

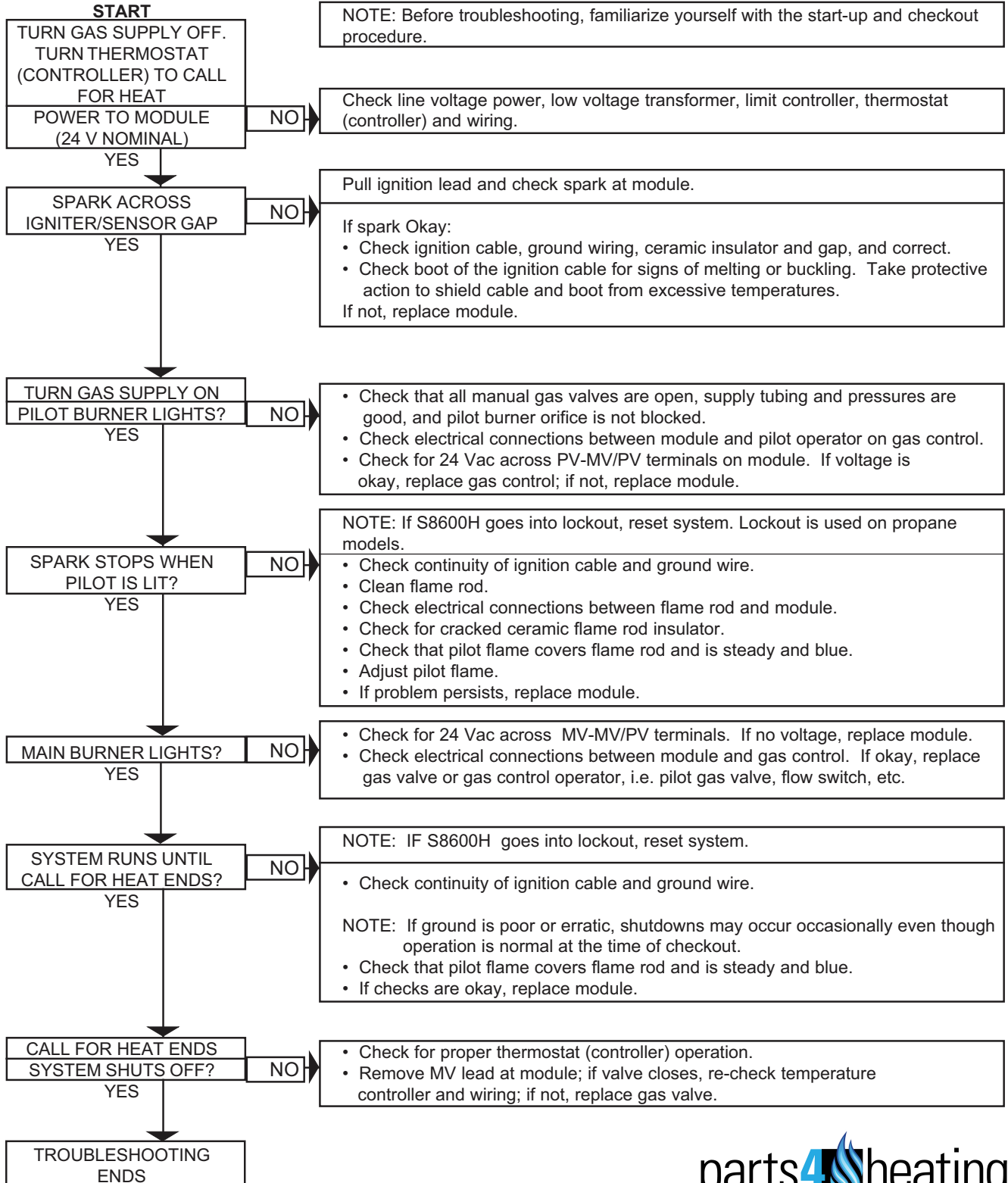
TROUBLESHOOTING

WARNING—HIGH VOLTAGE: For qualified technicians ONLY.

Electrical—Electronic Ignition IID

NOTE: Some heaters may be equipped with an ignition module that shuts off pilot gas if pilot fails to light. To reset, interrupt power to heater.

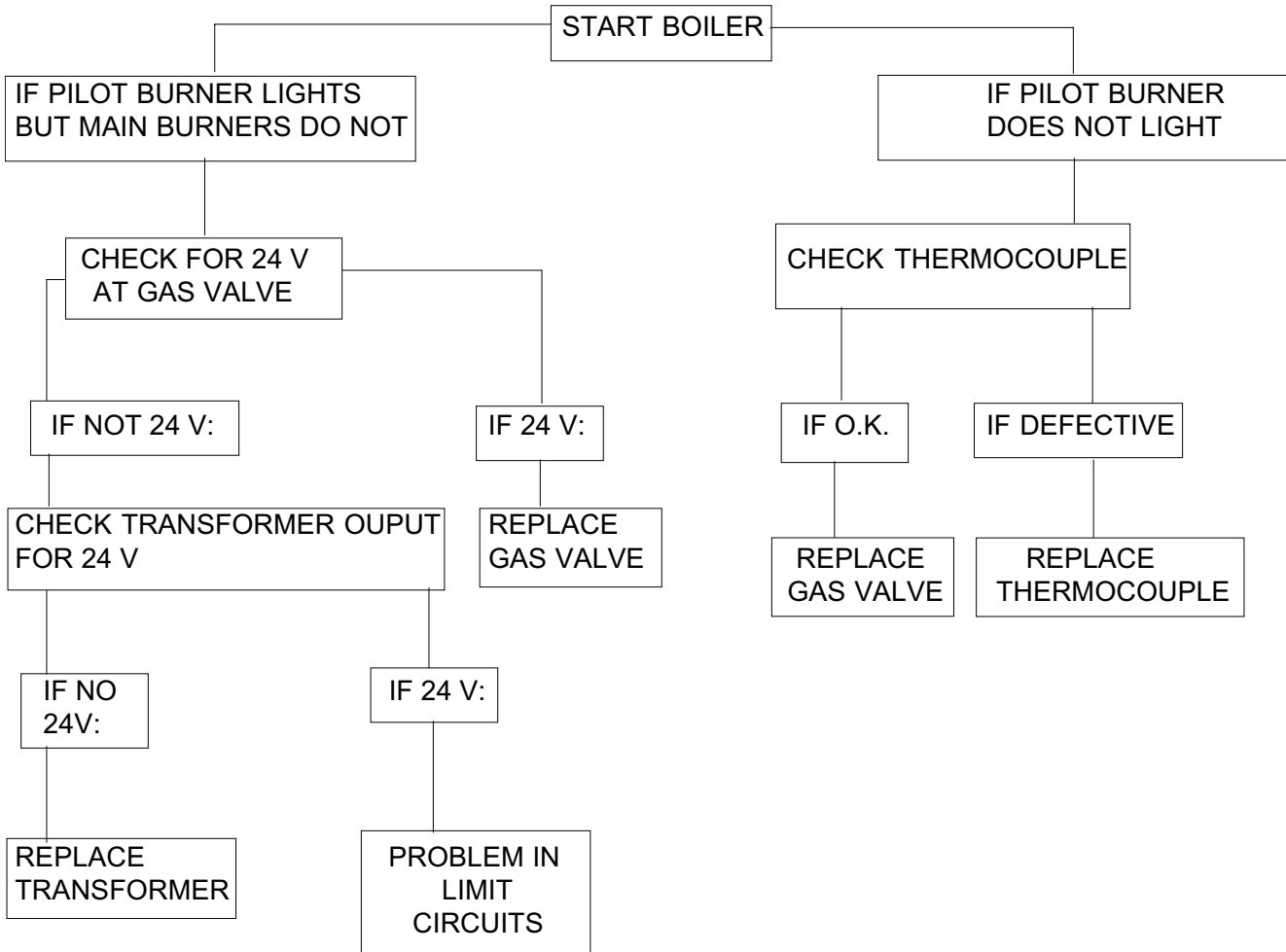
Intermittent Pilot System Honeywell S8600

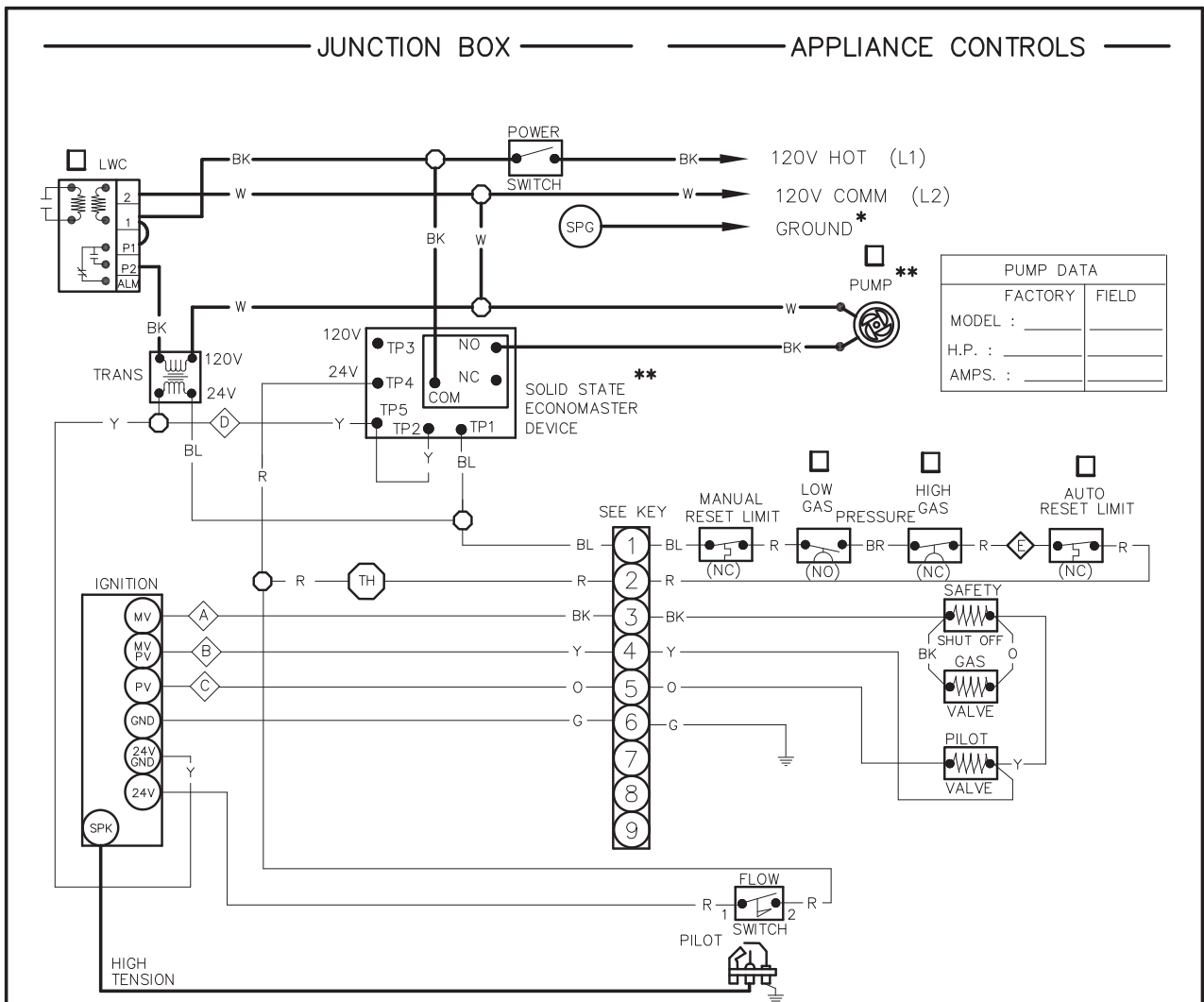


Electrical—Standing Pilot

WARNING—HIGH VOLTAGE: For qualified technicians ONLY.

For Service Technicians





PUMP DATA	
FACTORY	FIELD
MODEL :	
H.P. :	
AMPS. :	

SEE KEY

1	BL
2	R
3	BK
4	Y
5	O
6	G
7	
8	
9	

KEY										
—	24V 105°C									
—	120V 105°C									
○	WIRE NUT									
⊕	GROUND									
BK	BLACK									
BR	BROWN									
R	RED									
O	ORANGE									
Y	YELLOW									
G	GREEN									
BL	BLUE									
V	VIOLET									
W	WHITE									
PLUG (ACTUAL)										
<table border="1"> <tr><td>3</td><td>2</td><td>1</td></tr> <tr><td>6</td><td>5</td><td>4</td></tr> <tr><td>9</td><td>8</td><td>7</td></tr> </table>		3	2	1	6	5	4	9	8	7
3	2	1								
6	5	4								
9	8	7								
FRONT VIEW										

NOTES: * USE GROUND CONNECTION PROVIDED. FAILURE TO PROVIDE PROPER GROUND MAY RESULT IN LOCK-OUT ALL GROUND \perp TERMINATE AT \oplus .

****** PUMP USED MUST BE RATED 10 AMPS MAX OR 3/4 HP MAX. PUMP DELAY ADJUSTABLE BETWEEN 3 AND 10 MINUTES.
 ⬡ — ⬢ CONNECTIONS FOR OPTIONAL E-4 ALARM PANEL.
 ✓ CHECK CONTROLS PROVIDED (WIRED AS SHOWN) REPLACE WIRING WITH 105°C WIRE ONLY

APPROVED BY:	
CHECKED BY:	
ORIG E.O.	2397
	07/08/88
CHG E.O.	3883
	09/20/06
<i>Raypak</i>	

WIRING DIAGRAM IID/ECONOMASTER FIRING MODE - ON/OFF	
BOILER INPUTS: 825,000 THRU 1,826,000 BTUH	
BOILER SIZE: 824-1826	BOILER TYPE: H4/W1

152170	6
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TYPICAL ON-OFF INTERMITTENT IGNITION CONTROL WIRING DIAGRAM

MECHANICAL PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
When boiler is turned on nothing happens.	Pilot is not lit.....	Light pilot. (Standing pilot models)
	No power to the boiler.....	Check the circuit breaker, outdoor controller, etc., upstream of boiler.
	Bad transformer.....	If power to Leads L1 and L2 of transformer, but no power on 24V side, replace.
	Inoperative thermostat.....	Jumper thermostat. Replace with new if boiler fires.
	Inoperative toggle switch.....	If power to toggle switch, but not through switch, replace.
Thermostat in "ON" position causes relay and pump to operate, but boiler does not fire.	Inoperative relay.....	If power to relay, but not operating, replace.
	Main gas valve is closed.....	Open valve.
	Plugged bleed line on gas valve or gas pressure regulator.....	Loosen bleed line and clean.
	Broken pump coupler.....	Replace coupler. Inspect bearing assembly, and if frozen, lubricate or replace.
Continuous shut down of manual reset high limit.	Shutdown by low water cut-off, caused by air.....	Bleed air from system.
	Gas valve defective.....	Check for power to gas valve. If valve has power but will not open, check vent tube for blockage. If clear, replace valve.
	Temperature setting too low.....	Reset high limit to higher temperature.
Sooting CAUTION-Soot may be combustible. Wet down and exercise caution when cleaning.	Low water flow.....	Check system water pumps.
	Interrupted pump operation.....	Check pump oil if necessary.
	Modulating control set too high.....	Reset modulator to a lower setting.
	Mechanical modulating control.....	Check and replace if necessary.
	Air starvation.....	Refer to installation instructions regarding combustion air requirements.
Continuous shut down of low water cut-off or flow switch.	Condensation.....	Set bypass valve to prevent boiler inlet temperature from dropping below 105 °F.
	Toxic fumes which cause a chemical reaction with copper tubes or destroy combustion.....	Remove all sources of fumes, such as freon, chloride, or isolate the boiler.
	Improper venting.....	Follow recommended vent installation instructions.
Low flame.	Insufficient system flow.....	Check pumps and piping.
	Low water due to leaking.....	Inspect for leakage and repair.
	Air in system.....	Inspect for leakage and repair. Install an automatic air vent.
	Line strainer dirty.....	Clean.
Outer jacket very hot (blistered paint).	Lime in heat exchanger.....	Ream tubes.
	Gas supply.....	Debris in gas line (pipe dope, rocks, etc.). Gas line too small.
	Insects or debris clogging burners.....	Improperly sized gas meter.
	Burner intake ports low gas pressure....	Gas regulator adjustment.
	Venting or combustion air.....	Clean burners.
Outer jacket very hot (blistered paint).	Adjust gas pressure.	Refer to installation instructions regarding combustion air requirement.
	Broken refractory.....	Replace refractory panels.

Pumps

Failure To Pump

1. Pump not properly primed.
2. Wrong direction of rotation.
3. Speed too low.
4. Total head too high.

Reduced Capacity And/Or Head

1. Air pockets or leaks in suction line.
2. Clogged impeller.
3. Foot valve strainer too small or clogged.
4. Excessive suction lift (over 15 ft.).
5. Insufficient positive suction head (for hot water).
6. Total head more than that for which pump is intended.
7. Excessively worn impeller and wearing rings.

Rapid Wear Of Coupling

1. Misalignment or a bent shaft.
2. Sagging motor mounts (over-oiling).

Pump Loses Prime

1. Air leaks in suction line.
2. Excessive amount of air in water.
3. Water seal in stuffing box not functioning.
4. Excessive suction lift and pump operating too near shut-off point.

Overloaded Driving Unit

1. Head much lower than that for which pump is designed.
2. Speed too high or higher than that contemplated.

Mechanical Troubles and Noise

1. Misalignment.
2. Excessive suction lift or vapor binding (hot water).
3. Bent shaft and/or damaged bearings.
4. Suction and discharge piping not properly supported and anchored.

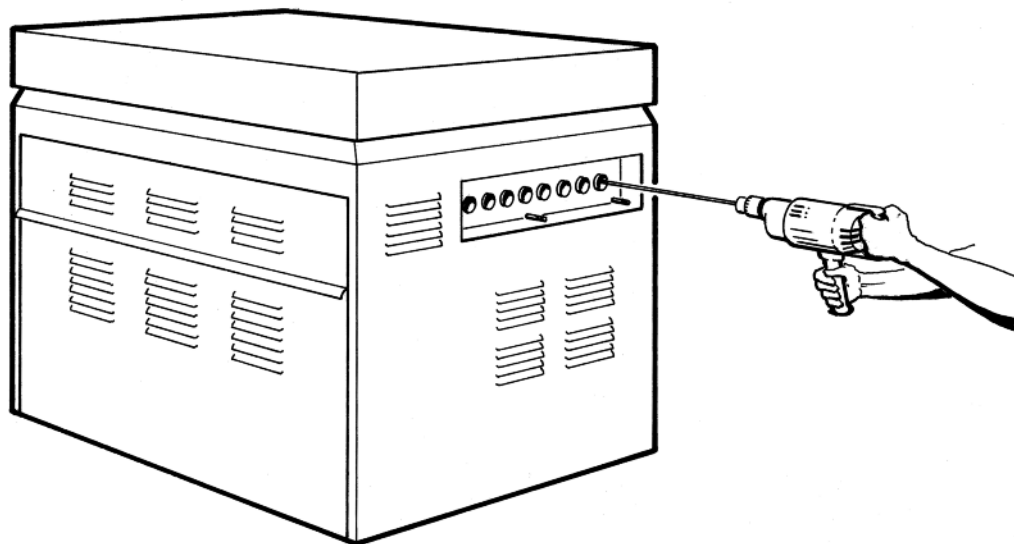


Fig. 49: Tube Cleaning Procedure

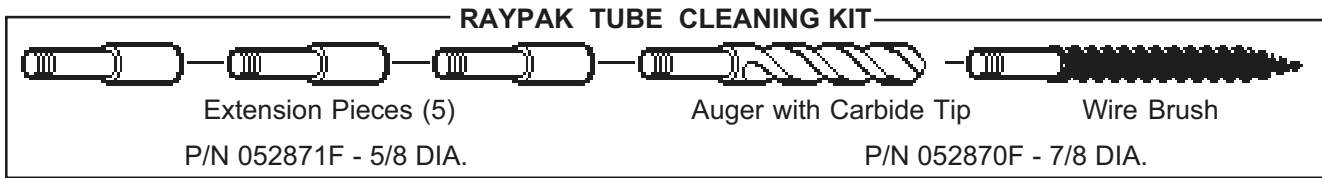


Fig. 50: Raypak Tube Cleaning Kit

Service

Repair Section

Tube Cleaning Procedure

Establish a regular inspection schedule, the frequency depending on the local water condition and severity of service. Do not let the tubes clog up solidly. Clean out deposits over 1/16" in thickness.

The boiler may be cleaned from the side opposite the water connections as shown, without breaking pipe connections. It is preferable, however, to remove both headers for better visibility through the tubes and to be sure the residue does not get into the system.

Note that you do not remove the top pan or the heat exchanger generally. After reaming with the auger, mount the wire brush and clean out the debris remaining in the tubes. Another method is to remove the heat exchanger, ream tubes and immerse heat exchanger in noninhibited de-scale solvent.

Burner Tray Removal

1. Shut-off power and gas supply to the boiler. Disconnect union(s) and pilot tubing, then loosen and remove burner hold-down screws.
2. Disconnect wires at gas valve and slide burner tray out.

Gas Valve Removal

1. Shut-off gas supply to the boiler. Remove gas piping to gas valve inlet.
2. Disconnect wires, pilot tubing and bleed line, if required.
3. Turn vertical gas pipe from manifold slightly and unscrew gas valve.
4. Reverse above procedure to re-install.

Main Burner And Orifice Removal

1. Remove screws and burner hold-down bracket.

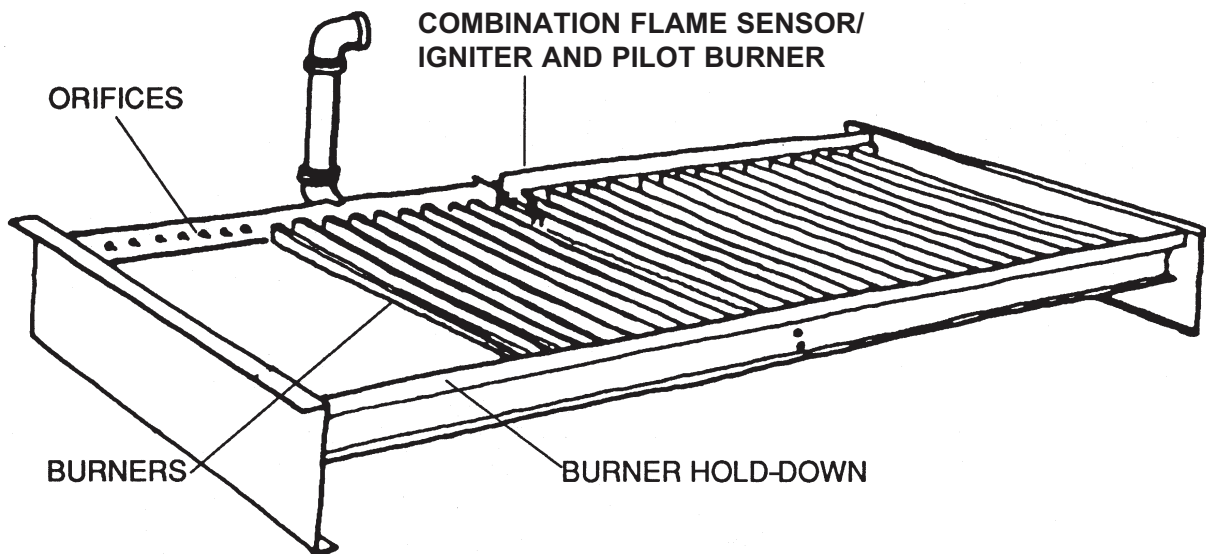


Fig. 51: Typical Burner Tray Illustrated

NOTE: If the heat exchanger is sooted badly, the burner hold-down bracket and spacer can become distorted from direct flame impingement and this usually necessitates replacement of these parts.

2. Lift burners from slotted spacer and slide from orifices. Clean with a wire brush.
3. Clean orifice(s) as necessary.

Pilot Removal and Cleaning

1. Disconnect pilot tubing at pilot and sensor/igniter wire. Remove screws holding pilot bracket to burner tray.
2. Remove pilot and bracket, clean pilot of debris, small bugs, etc., with wire or small brush.
3. Replace pilot, pilot tubing, sensor ignition wires and check for leaks.

High Limit or Tankstat Removal

1. Turn off electrical power.

2. Remove front inspection panel.
3. Remove wires to high limit and loosen screws holding high limit to cabinet.
4. Remove wedge clip holding sensing bulb in control well.
5. Remove high limit and install a new one.
6. Check control operation before leaving job.

Heat Exchanger Removal

1. Shut water, gas and electricity off, close valves and relieve pressure, remove relief valve. Remove side inspection panels.
2. Remove top holding screws.
3. Remove draft diverter, lift and remove top and flue collector on stack type models. Remove inspection panels.
4. Loosen bolts and disconnect flange nuts on in/out header, loosen union(s) at gas pipe, and slide boiler away from piping until studs clear the heater.

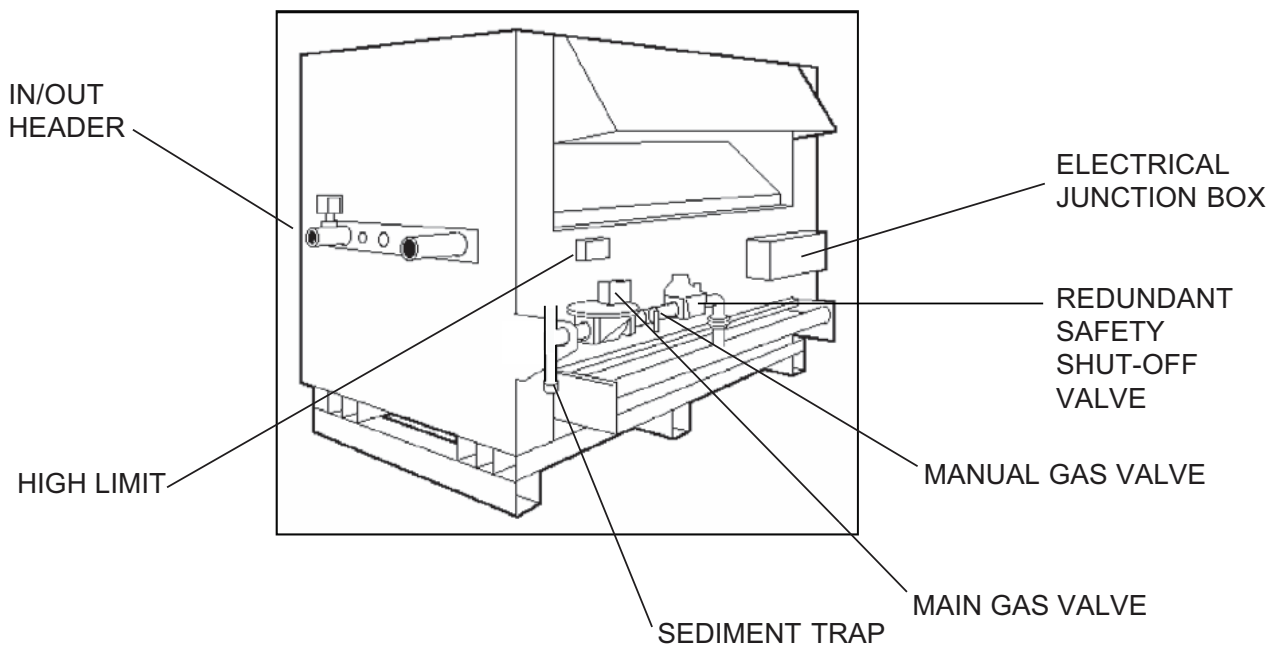


Fig. 52: Model 2100-4001 Boiler Illustration

5. Remove heat exchanger corner brackets.
6. Remove combustion chamber clips at the four corners of the heat exchanger.
7. Lift heat exchanger straight up using caution not to damage refractory.

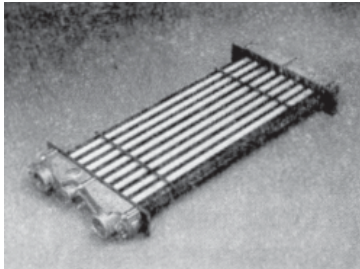


Fig. 53: Heat Exchanger

Heat Exchanger Re-Assembly

1. Heat exchanger water header O-rings should be replaced with new ones.
2. Install in/out and return water headers and install header retainer nuts and torque nuts evenly.
3. Install the four (4) corner clips between tube sheets and refractory. Replace "V" baffles.
4. Install thermostat sensing bulbs in header wells and replace bulb retaining clips.
5. Install inlet and return pipes in water headers using pipe thread sealant.
6. Install water pressure relief valve, flow switch, and low water cut-off devices if so equipped.
7. Open water supply and return shut-off valves. Fill boiler and water piping system with water. Check boiler and piping system for leaks at full line pressure. Run system circulating pump for a minimum of 1/2 hour with boiler off.
8. Shut down entire system and vent all radiation units and high points in system piping. Check all strainers for debris. Expansion tank water level should be at the 1/4 mark and the balance of the tank filled with air.
9. Install flue collector, jacket top and inspection panels. Install top holding screws. Install draft diverter and vent piping if so equipped.

10. If gas piping was disconnected, reconnect gas piping system and check for leakage using a soapy solution.
11. Check for correct water pressure and water level in the system. Make sure that system pump operates immediately on the call for heat. The system is ready for operation.
12. Within two (2) days of start-up, recheck all air vents and expansion tank levels.

Combustion Chamber Removal

To remove combustion chamber you must first remove the heat exchanger. Unbolt metal combustion chamber retainer from top and remove combustion chamber panels individually.

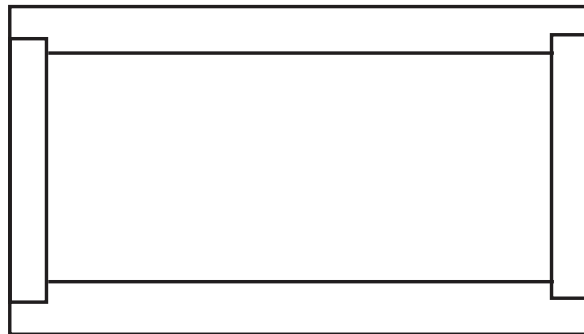


Fig. 54: Refractory Panels—Top View

Control Well Replacement

Remove top, sensing bulb and clip. Collapse well tube at the opening with a chisel, push through into header and remove the well through header. Insert a new well and roll into place. If a roller is not available, solder the well in place with silver solder.

Tube Replacement Procedure

1. Remove heat exchanger from boiler following instructions outlined under HEAT EXCHANGER REMOVAL above.
2. Remove in/out and return headers. Remove "V" baffle from damaged tube.
3. Remove damaged tube by cutting with a hack saw or shearing with a chisel adjacent to each tube sheet.
4. Collapse stub ends in tube sheets using a chisel or screwdriver. DO NOT cut into tube sheet or mar surface in tube hole in any way.

5. Insert replacement tube by inserting the end with the most fins removed in the opening of one tube sheet. Slide tube until the opposite end clears the other tube sheet and fit the tube into the hole.
6. Insert the tube roller into tube opening up to stop, making certain that 1/8" of tube projects beyond the tube sheet.
7. Attach drill to tube roller, holding it straight and level.

NOTE: Use a 3/8" heavy duty, reversible, electric drill or larger. Proceed to expand tube until tool starts to grab. Approximately 1/2 to 1" of the tool shank will be visible.

8. Reverse drill motor and withdraw tube roller. If necessary wrench out by hand.
9. DO NOT apply excessive torque during rolling operation and avoid thinning any wall of the tube beyond 0.015".
10. Use same procedure on opposite end.
11. Apply line pressure test. Re-roll if necessary.
12. Reinstall as outlined under HEAT EXCHANGER RE-ASSEMBLY.

Cleaning Flue Gas Passageways

Soot will clog areas behind fins and cause eventual tube failure. Any sign of soot at base of burners or around outer jacket indicates a need for cleaning.

1. Lift off draft hood and flue collector by removing bolts and screws.
2. Remove "V" baffles from heat exchanger.
3. Remove burner tray.
4. Take garden hose and wash heat exchanger, making sure soot is removed from between fins. (Avoid excessive water against refractory).
5. Reassemble; when boiler is fired, some steam will form from wet refractory. This is normal.
6. Correct reason for soot formation.

NOTE: In extreme cases it may be necessary to remove the heat exchanger completely for cleaning. The simplest method is steam cleaning at a local car wash. DO NOT WIRE BRUSH!

CAUTION: Soot is combustible, so exercise extreme care.

REPLACEMENT PARTS

See separate parts sheet in instruction envelope.

NOTE: To supply the correct part it is important that you supply the model number, serial number and type of gas when applicable.

Any part returned for replacement under standard company warranties must be properly tagged with Raypak return parts tag, completely filled in with the heater serial number, model number, etc., and shipped to Raypak freight prepaid. If determined defective by Raypak and within warranty, the part will be returned in kind or equal substitution, freight collect. Credit will not be issued.

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