
1	SC-041-50	Cap Screw 1/4-20 x 1/2 Hex Hd. (SST).....	4
2	00-855902-00001	Bracket - Faucet.....	1
3	00-854766-00001	Nut - Speed 3 Type.....	10
4	00-854763-00002	NLA - Obsolete--O-Ring.....	1
5	00-854761-00002	Relief - Strain 1/2 Electrical.....	1
6	SC-066-06	Mach. Screw 10-24 x 1/2 Phil. Truss Hd. (SST).....	10
7	00-856210-00001	Lid Assy. - Control Box.....	1
8	00-854762-00002	NLA - Obsolete--Lock Nut 1/2 Electrical.....	1
9	00-419317	Terminal - Stationary.....	1
10	SD-019-29	Self-Tapping Screw 6-20 x 1/2 Phil. Pan Hd., Type B.....	AR
11	00-854707-00002	Block - Terminal (2-Pole).....	1
12	SD-019-29	Self-Tapping Screw 6-20 x 1/2 Phil. Pan Hd., Type B.....	2
13	00-856677-00001	Block - Fuse (20 Amp., 300 V.).....	1
14	SD-019-29	Self-Tapping Screw 6-20 x 1/2 Phil. Pan Hd., Type B.....	1
15	SC-120-23	Mach. Screw 10-24 x 3/8 Hex Hd.....	1
16	00-328479-00002	Nut - Insert.....	1
17	SD-019-29	Self-Tapping Screw 6-20 x 1/2 Phil. Pan Hd., Type B.....	2
18	00-411500-00012	Transformer (120 VAC, 24 V., 40 VA).....	1
19	00-857112-00001	Controller - Temperature.....	1
20	SD-019-29	Self-Tapping Screw 6-20 x 1/2 Phil. Pan Hd., Type B.....	2
21	00-844070-00001	Control - Low Water.....	1
22	00-856847-00001	Panel - Electrical.....	1
23	NS-015-01	Nut 1/4-20 Hex (SST).....	3
24	NS-047-28	Nut - LOCK SP 3/16 STUD (PALNUT SK188008).....	2
25	00-957916-00003	Nameplate - Small (Vulcan).....	1
26	00-855889-00001	Overlay - Tilting Gas Kettles.....	1
27	00-856218-00001	NLA - Obsolete--Flap - Tilt Handle Opening.....	1
28	SC-066-06	Mach. Screw 10-24 x 1/2 Phil. Truss Hd. (SST).....	1
29	00-855969-00001	Light - Indicator (Red) (24 VAC).....	1
30	00-857971-00001	CONTROL SWITCH ASSY - AUTO.....	1
31	00-854647-00001	Knob - Control.....	1
32	00-854693-00001	Shaft - Rotary Seal.....	1
33	NS-011-18	Nut 10-24 Hex (SST).....	1
34	00-856816-00001	Box - Control.....	1
35	00-857389-00001	Potentiometer.....	1
36	00-856119-00001	Bracket - Offset.....	1
37	NS-047-98	Lock Nut 8-32 Hex.....	2
38	FE-024-94	Fuse - Time Delay (4.0 Amp.).....	1
39	00-857968-00001	Control Mount (Before S/N 463028412).....	1
40	00-854671-00001	Controller - Speed (Before S/N 463028412).....	1
41	00-854545-00001	Relay (Before S/N 463028412).....	2
42	00-856699-00001	Switch - Relay (Before S/N 463028412).....	1
43	00-854707-00002	Block - Terminal (2-Pole) (Before S/N 463028412).....	1
44	00-419317	Terminal - Stationary (Before S/N 463028412).....	1
45	00-411500-00012	Transformer (120 VAC, 24 V., 40 VA) (Before S/N 463028412).....	1
46	00-913102-00399	Kit - Board Assy. (Starting S/N 463028412).....	AR
47	FE-027-24	Holder - Fuse (Starting S/N 463028412).....	AR
48	FE-024-94	Fuse - Time Delay (4.0 Amp.) (Starting S/N 463028412).....	AR
49	FE-017-03	Fuse (2 Amp.) Slo-Blo (Starting S/N 463028412).....	AR



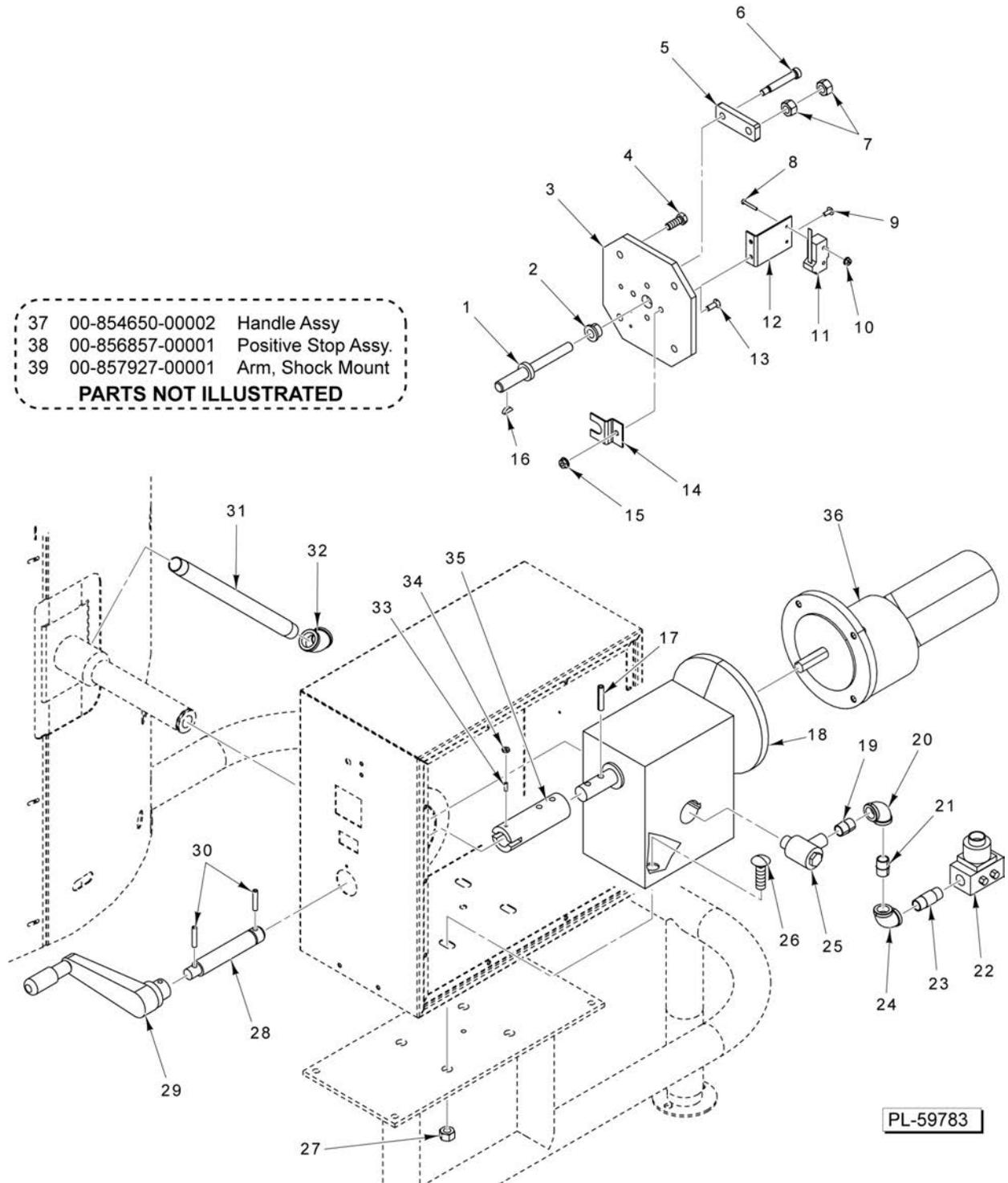
PL-59779

**GAS HEAT COMPONENTS**

## GAS HEAT COMPONENTS

ILLUS. PL-59779	PART NO.	NAME OF PART	AMT.
1	00-856941-00001	Manifold - Burner.....	1
2	00-855869-00001	Plate.....	1
3	00-855873-00001	Plate.....	1
4	00-855878-00001	Screw.....	3
5	FP-035-91	Pipe 1/2 x 1-1/8 TBE (Tilting Kettles).....	1
6	FP-013-15	Elbow - Pipe 1/2 x 90 Deg. (Tilting Kettles).....	1
7	FP-035-91	Pipe 1/2 x 1-1/8 TBE (Stationary Kettles).....	1
8	FP-013-15	Elbow - Pipe 1/2 x 90 Deg. (Stationary Kettles).....	1
9	FP-059-63	Pipe 1/2 x 6 TBE (Stationary Kettles).....	1
10	FP-013-14	Elbow - Pipe 1/2 x 45 Deg. (Stationary Kettles).....	1
11	FP-035-91	Pipe 1/2 x 1-1/8 TBE (Stationary Kettles).....	1
12	00-856940-00001	Valve Assy. - Gas.....	1
13	00-855877-00001	Screw.....	2
14	00-855868-00001	Blower Assy.....	1
15	SC-123-01	Cap Screw 10-24 x 3/4 Hex Socket Hd. (SST).....	4
16	WL-006-07	Lockwasher #10 Helical (SST).....	4
17	00-855649-00001	Gasket - Blower.....	1
18	00-855935-00001	Gasket - Spark Ignitor.....	1
19	00-855843-00001	Ignitor - Spark (Incls. High Voltage and Flame Sense Leads).....	1
20	SC-066-06	Mach. Screw 10-24 x 1/2 Phil. Truss Hd. (SST).....	2
21	FP-091-19	Fitting - Tube (1 In.) (Brass).....	1
22	00-858071-00001	Tube - Gas Supply.....	1
23	FP-091-19	Fitting - Tube (1 In.) (Brass).....	1
24	FP-013-27	Elbow - Pipe 1 x 90 Deg.....	1
25	NS-038-04	Lock Nut 1/4-20.....	2
26	00-855980-00001	Cover - Combustion Chamber.....	1
27	00-855950-00001	Insulation.....	1
28	00-855826-00001	Burner - Flat.....	1
29	NS-038-10	Lock Nut 3/8-16 Hex.....	6
30	00-856102-00001	Seal Ring.....	1
31	00-855914-00001	Ring - Floating Seal.....	1

- |                              |                 |                     |
|------------------------------|-----------------|---------------------|
| 37                           | 00-854650-00002 | Handle Assy         |
| 38                           | 00-856857-00001 | Positive Stop Assy. |
| 39                           | 00-857927-00001 | Arm, Shock Mount    |
| <b>PARTS NOT ILLUSTRATED</b> |                 |                     |

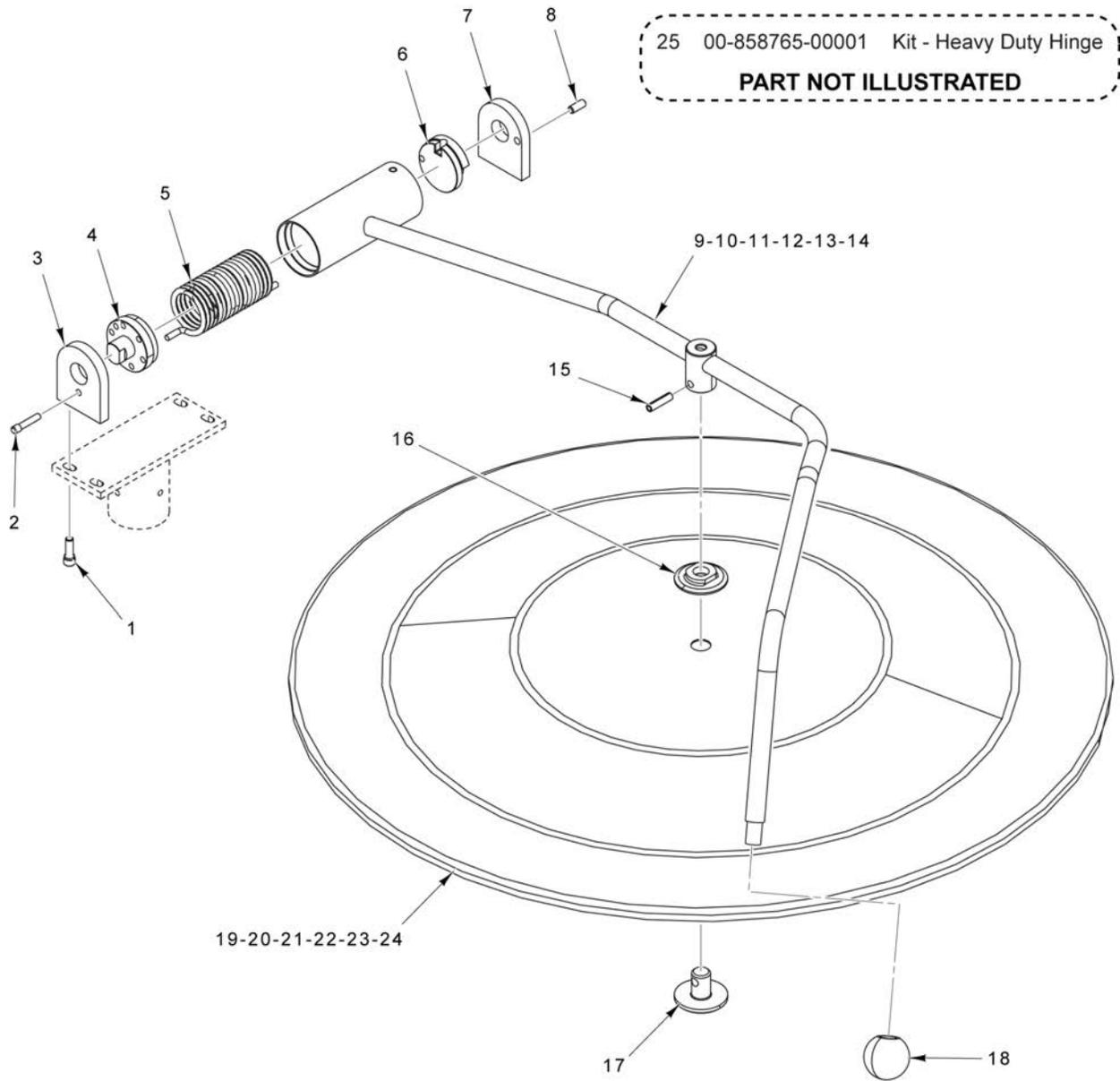


**TILTING COMPONENTS**

## TILTING COMPONENTS

ILLUS.	PART NO.	NAME OF PART	AMT.
1	00-856856-00001	Shaft - Positive Stop.....	1
2	00-857295-00001	Bearing 1/2 (Bronze).....	1
3	00-856854-00001	Plate - Positive Stop.....	1
4	SC-041-30	Cap Screw 3/8-16 x 1 Hex Hd. (SST).....	4
5	00-856855-00001	Traveller - Positive Stop.....	1
6	SC-130-09	Shoulder Screw 3/8 Dia. 5/16-18 x 2 Hex Socket Hd.....	1
7	NS-049-30	Jam Nut 1/2-20 Hex.....	2
8	SC-119-51	Mach. Screw 6-32 x 1 Slotted Pan Hd. (SST).....	2
9	SC-066-06	Mach. Screw 10-24 x 1/2 Phil. Truss Hd. (SST).....	2
10	NS-038-01	Lock Nut 6-32 Flange.....	2
11	00-411496-000F1	Switch - Micro.....	1
12	00-856843-00001	Bracket - Limit Switch.....	1
13	SC-022-33	Mach. Screw 1/4-20 x 3/4 Slotted Flat Hd. (SST).....	1
14	00-856858-00001	Clamp - Positive Stop.....	1
15	NS-038-04	Lock Nut 1/4-20.....	1
16	KW-003-07	Key - Woodruff 3/16 x 5/8.....	1
17	RP-003-36	Pin - Roll.....	2
18	00-856184-00002	Gear - Reducer (80:1).....	1
19	FP-035-91	Pipe 1/2 x 1-1/8 TBE.....	1
20	FP-013-15	Elbow - Pipe 1/2 x 90 Deg.....	1
21	FP-035-91	Pipe 1/2 x 1-1/8 TBE.....	1
22	00-856004-00001	Valve - Shut-Off.....	1
23	FP-035-95	Pipe 1/2 x 2 TBE.....	1
24	FP-013-15	Elbow - Pipe 1/2 x 90 Deg.....	1
25	00-856838-00001	Fitting 1/2 Swivel.....	1
26	SC-082-45	Bolt 1/2-13 x 1-1/2 Sq. Neck Rd. Hd. (SST).....	4
27	NS-015-20	Nut 1/2-13 Hex (SST).....	4
28	00-854652-00002	Shaft - Crank Handle.....	1
29	00-854651-00001	Handle - Crank.....	1
30	RP-002-46	Pin - Roll.....	2
31	FP-042-41	Pipe 3/4 x 14-7/8 TBE (Brass).....	1
32	FP-013-20	Elbow 3/4 x 45 Deg.....	1
33	00-854649-00001	Detent - Ball.....	1
34	NS-011-18	Nut 10-24 Hex (SST).....	1
35	00-854644-00002	Extension - Shaft Reducer.....	1
*36	00-854653-00001	Motor - Gear.....	1
37	00-854650-00002	Handle Assy. (Incls. Items 28, 29, & 30).....	1
38	00-856857-00001	Positive Stop Assy. (Incls. Items 1 thru 16).....	1
39	00-857927-00001	Arm, Shock Mount.....	1

\* Use Kit 00-913102-00399 when replacing motor

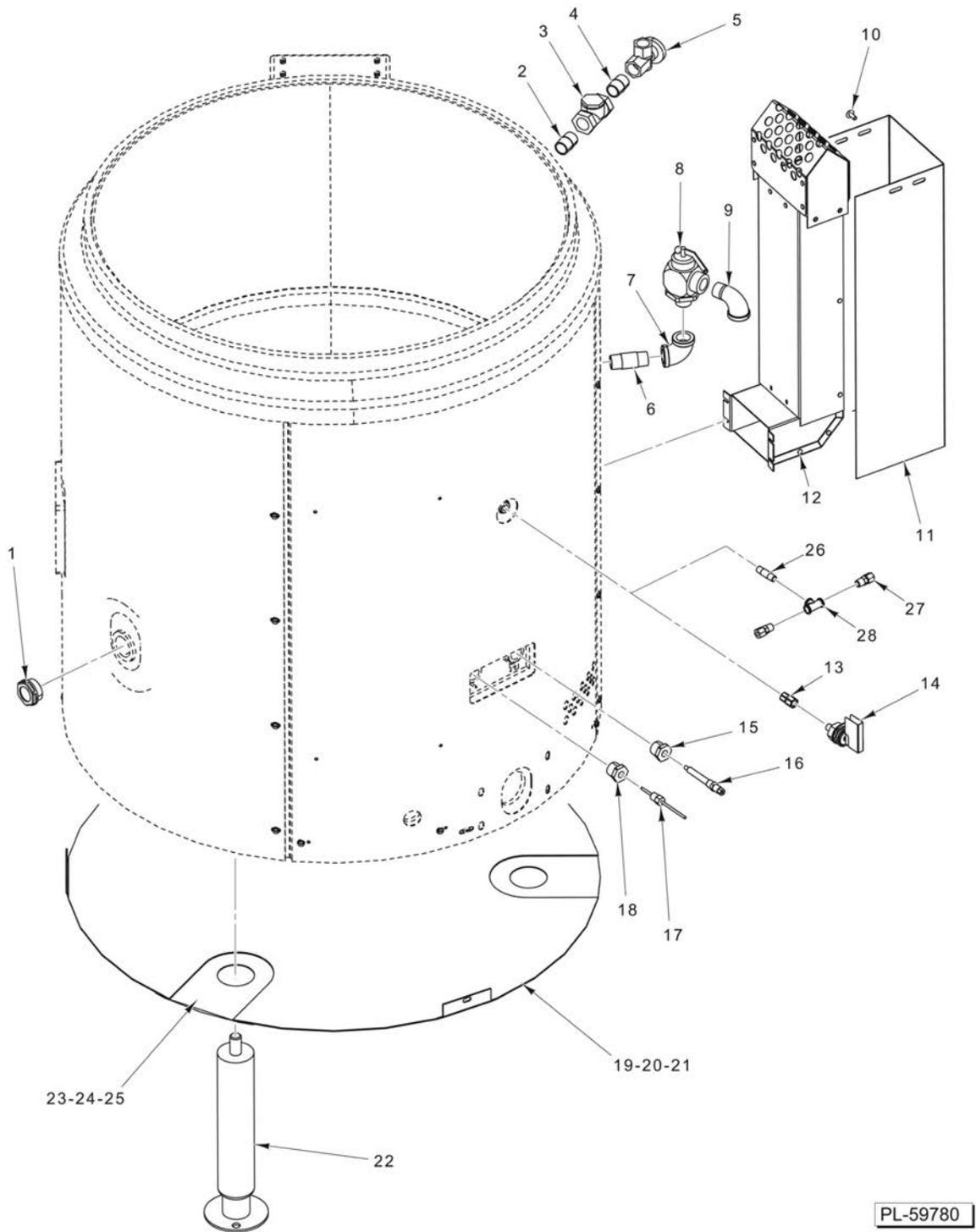


PL-59776

### LID AND HANDLE ASSEMBLY

## LID AND HANDLE ASSEMBLY

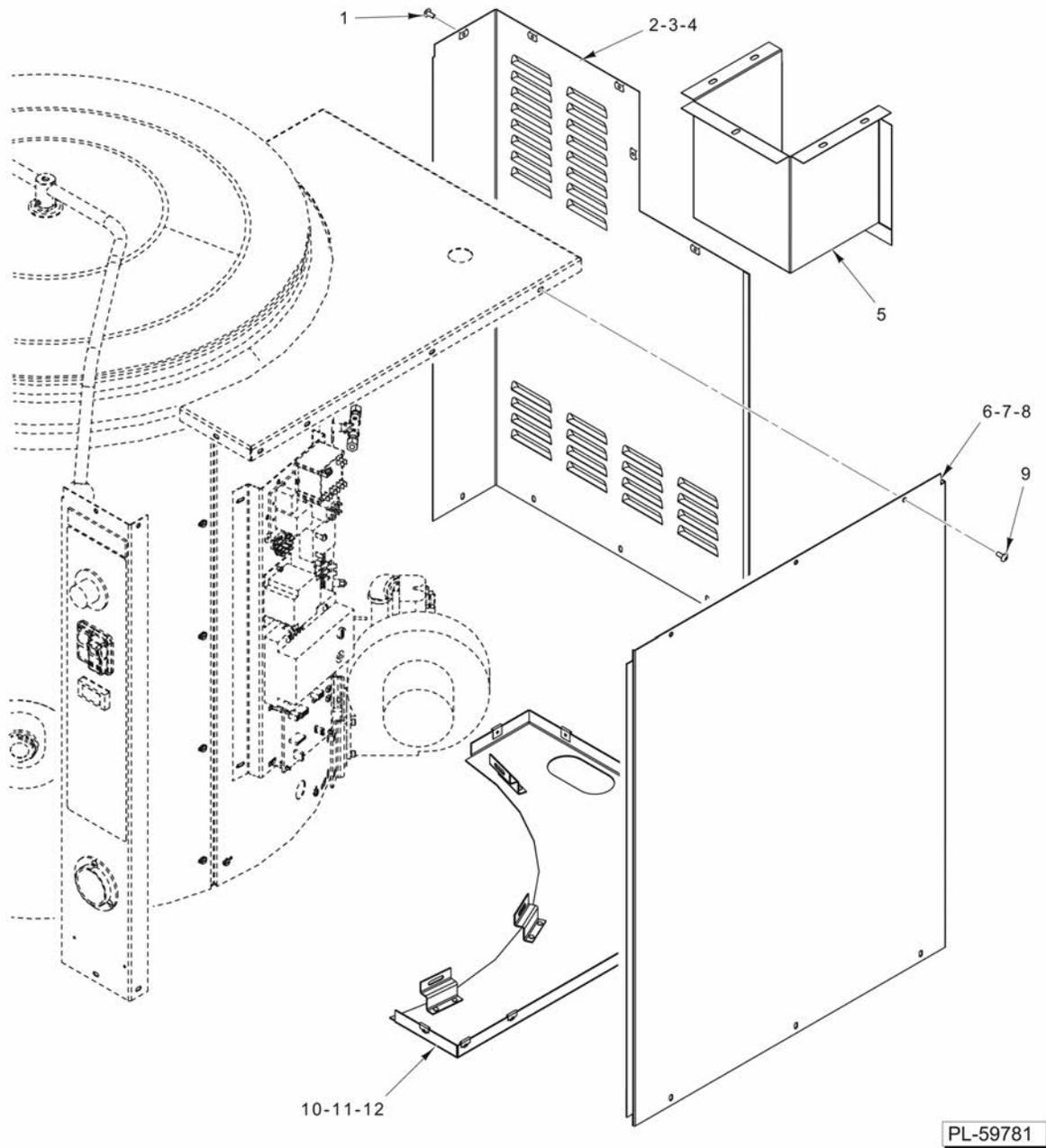
ILLUS. PL-59776	PART NO.	NAME OF PART	AMT.
1	SC-110-98	Cap Screw 1/4-20 x 3/4 Hex Socket Hd. (SST).....	4
2	00-853284-00001	Pin - Lock.....	1
3	00-853286-00001	Plate - Front.....	1
4	00-853292-00001	Disc - Tension Adjustment.....	1
5	00-853289-00001	Spring - Torsion.....	1
6	00-853293-00001	Disc - Rotary Stop.....	1
7	00-855220-00002	Plate - Rear (Incls. Item 8).....	1
8	00-855221-00001	Pin - Stop.....	1
9	00-856507-00001	Handle Assy. (ML-136090).....	1
10	00-856511-00001	Handle Assy. (ML-136091).....	1
11	00-856514-00001	Handle Assy. (ML-136092).....	1
12	00-855880-00001	Handle Assy. (ML-136094).....	1
13	00-855886-00001	Handle Assy. (ML-136095).....	1
14	00-856287-00001	Handle Assy. (ML-136096).....	1
15	RP-004-31	Roll Pin 1/4 x 1.....	1
16	00-853568-00001	Nut - Kettle Cover.....	1
17	00-853567-00001	Rocker - Kettle Cover.....	1
18	00-853285-00001	Knob - Press On.....	1
19	00-856490-00002	Lid Assy. (ML-136090) (Incls. Items 16 & 17).....	1
20	00-856495-00002	Lid Assy. (ML-136091) (Incls. Items 16 & 17).....	1
21	00-856500-00002	Lid Assy. (ML-136092) (Incls. Items 16 & 17).....	1
22	00-856490-00005	Lid Assy. (ML-136094) (Incls. Items 16 & 17).....	1
23	00-856495-00004	Lid Assy. (ML-136095) (Incls. Items 16 & 17).....	1
24	00-856500-00004	Lid Assy. (ML-136096) (Incls. Items 16 & 17).....	1
25	00-858765-00001	Kit - Heavy Duty Hinge.....	AR



**KETTLE EXTERIOR**

## KETTLE EXTERIOR

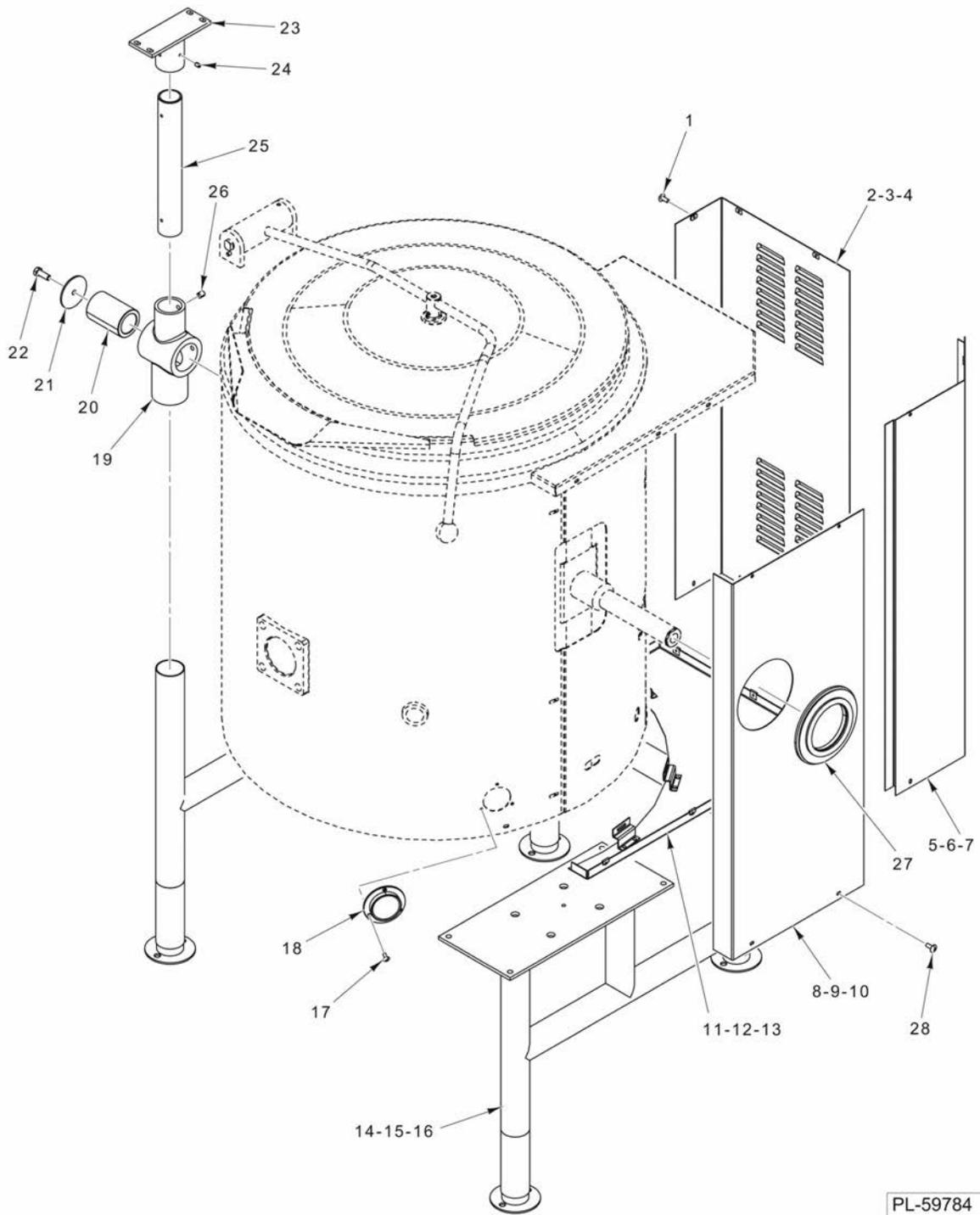
ILLUS.	PART NO.	NAME OF PART	AMT.
PL-59780			
1	00-855882-00001	Glass - Level Sight.....	1
2	FP-054-08	Pipe 1/2 x 1-1/8 TBE (SST).....	1
3	00-833648-00002	Valve - Swing Check 1/2" (Brass).....	1
4	FP-054-08	Pipe 1/2 x 1-1/8 TBE (SST).....	1
5	00-833501	Valve 1/2 Angle.....	1
6	FP-040-50	Pipe 1/2 x 2 TBE (Brass).....	1
7	FP-015-16	Elbow - Pipe 1/2 x 90 Deg. (Brass).....	1
8	00-855968-00001	Valve - Relief (50 PSI).....	1
9	FP-015-17	Elbow - Pipe 1/2 x 90 Deg. (Brass).....	1
10	SC-066-06	Mach. Screw 10-24 x 1/2 Phil. Truss Hd. (SST).....	4
11	00-856200-00001	Shield - Flue.....	1
12	00-855833-00001	Flue Assy. (Incls. Items 10 & 11).....	1
13	FP-012-10	Fitting - Tube 1/4 (Brass).....	1
14	00-856045-00001	Switch - Pressure.....	1
15	FP-027-06	Bushing - Pipe 1/2 To 1/8 (Brass).....	1
16	00-855856-00001	Probe - Water Level.....	1
17	00-856042-00001	Sensor - Temperature.....	1
18	FP-027-06	Bushing - Pipe 1/2 To 1/8 (Brass).....	1
19	00-856966-00001	Cover - Bottom (ML-136090).....	1
20	00-857155-00001	Cover - Bottom (ML-136091).....	1
21	00-856988-00001	Cover - Bottom (ML-136092).....	1
22	00-856977-00003	Leg - Adjustable (With Flange Foot) (Stationary Kettles Only).....	3
23	00-856314-00001	Cover - Leg (ML-136090).....	3
24	00-856128-00001	Cover - Leg (ML-136091).....	3
25	00-856251-00001	Cover - Leg (ML-136092).....	3
26	FP-040-03	Pipe 1/8 x 1-3/8 TBE (Brass) (Tilting Kettles Only).....	1
27	FP-012-16	Fitting - Tube (1/4) (Tilting Kettles Only).....	2
28	FP-019-02	Tee - Pipe 1/8 x 1/8 x 1/8 (Tilting Kettles Only).....	1
	00-855963-00001	Fill Assy. (Incls. Items 2 thru 5).....	1
	00-856918-00001	Cover - Bottom (ML-136094).....	1
	00-856953-00001	Cover - Bottom (ML-136095).....	1
	00-856846-00001	Cover - Bottom (ML-136096).....	1



**PANELS (STATIONARY)**

**PANELS (STATIONARY)**

<b>ILLUS.</b>	<b>PART NO.</b>	<b>NAME OF PART</b>	<b>AMT.</b>
<b>PL-59781</b>			
1	SC-066-06	Mach. Screw 10-24 x 1/2 Phil. Truss Hd. (SST).....	9
2	00-856313-00001	Panel - Rear (ML-136090).....	1
3	00-856047-00001	Panel - Rear (ML-136091).....	1
4	00-855979-00001	Panel - Rear (ML-136092).....	1
5	00-856206-00001	Bracket - Faucet.....	1
6	00-856312-00001	Panel - Side (ML-136090).....	1
7	00-856044-00001	Panel - Side (ML-136091).....	1
8	00-855987-00001	Panel - Side (ML-136092).....	1
9	SC-066-06	Mach. Screw 10-24 x 1/2 Phil. Truss Hd. (SST).....	6
10	00-855939-00001	Panel - Bottom (ML-136090).....	1
11	00-855860-00001	Panel - Bottom (ML-136091).....	1
12	00-855918-00001	Panel - Bottom (ML-136092).....	1



PL-59784

**PANELS AND FRAME (TILTING)**

### PANELS AND FRAME (TILTING)

ILLUS. PL-59784	PART NO.	NAME OF PART	AMT.
1	SC-066-06	Mach. Screw 10-24 x 1/2 Phil. Truss Hd. (SST).....	AR
2	00-856368-00001	Panel - Rear (ML-136094).....	1
3	00-856943-00001	Panel - Rear (ML-136095).....	1
4	00-856130-00001	Panel - Rear (ML-136096).....	1
5	00-856369-00001	Panel - Corner (ML-136094).....	1
6	00-856219-00001	Panel - Corner (ML-136095).....	1
7	00-856129-00001	Panel - Corner (ML-136096).....	1
8	00-856373-00001	Panel - Side (ML-136094).....	1
9	00-856252-00001	Panel - Side (ML-136095).....	1
10	00-856132-00001	Panel - Side (ML-136096).....	1
11	00-856912-00001	Panel - Bottom (ML-136094).....	1
12	00-857153-00001	Panel - Bottom (ML-136095).....	1
13	00-856986-00001	Panel - Bottom (ML-136096).....	1
14	00-856892-00001	Frame Assy. (ML-136094).....	1
15	00-856929-00001	Frame Assy. (ML-136095).....	1
16	00-856801-00001	Frame Assy. (ML-136096).....	1
17	SC-129-39	Mach. Screw 6-32 x 5/16 Slotted Oval Hd. (SST).....	3
18	00-856083-00001	Gauge - Pressure (Panel Mount).....	1
19	00-856183-00001	Pivot Assy.....	1
20	00-856180-00001	Bushing.....	1
21	00-856182-00001	NLA - Obsolete--Washer - Retainer.....	1
22	SC-041-30	Cap Screw 3/8-16 x 1 Hex Hd. (SST).....	1
23	00-856510-00001	Bracket - Lid Support.....	1
24	SC-047-12	Set Screw 1/4-20 x 3/8 Socket Hdls., Knife Cup Pt.....	4
25	00-856311	Mast - Lid Support.....	1
26	SC-047-43	Set Screw 3/8-16 x 1/2 Hex Hdls., Knife Cup Pt.....	4
27	00-855989-00001	Seal - Shaft.....	1
28	SD-009-41	Self-Tapping Screw 8-32 x 3/8 Phil. Pan Hd., Type F (SST).....	AR
	00-856183-00001	Pivot Assy. (Incls. Items 19, 20, & 26).....	1
	00-855882-00001	Glass - Level Sight.....	1
	00-851318-00001	Flex Line.....	1

