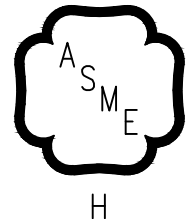


INSTALLATION, OPERATING AND SERVICE INSTRUCTIONS FOR

SERIES 5B GAS-FIRED BOILER



⚠ WARNING

This manual must only be used by a qualified heating installer/service technician. BEFORE installing, read all instructions in this manual and all other information shipped with the boiler. Post all instructions and manuals near the boiler for reference by service personnel. Perform steps in the order given. Failure to comply could result in severe personal injury, death or substantial property damage.

BURNHAM®
Commercial Boilers

www.burnhamcommercial.com

IMPORTANT INFORMATION - READ and save these instructions for reference

HAZARD DEFINITIONS

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels or to important information concerning the life of the product.

⚠ DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death, serious injury or substantial property damage.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury or property damage.

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death, serious injury or substantial property damage.

NOTICE

Indicates special instructions on installation, operation, or maintenance which are important but not related to personal injury hazards.

NOTICE

THIS BOILER HAS A LIMITED WARRANTY, A COPY OF WHICH IS PRINTED ON THE BACK OF THIS MANUAL. It is the responsibility of the installing contractor to see that all controls are correctly installed and are operating properly when the installation is complete. The warranty for this boiler is valid only if the boiler has been installed, maintained and operated in accordance with these instructions.

⚠ DANGER

DO NOT store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance.

If you smell gas or fuel oil vapors, do not try to operate the burner/boiler system. Do not touch any electrical switch or use any phone in the building. Immediately call the gas or oil supplier from a remotely located phone.

Burner/boiler systems produce steam or hot water in a pressurized vessel by mixing extremely flammable gaseous, liquid or solid fuels with air to produce combustion and very hot products of combustion. Explosions, fires severe personal injury, death and/or property damage will result from improper, careless or inadequate installation, operation or maintenance of fuel-burning and boiler equipment.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Failure to follow all instructions in the proper order can cause personal injury or death. Read and understand all instructions, including all those contained in component manufacturers manuals which are provided with the appliance before installing, starting-up, operating, maintaining or servicing this appliance. Keep this manual and literature in legible condition and posted near appliance for reference by owner and service technician.

This boiler requires regular maintenance and service to operate safely. Follow the instructions contained in this manual.

Installation, maintenance, and service must be performed only by an experienced, skilled and knowledgeable installer or service agency.

All heating systems should be designed by competent contractors and only persons knowledgeable in the layout and installation of hydronic heating systems should attempt installation of any boiler.

It is the responsibility of the installing contractor to see that all controls are correctly installed and are operating properly when the installation is completed.

Installation is not complete unless a pressure relief valve is installed into the specified tapping on the supply manifold located on top and at rear of appliance - See Section III, Paragraph 33, 'e' of this manual for details.

This boiler is NOT suitable for installation on combustible flooring.

Do not tamper with or alter the boiler or controls. Retain your contractor or a competent serviceman to assure that the unit is properly adjusted and maintained.

Clean boiler at least once a year - preferably at the start of the heating season to remove soot and scale. The inside of the combustion chamber should also be cleaned and inspected at the same time.

Have Burner and Controls checked at least once a year or as may be necessitated. Do not operate unit with jumpered or absent controls or safety devices. Do not operate unit if any control, switch, component, or device has been subject to water.

WARNING

Appliance materials of construction, products of combustion and the fuel contain alumina, silica, heavy metals, carbon monoxide, nitrogen oxides, aldehydes and/or other toxic or harmful substances which can cause death or serious injury and which are known to the state of California to cause cancer, birth defects and other reproductive harm. Always use proper safety clothing, respirators and equipment when servicing or working nearby the appliance.

This boiler contains very hot water under high pressure. Do not unscrew any pipe fittings nor attempt to disconnect any components of this boiler without positively assuring the water is cool and has no pressure. Always wear protective clothing and equipment when installing, starting up or servicing this boiler to prevent scald injuries. Do not rely on the pressure and temperature gauges to determine the temperature and pressure of the boiler. This boiler contains components which become very hot when the boiler is operating. Do not touch any components unless they are cool.

This appliance must be properly vented and connected to an approved vent system in good condition. Do not operate boiler with the absence of an approved vent system.

This boiler needs fresh air for safe operation and must be installed so there are provisions for adequate combustion and ventilation air.

The interior of the venting and air intake systems must be inspected and cleaned before the start of the heating season and should be inspected periodically throughout the heating season for any obstructions. Clean and unobstructed venting and air intake systems are necessary to allow noxious fumes that could cause injury or loss of life to vent safely and will contribute toward maintaining the boiler's efficiency.

This boiler is supplied with controls which may cause the boiler to shut down and not re-start without service. If damage due to frozen pipes is a possibility, the heating system should not be left unattended in cold weather; or appropriate safeguards and alarms should be installed on the heating system to prevent damage if the boiler is inoperative.

This boiler is designed to burn natural and/or LP gas only. Do not use gasoline, crankcase drainings, or any oil containing gasoline. Never burn garbage or paper in this boiler. Do not convert to any solid fuel (i.e. wood, coal). All flammable debris, rags, paper, wood scraps, etc., should be kept clear of the boiler at all times. Keep the boiler area clean and free of fire hazards.

Float type low water cutoff devices require annual inspection and maintenance. Refer to instructions in Section V, Paragraph 7 for inspection and cleaning instructions.

NOTICE

Series 5B cast iron boilers are designed, built, marked and tested in accordance with the ASME Boiler and Pressure Vessel Code, Section IV, Heating Boilers. An ASME Data Label is factory applied to each Series 5B jacket, which indicates the boiler Maximum Allowable Working Pressure (MAWP). Each cast iron section is permanently marked with the MAWP listed on the boiler's ASME Data Label. Those values for the Series 5B are as follows:

MAWP, Water - 50 PSI

MAWP, Steam - 15 PSI

SECTION I – EQUIPMENT CHECK LIST

U.S.A. EQUIPMENT CHECK LIST

(For Canadian Equipment Check List, Turn to Pages 7 and 8)

This Equipment Check List has been provided so that the Installer can determine if all parts have been provided for the boiler ordered. It covers standard equipment for both steam and water boilers without Tankless Heaters. Heaters or optional equipment ordered will be in addition to, or in lieu of, equipment shown below.

By opening cartons in numerical sequence, boiler assembly is simplified. If there is an exception, it will be pointed out in the boiler assembly procedure. When it does occur, you will find that assembly of the boiler is further simplified.

BOILER SIZE																			
	5006B	5007B	5008B	5009B	5010B	5011B	5012B	5013B	5014B	5015B	5016B	5017B	5018B	5019B	5020B	5021B	5022B	5024B	5026B
(1) LEH	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
(1) REH	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
(1) C	4	5	6	7	8	8	9	10	11	12	13	14	15	16	16	17	18	19	21
(2) CX	---	---	---	---	---	---	---	---	---	1	1	1	1	1	1	2	2	3	3
(3) CXP	---	---	---	---	---	1	1	1	1	---	---	---	---	---	1	---	---	---	---
(1)	Section Marking Cast on Section																		
(2)	"C" Cast on Section - When supply and return connections are tapped, section is paint stencilled "CX"																		
(3)	"C" Cast on Section - When supply and return connections are tapped and plugged, section is paint stencilled "CXP"																		
CARTONS, PACKAGES, OR BUNDLES																			
1	Base-Burner-Manifold Assembly (By Gas and By Pilot System) - One Left & One Right Req'd on 5015B and Larger Boilers																		
COMPLETE	1 6	1 7	1 8	1 9	1 10	1 11	1 12	1 13	1 14	---	---	---	---	---	---	---	---	---	---
L. SUB-BASE	---	---	---	---	---	---	---	---	---	L 1S 15	L 1S 16	L 1S 17	L 1S 18	L 1S 19	L 1S 20	L 1S 21	L 1S 22	L 1S 24	L 1S 26
R. SUB-BASE	---	---	---	---	---	---	---	---	---	R 1S 8	R 1S 9	R 1S 9	R 1S 10	R 1S 10	R 1S 10	R 1S 10	R 1S 10	R 1S 13	R 1S 13
2	Tie Rod Bundle(s) 4 Sizes - One to Five Per Boiler																		
22"	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
27"	---	---	1	2	1	---	---	---	2	1	---	---	---	---	1	---	---	---	2
37"	1	---	---	---	1	2	1	---	1	2	3	2	1	---	3	4	3	1	---
42"	---	1	---	---	---	---	1	2	---	---	---	1	2	3	---	---	1	3	3
2 A	Draw-up Rod Bundle(s) 3 Sizes - One to Three Per Boiler																		
37¾"	---	---	---	---	---	2	2	1	1	---	---	---	---	---	---	---	---	---	---
49¼"	1	1	---	---	---	---	---	1	1	2	2	1	1	1	---	---	---	3	2
67¼"	---	---	1	1	1	---	---	---	---	---	---	1	1	1	2	2	2	---	1
3 A	Boiler Assembly Carton(s) 6 Sizes - One to Five Per Boiler																		
3A6	1	---	---	---	---	1	---	---	---	---	1	---	---	---	---	1	---	---	---
3A7	---	1	---	---	---	---	1	---	---	---	---	1	---	---	---	---	1	---	---
3A8	---	---	1	---	---	---	---	1	---	---	---	---	1	---	---	---	---	---	1
3A9	---	---	---	1	---	---	---	---	1	---	---	---	---	1	---	---	---	1	1
3A10	---	---	---	---	1	---	---	---	---	1	---	---	---	---	1	---	---	---	---
3AM	---	---	---	---	---	1	1	1	1	1	2	2	2	2	2	3	3	3	3
4	Boiler Sealing Carton(s) 5 Sizes - One to Three Per Boiler																		
06	1	---	---	---	---	2	1	---	---	---	---	---	---	---	2	---	1	---	---
07	---	1	---	---	---	---	1	2	1	---	---	---	---	---	---	2	---	---	---
08	---	---	1	---	---	---	---	---	1	2	1	---	---	---	---	---	---	1	---
09	---	---	---	1	---	---	---	---	---	---	1	2	1	---	---	---	2	2	2
10	---	---	---	---	1	---	---	---	---	---	---	---	1	2	1	1	---	---	1
5	Integral Draft Hood Carton(s) 5 Sizes - One to Four Per Boiler (Natural & LP)																		
06	1	---	---	---	---	2	1	---	---	---	---	---	---	---	2	1	---	1	---
07	---	1	---	---	---	---	1	2	1	---	---	---	---	---	---	1	2	3	3
08	---	---	1	---	---	---	---	---	1	2	1	---	---	---	---	---	---	---	1
09	---	---	---	1	---	---	---	---	---	---	1	2	1	---	---	---	---	---	---
10	---	---	---	---	1	---	---	---	---	---	---	---	1	2	1	1	1	---	---

SECTION I – EQUIPMENT CHECK LIST (continued)

U.S.A. EQUIPMENT CHECK LIST

BOILER SIZE																			
	5006B	5007B	5008B	5009B	5010B	5011B	5012B	5013B	5014B	5015B	5016B	5017B	5018B	5019B	5020B	5021B	5022B	5024B	5026B
CARTONS, PACKAGES OR BUNDLES																			
7 S	Steam Trim Carton (Steam Boilers Only - Includes PA404 Pressure Limit Control) 4 Sizes - One Per Boiler																		
1	1	1	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	1	1	1	---	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	---	---	---	---	1	1	1	1	1	1	1	1	1	---	---	---	---
4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	1	1	1
67 BC-2	Low Water Cut-off Carton (Steam Boilers Only) One Per Boiler																		
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7 W	Water Trim Carton (Water Boilers Only - Includes L4006A Temp. Limit Control) 3 Sizes - One Per Boiler																		
2	1	1	1	1	1	1	---	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	---	---	---	---	1	1	1	1	1	1	1	1	1	1	1	---	---
4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	1
64	Low Water Cut-off Carton (Water Boilers Only) One Per Boiler																		
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
U 8	Complete Jacket Carton Assembly - One Per Boiler																		
9	Gas Train Cartons (By Gas) 2 Sizes - One or Two Per Boiler																		
⁹ ₁	1*	1*	1*	---	---	---	---	---	---	2	1	---	---	---	---	---	---	---	---
⁹ ₂	---	---	---	1*	1	1	1	1	1	---	1	2	2	2	2	2	2	2	2
⁹ _{3 EI}	1	1	1	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
EI	Controls Carton(s) (By Gas) (Intermittent Elec. Ign. - 100% Shutoff - 24V.) 1 Size - One or Two Per Boiler																		
EI ₁	1	1	1	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
EI ₂	---	---	---	---	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
U HCP 1	Plain Heater Cover Plate (Not furnished on Water Boiler Ordered With Two Tankless Heaters) One Per Boiler																		
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
U HCP 2	Tapped (¾" NPT) Heater Cover Plate (Not Furnished on Water Boiler Ordered With Tankless Heater(s) One Per Boiler																		
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

INSPECT SHIPMENT carefully for any signs of damage. All equipment is carefully manufactured, inspected and packed. Our responsibility ceases upon delivery of Boiler to carrier in good condition. Any claims for damage or shortage in shipment must be filed immediately against the carrier by the consignee. No claims for variances or shortages will be allowed by Boiler Manufacturer, unless presented within sixty (60) days after receipt of equipment.

*Carton 9₁, or 9₂ on sizes 5006B thru 5009B is standard on all systems except EI and may be optional on 5006B thru 5009B EI.

Carton 9₃ is standard on sizes 5006B thru 5009B for EI systems.

This Series 5B Boiler has been approved by the Massachusetts Board of Plumbers and Gas Fitters:

Approval No. G1-0202-11A.

The Commonwealth of Massachusetts requires this product to be installed by a licensed Plumber or Gas Fitter.

SECTION I – EQUIPMENT CHECK LIST (continued)

CANADIAN EQUIPMENT CHECK LIST

This Equipment Check List has been provided so that the Installer can determine if all parts have been provided for the boiler ordered. It covers standard equipment for both steam and water boilers without Tankless Heaters. Heaters or optional equipment ordered will be in addition to, or in lieu of, equipment shown below.

By opening cartons in numerical sequence, boiler assembly is simplified. If there is an exception, it will be pointed out in the boiler assembly procedure. When it does occur, you will find that assembly of the boiler is further simplified.

BOILER SIZE																			
	5006B	5007B	5008B	5009B	5010B	5011B	5012B	5013B	5014B	5015B	5016B	5017B	5018B	5019B	5020B	5021B	5022B	5024B	5026B
⁽¹⁾ LEH	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
⁽¹⁾ REH	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
⁽¹⁾ C	4	5	6	7	8	8	9	10	11	12	13	14	15	16	16	17	18	19	21
⁽²⁾ CX	---	---	---	---	---	---	---	---	---	1	1	1	1	1	1	2	2	3	3
⁽³⁾ CXP	---	---	---	---	---	1	1	1	1	---	---	---	---	---	1	---	---	---	---
(1)	Section Marking Cast on Section																		
(2)	"C" Cast on Section - When supply and return connections are tapped, section is paint stencilled "CX"																		
(3)	"C" Cast on Section - When supply and return connections are tapped and plugged, section is paint stencilled "CXP"																		
CARTONS, PACKAGES, OR BUNDLES																			
1	Base-Burner-Manifold Assembly (By Gas and By Pilot System) - One Left & One Right Req'd on 5015B and Larger Boilers																		
COMPLETE	1 6	1 7	1 8	1 9	1 10	1 11	1 12	1 13	1 14	---	---	---	---	---	---	---	---	---	---
L. SUB-BASE	---	---	---	---	---	---	---	---	---	L 1S 15	L 1S 16	L 1S 17	L 1S 18	L 1S 19	L 1S 20	L 1S 21	L 1S 22	L 1S 24	L 1S 26
R. SUB-BASE	---	---	---	---	---	---	---	---	---	R 1S 8	R 1S 9	R 1S 9	R 1S 10	R 1S 10	R 1S 10	R 1S 10	R 1S 10	R 1S 13	R 1S 13
2	Tie Rod Bundle(s) 4 Sizes - One to Five Per Boiler																		
22"	---	---	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
27"	---	---	1	2	1	---	---	---	2	1	---	---	---	---	1	---	---	---	2
37"	1	---	---	---	1	2	1	---	1	2	3	2	1	---	3	4	3	1	---
42"	---	1	---	---	---	---	1	2	---	---	---	1	2	3	---	---	1	3	3
2 A	Draw-up Rod Bundle(s) 3 Sizes - One to Three Per Boiler																		
37¼"	---	---	---	---	---	2	2	1	1	---	---	---	---	---	---	---	---	---	---
49¼"	1	1	---	---	---	---	---	1	1	2	2	1	1	1	---	---	---	3	2
67¼"	---	---	1	1	1	---	---	---	---	---	---	1	1	1	2	2	2	---	1
3 A	Boiler Assembly Carton(s) 6 Sizes - One to Five Per Boiler																		
3A6	1	---	---	---	---	1	---	---	---	---	1	---	---	---	---	1	---	---	---
3A7	---	1	---	---	---	---	1	---	---	---	---	1	---	---	---	---	1	---	---
3A8	---	---	1	---	---	---	---	1	---	---	---	---	1	---	---	---	---	---	1
3A9	---	---	---	1	---	---	---	---	1	---	---	---	---	1	---	---	---	1	1
3A10	---	---	---	---	1	---	---	---	---	1	---	---	---	---	1	---	---	---	---
3AM	---	---	---	---	---	1	1	1	1	1	2	2	2	2	2	3	3	3	3
4	Boiler Sealing Carton(s) 5 Sizes - One to Three Per Boiler																		
06	1	---	---	---	---	2	1	---	---	---	---	---	---	---	2	---	1	---	---
07	---	1	---	---	---	---	1	2	1	---	---	---	---	---	---	2	---	---	---
08	---	---	1	---	---	---	---	---	1	2	1	---	---	---	---	---	---	1	2
09	---	---	---	1	---	---	---	---	---	---	1	2	1	---	---	---	2	2	1
10	---	---	---	---	1	---	---	---	---	---	---	---	1	2	1	1	---	---	---
5	Integral Draft Hood Carton(s) 5 Sizes - One to Four Per Boiler																		
06	1	---	---	---	---	2	1	---	---	---	---	---	---	---	2	1	---	1	---
07	---	1	---	---	---	---	1	2	1	---	---	---	---	---	---	1	2	3	3
08	---	---	1	---	---	---	---	---	1	2	1	---	---	---	---	---	---	---	---
09	---	---	---	1	---	---	---	---	---	---	1	2	1	---	---	---	---	---	---
10	---	---	---	---	1	---	---	---	---	---	---	---	1	2	1	1	1	---	---

SECTION I – EQUIPMENT CHECK LIST (continued)

CANADIAN EQUIPMENT CHECK LIST

BOILER SIZE																			
	5006B	5007B	5008B	5009B	5010B	5011B	5012B	5013B	5014B	5015B	5016B	5017B	5018B	5019B	5020B	5021B	5022B	5024B	5026B
CARTONS, PACKAGES OR BUNDLES																			
7 S	Steam Trim Carton (Steam Boilers Only - Includes PA404 Pressure Limit Control) 4 Sizes - One Per Boiler																		
1	1	1	1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	1	1	1	---	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	---	---	---	---	1	1	1	1	1	1	1	1	1	---	---	---	---
4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	1	1	1
67 BC-2	Low Water Cut-off Carton (Steam Boilers Only) One Per Boiler																		
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7 W	Water Trim Carton (Water Boilers Only - Includes L4006A Temp. Limit Control) 3 Sizes - One Per Boiler																		
2	1	1	1	1	1	1	---	---	---	---	---	---	---	---	---	---	---	---	---
3	---	---	---	---	---	---	1	1	1	1	1	1	1	1	1	1	1	1	1
4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1	1
64	Low Water Cut-off Carton (Water Boilers Only) One Per Boiler																		
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
U 8	Complete Jacket Carton Assembly - One Per Boiler																		
c 9 1	Gas Train Cartons (By Gas) 2 Sizes - One or Two Per Boiler																		
c 9 1	1	1	1	---	---	---	---	---	---	2	1	---	---	---	---	---	---	---	---
c 9 2	---	---	---	1	1	1	1	1	1	---	1	2	2	2	2	2	2	2	2
U HCP 1	Plain Heater Cover Plate (Not furnished on Water Boiler Ordered With Two Tankless Heaters) One Per Boiler																		
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
U HCP 2	Tapped (¼" NPT) Heater Cover Plate (Not Furnished on Water Boiler Ordered With Tankless Heater(s) One Per Boiler																		
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

INSPECT SHIPMENT carefully for any signs of damage. All equipment is carefully manufactured, inspected and packed. Our responsibility ceases upon delivery of Boiler to carrier in good condition. Any claims for damage or shortage in shipment must be filed immediately against the carrier by the consignee. No claims for variances or shortages will be allowed by Boiler Manufacturer, unless presented within sixty (60) days after receipt of equipment.

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SECTION II - GENERAL INFORMATION - Page 10

SECTION III - INSTALLATION INSTRUCTIONS - Page 11

SECTION IV - OPERATION - Page 42

SECTION V - SERVICE - Page 60

SERVICE RECORDS - Pages 104, 105, 106, 107

SECTION VI - REPAIR PARTS - Page 70

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APPENDIX B - TABLES - Page 102

NOTE

- 5006B THRU 5014B BOILERS REQUIRE SINGLE GAS TRAIN LOCATION ON LEFT END OF BOILER (STANDARD) GAS TRAIN MAY BE RELOCATED TO RIGHT END OF BOILER (EXCEPT 5012B AND 5014B BOILERS).
- 5015B THRU 5026B BOILERS REQUIRE DUAL GAS TRAINS.
- GAS SUPPLY PRESSURE, IN W.C.
NATURAL GAS
MAXIMUM: 14" W.C.
MINIMUM: 5.5" W.C.
(5009B AND 5011B THRU 5014B AND 5020B THRU 5026B)
MINIMUM: 5" W.C.
(5006B THRU 5008B AND 5010B, 5015B THRU 5019B)
LP GAS:
MAXIMUM: 14" W.C.
MINIMUM: 11" W.C.
4. WATER BOILERS - MAXIMUM DESIGN WORKING PRESSURE: 50 PSI.
5. STEAM BOILER - MAXIMUM DESIGN WORKING PRESSURE: 15 PSI.
6. DIMENSIONS IN INCHES

Boiler Size	Jacket Overall Length 'A'	Draft Hood Height, Size and Location										Top Supply and Rear Return Location			Supply Conn. Qty & Size	Return Conn. Qty. & Size	Gas Conn. Size Nat. & Propane	No. & Dia. of Flue Outlets	Approx. Shipping Weight (LB.)
		'B' Dia.	'C' Dia.	'D' Dia.	'E' Dia.	'F'	'G'	'H'	'J'	'K'	'M'	'N'							
5006B	34	9							17	19-3/4			(2) 3	(2) 3	1	(1) 9	1160		
5007B	39-3/8	10							19-3/4	32-1/4			(2) 3	(2) 3	1	(1) 10	1340		
5008B	44-3/4	12							22-3/8	38-3/8			(2) 3	(2) 3	1	(1) 12	1525		
5009B	50-1/4	12							25-1/8	43-3/4			(2) 3	(2) 3	1-1/4**	(1) 12	1720		
5010B	55-3/4	12							27-7/8	49-1/4			(2) 3	(2) 3	1-1/4	(1) 12	1895		
5011B	61-1/8	9	9		27-1/4				17	54-3/4			(2) 3	(2) 3	1-1/4	(2) 9	2085		
5012B	66-1/2	9	10		29-7/8				19-3/4	60-1/8			(2) 3	(2) 3	1-1/4	(1) 9, (1) 10	2280		
5013B	72	10	10		32-5/8				19-3/4	65-1/2			(2) 3	(2) 3	1-1/4	(2) 10	2460		
5014B	77-1/2	10	12		35-3/8				22-3/8	71			(2) 3	(2) 3	1-1/4	(1) 10, (1) 12	2640		
5015B	82-7/8	12	12		38				22-3/8	38-1/4	38-1/4		(3) 3	(2) 3, (1) 2-1/2	(2) 1*	(2) 12	2870		
5016B	88-1/4	12	12		40-3/4				25-1/8	38-1/4	43-5/8		(3) 3	(2) 3, (1) 2-1/2	(1) 1, (1) 1-1/4*	(2) 12	3070		
5017B	93-3/4	12	12		43-1/2				25-1/8	43-5/8	43-5/8		(3) 3	(2) 3, (1) 2-1/2	(2) 1-1/4*	(2) 12	3265		
5018B	99-1/4	12	12		46-1/4				27-7/8	43-5/8	49-1/8		(3) 3	(2) 3, (1) 2-1/2	(2) 1-1/4*	(2) 12	3445		
5019B	104-5/8	12	12		49				27-7/8	49-1/8	49-1/8		(3) 3	(2) 3, (1) 2-1/2	(2) 1-1/4*	(2) 12	3620		
5020B	110	9	9	12	27-1/4	38			27-7/8	54-1/2	49-1/8		(3) 3	(2) 3, (1) 2-1/2	(2) 1-1/4*	(2) 9, (1) 12	3810		
5021B	115-1/2	9	10	12	29-7/8	40-3/4			27-7/8	27-3/8	32-5/8	49-1/8	(4) 3	(2) 3, (2) 2-1/2	(2) 1-1/4*	(1) 9, (1) 10, (1) 12	4005		
5022B	121	10	10	12	32-5/8	40-3/4			27-7/8	32-3/4	32-5/8	49-1/8	(4) 3	(2) 3, (2) 2-1/2	(2) 1-1/4*	(2) 10, (1) 12	4185		
5024B	131-3/4	9	10	10	29-7/8	32-5/8	32-5/8	19-3/4	27-3/8	65-1/4	32-3/4	32-3/4	(5) 3	(2) 3, (3) 2-1/2	(2) 1-1/4*	(1) 9, (3) 10	4530		
5026B	142-3/4	10	12	10	35-3/8	35-3/8	32-5/8	19-3/4	32-3/4	70-3/4	32-3/4	32-3/4	(5) 3	(2) 3, (3) 2-1/2	(2) 1-1/4*	(3) 10, (1) 12	4895		

* Dual Manifolds - 5015B thru 5026B
**1" - USA - EI

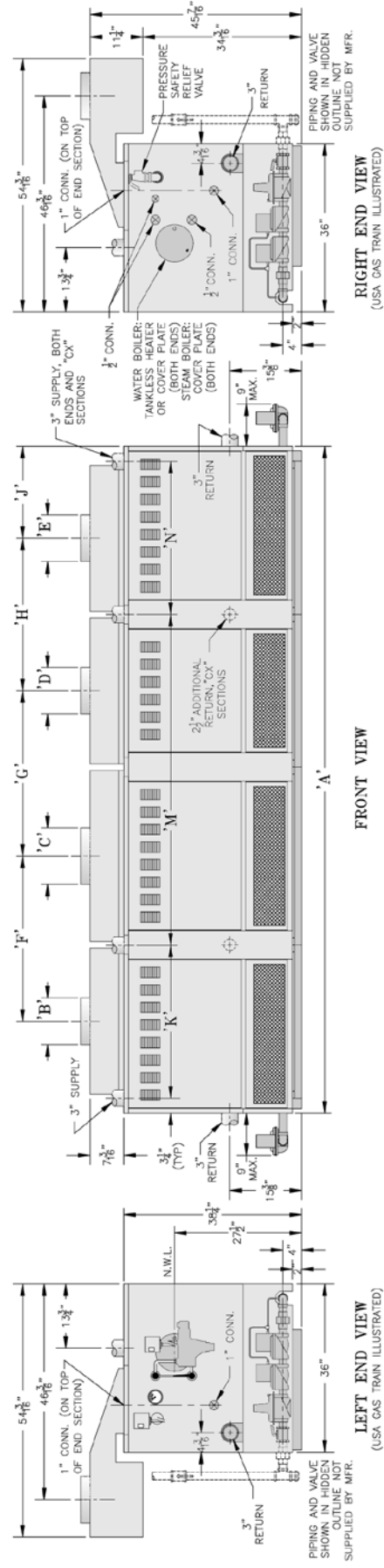


FIG. 1
DIMENSIONAL DATA

SECTION II – GENERAL INFORMATION

1. BOILER INSTALLATION must conform to the requirements of the authority having jurisdiction, or in the absence of such requirements, to:

USA – “National Fuel Gas Code, ANSI Z223.1”.

When required by the authority having jurisdiction, the installation must conform to American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, No. CSD-1.

CANADA – “Installation Codes for Natural and Propane Gas Burning Appliances and Equipment, CAN/CSA-B149 (.1 or .2)”.

DO NOT INSTALL THIS BOILER ON CARPETING.

2. BOILER LOCATION – locate on a level NON-COMBUSTIBLE FLOOR as close as possible to chimney so that vent connection is short and direct.

⚠ DANGER

Boiler must not be installed directly on combustible flooring. A concrete pad is not sufficient to protect combustible flooring.

The boiler shall be installed such that the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during boiler operation and service (circulator replacement, control replacement, etc.).

Do not install boiler where gasoline or other flammable vapors or liquids, or sources of hydrocarbons (i.e. bleachers, cleaners, chemicals, sprays, paint removers, fabric softeners, etc.) are used or stored.

Refer to table below for minimum clearances, service clearances, and clearances for removal of Tankless Heaters.

3. PROVIDE COMBUSTION AND VENTILATION AIR.

In the USA refer to *National Fuel Gas Code*, NFPA 54/ANSI Z223. Section 5.3, Air for Combustion and Ventilation. In Canada refer to *Natural Gas Installation Code*, CAN/CSA-B149.1 – latest edition or *Propane Installation Code*, CAN/CSA-B149.2 – latest edition. Local code provisions may apply and should be referenced.

⚠ WARNING

Adequate combustion and ventilation air must be provided to assure proper combustion.

- a. Determine volume of space (boiler room). Rooms communicating directly with the space, in which the appliances are installed, through openings not furnished with doors, are considered a part of the space.

$$\text{Volume (ft}^3\text{)} = \text{Length (ft)} \times \text{Width (ft)} \times \text{Height (ft)}$$

- b. Determine total input of all appliances in the space. Add inputs of all appliances in the space and round the result to the nearest 1000 Btu per hour.
- c. Determine type of space.

Divide Volume by Total Input of all appliances in space. If the result is greater than or equal to 50 ft³/1000 Btu per hour, then it is considered an *unconfined space*.

If the result is less than 50 ft³/1000 Btu per hour, then the space is considered a *confined space*.

- d. For boiler located in an *unconfined space of a conventionally constructed building*, the fresh air infiltration through cracks around windows and doors normally provides adequate air for combustion and ventilation.
- e. For boiler located in a confined space or an unconfined space in a building of unusually tight construction, provide outdoor air with the use of two permanent openings which communicate directly or by duct with the outdoors or spaces (crawl or attic) freely communicating with the outdoors. Locate one opening within 12 inches of top of space. Locate remaining opening within 12 inches of bottom of space. Minimum dimension of air opening is 3 inches. Size each opening per following:
 1. Direct communication with outdoors. Minimum free area of 1 square inch per 4,000 Btu per hour input of all equipment in space.
 2. Vertical ducts. Minimum free are of 1 square inch per 4,000 Btu per hour input of all

CLEARANCES - From Table below and from dimensional data in Fig. 1, determine BOILER ROOM space necessary for appropriate access to and servicing of Boiler. Consideration should be given to other appliances installed in the same area. Consult with local Building and Safety Codes for compliance.

	MINIMUM CLEARANCE - JACKET TO COMBUSTIBLE CONSTRUCTION	RECOMMENDED SERVICE CLEARANCE TO NON-COMBUSTIBLE CONSTRUCTION	CLEARANCES REQ'D FOR REMOVAL OF TANKLESS HEATER		
			AT-2	AT-3	AT-4
Left Side	24" (61 cm)	18" (Controls)	27"	32"	42"
Right Side	24" (61 cm)	18" (Controls)	27"	32"	42"
Front	24" (61 cm)	36" (Cleaning-Burner Removal)	---	---	---
Rear	24" (61 cm)	36" (Cleaning)	---	---	---
Top	24" (61 cm)	-----	---	---	---

SECTION II – GENERAL INFORMATION (continued)

equipment in space. Duct cross-sectional area shall be same as opening free area.

3. Horizontal ducts. Minimum free area of 1 square inch per 2,000 Btu per hour input of all equipment in space. Duct cross-sectional area shall be same as opening free area.

Alternate method for boiler located within confined space. Use indoor air if two permanent openings communicate directly with additional space(s) of sufficient volume such that combined volume of all spaces meet criteria for unconfined space. Size each opening for minimum free area of 1 square inch per 1,000 Btu per hour input of all equipment in spaces, but not less than 100 square inches.

4. LOUVERS AND GRILLES of Ventilation Ducts

All outside openings should be screened and louvered. Screens used should not be smaller than ¼ inch mesh. Louvers will prevent the entrance of rain and snow.

- a. Free area requirements need to consider the blocking effect of louvers, grilles, or screens protecting the openings. If the free area of the louver or grille is not known, assume wood louvers have 20-25 percent free area and metal louvers and grilles have 60-75 percent free area.
- b. Louvers and grilles must be fixed in the open position or interlocked with the equipment to open automatically during equipment operation.

SECTION III – INSTALLATION INSTRUCTIONS

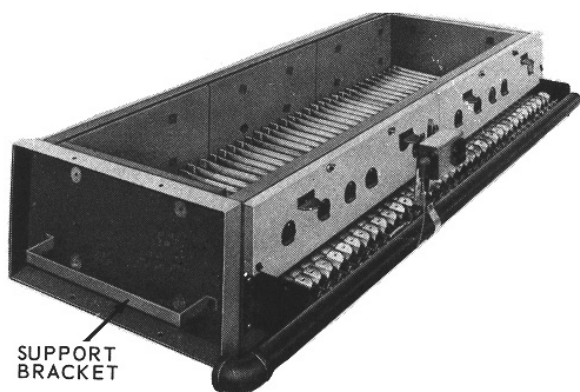


FIG. 2
SINGLE MANIFOLD BASE 5006B
THRU 5014B SECTION BOILERS

1. BASE-BURNER-MANIFOLD ASSEMBLY(S).

- a. 5006B section thru 5014B section boilers require single base assembly, see Fig. 2.
- b. 5015B section thru 5026B section boilers require a left and a right base subassembly, see Fig. 3.

Remove Base Assembly(s) From Skid(s)

- c. Remove bolts securing Base Assembly(s) to shipping skid(s) and place Base(s) in location where Boiler is to be installed.
- d. Join Base Sub-assemblies together (15 section & larger boilers) by first removing upper shipping strip and lower shipping angles from subassemblies. Use (4) ¼"-20 x ¾" MS, nuts and washers to attach subassemblies, see Fig. 3.
- e. Attach Front Intermediate Jacket Panel Support Bracket and Lower Rear Intermediate Panel Support Bracket to lower channel on Front Base Frame and Rear Base Frame, respectively, using (4) ¼"-20 x ¾" MS, nuts and washers.

- f. Base must be level in both directions and secure on the floor. Shim and grout under Base if necessary.
- g. Place cardboard covering over the top of the burner assembly to protect them during the assembly of the boiler sections.

2. CLEAN BOILER SECTIONS inside and out to remove dirt due to shipment and handling.

Open Tie Rod Bundle(s). Open Draw-up Rod Bundle(s).

Open Boiler Assembly Carton(s).

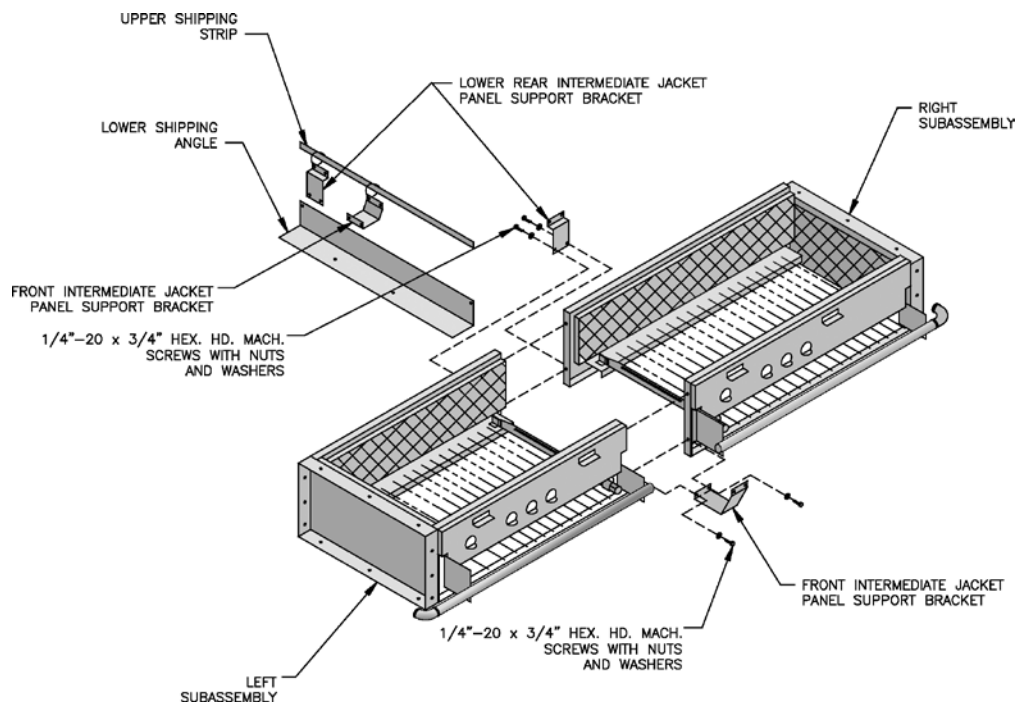
3. SET LEFT END SECTION ON BASE so that locating lugs on bottom of section go inside Front and Rear Base Frames. Slide section on base until these lugs strike High Base End Panel at left end of Base, see Fig. 4. (Note – if High Base End Panel is at right end of Base, section assembly must start with Right End Section). Left end sections are identified by "LEH" cast on section; Right End Sections are identified by "REH" cast on section.

4. CLEAN NIPPLES AND NIPPLE PORTS thoroughly with a de-greasing solvent. Use the Loctite® #592 supplied to lubricate the nipples and nipple ports. Apply the lubricant to the nipples and nipple ports, then use a brush to disperse it evenly around the nipples and the nipple ports. Use approximately 25 ml of Loctite® #592 per flueway [(1) 7" and (2) 3" nipples and their (6) corresponding nipple ports]. Use Nipple Gauge furnished – follow instructions included with gauge to set nipples. USE ALL PRECAUTIONS TO AVOID COCKED NIPPLES.

5. PAINT ALL GROUND SURFACES of each section with the Sealer Compound furnished.

6. ASSEMBLE CENTER SECTIONS. Refer to Fig. 6 for proper location of Tapped, and sometimes plugged,

SECTION III – INSTALLATION INSTRUCTIONS (continued)



1. REMOVE LOWER SHIPPING ANGLE AND UPPER SHIPPING STRIP FROM BOTH BASE SUBASSEMBLIES.
2. BOLT SUBASSEMBLIES TOGETHER.
3. ATTACH FRONT INTERMEDIATE JACKET PANEL SUPPORT BRACKET TO FRONT BASE FRAMES.
4. ATTACH LOWER REAR INTERMEDIATE JACKET PANEL SUPPORT BRACKET TO REAR BASE FRAMES.

FIG. 3

DUAL MANIFOLD BASES - 5015B THRU 5026B SECTION BOILERS

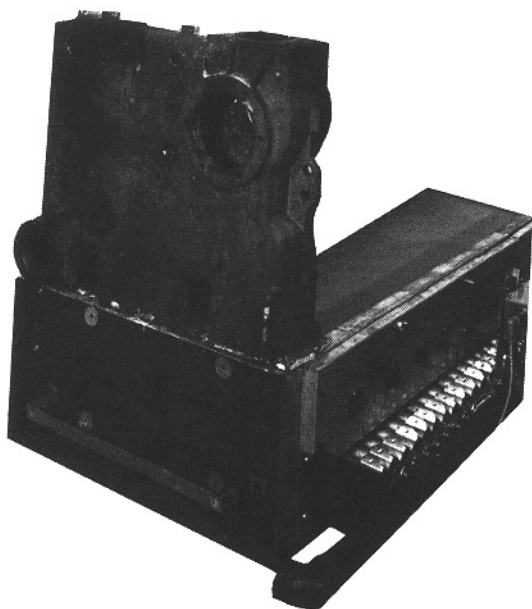


FIG. 4
LEH SECTION ON BASE

Center Sections on 11 section and larger boilers. THIS IS IMPORTANT.

- a. Carefully join a Center Section with nipples in adjoining section and bump lightly to secure.
- b. Run nut approximately 8" on two (2) 3/4" draw-up rods of equal length. (Note – more than one set of draw-up rods are furnished on 8 section and larger boilers). Place draw-up channel and one flat washer against nut.

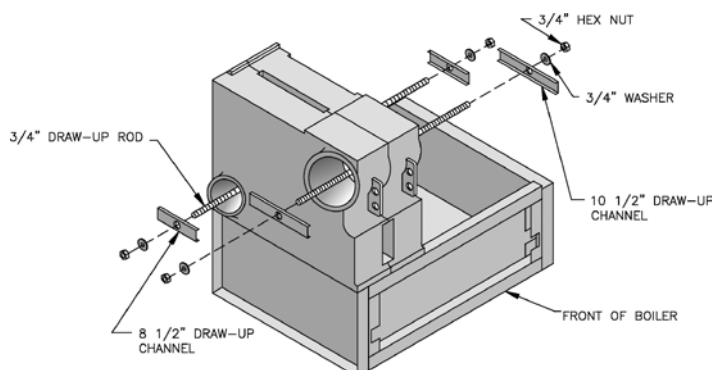
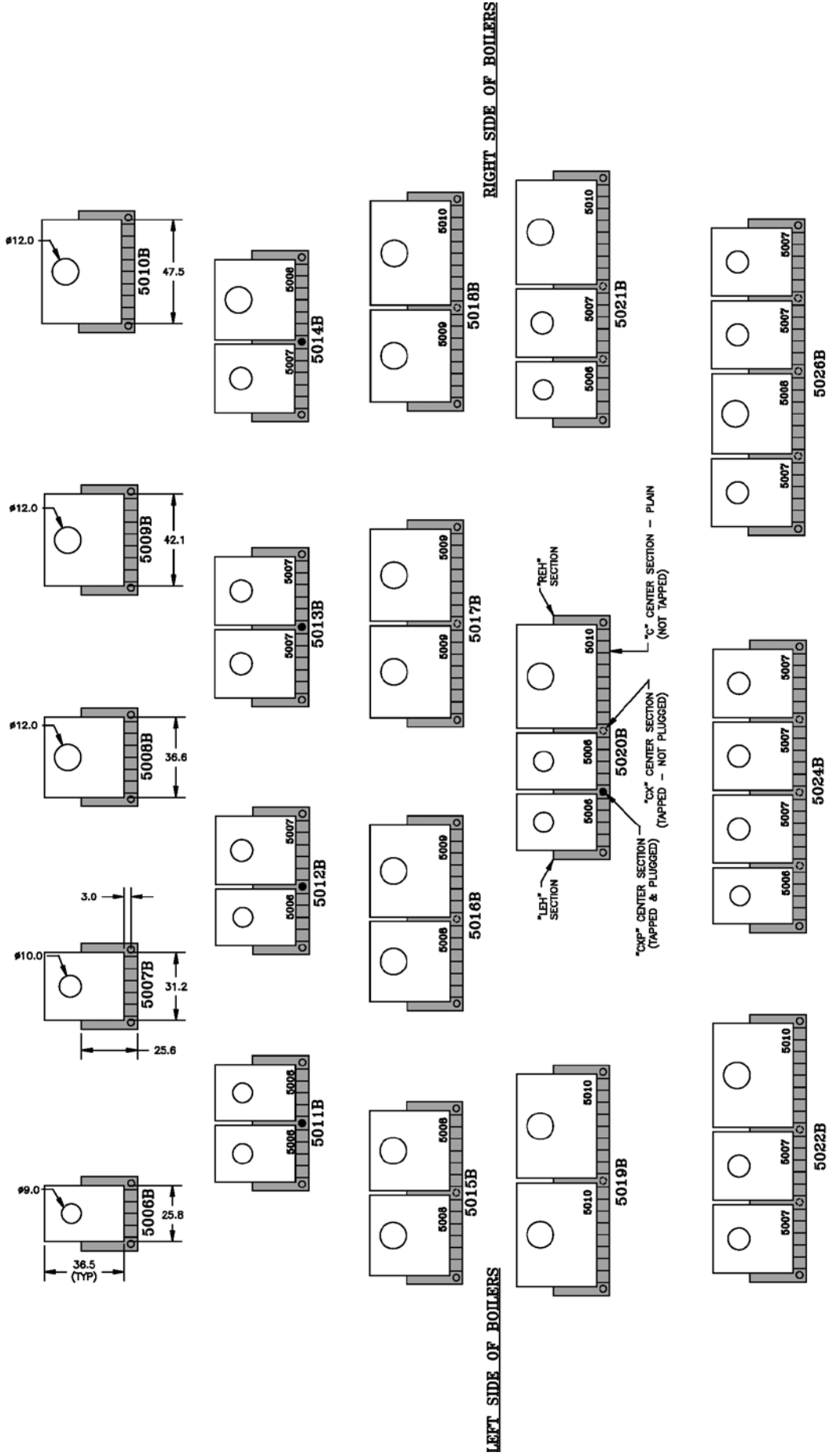


FIG. 5
ASSEMBLY OF CENTER SECTIONS

SECTION III – INSTALLATION INSTRUCTIONS (continued)

REAR OF BOILERS



1. THE NUMBERS ON THE CANOPIES INDICATE CANOPY SIZE.

- SUPPLY & RETURN ON RIGHT & LEFT END SECTIONS NOT PLUGGED.
- SUPPLY & RETURN ON CENTER SECTION NOT PLUGGED.
- SUPPLY & RETURN ON CENTER SECTION PLUGGED.

FIG. 6
ARRANGEMENT OF SECTIONS AND CANOPY(S)

SECTION III – INSTALLATION INSTRUCTIONS (continued)

- c. Insert short end of draw-up rod through front & rear nipple ports on both sections, see Fig. 5.
 - d. Place two (2) flat washers, draw-up channel and a nut on each end of draw-up rods and finger tighten.
 - e. DRAW UP CENTER SECTION SLOWLY AND EVENLY, tightening each DRAW-UP ROD a little at a time so that sections are equally spaced. KEEP NIPPLES ALIGNED WITH NIPPLE PORTS. If necessary, tap Nipples lightly with a blunt tool or rod to keep Nipples from cocking while Sections are being drawn up. DO NOT DRAW UP SECTION(S) WHEN NIPPLES ARE COCKED. Continue tightening Draw-Up Rods equally until Sections meet iron-to-iron on the ground surface. BUMPING OUTER EDGES OF SECTION WITH WOODEN BLOCK WILL EASE DRAW-UP OPERATION.
 - f. KEEP DRAW-UP ROD THREADS, NUTS AND WASHERS LUBRICATED with grease or heavy oil to prevent damage to rods and threads and to make assembling easier.
 - g. USING A PINCH BAR, insert WOOD WEDGES under last Center Section assembled so as to raise it just above Boiler Base. This will keep the next section to be assembled above the base, thus making it easier to join and draw-up. MOVE WOOD WEDGES FORWARD EACH time a Section has been drawn up.
7. ASSEMBLE REMAINING END SECTION WITH DRAW-UP RODS in a manner similar to that for assembling Center Sections. Remove wedges from under Boiler. Be sure Boiler is aligned and seated on Base.
 - a. After section assembly is completed install 5/8" tie rods from tie rod bundle through the upper lug holes in the front of Boiler and Lower lug holes in the rear of Boiler sections and tighten until they are finger tight only, to allow for expansion. This is necessary in order to allow clearance for installation of Flue cover plates. Finally, remove 3/4" draw-up rods from nipple ports.

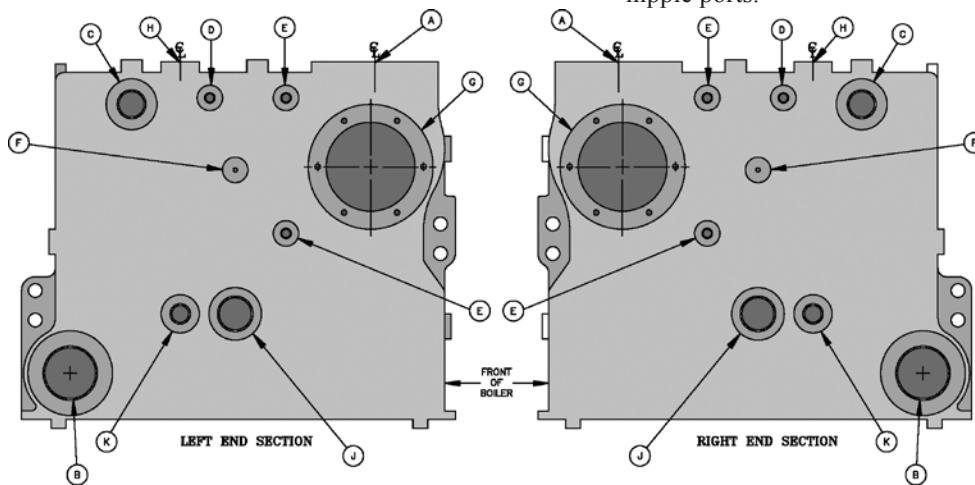


FIG. 7
PURPOSE OF TAPPINGS AND THEIR LOCATIONS

PURPOSE OF TAPPINGS ¹				
Location	Tapping Per End Section	Size	Steam Boilers	Water Boilers
A	1	3"	Supply	Supply
B	1	3"	Return	Return
C ²	1	1-1/2"	Pressure Operating Control (Bushed to 1/4")	Temperature Operating Control (less heater) Bushed to 3/4"; Plug (with heater)
D	1	1/2"	Pressure Gauge	Theraltimeter
E	2	1/2"	Water Gauge, LWCO & Pressure Limit	Plug
F	1	3/8"	Try-Cock (Special Order)	----
G ³	1	----	Cover Plate	Cover Plate or Tankless Heater
H	1	1"	See Note 4	See Note 4
J	1	1-1/2"	Indirect Water Heater Supply or Return	----
K	1	3/4"	Indirect Water Heater Limit	----

¹ Tappings on both end sections are identical - Recommend trim be installed in left end section or on same end as gas train.

² This tapping is used for safety valve and surface blowoff (steam boilers) and safety relief valve (water boilers) on end not equipped with trim.

³ Temperature operating control location on tankless heater equipped boilers. Also alternate operating control location, tapped cover plate.

⁴ If using a float type LWCO, feeder or pump controller on a steam boiler that does not use quick connect hook up fittings, install between tappings H and return B. Use opposite return B for system return connection. Water boilers using a probe LWCO must mount probe in supply pipe above boiler without any stop valves.

SECTION III – INSTALLATION INSTRUCTIONS (continued)

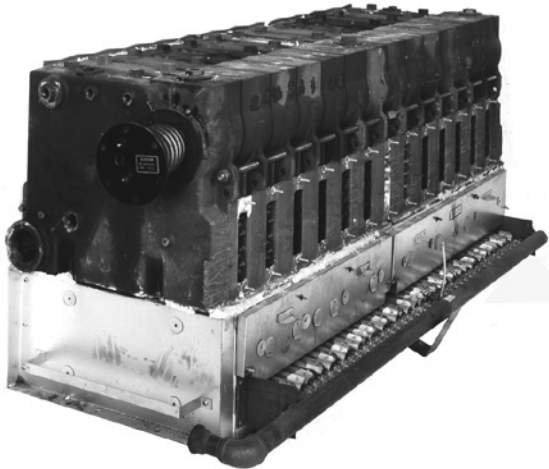


FIG. 8
INSTALLATION OF BUILT-IN HEATER

Open Steam or Water Trim Carton

8. USE THE PLUGS IN THIS CARTON to plug tappings in End Sections that will not be utilized on final installation, see Fig. 7.

Open Tankless Heater Carton(s) If Supplied.

Open Heater Opening Cover Plate Carton(s).

9. INSTALL BUILT-IN WATER HEATER(S) OR HEATER OPENING COVER PLATE(S), See Fig. 8. Heater may be installed in either End Section or, in some cases, in both End Sections. Heater Opening Cover Plates are used to cover any unused heater openings.
 - a. Place rubber gasket against surface of plate and align holes.
 - b. Place washer on each of 3/8" Cap Screws furnished and insert cap screws through plate and gasket. Start all screws in taps before final tightening.
10. **HYDROSTATIC TEST**, see Fig. 9: After the boiler sections have been assembled, it is essential that the boiler be hydrostatically tested before the canopy, flue cover plates, jacket, or piping is installed.
 - a. Plug all boiler tappings and fill boiler completely with cold water.

CAUTION

DO NOT install gauge until after hydrostatic testing the boiler. Gauge failure may result.

- b. All completed boilers must satisfactorily pass the prescribed hydrostatic test.
 - (1) **STEAM BOILERS:** The assembled boiler must be subjected to a hydrostatic test of 45 psig to 55 psig.

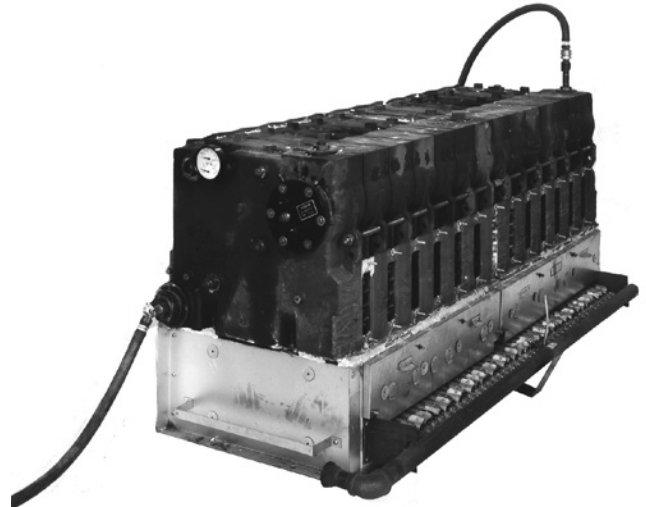


FIG. 9
TESTING BOILER ASSEMBLY FOR LEAKS

- (2) **HOT WATER BOILERS:** The assembled boiler must be subjected to a hydrostatic test of 75 psig to 85 psig.

WARNING

Failure to properly hydrotest all boilers at the correct pressure may result in section assembly failure in operation.

11. EXAMINE BOILER CAREFULLY, INSIDE AND OUTSIDE, to insure against leaks from cocked nipples or through concealed breakage caused in shipping and handling. This precaution is for your protection and will simplify handling of necessary replacements and adjustment claims. After making certain that there are no leaks, drain boiler and remove plugs for boiler trim and other connections.

Open Boiler Sealing Carton.

12. SEAL BETWEEN BOILER SECTIONS AND BASE, see Fig. 10.
 - a. Push 3/4" braided ceramic fibre Rope (furnished) into gap between bottom of End Section and Low Base End Panel until rope touches Front and Rear Base Frames. Place the 1-1/2" x 2" x 5/8" steel spacers between low base panel and section and in front of rope – align holes. Secure section to low base end panel with 3/8"-16 x 2" Cap Screws, washers and nuts.
 - b. Secure opposite end section to high base end panel with 3/8"-16 x 2" Cap Screws, washers and nuts.
 - c. Apply Furnace Cement to gaps between section assembly and base to make gas tight seal.
 - d. Check all joints between Boiler sections and use remaining Furnace Cement or Sealer Compound to make joints gas tight.

SECTION III – INSTALLATION INSTRUCTIONS (continued)

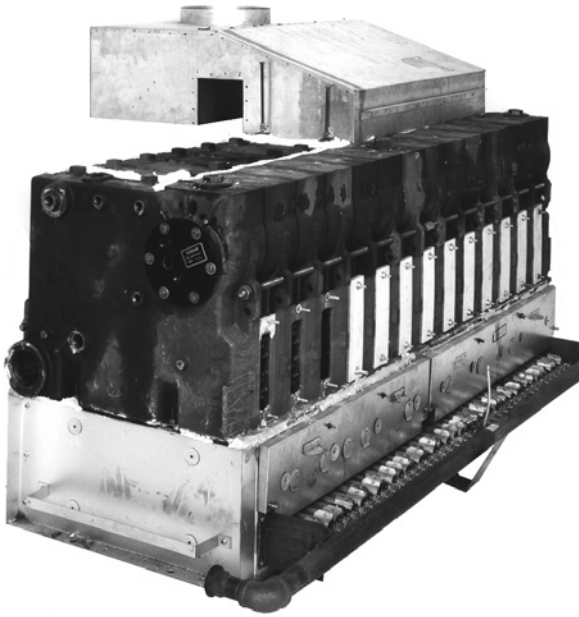


FIG. 10
SEALING OF BASE, INSTALLATION OF
FLUE COVERS AND CANOPIES

13. INSTALL FLUE COVER PLATES over cleanout openings on Front and Rear of Boiler. Use $\frac{1}{4}$ " Carriage Bolts installed at top and bottom of flue openings and secure with washer and jam nut to provide a fixed stud. Install flue cover plates over studs with insulation against Boiler and secure with washers and nuts, see Fig. 11.

14. CONNECT SUPPLY AND RETURN PIPING TO HEATING SYSTEM.

CLEARANCES – Steam and Hot water pipes shall have clearances of at least $\frac{1}{2}$ " from all combustible construction.

NOTICE

Before using copper for steam piping, consider the following characteristics of copper piping:

- 1) high coefficient of thermal expansion can induce mechanical stresses and cause expansion/contraction noises if not accounted for in the piping system design and installation,
- 2) high heat transfer rate (heat loss) of uninsulated copper piping must be included in the normal piping and pickup factors used to size the boiler,
- 3) soldering or brazing pastes and fluxes that end up in the system can cause poor heat transfer, surging, and unsteady water line and wet steam if not thoroughly removed during the boil out procedure and,
- 4) galvanic corrosion of the adjoining metal may occur due to dissimilar metals in certain water chemistries if dielectric unions are not used.

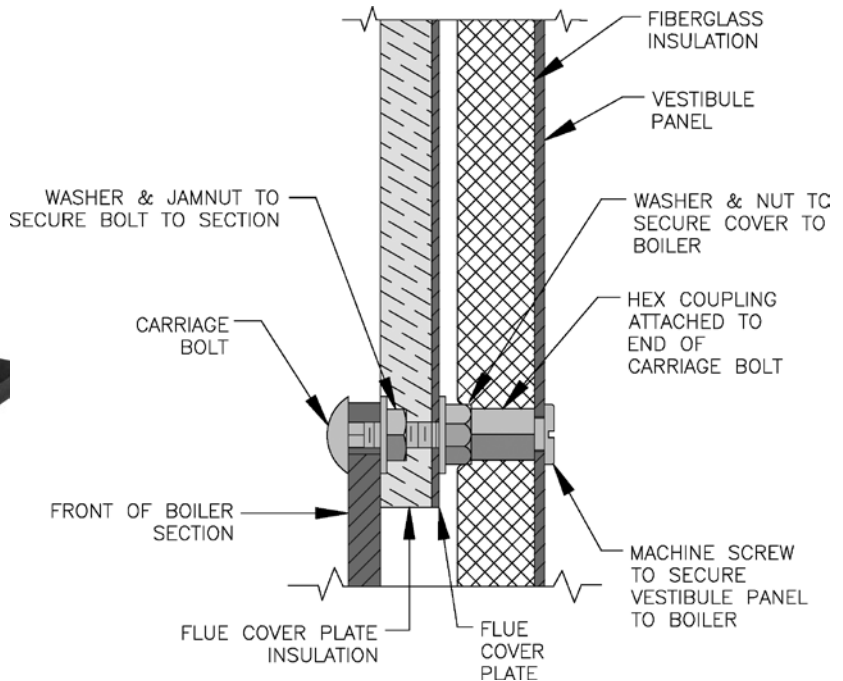


FIG. 11
ATTACHMENT OF FLUE COVERS

- a. With Steam Heating System, refer to Fig. 12, 13, 14 or 15.
- b. With Forced Circulation HOT WATER HEATING SYSTEMS, see Fig. 16A and 16B. For additional reference, consult I=B=R Installation and Piping Guide No. 250.

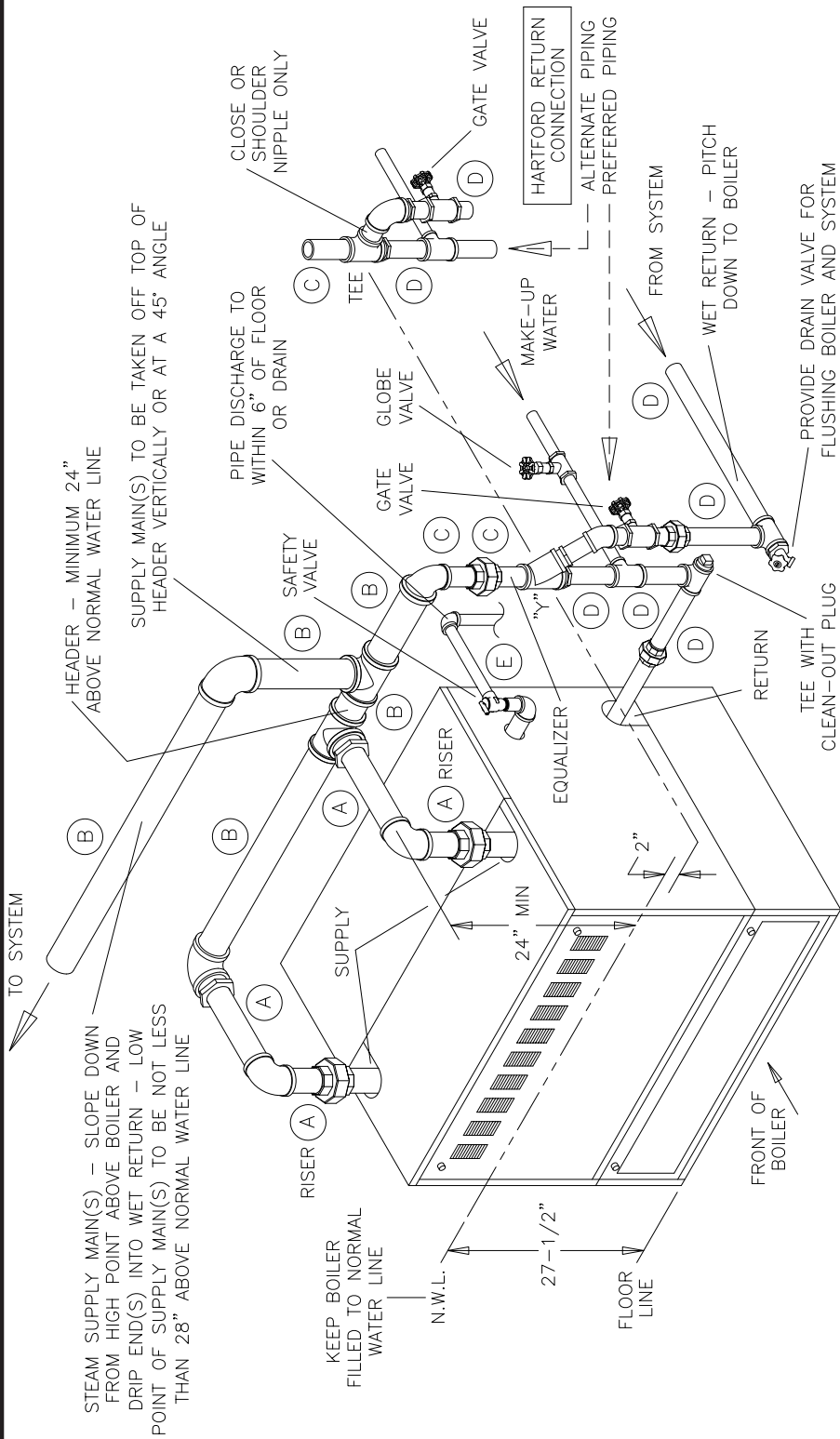
NOTE: When Hot Water Heating Boilers are connected to Heating Coils located in Air Handling Units where they may be exposed to refrigerated air circulation, the Boiler Piping System must be equipped with Flow Control Valves or other automatic means to prevent gravity circulation of the Boiler Water during the cooling cycle.

- c. With COMBINATION HEATING AND COOLING (REFRIGERATION) SYSTEMS having the same Distributing Units, Piping and Circulator, See Fig. 17. For additional reference, consult ASHRAE Systems Handbook 2008 Edition.
- d. **NOTE:** Valves must be installed in the supply and return branches to the Heating Boiler and Water Chiller so as to prevent circulation of Chilled Water through the Boiler or Heated Water through the Chiller.

OXYGEN CORROSION:

Oxygen contamination of the boiler water will cause corrosion of the iron and steel boiler components, which can lead to failure. As such, any system must be designed to prevent oxygen absorption in the first place or prevent it from reaching the boiler. Problems caused by oxygen contamination of boiler water are not covered by Burnham's standard warranty.

SECTION III – INSTALLATION INSTRUCTIONS (continued)



MINIMUM PIPE SIZE

5006**	5007**	5008	5009	5010	5011	5012	5013	5014
A	3"	3"	3"	3"	3"	3"	3"	3"
B	3"	3"	4"	4"	4"	5"	5"	5"
C	2"	2"	2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"
D	1-1/2"	1-1/2"	1-1/2"	2"	2"	2"	2"	2"
E	3/4"	3/4"	1"	1"	1"	1-1/4"	1-1/4"	1-1/4"

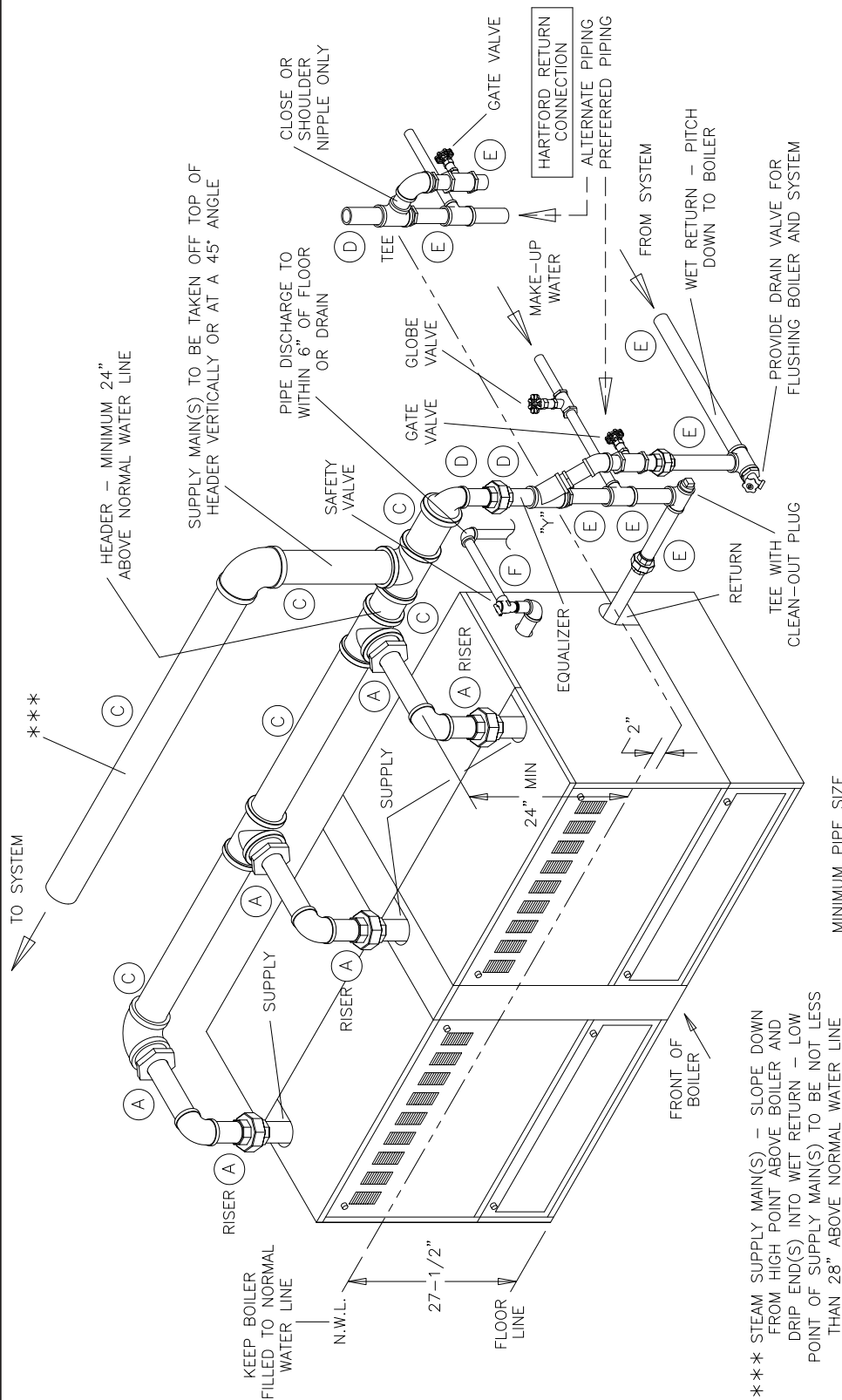
** SECOND SUPPLY RISER OPTIONAL

FIG. 12

RECOMMENDED STEAM BOILER PIPING, GRAVITY RETURN

I OR 2 SUPPLY CONNECTIONS - 5006B THRU 5014B

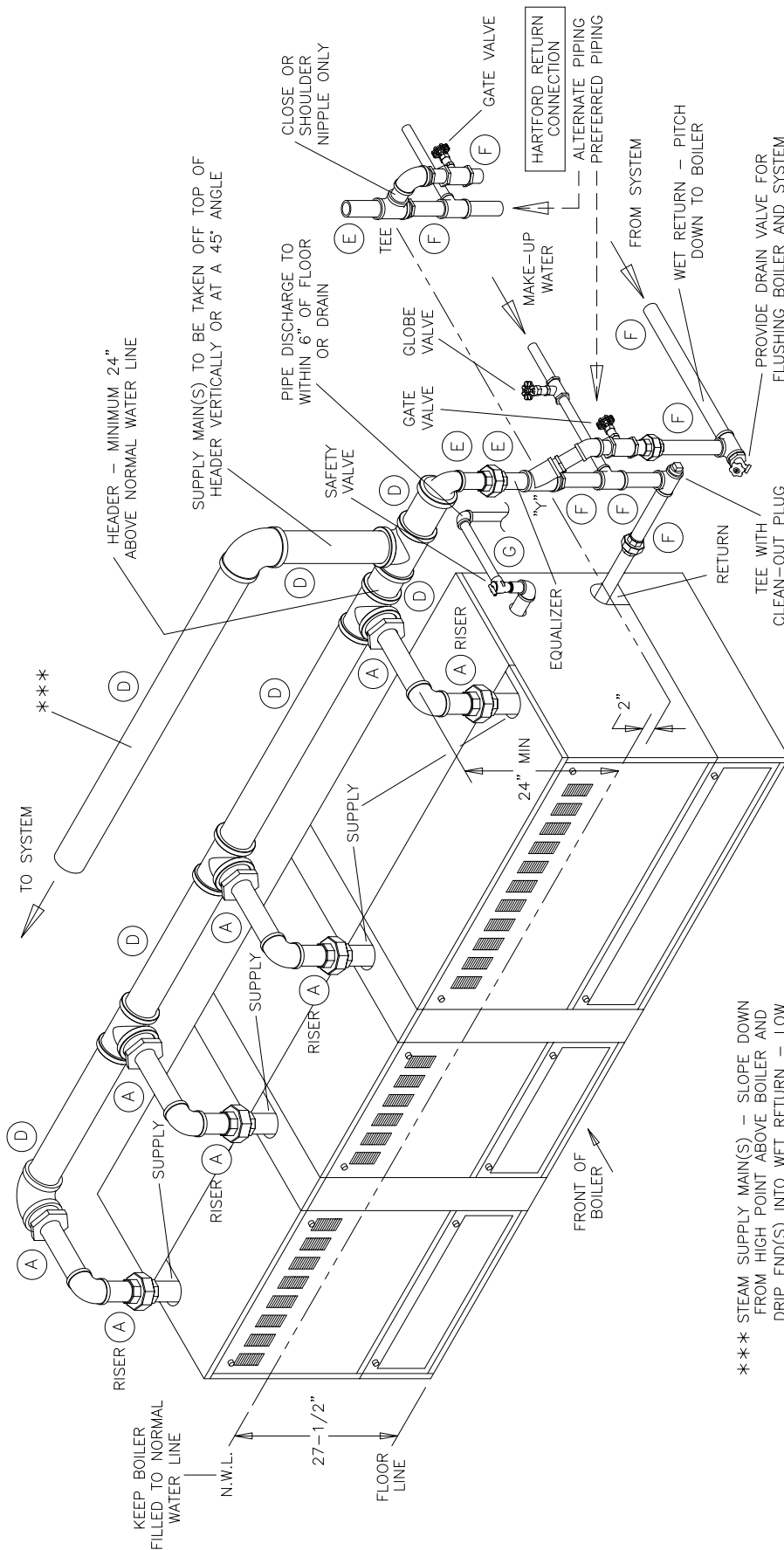
SECTION III – INSTALLATION INSTRUCTIONS (continued)



		MINIMUM PIPE SIZE					
		5015	5016	5017	5018	5019	5020
A	3"	3"	3"	3"	3"	3"	3"
B	—	—	—	—	—	—	—
C	5"	5"	5"	5"	5"	5"	5"
D	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"	2-1/2"
E	2"	2"	2"	2"	2"	2"	2"
F	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"

FIG. 13
RECOMMENDED STEAM BOILER PIPING, GRAVITY RETURN
3 SUPPLY CONNECTIONS - 5015B THRU 5020B

SECTION III – INSTALLATION INSTRUCTIONS (continued)



*** STEAM SUPPLY MAIN(S) – SLOPE DOWN FROM HIGH POINT ABOVE BOILER AND DRIP END(S) INTO WET RETURN – LOW POINT OF SUPPLY MAIN(S) TO BE NOT LESS THAN 28" ABOVE NORMAL WATER LINE

MINIMUM PIPE SIZE

	5021	5022	5024**	5026**
A	3"	3"	3"	3"
B	—	—	—	—
C	—	—	—	—
D	6"	6"	6"	6"
E	2-1/2"	2-1/2"	2-1/2"	3"
F	2"	2"	2"	2-1/2"
G	1-1/2"	1-1/2"	1-1/2"	1-1/2"

** FIVE SUPPLY RISERS REQUIRED

FIG. 14
RECOMMENDED STEAM BOILER PIPING, GRAVITY RETURN
4 OR 5 SUPPLY CONNECTIONS - 5021B THRU 5026B



FIG. 15

SECTION III – INSTALLATION INSTRUCTIONS (continued)

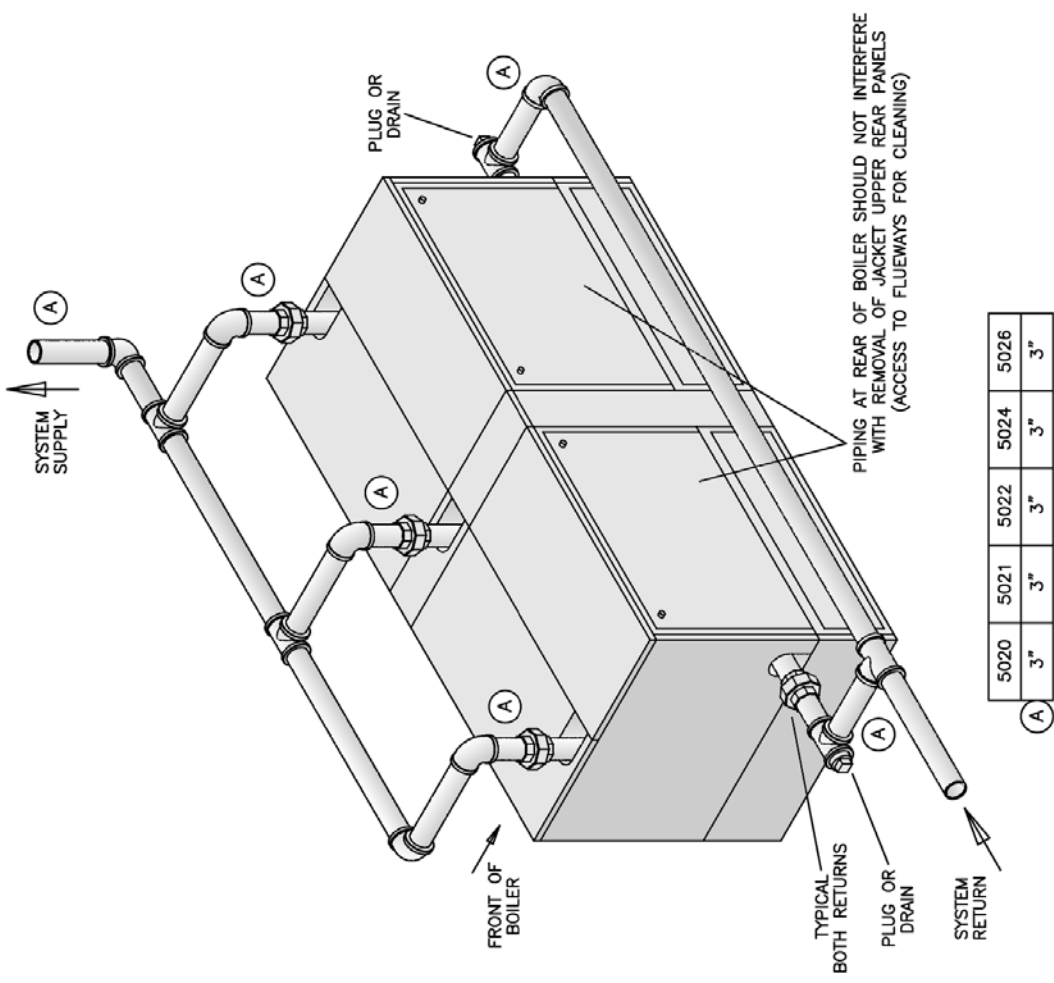


FIG. 16B
RECOMMENDED WATER BOILER PIPING
3 SUPPLY CONNECTIONS & 2 RETURN CONNECTIONS
SIZES 5020B THRU 5026B

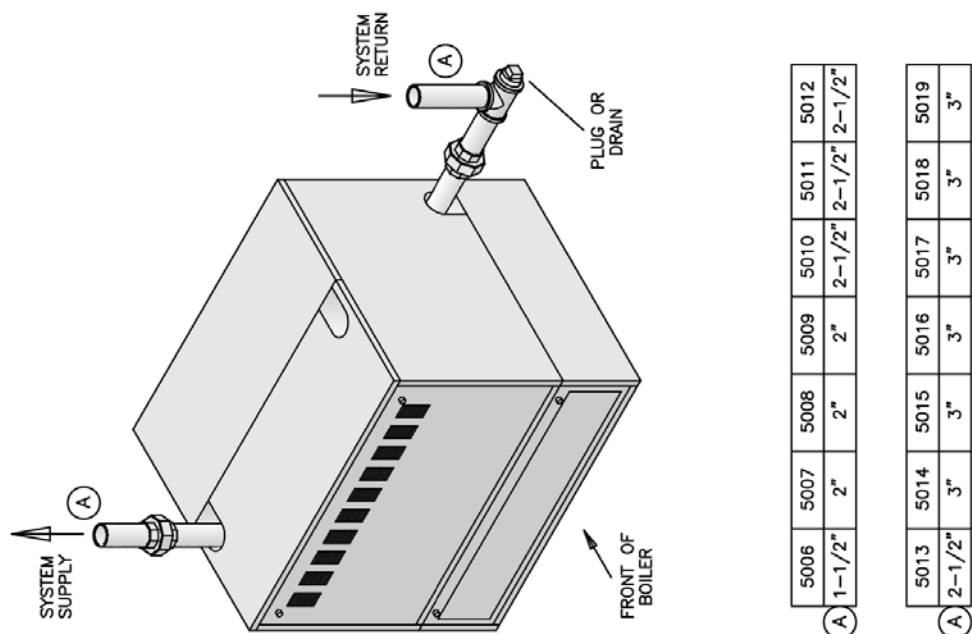


FIG. 16A
RECOMMENDED WATER BOILER PIPING
1 SUPPLY CONNECTION & 1 RETURN CONNECTION
SIZES 5006B THRU 5019B

SECTION III – INSTALLATION INSTRUCTIONS (continued)

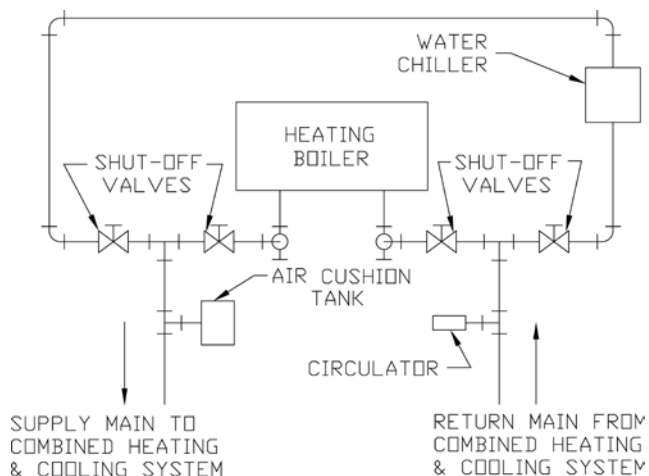


FIG. 17
RECOMMENDED BOILER PIPING FOR
COMBINATION HEATING & COOLING SYSTEMS

There are many possible causes of oxygen contamination such as:

1. Addition of excessive make-up water as a result of system leaks.
2. Absorption through open tanks and fittings.
3. Oxygen permeable materials in the distribution system.

In order to insure long product life, oxygen sources should be eliminated. This can be accomplished by taking the following measures:

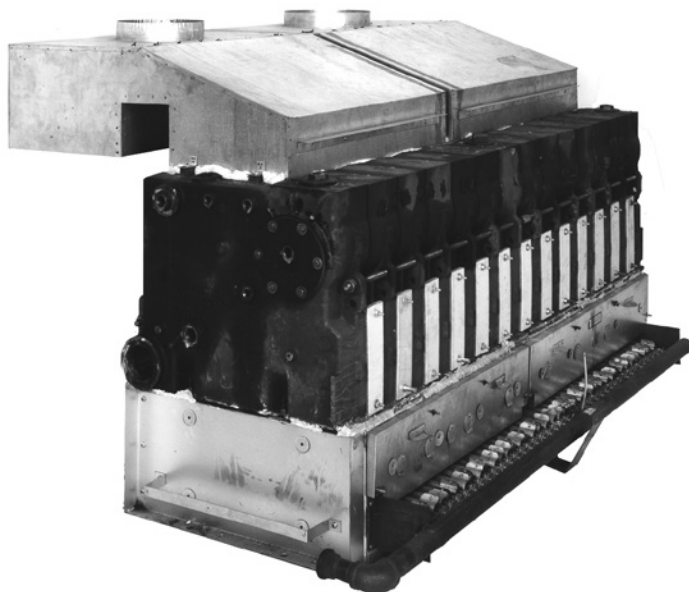


FIG. 18
INSTALLATION OF JACKET SUPPORT
BRACKETS TO BASE END PANELS

1. Repairing system leaks to eliminate the need for addition of make-up water.
2. Eliminating open tanks from the system.
3. Eliminating and/or repairing fittings which allow oxygen absorption.
4. Use of non-permeable materials in the distribution system.
5. Isolating the boiler from the system water by installing a heat exchanger.

Open Jacket Parts Carton

15. INSTALLATION OF JACKET PARTS COMMON TO ALL BOILER SIZES

1. Attach Lower Jacket End Panel Support Bracket to Base End Panel (Both ends) using $\frac{1}{4}$ "-20 x $\frac{1}{2}$ " self-tapping screws, see Fig. 2 and 18.
2. Attach Lower Left and Lower Right Jacket End Panels to their respective brackets using #10-32 x $\frac{1}{2}$ " self-tapping screws, see Fig. 19.
3. See Fig. 7 "Purpose of Tappings and Their Location" and remove necessary knockouts from Upper Left and from Upper Right Jacket End Panels.
4. Place Upper Right End Panel on top of Lower Right End Panel with lip on bottom of Upper Panel positioned behind Lower Panel. Secure to section using #10-32 x $\frac{1}{2}$ " self-tapping screws. Attach Upper Left End Panel in a similar manner, see Fig. 19.

NOTE: FOR INSTALLATION OF THE FRAMEWORK FOR THE LOWER UNCOMMON JACKET PARTS REFER TO THE FOLLOWING:

- a. 5006B thru 5010B section boilers – Paragraph 16, Fig. 21
- b. 5011B thru 5026B section boilers – Paragraph 30, Fig. 24, 25 or 26

COMPLETION OF JACKET INSTALLATION – 5006B THRU 5010B SECTION BOILERS

NOTE: Do not tighten any screws until Jacket installation is complete.

INSTALLATION OF LOWER FRAMEWORK

16. With "U" channel facing down, slip upper front channel behind joints formed by End Panels and secure to End Panels using #8 SMS. Position Lower Front Channel so that "U" of channel faces boiler. Slip Lower Front Channel behind Lower End Panels and secure with #8 SMS. Repeat similar procedure for installation of Upper Rear and Lower Rear Channels.
17. INSTALLATION OF VESTIBULE PANEL refer to Fig. 20.

SECTION III – INSTALLATION INSTRUCTIONS (continued)

Attach Hex Couplings to end of Carriage Bolts which secure flue cover plates.

NOTE: Select Carriage Bolts which line up with holes in the Vestibule Panel.

18. SECURE VESTIBULE PANEL TO HEX COUPLINGS using $\frac{1}{4}$ "-20 x $\frac{3}{8}$ " slotted pan head machine screws.
19. ATTACH REAR TOP JACKET PANEL TO UPPER END PANELS using #8 SMS. Refer to Fig. 21.
20. INSTALLATION OF CANOPY-DRAFT HOOD 5006B thru 5010B Section Boilers, see Fig. 22. Place Cerafelt strips on top of section assembly next to ledges formed by center sections and next to ledge on end sections. Overlap at corners.
21. SECURE CANOPY-DRAFT HOOD with $\frac{5}{16}$ "-18 x $\frac{5}{8}$ " MS driven into the tapped lugs provided for this purpose on top of the sections. Two screws are required at each end. Refer to Fig. 23.



FIG. 19
INSTALLATION OF JACKET END PANELS

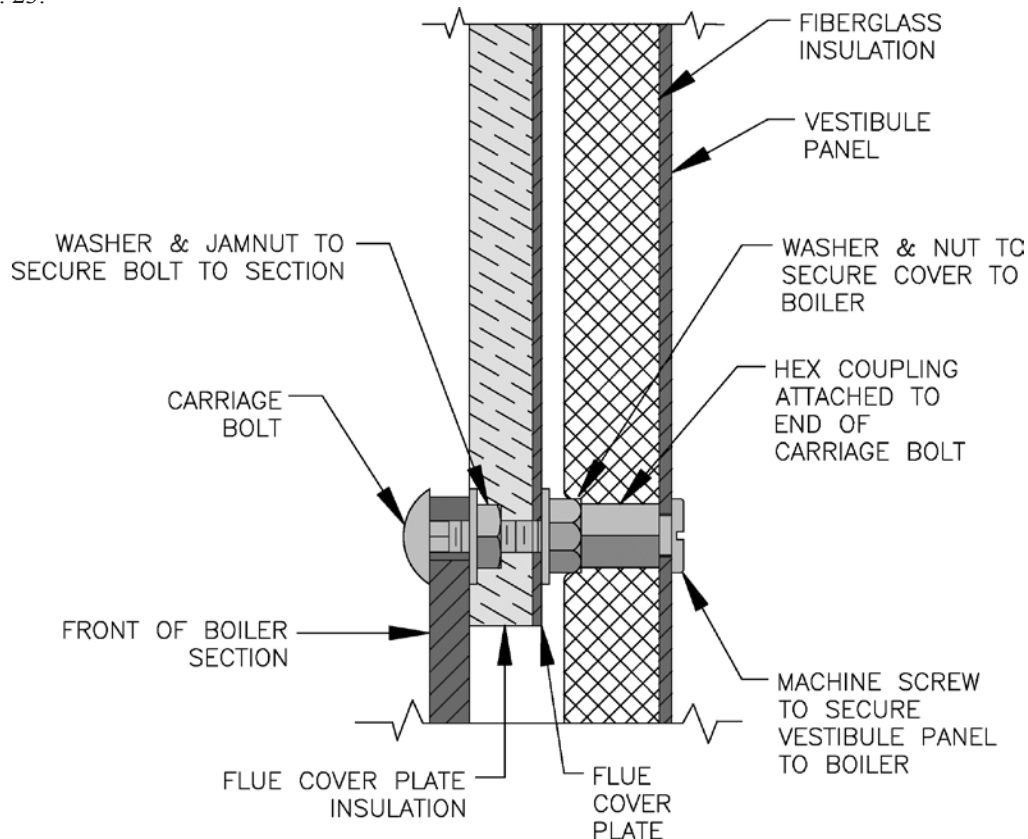


FIG. 20
VESTIBULE ATTACHMENT DIAGRAM

SECTION III – INSTALLATION INSTRUCTIONS (continued)

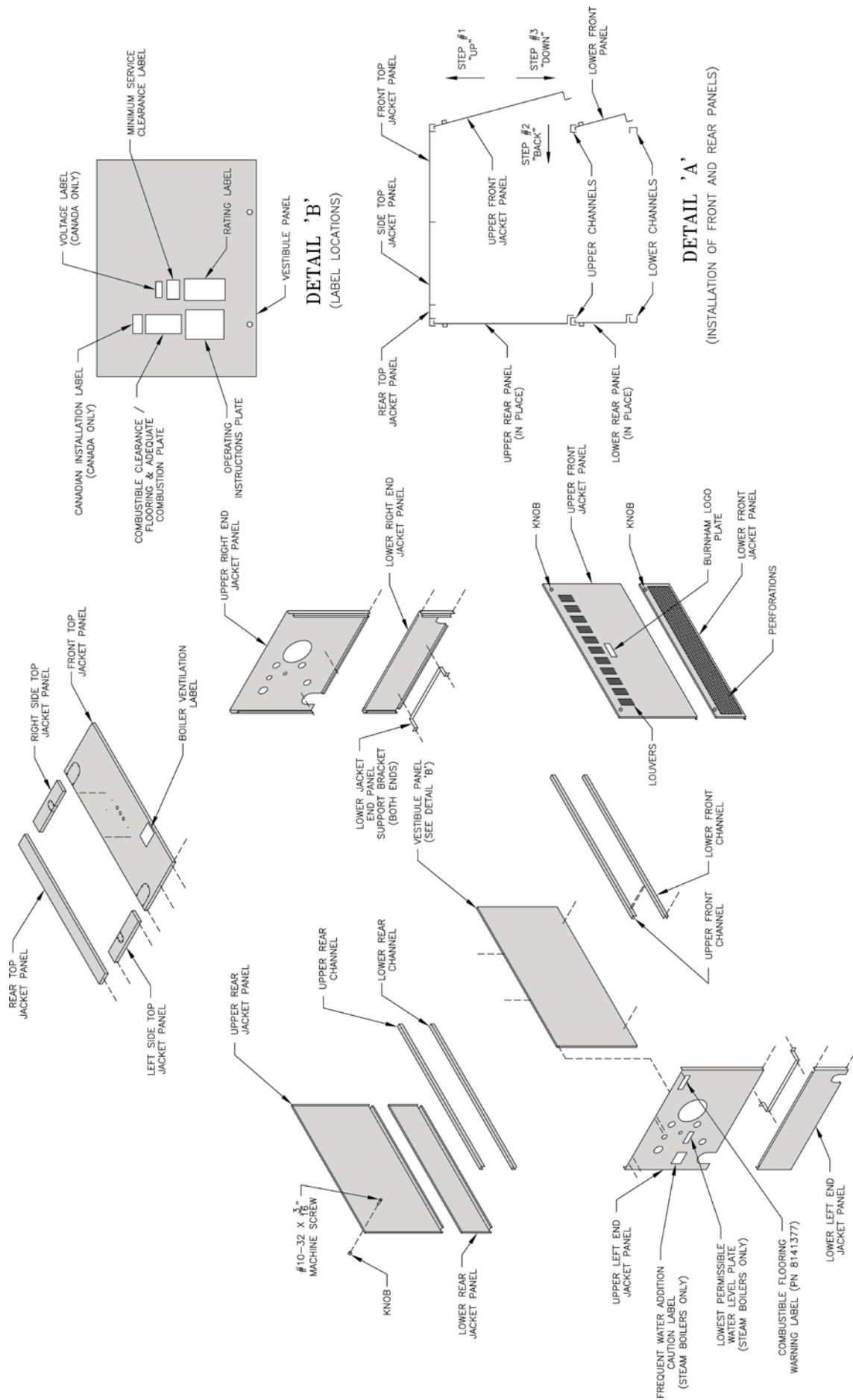


FIG. 21
EXPLODED VIEW OF JACKET
5006B THRU 5010B SECTION BOILERS

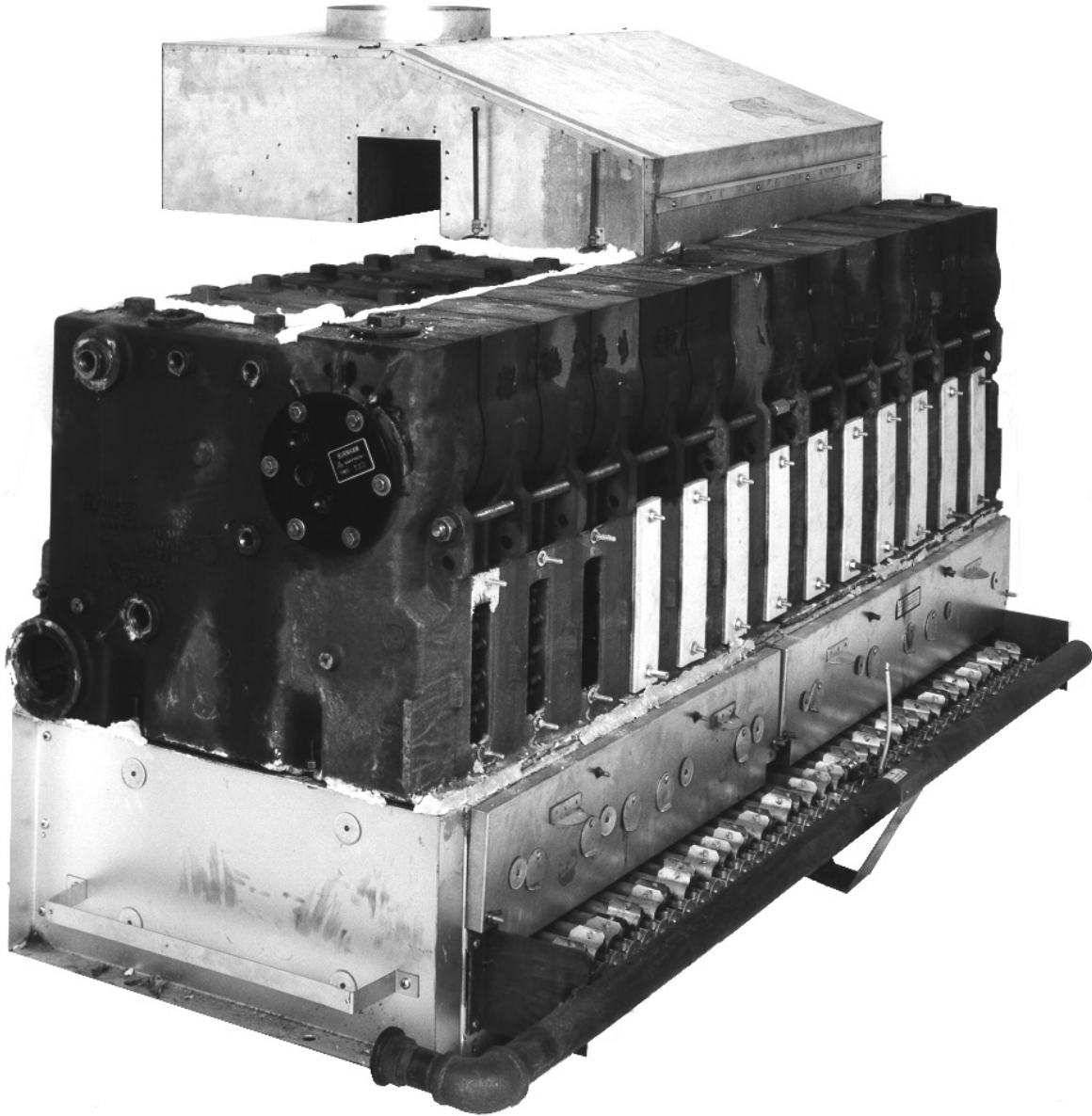
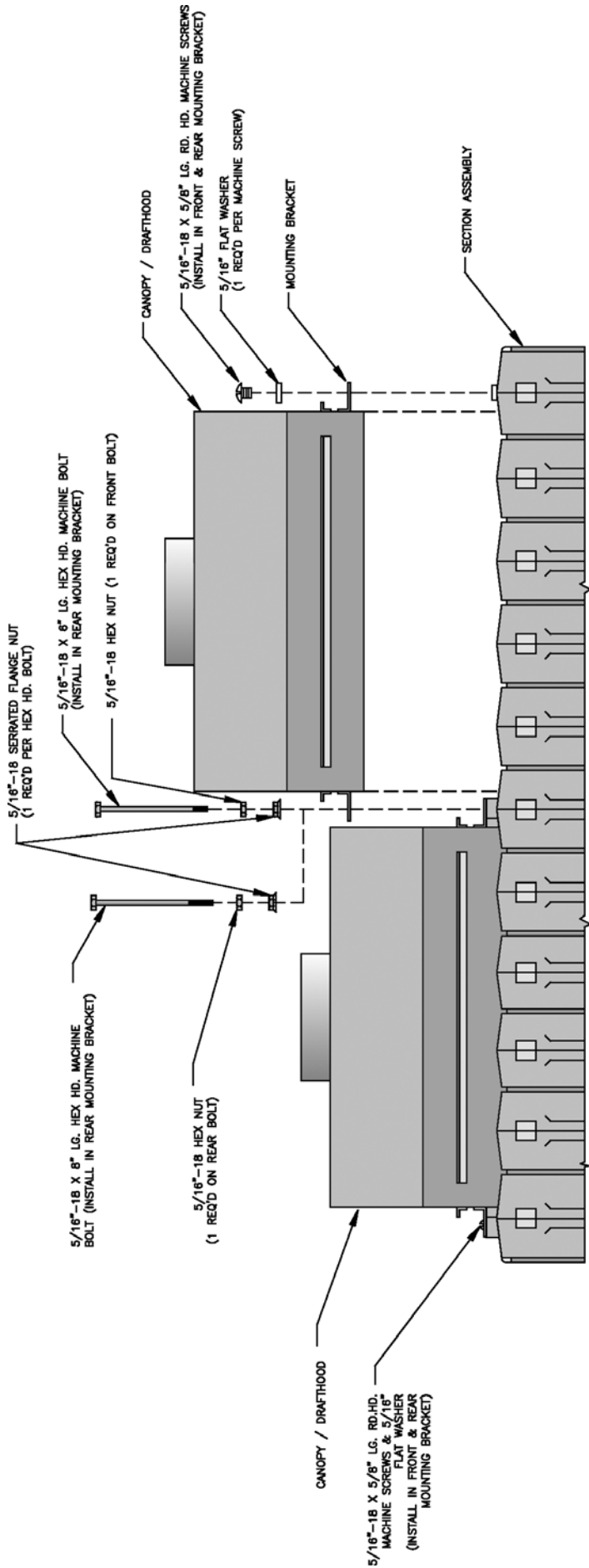


FIG. 22
SECURING OF CANOPY/DRAFT HOOD

SECTION III – INSTALLATION INSTRUCTIONS (continued)



NOTE – TO INSTALLER
RUN THE HEX NUTS AND FLANGE NUTS TO THE TOP OF THE THREADS OF THE MACHINE BOLTS. APPROXIMATELY 1/2" OF THREAD WILL BE EXPOSED. MACHINE BOLTS MUST NOT BOTTOM OUT IN TAPPINGS OR A TIGHT SEAL BETWEEN SECTIONS AND CANOPY / DRAFTHOOD WILL NOT BE OBTAINED.

BOILER MODEL	DESCRIPTION	QTY.
5006–5028	5/16"–18 X 5/8" LG. MACHINE SCREWS RD. HD.	4
5011–5019	5/16"–18 X 6" LG. HEX HD. MACHINE BOLTS	1
5020–5022	5/16"–18 X 6" LG. HEX HD. MACHINE BOLTS	2
5024–5028	5/16"–18 X 6" LG. HEX HD. MACHINE BOLTS	3
5011–5019	5/16"–18 X 8" LG. HEX HD. MACHINE BOLTS	1
5020–5022	5/16"–18 X 8" LG. HEX HD. MACHINE BOLTS	2
5024–5028	5/16"–18 X 8" LG. HEX HD. MACHINE BOLTS	3

FIG. 23
CANOPY/DRAFT HOOD MOUNTING DIAGRAM

SECTION III – INSTALLATION INSTRUCTIONS (continued)

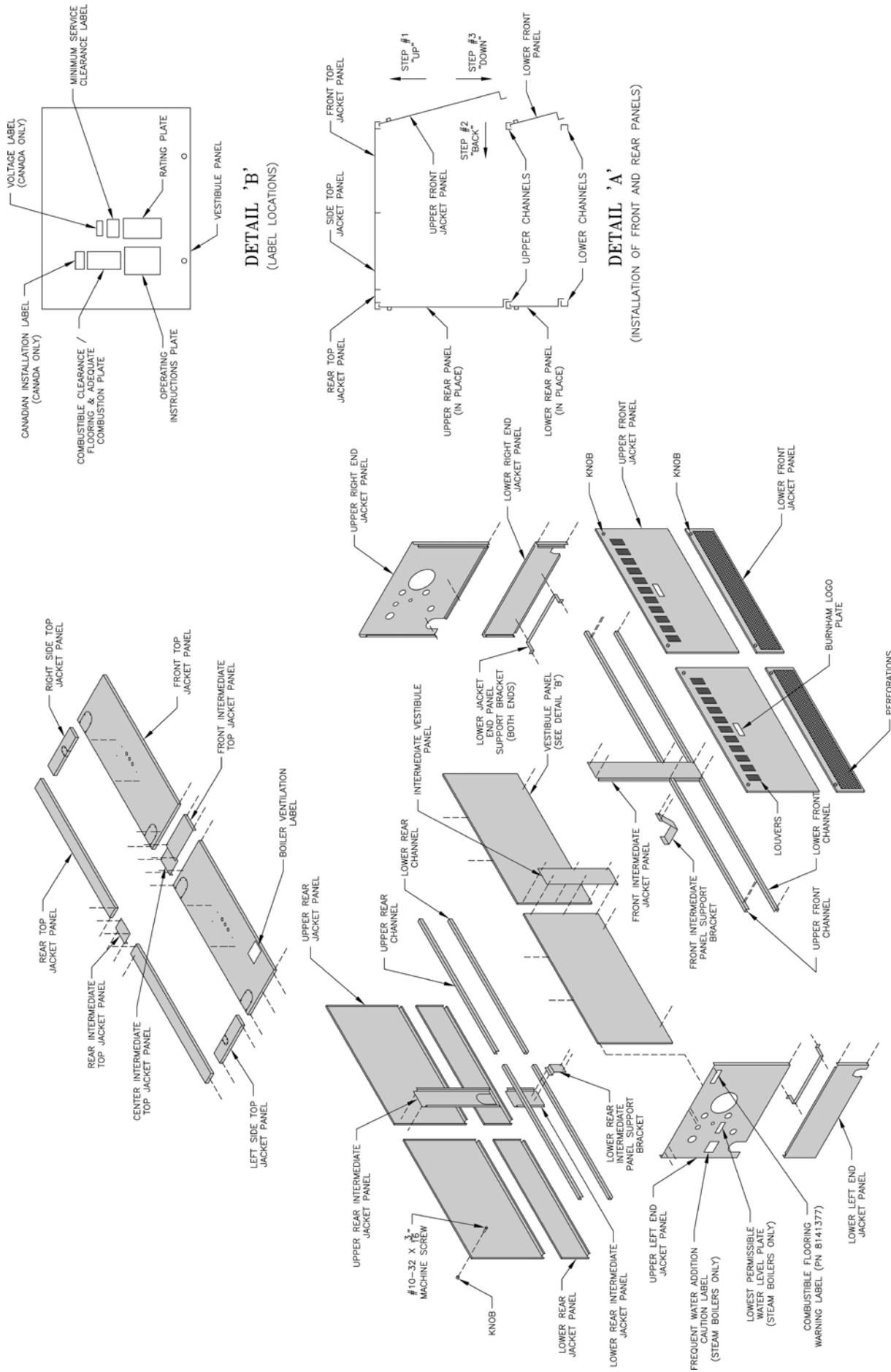


FIG. 24
EXPLODED VIEW OF JACKET
5011B THRU 5019B SECTION BOILERS

SECTION III – INSTALLATION INSTRUCTIONS (continued)

22. INSTALLATION OF TOP FRONT JACKET PANEL

- a. Remove knockout for supply piping (right or left for water boilers – both knockouts for steam boilers) refer to recommended boiler piping diagrams in this manual.
- b. Attach Top Front Jacket Panel to left and right end Jacket Panel and to Top Flange on the Vestibule Panel using #8 SMS. See Fig. 24.

23. INSTALLATION OF LEFT AND RIGHT TOP SIDE JACKET PANEL

- a. Remove knockout, right or left, only if needed. (See Fig. 7 for purpose of tappings), secure top side panels to upper end panels with #8 SMS.

24. INSTALL KNOBS on the four remaining panels using #10-32 x 3/16" MS.

25. INSTALL UPPER FRONT, LOWER FRONT, UPPER REAR AND LOWER REAR PANELS using procedure described in detail "A" of Fig. 25.

CAUTION

Panel with louvers must be at front of boiler for ventilation of vestibule. Panel with perforations must be at front of boiler for ventilation and combustion air.

26. TIGHTEN ALL SHEET METAL SCREWS.

27. INSTALL THE FOLLOWING PLATES OR LABELS which are found in the Instruction Envelope. See Fig. 21 or 24 for location.

- (1) Rating Label
- (2) Operating Instruction Plate (#8 SMS required to fasten)
- (3) Combustible Clearance Flooring & Adequate Combustion Plate
- (4) Minimum Service Clearance Label (self-adhesive)
- (5) Burnham Logo (self-adhesive) – Apply to Top Panel
- (6) Boiler Ventilation For Your Safety Label – Apply to Top Panel
- (7) Proceed to Paragraph 33 (Steam Boilers) or Paragraph 34 (Water Boilers).

COMPLETION OF JACKET INSTALLATION 5011B THRU 5026B SECTION BOILERS.

28. PARAGRAPHS 1 THRU 4 HAVE ALREADY BEEN COMPLETED. Refer to Paragraph 16 for installation of lower framework.

- a. Install Vestibule Panel(s) – refer to Fig. 21 and 24. Attach Hex Couplings to end of Carriage Bolts which secure Flue Cover Plates.

NOTE: Select Carriage Bolts which line up with holes in the Vestibule Panel(s).

- b. Attach Intermediate Vestibule Panel(s) to one of the Vestibule Panel(s) using #8 SMS.
- c. Secure Left and Right Vestibule Panels to Hex Couplings using 1/4"-20 x 3/8" slotted pan head machine screws.
- d. Attach the Lower Rear Intermediate Panels to the Lower Rear Intermediate Panel Support Bracket(s) using #10-32 x 1/2" self tapping screws.
- e. Attach the Upper Rear Intermediate Panel(s) to the Lower Rear Intermediate Panel(s) using #8 SMS.
- f. Attach Rear Top Intermediate Jacket Panel(s) to Rear Top Left and Right Jacket Panels using #8 SMS.
- g. Place Assembled Rear Top Jacket Panel in position and attach to Upper End Panels and Upper Rear Intermediate Panel using #8 SMS.

i. INSTALLATION OF CANOPY-DRAFT HOOD 5011B THRU 5026B SECTION BOILERS – these boilers require two or more Canopy-Draft Hoods – refer to Fig. 6 for proper arrangement. Determine where ends of Canopy-Draft Hood rest on intermediate sections. Place 1" x 14-1/2" Cerafelt strips on top of intermediate section at these locations. Place Cerafelt strips on top of section assembly next to ledges formed by center sections and next to ledges on end sections. Overlap at corner.

ii. SECURE CANOPY-DRAFT HOODS with machine screws and bolts as shown in Fig. 23. Select the type of fastener indicated and drive them into the Tapped Lugs provided for this purpose on top of the sections. Where two Canopy-Draft Hoods join together, the securing tabs will overlap.

iii. Attach the Front Intermediate Panel to the Front Intermediate Panel Support Bracket(s), using #10-32 x 1/2" self tapping screws.

29. INSTALLATION OF TOP FRONT JACKET PANELS

- a. Remove knockout for supply piping. Refer to recommended boiler piping diagrams in this manual.
- b. Attach Top Front Jacket Panels to left and right end Jacket Panels and also to top flange on the Vestibule Panel using #8 SMS. Refer to Fig. 25 or 26.

30. PLACE TOP INTERMEDIATE PANEL(S) ON TOP OF LEFT AND RIGHT PANELS, making sure that Front Intermediate Panel(s) is under Top Intermediate Panel(s). Secure Top Intermediate Panel using #8 SMS.

31. INSTALL KNOBS ON THE UPPER FRONT AND UPPER REAR PANELS using #10-32 x 3/16" MS.

Install Upper Front, Lower Front, Upper Rear and Lower Rear Panels using procedure we described in detail "A" of Fig. 25 or 26.

SECTION III – INSTALLATION INSTRUCTIONS (continued)

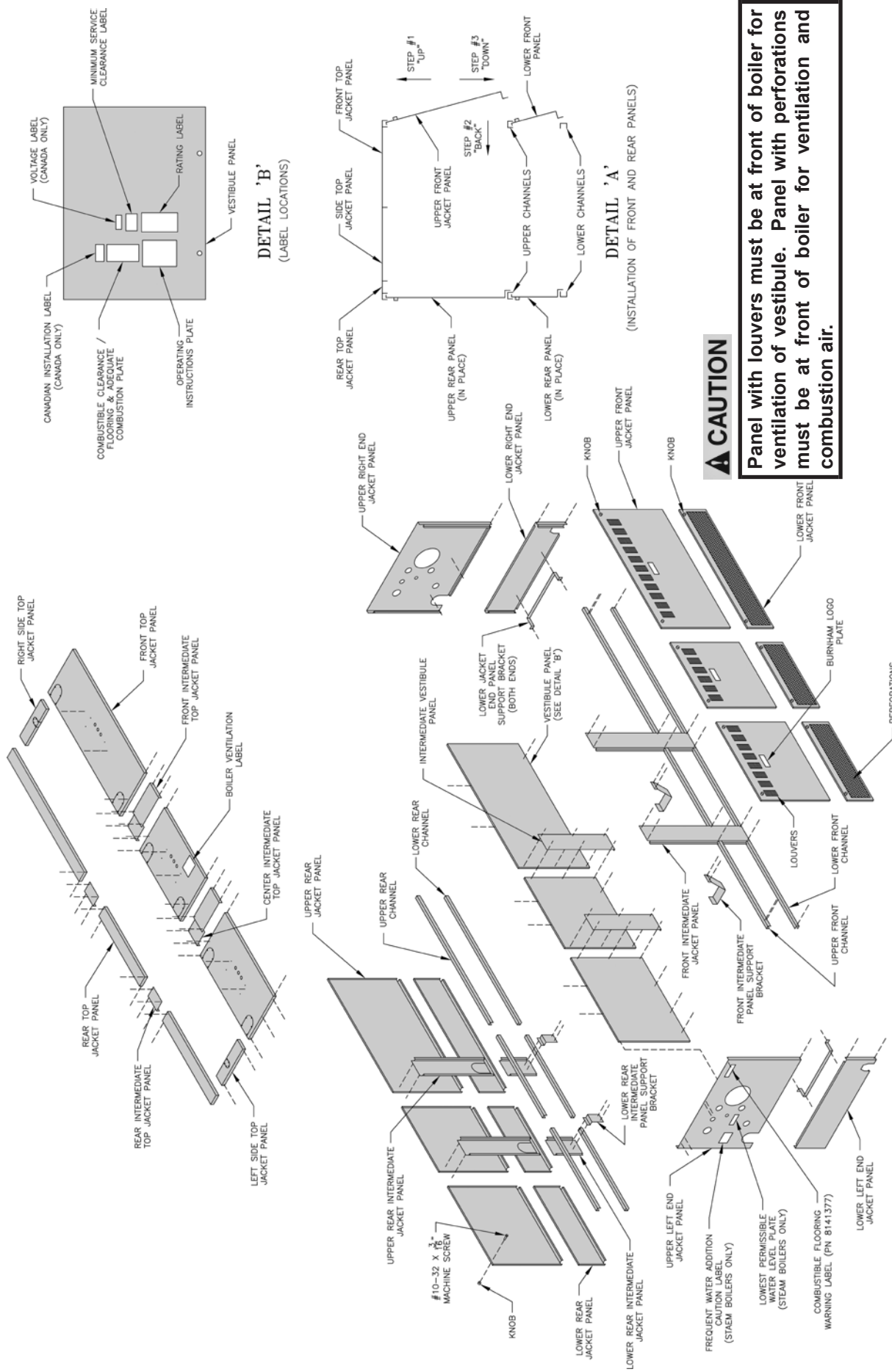


FIG. 25
EXPLODED VIEW OF JACKET
5020B THRU 5022B SECT. BOILERS

SECTION III – INSTALLATION INSTRUCTIONS (continued)

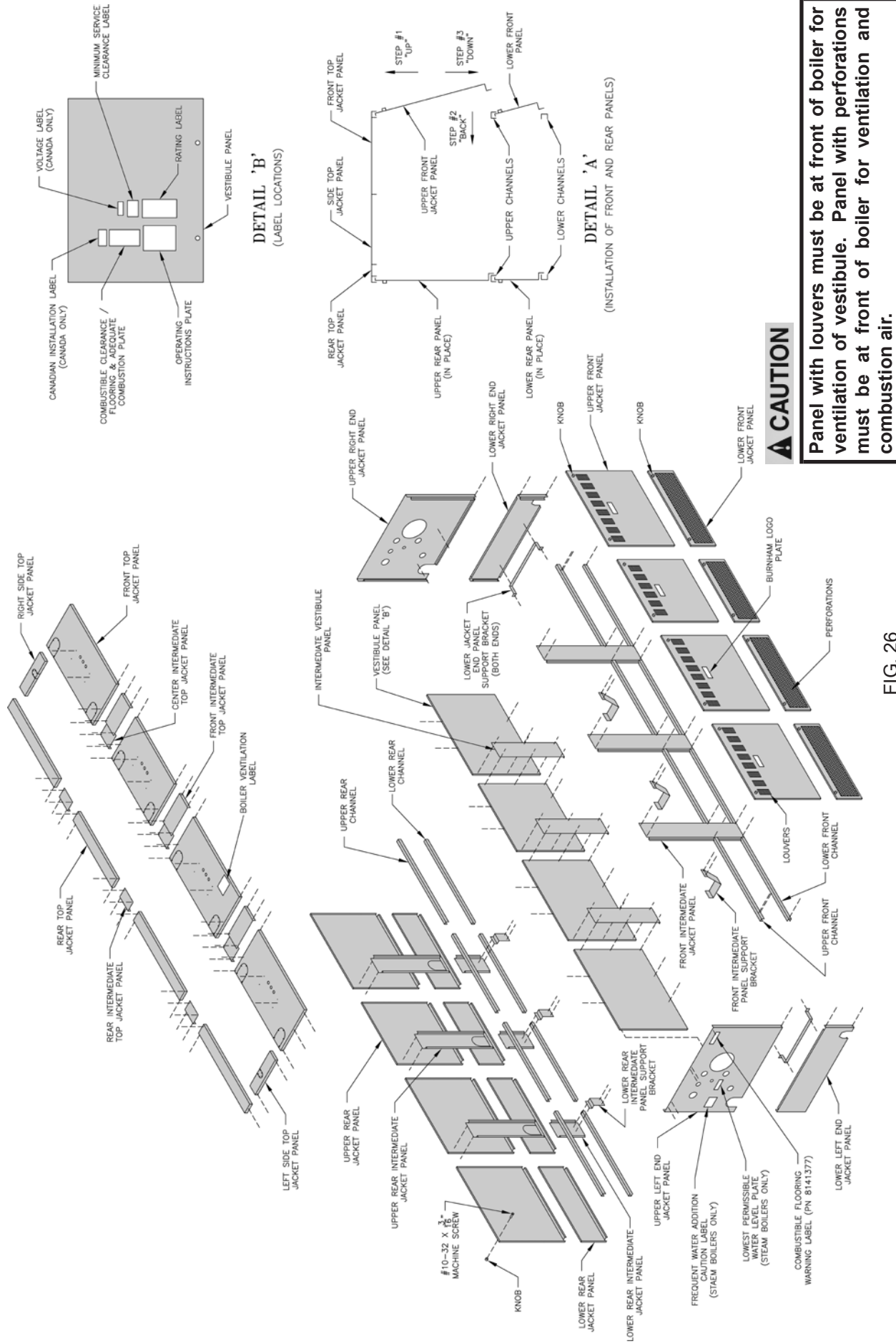


FIG. 26
EXPLODED VIEW OF JACKET
5024B AND 5026B SECT. BOILERS

SECTION III – INSTALLATION INSTRUCTIONS (continued)

32. TIGHTEN ALL SHEET METAL SCREWS.

- a. Install the following plates or labels which are found in the Instruction Envelope. See Fig. 25 or 26 for location.
 - (1) Rating Label
 - (2) Operating Instruction Plate (#8 SMS required to fasten)
 - (3) Combustible Clearance Flooring & Adequate Combustion Plate
 - (4) Minimum Service Clearance Label
 - (5) Burnham Logo – Apply to Top Panel
 - (6) Boiler Ventilation/For Your Safety Label
- b. Proceed to Paragraph 33 (Steam Boilers) or Paragraph 34 (Water Boilers).

NOTE: IF WATER BOILER, PROCEED DIRECTLY TO Paragraph 34.

33. INSTALL STEAM TRIM AND CONTROLS, See Fig. 7 and 27.

- a. Pressure Gauge is to be installed with $\frac{1}{2}$ " nipple and $\frac{1}{2}$ " x $\frac{1}{4}$ " reducing coupling in $\frac{1}{2}$ " tapping provided in upper corner of End Section using wrench applied to square shank on back of gauge. DO NOT APPLY FORCE ON GAUGE CASE.
- b. Install 67BC-2 Low Water Cut-Off or 47-2 Combination Feeder and Low Water Cut-Off in accordance with the Instructions packed with the control. $\frac{1}{2}$ " pipe extensions are provided and must be installed in the $\frac{1}{2}$ " tappings adjacent to the Pressure Gauge before the control can be mounted. Unions are furnished with the 67BC-2 Low Water Cut-Off for ease of installation. 1" pipe tappings have been provided in the End Sections for other



FIG. 27
STEAM TRIM AND CONTROLS

- types of Low Water Cut-Offs and Low Water Cut-Off & Feeder combinations. Fig. 28 illustrates the required mounting elevations for a M&M 150 and a 67M float LWCO. Fig. 15 illustrates a typical steam piping arrangement for pumped return systems.
- c. Install Gauge Glass Fittings into ends of tees used to connect the 67BC-2 or 47-2 Control. If other control is furnished, install Gauge Glass Fitting directly into $\frac{1}{2}$ " pipe extensions.
 - d. Install Pressure Limit Controls as follows:
 - (1) Boiler equipped with 67BC-2 Low Water Cut-Off – Connect Pressure Limit furnished to $\frac{1}{4}$ " street ell and $\frac{1}{4}$ " pigtail siphon. For installation of second pressure limit (not furnished), bush $1\frac{1}{2}$ " pipe tapping in upper corner of End Section. Connect Pressure Limit to this bushing with $\frac{1}{4}$ " pigtail siphon.
 - (2) Boiler equipped with Low Water Cut-Off other than (1) above or with Low Water Cut-Off Feeder Combination – Bush $1\frac{1}{2}$ " pipe tapping in upper corner of End Section and connect Pressure Limit furnished to this bushing with $\frac{1}{4}$ " pigtail siphon. For installation of second pressure limit bush any available tapping on opposite end section that is above normal water line. Connect Pressure Limit to this bushing with $\frac{1}{4}$ " pigtail siphon.
 - (3) Tighten limit controls by using wrench on hex fitting at bottom of control.
 - (4) The L404 Pressuretrol must be accurately leveled for proper operation. It is level when the leveling indicator hangs freely with its pointer directly over the index mark inside the back of the case. Level the controller by carefully bending the steam trap (siphon loop).
 - e. Install Pressure Safety Valve with fittings furnished, into $1\frac{1}{2}$ " pipe tapping in upper corner of End Section, see Fig. 12. DO NOT INSTALL A SHUTOFF VALVE BETWEEN SAFETY VALVE AND BOILER. If this boiler tapping is to be used as Surface Blowoff, replace ell with tee and plug open end of tee or valve off opening. Pressure Safety Valve must be in leg of tee and in a vertical position with handle up.
 - f. Install Boiler Drain Valve and 3" x $\frac{3}{4}$ " Bushing into one of the two return tappings. The drain valve may also be installed in return piping, but it must be installed in the leg of a tee so that it is directly opposite and as close as possible to the return tapping. The leg of the tee must be at least $1\frac{1}{2}$ " pipe size.

SECTION III – INSTALLATION INSTRUCTIONS (continued)

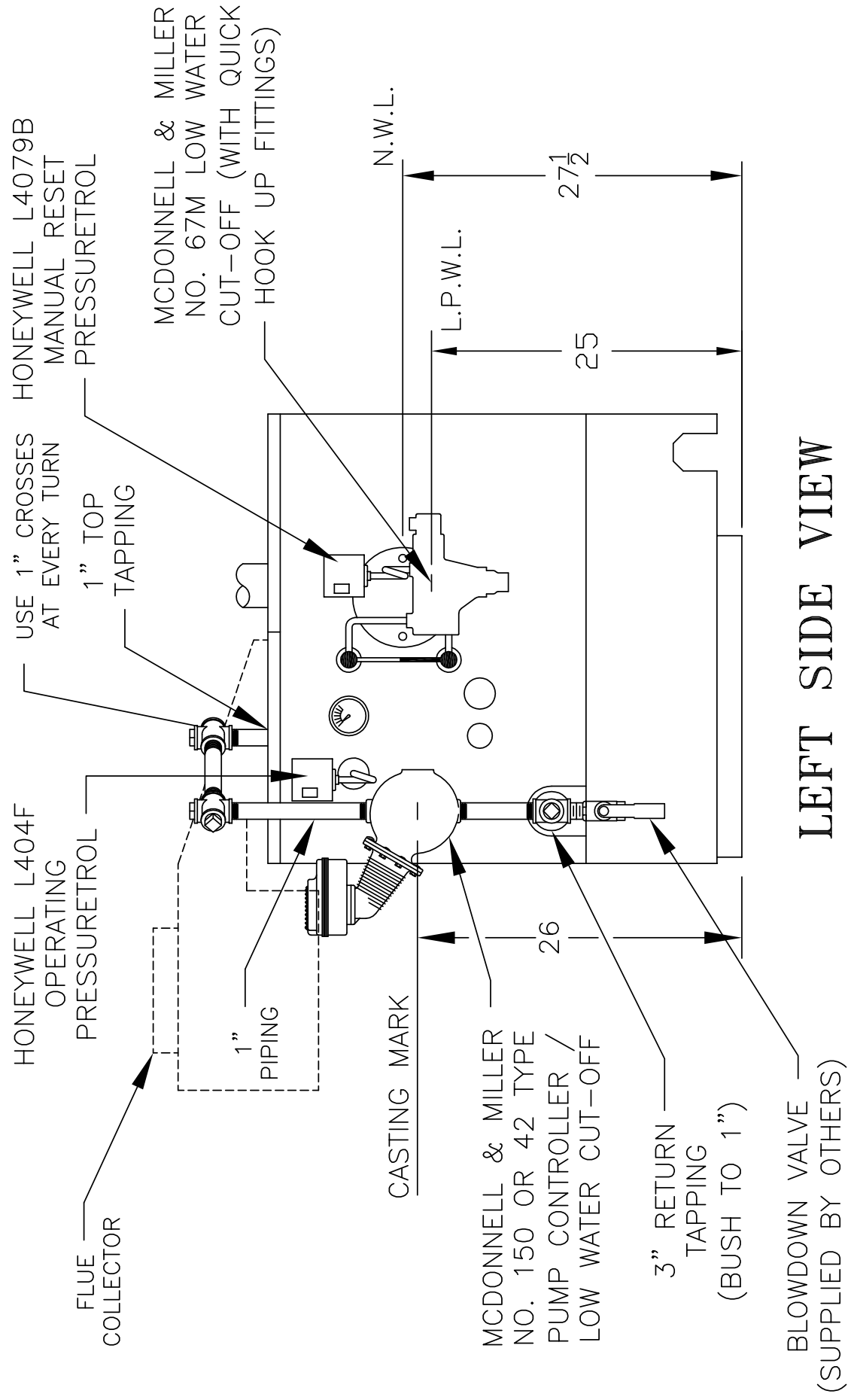


FIG. 28
MOUNTING ELEVATIONS OF M&M 150 AND A 67M FLOAT LWCO

SECTION III – INSTALLATION INSTRUCTIONS (continued)

A Bottom Blowoff using a valve must also be connected to one of the return tappings. The $\frac{3}{4}$ " Drain Valve may be used for Bottom Blowoff for 5009B or smaller boilers, since any Bottom Blowoff piping or valves for 5009B or smaller boilers must be at least $\frac{3}{4}$ ". Bottom Blowoff piping and valves for Boilers 5010B through 5021B must be at least 1". Bottom Blowoff piping and valves for 5022B Boilers and larger must be at least $1\frac{1}{4}$ ".

- g. If boiler has been ordered with $\frac{3}{8}$ " try-valve tapping, install try-cock.
- h. Install "Lowest Permissible Water Level Plate" and "Frequent Water Addition – Caution Label" on upper left end jacket panel.
- i. Proceed directly to Paragraph 36.



FIG. 29
WATER TRIM AND CONTROLS

34. INSTALL WATER TRIM AND CONTROLS, see Fig. 7 and 29.

- a. Temperature Gauge is to be installed with $\frac{1}{2}$ " nipple and $\frac{1}{2}$ " x $\frac{1}{4}$ " reducing coupling in $\frac{1}{2}$ " tapping provided in upper corner of End Section using wrench applied to square shank on back of gauge. DO NOT APPLY PRESSURE ON GAUGE GLASS.
- b. Install Temperature Limit Controls as follows:
Bush $1\frac{1}{2}$ " tapping in upper corner of End Section to $\frac{3}{4}$ " and install Temperature Limit Control furnished following instructions supplied with control. On boilers without Built-in Tankless Heater, install second temperature limit control (not furnished) in Tapped Heater Opening Cover Plate.

On boilers with Built-in Tankless Heater, install operating control in $\frac{3}{4}$ " tapping in Heater Plate-plug tapping in Second Heater when supplied.

- c. On boilers equipped for forced circulation hot water heating without domestic hot water, a reverse acting circulator control may be needed to prevent condensation of flue gases during periods of low boiler water temperature. This control can be installed in the Tapped Heater Opening Cover Plate.

d. TANKLESS HEATER PERFORMANCE

Tankless heater ratings in Series 5B boilers are based on continuous draw, temperature rise of 100°F (40-140°F) and boiler water temperature of 200°F. Some of the items affecting the coil performance are as follows:

- (1) FLOW REGULATION – If flow through the heater is greater than its rating, the supply of adequate hot water may not be able to keep up with the demand. For this reason a FLOW REGULATOR matching the heater rating should be installed in the cold water line to the heater.
- (2) FLUSHING OF HEATER - All water contains some sediment which settles on the inside of the coil. Consequently, the heater should be periodically back-washed. This is accomplished by installing hose bibs as illustrated in Fig. 30 and allowing water at city pressure to run into hose bib A, through the heater, and out hose bib B until the discharge is clear. The tees in which the hose bibs are located should be the same size as heater connections to minimize pressure drop.
- (3) HARD WATER – This is applicable to some city water and particularly to well water. This should not be a deterrent but precautions are necessary. A water analysis is necessary and an appropriate water softener installed. This is not only beneficial to the heater but to piping and fixtures plus the many other benefits derived from soft water.

NOTE: A hot water boiler installed above radiation level must be provided with a low water cut-off device as part of the installation.

⚠ WARNING

Install automatic mixing valve at tankless heater outlet to avoid risk of burns or scalding due to excessively hot water at fixtures. Adjust and maintain the mixing valve in accordance with the manufacturers instructions.

- e. Following recommendations supplied with control, install #64 Low Water Cut-Off in 1" pipe tapping "H" (Fig. 7) and System Return Piping. Control

SECTION III – INSTALLATION INSTRUCTIONS (continued)

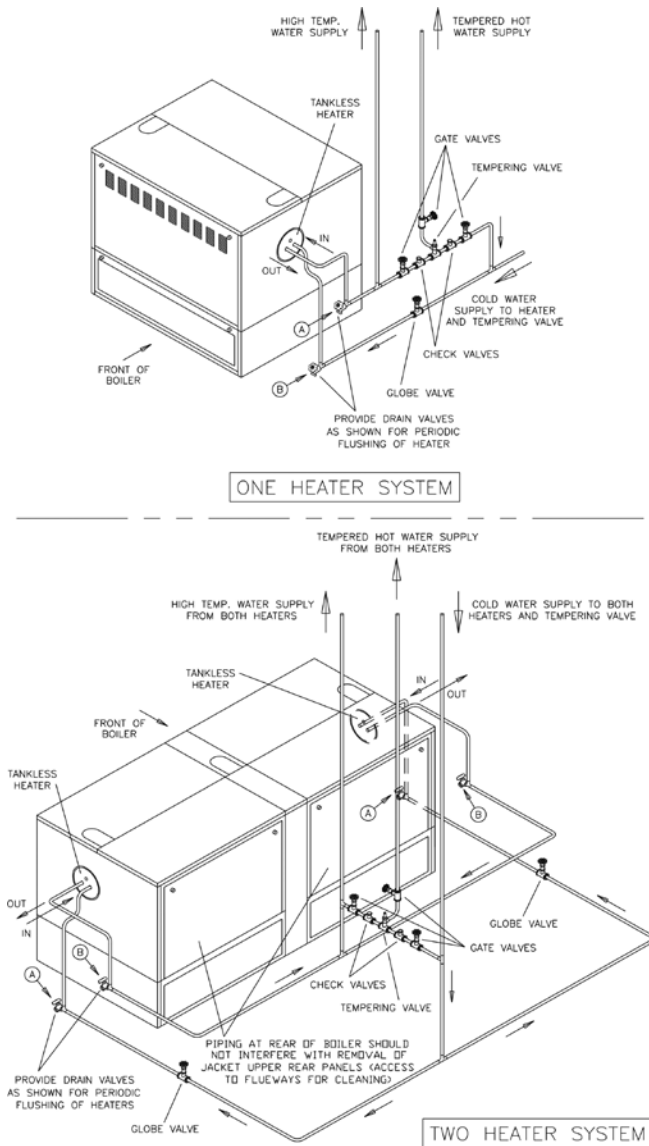


FIG. 30
RECOMMENDED PIPING TO
BUILT-IN TANKLESS HEATERS

must be mounted so that cut off point is above marking on Lowest Permissible Water Line Plate.

- f. Install Pressure Safety Relief Valve, using fittings furnished, into 1-1/2" pipe tapping in upper corner of End Section. DO NOT INSTALL A SHUTOFF VALVE BETWEEN SAFETY RELIEF VALVE AND BOILER. Safety Relief Valve must be installed in a Vertical Position with handle up.
- g. Install Boiler Drain Valve into one of unused return tappings that has been bushed to 3/4". Drain Valve can also be installed in return piping, preferably in leg of tee that is located in line with return connection on Boiler.

35. CONNECT PIPING TO BUILT-IN HEATER(S) IF USED, see Fig. 30, top - left side of this page.

TABLE I - NATURAL GAS

Maximum Capacity of Piping in Cubic Feet of Gas Per Hour
(Based on a Pressure Drop of 0.3" Water
and 0.6 Specific Gravity)

Pipe Length in Feet	NOMINAL IRON PIPE SIZE IPS INCHES							
	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
10	278	520	1050	1600	3050	4800	8500	17500
20	190	350	730	1100	2100	3300	5900	12000
30	152	285	590	890	1650	2700	4700	9700
40	130	245	500	760	1450	2300	4100	8300
50	115	215	440	670	1270	2000	3600	7400
60	105	195	400	610	1150	1850	3250	6800
70	96	180	370	560	1050	1700	3000	6200
80	90	170	350	530	990	1600	2800	5800
90	84	160	320	490	930	1500	2600	5400
100	79	150	305	460	870	1400	2500	5100
125	72	130	275	410	78	1250	2200	4500
150	64	12	250	380	710	1130	2000	4100
175	59	110	225	350	650	1050	1850	3800
200	55	100	210	320	610	980	1700	3500

TABLE II

Multipliers to be used with Table I when Pressure Drop is not 0.3"

Pressure Drop	Multiplier
0.1	.577
0.2	.815
0.5	1.29
1.0	1.83
0.3	1.00

TABLE III

Multipliers to be used with Tables I and II for
Specific Gravity Other than 0.60

Specific Gravity	Correction Factors
.50	1.10
.55	1.04
.60	1.00
.65	.96
.70	.93

36. OPEN GAS TRAIN CARTON(S)

CONNECT GAS TRAIN(S) TO ELBOW ON END OF MANIFOLD(S) according to the Gas Trains on pages 90 thru 96. On those boilers with two manifolds (15 sect. and larger), two identical sets of Gas Controls are furnished. Hence, the procedure for installing one set is equally applicable to the second set.

PRESSURE TESTING of gas service piping must be done before connecting to the boiler gas train. Test for leaks by introducing, from an isolated source, air or inert gas to the piping. Piping shall withstand 3 PSI gage pressure for a period of not less than 10 minutes without showing any drop in pressure.

SECTION III – INSTALLATION INSTRUCTIONS (continued)

37. A DRIP LEG SHOULD BE PROVIDED IN THE VERTICAL DROP TO EACH GAS TRAIN, see Fig. 1. An additional Manual Shut-off valve and ground joint union, as show in Fig. 1, should be installed in the piping to each gas train for ease of servicing.

CONNECT GAS SERVICE FROM METER TO GAS TRAIN in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements to the –

USA – “National Fuel Gas Code, ANSI Z223.1”.

CANADA – “Installation Codes for Natural and LP Gas Burning Appliances and Equipment, CAN/B149.1 & .2”.

The size of the gas train(s) has no criteria as to the size of the service from the meter to the gas train(s). Sizing of the service is dependent on:

- a. Required supply of gas in cu. ft./hr.

$$\text{input of boiler in BTUH} = \frac{\text{heat value of gas, BTU/cu. ft.}}{\text{BTU/cu. ft.}}$$
- b. Allowable loss of pressure in piping to obtain minimum input pressure indicated on rating label of boiler.
- c. Length of piping in feet and number of elbows – for practical purposes each 90° elbow can be considered as the following equivalent in length of straight pipe:

3/4"	-	2.1 ft.	2"	-	5.2 ft.
1"	-	2.6 ft.	2-1/2"	-	6.2 ft.
1-1/4"	-	3.5 ft.	3"	-	7.7 ft.
1-1/2"	-	4.0 ft.	4"	-	10.1 ft.

- d. Specific gravity of gas

In the absence of requirements of the authority having jurisdiction, the tables below may be used to size natural gas supply piping.

A pipe thread compound resistant to the action of liquefied petroleum gases must be used on all threaded joints in the gas piping.

Pressure testing of the Gas Supply Piping Boiler and its connections is required before placing the boiler in operation.

The boiler and shutoff valve must be disconnected from the gas supply piping system during any pressure testing at pressures greater than 1/2" psig.

The boiler must be isolated from the gas supply piping system during any pressure testing at pressures equal to or less than 1/2 psig.

WITH GAS SUPPLY “OFF” and Service Piping connected to the boiler, open Manual Valve(s) and pilot valve(s) at end of Gas Train(s) and reduce pressure to 1/2 lb. gage pressure. Using soap solution or other approved method check gas train piping, pilot piping, bleed piping and orifices for leaks.

38. **THE INSTALLATION OF THE REMAINDER OF THE GAS CONTROLS IS DEPENDENT ON THE CONTROL SYSTEM FURNISHED.** REFER TO THE TABLE BELOW FOR THE FIGURES IN THIS MANUAL APPLICABLE TO THE VARIOUS CONTROL SYSTEMS OFFERED AS STANDARD OR AS OPTIONAL EQUIPMENT. IF THE CONTROL SYSTEM ORDERED IS NOT LISTED, SPECIAL INSTRUCTIONS HAVE BEEN PREPARED BY THE APPLICATION ENGINEERING DEPARTMENT AND CAN BE FOUND IN THE INSTRUCTION ENVELOPE FURNISHED WITH THE BOILER.

BOILER SIZE	CONTROL SYSTEM	NATURAL GAS				LP				REFERENCE FIGURES
		USA		CANADA		USA		CANADA		
		STD	OPT	STD	OPT	STD	OPT	STD	OPT	
6 thru 9 sect.	EI	X	---	---	X	X	---	---	---	31, 32
10 thru 26 sect.	EI	X	---	---	X	---	---	---	---	31, 33
6 thru 26 sect.	EI		---		X	---	---	---	---	31, 33
6 thru 14 sect.	EP	---	X	---	X	---	---	---	---	34, 35
15 thru 26 sect.	EP	---	X	---	X	---	---	---	---	34, 35

SECTION III – INSTALLATION INSTRUCTIONS (continued)

EI Control System

1. **INSTALLATION OF GAS VALVE TRANSFORMER AND PILOT PIPING** (for Robertshaw Pilot Piping, see Fig. 32) – Attach the bracket for mounting of the junction box to the lower front corner of the Jacket Upper End Panel using two #10-32 x 1/2" MS and nuts. Mount junction box to bracket using #8 SMS, see Fig. 27 or 29. Connect pilot solenoid valve to bottom center knockout of J-box using conduit fittings furnished, (V88 Gas Train only) see Fig. 33. Mount transformer on J-box. If Foot Mounted Transformer, connect to J-box with Straight Connector, BX, Straight Connector and 1/2" pipe coupling. Drill holes in Jacket and fasten Transformer using SMS. Install RV-12LT pilot line regulator (packed in Gas Train Carton) and other 1/8" pipe fittings as shown in Section VI, Repair Parts (V88 Gas Train only).

Using 1/4" OD aluminum tubing, connect the inlet of the pilot solenoid valve to the pilot valve installed in the manual shut off valve in the Gas Train. Using 1/4" aluminum tubing, complete installation to Pilot Burner, see Fig. 33 (V88 Gas Train only).

2. **INSTALLATION OF BLEED PIPING** (V88 Gas Train only) – Using 1/4" OD aluminum tubing, install a bleed line on both diaphragm gas valves, connect together, and, on USA boilers, run tubing to bleed line protruding from inside base, see Fig. 33. On boilers installed in Canada, run bleed line to outdoors.
3. **INSTALLATION AND WIRING OF S8610M IGNITION CONTROL MODULE** – Using two #10-32 x 2" MS, and nuts, install the S8610M module bracket on the manifold just to the right of the main burner

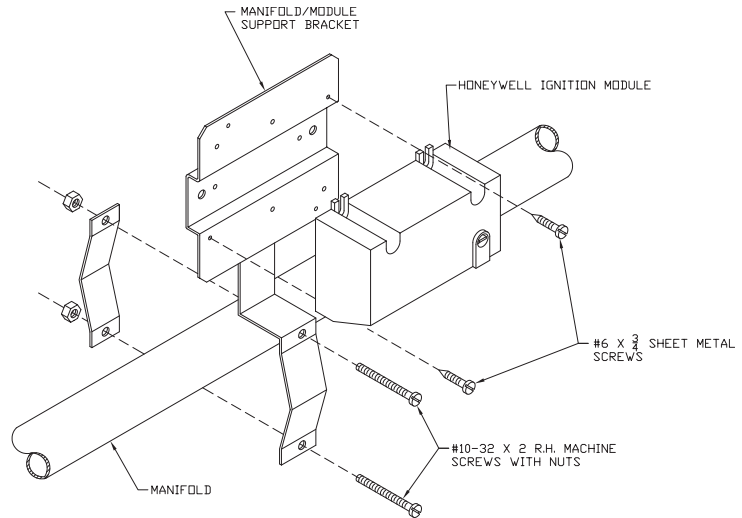


FIG. 31
INSTALLATION OF S8610M MODULE

with pilot, see Fig. 31. Using two #6 x 3/4" SMS, install the S8610M module on the bracket. Connect the two wires from the Q3481B pilot to the S8610M module as shown on Fig. 40, 41 or 42.

- a. Ground Wire (200°C) to "BNR GND" terminal
- b. Ignition Sensor Wire to "Spark" terminal

Secure these wires to Pilot Piping with Wire Tie to provide strain relief.

Using wiring harness furnished, connect leads with push-on terminals on S8610M module as shown in Fig. 40, 41 or 42. Run harness outside of jacket on underside of manifold and secure in this position with Wire Ties furnished. Connect the six wires in the harness to the specified controls as shown in Fig. 40, 41 or 42.

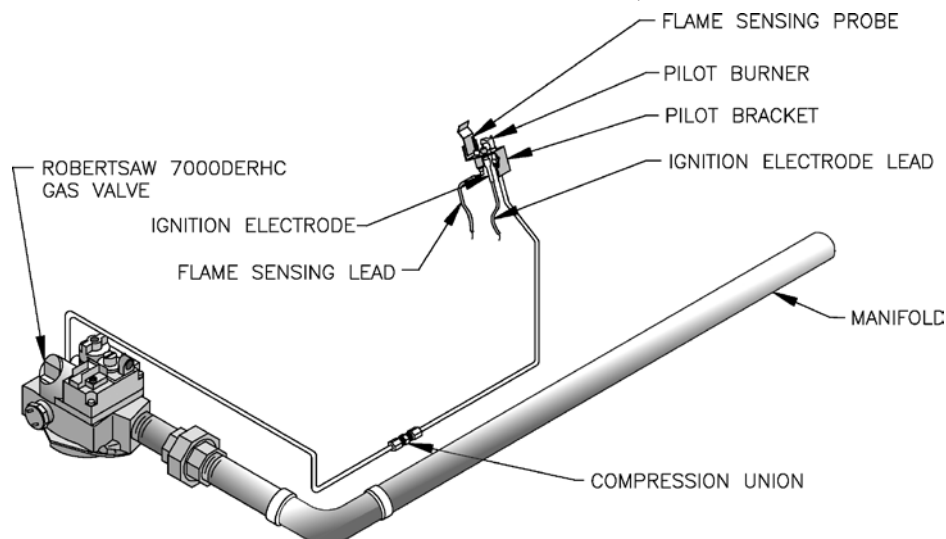


FIG. 32
PILOT PIPING - EI CONTROL SYSTEM
(Robertshaw7000)
U.S.A. 5006B THRU 5009B

SECTION III – INSTALLATION INSTRUCTIONS (continued)

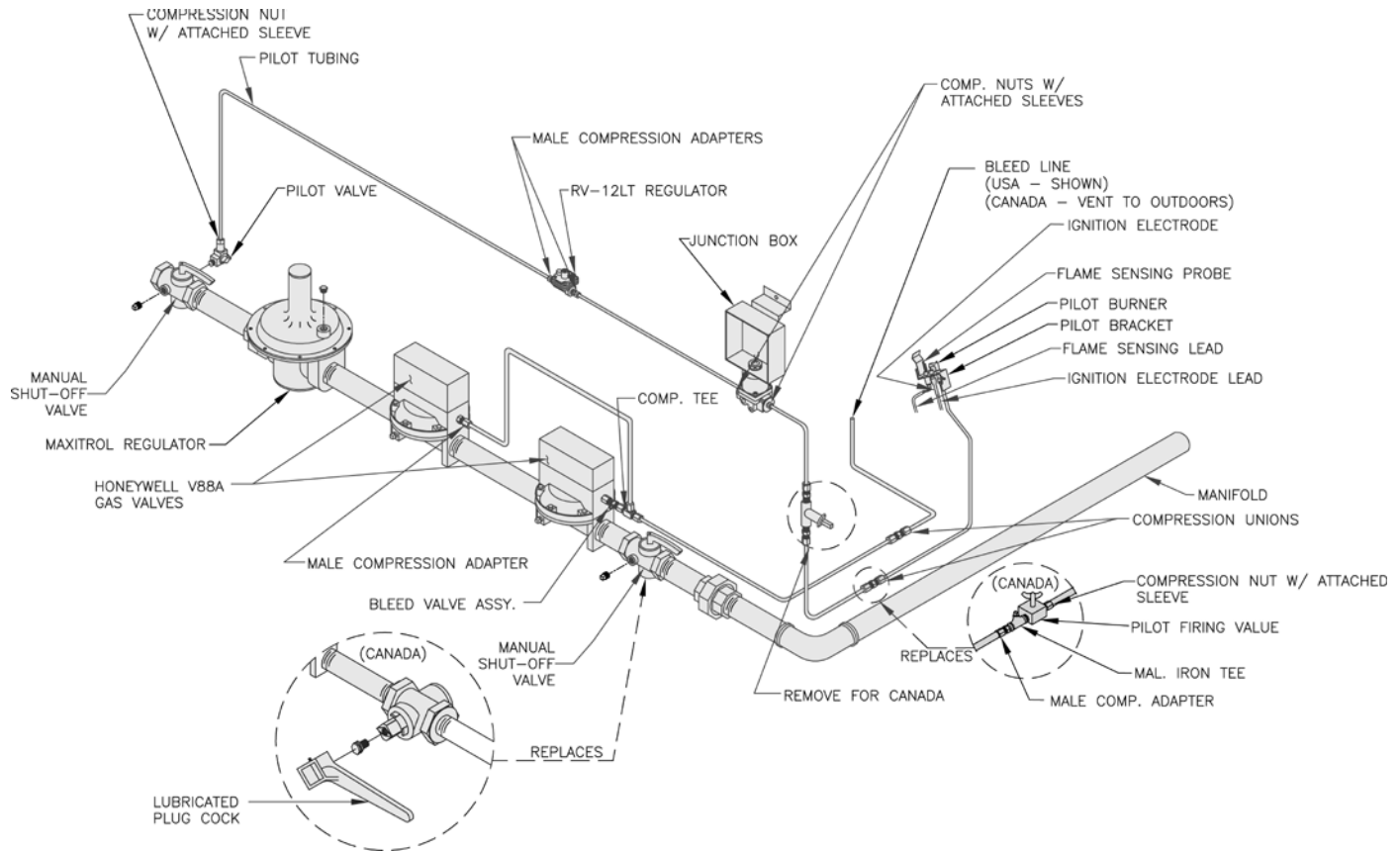


FIG. 33
PILOT PIPING - EI CONTROL SYSTEM (V88A)
U.S.A. 5010B THRU 5026B - NAT. GAS
CANADA - 5006B THRU 5026B - NAT. GAS

4. **COMPLETION OF WIRING** – Connect power supply fused disconnect switch, service switch, primary side of transformer, gas valves and remaining controls – see Fig. 40, 41 or 42 for wire type and connections to be made. All wiring must be adequately supported and strain relief provided. All wiring including ground connections must comply with the requirements of the authority having jurisdiction and, in the absence of such, to the National Electrical Code, ANSI NFPA No. 70-2005, or the Canadian Electrical Code, C22.1, whichever is applicable.

EP Control System

1. **INSTALLATION OF “EP PANEL”**, - Attach the EP Control Panel with RM7890 control, see Fig. 34, to the front top jacket panel, preferably on the closest jacket panel to the gas train installed. There are (3) three KO's and (4) four fastening holes provided for this purpose, use (4) four #8 SMS to fasten the Control Panel to the front top jacket panel. If Foot Mounted Transformer, connect to J-box using straight connector, BX, straight connector and 1/2" pipe nipple. Drill holes in Jacket and fasten Transformer using SMS. Install Honeywell

RM7890 Control (located in RM7890 Control Carton) onto prewired sub base.

Remove RM7890's Dust Cover. With a pair of side cutters, carefully snip both wire leads to the brown resistor labelled “JR2” and discard it. Replace Dust Cover. Install Honeywell R7847 Flame Amplifier. Install heat shield (optional).

2. **INSTALLATION OF PILOT PIPING** – Install the H91WA-4 pilot solenoid valve in the bottom center knockout of the J-box using conduit fittings furnished, see Fig. 35. Install RV-12LT regulator, (Packed in Gas Train Carton) and 1/8" tee in the 1/4" OD pilot tubing as shown in Fig. 35.
3. **INSTALLATION OF BLEED PIPING** – Using 1/4" OD aluminum tubing, install a bleed line on both diaphragm valves, connect together, see Fig. 35, and, on USA boilers, run tubing to bleed line protruding from inside base, see Fig. 35. On boilers installed in Canada, run bleed line to outdoors.

SECTION III – INSTALLATION INSTRUCTIONS (continued)

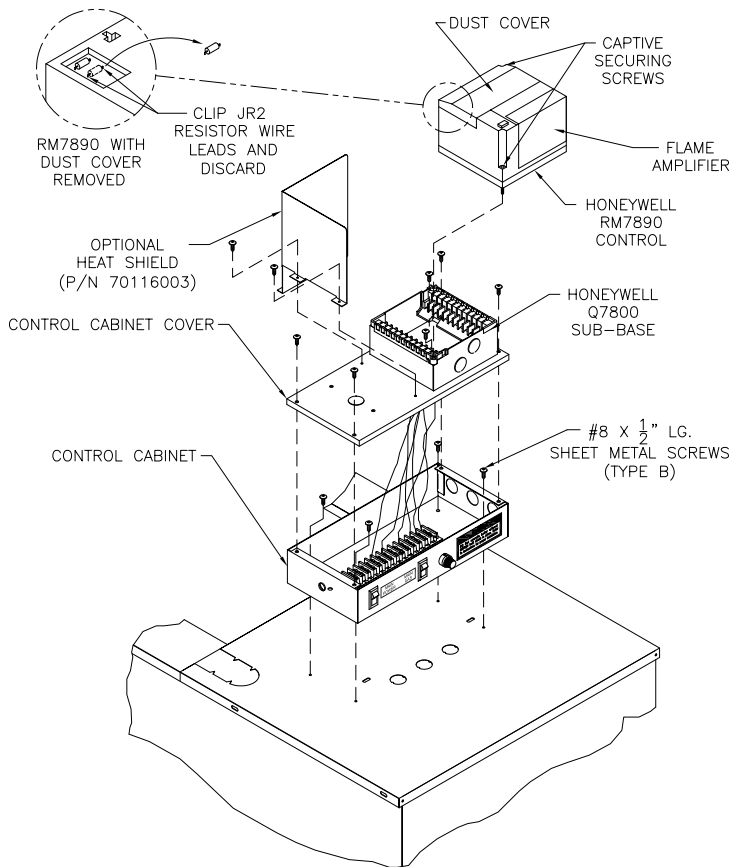


FIG. 34
INSTALLATION OF EP CONTROL PANEL

NOTE - PILOT PIPING DUPLICATED ON 15 SECT. AND LARGER BOILERS.

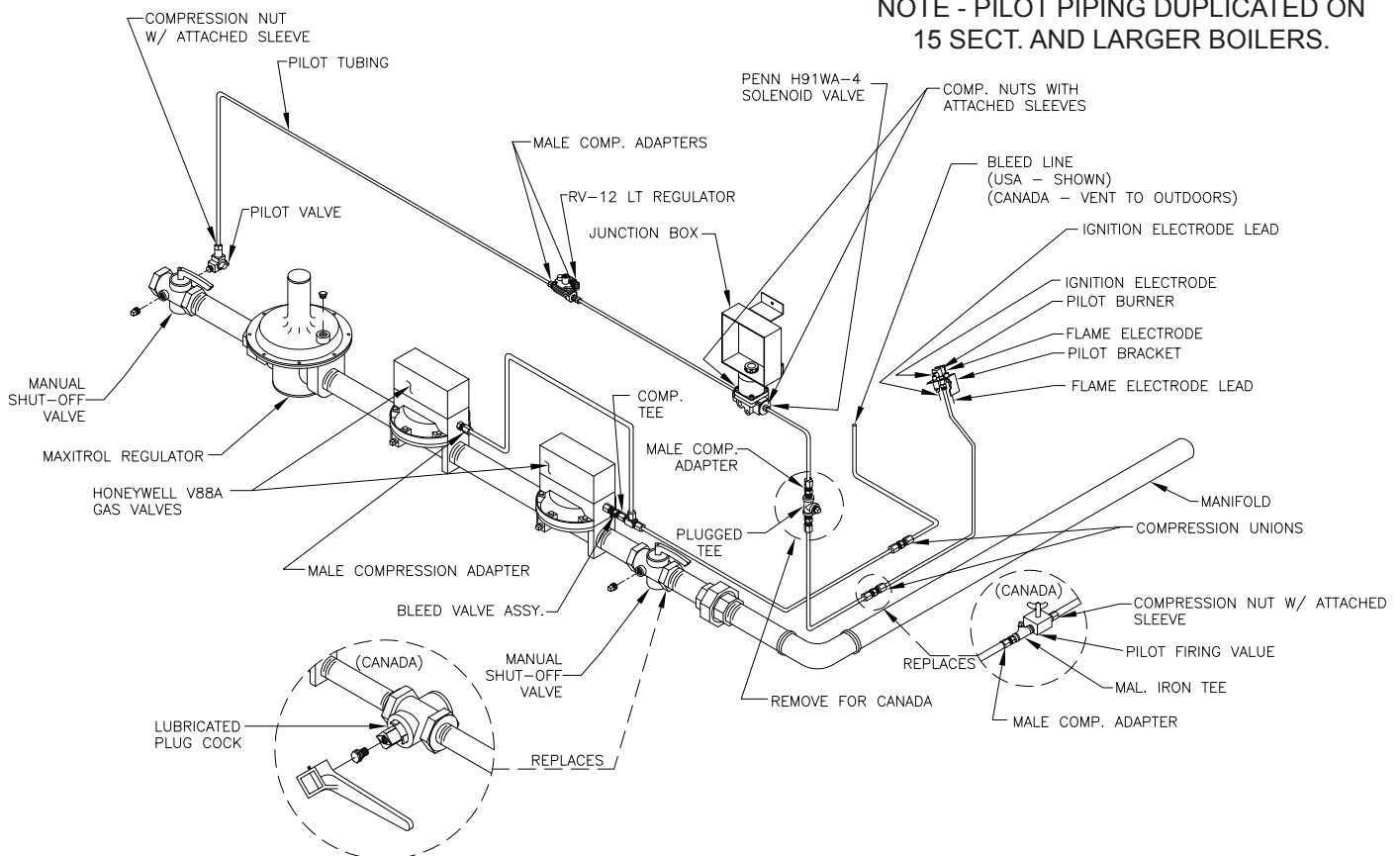


FIG. 35
PILOT PIPING - EP CONTROL SYSTEM

SECTION III – INSTALLATION INSTRUCTIONS (continued)

4. **INSTALLATION OF IGNITION TRANSFORMER AND WIRING OF PILOT** – If space permits, mount the ignition transformer on the Jacket above the Gas Train using four #8 x ½” SMS. Holes will have to be drilled for this purpose. If space does not permit mounting the Ignition Transformer on the Jacket, install the Ignition Transformer on a nearby wall. Connect the two wires from the Q179C pilot to the RM7890 sub-base as follows:
 - a. Ground Wire (200°C) to the “12” terminal
 - b. Flame detector wire (Honeywell 1298020) to “11” terminal
 - c. Ignition Cable (Honeywell 1061012) to the Secondary (High Voltage) terminal of the Ignition Transformer
 5. **COMPLETION OF WIRING** – Connect power supply fused disconnect switch, service switch, primary and secondary side of gas valve transformer, primary side of ignition transformer, and remaining controls – see Fig. 44 for wire type and connections to be made. All wiring must be adequately supported and strain relief provided. All wiring including ground connections must comply with the requirements of the authority having jurisdiction and, in the absence of such, to the National Electrical Code, ANSI NFPA No. 70-2005, or the Canadian Electrical Code, C22.1, whichever is applicable.
- Run these wires to outside of jacket on underside of manifold and secure in this position with Wire Ties furnished to provide strain relief. Provide adequate support and strain relief for wiring outside jacket.

SECTION III – INSTALLATION INSTRUCTIONS (continued)

Venting

1. INSTALL VENT CONNECTOR from canopy Draft Hood or damper to chimney maintaining 6" clearances from combustible materials.
2. INSTALL VENT SYSTEM – Typical vent systems are shown in Fig. 38 and 39. Some of the factors affecting vent sizing and construction accompany these figures.

Vent installation shall be in accordance with local building codes; or the local authority having jurisdiction; or the National Fuel Gas Code, ANSI Z223.1/NFPA 54; or the Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances, ANSI/NFPA 211. Both of the aforementioned standards, ANSI Z223.1 and ANSI/NFPA 211, specify Type B and Type L double wall metal vents and fire clay tile lined masonry chimneys as suitable chimney constructions for Category I, draft hood equipped appliances, such as this Series 5B boiler. Both standards prohibit the use of unlined masonry construction as a chimney, with the exception in ANSI Z223.1/NFPA 54 that "Where permitted by the authority having jurisdiction, existing chimneys shall be permitted to have their use continued when an appliance is replaced by an appliance of similar type, input rating and efficiency." ANSI/NFPA 211 prohibits the use of single wall metal vent as a chimney, while ANSI Z223.1 allows it under very restrictive conditions.

In Canada, refer to CAN/CSA-B149.1 or .2-M86 and local codes for venting.

SOME ITEMS RELATIVE TO CONSTRUCTION AND SIZING OF VENT SYSTEM

- (1) Total Vent Height.
- (2) Vent Connector – make Initial Rise as high as possible.
- (3) Length of Lateral – hold to a minimum.
- (4) Number of Elbows – hold to a minimum.
- (5) UL Listed Vent Cap – assures full vent capacity and freedom from adverse wind effects.
- (6) Locate Boiler as close to Chimney as possible consistent with necessary clearances, see page 10, lower table.
- (7) Run Breaching Horizontal and slope upward to Chimney maximum of $\frac{1}{4}$ " per ft.
- (8) Use thimble where Breaching enters masonry chimney – keep breaching flush with inside of flue liner – do not connect into same leg of chimney serving an open fireplace.
- (9) Install vent above bottom of Chimney to prevent blockage – inspect chimney for obstructions or restrictions and remove – clean chimney if necessary.

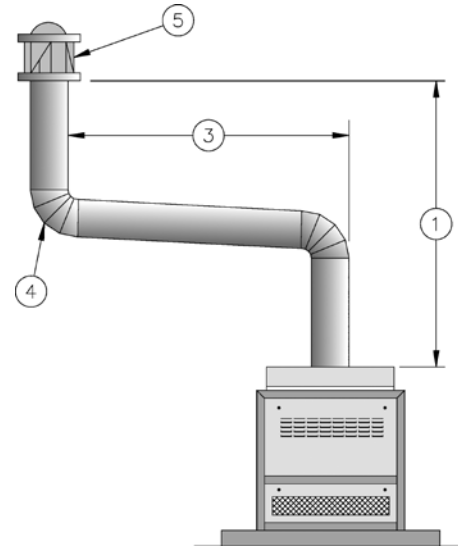


FIG. 38
SINGLE VENT SYSTEM

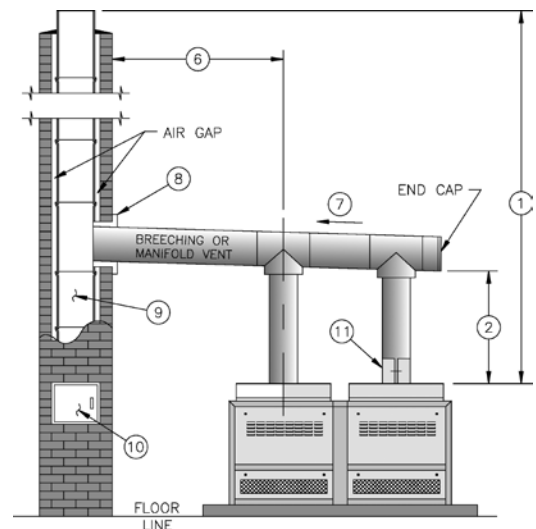


FIG. 39
MANIFOLD VENT SYSTEM

- (10) Provide cleanout in chimney.
- (11) Slip joint or draw band – facilitates installation and future servicing when necessary.
- (12) Venting of other appliances into same chimney or into a common vent will affect sizing of the chimney or common vent.
- (13) Correction for altitude – design vent system for sea level input.
- (14) Provide adequate ventilation of Boiler Room, see page 10 – this cannot be overemphasized.
- (15) Never pass any portion of a vent system thru a circulating air duct or plenum.
- (16) Support of lateral runs so that vent pipe does not sag.
- (17) Support of common vent where it passes thru a ceiling or roof.

SECTION III – INSTALLATION INSTRUCTIONS (continued)

- (18) Clearances to combustible material – use of thimbles.
- (19) Firestops.
- (20) Flashing and storm collars.
- (21) Guying or bracing of common vent pipe above roof.
- (22) Securing and gas tightness of joints.
- (23) Lightning arrester if top of metal vent is one of highest points on the roof.

Where choice is possible, many advantages can be listed for the UL Listed double wall metal type B vent:

- 1. Warm up is faster with type B vents than vents having greater mass.
- 2. Type B vents permit closer clearance to combustible material than single wall metal vents unless special precautions are taken with the latter.
- 3. Type B vents are less prone to condensation and corrosion than single wall metal vents.
- 4. Type B vents are lightweight, easy to handle and assemble.

WARNING

WHEN AN EXISTING BOILER IS REMOVED FROM A COMMON VENTING SYSTEM, THE COMMON VENTING SYSTEM IS LIKELY TO BE TOO LARGE FOR PROPER VENTING OF THE APPLIANCES REMAINING CONNECTED TO IT. AT THE TIME OF REMOVAL OF AN EXISTING BOILER, THE FOLLOWING STEPS SHALL BE FOLLOWED WITH EACH APPLIANCE REMAINING CONNECTED TO THE COMMON VENTING SYSTEM PLACED IN OPERATION, WHILE THE OTHER APPLIANCES REMAINING CONNECTED TO THE COMMON VENTING SYSTEM ARE NOT IN OPERATION.

- A. SEAL ANY UNUSED OPENINGS IN THE COMMON VENTING SYSTEM.**
- B. VISUALLY INSPECT THE VENTING SYSTEM FOR PROPER SIZE AND HORIZONTAL PITCH AND DETERMINE THERE IS NO BLOCKAGE OR RESTRICTION, LEAKAGE, CORROSION AND OTHER DEFICIENCIES WHICH COULD CAUSE AN UNSAFE CONDITION.**
- C. IN SO FAR AS IS PRACTICAL, CLOSE ALL BUILDING DOORS AND WINDOWS AND ALL DOORS BETWEEN THE SPACE IN WHICH THE APPLIANCES REMAINING CONNECTED TO THE COMMON VENTING SYSTEM ARE LOCATED AND OTHER SPACES OF THE BUILDING. TURN ON CLOTHES DRYER AND ANY APPLIANCE NOT CONNECTED TO THE COMMON VENTING SYSTEM. TURN ON ANY EXHAUST FANS, SUCH AS RANGE HOODS AND BATHROOM EXHAUSTS, SO THEY WILL OPERATE AT MAXIMUM SPEED. DO NOT OPERATE A SUMMER EXHAUST FAN. CLOSE FIREPLACE DAMPERS.**
- D. PLACE IN OPERATION THE APPLIANCE BEING INSPECTED. FOLLOW THE LIGHTING INSTRUCTIONS. ADJUST THERMOSTAT SO APPLIANCE WILL OPERATE CONTINUOUSLY.**
- E. TEST FOR SPILLAGE AT THE DRAFT HOOD RELIEF OPENING AFTER 5 MINUTES OF MAIN BURNER OPERATION. USE THE FLAME OF A MATCH OR CANDLE, OR SMOKE FROM A CIGARETTE, CIGAR OR PIPE.**
- F. AFTER IT HAS BEEN DETERMINED THAT EACH APPLIANCE REMAINING CONNECTED TO THE COMMON VENTING SYSTEM PROPERLY VENTS WHEN TESTED AS OUTLINED ABOVE, RETURN DOORS, WINDOWS, EXHAUST FANS, FIREPLACE DAMPERS AND OTHER GAS BURNING APPLIANCE TO THEIR PREVIOUS CONDITIONS OF USE.**
- G. ANY IMPROPER OPERATION OF THE COMMON VENTING SYSTEM SHOULD BE CORRECTED SO THE INSTALLATION CONFORMS WITH THE NATIONAL FUEL GAS CODE, ANSI Z223.1. WHEN RESIZING ANY PORTION OF THE COMMON VENTING SYSTEM, THE COMMON VENTING SYSTEM SHOULD BE RESIZED TO APPROACH THE MINIMUM SIZE AS DETERMINED USING THE APPROPRIATE TABLES IN CHAPTER 10 IN THE NATIONAL FUEL GAS CODE, ANSI Z223.1.**

SECTION IV - OPERATION

Safe lighting and other performance criteria were met with the gas manifold and control assembly provided on the boiler when the boiler underwent tests specified in ANSI Z21.13.

1. GENERAL

- a. INITIAL FILL – Before putting water into a new boiler, make certain that the firing equipment is in operating condition to the extent that this is possible, without actually firing into an empty boiler. This is necessary because raw water must be boiled [or heated to at least 180°F] promptly after it is introduced into the boiler in order to drive off the dissolved gases which might otherwise corrode the boiler.
- b. PURGE GAS PIPING OF AIR – Check Manual Shut Off Valve(s) and Pilot Shut Off Valve(s) at boiler to see that they are closed. Turn gas on at meter. Disconnect Pilot Tubing at Pilot Shut Off Valve(s), open Pilot Valve(s) until gas flows from valve(s) KEEPING A CONSTANT CHECK DURING THE PURGING. Close pilot valve(s) and reconnect the pilot tubing. (In Canada, refer to applicable Installation Codes for purging procedure.)
- c. SINCE LIGHTING INSTRUCTIONS, SHUTDOWN INSTRUCTIONS, AND CONTROL SEQUENCE OF OPERATION VARY WITH GAS CONTROL SYSTEM INSTALLED, REFERENCE SHOULD NEXT BE MADE TO THE APPLICABLE CONTROL SYSTEM:

 EI Control System - Page 45

 EP Control System - Page 51

Check all electrical circuits and connections. Then follow lighting instructions up to a point where the boiler is ready to light.

2. BOILER AND SYSTEM CLEANING INSTRUCTIONS FOR TROUBLE FREE OPERATION

A qualified water treatment chemical specialist should be consulted for recommendations regarding appropriate chemical compounds and concentrations which are compatible with local environmental regulations.

A. Steam Boilers

1. Oil, greases & sediments which accumulate in a new boiler and piping must be removed in order to prevent an unsteady water line and carry over of the water into the supply main above boiler. Operate the boiler with steam in the entire system for a few days allowing the condensate to return to the boiler. If the condensate can temporarily be

wasted, operate boiler only for the length of time it takes for condensate to run clear. If the latter cannot be achieved or if the condensate is returned to the boiler, boil out the boiler using the surface blowoff connection. See Fig. 7.

- a. Drain boiler until water is just visible in gauge glass. Run temporary 1½" pipe line from the surface blowoff connection to an open drain or some other location where hot water may be discharged safely. Do not install valve in this line.
 - b. Add an appropriate amount of recommended boil out compound.
 - c. Start burner and operate sufficiently to boil the water without producing steam pressure. Boil for about 5 hours. Open boiler feed pipe sufficiently to permit a steady trickle of water from the surface blowoff pipe. Continue this slow boiling and trickle of overflow for several hours until the water coming from the overflow is clear.
 - d. Stop burner and drain boiler in a manner and to a location that hot water can be discharged with safety.
 - e. Refill boiler to normal water line. If water in gauge glass does not appear to be clear, repeat steps (a. through c.) and boil out the boiler for a longer time.
2. Low pressure steam boilers such as the 5B series should be maintained with appropriate water treatment compounds. Add suitable water treatment compounds as recommended by your qualified water treatment company.
 3. Remove temporary surface blowoff piping, plug tapping and reinstall safety valve. Boil or bring water temperature to 180°F promptly in order to drive off the dissolved gases in the fresh water.
 4. If unsteady water line, foaming or priming persist, install gate valve in Hartford Loop and drain valves in return main and at boiler and proceed as follows:
 - a. Connect hoses from drain valves to floor drain. Close gate valve in Hartford Loop and open drain valve in return main. Fill boiler to normal water level, turn on burner and operate boiler at this water level for at least 30 minutes after the condensate begins to run hot, then turn off burner.
Close all radiator valves. Remove all supply main air valves and plug the openings in supply main.

SECTION IV - OPERATION (continued)

- b. Draw about 5 gallons of hot water from boiler into a container and dissolve into it the appropriate amount of a recommended boilout compound. Remove safety valve from boiler and pour this solution into boiler, then reinstall safety valve.
 - c. Turn on burner and keep operating while feeding water to boiler slowly. This will raise water level in boiler slowly into supply main and back through return main, flowing from drain hose at about 180°F. Continue until water runs clear from drain hose for at least 30 minutes.
 - d. Stop feeding water to boiler but continue operating burner until excess water in boiler flows out through supply main and water lowers (by steaming) until it reaches normal level in boiler.
Turn off burner. Drain boiler. Open all radiator valves. Reinstall all supply main air valves. Open gate valve in Hartford Loop.
 - e. When boiler has cooled down sufficiently (crown-sheet of sections are not too hot to touch), close the drain valves at boiler and in return main and feed water slowly up to normal level in boiler. Turn on burner and allow boiler to steam for 10 minutes, then turn off burner. Draw off one quart of water from bottom gauge glass fitting and discard. Draw off another quart sample and if this sample is not clear, repeat the cycle of draining the boiler and return main and refilling the boiler until sample is clear.
 - f. If the boiler water becomes dirty again at a later date due to additional sediment loosened up in the piping, close gate valve in Hartford Loop, open drain valve in return main, turn on burner and allow condensate to flow to drain until it has run clear for at least 30 minutes while feeding water to boiler so as to maintain normal water level. Turn off burner, drain boiler, open gate valve in Hartford Loop, then repeat step 1 above.
3. Make pH or Alkalinity Test
After boiler and system have been cleaned and refilled as previously described, test the pH of the water in the system. This can easily be done by drawing a small sample of boiler water and testing with Hydrion paper which is used in the

same manner as litmus paper, except that it gives specific readings. A color chart on the side of the small hydrion dispenser gives the reading in pH. Hydrion paper is inexpensive and obtainable from any chemical supply house or through your local druggist. The pH should be in accordance to "Minimum Water Quality Requirements" chart below. Add some washout chemicals (caustic soda), if necessary, to bring the pH within the specified range. With this lower level of protection, care must be exercised to eliminate all of the free oxygen in the system.

4. Boiler is now ready to be put into service.

Recommended Water Quality Requirements

pH: 8.3 - 10.5

TDS: < 3500 ppm

Total alkalinity ppm as CaCO₃: < 1200

Total copper ppm: < .05

Oily matter ppm: < -1

Total harness ppm: < -3

Chlorides: < 50 ppm

TABLE IV: WATER CONTENT

Boiler Size	Water Content (Gallons)	
	Water Boiler	Steam Boiler
5006B	37.6	25.6
5007B	43.4	29.3
5008B	49.1	33.0
5009B	54.9	36.8
5010B	60.6	40.5
5011B	66.4	44.2
5012B	72.1	47.9
5013B	77.9	51.6
5014B	83.7	55.4
5015B	89.4	59.1
5016B	95.2	62.8
5017B	100.9	66.5
5018B	106.7	70.2
5019B	112.5	73.9
5020B	118.2	77.7
5021B	124.0	81.4
5022B	129.7	85.1
5024B	141.2	92.5
5026B	152.8	100.0

SECTION IV - OPERATION (continued)

3. CONDENSATION

Following a cold start, condensation (sweating) may occur in a gas fired boiler to such an extent that it

appears that the boiler is leaking. This condensation can be expected to stop after the boiler is hot.

CONTROL VARIATIONS

NATURAL GAS

MODEL NO.	CONTROL SYSTEM	TYPE OF PILOT	GAS VALVES		OPTIONAL MAIN VALVES	REFERENCE PAGE
			PILOT	MAIN		
5006B-5009B (USA)	EI	Elec. Ign.	(1) 7000DERHC-S7C		(B)	47
5010B-5026B (USA) 5006B-5026B (CANADA)	EI	Elec. Ign.	(1) H91WG-6	(2) V88A	(B)**	48-50
5008B-5026B (USA & CANADA)	EP	Elec. Ign. Q179C	(1) H91WA-4	(2) V88A	(A), (B)*	54 & 55

LP GAS

MODEL NO.	CONTROL SYSTEM	TYPE OF PILOT	GAS VALVES		OPTIONAL MAIN VALVES	REFERENCE PAGE
			PILOT	MAIN		
5006B-5009B (USA)	EI	Elec. Ign.	(1) 7000DERHC-S7C			47

(A) -- (1) Honeywell V5055B Motorized Gas Valve with V4055A/V4062A/V9055A Actuator and (1) ITT K3A Solenoid Valve (120V)

(B) -- (1) Honeywell V8944B Combination Gas Valve and (1) ITT K3A Solenoid Valve (24V)

* -- To be used with (1) H91WA-4 Pilot Valve (120V)

** -- To be used with (1) H91WG-6 Pilot Valve (24V)

NOTE:

- For Steam or Water
- For 24V Thermostat Application - Wire S8610M Relay in Place of Operating Control Set Thermostat Heat Anticipator at 0.4 Amp. See Pages 47, 48 and 49.
- All Battery Operated Thermostats **must** be Electrically Isolated From the Primary Circuit by an Isolating Relay.

SECTION IV - OPERATION (continued)

4. EI CONTROL SYSTEM – The EI control system utilizes a solid state ignition control which lights the pilot burner by spark. Pilot gas is ignited and burns during each running cycle (intermittent electric pilot). Main burner and pilot gas are extinguished during the “off” cycle.

This system permits the main gas valves [Robertshaw7000 for 5006B thru 5009B, (2) V88A’s for 5010B thru 5014B] to open, and the pilot line gas valve to remain open, only when the Pilot Burner is proven to be lit.

Should a loss of flame occur, the main valve closes and the spark reoccurs within 0.8 second. The ignition module has an internal 100% lockout function to completely shutdown the system should the pilot gas fail to ignite within approximately 90 seconds. Five to six minutes after shutdown, the Ignition Module restarts the ignition sequence. The ignition trial, shutdown, and wait sequence continues until either the pilot lights or the Thermostat is set below room temperature (to end the call for heat). The ignition sequence can be reset by setting down the Thermostat for one minute.

a. OPERATING INSTRUCTIONS

- (1) Make sure all Manual Main Shut-off Valves and all Pilot Valves have been off for at least five minutes.
- (2) Set Operating and Limit Controls to desired settings.
- (3) Turn all Manual Main Shut-Off Valves and Pilot Valves to Open Position.
- (4) Turn on Main Electric Switch and Service Switch – Pilot(s) will automatically light main burners.

b. NORMAL OPERATION SEQUENCE

5006B thru 5009B, see Fig. 40
5010B thru 5014B, see Fig. 41
5015B thru 5026B, see Fig. 42

c. SHUT DOWN INSTRUCTIONS

- (1) Close manual shut-off valves and pilot valves.
- (2) Turn off main electric switch.

d. SAFETY SHUTDOWN

- (1) Safety Switch Circuit
If limit control, low water cut-off or any other electrical safety switch opens, power to the 24V terminal of all S8610M Ignition Controls is interrupted thus de-energizing terminals PV and MV. Loss of power to these terminals means loss of power to all pilot gas valves and to main

gas valves, respectively. Thus, pilot burner and main burner flames are extinguished.

Normal operation can be resumed when the cause of safety switch malfunction is corrected. Any controls with Manual Reset must be reactivated.

(2) Pilot Failure

Pilot failure can occur during the start-up or during the operating cycle of the boiler. Any failure of a Q3481B pilot will close the main gas valves controlled by this pilot within 0.8 second. For 90 seconds after pilot failure, the Ignition Control will try to reestablish pilot flame. If the pilot flame cannot be sensed by the sensing probe, the module will lock out on safety. Five to six minutes after shutdown, the IGNITION MODULE restarts the ignition sequence. The ignition trial, shutdown, and wait sequence continues until either the pilot lights or the Thermostat is set below room temperature (to end the call for heat). The ignition sequence can be reset by setting down the Thermostat for one minute.

On 15 section and larger boilers, where two manifolds, gas trains and pilot systems are employed, failure of one pilot will not affect operation of the other system. Thus, it is possible to fire the boiler at a reduced rate thru one manifold while the other is inoperative.

Pilot failure is caused by one of the following:

- (a) Pilot burns yellow resulting in weak signal from sensor to Ignition Control – may be due to dirt or lint that has covered the lower portion of the pilot burner – remove with a soft brush or by vacuuming.
- (b) Loss of pilot gas – may be due to faulty pilot solenoid valve, improper wiring, loose connections, or low voltage.
- (c) Loss of signal from sensing probe – may be faulty probe, improper or loose electrical connection, or faulty Ignition Control.

CAUTION

Be sure power is off when checking high voltage connections.

For S8610M Trouble Shooting Guide, see Page 51.

SECTION IV - OPERATION (continued)

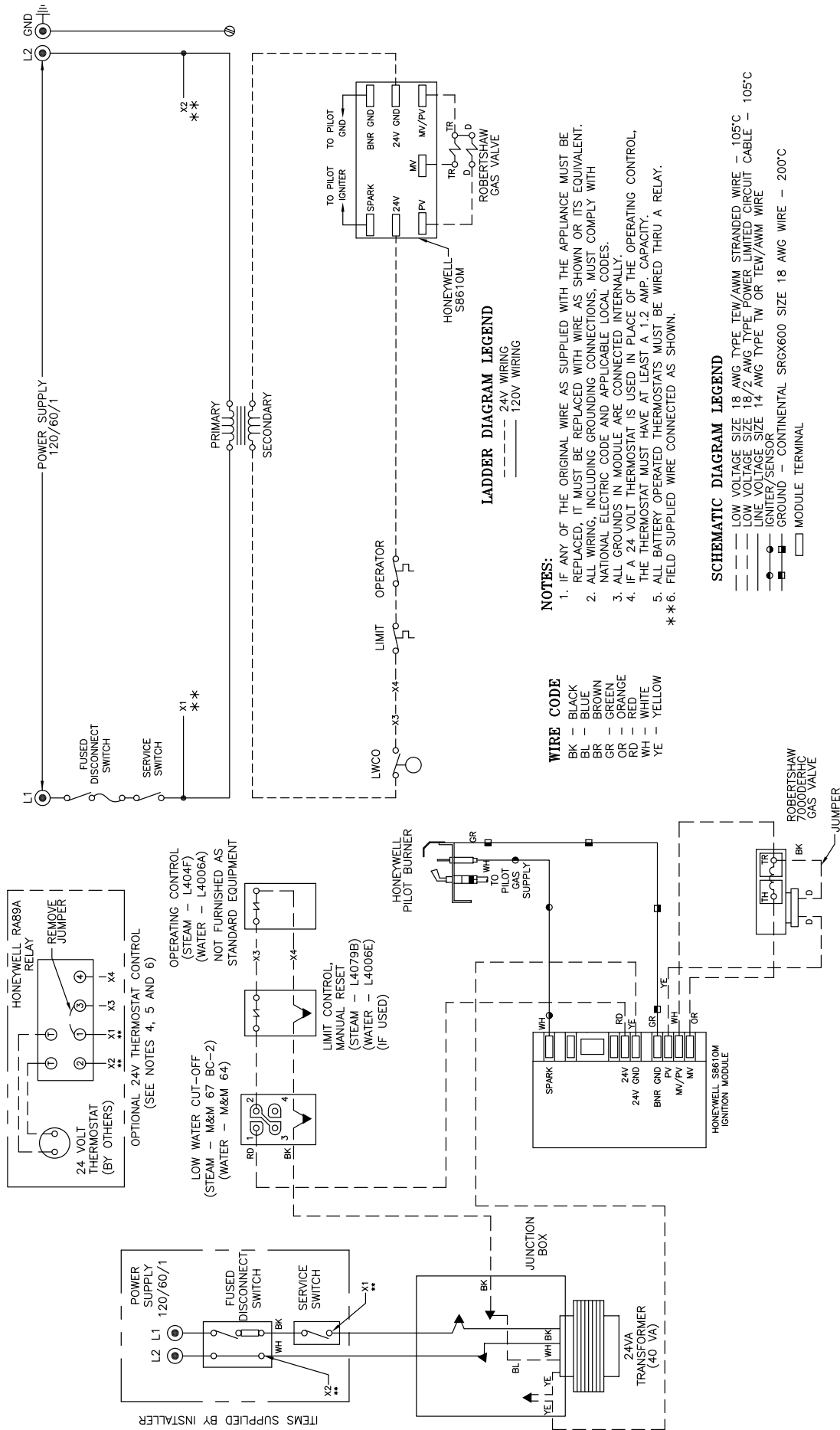


FIG. 40
SCHEMATIC WIRING DIAGRAM - EI CONTROL SYSTEM (ROBERTSHAW7000 GAS VALVE)
U.S.A. 5006B THRU 5009B

SECTION IV - OPERATION (continued)

EI SEQUENCE OF OPERATION - 5006B THRU 5009B

WHEN OPERATING CONTROL CLOSES, THE ELECTRIC SPARK AND PILOT VALVE ARE AUTOMATICALLY ENERGIZED. THE SENSING PROBE PROVES THE PRESENCE OF THE PILOT FLAME. INTERNAL SWITCH ACTION DE-ENERGIZES THE SPARK AND ENERGIZES THE MAIN GAS VALVES STARTING MAIN BURNER OPERATION. WHEN THE OPERATING CONTROL IS SATISFIED THE PILOT GAS VALVE AND THE MAIN GAS VALVES ARE DE-ENERGIZED STOPPING THE BURNER OPERATION.

IN THE EVENT OF EXCESSIVE STEAM PRESSURE (STEAM BOILER) OR EXCESSIVE BOILER WATER TEMPERATURE (WATER BOILER), THE HIGH LIMIT CONTROL WILL DE-ENERGIZE THE PILOT GAS VALVE AND THE MAIN GAS VALVES STOPPING BURNER OPERATION.

THE LOW WATER CUT-OFF WILL ALSO STOP BURNER OPERATION IF THE WATER LEVEL IN THE BOILER SHOULD DROP BELOW THE LOWEST SAFE LEVEL.

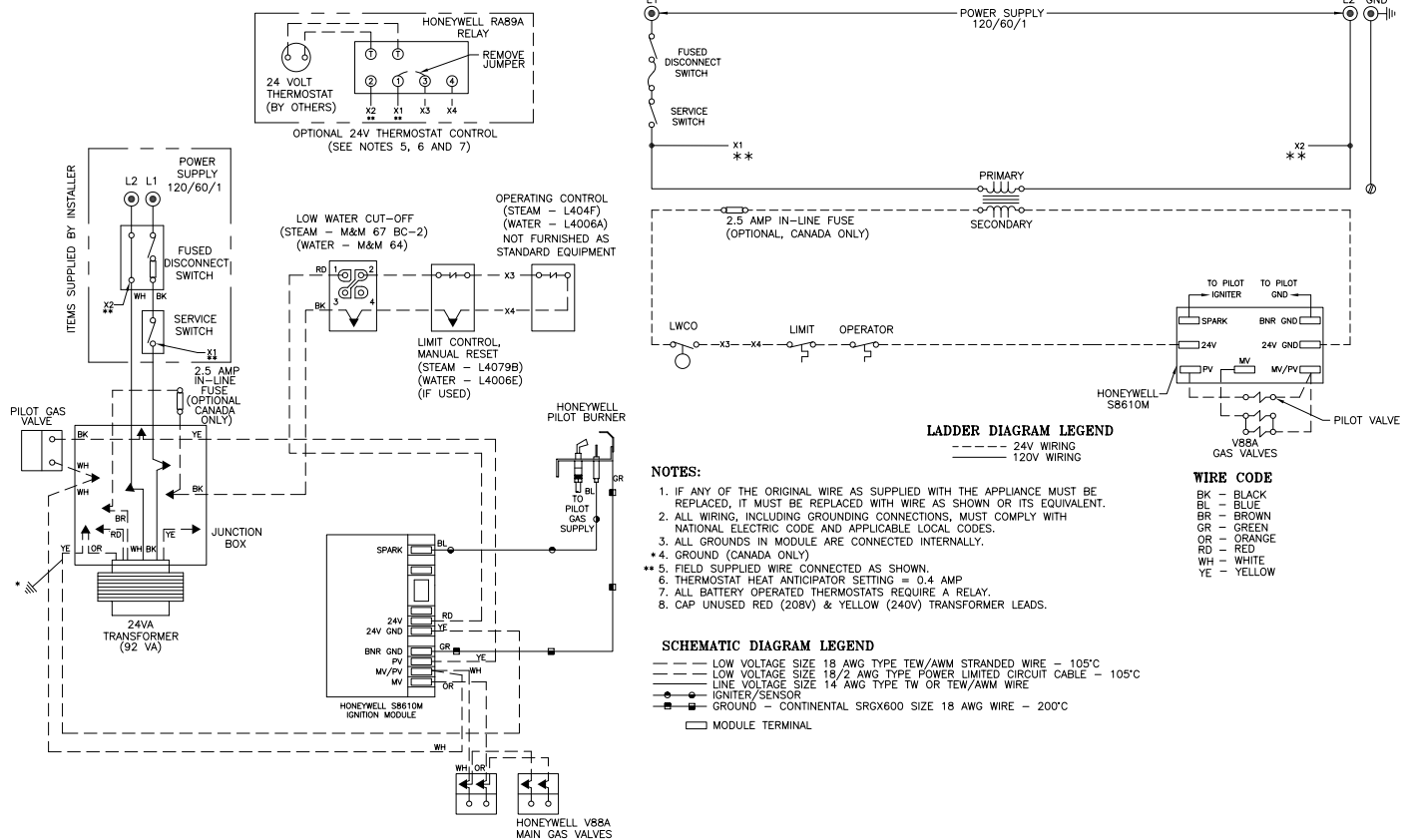


FIG. 41
SCHEMATIC WIRING DIAGRAM - EI CONTROL SYSTEM (V88 GAS TRAIN)
U.S.A. 5010B THRU 5014B
CANADA 5006B THRU 5014B

SECTION IV - OPERATION (continued)

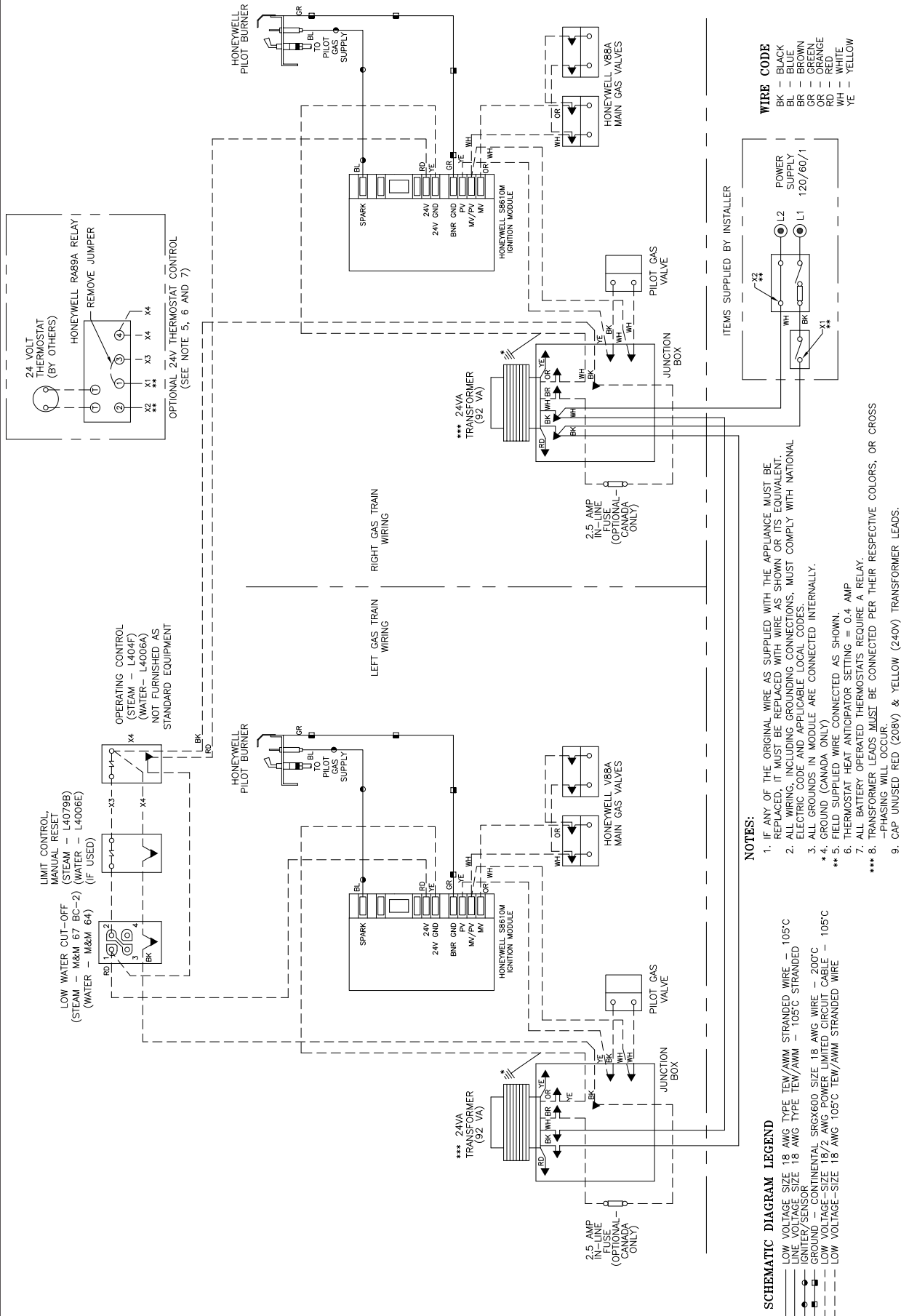


FIG. 42
SCHEMATIC WIRING DIAGRAM - 5015B THRU 5026B SECTION BOILERS
EI CONTROL SYSTEM

SECTION IV - OPERATION (continued)

EI SEQUENCE OF OPERATION - 5010B THRU 5014B

WHEN OPERATING CONTROL CLOSES, THE ELECTRIC SPARK AND PILOT VALVE ON EACH SIDE ARE AUTOMATICALLY ENERGIZED. THE SENSING PROBE ON EACH OF THE PILOTS PROVES THE PRESENCE OF THE PILOT FLAME. INTERNAL SWITCH ACTION IN EACH IGNITION MODULE DE-ENERGIZES THE SPARK AND ENERGIZES THE MAIN GAS VALVES FOR ITS RESPECTIVE GAS TRAIN, STARTING MAIN BURNER OPERATION. WHEN THE OPERATING CONTROL IS SATISFIED THE PILOT GAS VALVE AND MAIN GAS VALVES FOR EACH GAS TRAIN ARE DE-ENERGIZED STOPPING BURNER OPERATION.

IN THE EVENT OF EXCESSIVE STEAM PRESSURE (STEAM BOILER) OR EXCESSIVE WATER TEMPERATURE (WATER BOILER) THE HIGH LIMIT CONTROL WILL DE-ENERGIZE THE PILOT VALVES AND MAIN GAS VALVES ON BOTH SIDES STOPPING BURNER OPERATION.

THE LOW WATER CUT-OFF WILL ALSO STOP BURNER OPERATION IF THE WATER LEVEL IN THE BOILER SHOULD DROP BELOW THE LOWEST SAFE LEVEL.

SHOULD ONE OF THE PILOT FLAMES FAIL TO IGNITE OR BECOME EXTINGUISHED, THE MAIN GAS VALVES CONTROLLED BY THAT PARTICULAR PILOT WOULD CLOSE STOPPING BURNER OPERATION ON THE BURNERS SUPPLIED BY THAT GAS TRAIN. OPERATION OF THE BURNERS SUPPLIED BY THE SECOND GAS TRAIN WOULD BE UNAFFECTED.

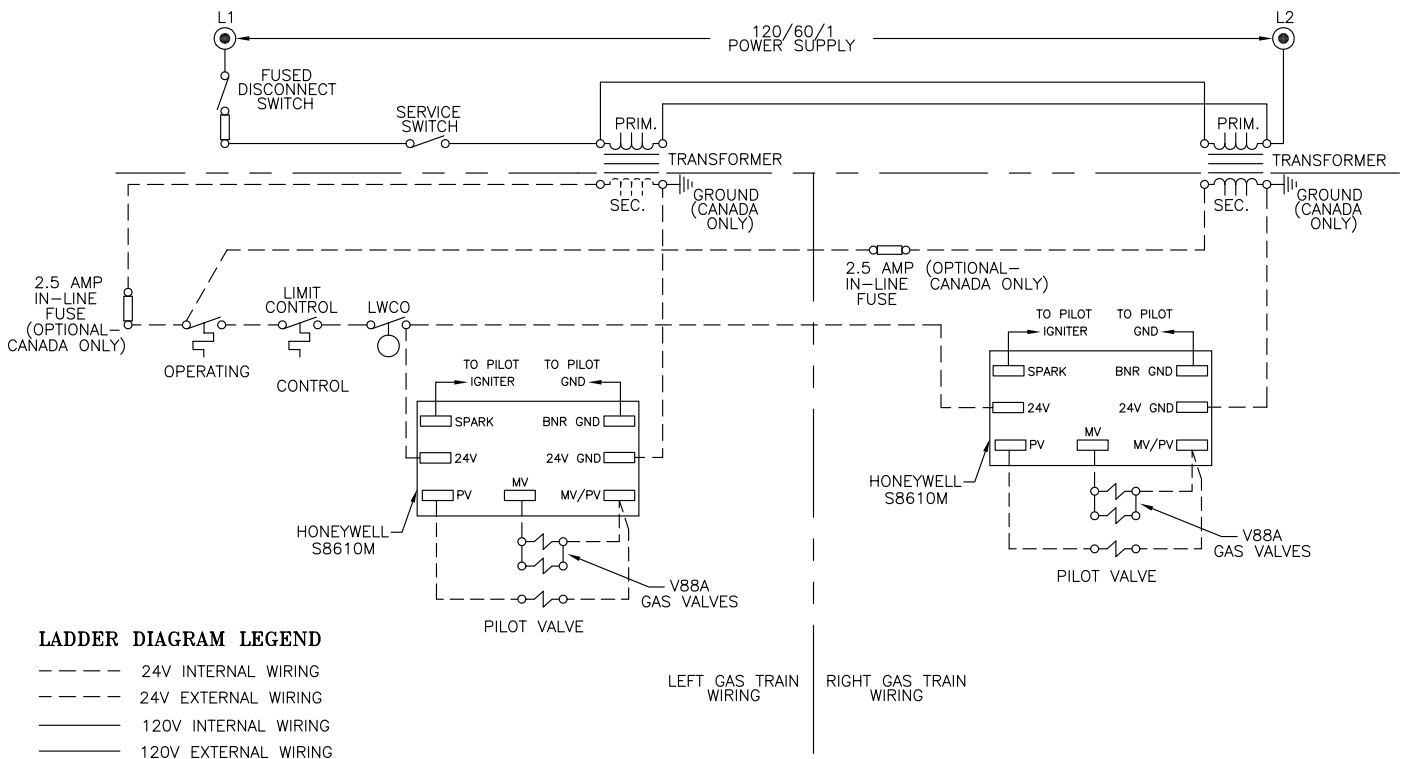
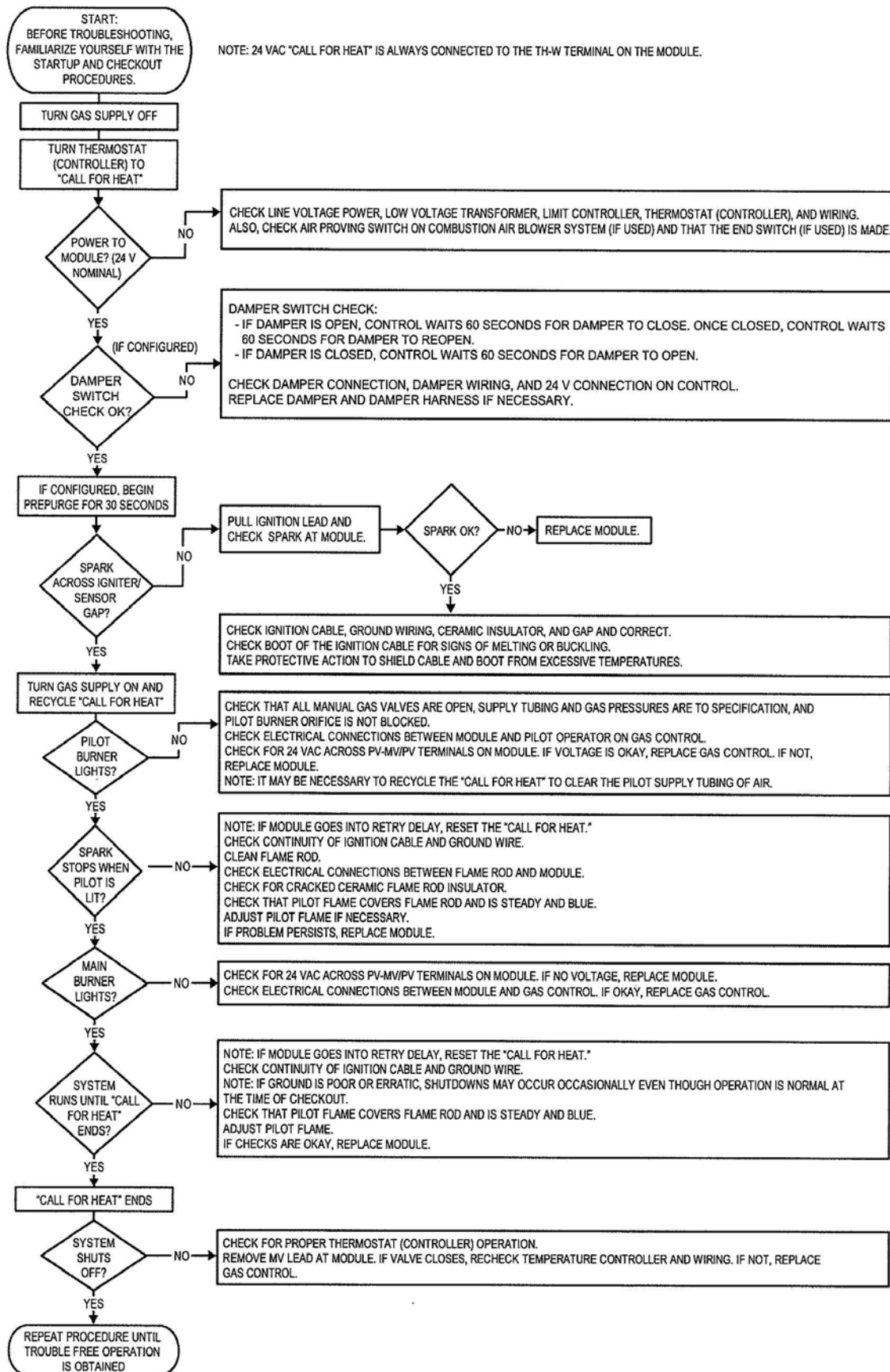


FIG. 43
LADDER WIRING DIAGRAM - 5015B THRU 5026B SECTION BOILERS
EI CONTROL SYSTEM

SECTION IV - OPERATION (continued)

TROUBLE SHOOTING GUIDE BOILERS EQUIPPED WITH S8610M INTERMITTENT ELECTRIC IGNITION



SECTION IV - OPERATION (continued)

7. EP CONTROL SYSTEM – 5006B thru 5014B

The EP Control System utilizes an RM7890A Relay Module and a Q179C Rectification Pilot, which in addition to a pilot burner and rectifying flame rod flame detector to prove pilot, includes an ignition electrode for spark ignition of the pilot. A Webster 612-6A7 Transformer supplies the high voltage spark potential. Once pilot flame continues as long as there is a “call for heat” (intermittent electrically ignited pilot).

The RM7890A Relay Module Primary Control is a non-programming amplifying relay which when used with the Q179C Pilot provides solid state electronic Flame Safeguard Protection that will not allow the main gas valves to open on “call for heat” for that will shut down main burners within 0.8 second if pilot flame is not “proved”. Relay Module will lockout on safety shutdown within 15 seconds if there is a pilot flame failure on start or, if during the “run” cycle, pilot flame is not re-established. Since #8 terminal in the Relay Module is de-energized at end of safety switch timing, a solenoid valve in the pilot line will close and thus 100% shut-off is achieved.

a. OPERATING INSTRUCTIONS

- (1) Make sure Manual Main Shut-off Valve and all Pilot Valves have been off for at least five minutes.
- (2) Set Operating and Limit Controls to desired settings.
- (3) Turn Manual Main Shut-off Valve and Pilot Valve to Open Position.
- (4) Turn on Main Electric Switch and Service Switch – Pilot will automatically light main burners.

SEQUENCE OF OPERATION EP - See Fig. 44

b. NORMAL OPERATION - 5006B thru 5014B

- (1) When the operating control calls for heat, terminal #6 of RM7890A Relay is energized.
- (2) A component check circuit in the RM7890A Relay is activated which, checks the electronic network in the relay.
- (3) Terminals #8 and #10 of the relay are energized. Terminal #8 opens pilot line solenoid valve supplying gas to pilot. Terminal #10 energizes ignition transformer creating electric spark ignition at pilot.
- (4) Flame rod circuit between Q179C pilot and RM7890A proves presence of pilot flame electronically.
- (5) Terminal #10 to ignition transformer is de-energized.
- (6) Terminal #9 is energized and supplies power to the main gas valves.
- (7) Main gas valves open and main burners are lighted by pilot.
- (8) When operating control is satisfied, terminals #6 and #9 are de-energized. Main Gas Valves and pilot line solenoid valve are all de-energized and main burner and pilot burner flames are extinguished.

c. SAFETY SHUTDOWN

(1) SAFETY SWITCH CIRCUIT

If limit control, low water cut-off or any other electrical safety switch opens, power to terminal #6 in relay is interrupted thus de-energized terminal #9 and #8 in relay which de-energizes main gas valves and pilot valves. Main gas burners and pilot burners are immediately extinguished. Normal operation can be resumed when the cause of safety switch malfunction is corrected. Make sure all manual resets are activated where involved.

(2) PILOT FAILURE

- (a) Pilot failure can occur during the start of operating cycle of the boiler. Any pilot failure, on the Q179C electronic pilot, after ignition of pilot flame will close the main gas valves in 0.8 second.
- (b) For 15 seconds after failure of the Q179C pilot, the relay through terminals #8 and #10 will try to establish pilot flame. If not pilot flame can be sensed by the flame rod circuit, terminal #8 and #10 are de-energized, and the relay will lock out on safety.
- (c) Pilot failure is caused by the following:
 - (1) Complete loss of gas supply.
 - (2) Poor ignition spark caused by low voltage, poor ground connection, faulty wiring, and possibly a defective ignition transformer.
 - (3) Low gas pressure will prevent flame rod circuit from sensing pilot flame properly.
 - (4) Unusually strong secondary air drafts can blow the pilot flame away from the flame rod momentarily causing nuisance shutdown.
 - (5) A pilot line solenoid valve will not open because of faulty wiring, low voltage, or possibly the valve is defective.
 - (6) A defective RM7890A may be the cause but items (1) thru (5) should be followed first. Refer also to RM7890A relay literature furnished with the control.
- (d) By referring to the Sequence of Operations step-by-step operation of the system can be controlled and the cause of pilot failure

SECTION IV - OPERATION (continued)

can be readily found. After the cause of the pilot failure has been corrected, resume normal operation by following the Lighting Instructions.

(3) SHUTDOWN INSTRUCTIONS

- (a) Close manual shut-off valves and pilot valves.
- (b) Turn off main electric switch.

8. EP CONTROL SYSTEM – 5015B thru 5026B (see Fig. 45)

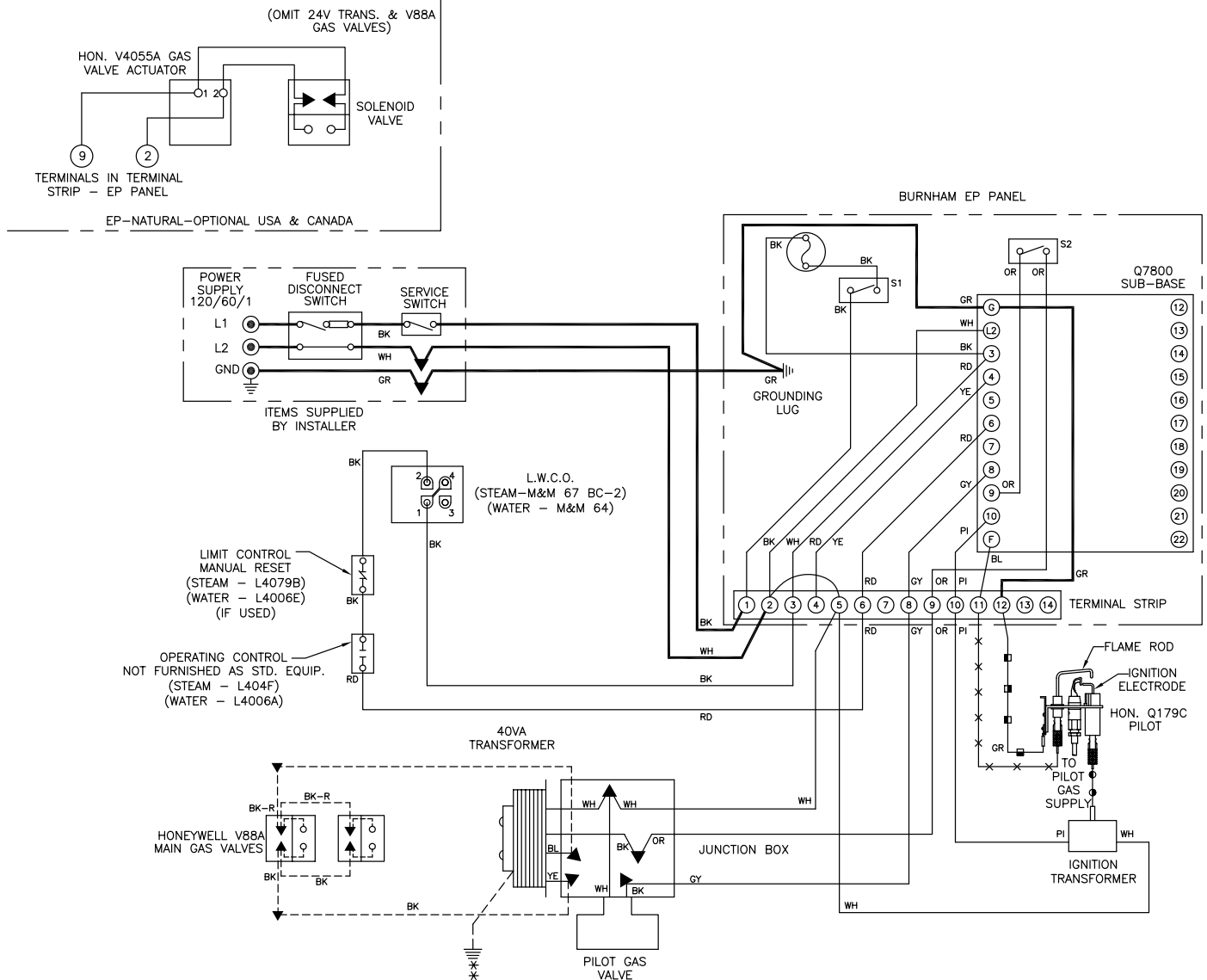
The 5015B thru 5026B boilers utilize two EP control systems that are interconnected electrically thru all operating and safety controls. Should any of the aforementioned controls break the power supply circuit, both EP control systems would be de-energized. The succeeding paragraphs describe the function and operation of each EP Control System. Should a pilot failure on one EP Control System occur, the other EP Control System would not be affected. Thus main burners on the unaffected side would ignite on a “call for heat” and would continue to operate until the

operating control was satisfied.

The EP Control System utilizes and RM7890A Relay Module and a Q179C Rectification Pilot, which in addition to a pilot burner and rectifying flame rod flame detector to prove pilot, includes an ignition electrode for spark ignition of the pilot. A Webster 612-6A7 Transformer supplies the high voltage spark potential. Once pilot flame is proven, ignition stops but pilot flame continues as long as there is a “call for heat” (intermittent electrically ignited pilot).

The RM7890A Primary Control is a non-programming amplifying relay which when used with the Q179C Pilot provides solid state electronic Flame Safeguard Protection that will not allow the main gas valve to open on “call for heat” or that will shut down main burners within 0.8 second if pilot flame is not “proved”. Relay Module will lock out on safety shutdown within 15 seconds if there is a pilot flame failure on start or, if during the “run” cycle, pilot flame is not re-established. Since #8 terminal in the Relay Module is de-energized at end of safety switch timing, a solenoid valve in the pilot line will close and thus 100% shut-off is achieved.

SECTION IV - OPERATION (continued)



NOTES:

1. IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRE AS SHOWN OR ITS EQUIVALENT.
2. ADDITIONAL LIMITS (TEMPERATURE, LOW WATER CUT-OFF, ETC.) SUPPLIED BY INSTALLER.
3. ALL WIRING, INCLUDING GROUNDING CONNECTIONS, MUST COMPLY WITH NATIONAL ELECTRICAL CODE AND APPLICABLE LOCAL CODES.

** GROUND (CANADA ONLY)

WIRE CODE

BK - BLACK
BL - BLUE
GR - GREEN
GY - GRAY
GY/WH - GRAY WITH WHITE TRACE
PI - PINK
RD - RED
OR - ORANGE
WH - WHITE
YE - YELLOW
BK-R - BLACK/RIBBED/LETTERED

SCHEMATIC DIAGRAM LEGEND

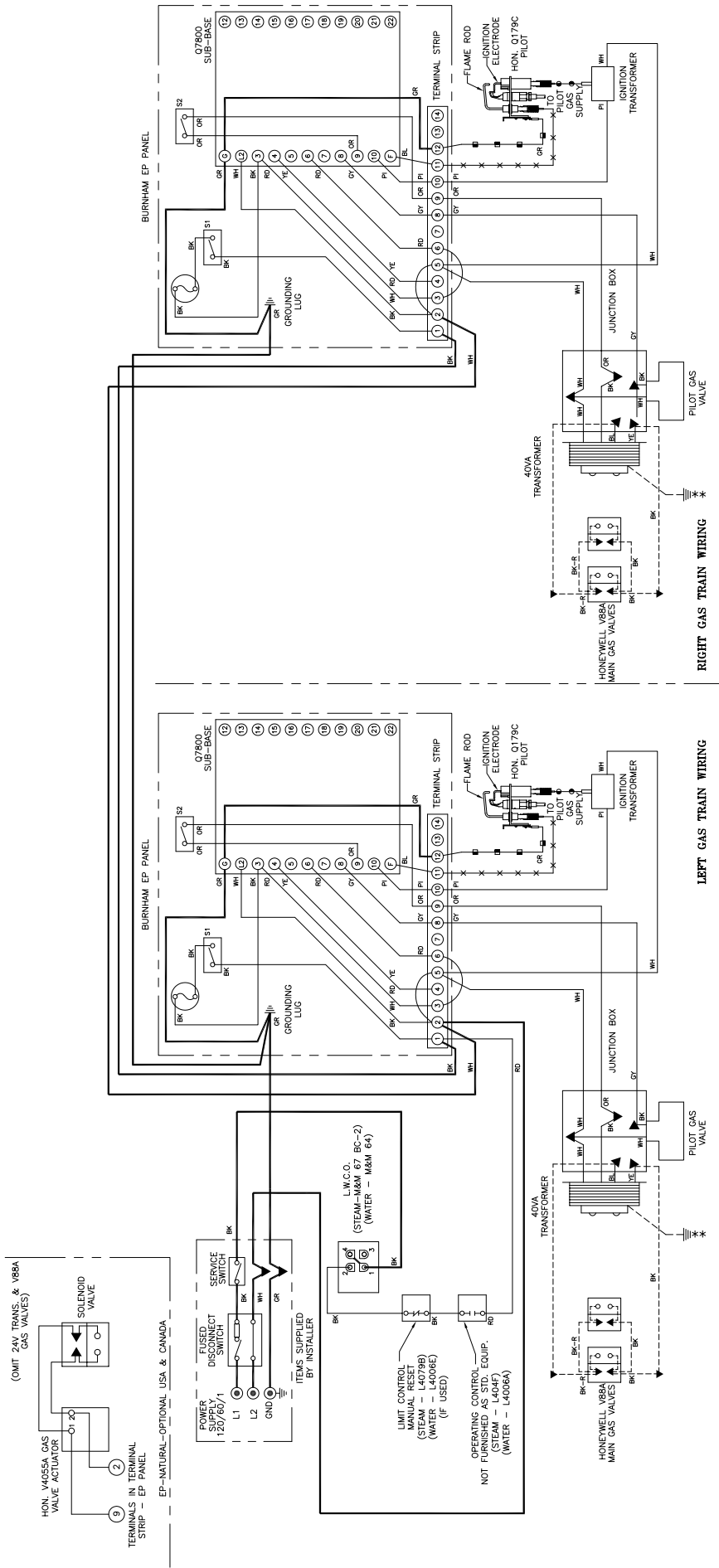
----- LOW VOLTAGE SIZE 18 AWG TYPE TEW/AWM STRANDED WIRE - 105°C
----- LOW VOLTAGE SIZE 18/2 AWG TYPE CL2X STRANDED WIRE - 105°C
===== LINE VOLTAGE SIZE 14 AWG TYPE TW OR TEW/AWM WIRE
===== LINE VOLTAGE SIZE 18 AWG TYPE TW OR TEW/AWM WIRE
- - - - - GROUND - SIZE 18 AWG TYPE SF-2/SEW-2, STRANDED
CONTINENTAL SRGX600 - 200°C WIRE OR EQUAL
- x - x - FLAME ROD LEAD, HONEYWELL R129B020 WIRE (DO NOT RUN CONDUIT WITH LINE VOLTAGE WIRING)

EP PANEL COMPONENT

S1 - POWER SWITCH
S2 - GAS VALVE SWITCH

FIG. 44
WIRING DIAGRAM - 5006B THRU 5014B SECTION BOILERS
EP CONTROL SYSTEM

SECTION IV - OPERATION (continued)



NOTES:
1. IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRE AS SHOWN OR ITS EQUIVALENT.
2. ADDITIONAL LIMITS (TEMPERATURE, LOW WATER CUT-OFF, ETC.) SUPPLIED BY OTHER MANUFACTURERS MUST BE INSTALLED AND WIRING AS SHOWN.
3. ALL WIRING, INCLUDING GROUNDING CONNECTIONS, MUST COMPLY WITH NATIONAL ELECTRICAL CODE AND APPLICABLE LOCAL CODES.
** GROUND (CANADA ONLY)

WIRE CODE	
BK	BLACK
BL	BLUE
GR	GREEN
GR/WH	GRAY WITH WHITE TRACE
PI	PINK
RD	RED
WH	WHITE
WH/WH	WHITE WITH WHITE TRACE
BK-R	BLACK/RIBBED/LETTERED

SCHEMATIC DIAGRAM LEGEND	
LOW VOLTAGE SIZE 18 AWG TYPE TW/AMW STRANDED WIRE - 105°C	POWER SWITCH
LINE VOLTAGE SIZE 14 AWG TYPE TW/AMW STRANDED WIRE - 105°C	S1 - GAS VALVE SWITCH
LINE VOLTAGE SIZE 14 AWG TYPE TW/AMW STRANDED WIRE - 105°C	S2 - GAS VALVE SWITCH
CONTINENTAL SRQ600 - 200°C WIRE OR EQUAL	
FLAME ROD LEAD, HONEYWELL R1298020 WIRE	
(DO NOT RUN CONDUIT WITH LINE VOLTAGE WIRING)	

EP PANEL COMPONENT	
POWER SWITCH	S1
GAS VALVE SWITCH	S2

FIG. 45
WIRING DIAGRAM - 5015B THRU 5026B SECTION BOILERS
EP CONTROL SYSTEM

SECTION IV - OPERATION (continued)

a. OPERATING INSTRUCTIONS

- (1) Make sure all Manual Main Shut-off Valves and all Pilot Valves have been off for at least five minutes.
- (2) Set Operating and Limit Controls to desired setting.
- (3) Turn all Manual Main Shut-off Valves and Pilot Valves to Open Position.
- (4) Turn on Main Electric Switch and Service Switch. Pilots will automatically light main burners.

SEQUENCE OF OPERATION EP – See Fig. 45

b. NORMAL OPERATION – 5015B thru 5026B

1. When the operating control calls for heat, terminal #6 of each RM7890A is energized.
2. A component check circuit in each RM7890A is activated which checks the electronic network of the relay.
3. Terminals #8 and #10 of each RM7890A relay are energized. Terminal #8 opens the pilot line solenoid valve supplying gas to the Q179C pilot. Terminal #10 energizes ignition transformer creating electric spark ignition at the Q179C pilot.
4. Flame rod circuit between each Q179C pilot and terminal “11” on its respective RM7890A proves presence of flame electronically at its Q179C pilot.
5. Terminal #10 of each RM7890A and the ignition transformer connected to it is de-energized.
6. Terminal #9 on each RM7890A is energized supplying power to its respective main gas valves.
7. Main gas valves open and main burners are ignited by the pilot flames.
8. When the operating control is satisfied, terminals 6 and all other terminals on both RM7890A relays are de-energized. The main gas valves and pilot valve for each gas train are closed and main burners and pilot burner flames are extinguished.

c. SAFETY SHUTDOWN

(1) SAFETY SWITCH CIRCUIT

If limit control, low water cut-off or any other electrical safety switch opens, power to terminal 6 and all other terminals on both RM7890A relays are interrupted de-energizing the main gas valves and pilot valves and the main gas burners and pilot burners are immediately

extinguished. Normal operation can be resumed when the cause of the safety switch malfunction is corrected. Make sure all manual resets are activated where applicable.

(2) PILOT FAILURE

- (a) Pilot failure can occur during the start and operating cycle of the boiler. Any pilot failure on either of the Q179C Electronic Pilots, after ignition of pilot flame will close the pilot valve and the main gas valves controlled by that particular RM7890A relay in 0.8 second. The burners controlled by the other RM7890A will continue to burn.
- (b) For 15 seconds after failure of a Q179C pilot, the relay through terminals #8 and #10 will attempt to re-establish pilot flame. If no pilot flame can be sensed by the flame rod circuit in 15 seconds, terminals #8 and #10 are de-energized, and the relay will lock out on safety.
- (c) Pilot failure is caused by the following:
 - (1) Complete loss of gas supply.
 - (2) Poor ignition spark caused by low voltage, poor ground connection, faulty wiring, and possibly a defective ignition transformer.
 - (3) Low gas pressure will prevent flame rod circuit from sensing pilot flame properly.
 - (4) Unusually strong secondary air drafts can blow the pilot flame away from the flame rod momentarily causing nuisance shutdown.
 - (5) A pilot line solenoid valve will not open because of faulty wiring, low voltage, or possibly the valve is defective.
 - (6) A defective RM7890A may be the cause but items (1) thru (5) should be followed first. Refer also to RM7890A relay literature furnished with the control.
- (d) By referring to the Sequence of Operations step by step operation of the system can be controlled and the cause of pilot failure can be readily found. After the cause of pilot failure has been corrected, resume normal operation by following the Lighting Instructions.

(3) SHUTDOWN INSTRUCTIONS

- (a) Close manual shut-off valves and pilot valves.
- (b) Turn off main electric switch.

SECTION IV - OPERATION (continued)

10. CHECK GAS INPUT RATE TO BOILER

- (1) Input Rate and Maximum Inlet Pressure shown on Rating Plate must not be exceeded. Inlet pressure must not be lower than minimum inlet pressure shown on Rating Plate.
- (2) All Rate checks and all adjustments are to be made while boiler is firing – all other appliances connected to the same meter as the boiler must be off.
- (3) Water Manometer or water column gauge should be connected to a shut-off valve installed in the 1/8" pipe tapping in each manifold – boiler off. By installing gas valve upstream of manometer, gas pressure can be introduced gradually – without shut-off valve, surge of pressure when boiler is turned on, could blow liquid out of manometer.
- (4) LP Gas Input
 - (a) Adjust Gas Train Regulator(s) so that manifold pressure is ten (10) inches water column. Turning Regulator Adjusting Screw Clockwise increases pressure, Counterclockwise rotation decreases pressure. If boiler is equipped with two manifolds (5015B thru 5026B), pressure in each must be equal.
- (5) Natural Gas Input
 - (a) Approximate Input – Adjust Gas Train Regulator(s) so that manifold pressure is three and a half (3½) inches from water column. Turning Regulator Adjusting Screw Clockwise increases pressure, Counterclockwise rotation decreases pressure. If boiler is equipped with two manifolds, pressure in each must be equal. If more accurate check on input is necessary, see (b) below.

For minor input changes readjust Gas Train Regulator(s) to increase or decrease manifold pressure to obtain corresponding increase or decrease in gas input. If it is necessary to increase manifold pressure more than 0.3" of water to obtain rated input, remove orifices and drill one size larger. Reinstall and recheck input rate.
 - (b) Additional Check on Input – Since input is a function of heating value, specific gravity and volume of gas flow contact your utility for the first two items in order to utilize the formula below. The gas meter should then be clocked for three (3) minutes with stop watch

and substituting the appropriate values in the formula below, determine what the gas flow should be in this 3 minute period to give the input shown on the Rating Plate:

$$\text{cu. ft. per } \frac{\text{Btuh Input}}{3 \text{ min.}} = \frac{\text{Heating Value of gas (Btu/cu.ft.)} \times 20 \times \text{multiplier (from table below)}}{3 \text{ min.}}$$

<u>spec. gravity</u>	<u>multiplier</u>
.50	1.10
.55	1.04
.60	1.00
.65	0.96
.70	0.93

- (c) ADJUST AIR SHUTTERS – See Section V; 5. Burners are normally shipped with the air shutters in the wide open position. Loosen air shutter securing screws and close air shutters until yellow tips appear on flames, then open shutters slowly until defined inner cones may be seen. Lock shutters in this position.
- (d) ADJUST BLEED LINE REGULATOR (V88A's)

All gas boilers for the USA and Canada are normally equipped with two diaphragm gas valves per manifold. The gas valve(s) nearest the manifold on all boilers, is equipped with an adjustable bleed. This bleed regulator should be adjusted so that the burners reach full fire in approximately 10-12 seconds after the main gas valves have been energized.
- (e) ADJUST PILOT LINE PRESSURE – See Section V - Service; 6. Pilot Flame

Shut down boiler and remove gas valve and manometer from 1/8" pipe tapping in each manifold. Plug tappings with square head pipe plugs. Install gas valve in tee in each pilot line. Connect manometer to each gas valve and, with boiler in operation, set pilot line pressure at 5.5" water – natural gas boilers and 6.5" water – propane gas boilers.

Shut boiler down, remove gas valves and manometers and plug tees with square head pipe plugs. Restart boiler.

SECTION IV - OPERATION (continued)

CAUTION

The following procedures should only be performed by a qualified service technician.

11. MINIMUM INPUT ADJUSTMENTS

This section covers Minimum Input Adjustments on Honeywell V8944B Diaphragm Type “Lo-Hi-Lo” Gas Valves, Honeywell V5055B Fluid Power Gas Valves equipped with either a V4062A “Lo-Hi-Lo” Actuator or a V9055A “Modulating” Actuator.

a. Minimum Input Adjustments – “Lo-Hi-Lo”

Combination Valve, V8944B (Natural Gas Only)

On boilers equipped with the V8944B combination diaphragm valve/regulator, Low Fire Adjustment should not be less than Minimum Input shown on Rating Plate (1/3 of full rated input). Fig. 48 shows the outlet pressure adjustment screws for low and high fire. The V8944B low and high fire pressure settings are factory set at 0.8” and 3.5” W.C. respectively. If further adjustments are necessary, remove pressure regulator adjustment caps and insert a screwdriver to raise or lower the regulator pressure.

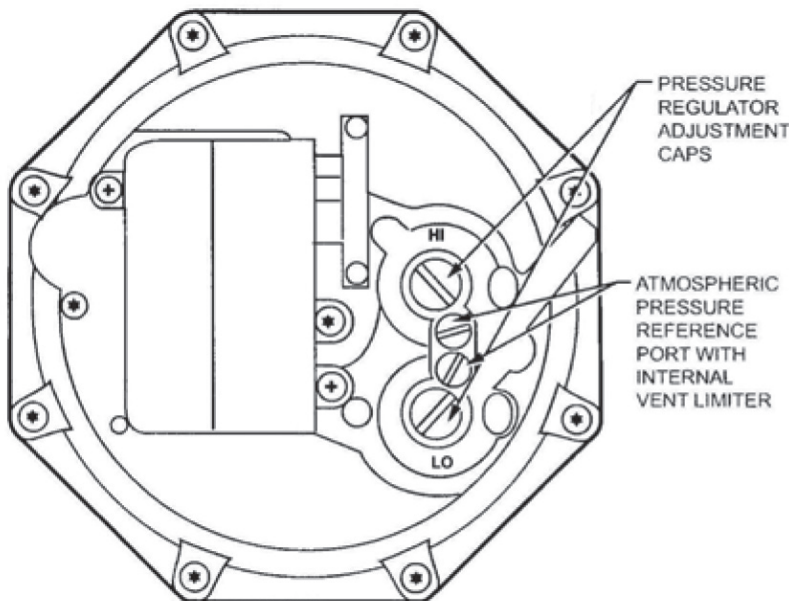


FIG. 48
V8944B COMBINATION VALVE

b. MINIMUM INPUT ADJUSTMENTS –

“Lo-Hi-Lo” MOTORIZED ACTUATOR, V4062A

On boilers equipped with Fluid Power Valves that have “Lo-Hi-Lo” Actuator, Low Fire Adjustment should not be less than Minimum Input shown on Rating Plate (1/3 of full rated input).

Fig. 49 shows the Limit Switch Cam and Scales to indicate direction to rotate cam for increasing or decreasing low fire input on the Honeywell V4062A “Lo-Hi-Lo” Actuator. To adjust the low fire setting after the burners are “on”, the following procedure should be used.

- (1) With power to actuator “off”, remove the wiring compartment cover.
 - (2) Check to be sure the low fire adjustment is set at MAX to insure a safe light-off. (Low fire adjustment is preset at factory in the MAX position.)
 - (3) Disconnect the controller lead from terminal #4 on the actuator to keep the valve in the low fire position.
 - (4) Start the system and establish the main burner flame.
 - (5) Loosen the setscrew in the cam (Fig. 49) with the special wrench taped to inside of actuator cover. Keep the wrench seated in the setscrew. Rotate the cam slightly downward (by moving the wrench toward the base of actuator) to open bleed valve. Actuator will start to close.
 - (6) When valve reaches desired low fire position, quickly tighten setscrew and remove wrench. If the desired low fire setting is “missed”, merely loosen the setscrew and rotate cam in the opposite direction to the desired set point.
 - (7) Shut down burner, and then restart. Repeat several times to be sure the low fire setting is that desired and suitable for correct burner lightoff. Readjust if necessary.
 - (8) Disconnect power and reconnect controller lead removed in step (3) above.
 - (9) Replace the wiring compartment cover.
- c. MINIMUM INPUT ADJUSTMENTS –
MOTORIZED “MODULATING” ACTUATOR,
V9055A

On boilers equipped with Fluid Power Valves that have “Modulating” Actuators, Low Fire Adjustment should not be less than Minimum Input shown on Rating Plate (1/3 of full rated input).

Fig. 50 shows the Low Fire Adjusting Screw for increasing or decreasing low fire input on the Honeywell V9055A “Modulating” Actuator. To adjust the low fire setting after the burners are “on”, the following procedure should be used.

- (1) With power to actuator “off”, remove the wiring compartment cover.
- (2) Check to make sure the low fire adjustment is set at MAX (full clockwise) to insure a safe light-off. (Low fire adjustment is preset at the factory in the MAX position.)

SECTION IV - OPERATION (continued)

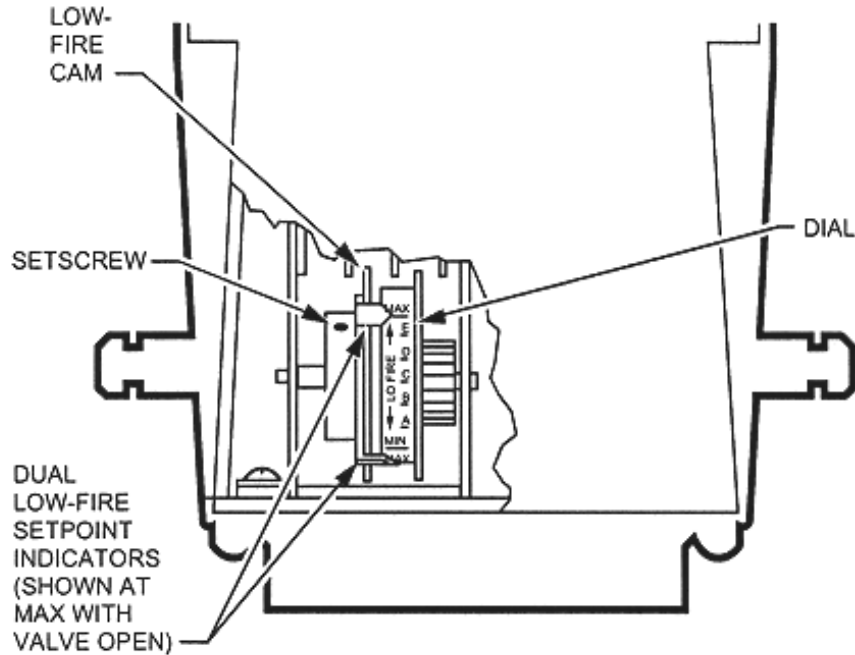


FIG. 49
LOW FIRE ADJUSTMENT - V4062 ACTUATOR

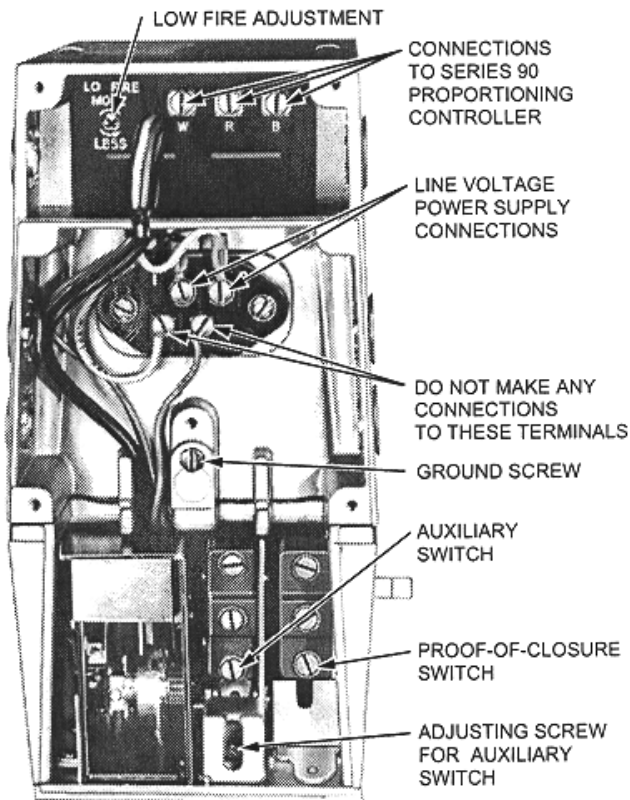


FIG. 50
LOW FIRE ADJUSTMENT - V9055A ACTUATOR

- (3) Remove the lead to V9055A terminal R.
Jumper terminal R to W. This will prevent the actuator from going to the high fire position.
 - (4) Energize the system and light the main burner.
 - (5) Use a Phillips screwdriver, or standard type with a blade no more than 3/16 inch wide, to turn the low fire adjusting screw for the desired low fire position. DO NOT PUSH INWARD ON SCREW.
 - (6) Shut down the burner, and then restart. Repeat several times to be sure the low fire setting is that desired and suitable for correct burner light off.
 - (7) Turn off power supply. Remove R-W jumper, and reconnect the lead to terminal R on the V9055A.
 - (8) Replace the wiring compartment cover.
12. MAIN BURNER FLAMES should have a clearly defined inner cone, see Fig. 55 with no yellow tipping. Orange-yellow streak caused by dust should not be confused with true yellow tipping.
 13. CHECK PILOT FLAME. Flame should be a blue medium hard flame enveloping approximately 3/8" of the end of the thermocouple, flame sensor, or sensing probe, see Fig. 56 thru 59.

SECTION IV - OPERATION (continued)

14. CHECK THERMOSTAT OPERATION. Raise and lower thermostat setting as required to start and stop burners.
15. CHECK HIGH LIMIT CONTROL. Jumper Thermostat terminals or thermostat connections in Limit Control. Allow burners to operate until shutdown by limit. REMOVE JUMPER.
16. TEST IGNITION SYSTEM SAFETY SHUT-OFF DEVICE AS FOLLOWS:

Place the boiler into operation by following the appropriate lighting instructions in this manual.

Proceed with test as follows:

a. *Thermocouple Pilot System*

Using a 3/8" wrench loosen the thermocouple lead at the gas valve. Main gas and pilot gas must shut off. If not, replace gas valve.

b. *EI Pilot System*

Carefully remove ignitor sensor wire from ignition module. Main gas and pilot gas must shut off immediately. If not, replace the module.

c. *EP Pilot Systems*

Carefully remove the flame rod wire from terminal "11" on the RM7890 Control. Main gas and pilot gas must shut off. If not, replace the RM7890 Control.

17. COMBUSTION CHAMBER BURN-OFF

- a. The mineral wool combustion chamber panels contain a cornstarch based binder that must be burned out at installation to prevent odors during subsequent boiler operation.
- b. Ventilate the boiler room, set the high limit to its maximum setting, set the thermostat to call for heat. Allow the boiler to fire for at least an hour or until the odor from the cornstarch has dissipated.
- c. Return the high limit and thermostat to their desired settings.

⚠ CAUTION

Avoid operating this boiler in an environment where saw dust, loose insulation fibers, dry wall dust, etc. are present. If boiler is operated under these conditions, the burner interior and ports must be cleaned and inspected daily to insure proper operation.

SECTION V – SERVICE

⚠ DANGER

This boiler used flammable gas, high voltage electricity, moving parts, and very hot water under high pressure. Assure that all gas and electric power supplies are off and that the water temperature is cool before attempting any disassembly or service.

More than one gas shut-off valve and electrical disconnect switch are used on the boiler. Assure that all gas valves and electrical disconnect switches are off before attempting any disassembly or service.

Do not attempt any service work if gas is present in the air in the vicinity of the boiler.
Never modify, remove or tamper with any control device.

⚠ WARNING

This boiler must only be serviced and repaired by skilled and experienced service technicians.

If any controls are replaced, they must be replaced with identical models.

Read, understand and follow all the instructions and warnings contained in all the sections of this manual.

If any electrical wires are disconnected during service, clearly label the wires and assure that the wires are reconnected properly.

NEVER operate boiler without all sight glasses and brackets in place and securely fastened and sealed. Very HOT combustion gas may cause burn injury.

Read, understand and follow all the instructions and warnings contained in ALL of the component instruction manuals.

Assure that all safety and operating controls and components are operating properly before placing the boiler back in service.

1. GENERAL – “Inspection should be conducted annually. Service as frequently as specified in paragraphs below.” While service or maintenance is being done, Electrical Power and all Gas Supply to the Boiler must be “off”.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

2. VENT SYSTEM – Vent system should be checked annually for:
 - a. obstructions
 - b. accumulations of soot
 - c. deterioration of vent pipe or vent accessories due to condensation or other reasons
 - d. proper support – no sags, particularly in horizontal runs
 - e. tightness of jointsRemove all accumulations of soot with wire brush and vacuum. Remove all obstructions. Replace all deteriorated parts and support properly. Seal all joints. See Fig. 53.

3. CLEANING OF FLUES AND BURNERS – Flue passageways in the boiler sections should be checked annually for any blockage or accumulation of soot. To obtain access to the flue cleanout panels, which are installed on both the front and rear of the boiler, the upper front and upper rear jacket panels must be removed, see Fig. 51. Also remove front vestibule panel. See Fig. 20.

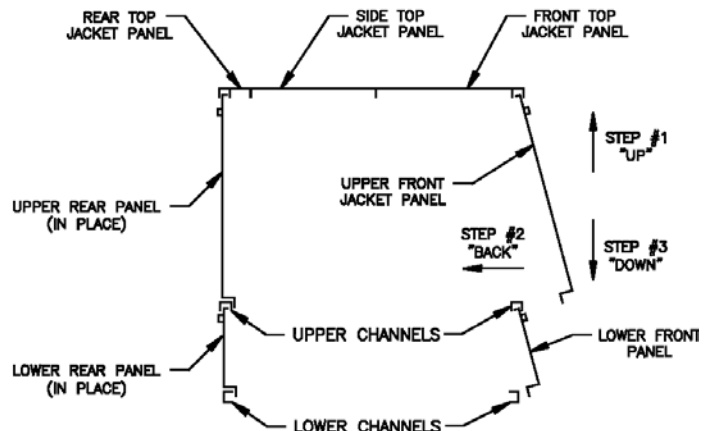


FIG. 51
REMOVAL OF JACKET FRONT PANEL

Important Product Safety Information

Refractory Ceramic Fiber Product

WARNING

The Repair Parts list designates parts that contain refractory ceramic fibers (RCF). RCF has been classified as a possible human carcinogen. When exposed to temperatures above 1805°F, such as during direct flame contact, RCF changes into crystalline silica, a known carcinogen. When disturbed as a result of servicing or repair, these substances become airborne and, if inhaled, may be hazardous to your health.

AVOID Breathing Fiber Particulates and Dust

Precautionary Measures:

Do not remove or replace RCF parts or attempt any service or repair work involving RCF without wearing the following protective gear:

1. A National Institute for Occupational Safety and Health (NIOSH) approved respirator
 2. Long sleeved, loose fitting clothing
 3. Gloves
 4. Eye Protection
- Take steps to assure adequate ventilation.
 - Wash all exposed body areas gently with soap and water after contact.
 - Wash work clothes separately from other laundry and rinse washing machine after use to avoid contaminating other clothes.
 - Discard used RCF components by sealing in an airtight plastic bag. RCF and crystalline silica are not classified as hazardous wastes in the United States and Canada.

First Aid Procedures:

- If contact with eyes: Flush with water for at least 15 minutes. Seek immediate medical attention if irritation persists.
- If contact with skin: Wash affected area gently with soap and water. Seek immediate medical attention if irritation persists.
- If breathing difficulty develops: Leave the area and move to a location with clean fresh air. Seek immediate medical attention if breathing difficulties persist.
- Ingestion: Do not induce vomiting. Drink plenty of water. Seek immediate medical attention.

SECTION V – SERVICE (continued)

Remove the Front Cleanout Panels first by removing the upper and lower nuts and washers securing these panels to the boiler sections, see Fig. 52.

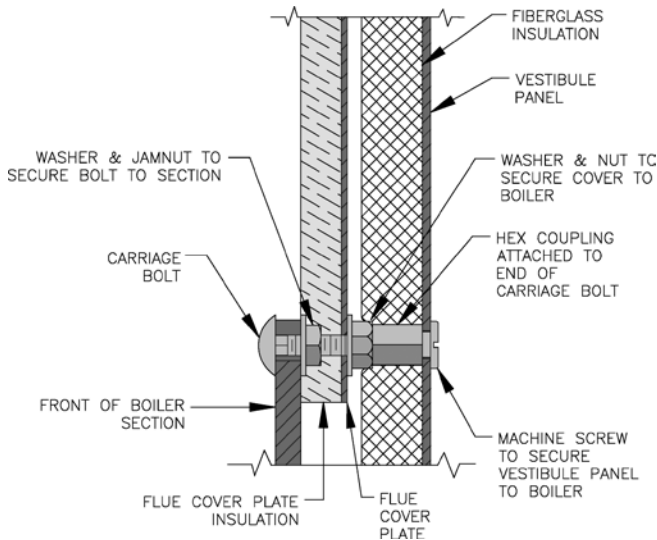


FIG. 52
ATTACHMENT OF FLUE COVERS

CARE SHOULD BE EXERCISED IN REMOVING THE CLEANOUT PLATES FROM THE BOLTS SO THAT THE INSULATION IS NOT DAMAGED. IF DAMAGED, ALL EDGES OF THE CLEANOUT PLATES SHOULD BE SEALED WITH BOILER PUTTY WHEN REINSTALLED UNTIL INSULATION CAN BE REPLACED.

Using a flashlight, examine all flue passageways. If passageways are free of soot and obstructions, it is not necessary to remove the rear cleanout panels. Remove the Burner Access Panels at front of base and place paper or cardboard over burners. With long handle wire flue brush and vacuum, brush flueways thoroughly through front and rear cleanout openings – see Fig. 53.

Remove material placed over burners and vacuum the following with care so as not to disturb base insulation: floor, top of burners, primary air opening in burners, and primary air openings in pilot. This will remove any dust or lint that may have accumulated as well as any foreign matter that may have been dislodged during the cleaning of the flues.

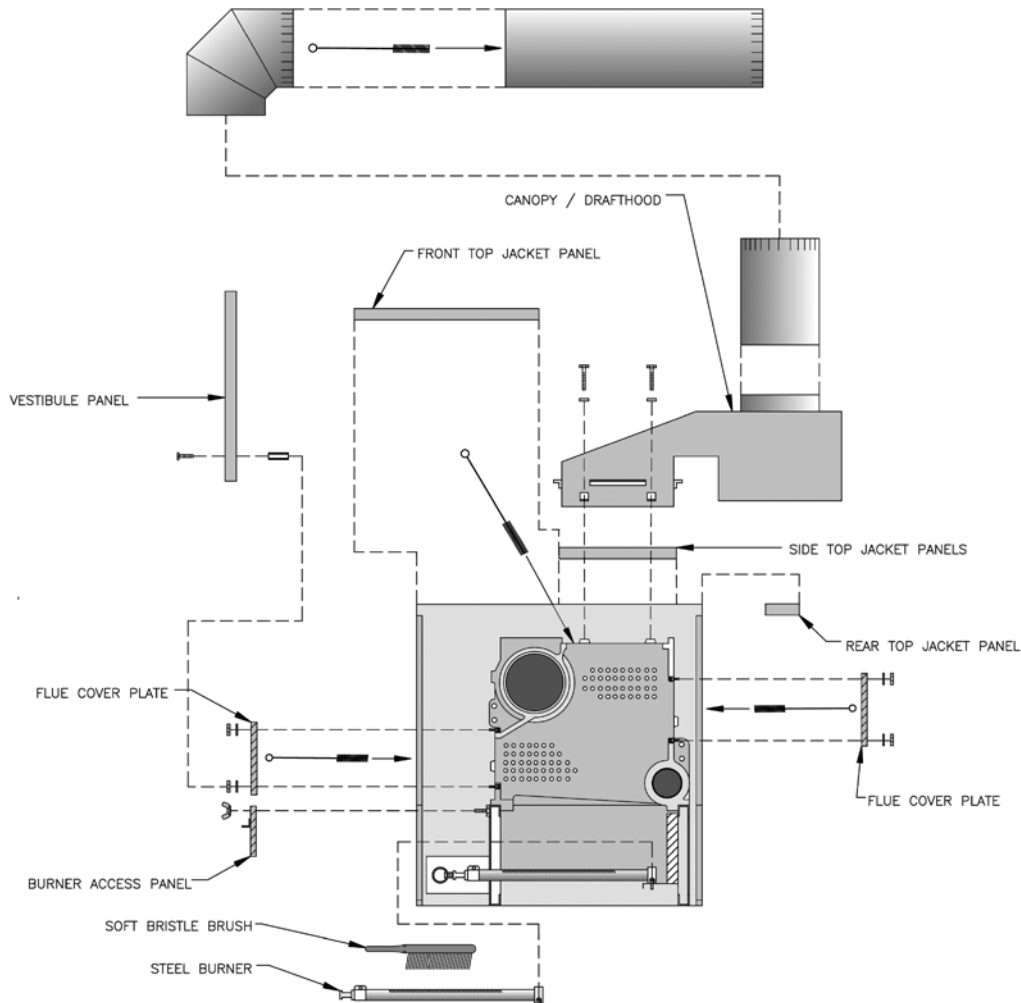
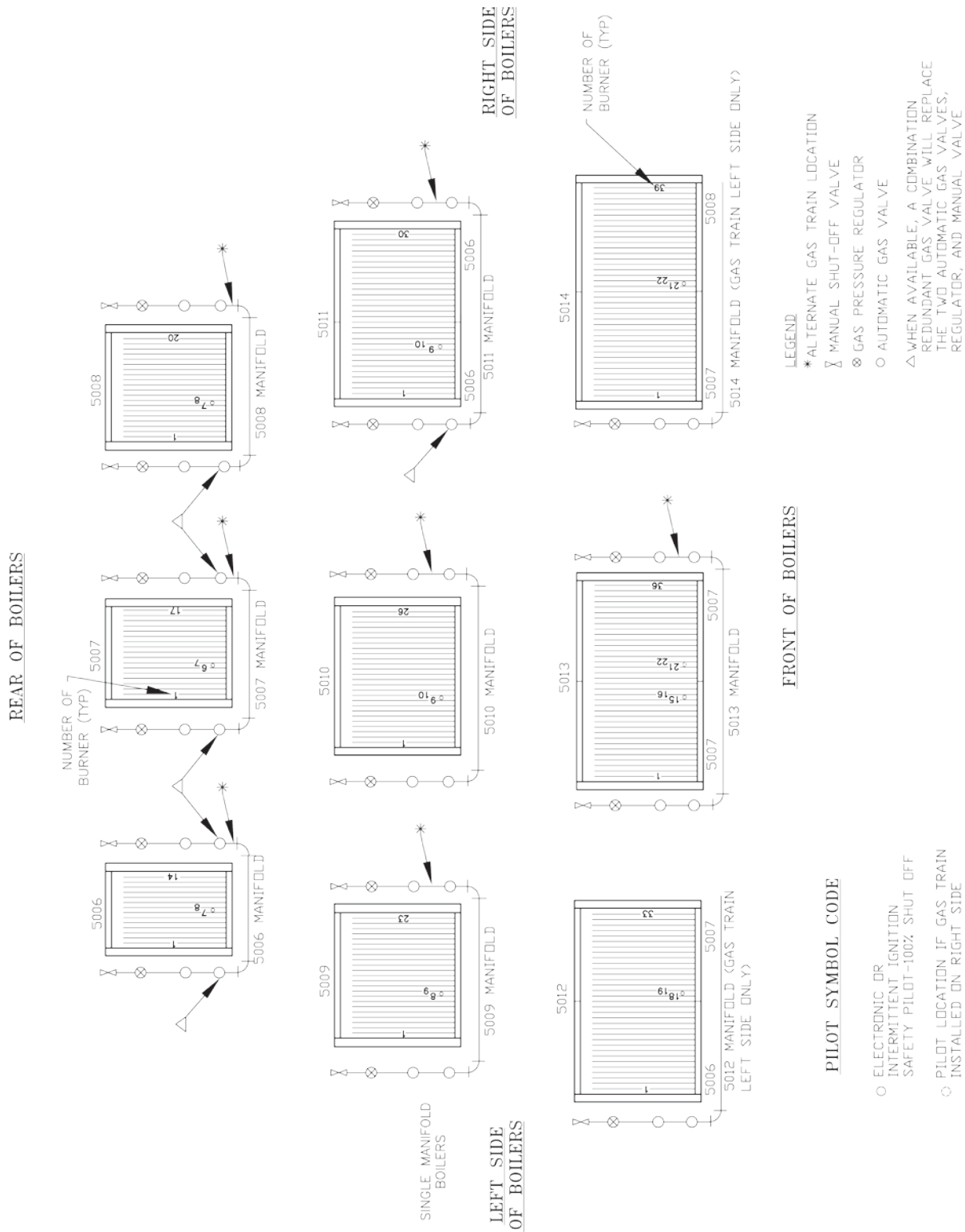


FIG. 53
CLEANING OF FLUEWAYS

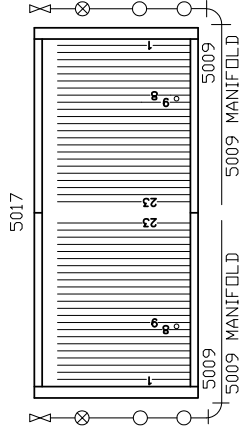
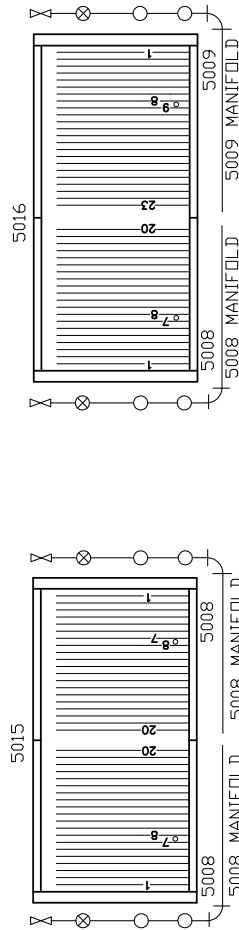
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SECTION V – SERVICE (continued)



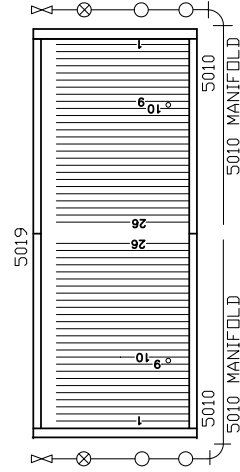
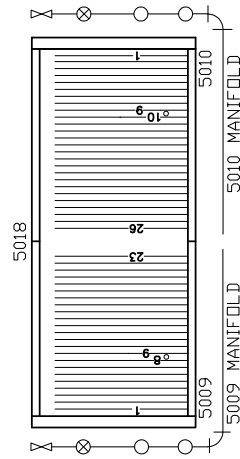
SECTION V – SERVICE (continued)

REAR OF BOILERS



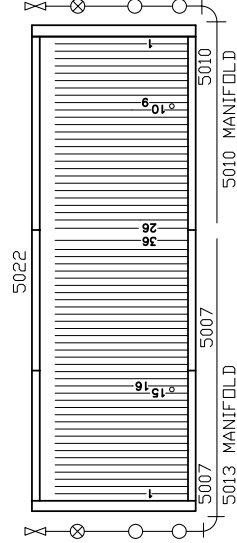
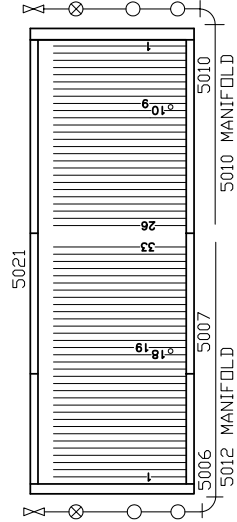
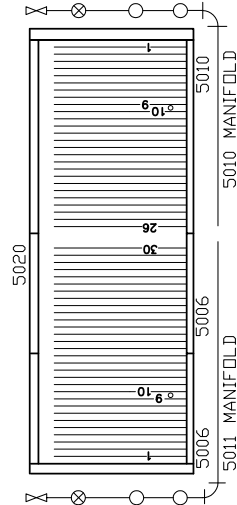
PILOT SYMBOL CODE

- THERMOCOUPLE, ELECTRONIC OR INTERMITTENT IGNITION
- SAFETY PILOT-100% SHUT OFF
- PILOT LOCATION IF GAS TRAIN INSTALLED ON RIGHT SIDE



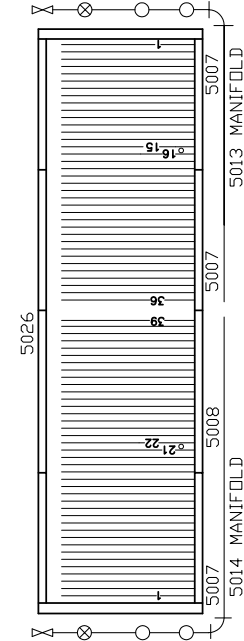
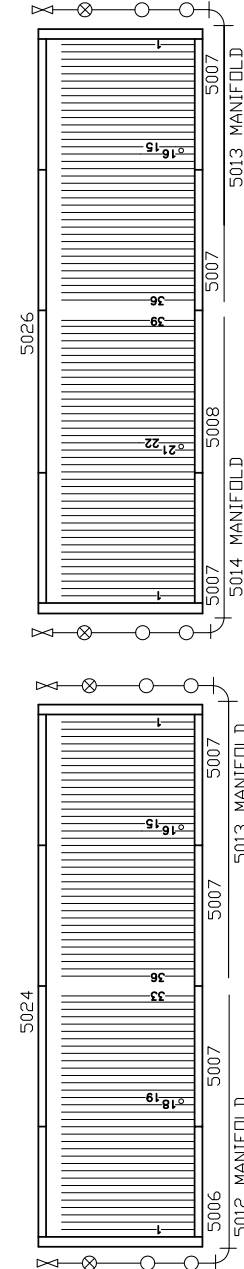
LEFT SIDE OF BOILERS

DUAL MANIFOLD BOILERS



LEGEND

- * ALTERNATE GAS TRAIN LOCATION
- ⌵ MANUAL SHUT-OFF VALVE
- ⊗ GAS PRESSURE REGULATOR
- AUTOMATIC GAS VALVE
- △ WHEN AVAILABLE, A COMBINATION REDUNDANT GAS VALVE WILL REPLACE THE TWO AUTOMATIC GAS VALVES, REGULATOR, AND MANUAL VALVE



FRONT OF BOILERS

FIG. 54-2
PILOT LOCATIONS

SECTION V – SERVICE (continued)

If Burners must be removed, use the following procedure:

- a. Mark location on manifold of all burners with pilots.
- b. Using a pair of pliers, remove hitch pin clips (shaped like a hairpin) from groove in main burner orifices. **SAVE ALL CLIPS.**
- c. Remove all burners without pilots by lifting front of burner slightly, then pushing burner toward rear of boiler until front of burner clears orifice, then lift rear of burner until head of weld pin on bottom rear of burner clears keyhole slot in base rear panel. Burner is now free and can be lifted out thru opening in base front frame.
- d. Remove all burners with pilots by first tracing all electrical leads coming from pilot to their points of connection, remove leads from terminals to which they are connected, and then tag each lead with respective terminal designation. Disconnect Pilot Tubing at nearest connection to pilot and remove burner as outlined in paragraph c. above.
- e. When replacing burners, reverse procedure used in removal of burners. Make sure burners are secure in keyhole slots in base rear panel and hitch pin clips are installed in grooves in all main burner orifices. Burners with pilots must be in same locations as original installation. If markings placed on manifold (when burners were removed) are obliterated, see Fig. 54. Reconnect electrical leads and reconnect pilot tubing.

Reinstall Flue Cleanout Plates so that they are gas tight. Reinstall Burner Access Panels and Jacket Panels.

4. LUBRICATION

Manufacturers Instruction should be followed on all parts installed on the boiler that require lubrication. Generally this involves only the circulator in a hot water system. This includes:

- (a) Type of lubricant to be used
- (b) Frequency of lubrication
- (c) Points to lubricate

5. MAIN BURNER FLAMES –

Main Burner Flames should be checked at initial start-up, annually thereafter, or after flueway cleaning, or after an extended shutdown period. Main Burner Flame should have a clearly defined inner cone, see Fig. 55, with no yellow tipping. Orange-yellow streaks caused by dust should not be confused with true yellow tipping.

Yellow-tipping indicates a lack of primary air and normally can be corrected by opening the air shutter. Improper alignment of burner on orifice will also affect primary air injection.

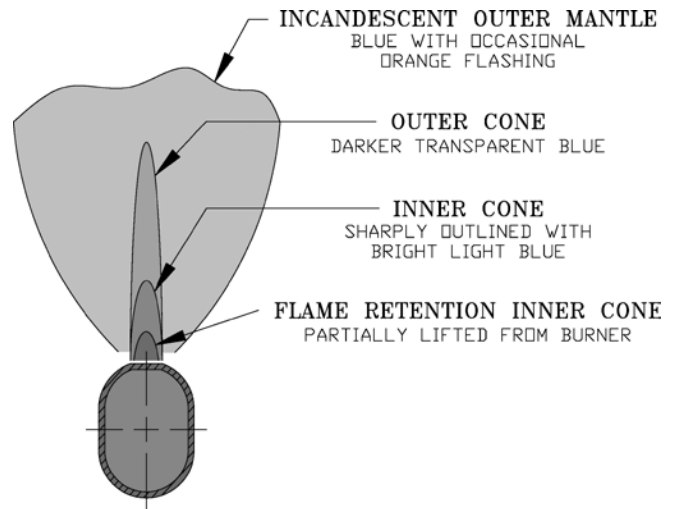


FIG. 55
MAIN BURNER FLAME ADJUSTMENT

6. PILOT FLAME –

Pilot Flame should be checked at initial start-up, annually thereafter, or after flueway cleaning, or after an extended shutdown period.

The EI Control System utilizes a Honeywell Q3481B pilot. Flame should be adjusted by means of the pilot line regulator 5.5" WC pilot line press so that a medium hard center flame envelopes approximately 3/8" of the end of the sensing probe, see Fig. 56. If flame is yellow, primary air slot may be covered with dirt or lint. This can be removed with a soft brush or by vacuuming.

- a. To adjust or check spark gap between electrode and hood on Honeywell Q3481B intermittent pilot. (See Fig. 56)
 1. Use a round wire gauge to check spark gap.
 2. Spark gap should be 0.1" for optimum performance.

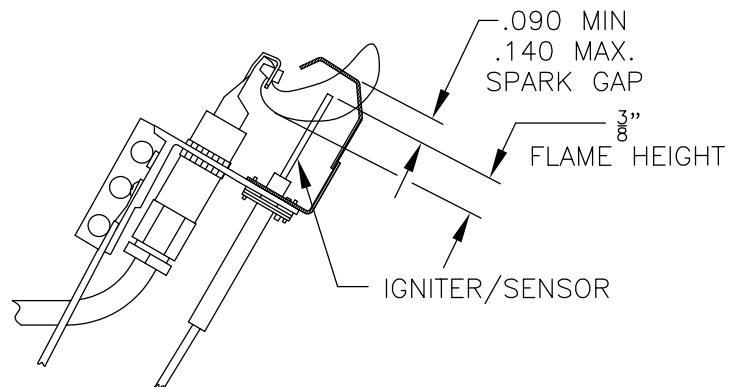


FIG. 56
PILOT FLAME - HONEYWELL Q3481B

SECTION V – SERVICE (continued)

The EP Control Systems utilize a Honeywell Q179C Flame Rectification Pilot. Adjust pilot line regulator (5.5" WC in pilot line) so that a medium hard center flame envelops flame rod, see Fig. 57. If flame is yellow, primary air opening may be covered with dirt or lint. This can be removed with a soft brush or by vacuuming.

The Thermocouple Control System utilizes a Honeywell Q327A non-primary aerated pilot with a Q309A thermocouple. Adjust pilot line regulator to give a steady flame enveloping 3/8" to 1/2" of the tip of the thermocouple, see Fig. 58.

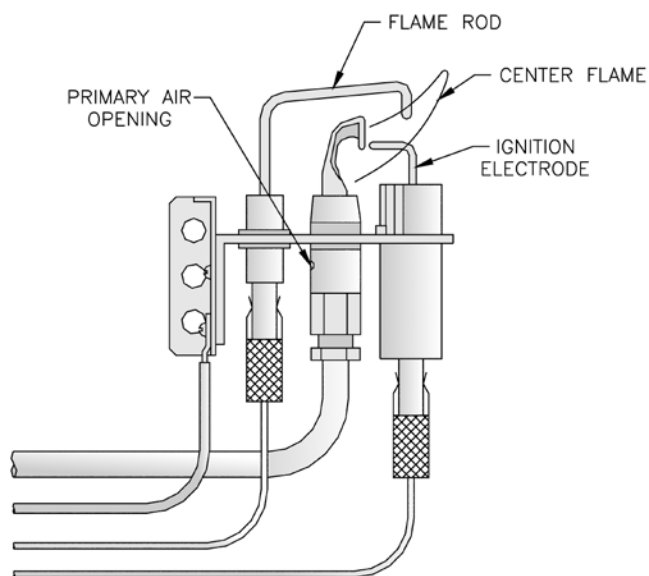


FIG. 57
PILOT FLAME
HONEYWELL Q179C PILOT

7. LOW WATER CUT-OFF –

a. Float Type Low Water Cut-off

During the heating season, if an external low water cut-off is on the boiler, the blow off valve should be opened once a month (use greater frequency where conditions warrant), to flush out the sediment chamber so the device will be free to function properly.

Low-water fuel cut-offs and water feeders should be dismantled annually by qualified personnel, to the extent necessary to insure freedom from obstructions and proper functioning of the working parts. Inspect connecting lines to boiler for accumulation of mud, scale, etc. and clean as required. Examine all visible wiring for brittle or worn insulation and make sure electrical contacts are clean and that they function properly. Give special attention to solder joints on bellows and float when this type of control is used. Check float for evidence of collapse and check mercury bulb (where applicable) for mercury separation or discoloration. *Do not attempt to repair mechanisms in the field.* Complete replacement mechanisms, including necessary gaskets and installation instructions, are available from the manufacturer.

⚠ WARNING

Before returning boiler to service:

Follow this low water cut-off check out procedure:

- Set thermostat to the highest setting.
- While boiler is operating, open drain valve and *slowly* drain down boiler water.

SECTION V – SERVICE (continued)

⚠ CAUTION

Do not drain water below gauge glass.

- Main burners should turn off when water level drops below low water cut-off. At this point the water level in gauge glass will just be visible.
- Be sure that it is the low water cut-off control and not the room thermostat, pressure cut-out or other control that has shut off the burners.
- Refill the boiler to the normal water level.
- Main burners should reignite.
- Clean out the boiler according to the instructions for steam boilers on page 43.
- Reset controls for normal operation.

8. FREQUENT WATER ADDITION

A leaky system will increase the volume of make-up water supplied to the boiler which can significantly shorten the life of the boiler. Entrained in make-up water are dissolved minerals and oxygen. When the fresh, cool make-up water is heated in the boiler the minerals fall out as sediment and the oxygen escapes as a gas. Both can result in reduced boiler life. The accumulation of sediment can eventually isolate the water from contacting the cast iron. When this happens the cast iron in that area gets extremely hot and eventually cracks. The presence of free oxygen in the boiler creates a corrosive atmosphere which, if the concentration becomes high enough, can corrode the cast iron through from the inside. Since neither of these failure types are the result of a casting defect the warranty does not apply. Clearly it is in everyone's best

interest to prevent this type of failure. The maintenance of system integrity is the best method to achieve this. Refer to Recommended Water Quality Requirements chart on Page 44.

9. OXYGEN CORROSION:

⚠ WARNING

Oxygen contamination of the boiler water will cause corrosion of iron and steel boiler components, and can lead to boiler failure. Burnham Commercial's standard warranty does not cover problems caused by oxygen contamination of boiler water or scale (lime) build-up caused by frequent addition of water.

There are many possible causes of oxygen contamination such as:

- a. Addition of excessive make-up water as a result of system leaks.
- b. Absorption through open tanks and fittings.
- c. Oxygen permeable materials in the distribution system.

In order to ensure long product life, oxygen sources should be eliminated. This can be accomplished by taking the following measures:

- a. Repairing system leaks to eliminate the need for addition of make-up water.
- b. Eliminating open tanks from the system.
- c. Eliminating and/or repairing fittings which allow oxygen absorption.
- d. Use of non-permeable materials in the distribution system.
- e. Isolating the boiler from the system water by installing a heat exchanger.

NOTICE

If, during normal operation, it is necessary to add water to this boiler more frequently than once a month, consult a qualified service technician to check your system for leaks. A leaky system will increase the volume of make-up water supplied to the boiler which can significantly shorten a life of the boiler. Entrained in make-up water are dissolved minerals and oxygen. When the fresh, cool make-up water is heated in the boiler the minerals fall out as sediment and the oxygen escapes as a gas. Both can result in reduced boiler life. The accumulation of sediment can eventually isolate the water from contacting the cast iron. When this happens the cast iron in that area gets extremely hot and eventually cracks. The presence of free oxygen in the boiler creates a corrosive atmosphere which, if the concentration becomes high enough, can corrode the cast iron through from the inside. Since neither of these failure types are the result of a casting defect the warranty does not apply. Clearly it is in everyone's best interest to prevent this type of failure. The maintenance of system integrity is the best method to achieve this.

For service or repairs to boiler, call your heating contractor. When seeking information on boiler, provide Boiler Model Number and Serial Number as shown on Rating Label.

Boiler Model Number K50 _ _ _ _ _	Boiler Serial Number 6 _ _ _ _ _	Installation Date
Heating Contractor		Phone Number
Address		

SERVICE RECORD

DATE _____

SERVICE PERFORMED

SECTION VI - REPAIR PARTS

REPAIR PARTS INDEX

ITEM	PAGE NOS.
Base Parts	71 thru 74
Integral Draft Hoods & Sections	75 thru 76
Sections	77
Base/Pilot Assemblies	78
Jackets	79 thru 83
Water / Steam Trim.....	84 and 85
Gas Trains	86 thru 92
Support Brackets, Ignition Modules.....	93 thru 96
Transformers, Pilot	
Solenoid Valves & Pilot Line	
Regulators	
EP Control Panel	97
Pilot Assemblies	98 and 99

All Series 5B Repair Parts may be obtained through your local Burnham Wholesale distributor. Should you require assistance in locating a Burnham Distributor in your area, or have questions regarding the availability of Burnham products or repair parts, please contact Burnham Customer Service at: 888-791-3790 or Fax (717) 293-5803.

SECTION VI - REPAIR PARTS (continued)

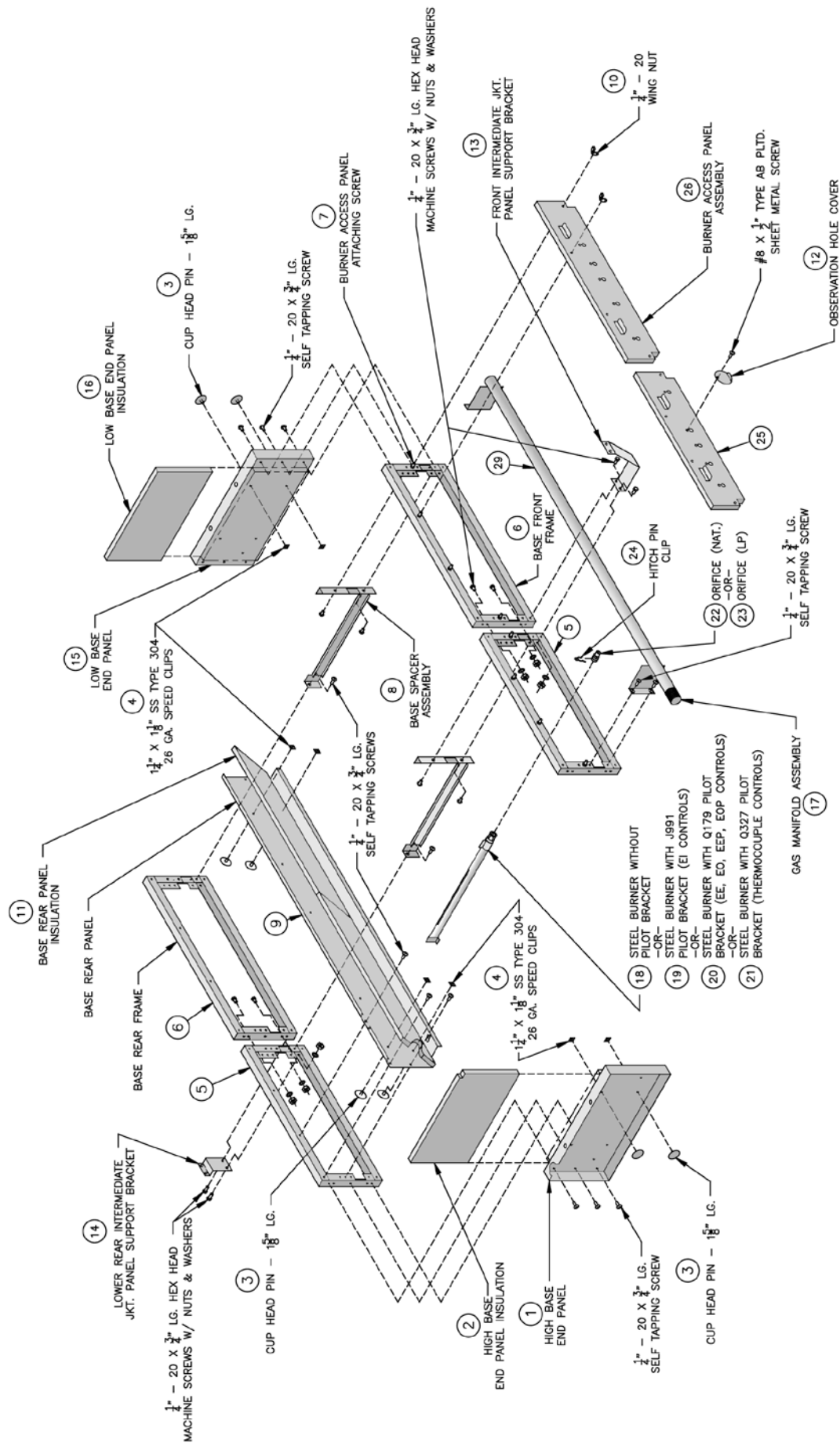


FIG. 59
BASE PARTS (5006B THRU 5014B)

SECTION VI - REPAIR PARTS (continued)

TABLE 2A
SERIES 5B BASE PARTS - 5006B thru 5014B

Number in () in Table Relates to Corresponding Number in  in Figure 60

PART NUMBER	ITEM	PART SIZE	BOILER SIZE								
			5006B	5007B	5008B	5009B	5010B	5011B	5012B	5013B	5014B
7181301	High Base End Panel	12-1/2 x 25-3/4	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
7201319	High Base End Panel Insul. - 1" Supertemp	12 x 21-1/2	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
80861551	Cup Head Pin CL #10 x 1-5/8"		(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
80861503	Speed Clip 1-1/4" x 1-1/8" SS Type 304		(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
61813061	5006B Base Front and Rear Frame Assembly	12-1/2 x 27-3/16	(5)					(5) & (6)	(5)		
61813071	5007B Base Front and Rear Frame Assembly	12-1/2 x 32-5/8		(5)					(6)	(5) & (6)	(5)
61813081	5008B Base Front and Rear Frame Assembly	12-1/2 x 38-1/16			(5)						
61813091	5009B Base Front and Rear Frame Assembly	12-1/2 x 43-1/2				(5)					
61813101	5010B Base Front and Rear Frame Assembly	12-1/2 x 48-15/16					(5)				
80861601	Burner Access Panel Attaching Screw		(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)
6181301	Base Spacer Assembly	11 x 22-3/4						(8)	(8)	(8)	(8)
71813062	5006B Base Rear Panel	9-5/8 x 26-15/16	(9)								
71813072	5007B Base Rear Panel	9-5/8 x 32-3/8		(9)							
71813082	5008B Base Rear Panel	9-5/8 x 37-13/16			(9)						
71813092	5009B Base Rear Panel	9-5/8 x 43-1/4				(9)					
71813102	5010B Base Rear Panel	9-5/8 x 48-11/16					(9)				
71813112	5011B Base Rear Panel	9-5/8 x 54-1/8						(9)			
71813122	5012B Base Rear Panel	9-5/8 x 59-9/16							(9)		
71813132	5013B Base Rear Panel	9-5/8 x 65								(9)	
71813142	5014B Base Rear Panel	9-5/8 x 70-7/16									(9)
72013065	Base Rear Panel Insulation - 1" Supertemp	8-3/4 x 26-15/16	(11) 1 pc								
72013075	Base Rear Panel Insulation - 1" Supertemp	8-3/4 x 32-3/8		(11) 1 pc							
72013085	Base Rear Panel Insulation - 1" Supertemp	8-3/4 x 18-7/8			(11) 2 pcs						
72013095	Base Rear Panel Insulation - 1" Supertemp	8-3/4 x 21-5/8				(11) 2 pcs					
72013105	Base Rear Panel Insulation - 1" Supertemp	8-3/4 x 24-5/16					(11) 2 pcs				
72013115	Base Rear Panel Insulation - 1" Supertemp	8-3/4 x 29-3/4							(11) 2 pcs		
72013125	Base Rear Panel Insulation - 1" Supertemp	8-3/4 x 35-3/16									
7181312	Front Int. Panel Support Bracket							(13)	(13)	(13)	(13)
7181313	Lower Rear Int. Panel Support Bracket							(14)	(14)	(14)	(14)
7181302	Low Base End Panel	11-7/8 x 25-3/4	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	V
7201320	Low Base End Panel Insul. - 1" Supertemp	11-3/8 x 21-1/2	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)
8221306	5006B Manifold	1-1/2 Pipe x 34-5/16	(17)								
8221307	5007B Manifold			(17)							
8221308	5008B Manifold				(17)						
8221309	5009B Manifold					(17)					
8221310	5010B Manifold						(17)				
8221311	5011B Manifold							(17)			
8221312	5012B Manifold								(17)		
8821313	5013B Manifold									(17)	
8221314	5014B Manifold										(17)
8231301	Main Burners without Pilot Bracket		(18)	(18)	(18)	(18)	(18)	(18)	(18)	(18)	(18)
8231302	Or Main Burners w/J991 Pilot Bracket (EI Controls)		(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)
8231303	Or Main Burners w/Q179 Pilot Bkt (EP Controls)		(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)
822628	Main Gas Orifices (Nat. Gas) - #40 Drill		(22)	(22)	(22)	(22)	(22)	(22)	(22)	(22)	(22)
822629	Or Main Gas Orifices (LP) - #55 Drill		(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
822604	Hitch Pin Clip		(24)	(24)	(24)	(24)	(24)	(24)	(24)	(24)	(24)
61813062	5006B Burner Access Panel Assembly	7-1/4 x 26-15/16	(25)					(25) & (26)	(25)		
61813072	5007B Burner Access Panel Assembly	7-1/4 x 32-3/8		(25)					(26)	(25) & (26)	(25)
61813082	5008B Burner Access Panel Assembly	7-1/4 x 37-13/16			(25)						(26)
61813092	5009B Burner Access Panel Assembly	7-1/4 x 43-1/4				(25)					
61813102	5010B Burner Access Panel Assembly	7-1/4 x 48-11/16					(25)				
7186001	Observation Hole Cover		(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)
80860900	1/4 - 20 Wing Nut		(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
8201303	Low Base End to Right Section Fiberglass Rope	3/4 X 25-3/4									

SECTION VI - REPAIR PARTS (continued)

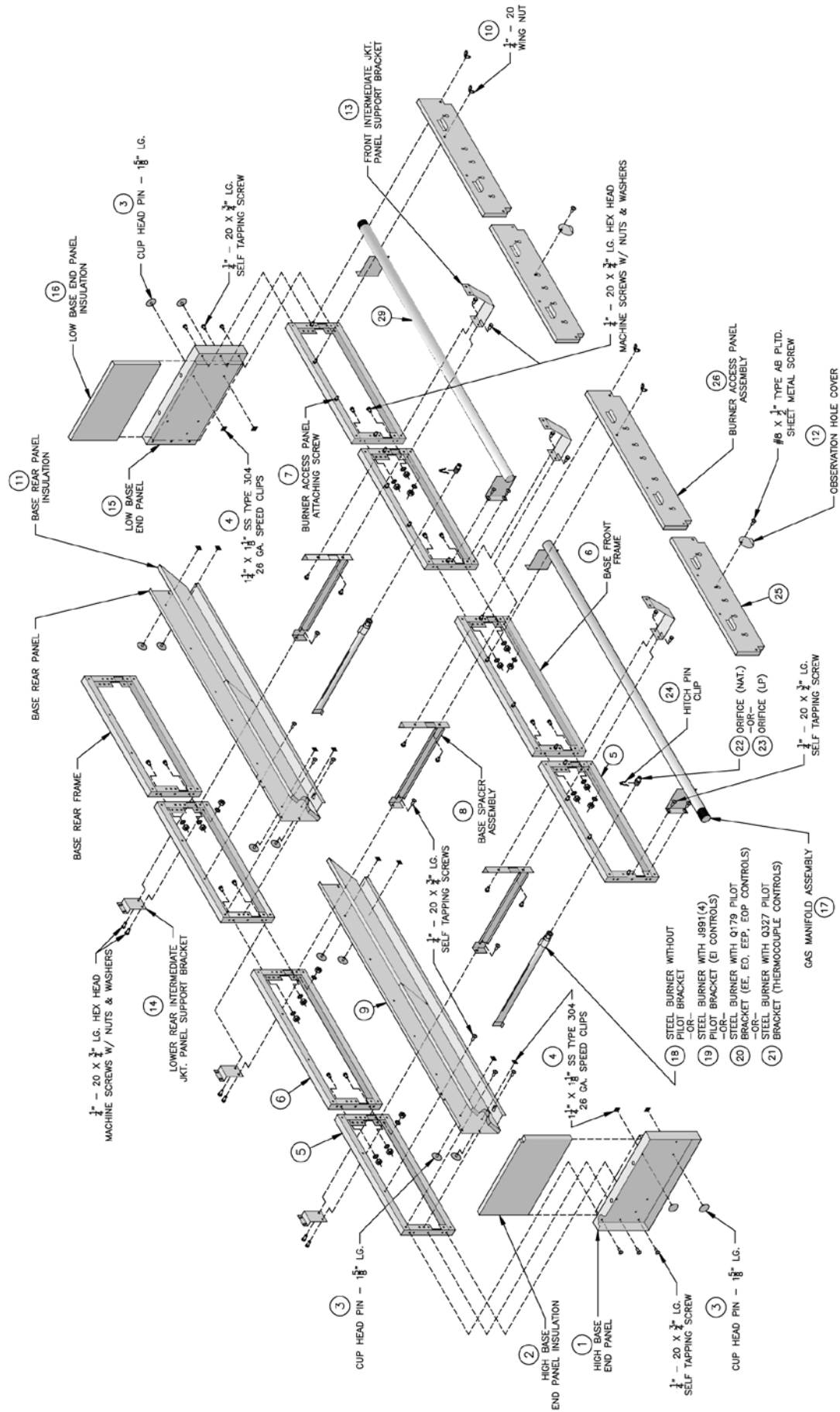


FIG. 60
BASE PARTS (5015B THRU 5026B)

SECTION VI - REPAIR PARTS (continued)

TABLE 2B

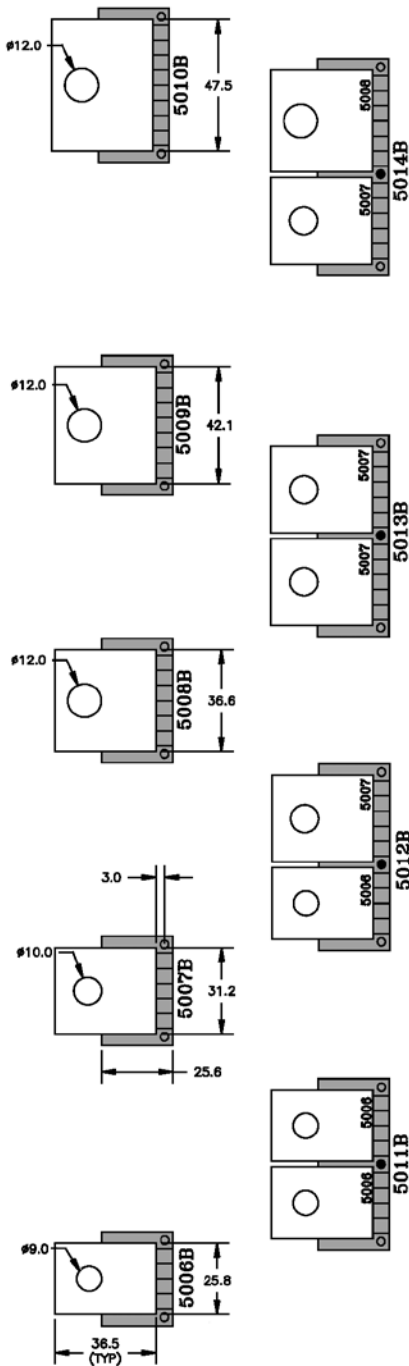
SERIES 5B BASE PARTS - 5015B Thru 5026B

Number in () in Table Relates to Corresponding Number in  in Figure 61

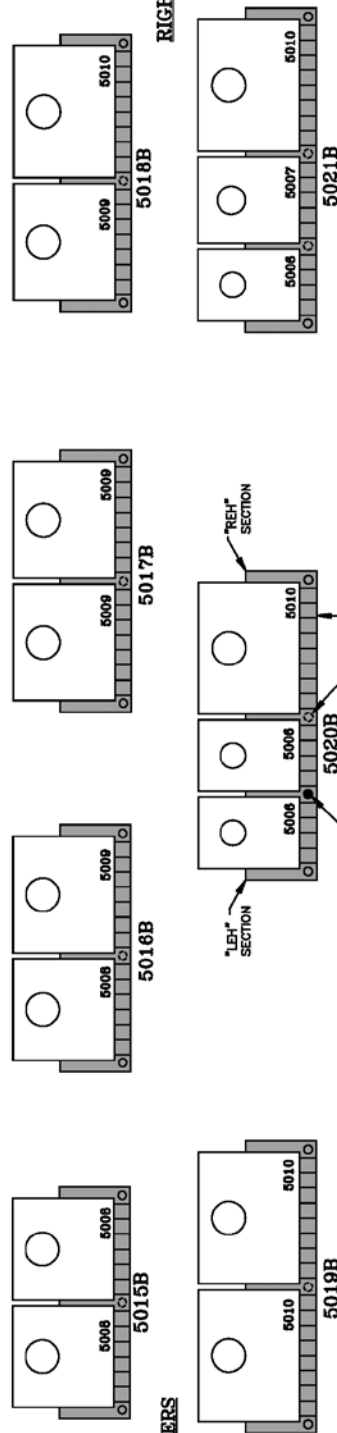
PART NUMBER	ITEM	PART SIZE	BOILER SIZE									
			5015B	5016B	5017B	5018B	5019B	5020B	5021B	5022B	5024B	5026B
7181301	High Base End Panel	12-1/2 x 25-3/4	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
7201319	High Base End Panel Insul. - 1" Thick	12 x 21-1/2	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
80861551	Cup Head Pin Cl. #10 x 1-5/8"		(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
80861503	Speed Clip 1-1/4" x 1-1/8" SS Type 304		(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)
61813061	5006B Base Front and Rear Frame Assembly	12-1/2 x 27-3/16						(5) & (6)	(5)	(5)	(5)	(5)
61813071	5007B Base Front and Rear Frame Assembly	12-1/2 x 32-5/8							(6)	(5) & (6)	(6), (30) & (31)	(5), (30) & (31)
61813081	5008B Base Front and Rear Frame Assembly	12-1/2 x 38-1/16	(5) & (6)	(5)								(6)
61813091	5009B Base Front and Rear Frame Assembly	12-1/2 x 43-1/2	(6)	(6)	(5) & (6)	(5)						
61813101	5010B Base Front and Rear Frame Assembly	12-1/2 x 48-15/16										
80861601	Burner Access Panel Attaching Screw		(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)
6181301	Base Spacer Assembly	11 x 22-3/4	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)
71813082	5008B Base Rear Panel	9-5/8 x 37-13/16	(9) & (32)	(9)	(32)	(9)						
71813092	5009B Base Rear Panel	9-5/8 x 43-1/4										
71813102	5010B Base Rear Panel	9-5/8 x 48-11/16				(32)	(9) & (32)	(32)	(32)	(32)		
71813112	5011B Base Rear Panel	9-5/8 x 54-1/8						(9)				
71813122	5012B Base Rear Panel	9-5/8 x 59-9/16										
71813132	5013B Base Rear Panel	9-5/8 x 65								(9)	(32)	(32)
71813142	5014B Base Rear Panel	9-5/8 x 70-7/16									(32)	(9)
72013065	Base Rear Panel Insulation - 1" Thick	8-3/4 x 26-15/16						(11) 2 pcs		(11) 2 pcs	(11) 2 pcs	(11) 2 pcs
72013075	Base Rear Panel Insulation - 1" Thick	8-3/4 x 32-3/8										
72013085	Base Rear Panel Insulation - 1" Thick	8-3/4 x 38-7/8	(11) 4 pcs	(11) 2 pcs								
72013095	Base Rear Panel Insulation - 1" Thick	8-3/4 x 43-1/2			(11) 4 pcs	(11) 2 pcs						
72013105	Base Rear Panel Insulation - 1" Thick	8-3/4 x 48-1/2										
72013115	Base Rear Panel Insulation - 1" Thick	8-3/4 x 53-1/2										
72013125	Base Rear Panel Insulation - 1" Thick	8-3/4 x 58-1/2										
7181312	Front Int. Panel Support Bracket	8-3/4 x 35-3/16	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(11) 2 pcs
7181313	Lower Rear Int. Panel Support Bracket		(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)
7181302	Low Base End Panel	11-7/8 x 25-3/4	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
7201320	Low Base End Panel Insul. - 1" Thick	11-3/8 x 21-1/2	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)
8221308	5008B Manifold	1-1/2 Pipe x 45-3/16	(17) & (29)	(17)								
8221309	5009B Manifold	1-1/2 Pipe x 50-5/8		(29)	(17 & 29)	(17)						
8221310	5010B Manifold	1-1/2 Pipe x 56-1/6			(29)	(29)	(17) & (29)	(29)	(29)	(29)		
8221311	5011B Manifold	1-1/2 Pipe x 61-1/2						(17)				
8221312	5012B Manifold	1-1/2 Pipe x 66-15/16										
8221313	5013B Manifold	1-1/2 Pipe x 72-3/8								(17)		
8221314	5014B Manifold	1-1/2 Pipe x 77-13/16								(17)	(29)	(29)
8231301	Main Burners without Pilot Bracket		(18)	(18)	(18)	(18)	(18)	(18)	(18)	(18)	(18)	(18)
8231302	Or Main Burners w/Q3481B Pilot Bracket (EI Controls)		(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)	(19)
8231303	Or Main Burners w/Q179 Pilot Bkt (EP Controls)		(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)	(20)
822628	Main Gas Orifices (Nat. Gas) - #40 Drill		(22)	(22)	(22)	(22)	(22)	(22)	(22)	(22)	(22)	(22)
822629	Or Main Gas Orifices (LP) - #55 Drill		(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)	(23)
822604	Hitch Pin Clip		(24)	(24)	(24)	(24)	(24)	(24)	(24)	(24)	(24)	(24)
61813062	5006B Burner Access Panel Assembly	7-1/4 x 26-15/16	(25)					(25) & (26)	(25)	(25) & (26)	(26), (27) & (28)	(25), (27) & (28)
61813072	5007B Burner Access Panel Assembly	7-1/4 x 32-3/8		(25)					(26)			
61813082	5008B Burner Access Panel Assembly	7-1/4 x 37-13/16	(25) & (26)	(25)	(25)							(26)
61813092	5009B Burner Access Panel Assembly	7-1/4 x 43-1/4		(26)	(25) & (26)	(25)						
61813102	5010B Burner Access Panel Assembly	7-1/4 x 48-11/16				(26)	(25) & (26)	(27)	(27)	(27)	(12)	(12)
7186001	Observation Hole Cover		(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)
80860900	1/4 - 20 Wing Nut		(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)

SECTION VI - REPAIR PARTS (continued)

REAR OF BOILERS

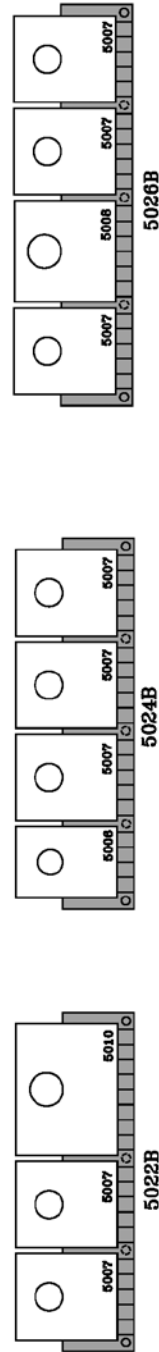


LEFT SIDE OF BOILERS



RIGHT SIDE OF BOILERS

"LH" SECTION
"RH" SECTION
"CX" CENTER SECTION (TAPPED & PLUGGED)
"CP" CENTER SECTION (TAPPED & PLUGGED)
"C" CENTER SECTION - PLAIN (NOT TAPPED)



FRONT OF BOILERS

- SUPPLY & RETURN ON RIGHT & LEFT END SECTIONS NOT PLUGGED.
- SUPPLY & RETURN ON CENTER SECTION NOT PLUGGED.
- SUPPLY & RETURN ON CENTER SECTION PLUGGED.

1. THE NUMBERS ON THE CANOPIES INDICATE CANOPY SIZE.

FIG. 61
INTEGRAL CANOPY DRAFT HOODS & SECTIONS

SECTION VI - REPAIR PARTS (continued)

TABLE 3A

SERIES 5B INTEGRAL CANOPY DRAFT HOODS - BOILER SIZES

PART SIZE	PART NO.	Canopy - Draft Hood No.	BOILER SIZE (QUANTITY)				
			5006B	5007B	5008B	5009B	5010B
36-1/2 X 25-3/4	61113063	5006B (1)	1				
36-1/2 X 31-3/16	61113073	5007B (2)		1			
36-1/2 X 36-5/8	61113083	5008B (3)			1		
36-1/2 X 41-1/16	61113093	5009B (4)				1	
36-1/2 X 47-1/2	61113103	5010B (5)					1
			5011B	5012B	5013B	5014B	5015B
36-1/2 X 25-3/4	61113063	5006B (1)	2	1			
36-1/2 X 31-3/16	61113073	5007B (2)		1	2	1	
36-1/2 X 36-5/8	61113083	5008B (3)				1	2
36-1/2 X 41-1/16	61113093	5009B (4)					
36-1/2 X 47-1/2	61113103	5010B (5)					
			5016B	5017B	5018B	5019B	5020B
36-1/2 X 25-3/4	61113063	5006B (1)					3
36-1/2 X 31-3/16	61113073	5007B (2)					
36-1/2 X 36-5/8	61113083	5008B (3)	1				
36-1/2 X 41-1/16	61113093	5009B (4)	1	2	1		
36-1/2 X 47-1/2	61113103	5010B (5)			1	2	1
			5021B	5022B	5024B	5026B	
36-1/2 X 25-3/4	61113063	5006B (1)	1		1		
36-1/2 X 31-3/16	61113073	5007B (2)	1	2	3	3	
36-1/2 X 36-5/8	61113083	5008B (3)				1	
36-1/2 X 41-1/16	61113093	5009B (4)					
36-1/2 X 47-1/2	61113103	5010B (5)	1	1			

SECTION VI - REPAIR PARTS (continued)

TABLE 3B
SERIES 5B SECTION REPLACEMENT CHART
Refer to Fig. 61

PART NO.	ITEM	BOILER SIZE (QUANTITY)																		
		5006B	5007B	5008B	5009B	5010B	5011B	5012B	5013B	5014B	5015B	5016B	5017B	5018B	5019B	5020B	5021B	5022B	5024B	5026B
7171301	LEH Section	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
7171303	C Center Section Plain	(4)	(5)	(6)	(7)	(8)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(16)	(17)	(18)	(19)	(21)
7171302	REH Section	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
7171304	CX Center Section Tapped - Not Plugged										(1)	(1)	(1)	(1)	(1)	(1)	(2)	(2)	(3)	(3)
6171301	CXP Center Section Tapped - Plugged					(1)	(1)	(1)	(1)	(1)						(1)				
806600023	Nipple Gauge, 3" & 7"	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
8056254	Nipple Lubricant, Loctite® #592, 50 ml	(3)	(3)					(1)	(1)	(2)	(2)	(3)	(3)				(1)	(2)	(3)	
8056255	Nipple Lubricant, Loctite® #592, 250 ml		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)	(2)

SECTION VI - REPAIR PARTS (continued)

TABLE 3C
SERIES 5B BASE / PILOT ASSEMBLIES
5006B THRU 5014B BOILERS - SINGLE BASE REQUIRED

(NATURAL GAS)												
Complete Base Ass'y w/EI Pilot Ass'y	5006B	5007B	5008B	5009B	5010B	5011B	5012B	5013B	5014B			
	618130642	618130742	618130842	618130942	618131042	618131142	618131242	618131342	618131442			
Complete Base Ass'y w/EP Pilot Ass'y	618130611	618130711	618130811	618130911	618131011	618131111	618131211	618131311	618131411			
(LP GAS)												
Complete Base Ass'y w/EI Pilot Ass'y	618130682	618130782	618130882	618130982								
(NATURAL GAS)												
Right Base Subass'y w/EI Pilot Ass'y	5015B	5016B	5017B	5109B	5020B	5021B	5022B	5024B	5026B			
	618130852	618130952	618131052	618130952	618131052	618131052	618131052	618131352	618131352			
Right Base Subass'y w/EP Pilot Ass'y	618130821	618130921	618130921	618131021	618131021	618131021	618131021	618131321	618131321			
Left Base Subass'y w/EI Pilot Ass'y	618131541	618131641	618131741	618131841	618131941	618132041	618132141	618131352	618131352			
Left Base Subass'y w/EP Pilot Ass'y	61813157	61813167	61813177	61813187	61813197	61813207	61813217	61813227	61813247	61813267		

SECTION VI - REPAIR PARTS (continued)

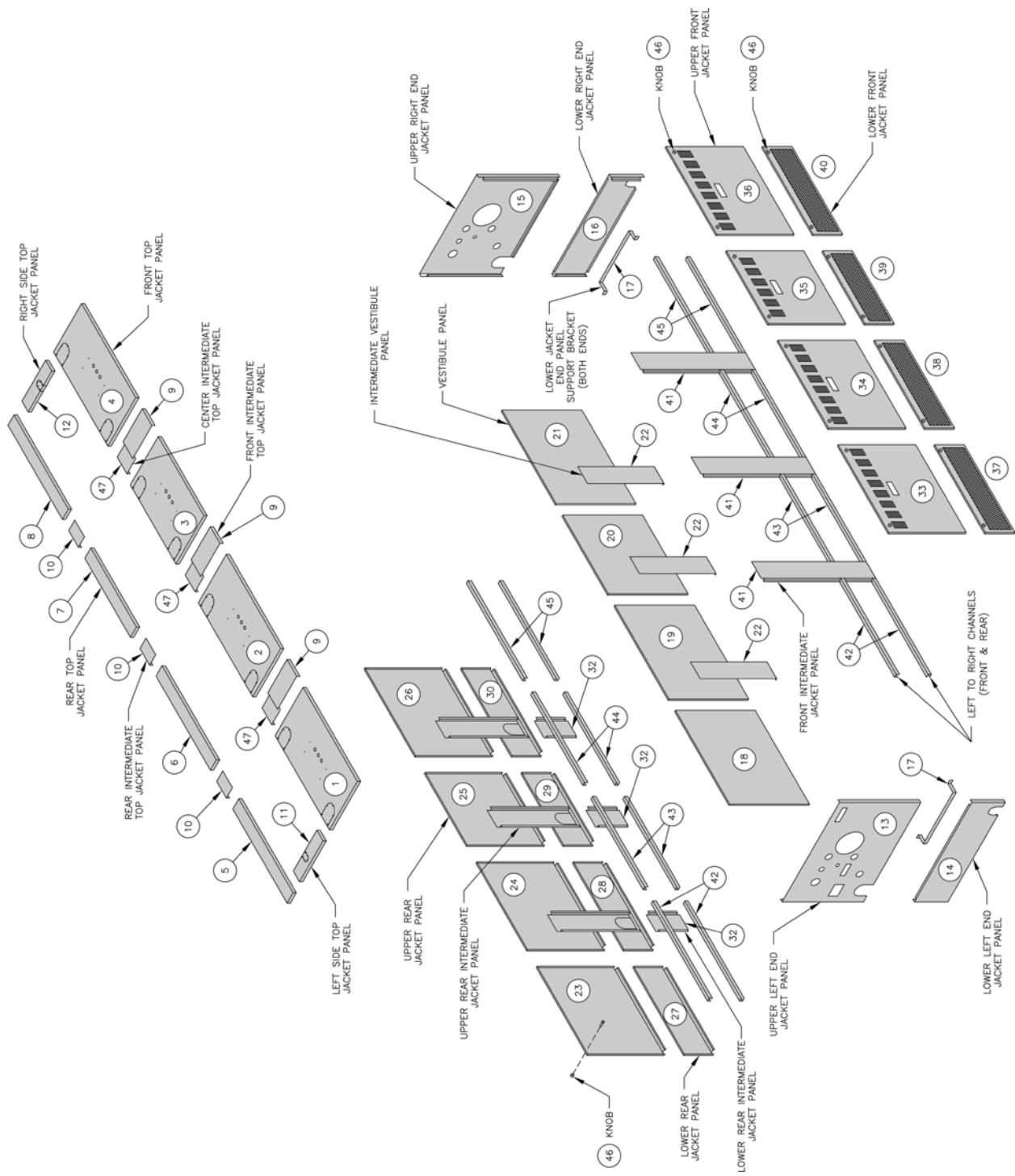


FIG. 62
JACKETS

SECTION VI - REPAIR PARTS (continued)

TABLE 4A
SERIES 5B JACKETS

Number in () in Table Relates to Corresponding Number in  in Figure 63

PART NUMBER	ITEM	PART SIZE	BOILER SIZE									
			5006B	5007B	5008B	5009B	5010B	5011B	5012B	5013B	5014B	5015B
60413059	*5005B Front Top Panel	17-1/2 x 28-5/8						(1) & (2)	(1)			
60413069	5006B Front Top Panel	17-1/2 x 34-1/16	(1)						(2)	(1) & (2)	(1)	
60413079	5007B Front Top Panel	17-1/2 x 39-1/2		(1)								
60413089	5008B Front Top Panel	17-1/2 x 44-15/16			(1)							
60413099	5009B Front Top Panel	17-1/2 x 50-3/8				(1)						
60413109	5010B Front Top Panel	17-1/2 x 55-13/16					(1)					
7041316	Front Top Int. Panel	6-1/16 x 12						(9)	(9)	(9)	(9)	(9)
6041327	Center Top Int. Panel	6-1/16 x 6-7/8						(47)	(47)	(47)	(27)	(47)
6041328	Rear Top Int. Panel	3-25/32 x 6-1/16						(10)	(10)	(10)	(10)	(10)
60413052	*5005B Upper Rear Panel	24-1/2 x 26-5/16						(23) & (24)	(24)			
60413062	5006B Upper Rear Panel	24-1/2 x 31-3/4	(23)						(23)	(23) & (24)	(23)	(23) & (24)
60413072	5007B Upper Rear Panel	24-1/2 x 37-3/16		(23)							(24)	
60413082	5008B Upper Rear Panel	24-1/2 x 42-5/8			(23)							
60413092	5009B Upper Rear Panel	24-1/2 x 48-1/16				(23)						
60413102	5010B Upper Rear Panel	24-1/2 x 53-1/2					(23)					
60413053	*5005B Lower Rear Panel	9-1/2 x 26-5/16						(27) & (28)	(27)			
60413063	5006B Lower Rear Panel	9-1/2 x 31-3/4	(27)						(28)	(27) & (28)	(27)	
60413073	5007B Lower Rear Panel	9-1/2 x 37-3/16		(27)								
60413083	5008B Lower Rear Panel	9-1/2 x 42-5/8			(27)							
60413093	5009B Lower Rear Panel	9-1/2 x 48-1/16				(27)						
60413103	5010B Lower Rear Panel	9-1/2 x 53-1/2					(27)					
60413021	Upper Rear Int. Panel	7-5/16 x 25-1/2						(31)	(31)	(31)	(31)	(31)
60413031	Lower Rear Int. Panel	7-5/16 x 10-1/2						(32)	(32)	(32)	(32)	(32)
6041329	Upper Left End Panel	36 x 26	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)
60413071	Lower Left End Panel	36 x 10-1/2	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)
70413054	*5005B Upper Front Panel	24-1/2 x 26-5/16						(33) & (34)	(33)			
70413064	5006B Upper Front Panel	24-1/2 x 31-3/4	(33)						(34)	(33) & (34)	(33)	(33) & (34)
70413074	5007B Upper Front Panel	24-1/2 x 37-6/16		(33)							(34)	
70413084	5008B Upper Front Panel	24-1/2 x 42-5/8			(33)							
70413094	5009B Upper Front Panel	24-1/2 x 48-1/16				(33)						
70413104	5010B Upper Front Panel	24-1/2 x 53-1/2					(33)					
For Multiple Usage Only												

* For Multiple Usage Only

SECTION VI - REPAIR PARTS (continued)

TABLE 4B

SERIES 5B JACKETS

Number in () in Table Relates to Corresponding Number in  in Figure 63

PART NUMBER	ITEM	PART SIZE	BOILER SIZE									
			5006B	5007B	5008B	5009B	5010B	5011B	5012B	5013B	5014B	5015B
60413055	*5005B Lower Top Panel	9-1/2 x 26-5/16						(37) & (37)	(37)			
60413065	5006B Lower Top Panel	9-1/2 x 31-3/4	(37)						(38)	(37) & (38)	(37)	
60413075	5007B Lower Top Panel	9-1/2 x 37-3/16		(37)							(38)	(37) & (38)
60413085	5008B Lower Top Panel	9-1/2 x 42-5/8			(37)							
60413095	5009B Lower Top Panel	9-1/2 x 48-1/16				(37)						
60413105	5010B Lower Top Panel	9-1/2 x 53-1/2					(37)					
6041330	Upper Right End Panel	36 x 26	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
60413051	Lower Right End Panel	36 x 10-1/2	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)
7041301	Lower End Panel Support Bkt.	1 x 21	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)
60413081	Front Int. Panel	36 x 7-5/16						(41)	(41)	(41)	(41)	(41)
604130510	*5005B Vestibule Panel	25 x 28-1/2						(18) & (19)	(18)			
604130610	5006B Vestibule Panel	25 x 33-15/16	(18)						(19)	(18) & (19)	(18)	
604130710	5007B Vestibule Panel	25 x 39-3/8		(18)								
604130810	5008B Vestibule Panel	25 x 44-13/16			(18)							
604130910	5009B Vestibule Panel	25 x 50-1/4				(18)						
604131010	5010B Vestibule Panel	25 x 55-11/16					(18)					
604130511	*5005B Rear Top Panel	3-3/4 x 28-5/8						(5) & (6)	(5)			
604130611	5006B Rear Top Panel	3-3/4 x 34-1/16	(5)						(6)	(5) & (6)	(5)	
604130711	5007B Rear Top Panel	3-3/4 x 39-1/2		(5)								
604130811	5008B Rear Top Panel	3-3/4 x 44-15/16			(5)							
604130911	5009B Rear Top Panel	3-3/4 x 50-3/8				(5)						
604131011	5010B Rear Top Panel	3-3/4 x 55-13/16					(5)					
6041331	Intermediate Vestibule Panel	24 x 6-1/8						(22)	(22)	(22)	(22)	(22)
6041332	Left Side Top Panel	3-7/8 x 14-13/16	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
6041333	Right Side Top Panel	3-7/8 x 14-13/16	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)
7041302	#6 Left to Right Channel	1 x 33-15/16	(42)									
7041303	#7 Left to Right Channel	1 x 39-3/8		(42)								
7041304	#8 Left to Right Channel	1 x 44-13/16			(42)							
7041305	#9 Left to Right Channel	1 x 50-1/4				(42)						
7041306	#10 Left to Right Channel	1 x 55-11/16					(42)					
7041307	#16 Left to Right Channel	1 x 30-9/16						(42) & (43)	(42)			
7041308	#17 Left to Right Channel	1 x 36							(43)	(42) & (43)	(42)	
7041309	#18 Left to Right Channel	1 x 41-7/16								(43)	(43)	(42) & (43)
80860926	Knobs Dimco - Black #516		(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)
80860800	Machine Screw #10-32 x 3/16" Lg. Slotted Rd. Head		(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)

SECTION VI - REPAIR PARTS (continued)

TABLE 4C
SERIES 5B JACKETS
 Number in () in Table Relates to Corresponding Number in  in Figure 63

PART NUMBER	ITEM	PART SIZE	BOILER SIZE								
			5016B	5017B	5018B	5019B	5020B	5021B	5022B	5024B	5026B
60413049	*5004B Front Top Panel	17-1/2 x 23-3/16					(2)				
60413059	*5005B Front Top Panel	17-1/2 x 28-5/8					(1)	(1) & (2)	(2)	(1), (2) & (3)	(3)
60413069	5006B Front Top Panel	17-1/2 x 34-1/16							(1)	(4)	(1), (2) & (4)
60413079	5007B Front Top Panel	17-1/2 x 39-1/2	(1)								
60413089	5008B Front Top Panel	17-1/2 x 44-15/16	(2)	(1) & (2)	(1)						
60413099	5009B Front Top Panel	17-1/2 x 50-3/8			(2)	(1) & (2)	(3)	(3)			
60413109	5010B Front Top Panel	17-1/2 x 55-13/16									
7041316	Front Top Int. Panel	6-1/16 x 12	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)
6041327	Center Top Int. Panel	6-1/6 x 6-7/8	(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)
6041328	Rear Top Int. Panel	3-25/32 x 6-1/16	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)	(10)
60413042	*5004B Upper Rear Panel	24-1/2 x 20-7/8					(24)				
60413052	*5005B Upper Rear Panel	24-1/2 x 26-5/16					(23)	(23) & (24)	(24)	(23), (24) & (25)	(25)
60413062	5006B Upper Rear Panel	24-1/2 x 31-3/4							(23)	(26)	(23), (24) & (26)
60413072	5007B Upper Rear Panel	24-1/2 x 37-3/16	(23)								
60413082	5008B Upper Rear Panel	24-1/2 x 42-5/8	(24)	(23) & (24)	(23)						
60413092	5009B Upper Rear Panel	24-1/2 x 48-1/16			(24)	(23) & (24)	(25)	(25)			
60413043	*5004B Lower Rear Panel	9-1/2 x 20-7/8		(5)			(28)				
60413053	*5005B Lower Rear Panel	9-1/2 x 26-5/16			(5)		(27)	(27) & (28)	(28)	(27), (28) & (29)	(29)
60413063	5006B Lower Rear Panel	9-1/2 x 31-3/4				(5)			(27)	(30)	(27), (28) & (30)
60413073	5007B Lower Rear Panel	9-1/2 x 37-3/16	(27)								
60413083	5008B Lower Rear Panel	9-1/2 x 48-1/16	(28)	(27) & (28)	(27)			(29)			
60413093	5009B Lower Rear Panel	9-1/2 x 48-1/16		(28)	(28)	(27) & (28)	(12)	(12)	(12)	(12)	(12)
6041333	Right Side Top Panel	3-7/8 x 14-13/16	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)
60413021	Upper Rear Int. Panel	7-5/16 x 25-1/2	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)	(31)
60413031	Lower Rear Int. Panel	7-5/16 x 10-1/2	(32)	(32)	(32)	(32)	(32)	(32)	(32)	(32)	(32)
6041329	Upper Left End Panel	36 x 26	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)	(13)
60413071	Lower Left End Panel	36 x 10-1/2	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)	(14)
70413044	*5004B Upper Front Panel	24-1/2 x 20-7/8					(34)				
70413054	*5005B Upper Front Panel	24-1/2 x 26-5/16					(33)	(33) & (34)	(34)	(33), (34) & (35)	(35)
70413064	5006B Upper Front Panel	24-1/2 x 31-3/4							(33)	(37)	(33), (34) & (36)
70413074	5007B Upper Front Panel	24-1/2 x 37-6/16	(33)								
70413084	5008B Upper Front Panel	24-1/2 x 48-1/16			(34)	(33) & (34)	(35)	(35)	(35)		

* For Multiple Usage Only

SECTION VI - REPAIR PARTS (continued)

TABLE 4D

SERIES 5B JACKETS

Number in () in Table Relates to Corresponding Number in  in Figure 63

PART NUMBER	ITEM	PART SIZE	BOILER SIZE								
			5016B	5017B	5018B	5019B	5020B	5021B	5022B	5024B	5026B
60413045	*5004B Lower Front Panel	9-1/2 x 20-7/8					(38)				
60413055	*5005B Lower Front Panel	9-1/2 x 26-5/16					(37)	(37) & (38)	(38)		(40)
60413065	5006B Lower Front Panel	9-1/2 x 31-3/4							(37)	(40)	(37)
60413075	5007B Lower Front Panel	9-1/2 x 37-3/16	(37)								(38)
60413085	5008B Lower Front Panel	9-1/2 x 42-5/8	(38)	(37) & (38)	(37)						
60413095	5009B Lower Front Panel	9-1/2 x 48-1/16			(38)	(37) & (38)	(39)	(39)			
6041330	Upper Right End Panel	36 x 26	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)	(15)
60413051	Lower Right End Panel	36 x 10-1/2	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)	(16)
604130410	*5004B Vestibule Panel	25 x 23-1/4					(19)				
604130510	*5005B Vestibule Panel	25 x 28-1/2					(18)	(18) & (19)	(19)	(18), (19) & (20)	(20)
604130610	5006B Vestibule Panel	25 x 33-15/16	(23)					(18)	(18)	(21)	(18), (19) & (21)
604130710	5007B Vestibule Panel	25 x 39-3/8	(18)								
604130810	5008B Vestibule Panel	25 x 44-13/16	(19)	(18) & (19)	(18)						
604130910	5009B Vestibule Panel	25 x 50-1/4		(19)	(19)	(18) & (19)	(20)	(20)			
604131010	5010B Vestibule Panel	25 x 55-11/16									
604130411	*5004B Rear Top Panel	3-3/4 x 23-3-16				(6)					
604130511	*5005B Rear Top Panel	3-3/4 x 28-5/8					(5)	(5) & (6)	(6)	(5), (6) & (7)	(7)
604130611	5006B Rear Top Panel	3-3/4 x 34-1/16							(5)	(6)	(5), (6) & (8)
604130711	5007B Rear Top Panel	3-3/4 x 39-1/2	(5)								
604130811	5008B Rear Top Panel	3-3/4 x 44-15/16	(6)	(5) & (6)	(5)						
604130911	5009B Rear Top Panel	3-3/4 x 50-3/8		(6)	(6)	(5) & (6)	(7)	(7)			
604131011	5010B Rear Top Panel	3-3/4 x 55-13/16									
6041331	Intermediate Vestibule Panel	6-1/8 x 24	(22)	(22)	(22)	(22)	(22)	(22)	(22)	(22)	(22)
6041332	Left Side Top Panel	3-7/8 x 14-13/16	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
6041333	Right Side Top Panel	3-7/8 x 14-13/16	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)	(12)
7041301	Lower End Panel Support Bkt.	1 x 21	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)
60413081	Front Int. Panel	36 x 7-5/16	(41)	(41)	(41)	(41)	(41)	(41)	(41)	(41)	(41)
7041307	#16 Left to Right Channel	1 x 30-9/16					(42)	(42)	(42)	(42)	
7041308	#17 Left to Right Channel	1 x 36									(42) & (45)
7041309	#18 Left to Right Channel	1 x 41-7/16	(42)								
7041310	#19 Left to Right Channel	1 x 46-7/8	(43)	(42) & (43)	(42)						
7041311	#20 Left to Right Channel	1 x 52-5/16			(43)	(42) & (43)	(44)	(44)	(44)		
7041312	#26 Left to Right Channel	1 x 27-3/16					(43)				
7041313	#27 Left to Right Channel	1 x 32-5/8						(43)	(43)	(43) & (44)	(44)
7041314	#28 Left to Right Channel	1 x 38-1/16									(43)
80860926	Knobs Dimco - Black #516		(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)
80860800	Machine Screw #10-.32 x 3/16" Lg. Slotted Rd. Head		(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)	(47)

TABLE 4E COMPLETE JACKETS

BOILER SIZE	PART NO.	BOILER SIZE	PART NO.	BOILER SIZE	PART NO.	BOILER SIZE	PART NO.	BOILER SIZE	PART NO.
5006B	60413068	5009B	60413068	5012B	60413128	5015B	60413158	5018B	60413188
5007B	60413078	5010B	60413108	5013B	60413138	5016B	60413168	5019B	60413198
5008B	60413088	5011B	60413118	5014B	60413148	5017B	61413178	5020B	60413208
								5024B	60413248

SECTION VI - REPAIR PARTS (continued)

TABLE 4F

Water Trim

Water Trim Carton Number:	7W2	7W3	7W4	
Description	5006B-5011B	5012B-5022B	5024B-5026B	PART NO.
Temperature Control, Honeywell L4006A2015	1	1	1	80160400
Immersion Well, Honeywell #123871A, 3/4"	1	1	1	80160452
Temperature Pressure Gauge, 100 PSI, 80-320°F, 1/2" NPT	1	1	1	8056028
Relief Valve Piping:				
Nipple, 3/4" x 2"	1	1		806600003
Nipple, 1" x 2"			1	806600004
Nipple, 1-1/2" x 3"	1	1	1	806600006
Bushing, Hex, 1-1/2" x 3/4"	1	1	1	806600507
Elbow, Reducing, 1-1/2" x 3/4" x 90°	1	1		806601506
Elbow, Reducing, 1-1/2" x 1" x 90°			1	806601507
Relief Valve, ConBraCo #10-303-10, 3/4" x 3/4", 50 psi	1			81660302
Relief Valve, ConBraCo #10-614-10, 3/4" x 1", 50 psi		1		81660359
Relief Valve, ConBraCo #10-615-10, 1" x 1-1/4", 50 psi			1	81660362
Plug extra tapings:				
Plug, Pipe, 3/4" Countersunk	3	3	3	806603504
Plug, Pipe, 1-1/2" Countersunk	2	2	2	806603506
Plug, Pipe, 1/2" Countersunk	5	5	5	806603510
Plug, Pipe, 1" Countersunk	2	2	2	806603517

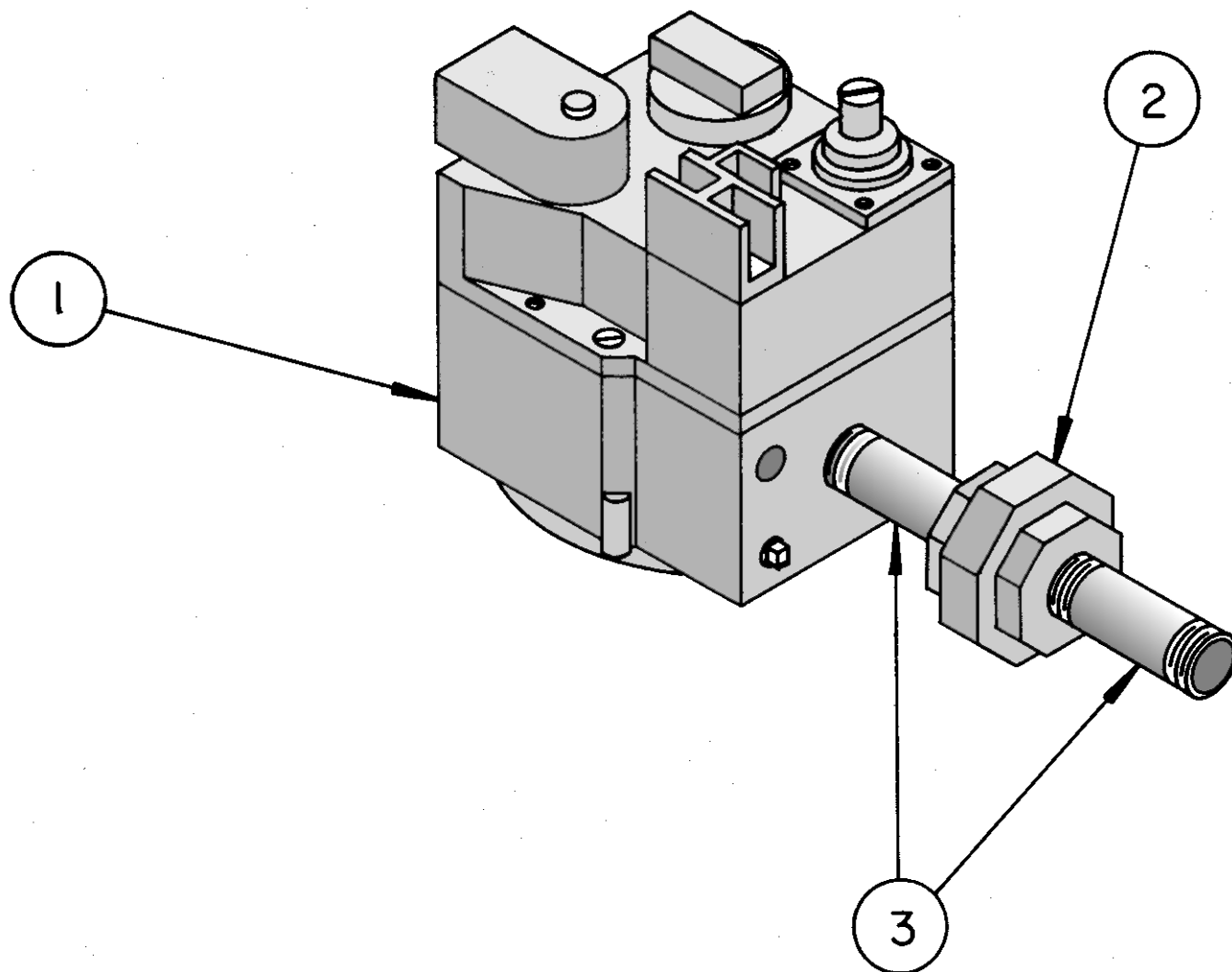
SECTION VI - REPAIR PARTS (continued)

TABLE 4G

Steam Trim

Steam Trim Carton Number:	7S1	7S2	7S3	7S4	
Description	5006B-5008B	5009B-5011B	5012B-5020B	5021B-5026B	PART NO.
Pressuretrol, Honeywell L404F1060	1	1	1	1	80160942
Steam Gauge, 4" Dia., 30" -0-30 PSI, 1/4"	1	1	1	1	8056022
Gauge Glass Set, Conbraco #20-104-10 (6¾")	1	1	1	1	8056019
Safety Valve Piping:					
Nipple, 1½" x 3", Black	1	1	1	1	806600006
Elbow, Reducing, 1½" x ¾" x 90°	1				806601506
Elbow, Reducing, 1½" x 1" x 90°		1			806601507
Elbow, Reducing, 1½" x 1¼" x 90°			1		806601508
Elbow, 1½" x 90°				1	806601547
Safety Valve, ConBraCo #13-211-08, ¾", 15 psi	1				81660500
Safety Valve, ConBraCo #13-202-08, 1" x 1", 15 psi		1			81660501
Safety Valve, ConBraCo #13-213-08, 1¼" x 1½", 15 psi			1		81660505
Safety Valve, Conbraco #13-214-08, 1½" x 2", 15 psi				1	81660503
Miscellaneous Fittings:					
Coupling, Reducing, ½" x ¼" (Mount Syphon)	1	1	1	1	806602503
Extension Adapter, ½" FPT x ½" MPT (Mount Gauge Glass)	2	2	2	2	806604501
Syphon, ¼" x 90° (Mount Pressuretrol)	1	1	1	1	8066030006
Elbow, street, ¼" x 90° (Mount Syphon)	1	1	1	1	806601509
Nipple, ½" x Close (Mount Syphon)	1	1	1	1	806600040
Plug Extra Tappings:					
Plug, Pipe, ¾" Countersunk	2	2	2	2	806603504
Plug, Pipe, 1½" Countersunk	3	3	3	3	806603506
Plug, Pipe, ½" Countersunk	3	3	3	3	806603510
Plug, Pipe, 1" Countersunk	4	4	4	4	806603517
Lowest Permissible Water Level Plate	1	1	1	1	8141307

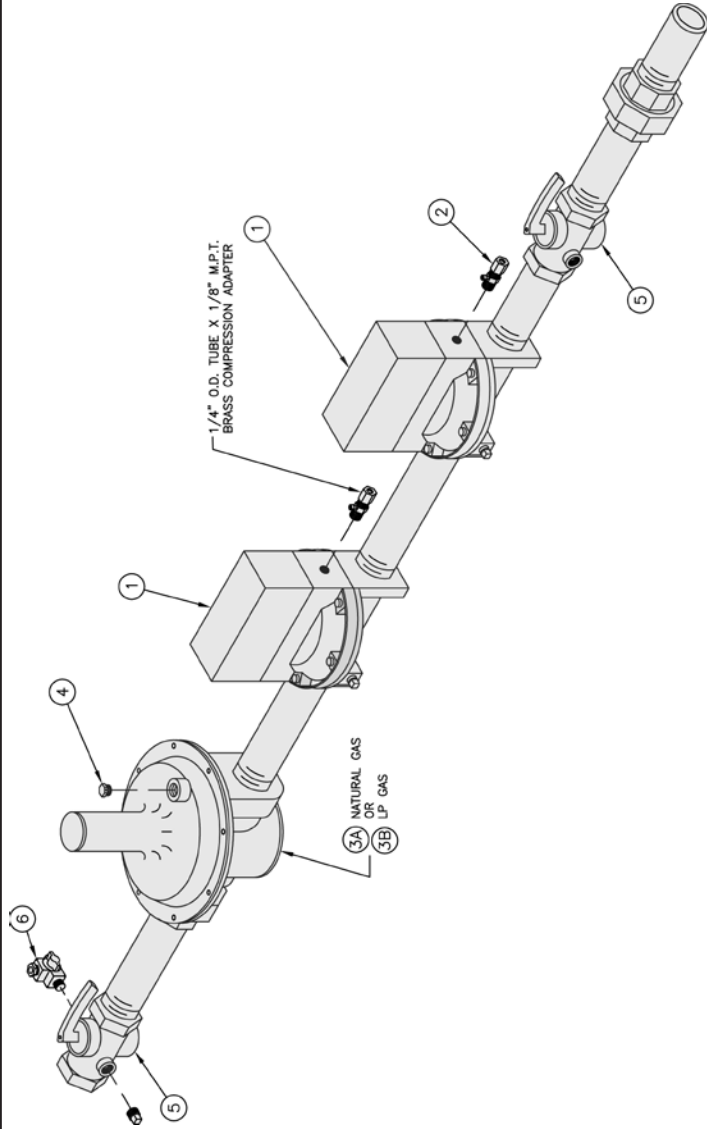
SECTION VI - REPAIR PARTS (continued)



7000DERHC GAS TRAIN - EI - 5006B THRU 5009B - USA

PART NO.	ITEM	BOILER SIZE			
		5006B	5007B	5008B	5009B
81660151	Robertshaw 7000DERHC-S7C 1" x 1" Gas Valve (Nat.)	(1)	(1)	(1)	(1)
-- OR --					
81660158	Robertshaw 7000DERHC-LP-S7C 1" x 1" Gas Valve (LP)	(1)	(1)	(1)	(1)
806604002	1" Ground Joint Union	(2)	(2)	(2)	(2)
806600027	1" x 3" Lg. -- Nipple	(3)	(3)	(3)	(3)

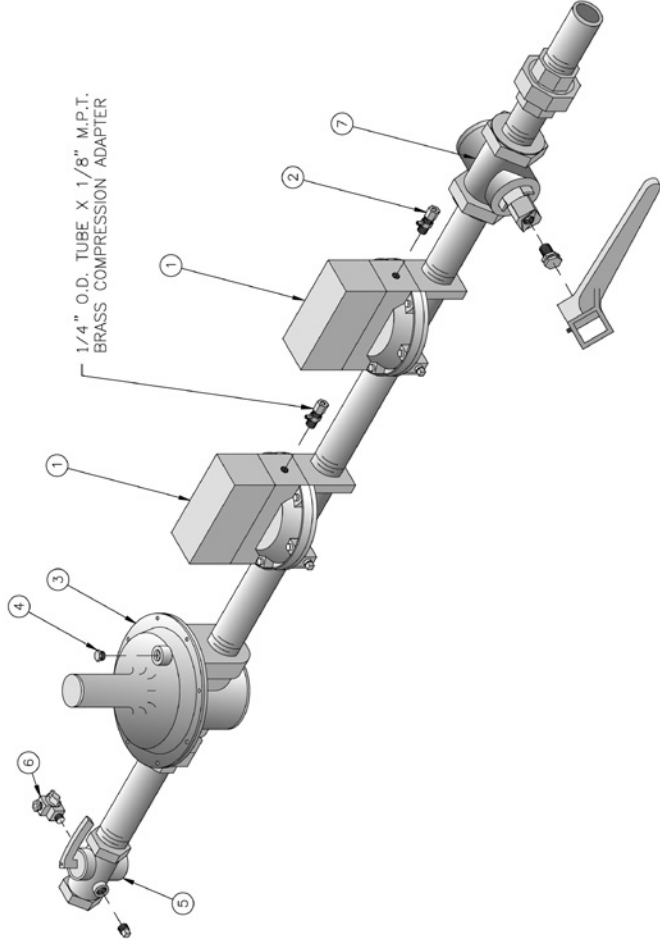
SECTION VI - REPAIR PARTS (continued)



V88A GAS TRAINS - USA

PART NO.	ITEM	BOILER SIZE					
		5006B - 5008B	5009B - 5014B	5015B	5016B	5017B - 5026B	
Diaphragm Gas Valve							
81660008	1" Honeywell V88A1618	1	---	1	1	---	
81660009	1 1/4" Honeywell V88A1626	---	1	---	1	1	
822605	Bleed Valve Assembly - Honeywell #126590	2	2	2	2	2	
	Nat. Gas Regulator - Std. Cad Plate Spring 3.0" x 6.0" WC						
8226006	Maxitrol RV-61 1" x 1"	3A	---	3A	3A	---	
822607	Maxitrol RV-81 1 1/4" x 1 1/4"	---	3A	---	3A	3A	
	LP Gas Regulator HO1 Blue Spring 5.5" to 12.0" WC						
8226011	Maxitrol RV-61 1" x 1"	3B	---	3B	3B	---	
8226012	Maxitrol RV-81 1 1/4" x 1 1/4"	---	3B	---	3B	3B	
822614	Leak Limiter - Maxitrol #12A04 (incl. w / RV-61)	4	---	4	4	---	
8226010	Leak Limiter - Maxitrol #12A34 (incl. w / RV-81)	---	4	---	4	4	
	Manual Shutoff Valve						
822615	ConBraCo 50-GB5-01A 1" x 1"	5	---	5	5	---	
8226161	ConBraCo 50-GB6-01A 1 1/4" x 1 1/4"	---	5	---	5	5	
822645	Pilot Valve	6	6	6	6	6	

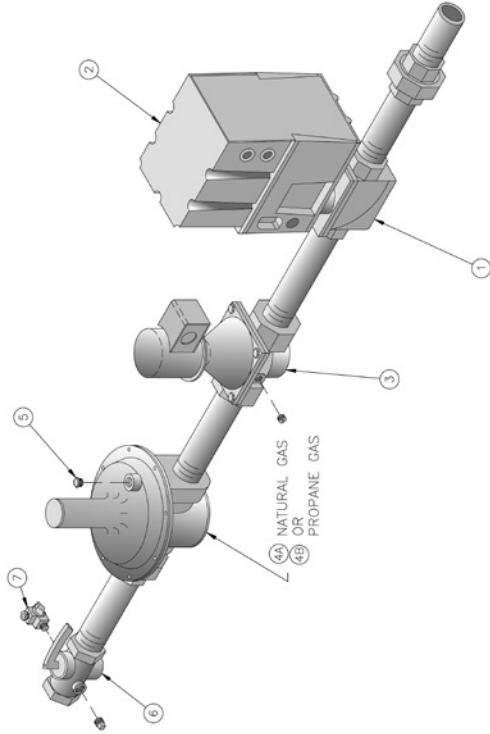
SECTION VI - REPAIR PARTS (continued)



V88A GAS TRAINS - CANADA NATURAL GAS ONLY

PART NO.	ITEM	BOILER SIZE			
		5006B - 5008B	5009B - 5014B	5015B	5016B - 5026B
Diaphragm Gas Valve					
81660008	1" Honeywell V88A1618	1	---	1	---
81660009	1 1/4" Honeywell V88A1626	---	1	---	1
822605	Bleed Valve Assembly - Honeywell #126590	2	2	2	2
	Nat. Gas Regulator - Std. Cad Plate Spring 3.0" x 6.0" WC				
822606	Maxitrol RV-61 1" x 1"	3	---	3	---
822607	Maxitrol RV-81 1 1/4" x 1 1/4"	---	3	---	3
822614	Leak Limiter - Maxitrol #12A04 (incl. w / RV-61)	4	---	4	---
8226010	Leak Limiter - Maxitrol #12A34 (incl. w / RV-81)	---	4	---	4
	Manual Shutoff Valve				
822615	ConBraCo 50-GB5-01A 1" x 1"	5	---	5	---
8226161	ConBraCo 50-GB6-01A 1 1/4" x 1 1/4"	---	5	---	5
822645	Pilot Valve	6	6	6	6
	Lubricated Plug Valve				
822619	Newman-Milliken 200M - 1"	7	---	7	---
822620	Newman-Milliken 200M - 1 1/4"	---	7	---	7

SECTION VI - REPAIR PARTS (continued)

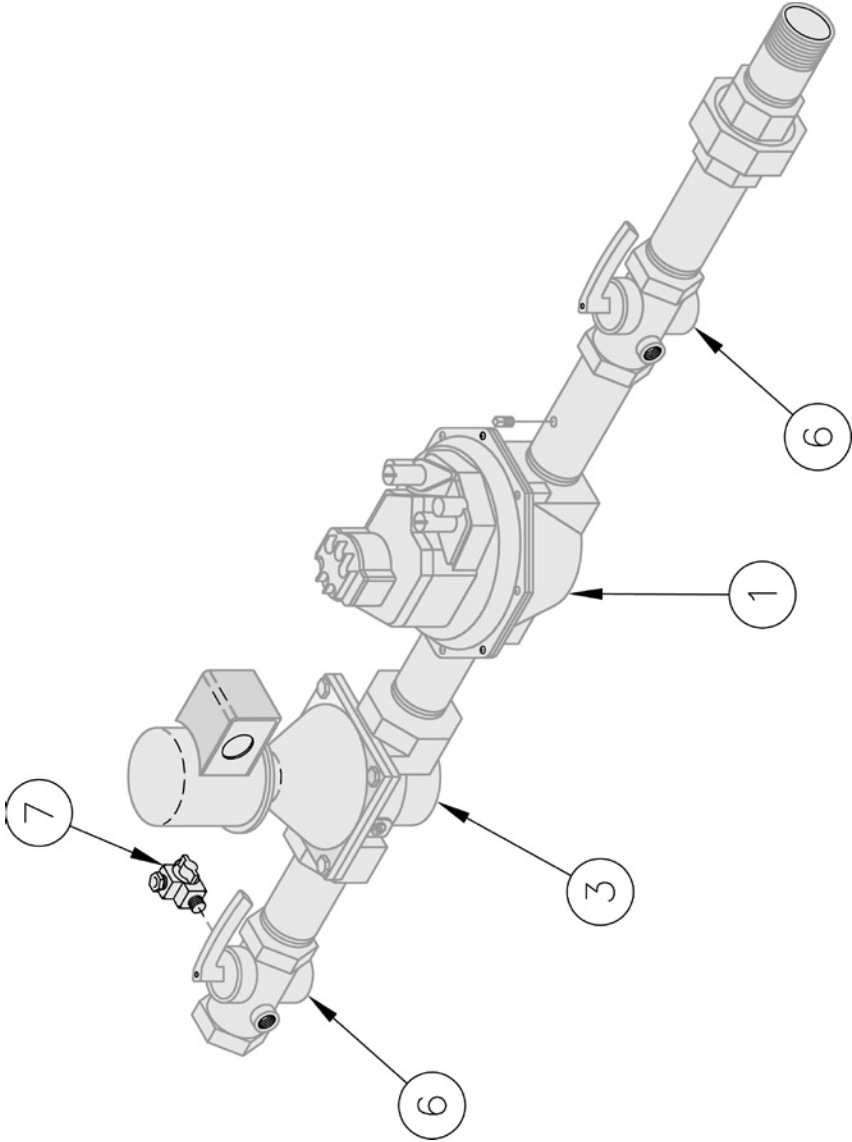


FLUID POWER GAS TRAINS - USA
(See Page 94 for "O-HI-LO" Natural Gas Diaphragm Type Valves)

(See Page 94 for "LO-HI-LO" Natural Gas Diaphragm Type Valves)

PART NO.	ITEM	5006B - 5008B	5009B - 5014B	5015B	5016B	5017B - 5026B
	Fluid Power Gas Valve					
81660010	1" - Honeywell V5055B1002	1	---	1	1	---
81660011	1 1/4" - Honeywell V5055B1010	---	1	---	1	1
	Actuators for Fluid Power Valves					
81660012	"Lo-Hi-Off" Honeywell V4055A1007 - 5026B Sec. Opening Time - 120V 60HZ					
81660013	"Lo-Hi-Lo" Honeywell V4062A1008 - 5026B Sec. Opening Time - 120V 60HZ					
81660014	"Modulating" Honeywell V9055A1055 - 5026B Sec. Opening Time - 120V 60HZ					
	Solenoid Gas Valve					
81660088	1" - ITT Gen. K3A562	3	---	3	3	---
81660086	1 1/4" - ITT Gen. K3A772	---	3	---	3	3
	Nat. Gas Regulator - Std. Cad Plate Spring 3.0" x 6.0" WC					
8226006	Maxitrol RV-61 1" x 1"	4A	---	4A	4A	---
8226012	Maxitrol RV-81 1 1/4" x 1 1/4"	---	4A	---	4A	4A
	LP Gas Regulator HO1 Blue Spring 5.5" to 12.0" WC					
8226011	Maxitrol RV-61 1" x 1"	4B	---	3B	3B	---
8226012	Maxitrol RV-81 1 1/4" x 1 1/4"	---	4B	---	4B	4B
822614	Leak Limiter - Maxitrol #12A04 (included w/ RV-61)	5	---	5	5	---
8226010	Leak Limiter - Maxitrol #12A34 (included w/ RV-81)	---	5	---	5	5
	Manual Shutoff Valve					
822615	ConBraCo 50-GB5-01A 1" x 1"	6	---	6	---	---
8226161	ConBraCo 50-GB6-01A 1 1/4" x 1 1/4"	---	6	---	6	6
822645	Pilot Valve	7	7	7	7	7

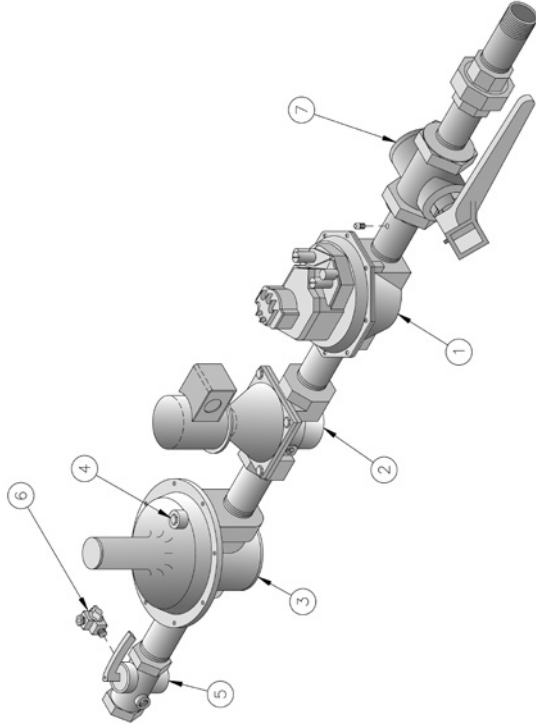
SECTION VI - REPAIR PARTS (continued)



DIAPHRAGM VALVE "LO-HI-LO" GAS TRAIN
USA - NATURAL GAS ONLY

PART NO.	ITEM	BOILER SIZE		
		5006B	5009B	5015B
81660149	"Lo-Hi-Lo" Gas Valve	1	---	1
81660150	1" Honeywell V8944B1019	---	1	---
81660081	1 1/4" Honeywell V8944B1027	3	---	3
81660094	Solenoid Gas Valve	---	3	---
822615	1" - ITT Gen. K8A461	6	---	6
8226161	1 1/4" - ITT Gen. K8A771	---	6	---
822645	Manual Shutoff Valve	7	7	7
	ConBraCo 50-GB5-01A 1" x 1"			
	ConBraCo 50-GB6-01A 1 1/4" x 1 1/4"			
	Pilot Valve			

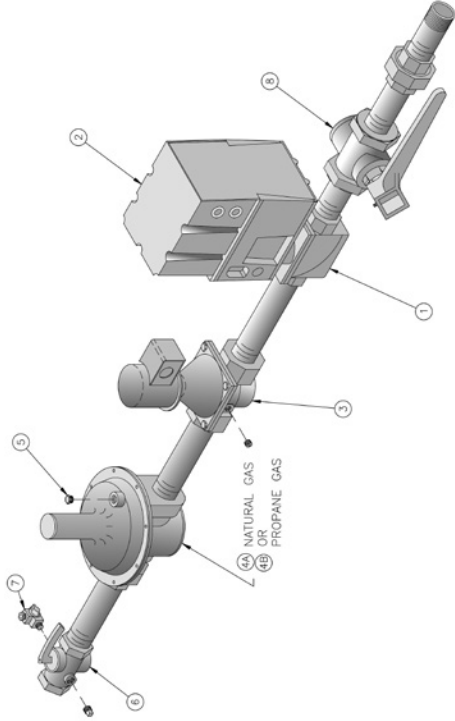
SECTION VI - REPAIR PARTS (continued)



DIAPHRAGM VALVE "LO-HI-LO" GAS TRAIN
CANADA - NATURAL GAS ONLY

PART NO.	ITEM	BOILER SIZE						
		5006B - 5008B	5009B - 5014B	5015B	5016B	5017B - 5026B		
81660149	"Lo-Hi-Lo" Gas Valve	1	---	1	1	---		
81660150	1" Honeywell V8944B1019	---	1	---	1	1		
	1 1/4" Honeywell V8944B1027							
	Solenoid Gas Valve							
81660081	1" - ITT Gen. K8A461	3	---	3	3	---		
81660094	1 1/4" - ITT Gen. K8A771	---	3	---	3	3		
	Nat. Gas Regulator - Std. Cad Plate Spring 3.0" x 6.0" WC							
8226006	Maxitrol RV-61 1" x 1"	3	---	3	3	---		
8226012	Maxitrol RV-81 1 1/4" x 1 1/4"	---	3	---	3	3		
	LP Gas Regulator HO1 Blue Spring 5.5" to 12.0" WC							
8226011	Maxitrol RV-61 1" x 1"	3	---	3	3	---		
8226012	Maxitrol RV-81 1 1/4" x 1 1/4"	---	3	---	3	3		
	Leak Limiter							
822614	Maxitrol #12A04 (included w/ RV-61)	4	---	4	4	---		
8226010	Maxitrol #12A34 (included w/ RV-81)	---	4	---	4	---		
	Manual Valve							
822615	ConBraCo 50-GB5-01A 1" x 1"	5	---	5	5	---		
8226161	ConBraCo 50-GB6-01A 1 1/4" x 1 1/4"	---	5	---	5	5		
	Pilot Valve							
822645	1/8" MPT x 1/4" OD Tube	6	6	6	6	6		
	Manual Valve							
822619	Newman-Miliken 200M - 1"	7	---	7	7	---		
822620	Newman-Miliken 200M - 1 1/4"	---	7	---	7	7		

SECTION VI - REPAIR PARTS (continued)

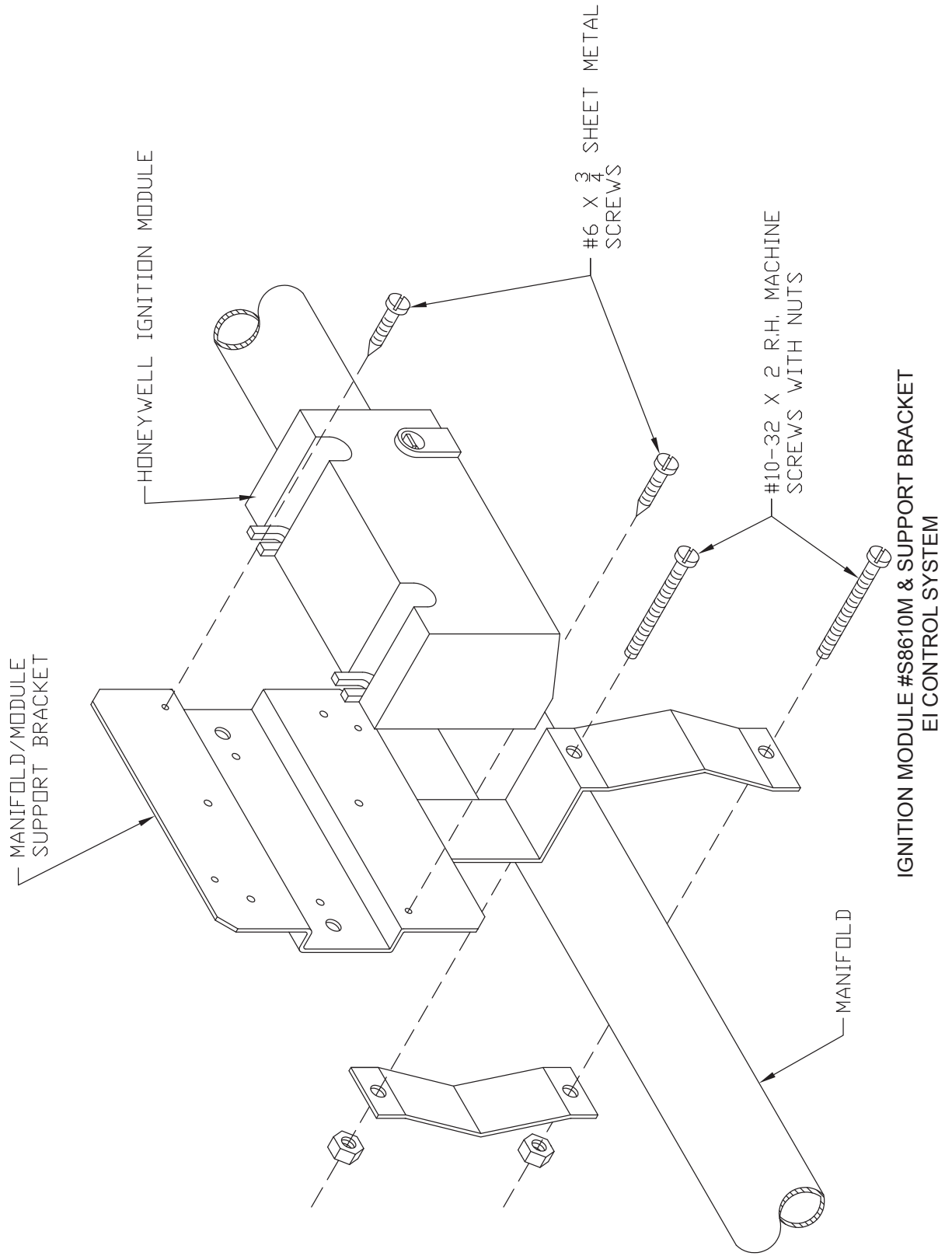


FLUID POWER GAS TRAINS - CANADA

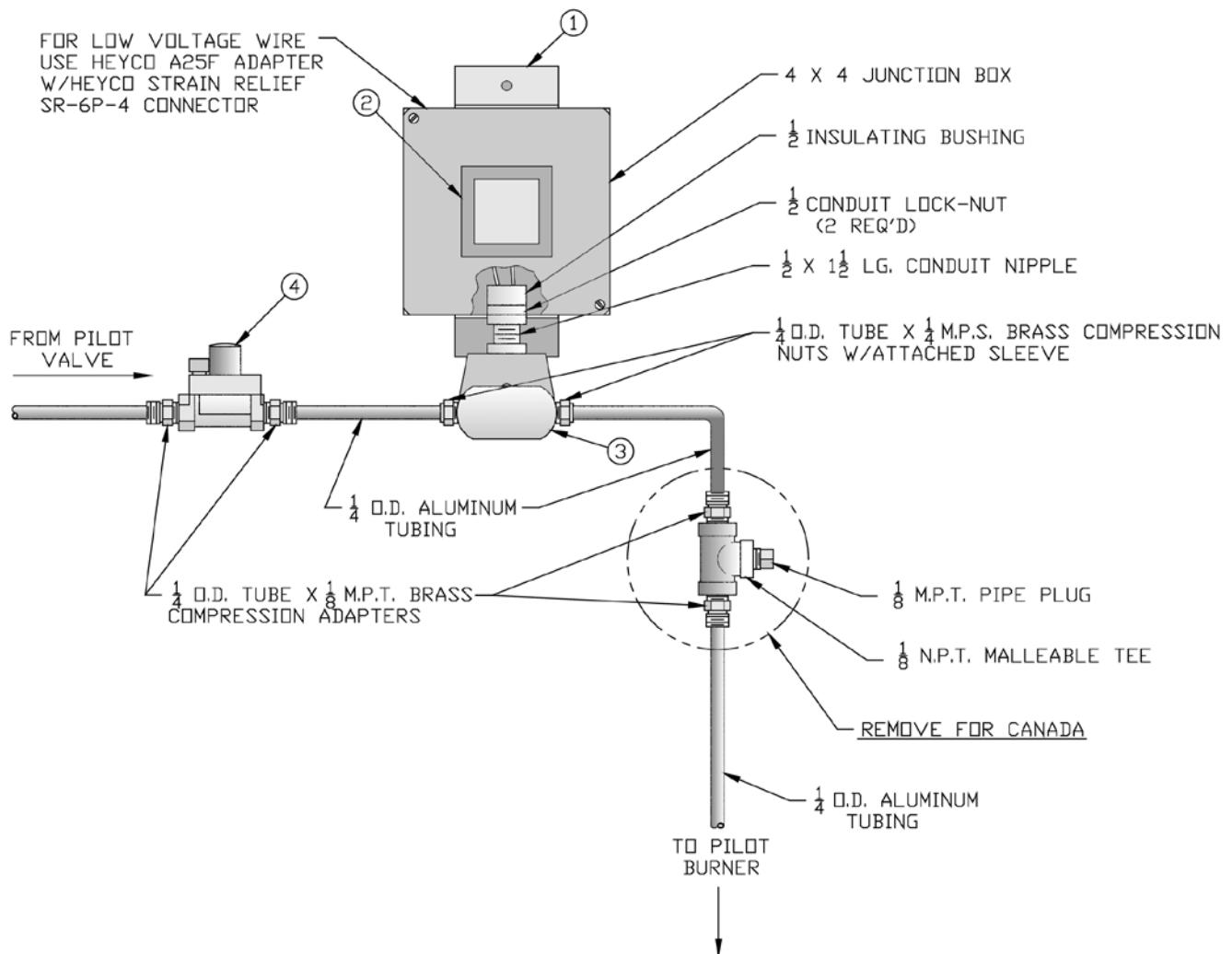
PART NO.	ITEM	BOILER SIZE				
		5006B - 5008B	5009B - 5014B	5015B	5016B	5017B - 5026B
Fluid Power Gas Valve						
81660010	1" - Honeywell V5055B1002	1	---	1	1	---
81660011	1 1/4" - Honeywell V5055B1010	---	1	---	1	1
Actuators for Fluid Power Valves						
81660012	"Lo-Hi-Off" Honeywell V4055A1007 - 5026B Sec. Opening Time - 120V 60HZ					
81660013	"Lo-Hi-Lo" Honeywell V4062A1008 - 5026B Sec. Opening Time - 120V 60HZ - LP Only					
81660014	"Modulating" Honeywell V9055A1055 - 5026B Sec. Opening Time - 120V 60HZ					
Solenoid Gas Valve						
81660088	1" - ITT Gen. K3A562	3	---	3	3	---
81660094	1 1/4" - ITT Gen. K3A772	---	3	---	3	3
Nat. Gas Regulator - Std. Cad Plate Spring 3.0" x 6.0" WC						
8226006	Maxitrol RV-61 1" x 1"	4A	---	4A	4A	---
822607	Maxitrol RV-81 1 1/4" x 1 1/4"	---	4A	---	4A	4A
LP Gas Regulator HO1 Blue Spring 5.5" to 12.0" WC						
8226011	Maxitrol RV-61 1" x 1"	4B	---	3B	3B	---
8226012	Maxitrol RV-81 1 1/4" x 1 1/4"	---	4B	---	4B	4B
822614	Leak Limiter - Maxitrol #12A04 (included w/ RV-61)	5	---	5	5	---
8226010	Leak Limiter - Maxitrol #12A34 (included w/ RV-81)	---	5	---	5	5
Manual Shutoff Valve						
822615	ConBraCo 50-GB5-01A 1" x 1"	6	---	6	6	---
8226161	ConBraCo 50-GB6-01A 1 1/4" x 1 1/4"	---	6	---	6	6
822645	Pilot Shutoff Valve	7	7	7	7	7
822619	Newman-Milliken 200M - 1"	8	---	8	8	---
822620	Newman-Milliken 200M - 1 1/4"	---	8	---	8	8

SECTION VI - REPAIR PARTS (continued)

PART NO.	6011301	100958-01
Description	Manifold Module Support Bracket Assembly	Honeywell S8610M3009 Ignition Module



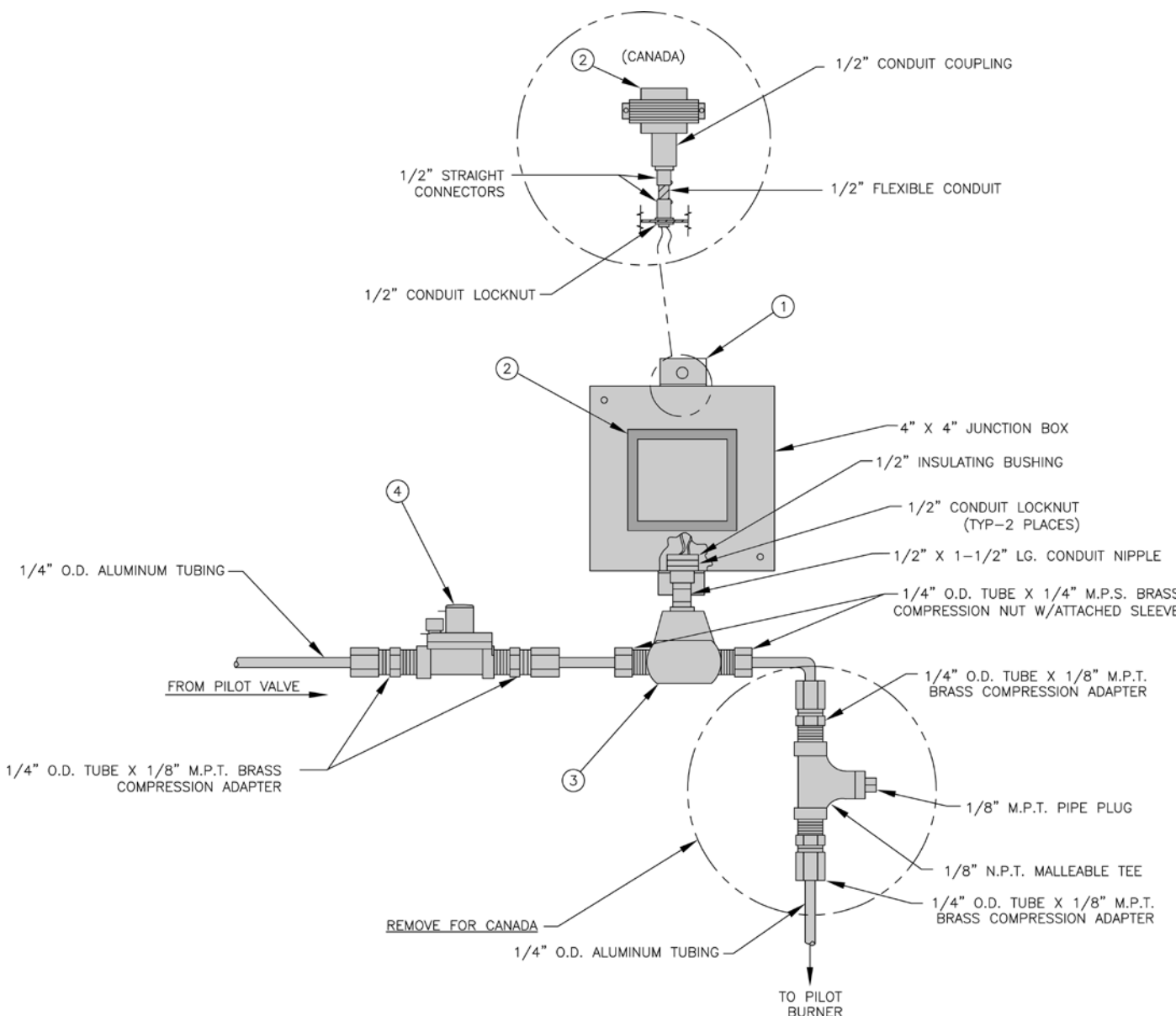
SECTION VI - REPAIR PARTS (continued)



TRANSFORMER, PENN #H91WG PILOT SOLENOID VALVE & PILOT LINE REGULATOR
EI CONTROL SYSTEM
U.S.A. - 5010B-5026B NAT. GAS
CANADA - 5006B-5026B NAT. GAS

PART NO.	ITEM
7136001	(1) "J" Box Mounting Bracket 24V 100 VA Transformer - 120 60HZ Primary
80160016	(2) Penn Y64T22-0 Plate Mounted
822666	(3) Penn Pilot Solenoid Valve H91WG-6
8226005	Pilot Line Regulator Nat. Gas - Maxitrol RV-12-LT w/orange spring 4" to 8" WC
8136037	Heyco A25F Strain Relief Adaptor
8136038	Heyco Strain Relief Bushing SR-6P-4

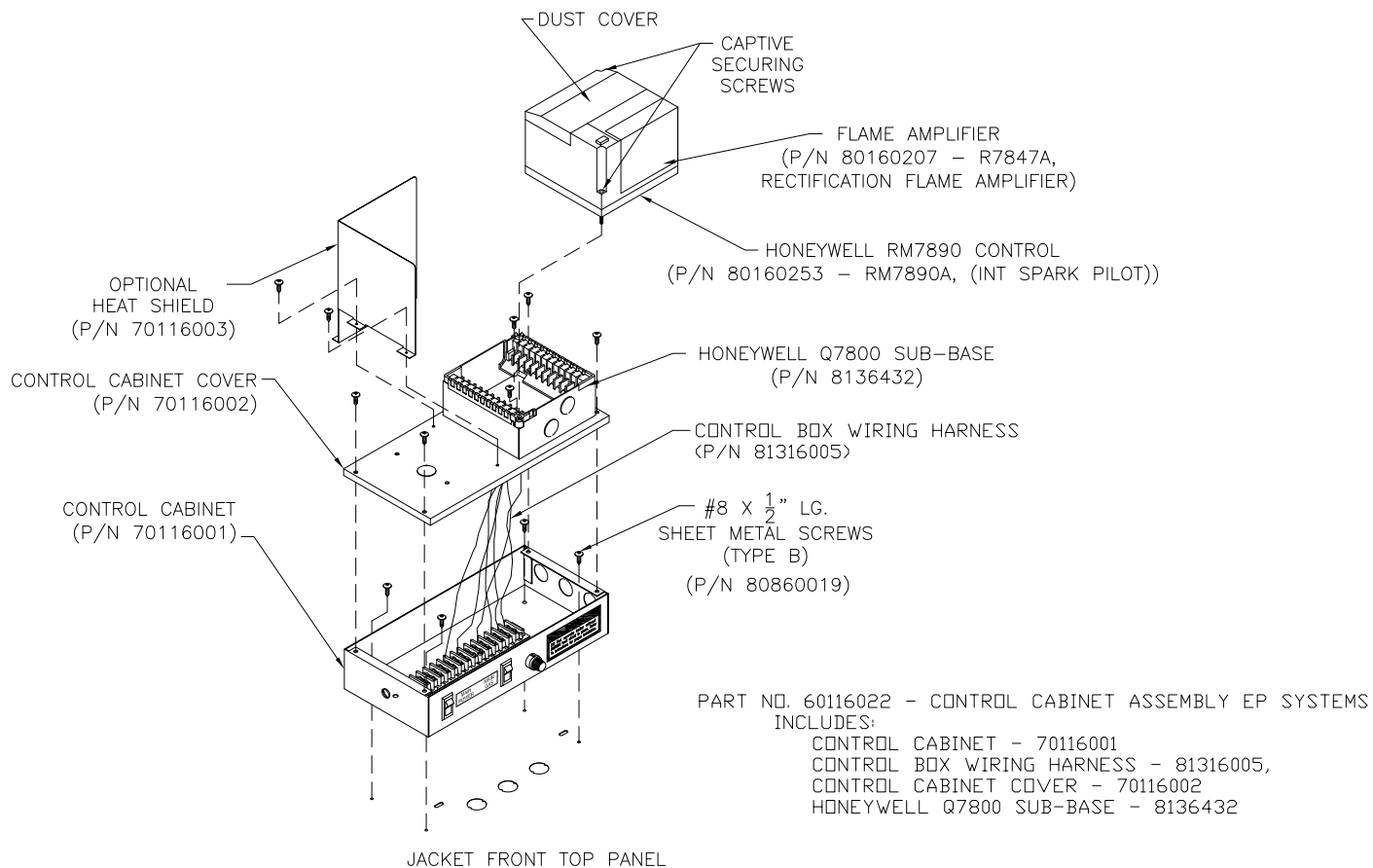
SECTION VI - REPAIR PARTS (continued)



TRANSFORMER, PENN #H91WA-4 PILOT SOLENOID VALVE & PILOT LINE REGULATOR
EP CONTROL SYSTEM

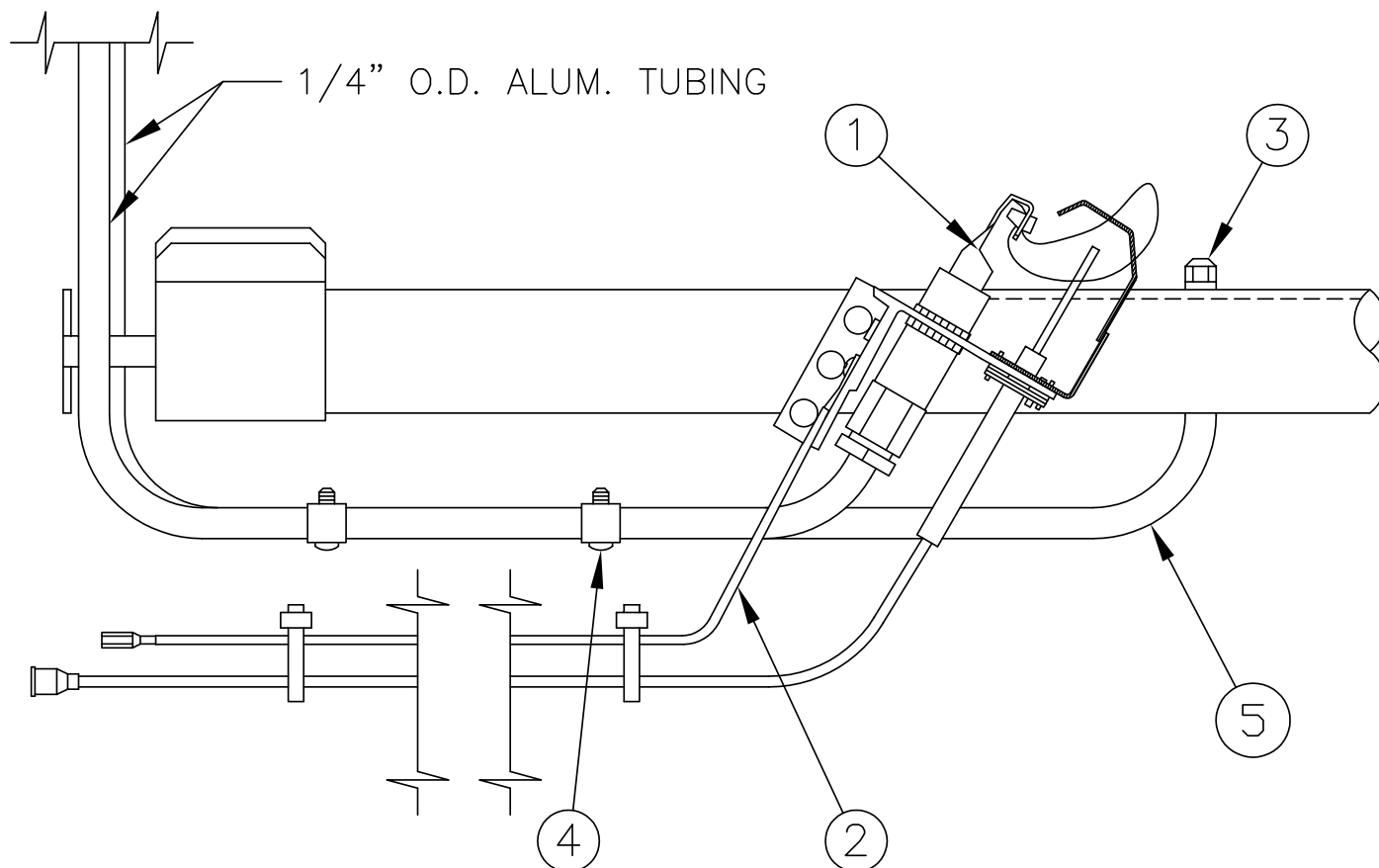
PART NO.	ITEM
7016003	(1) EP Control Mounting Bracket 24V - 40 VA Transformer - 120V 60HZ Primary
80160039	(2A) USA - Honeywell Plate Mounted AT140D1012
80160014	(2B) Canada - Honeywell Foot Mounted AT72D1089
822662	(3) Penn Pilot Solenoid Valve H91WA-4, 120V
8226005	(4) Nat. Gas - Maxitrol RV-12-LT w/orange spring 4" to 8" WC
80160018	Webster 612-6A7 Ignition Transformer (not shown)

SECTION VI - REPAIR PARTS (continued)



**CONTROL ASSEMBLY AND MOUNTING BRACKET
EP CONTROL SYSTEMS**

SECTION VI - REPAIR PARTS (continued)



EI CONTROL SYSTEM - HONEYWELL Q3481 PILOT ASSEMBLY

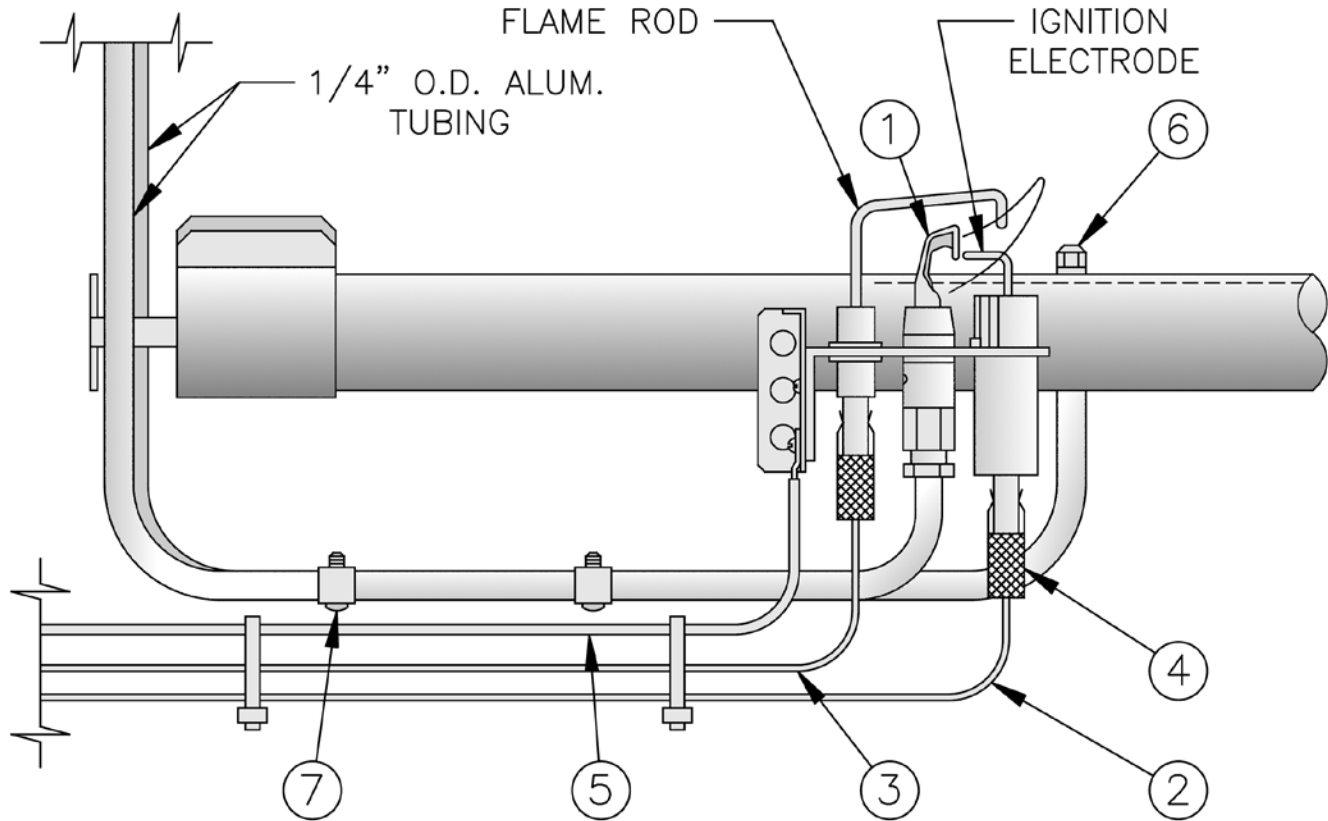
EI CONTROL SYSTEM - PILOT ASSEMBLY

6236072 EI - 1, NAT., 5006B - 5009B Sections
 6236075 EI - 1, LP., 5006B - 5009B Sections
 6236076 EI - 2, NAT., 5010B - 5026B Sections
 Not AvailableLP, 5010B - 5026B Sections

PART NO.	ITEM
103704-01	(1) Pilot Burner/Igniter/Sensor Honeywell Q3481B1206, Nat. Gas with NE24 orifice
100332-01	(1) Pilot Burner/Igniter/Sensor Honeywell Q3481B1180, LP Gas with KR14 orifice
6136054	(2) Pilot Ground Wire Assembly, 36" (5006B - 5009B)
6137375	(2) Pilot Ground Wire Assembly, 72" (5010B - 5026B)
8236015	(3) Vent Tube Tip (USA Only) (5010B - 5026B Sections Only)
8236016	(4) Vent Tube Clip - Tinnerman C4886A4-27 (USA Only) (5010B - 5026B Sections Only)
8236048	(5) Vent Tube - 1/4" x 18" Long Aluminum Tubing

For Canada, Omit Vent Tube, Vent Tube Tip and Vent Tube Clips. These items are not used on 5006B - 5009B Sections, Robertshaw Gas Valves - USA.

SECTION VI - REPAIR PARTS (continued)



EP CONTROL SYSTEM - PILOT ASSEMBLY

6236003 NAT. GAS
Not Available for LP

PART NO.	ITEM
8236017	(1) Flame Rectification Pilot Ass'y Natural Gas - Honeywell Q179C1009 w/388146 AG Orifice
7136255	(2) Ignition Lead - Honeywell R1061012 - 6' Long
7136256	(3) Flame Rod Lead - Honeywell R1298020 - 6' Long
8236021	(4) Female Rajah Connector - Honeywell 37356
6236020	(5) Ground Wire - Continental SRGX-600 200°C - Green - 72" Long
8236015	(6) Vent Tube Tip - (USA Only)
8236016	(7) Vent Tube Clip - Tinnerman C4886A4-27 (USA Only)

APPENDIX A - FIGURES

<u>Figure Number</u>	<u>Page Number</u>	<u>Description</u>
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Canada KD Boilers	7 & 8	Canadian Equipment Check List
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Section II - General Information		
Section III - Installation Instructions		
Fig. 2	11	Single Manifold Base 5006B Thru 5014B Section Boilers
Fig. 3	12	Dual Manifold Bases - 5015B Thru 5026B Section Boilers
Fig. 4	12	LEH Section on Base
Fig. 5	12	Assembly of Center Sections
Fig. 6	13	Arrangement of Sections and Canopy(s)
Fig. 7	14	Purpose of Tappings and Their Locations
Fig. 8	15	Installation of Built-in Heater
Fig. 9	15	Testing Boiler Assembly for Leaks
Fig. 10	16	Sealing of Base, Installation of Flue Covers and Canopies
Fig. 11	16	Attachment of Flue Covers
Fig. 12	17	Recommended Steam Boiler Piping, Gravity Return, 1 or 2 Supply Connections - 5006B Thru 5014B Section Boilers
Fig. 13	18	Recommended Steam Boiler Piping, Gravity Return, 3 Supply Connections - 5015B Thru 5020B Section Boilers
Fig. 14	19	Recommended Steam Boiler Piping, Gravity Return, 4 or 5 Supply Connections - 5021B Thru 5026B Section Boilers
Fig. 15	20	Typical Steam Piping Arrangement for Boilers with Pumped Condensate Return and Boiler Feed Unit
Fig. 16A	21	Recommended Water Boiler Piping 1 Supply Connection and 1 Return Connection, Sizes 5006B Thru 5019B Section Boilers
Fig. 16B	21	Recommended Water Boiler Piping, 3 Supply Connections and Two Return Connections, Sizes 5020B Thru 5026B Section Boilers
Fig. 17	22	Recommended Boiler Piping for Combination Heating and Cooling Systems
Fig. 18	22	Installation of Jacket Support Brackets to Base End Panels
Fig. 19	23	Installation of Jacket End Panels
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Fig. 21	24	Exploded View of Jacket, 5006B Thru 5010B Section Boilers
Fig. 22	25	Securing of Canopy/Draft Hood
Fig. 23	26	Canopy/Draft Hood Mounting Diagram
Fig. 24	27	Exploded View of Jacket, 5011B Thru 5019B Section Boilers
Fig. 25	29	Exploded View of Jacket, 5020B Thru 5022B Section Boilers
Fig. 26	30	Exploded View of Jacket, 5024B and 5026B Section Boilers
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Fig. 29	33	Water Trim and Controls
Fig. 30	34	Recommended Piping to Built-in Tankless Heaters
Fig. 31	36	Installation of S8610M Module
Fig. 32	36	Pilot Piping - EI Control System (Robertshaw7000) USA 5006B Thru 5009B
Fig. 33	37	Pilot Piping - EI Control System (V88A) USA 5010B Thru 5026B - Nat. Gas; Canada - 5006B Thru 5026B - Nat. Gas
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APPENDIX A - FIGURES (continued)

<u>Figure Number</u>	<u>Page Number</u>	<u>Description</u>
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Fig. 40	46	Schematic Wiring Diagram - EI Control System (Robertshaw7000 Gas Valve) USA 5006B Thru 5009B
Fig. 41	47	Schematic Wiring Diagram - EI Control System (V88 Gas Train) USA 5010B Thru 5014B; Canada 5006B Thru 5014B
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Fig. 52	62	Attachment of Flue Covers
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Fig. 54-1	64	Pilot Locations
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Fig. 56	66	Pilot Flame - Honeywell Q3481B
Fig. 57	67	Pilot Flame Honeywell Q179C Pilot
Section VI - Repair Parts		
Fig. 59	71	Base Parts (5006B Thru 5014B)
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Fig. 61	75	Integral Canopy Draft Hoods and Sections
Fig. 62	79	Jackets
Robertshaw Gas Train	86	7000DERHC Gas Train - EI - 5006B Thru 5009B - USA
Honeywell Gas Train	87	V88A Gas Train - USA
Honeywell Gas Train	88	V88A Gas Train - Canada (Natural Gas Only)
Honeywell Gas Train	89	Fluid Power Gas Train - USA
Honeywell Gas Train	90	Diaphragm Valve LO-HI-LO Gas Train, USA (Natural Gas Only)
Honeywell Gas Train	91	Diaphragm Valve LO-HI-LO Gas Train, Canada (Natural Gas Only)
Honeywell Gas Train	92	Fluid Power Gas Train - Canada

APPENDIX A - FIGURES (continued)

<u>Figure Number</u>	<u>Page Number</u>	<u>Description</u>
Section VI - Repair Parts (continued)		
Honeywell Ignition Module	93	Ignition Module #S8610M and Support Bracket, EI Control System
Penn Pilot Solenoid Valve Ass'y	94	Transformer, Penn #H91WG-5 Pilot Solenoid Valve and Pilot Line Regulator EI Control System, USA (5010B - 5026B) Natural Gas; Canada (5006B - 5026B) Natural Gas
Penn Pilot Solenoid Valve Ass'y	95	Transformer, Penn #H91WA-4 Pilot Solenoid Valve and Pilot Line Regulator, EP Control System
EP Control Ass'y	96	Control Assembly and Mounting Bracket, EP Control Systems
Honeywell Q3481 Pilot Ass'y	97	EI Control System - Honeywell Q3481 Pilot Assembly
Honeywell Q179C Pilot Ass'y	98	EP Control System - Pilot Assembly
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Table 4E	83	Complete Jackets
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Robertshaw Gas Train	86	7000DERHC Gas Train - EI - 5006B thru 5009B - USA
Honeywell Gas Train	87	V88A Gas Train - USA
Honeywell Gas Train	88	V88A Gas Train - Canada (Natural Gas Only)
Honeywell Gas Train	89	Fluid Power Gas Train - USA
Honeywell Gas Train	90	Diaphragm Valve LO-HI-LO Gas Train, USA (Natural Gas Only)
Honeywell Gas Train	91	Diaphragm Valve LO-HI-LO Gas Train, Canada (Natural Gas Only)
Honeywell Gas Train	92	Fluid Power Gas Train - Canada
Honeywell Ignition Module	93	Ignition Module #S8610M and Support Bracket, EI Control System

APPENDIX B - TABLES (continued)

<u>Table Number</u>	<u>Page Number</u>	<u>Description</u>
Section VI - Repair Parts (continued)		
Penn Pilot Solenoid Valve Ass'y	94	Transformer, Penn #H91WG-5 Pilot Solenoid Valve and Pilot Line Regulator EI Control System, USA (5010B - 5026B) Natural Gas; Canada (5006B - 5026B) Natural Gas
Penn Pilot Solenoid Valve Ass'y	95	Transformer, Penn #H91WA-4 Pilot Solenoid Valve and Pilot Line Regulator, EP Control System
Control Assembly	96	Control Assembly & Mounting Bracket, EP Control Systems
Honeywell Q3481 Pilot Ass'y	99	EI Control System - Honeywell Q3481 Pilot Assembly
Honeywell Q179C Pilot Ass'y	98	EP Control System - Pilot Assembly
Miscellaneous		
Tables	102 - 103	Appendix B - Tables
Rear Cover		Limited Warranty for Commercial Grade Boilers and Parts/Accessories

SERVICE RECORD

DATESERVICE PERFORMED

SERVICE RECORD

DATE _____

SERVICE PERFORMED

SERVICE RECORD

DATESERVICE PERFORMED

SERVICE PERFORMED

Limited Warranty

For Commercial Grade Boilers

Using Cast Iron, Carbon Steel,
or Stainless Steel Heat Exchangers
and Parts/Accessories

Subject to the terms and conditions set forth below, Burnham Commercial, Lancaster, Pennsylvania hereby extends the following limited warranties to the original owner of a commercial grade water or steam boiler or Burnham Commercial supplied parts and/or accessories manufactured and shipped on or after October 1, 2009:

ONE YEAR LIMITED WARRANTY ON COMMERCIAL GRADE BOILERS AND PARTS / ACCESSORIES SUPPLIED BY BURNHAM COMMERCIAL.

Burnham Commercial warrants to the original owner that its commercial grade water and steam boilers and parts/accessories comply at the time of manufacture with recognized hydronic industry standards and requirements then in effect and will be free of defects in material and workmanship under normal usage for a period of one year from the date of original installation. If any part of a commercial grade boiler or any part or accessory provided by Burnham Commercial is found to be defective in material or workmanship during this one year period, Burnham Commercial will, at its option, repair or replace the defective part (not including labor).

HEAT EXCHANGER WARRANTIES

Burnham Commercial warrants to the original owner that the heat exchanger of its commercial grade boilers will remain free from defects in material and workmanship under normal usage for the time period specified in the chart below to the original owner at the original place of installation. If a claim is made under this warranty during the "No Charge" period from the date of original installation, Burnham Commercial will, at its option, repair or replace the heat exchanger (not including labor). If a claim is made under this warranty after the expiration of the "No Charge" period from the date of original installation, Burnham Commercial will, at its option and upon payment of the pro-rated service charge set forth below, repair or replace the heat exchanger. The service charge applicable to a heat exchanger warranty claim is based upon the number of years the heat exchanger has been in service and will be determined as a percentage of the retail price of the heat exchanger model involved at the time the warranty claim is made as follows:

Years in Service	Service Charge as a % of Retail Price									
	1	2	3	4	5	6	7	8	9	10+
Cast Iron	No Charge									100
Carbon Steel	No Charge	100								
Stainless Steel	No Charge					20	40	60	80	100

NOTE: If the heat exchanger involved is no longer available due to product obsolescence or redesign, the value used to establish the retail price will be the published price as set forth in Burnham Commercial Repair Parts Pricing where the heat exchanger last appeared or the current retail price of the then nearest equivalent heat exchanger, whichever is greater.

ADDITIONAL TERMS AND CONDITIONS

- Applicability:** The limited warranties set forth above are extended only to the original owner at the original place of installation within the United States and Canada. These warranties are applicable only to boilers, parts, or accessories designated as commercial grade by Burnham Commercial and installed and used exclusively for purposes of commercial space heating or domestic hot water generation through a heat exchanger (or a combination for such purposes) and do not apply to residential grade products or industrial uses.
- Components Manufactured by Others:** Upon expiration of the one year limited warranty on commercial grade boilers, all boiler components other than heat exchangers manufactured by others but furnished by Burnham Commercial (such as oil burner, circulator and controls) will be subject only to the manufacturer's warranty, if any.
- Proper Installation:** The warranties extended by Burnham Commercial are conditioned upon the installation of the commercial grade boiler, parts, and accessories in strict compliance with Burnham Commercial installation instructions. Burnham Commercial specifically disclaims liability of any kind caused by or relating to improper installation.
- Proper Use and Maintenance:** The warranties extended by Burnham Commercial conditioned upon the use of the commercial grade boiler, parts, and accessories for its intended purposes and its maintenance accordance with Burnham Commercial recommendations and hydronics industry standards. For proper installation, use, and maintenance, see all applicable sections of the Installation and Operating, and Service Instructions Manual furnished with the unit.
- This warranty does not cover the following:
 - Expenses for removal or reinstallation. The owner will be responsible for the cost of removing and reinstalling the alleged defective part or its replacement and all labor and material connected therewith, and transportation to and from Burnham Commercial.
 - Components that are part of the heating system but were not furnished by Burnham Commercial as part of the commercial boiler.
 - Improper burner adjustment, control settings, care or maintenance.
 - This warranty cannot be considered as a guarantee of workmanship of an installer connected with the installation of the Burnham Commercial boiler, or as imposing on Burnham Commercial liability of any nature for unsatisfactory performance as a result of faulty workmanship in the installation, which liability is expressly disclaimed.

- Boilers, parts, or accessories installed outside the 48 contiguous United States, the State of Alaska and Canada.
 - Damage to the boiler and/or property due to installation or operation of the boiler that is not in accordance with the boiler installation and operating instruction manual.
 - Any damage or failure of the boiler resulting from hard water, scale buildup or corrosion the heat exchanger.
 - Any damage caused by improper fuels, fuel additives or contaminated combustion air that may cause fireside corrosion and/or clogging of the burner or heat exchanger.
 - Any damage resulting from combustion air contaminated with particulate which cause clogging of the burner or combustion chamber including but not limited to sheetrock or plasterboard particles, dirt, and dust particulate.
 - Any damage, defects or malfunctions resulting from improper operation, maintenance, misuse, abuse, accident, negligence including but not limited to operation with insufficient water flow, improper water level, improper water chemistry, or damage from freezing.
 - Any damage caused by water side clogging due to dirty systems or corrosion products from the system.
 - Any damage resulting from natural disaster.
 - Damage or malfunction due to the lack of required maintenance outlined in the Installation and Operating Manuals furnished with the unit.
- Exclusive Remedy:** Burnham Commercial obligation for any breach of these warranties is limited to the repair or replacement of its parts (not including labor) in accordance with the terms and conditions of these warranties.
 - Limitation of Damages:** Under no circumstances shall Burnham Commercial be liable for incidental, indirect, special or consequential damages of any kind whatsoever under these warranties, including, but not limited to, injury or damage to persons or property and damages for loss of use, inconvenience or loss of time. Burnham Commercial liability under these warranties shall under no circumstances exceed the purchase price paid by the owner for the commercial grade boiler involved. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.
 - Limitation of Warranties:** These warranties set forth the entire obligation of Burnham Commercial with respect to any defect in a commercial grade boiler, parts, or accessories and Burnham Commercial shall have no express obligations, responsibilities or liabilities of any kind whatsoever other than those set forth herein. These warranties are given in lieu of all other express warranties.

ALL APPLICABLE IMPLIED WARRANTIES, IF ANY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY LIMITED IN DURATION TO A PERIOD OF ONE YEAR EXCEPT THAT IMPLIED WARRANTIES, IF ANY, APPLICABLE TO THE HEAT EXCHANGER IN A COMMERCIAL GRADE BOILER SHALL EXTEND TO THE ORIGINAL OWNER FOR THE TIME SPECIFIED IN THE HEAT EXCHANGER SECTION SHOWN ABOVE AT THE ORIGINAL PLACE OF INSTALLATION. SOME STATES DO NOT ALLOW LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

PROCEDURE FOR OBTAINING WARRANTY SERVICE

In order to assure prompt warranty service, the owner is requested to complete and mail the Warranty Card provided with the product or register product online at www.burnhamcommercialcastiron.com within ten days after the installation of the boiler, although failure to comply with this request will not void the owner's rights under these warranties. Upon discovery of a condition believed to be related to a defect in material or workmanship covered by these warranties, the owner should notify the installer, who will in turn notify the distributor. If this action is not possible or does not produce a prompt response, the owner should write to Burnham Commercial, P.O. Box 3939, Lancaster, PA 17604, giving full particulars in support of the claim. The owner is required to make available for inspection by Burnham Commercial or its representative the parts claimed to be defective and, if requested by Burnham Commercial to ship these parts prepaid to Burnham Commercial at the above address for inspection or repair. In addition, the owner agrees to make all reasonable efforts to settle any disagreement arising in connection with a claim before resorting to legal remedies in the courts.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.



Burnham Commercial, P.O. Box 3939, Lancaster, PA 17604

Revised November 1, 2009