

# **F8AUH** **Gas Furnaces** **Up-Flow/Horizontal**

**AFUE - Up to 80.5%**  
**Heating Input - 45,000 to 120,000 Btuh (13.2 to 35.2 kW)**  
**Add-On Cooling - 1 thru 5 Tons (3.5 to 17.6 kW)**

## **SERVICE MANUAL**

**Corp 9912-L5**  
**Revised 08-2004**

F8AUH series units are mid-efficiency gas furnaces used for upflow or horizontal applications only, manufactured with tubular heat exchangers formed of aluminized steel. F8AUH units are available in heating capacities of 45,000 to 120,000 Btuh and cooling applications up to 5 tons. Refer to Engineering Handbook for proper sizing.

Units are factory equipped for use with natural gas. Kits are available for conversion to LPG operation. F8AUH model units are equipped with a hot surface silicon carbide ignition system. The F8AUHX unit meets the California Nitrogen Oxides (NO<sub>x</sub>) Standards and California Seasonal Efficiency requirements. All units use a redundant gas valve to assure safety shut-off as required by A.G.A. or C.G.A. Units may be installed in upflow or horizontal position.

All specifications in this manual are subject to change. Procedures outlined in this manual are presented as a recommendation only and do not supersede or replace local or state codes. In the absence of local or state codes, the guidelines and procedures outlined in this manual (except where noted) are recommended only and do not constitute code.

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## SPECIFICATIONS

Model No.	F8AUH** <b>-24-045</b> F8AUH** <b>-24-045X</b>	F8AUH** <b>-24-060</b>	F8AUH** <b>-36-060</b> F8AUH** <b>-36-060X</b>	F8AUH** <b>-24-075</b>	F8AUH** <b>-36-075</b> F8AUH** <b>-36-075X</b>
Input Btuh (kW)	45,000 (13.2)	60,000 (17.6)	60,000 (17.6)	75,000 (22.0)	75,000 (22.0)
Output Btuh (kW)	39,600 (10.8)	49,200 (14.4)	49,200 (14.4)	61,700 (18.1)	61,700 (18.1)
①AFUE	80.1%	80.5%	80.5%	80.1%	80.0%
California Seasonal Efficiency	75.4%	76.4%	75.9%	76.8%	76.8%
Flue size connection dia. - in. (mm) round	3 (76)	3 (76)	3 (76)	4 (102)	4 (102)
Temperature rise range - °F (°C)	30 - 60 (17 - 33)	45 - 75 (25 - 42)	45 - 75 (25 - 42)	45 - 75 (25 - 42)	45 - 75 (25 - 42)
High static AGA/CGA cert. - in wg. (Pa)	.50 (125)	.50 (125)	.50 (125)	.50 (125)	.50 (125)
Gas Piping Size IPS Nat. or LPG/propane	1/2 (13)	1/2 (13)	1/2 (13)	1/2 (13)	1/2 (13)
Blower wheel nominal diameter x width	in.	9 x 7	9 x 7	10 x 7	9 x 7
	mm	229 x 178	229 x 178	254 x 178	229 x 178
Blower motor output - hp (W)	1/4 (187)	1/4 (187)	1/3 (224)	1/4 (187)	1/3 (224)
Nominal cooling that can be added	Tons	1, 1.5 or 2	1, 1.5 or 2	2, 2.5 or 3	1, 1.5 or 2
	kW	3.5, 5.3 or 7.0	3.5, 5.3 or 7.0	7.0, 8.8 or 10.6	3.5, 5.3 or 7.0
Shipping weight - lbs. (kg) 1 package	130 (59)	130 (59)	135 (61)	135 (61)	135 (61)
Electrical characteristics	120 volts - 60 hertz - 1 phase (less than 12 amps) All models				
<b>OPTIONAL ACCESSORIES - Must Be Ordered Extra</b>					
Hanging Bracket Kit	46J66	46J66	46J66	46J66	46J66
②High Altitude Pressure Switch Kits	No Change	No Change	No Change	88J80	88J80
LPG/propane kit	38K84	38K84	38K84	38K84	38K84
③Sidewall Power Venting Kit	79J15	79J15	79J15	79J15	79J15
Twinning Kit	15L38	15L38	15L38	15L38	15L38
Up-Flow/Horizontal Filter and Filter Rack Kits	32J02 (single) 66K64 (ten)	32J02 (single) 66K64 (ten)	32J02 (single) 66K64 (ten)	32J02 (single) 66K64 (ten)	32J02 (single) 66K64 (ten)
④No. & size of filters - in. (mm)	(1) 16 x 20 x 1 (406 x 508 x 25)	(1) 16 x 20 x 1 (406 x 508 x 25)	(1) 16 x 20 x 1 (406 x 508 x 25)	(1) 16 x 20 x 1 (406 x 508 x 25)	(1) 16 x 20 x 1 (406 x 508 x 25)

\*Variable Field.

①Annual Fuel Utilization Efficiency based on US DOE test procedures and according to FTC labeling regulations. Isolated combustion system rating for non-weatherized furnaces.

②For proper operation at altitudes over 4500 ft. (1370 m).

③Required for horizontal venting applications.

④Polyurethane frame type filter is furnished with kit.

## SPECIFICATIONS

Model No.	F8AUH**-48-075 F8AUH**-48-075X	F8AUH**-48-100 F8AUH**-48-100X	F8AUH**-60-100 F8AUH**-60-100X	F8AUH**-48-120	F8AUH**-60-120 F8AUH**-60-120X
Input Btuh (kW)	75,000 (22.0)	100,000 (29.3)	100,000 (29.3)	120,000 (35.2)	120,000 (35.2)
Output Btuh (kW)	61,700 (18.1)	82,000 (24.0)	82,000 (24.0)	98,400 (28.8)	98,400 (28.8)
① AFUE	80.0%	80.1%	80.0%	80.0%	80.1%
California Seasonal Efficiency	76.3%	76.5%	77.0%	Not available	75.5%
Flue size connection dia. - in. (mm) round	4 (102)	4 (102)	4 (102)	4 (102)	4 (102)
Temperature rise range - °F (°C)	45 - 75 (25 - 42)	45 - 75 (25 - 42)	35 - 65 (19 - 36)	45 - 75 (25 - 42)	45 - 75 (25 - 42)
High static AGA/CGA cert. - in wg. (Pa)	.50 (125)	.50 (125)	.65 (162)	.50 (125)	.50 (125)
Gas Piping Size IPS Nat. or LPG/propane	1/2 (13)	1/2 (13)	1/2 (13)	1/2 (13)	1/2 (13)
Blower wheel nominal diameter x width	in.	11 x 8	12 x 8	12 x 9	10 x 10
	mm	279 x 203	305 x 203	305 x 229	254 x 254
Blower motor output - hp (W)	1/2 (373)	1/2 (373)	3/4 (560)	1/2 (373)	3/4 (560)
Nominal cooling that can be added	Tons	2 thru 4	2 thru 4	3.5 thru 6	2 thru 4
	kW	7.0 thru 14.1	7.0 thru 14.1	12.3 thru 21.1	7.0 thru 14.1
Shipping weight - lbs. (kg) 1 package	140 (64)	175 (79)	175 (79)	175 (79)	175 (79)
Electrical characteristics	120 volts - 60 hertz - 1 phase (less than 12 amps) All models				
<b>OPTIONAL ACCESSORIES - Must Be Ordered Extra</b>					
Hanging Bracket Kit	46J66	46J66	46J66	46J66	46J66
② High Altitude Pressure Switch Kits	88J80	18L24	18L24	18L24	18L24
LPG/propane kit	38K84	81J14	81J14	81J14	81J14
③ Sidewall Power Venting Kit	79J15	79J15	79J15	79J15	79J15
Twinning Kit	15L38	15L38	15L38	15L38	15L38
Up-Flow/Horizontal Filter and Filter Rack Kits	32J02 (single) 66K64 (ten)	46J14 (single) 66K65 (ten)	46J14 (single) 66K65 (ten)	46J14 (single) 66K65 (ten)	46J14 (single) 66K65 (ten)
④ No. & size of filters - in. (mm)	(1) 16 x 20 x 1 (406 x 508 x 25)	(1) 20 x 20 x 1 (508 x 508 x 25)	(1) 20 x 20 x 1 (508 x 508 x 25)	(1) 20 x 20 x 1 (508 x 508 x 25)	(1) 20 x 20 x 1 (508 x 508 x 25)

\*Variable Field.

① Annual Fuel Utilization Efficiency based on US DOE test procedures and according to FTC labeling regulations. Isolated combustion system rating for non-weatherized furnaces.

② For proper operation at altitudes over 4500 ft. (1370 m).

③ Required for horizontal venting applications.

④ Polyurethane frame type filter is furnished with kit.

## BLOWER DATA

### F8AUH\*\*-24-045, F8AUH\*\*-24-060 AND F8AUH\*\*-24-75 BLOWER PERFORMANCE

External Static Pressure		Air Volume at Various Blower Speeds							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1270	600	980	460	770	365	570	270
.05	12	1245	590	975	460	770	365	565	265
.10	25	1220	575	975	460	770	365	565	265
.15	37	1195	565	965	455	765	360	560	265
.20	50	1170	550	960	455	760	360	560	265
.25	62	1140	540	950	450	760	360	555	260
.30	75	1110	525	940	445	760	360	550	260
.40	100	1060	500	910	430	750	355	545	255
.50	125	990	465	880	415	740	350	540	255
.60	150	900	425	810	380	690	325	530	250
.70	175	800	380	740	350	630	295	520	245

NOTE - All air data is measured external to unit with 1 in. (25 mm) cleanable filter (not furnished) in place. Also see Filter Air Resistance table

### F8AUH\*\*-36-060 AND F8AUH\*\*-36-075 BLOWER PERFORMANCE

External Static Pressure		Air Volume at Various Blower Speeds							
		High		Medium-High		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1425	670	1240	585	1000	470	800	380
.05	12	1415	670	1230	580	995	470	800	380
.10	25	1400	660	1220	575	990	465	795	375
.15	37	1385	655	1200	565	985	465	795	375
.20	50	1370	645	1180	555	980	460	790	375
.25	62	1350	635	1160	545	970	460	780	370
.30	75	1330	630	1140	540	955	450	770	365
.40	100	1280	605	1095	515	925	435	750	355
.50	125	1210	570	1040	490	900	425	720	340
.60	150	1135	535	985	465	860	405	680	320
.70	175	1070	505	920	435	800	380	630	300

NOTE - All air data is measured external to unit with 1 in. (25 mm) cleanable filter (not furnished) in place. Also see Filter Air Resistance table

### F8AUH\*\*-48-075, F8AUH\*\*-48-100 AND F8AUH\*\*-48-120 BLOWER PERFORMANCE

External Static Pressure		Air Volume at Various Blower Speeds									
		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	1830	865	1600	755	1325	625	1070	505	880	415
.05	12	1815	855	1585	750	1320	625	1070	505	880	415
.10	25	1800	850	1570	740	1315	620	1070	505	880	415
.15	37	1875	885	1550	730	1310	620	1065	505	875	415
.20	50	1750	825	1530	720	1300	615	1060	500	875	415
.25	62	1725	815	1515	715	1290	610	1050	495	870	410
.30	75	1700	800	1500	710	1275	600	1040	490	870	410
.40	100	1650	780	1460	690	1245	590	1020	480	860	405
.50	125	1600	755	1420	670	1210	570	1000	470	840	395
.60	150	1550	730	1380	650	1170	550	980	460	820	385
.70	175	1480	700	1330	630	1130	535	960	455	790	375

NOTE - All air data is measured external to unit with 1 in. (25 mm) cleanable filter (not furnished) in place. Also see Filter Air Resistance table

## BLOWER DATA

### F8AUH\*\*-60-100 AND F8AUH\*\*-60-120 BLOWER PERFORMANCE

External Static Pressure		Air Volume at Various Blower Speeds									
		High		Medium-High		Medium		Medium-Low		Low	
in. w.g.	Pa	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
0	0	2450	1155	2160	1020	1970	930	1700	800	1500	710
.05	12	2440	1150	2155	1015	1965	925	1695	800	1500	710
.10	25	2430	1145	2150	1015	1960	925	1690	800	1495	705
.15	37	2415	1140	2135	1010	1950	920	1685	795	1495	705
.20	50	2400	1135	2120	1000	1940	915	1680	795	1490	705
.25	62	2380	1125	2105	995	1930	910	1675	790	1480	700
.30	75	2360	1115	2090	985	1915	905	1670	790	1470	695
.40	100	2310	1090	2050	965	1870	880	1650	780	1440	680
.50	125	2260	1065	2000	945	1810	855	1610	760	1410	665
.60	150	2180	1030	1950	920	1750	825	1560	735	1370	645
.70	175	2100	990	1890	890	1700	800	1520	715	1330	630

NOTE - All air data is measured external to unit with 1 in. (25 mm) cleanable filter (not furnished) in place. Also see Filter Air Resistance table

### FILTER AIR RESISTANCE

cfm (L/s)	in. w.g. (Pa)
0 (0)	0.00 (0)
200 (95)	0.01 (2)
400 (185)	0.03 (7)
600 (280)	0.04 (10)
800 (375)	0.06 (15)
1000 (470)	0.09 (22)
1200 (560)	0.12 (30)
1400 (655)	0.15 (37)
1600 (750)	0.19 (47)
1800 (845)	0.23 (57)
2000 (935)	0.27 (67)
2200 (1030)	0.33 (82)
2400 (1125)	0.38 (95)
2600 (1220)	0.44 (110)

## HORIZONTAL VENTING REQUIREMENTS (Requires Optional Side Wall Power Venting Kit)

Furnace Model No.	Vent Pipe Diameter Furnace Connection		Vent Pipe Minimum Equivalent Length		Vent pipe Maximum Equivalent Length		Horizontal Venting Transition Required	
	in.	mm	feet	meters	feet	meters	in.	mm
F8AUH**-24-045 F8AUH**-24-060 F8AUH**-36-060	3	76	10	3.0	60	18.0	☐3 to 4	☐76 to 102
F8AUH**-24-075 F8AUH**-36-075 F8AUH**-48-075 F8AUH**-48-100 F8AUH**-60-100 F8AUH**-48-120 F8AUH**-60-120	4	102	10	3.0	60	18.0	----	----

VENTING NOTES - Elbows - One 3 inch (76 mm) diameter 45° elbow is equivalent to 3 feet (1.0 m) of straight vent pipe.  
 One 4 inch (102 mm) diameter 45° elbow is equivalent to 4 feet (1.2 m) of straight vent pipe.  
 One 3 inch (76 mm) 90° elbow is equivalent to 5 feet (1.5 m) of straight vent pipe.  
 One 4 inch (102 mm) 90° elbow is equivalent to 7 feet (2.1 m) of straight vent pipe.  
 Two 45° elbows are equal to one 90° elbow.

Tees - One 3 inch (76 mm) diameter tee is equivalent to 19 feet (5.8 m) of straight vent pipe.  
 One 4 inch (102 mm) diameter tee is equivalent to 25 feet (7.6 m) of straight vent pipe.

Transition - 3 inch to 4 inch (76 mm to 102 mm) transition is equivalent to 2 feet (0.61 m) of straight vent pipe.

☐ Transition furnished with power venter should be installed on top of flue adaptor at induced draft blower.  
 NOTE - All horizontal venting applications require optional Sidewall Power Venting Kit.

### HIGH ALTITUDE DERATE

Refer to table below for manifold pressure settings for Installations at different altitudes and different fuels.

*NOTE-In Canada, certification for installations over 4500 ft. (1372m) above sea level is the jurisdiction of the local authorities.*

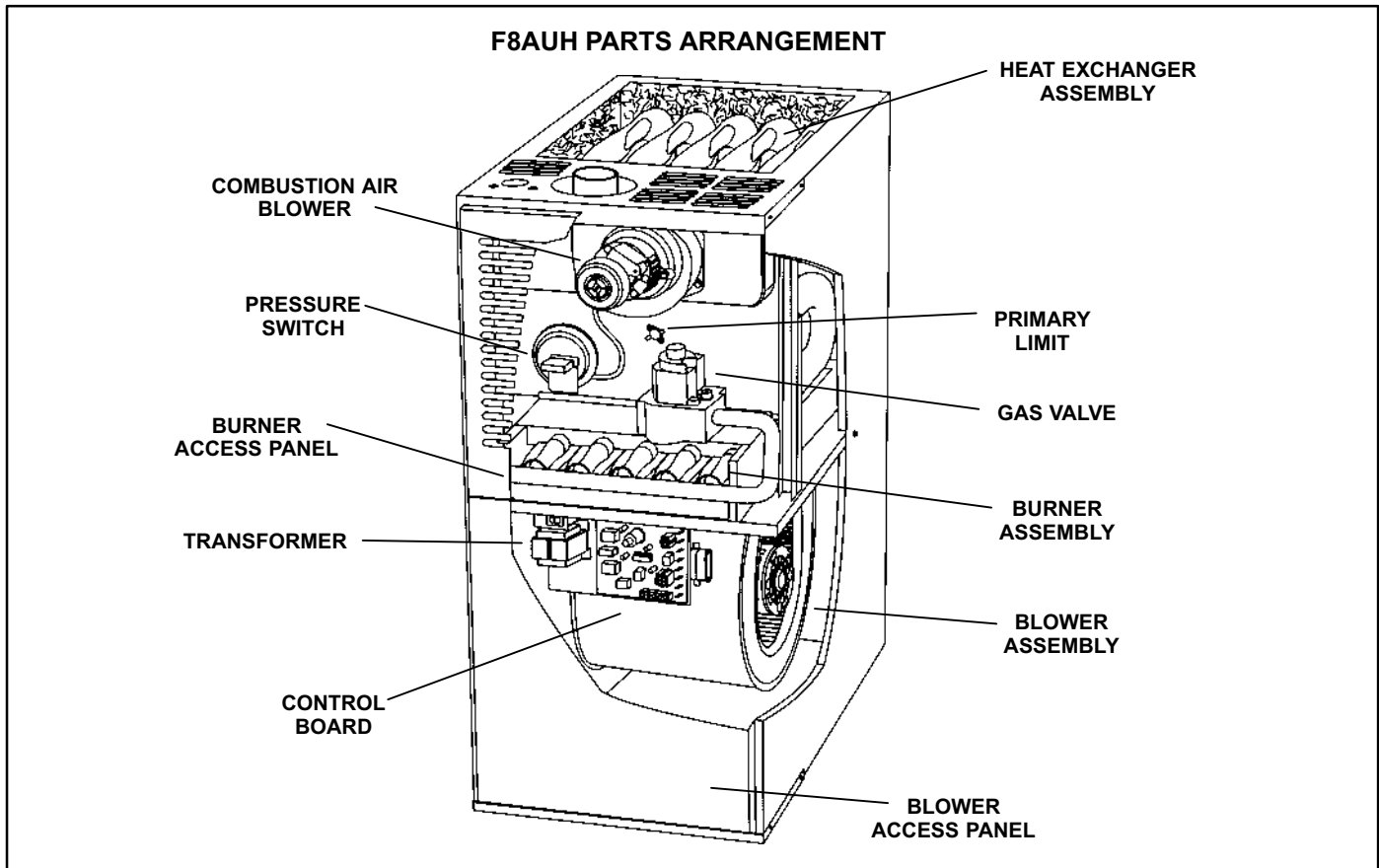
The combustion air blower pressure switches are factory set and are not to be adjusted.

At elevations of 4500 ft. (1372m) or greater, change factory installed pressure switch to switch listed in table below.

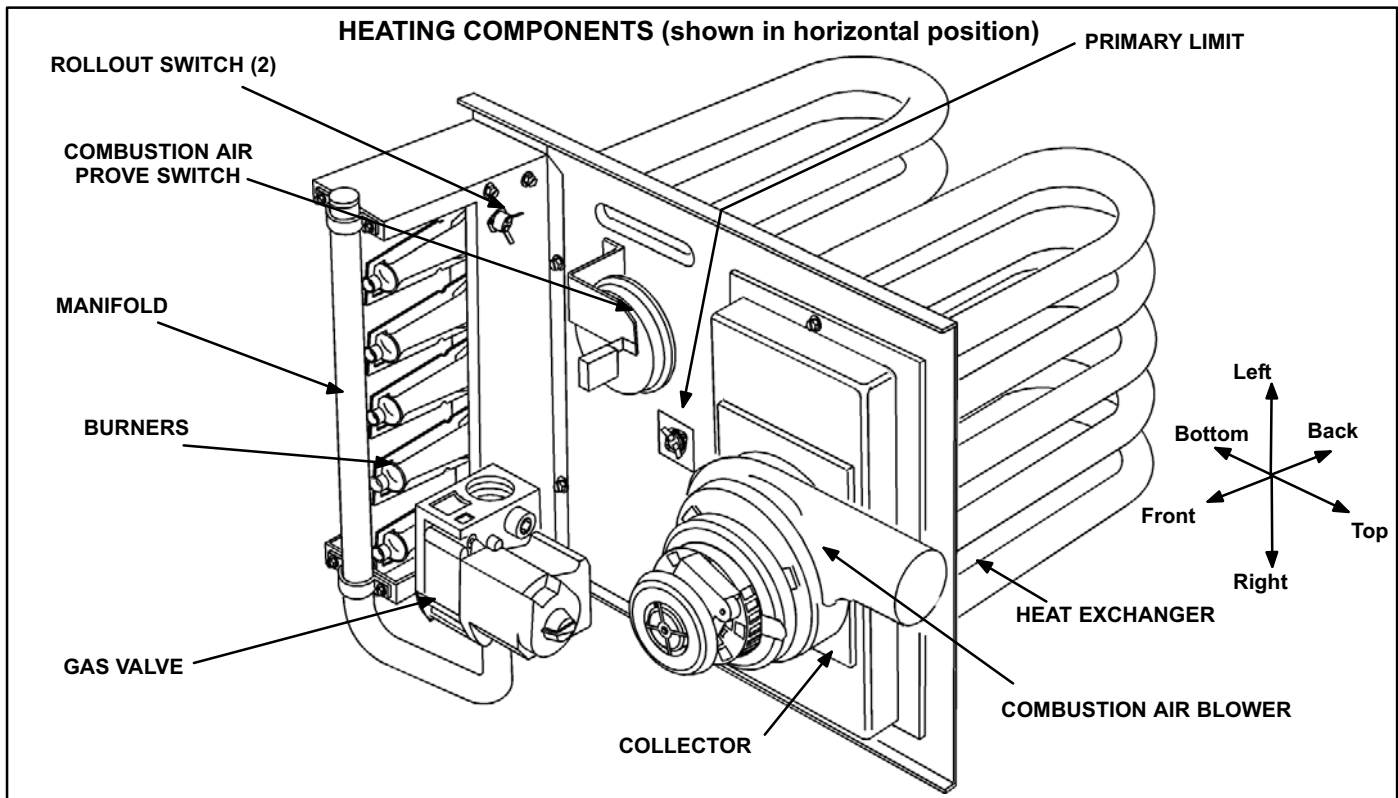
#### Manifold Absolute Pressure in. w.c. (kPa)

ALTITUDE ft. (m)				
FUEL	0-4500 (0-1372)	4500-5500 (1372-1676)	5500-6500 (1676-1981)	6500-7500 (1982-2286)
NAT	3.5 (0.87)	3.4 (0.85)	3.3 (0.82)	3.2 (0.80)
LP	9.5 (2.36)	9.2 (2.29)	8.9 (2.21)	8.6 (2.14)

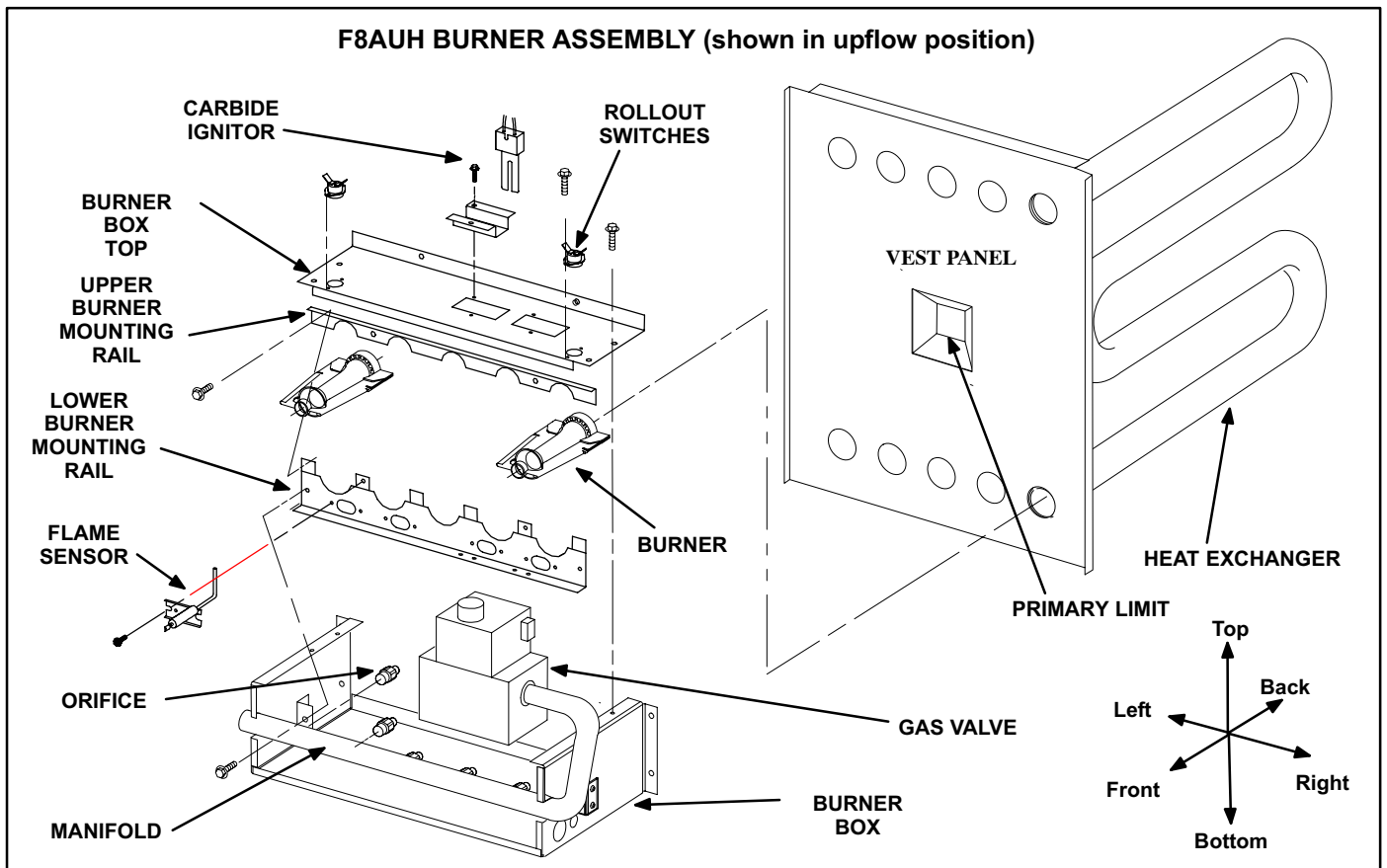
UNIT MODEL	PRESSURE SWITCH PART NUMBER
F8AUH**-24-045(X)	NO CHANGE
F8AUH**-24-060 F8AUH**-36-060(X)	NO CHANGE
F8AUH**-24-075 F8AUH**-36-075(X) F8AUH**-48-75(X)	88J80
F8AUH**-48-100(X) F8AUH**-60-100(X)	18L24
F8AUH**-48-120 F8AUH**-60-120(X)	18L24



**FIGURE 1**



**FIGURE 2**



**FIGURE 3**

**I-UNIT COMPONENTS (Figures 1, 2, 3)**

F8AUH unit components are shown in figure 1. The gas valve, combustion air blower and burners can be accessed by removing the burner access panel. Electrical components are mounted to the blower housing. F8AUH units are factory equipped with bottom return air panels in place. The panels are designed to be field removed as required for bottom air return. Knockout panels are provided for side return air.

**ELECTROSTATIC DISCHARGE (ESD)  
Precautions and Procedures**

**⚠ CAUTION**

Electrostatic discharge can affect electronic components. Take precautions during furnace installation and service to protect the furnace's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the furnace, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface, such as the gas valve or blower deck, before performing any service procedure.

**1- Control Transformer (T1)**

A transformer located on the blower housing provides power to the low voltage section of the unit. Transformers on all models are rated 30VA with a 120V primary and a 24V secondary.

**2-Door Interlock Switch (S51)**

A door interlock switch rated 16A at 125VAC is wired in series with line voltage. When the blower door is removed the unit will shut down.

**⚠ DANGER**

Shock hazard.  
Spark related components contain high voltage. Disconnect power before servicing. Control is not field repairable. If control is inoperable, simply replace entire control.  
Can cause injury or death. Unsafe operation will result if repair is attempted.



### 3- Furnace Control (A3)

All F8AUH model units are equipped with an integrated ignition blower control (50A55), which controls ignition, safety circuits, blower operation, fan off timing and allows for thermostat connection and troubleshooting. The system consists of ignition control board (figure 6 with control terminal designations in table 4) and a silicon carbide ignitor (figure 7). The board features two LED lights for troubleshooting and two accessory terminals rated at (4) four amps. See table 3 for troubleshooting diagnostic codes. Table 1 and 2 show jack plug terminal designations. Units equipped with this control board board can be used with either electronic or electro-mechanical thermostats without modification. Each time power is applied to the furnace, the control board board performs a selfcheck including energizing the combustion air blower for a period of 1 second.

**TABLE 1**

CONTROL BOARD J156 (J2) TERMINAL DESIGNATIONS	
PIN #	FUNCTION
1	Combustion Air Blower Line
2	Ignitor Line
3	Combustion Air Blower Neutral
4	Ignitor Neutral

**TABLE 2**

CONTROL BOARD J58 (J1) TERMINAL DESIGNATIONS	
PIN #	FUNCTION
1	High Limit Out
2	Not Used
3	24V
4	Not Used
5	Rollout Switch In
6	24V
7	High Limit In
8	Ground
9	Gas Valve In
10	Pressure Switch In
11	Rollout Switch Out
12	Gas Valve Out

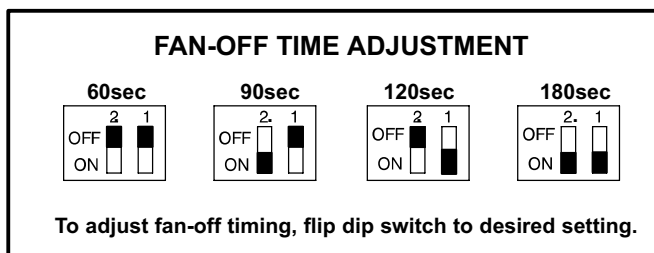
#### a-Electronic Ignition (See Figure 5)

On a call for heat the 50A55 control board monitors the combustion air blower pressure switch. The control will not begin the heating cycle if the pressure switch is closed (bypassed). Once the pressure switch is determined to be open, the combustion air blower is energized. When the differential in the pressure switch is great enough, the pressure switch closes and a 15-second pre-purge begins. If the pressure switch is not proven within 2-1/2 minutes, the control goes into Watchguard-Pressure Switch mode for a 5-minute re-set period.

After the 15-second pre-purge period, the carbide ignitor warms up for 11 to 21 seconds during which the gas valve opens at 19 seconds for a 4-second trial for ignition. The ignitor stays energized for the first second of the 4-second trial. If ignition is not proved during the 4-second period, the control will try four more times with an inter purge and warm-up time between trials of 37 seconds. After a total of five trials for ignition (including the initial trial), the control goes into Watchguard-Flame Failure mode. After a 60-minute reset period, the control will begin the ignition sequence again.

#### b-Fan Time Control

The fan on time of 45 seconds is not adjustable. Fan off time (time that the blower operates after the heat demand has been satisfied) can be adjusted by flipping the dip switches located on the integrated control. The unit is shipped with a factory fan off setting of 90 seconds. Fan off time will affect comfort and is adjustable to satisfy individual applications. See figure 4.



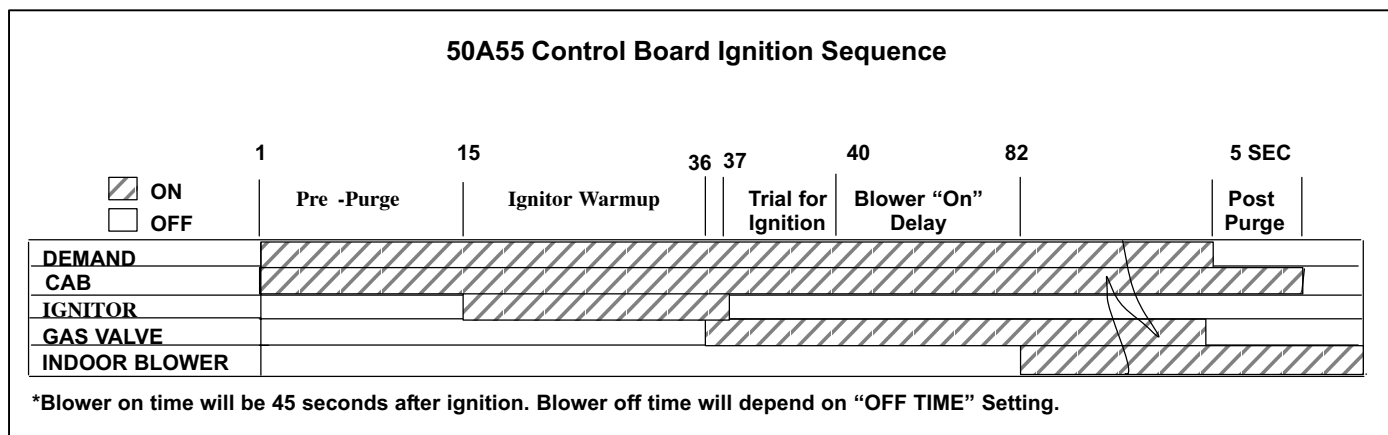
**FIGURE 4**

The 50A55 control board is equipped with two LED lights for troubleshooting. The diagnostic codes are listed below in table 3.

**TABLE 3  
DIAGNOSTIC CODES**

MAKE SURE TO ID LED'S CORRECTLY: REFER TO INSTALLATION INSTRUCTIONS FOR CONTROL BOARD LAYOUT.		
LED #1	LED #2	DESCRIPTION
SIMULTANEOUS SLOW FLASH	SIMULTANEOUS SLOW FLASH	Power - Normal operation Also signaled during cooling and continues fan.
SIMULTANEOUS FAST FLASH	SIMULTANEOUS FAST FLASH	Normal operation - signaled when heating demand initiated at thermostat.
SLOW FLASH	ON	Primary or Secondary limit open. Units with board 12L42: Limit must close within 5 trials for ignition or board goes into one hour limit Watchguard. Units with board 56L85: Limit must close within 3 minutes or board goes into one hour limit Watchguard.
OFF	SLOW FLASH	Pressure switch open or has opened 5 times during a single call for heat; OR: Blocked inlet/exhaust vent; OR: Condensate line blocked; OR: Pressure switch closed prior to activation of combustion air blower.
ALTERNATING SLOW FLASH	ALTERNATING SLOW FLASH	Watchguard - burners fail to ignite.
SLOW FLASH	OFF	Flame sensed without gas valve energized.
ON	SLOW FLASH	Rollout switch open. OR: 9 pin connector improperly attached.
ON ON OFF	ON OFF ON	Circuit board failure or control wired incorrectly.
FAST FLASH	SLOW FLASH	Main power polarity reversed. Switch line and neutral.
SLOW FLASH	FAST FLASH	Low flame signal. Measures below .7 microAmps. Replace flame sense rod.
ALTERNATING FAST FLASH	ALTERNATING FAST FLASH	Improper main ground or line voltage below 75 volts; OR: Broken ignitor; OR: Open ignitor circuit.

NOTE - Slow flash equals 1 Hz (one flash per second). Fast flash equals 3 Hz (three flashes per second). Drop out flame sense current < 0.15 microAmps



**FIGURE 5**

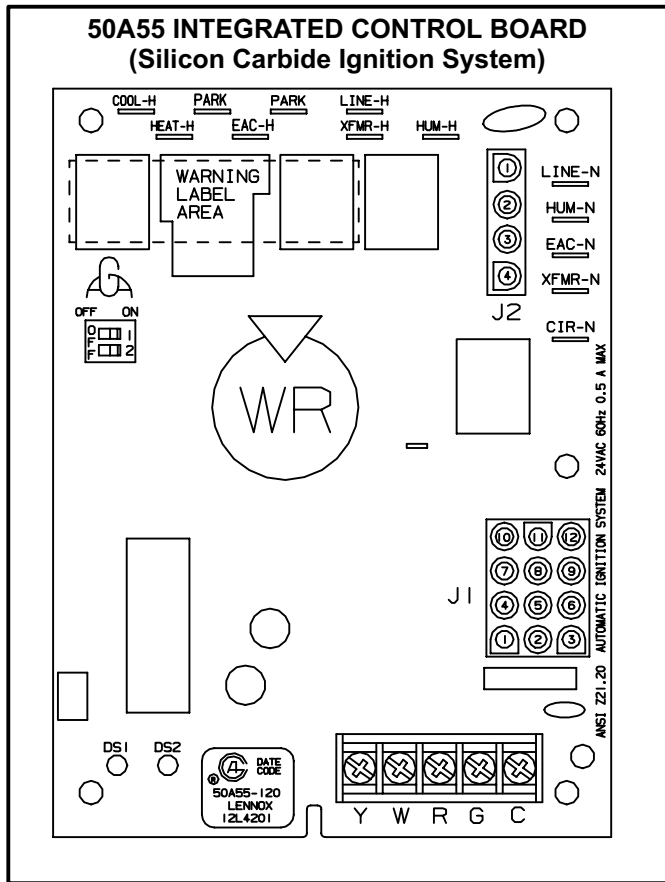


FIGURE 6

#### 4-Flame Sensor

A flame sensor is located on the left side of the burner support. See figure 8. The sensor is mounted on a bracket in the burner support and the tip protrudes into the flame envelope of the left-most burner. The sensor is fastened to burner supports and can be removed for service without removing any part of the burners. During operation, flame is sensed by current passed through the flame and sensing electrode. The control board allows the gas valve to remain open as long as flame signal is sensed.

*NOTE - The F8AUH furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.*

TABLE 4

TERMINAL DESIGNATIONS	
COOL-H	Blower - Cooling Speed (120VAC)
HEAT-H	Blower - Heating Speed (120VAC)
EAC-H	Electronic Air Cleaner (120VAC)
HUM-H	Humidifier (120VAC)
XFMR-H	Transformer (120VAC)
LINE-H	Input (120VAC)
LINE-N	Input (Neutral)
HUM-N	Humidifier (Neutral)
EAC-N	Electronic Air Cleaner (Neutral)
XFMR-N	Transformer (Neutral)
CIR-N	Not Used
PARK	Alternate Blower Speeds (Dead)
(FLAME SENSE)	Flame Sensor

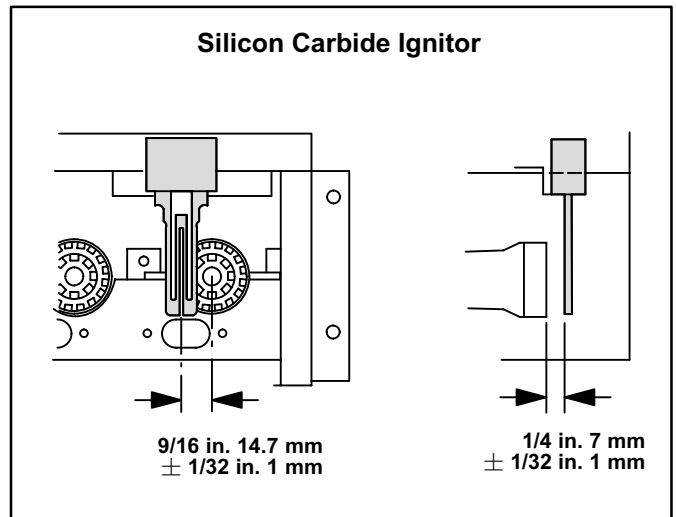


FIGURE 7

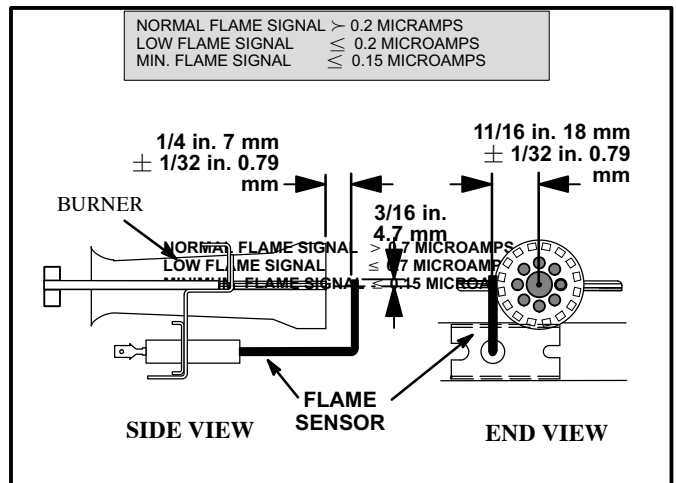


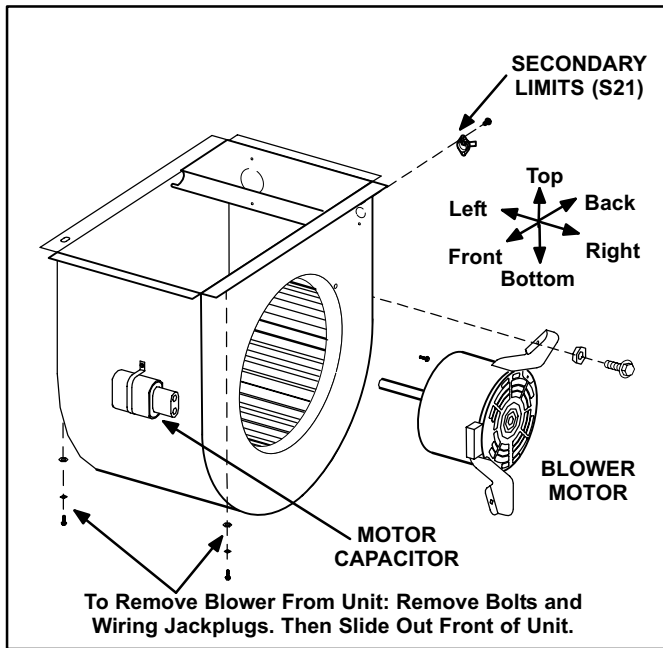
FIGURE 8

## 5-Blower Motors and Capacitors

All F8AUH units use direct drive blower motors. All motors used are 120V permanent split capacitor motors to ensure maximum efficiency. See table 5 for ratings.

**TABLE 5**

F8AUH BLOWER RATINGS 120V 1PH		
BLOWER MOTOR	HP	CAP
F8AUH24-045/060/075	1/4	5MFD 370V
F8AUH36-060/075	1/3	5MFD 370V
F8AUH48-075/100/120	1/2	7.5MFD 370V
F8UH60-100/120	3/4	40MFD 370V



**FIGURE 9**

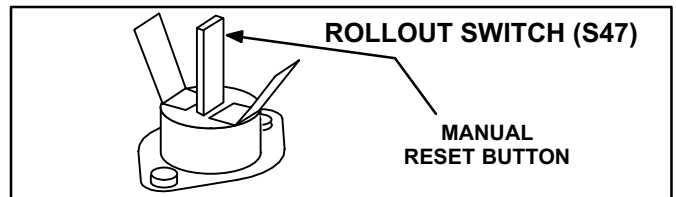
## 6-Combustion Air Blower (B6)

All F8AUH units use a combustion air blower to move air through the burners and heat exchanger during heating operation. The blower uses a 120VAC motor. The motor operates during all heating operation and is controlled by furnace control A3. The blower also operates for 15 seconds before burner ignition (pre-purge) and for 5 seconds after the gas valve closes (post-purge)

A pressure switch connected to the combustion air blower housing is used to prove combustion air blower operation. The switch monitors air pressure in the blower housing. During normal operation, the pressure in the housing is negative. If pressure becomes less negative (signifying an obstruction) the pressure switch opens. When the pressure switch opens, the furnace control (A3) immediately closes the gas valve to prevent burner operation.

## 7-Flame Rollout Switches (S47)

Flame rollout switch is a high temperature limit located on top of the burner box. Each furnace is equipped with two identical switches. One switch is located over the leftmost burner and the other switch is located over the rightmost burner. The limit is a N.C. SPST manual-reset limit connected in series with the ignition control A3. When S47 senses rollout, the ignition control immediately stops ignition and closes the gas valve. If unit is running and flame rollout is detected, the gas valve will close and ignition control will be disabled. Rollout can be caused by a blocked flue or lack of combustion air. The switch is factory set and cannot be adjusted. The setpoint will be printed on the side of the limit. The switch can be manually reset. To manually reset a tripped switch, push the reset button located on the control.



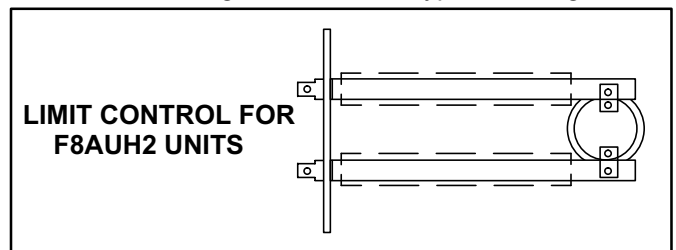
**FIGURE 10**

## 8-Primary Limit Control (S10) Figure 12

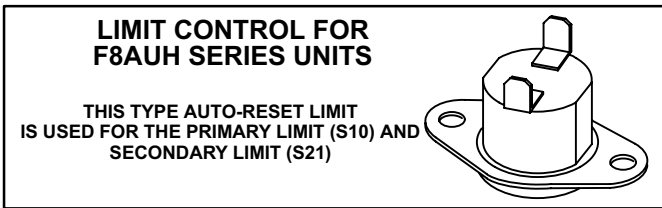
The primary limit (S10) on F8AUH units is located in the middle of the heating vestibule panel. When excess heat is sensed in the heat exchanger, the limit will open. If the limit is tripped, the furnace control energizes the supply air blower and closes the gas valve. The limit automatically resets when unit temperature returns to normal. The switch is factory set and cannot be adjusted. The switch may have a different setpoint for each unit model number. However, the setpoint will be printed on the side of the limit.

## 9-Secondary Limit Controls (S21) Figure 12

The secondary limit (S21) on F8AUH units is located in the blower compartment in the back side of the blower housing. When excess heat is sensed in the blower compartment, the limit will open. If the limit is tripped, the furnace control energizes the supply air blower and closes the gas valve. The limit automatically resets when unit temperature returns to normal. The switch is factory set and cannot be adjusted. F8AUH 2 ton units will be equipped with type limit in figure 11 and F8AUH 3 ton and greater will have type limit in figure 12 .



**FIGURE 11**



**FIGURE 12**

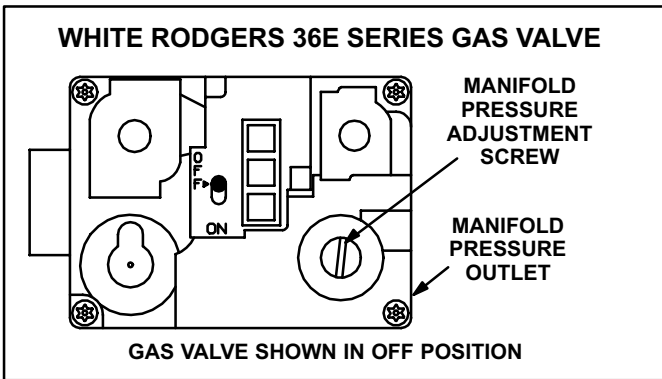
**10-Gas Valve**

The F8AUH uses a gas valve manufactured by White Rodgers (figure 13) or Honeywell (figure 14). The valve is internally redundant to assure safety shut-off. If the gas valve must be replaced, the same type valve must be used.

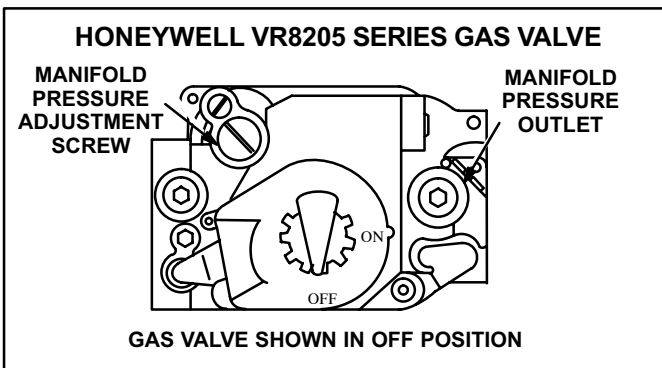
24VAC terminals and gas control knob are located on top of the valve. All terminals on the gas valve are connected to wires from the electronic ignition control. 24V applied to the terminals energizes the valve.

Inlet and outlet pressure taps are located on the valve. A regulator adjustment screw is located on the valve.

LPG change over kits are available. Kits include burner orifices and a gas valve regulator conversion kit. See optional accessories in the SPECIFICATIONS section of this manual for kit number.



**FIGURE 13**

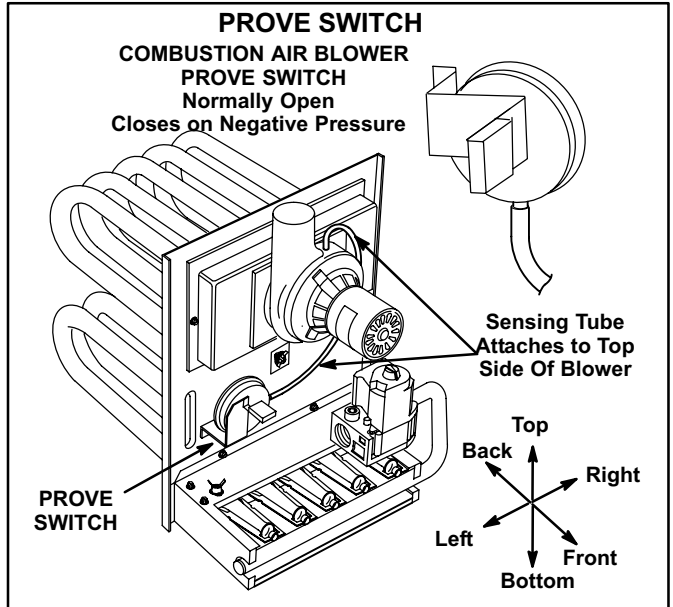


**FIGURE 14**

**11-Combustion Air Blower Prove (Pressure) Switch (S18)**

F8AUH series units are equipped with a combustion air blower prove switch located on the vestibule panel. The switch is connected to the combustion air blower housing by means of a flexible silicone hose. It monitors air pressure in the combustion air blower housing.

The switch is a single-pole single-throw pressure switch electrically connected to the furnace control. The purpose of the switch is to prevent burner operation if the combustion air blower is not operating or if the flue becomes obstructed.



**FIGURE 15**

On start-up, the switch senses that the combustion air blower is operating. It closes a circuit to the furnace control when pressure inside the combustion air blower decreases to a certain set point. Set points vary depending on unit size. The pressure sensed by the switch is relative to atmospheric pressure. If the flue becomes obstructed during operation, the switch senses a loss of negative pressure (pressure becomes more equal with atmospheric pressure) and opens the circuit to the furnace control and gas valve. A bleed port on the switch allows dry relative air in the vestibule to purge switch tubing, to prevent condensate build up. The switch also has an internal inline orifice, designed to prevent nuisance shut downs due to erratic vent pressure fluctuations.

The switch is factory set and is not field adjustable. It is a safety shut-down control in the furnace and must not be by-passed for any reason. If switch is closed or by-passed, the control will not initiate ignition at start up.

## II-PLACEMENT AND INSTALLATION

Make sure unit is installed in accordance with installation instructions and applicable codes.

## III-START-UP

### A-Preliminary and Seasonal Checks

- 1 - Inspect electrical wiring, both field and factory installed for loose connections. Tighten as required.
- 2 - Check voltage at disconnect switch. Voltage must be within range listed on the nameplate. If not, consult the power company and have voltage condition corrected before starting unit.

### B-Heating Start-Up

## ⚠ WARNING

**Shock and burn hazard.**

**F8AUH units are equipped with a direct spark ignition system. Do not attempt to light manually.**

- 1 - **STOP!** Read the safety information at the beginning of this section.
- 2 - Set thermostat to lowest setting.
- 3 - Turn off all electrical power to appliance.
- 4 - This appliance is equipped with an ignition device which automatically lights the burners. Do **not** try to light the burners by hand.
- 5 - Remove top access panel.
- 6 - *White Rodgers 36E Gas Valve* -- Switch lever to **OFF**. See figure 13.  
*Honeywell VR8205 Gas Valve* -- Turn knob on gas valve clockwise ➡ to **OFF**. Do not force. See figure 14.
- 7 - Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas go to next step.
- 8 - *White Rodgers 36E Gas Valve* -- Switch gas valve lever to **ON**.  
*Honeywell VR8205 Gas Valve* -- Turn knob on gas valve counterclockwise ⬅ to **ON**. Do not force.
- 9 - Replace access panel.
- 10- Turn on all electrical power to unit.
- 11- Set thermostat to desired setting.
- 12- If the appliance will not operate, follow the instructions "To Turn Off Gas To Unit" and call your service technician or gas supplier.

### Turning Off Gas To Unit

- 1 - Set thermostat to lowest setting.
- 2 - Turn off all electrical power to unit if service is to be performed.
- 3 - Remove access panel.
- 4 - Switch lever on White Rodgers gas valve to **OFF**; turn

knob on Honeywell valve clockwise ➡ to **OFF**. Do not force.

- 5 - Replace access panel.

### C-Safety or Emergency Shutdown

Turn off unit power. Close manual and main gas valves.

### D-Extended Period Shutdown

Turn off thermostat or set to "UNOCCUPIED" mode. Close all gas valves (both internal and external to unit) to guarantee no gas leak into combustion chamber. Turn off power to unit. All access panels, covers and vent caps must be in place and secured.

## IV-HEATING SYSTEM SERVICE CHECKS

### A-A.G.A./C.G.A. Certification

All units are A.G.A. and or C.G.A. design certified without modifications. Refer to the F8AUH Operation and Installation Instruction Manual Information.

### B-Gas Piping

Gas supply piping should not allow more than 0.5"W.C. drop in pressure between gas meter and unit. Supply gas pipe must not be smaller than unit gas connection.

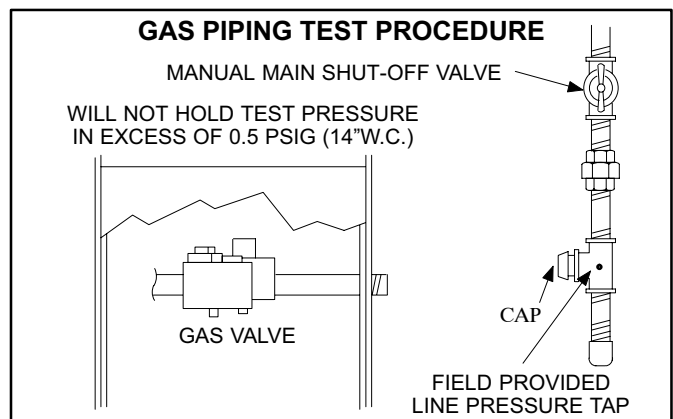
Compounds used on gas piping threaded joints should be resistant to action of liquefied petroleum gases.

### C-Testing Gas Piping

## ⚠ IMPORTANT

**In case emergency shutdown is required, turn off the main shut-off valve and disconnect the main power to unit. These controls should be properly labeled by the installer.**

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5psig (14" W.C.). See figure 16. If the pressure is equal to or less than 0.5psig (14"W.C.), use the manual shut-off valve before pressure testing to isolate furnace from gas supply.



**FIGURE 16**

When checking piping connections for gas leaks, use preferred means. Kitchen detergents can cause harmful corrosion on various metals used in gas piping. Use of a specialty Gas Leak Detector is strongly recommended.

Do not use matches, candles, flame or any other source of ignition to check for gas leaks.

### D-Testing Gas Supply Pressure

When testing supply gas pressure, connect test gauge to inlet pressure tap (field provided). See figure 16. Check gas line pressure with unit firing at maximum rate. Low pressure may result in erratic operation or underfire. High pressure can result in permanent damage to gas valve or overfire. For F8AUH-45,60 and 75 BTUH natural gas units, operating pressure at the unit must be a minimum 4.5" W.C. For the F8AUH-100 and 120 BTUH units, the operating pressure must be a minimum of 5.0" W.C. For L.P. gas units, operating pressure at unit gas connection must be a minimum of 11.0" W.C.

On multiple unit installations, each unit should be checked separately, with and without other units operating. Supply pressure must fall within range listed in previous paragraph.

### E-Check Manifold Pressure

After line pressure has been checked and adjusted, check manifold pressure. Move pressure gauge to outlet pressure tap located on unit gas valve (GV1). Checks of manifold pressure are made as verification of proper regulator adjustment. Manifold pressure for the F8AUH can be measured at any time the gas valve is open and is supplying gas to the unit. Normal manifold pressure for natural gas units is 3.5 in. W.C. For LP/propane gas the correct manifold pressure is 9.5 in. W.C.

## ⚠ IMPORTANT

**For safety, connect a shut-off valve between the manometer and the gas tap to permit shut off of gas pressure to the manometer.**

TABLE 6

GAS VALVE REGULATION	
Unit (Fuel)	Operating Pressure (outlet) in. W.C.
Natural	3.5 +0 -0.3
L.P	9.5 ± 0.5

The gas valve is factory set and should not require adjustment. All gas valves are factory regulated. See table 6. See specifications section of this manual for High Altitude manifold pressure settings.

### Manifold Adjustment Procedure:

- 1 - Connect a test gauge to outlet pressure tap on gas valve. Start unit and allow 5 minutes for unit to reach steady state.
- 2 - While waiting for the unit to stabilize, notice the flame. Flame should be stable and should not lift from burner. Natural gas should burn blue. L.P. gas should burn mostly blue with some orange streaks.
- 3 - After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to values given in table 6.

*NOTE-Shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.*

### F- Proper Gas Flow (Approximate)

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for **two** revolutions of gas through the meter. (Two revolutions assures a more accurate time.) **Divide by two** and compare to time in table 7 below. Adjust manifold pressure on gas valve to match time needed.

*NOTE- To obtain accurate reading, shut off all other gas appliances connected to meter.*

TABLE 7

GAS METER CLOCKING CHART				
FAUH Unit	Seconds for One Revolution			
	Natural		LP	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft DIAL
-45	80	160	200	400
-60	60	120	150	300
-75	48	96	120	240
-100	36	72	90	180
-120	30	60	75	150
Natural-1000 btu/cu ft		LP-2500 btu/cu ft		

## ⚠ IMPORTANT

**For safety, shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.**

### G-Flame Signal

A microamp DC meter is needed to check the flame signal on the ignition control.

Flame (microamp) signal is an electrical current which passes from the furnace control through the sensor during unit operation. Current passes from the sensor through the flame to ground to complete a safety circuit.

### To Measure Flame Signal - Ignition Control:

A transducer is required to measure flame signal if meter used will not read a low micro amp signal.

See figure 17. The transducer converts microamps to volts on a 1:1 conversion. Flame signal for the control board should read 0.7 microamps with a lock-out signal of .15 microamps. A digital readout meter must be used. The transducer plugs into most meters. See figure 18 for proper use of transducer.

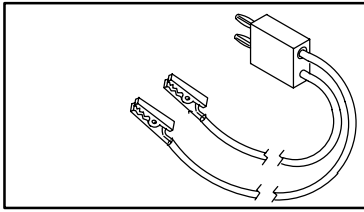


FIGURE 17

- 1 - Set the volt meter to the DC voltage scale. Insert transducer into the VDC and common inputs. Observe correct polarities. Failure to do so results in negative (-) values.
- 2 - Turn off supply voltage to control.
- 3 - Disconnect ignition control flame sensor wire from the flame sensor.
- 4 - Connect (-) lead of the transducer to flame sensor.
- 5 - Connect (+) lead of transducer to the ignition control sensor wire.
- 6 - Turn supply voltage on and close thermostat contacts to cycle system.
- 7 - When main burners are in operation for two minutes, take reading. Remember 1 DC volt = 1 DC microamp.

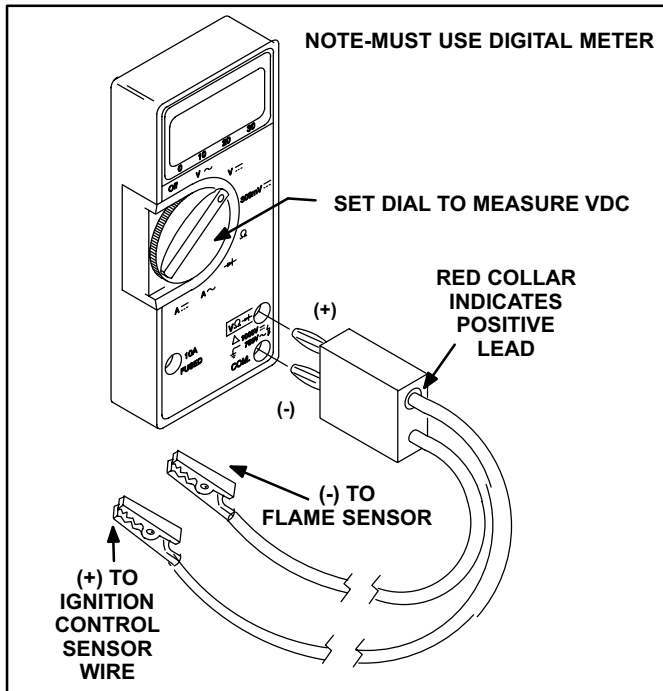


FIGURE 18

## ⚠ WARNING

**Fire and explosion hazard.**  
These instructions **MUST** be followed exactly.  
Can cause a fire or explosion resulting in property damage, personal injury or loss of life.

### V-TYPICAL OPERATING CHARACTERISTICS

#### A-Blower Operation and Adjustment

*NOTE-* The following is a generalized procedure and does not apply to all thermostat controls.

- 1 - Blower operation is dependent on thermostat control system.
- 2 - Generally, blower operation is set at thermostat sub-base fan switch. With fan switch in ON position, blower operates continuously on heating speed. With fan switch in AUTO position, blower cycles with demand or runs continuously while heating or cooling circuit cycles.
- 3 - Depending on the type of indoor thermostat, blower and entire unit will be off when the system switch is in OFF position.

#### B-Temperature Rise

Temperature rise for F8AUH units depends on unit input, blower speed, blower horsepower and static pressure as marked on the unit rating plate. The blower speed must be set for unit operation within the range of "AIR TEMP. RISE °F" listed on the unit rating plate.

#### To Measure Temperature Rise:

- 1 - Place plenum thermometers in the supply and return air plenums. Locate supply air thermometer in the first horizontal run of the plenum where it will not pick up radiant heat from the heat exchanger.
- 2 - Set thermostat to highest setting.
- 3 - After plenum thermometers have reached their highest and steadiest readings, subtract the two readings. The difference should be in the range listed on the unit rating plate. If the temperature is too low, decrease blower speed. If temperature is too high, first check the firing rate. Provided the firing rate is acceptable, increase blower speed to reduce temperature. To change blower speed taps see the Blower Speed Taps section in this manual.



## C-External Static Pressure

1 - Tap locations shown in figure 19.

2 - Punch a 1/4" diameter hole in supply and return air plenums. Insert manometer hose flush with inside edge of hole or insulation. Seal around the hose with permagum. Connect the zero end of the manometer to the discharge (supply) side of the system.

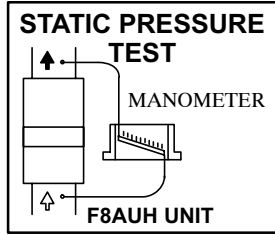


FIGURE 19

On ducted systems, connect the other end of manometer to the return duct as above. For systems with non-ducted returns, leave the other end of the manometer open to the atmosphere.

3 - With only the blower motor running and the evaporator coil dry, observe the manometer reading. Adjust blower motor speed to deliver the air desired according to the job requirements.

4 - External static pressure drop must not be more than 0.5" W.C.

5 - Seal around the hole when the check is complete.

## D-Blower Speed Taps

Blower speed tap changes are made on the control board. See figure 6. Unused taps must be secured on two dummy terminals labeled "PARK" on the control board. The heating tap is connected to the "HEAT-H" terminal and the cooling tap is connected to the "COOL-H" terminal. The continuous blower tap is the same as the heating tap. To change existing heat tap, turn off power then switch out speed tap on "HEAT-H" with tap connected to "PARK". See table 8 for blower motor tap colors for each speed.

TABLE 8

BLOWER SPEED CHART					
UNIT	FACTORY CONNECTED SPEED TAP				MOTOR SPEEDS AVAILABLE
	COOL	HEAT	PARK	PARK	
24-045/060, 36-060/075	BLK	YEL	RED	BRN	4
48-075/100	BLK	BLUE	RED	YEL	5
60-100/120	BLK	YEL	RED	BRN	5
24-075	BLK	BRN	RED	YEL	4
48-120	BLK	BRN	RED	YEL	5
BLOWER SPEED SELECTION					
HI ← → LO					
SPEED TAP	BLK	BRN	YEL	RED	4
	BLK	BRN	BLUE	YEL	5

## VI-MAINTENANCE

At the beginning of each heating season, the system should be checked as follows:

### A-Filters

Return air filter is not supplied with unit. See Optional Accessories section in this manual for filter and rack size. A filter must be used in order to ensure long life and proper

operation. The filter is located in the return air duct or return air register. Filters must be cleaned or replaced when dirty to assure proper unit operation.

### B- Heat Exchanger and Burners

Due to crimps designed in the heat exchanger, cleaning is not recommended. Removal is for inspection only.

*NOTE-Use papers or protective covering in front of furnace while cleaning furnace.*

#### To clean burners:

- 1 - Remove screws holding upper burner mounting rail. Remove rail.
- 2 - Slide burners off each orifice pull burners from heat exchanger.
- 3 - Clean holes in burner head (retention ring) with a wire brush. See figure 20.

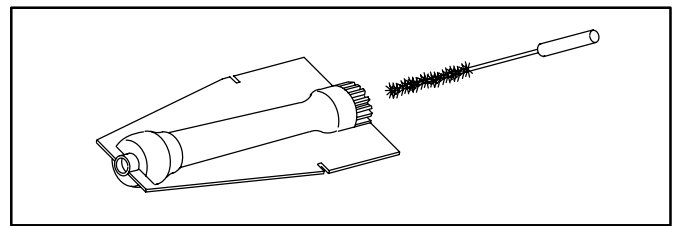


FIGURE 20

- 4 - With a shop vacuum or rags, clean out soot and scale deposits from burners.
- 5 - Remove screws securing flue box to vestibule panel. Remove flue box from unit. Leave combustion air blower attached to flue box.
- 6 - With a shop vacuum or rags, clean out soot and scale deposits from heat exchanger tubes and flue box. If turbulators are removed make sure they are re-installed before reassembling units.
- 7 - Inspect heat exchanger for corrosion damage, holes or cracks.
- 8 - Replace burners making sure to fully engage on orifice. Resecure burner mounting rail and flue box. Inspect flue box gasket. Replace gasket if necessary.
- 9 - Slide heat exchanger into cabinet and re-secure heat exchanger screws.
- 10 - Reinstall filler piece making sure that there is a good seal between the cabinet sides, blower and deck and filler piece.
- 11 - Re-secure flue pipe, gas piping and access panels.
- 12 - Carefully check all piping connections (factory and field) for gas leaks. Use a leak detecting solution or other preferred means.
- 13 - Turn on gas and electrical supply.

## HEAT EXCHANGER REMOVAL (unit shown in horizontal position)

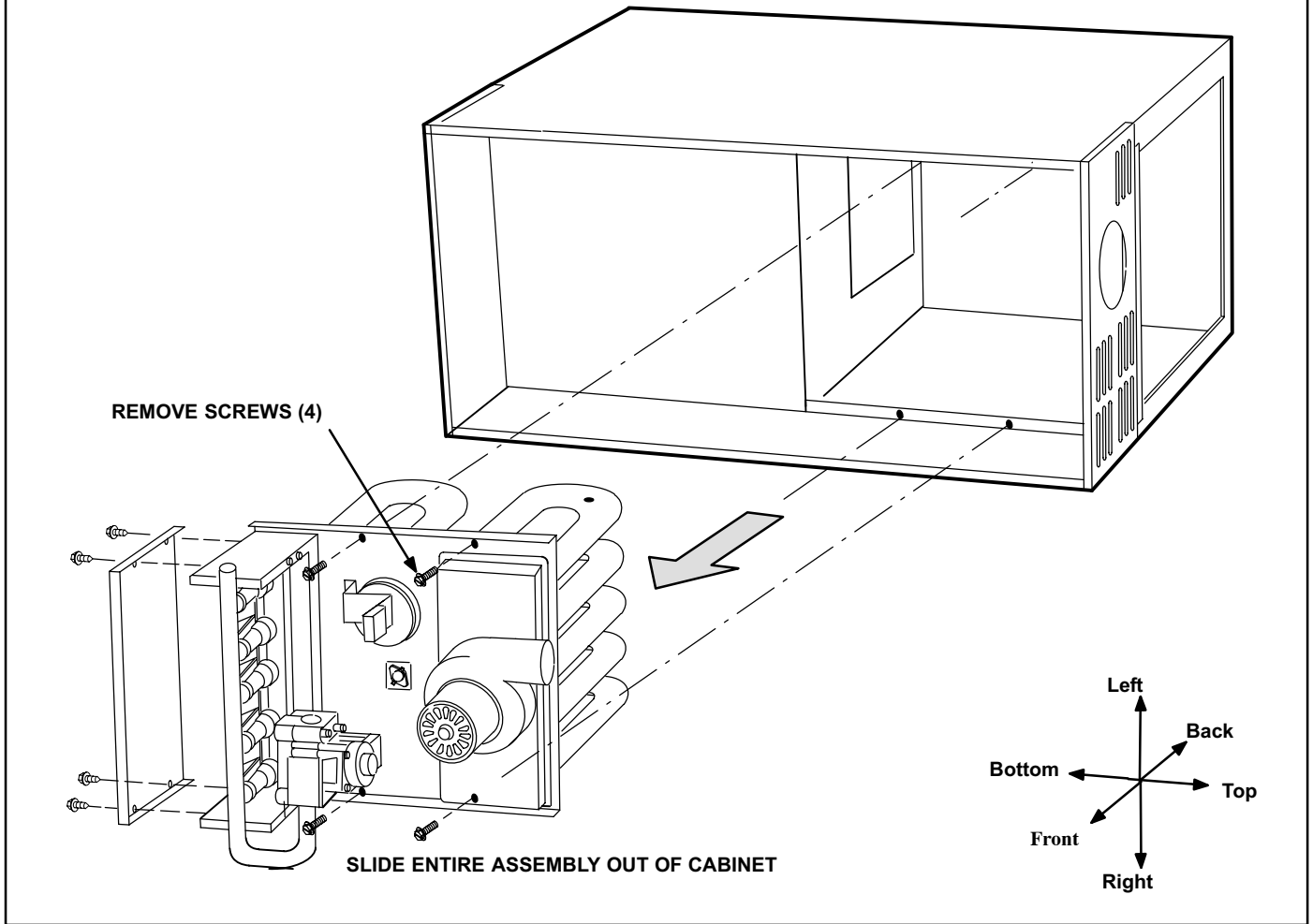


FIGURE 21

### **⚠ CAUTION**

Potential for gas leaks, fire or explosion. Some soaps used for leak detection are corrosive to certain metals. Carefully clean piping thoroughly after leak detection has been completed. Can cause damage to piping resulting in gas leaks, fire or explosion.

#### **C-Supply Air Blower**

- 1 - Check and clean blower wheel.
- 2 - Motors used on the F8AUH series units are permanently lubricated and need no further lubrication.

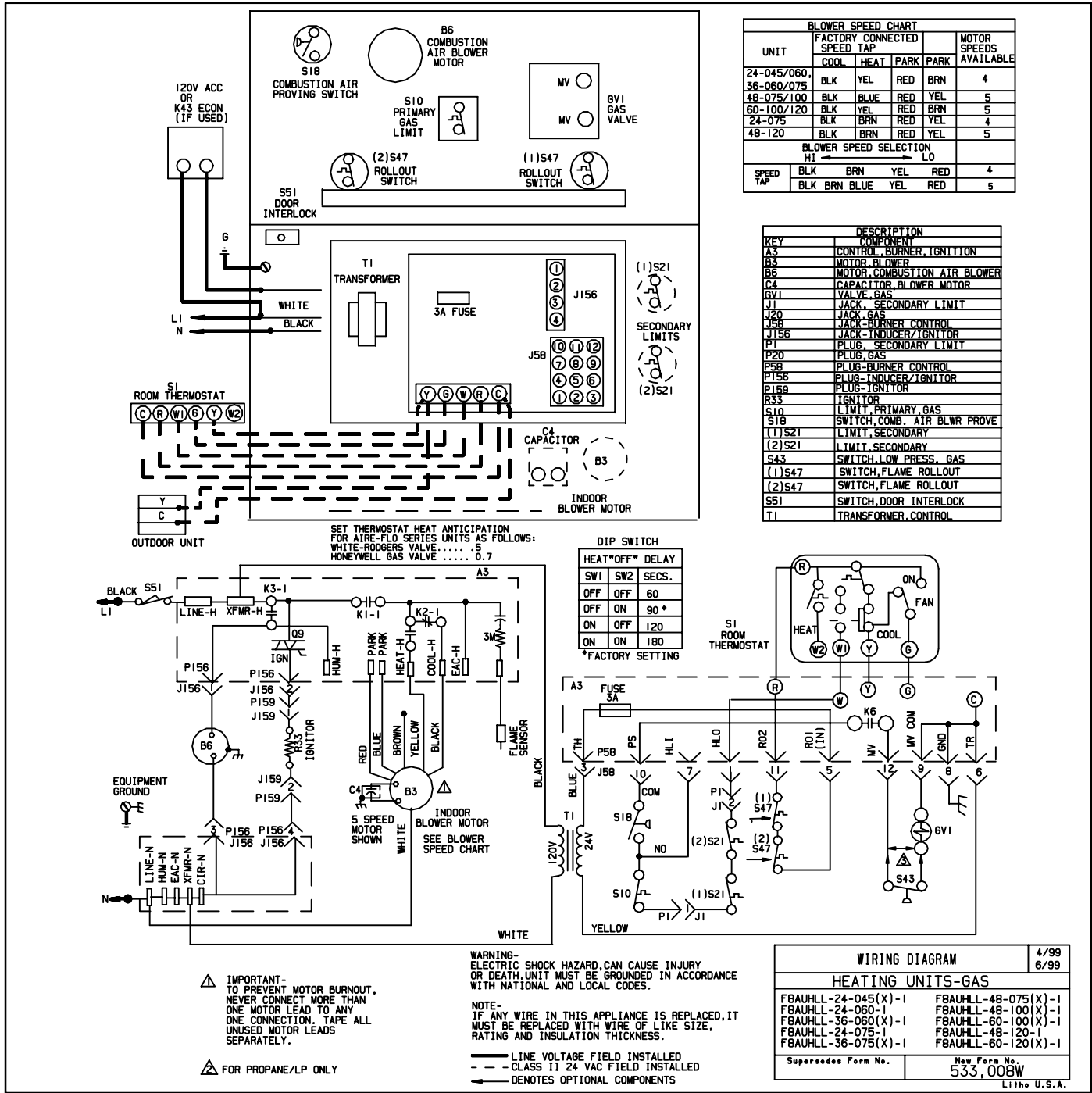
#### **D-Flue and Chimney**

Flue must conform to all AGA/GAMA venting requirements. Flue pipe deteriorates from the inside out and must be disconnected in order to check thoroughly. Check flue pipe, chimney and all connections for tightness and to make sure there is no blockage or leaks.

#### **E-Electrical**

- 1 - Check all wiring for loose connections.
- 2 - Check for correct voltage.
- 3 - Check amp-draw on blower motor.

# VII- Wiring and Sequence of Operation

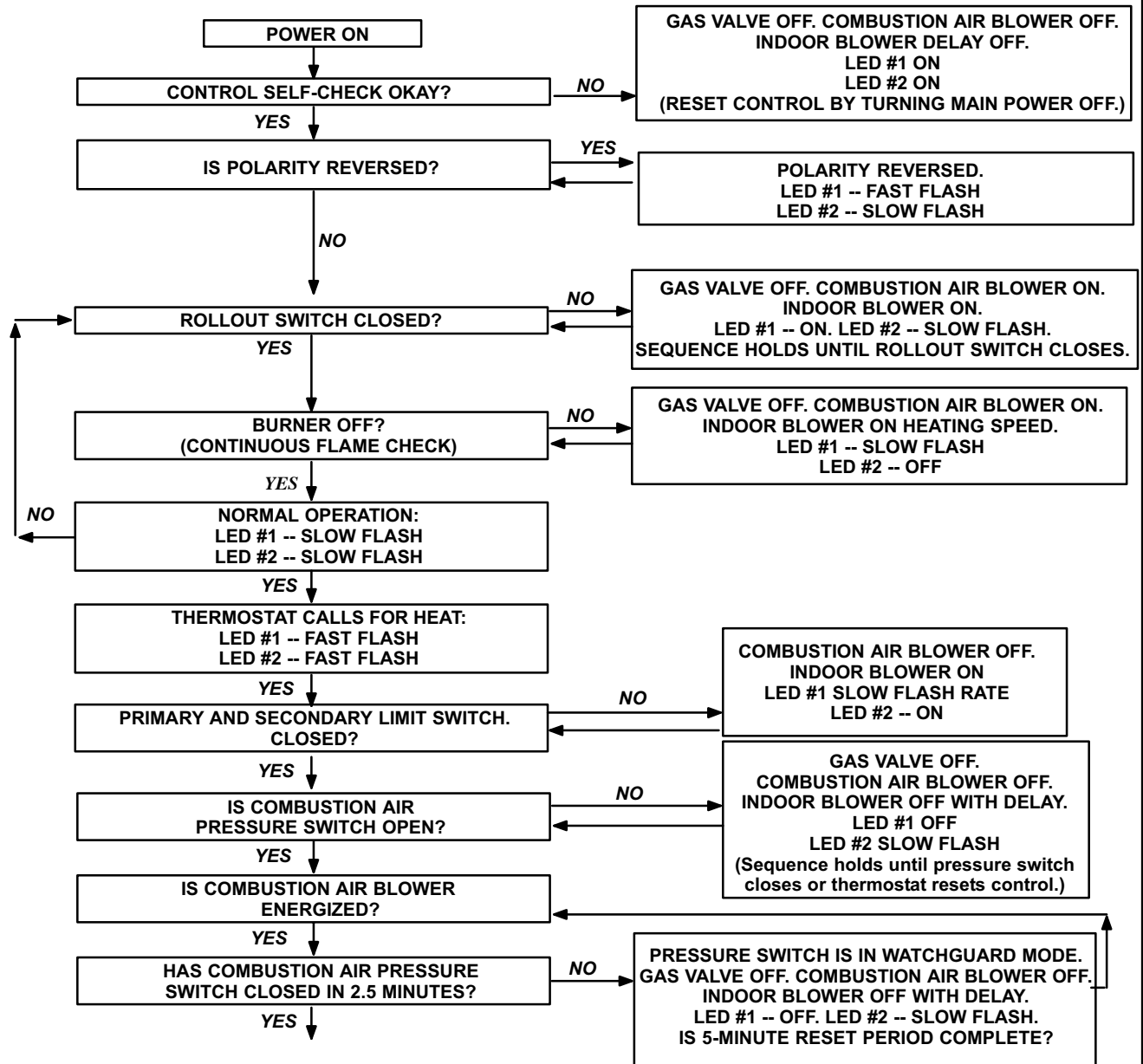


- 1 - When there is a call for heat, W1 of the thermostat energizes W of the furnace control with 24VAC.
- 2 - S10 primary limit switch and S47 rollout switch are closed. Call for heat can continue.
- 3 - Control board energizes combustion air blower B6. Combustion air blower runs until S18 combustion air prove switch closes (switch must close within 2-1/2 minutes or control goes into 5 minute Watchguard Pressure Switch delay). Once S18 closes, a 15-second pre-purge follows.
- 4 - Control board energizes ignitor. An 11 to 21 second warm-up period begins.
- 5 - Gas valve opens for a 4-second trial for ignition (ignitor will remain energized for the first second).
- 6 - Flame is sensed, gas valve remains open for the heat call.
- 7 - After 45-second delay, control board energizes indoor blower B3.
- 8 - When heat demand is satisfied, W1 of the indoor thermostat de-energizes W of the control board which de-energizes the gas valve. Combustion air blower B6 continues a 5-second post-purge period, and indoor blower B3 completes a selected OFF time delay.

# HEATING SEQUENCE OF OPERATION

## NORMAL HEATING MODE

## ABNORMAL HEATING MODE



CONTINUED NEXT PAGE

## HEATING SEQUENCE CONTINUED

### NORMAL HEATING MODE

### ABNORMAL HEATING MODE

15-SECOND COMBUSTION AIR BLOWER PREPURGE INITIATED BY CLOSED PRESSURE SWITCH.

YES

IGNITOR WARM-UP -- 11 TO 21 SECONDS.

YES

4-SECOND TRIAL FOR IGNITION. GAS VALVE OPENS. IGNITOR ENERGIZED FOR 1 SECOND AFTER VALVE OPENS. NO FLAME SENSED DURING THIS PERIOD.

YES

FLAME STABILIZATION PERIOD.

4 SECONDS

FLAME RECTIFICATION CURRENT CHECK. CAN FLAME BE PROVEN WITHIN 4 SECONDS AFTER GAS VALVE OPENS? (> 0.15 microamps)

YES

FLAME PRESENT?

YES

FLAME SIGNAL ABOVE 0.2 MICROAMPS?

YES

INDOOR BLOWER ON DELAY BEGINS (45 seconds.)

YES

PRIMARY AND SECONDARY LIMIT SWITCHES CLOSED?

YES

ROLLOUT SWITCH CLOSED?

YES

COMBUSTION AIR PRESSURE SWITCH CLOSED?

YES

THERMOSTAT DEMAND SATISFIED.

YES

LED #1 & #2 SIMULTANEOUS SLOW FLASHES.

YES

COMB. AIR BLOWER CONTINUES 5-SECOND POST PURGE AFTER T' STAT DEMAND IS SATISFIED. INDOOR AIR BLOWER COMPLETES SELECTED "OFF" DELAY BEFORE SHUTTING OFF.

NO

IS THERE A PROPER GROUND?

NO

LEDS SIGNAL ALTERNATING FAST FLASH

YES

NO

GAS VALVE OFF. COMBUSTION AIR BLOWER ON. INDOOR BLOWER OFF. HAS CONTROL FAILED TO SENSE FLAME FOR FIVE CONSECUTIVE TRIES DURING A SINGLE HEAT DEMAND?

NO

WATCHGUARD MODE. GAS VALVE OFF. COMBUSTION AIR BLOWER OFF. INDOOR BLOWER OFF WITH DELAY. LEDS SIGNAL WATCHGUARD FAILURE CODE. IS 60-MINUTE RESET PERIOD COMPLETE?

YES

HAS CONTROL RESET IGNITION SEQUENCE FOUR TIMES?

YES

NO

NO

LOW FLAME SIGNAL (Does not affect operation of control) LED #1 -- SLOW FLASH LED #2 -- FAST FLASH

NO

GAS VALVE DE-ENERGIZED. COMBUSTION AIR BLOWER DE-ENERGIZED. INDOOR BLOWER ON UNTIL SWITCH CLOSES. LED #1 -- SLOW FLASH. LED #2 -- ON. IS LIMIT SWITCH CLOSED?

NO

YES

HAS PRIMARY LIMIT OPENED FIVE TIMES DURING ONE UNSATISFIED HEATING DEMAND?

YES

NO

NO

GAS VALVE POWER OFF. COMBUSTION AIR BLOWER POWER ON. INDOOR BLOWER ON. LED #1 -- ON. LED #2 -- SLOW FLASH. SEQUENCE HOLDS UNTIL ROLLOUT SWITCH IS RESET AND MAIN POWER IS INTERRUPTED OR THERMOSTAT IS CYCLED OFF/ON FOR 1 TO 20 SEC.

NO

GAS VALVE DE-ENERGIZED. COMBUSTION AIR BLOWER ON. INDOOR BLOWER OFF WITH DELAY. LED #1 -- OFF. LED #2 -- SLOW FLASH. HAS CAB SWITCH CLOSED IN 2.5 MINUTES?

YES

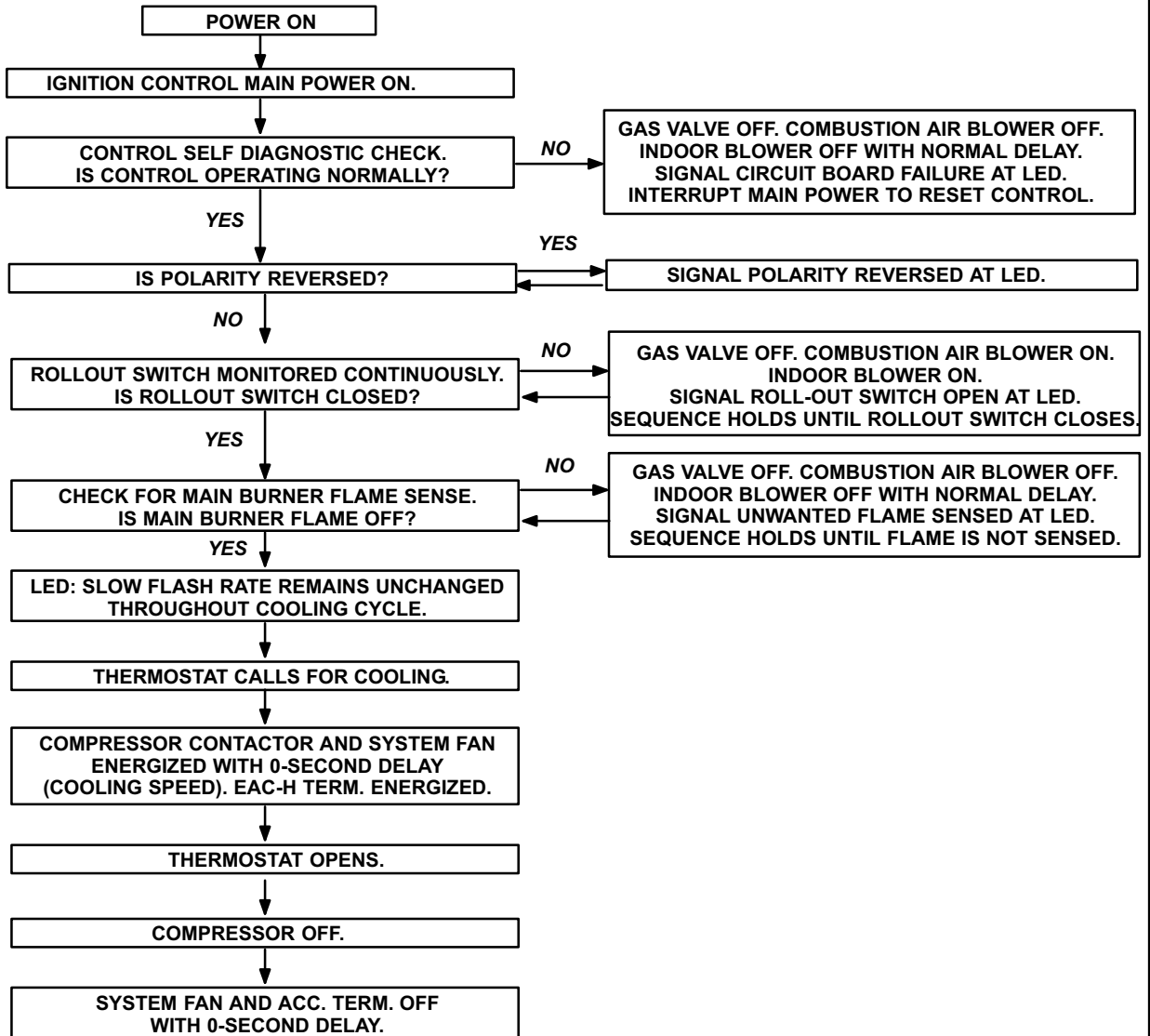
NO

5-MINUTE PRESSURE SWITCH WATCHGUARD MODE.

## COOLING SEQUENCE OF OPERATION

### NORMAL COOLING MODE

### ABNORMAL COOLING MODE



## VIII-Troubleshooting- Silicon Carbide Ignition System

<b>PROBLEM: 1 UNIT FAILS TO OPERATE IN THE COOLING, HEATING, OR CONTINUOUS FAN MODE</b>		
<b>Condition</b>	<b>Possible Cause</b>	<b>Corrective Action / Comments</b>
<p><b>1.1</b></p> <p>- Both diagnostic lights fail to light up.</p> <p>LED#1-Off LED#2-Off</p>	<p><b>1.1.1</b></p> <p>Main voltage 120V not supplied to unit.</p>	<p><b>ACTION 1</b> - Check 120V main voltage. Determine cause of main power failure.</p>
	<p><b>1.1.2</b></p> <p>Miswiring of furnace or improper connections.</p>	<p><b>ACTION 1</b> - Check for correct wiring of 120V to power make up box and transformer. <b>ACTION 2</b> - Check 24V wiring to control board.</p>
	<p><b>1.1.3</b></p> <p>Circuit breaker tripped or fails to close.</p>	<p><b>ACTION 1</b> - Replace circuit breaker if it is reset but does not have continuity. <b>ACTION 2</b> - If circuit breaker still trips, check for short.</p>
	<p><b>1.1.4</b></p> <p>Door interlock switch failure.</p>	<p><b>ACTION 1</b> - Check that door switch is activated when door is closed. <b>ACTION 2</b> - Check wire connections to switch, replace loose connectors. <b>ACTION 3</b> - Check continuity of switch in closed position. Replace if malfunctioning</p>
	<p><b>1.1.5</b></p> <p>Transformer Failure.</p>	<p><b>ACTION 1</b> - Check that transformer output is 24V. Replace if malfunctioning</p>
	<p><b>1.1.6</b></p> <p>Failed control board.</p>	<p><b>ACTION 1</b> - If all the above items have been checked, replace board.</p>
<p><b>1.2</b></p> <p>- Diagnostic lights flash the roll-out code.</p> <p>LED#1-On, LED#2-Slow Flash</p>	<p><b>1.2.1</b></p> <p>Roll-out switch open.</p>	<p><b>ACTION 1</b> - Manually reset the roll-out switch by pushing the top button. <b>ACTION 2</b> - Determine the cause of the roll-out switch activation before leaving furnace.</p>
	<p><b>1.2.2</b></p> <p>Roll-out switch failure.</p>	<p><b>ACTION 1</b> - Check continuity across roll-out switch. Replace roll-out switch if switch is reset but does not have continuity.</p>
	<p><b>1.2.3</b></p> <p>Miswiring or improper connections at roll-out switch.</p>	<p><b>ACTION 1</b> - Check wiring connections to switch.</p>
	<p><b>1.2.4</b></p> <p>Nine pin connector failure</p>	<p><b>ACTION 1</b> - Check 9-pin connector for proper connection to control board. <b>ACTION 2</b> - Check continuity of the multi plug pin.</p>
<p><b>1.3</b></p> <p>- On initial power-up the comb. air blower does not energize. - Diagnostic lights flash the reverse polarity code.</p> <p>LED#1-Fast Flash, LED#2-Slow Flash.</p>	<p><b>1.3.1</b></p> <p>120V main power polarity reversed.</p>	<p><b>ACTION 1</b> - Check the 120V has line and neutral correctly input into control. <b>ACTION 2</b> - Reverse the line and neutral at the 120V field connection.</p>
<p><b>1.4</b></p> <p>- On initial power up the combustion air blower does not energize. - Diagnostic lights flash normal power on operation.</p> <p>LED#1-Slow Flash LED#2-Slow Flash</p>	<p><b>1.4.1</b></p> <p>Open combustion air blower motor circuit.</p>	<p><b>ACTION 1</b> - Check for 120V to combustion air blower. If no power, check wire and connections.</p>
	<p><b>1.4.2</b></p> <p>Failed combustion air blower motor.</p>	<p><b>ACTION 1</b> - If power is present at blower, replace blower.</p>

**PROBLEM 1: UNIT FAILS TO OPERATE IN THE COOLING, HEATING, OR CONTINUOUS FAN MODE**

Condition	Possible Cause	Corrective Action / Comments
<p><b>1.5</b></p> <ul style="list-style-type: none"> <li>- On initial power-up the combustion air blower remains energized.</li> <li>- Diagnostic lights flash the improper main ground.</li> </ul> <p>LED#1-Alternating Fast Flash LED#2-Alternating Fast Flash</p>	<p><b>1.5.1</b></p> <p>Improper ground to the unit.</p>	<p><b>ACTION 1</b> - Check that the unit is properly grounded.</p> <p><b>ACTION 2</b> - Install a proper main ground to the unit</p>
	<p><b>1.5.2</b></p> <p>6-Pin connector is improperly attached to the circuit board.</p>	<p><b>ACTION 1</b> - Check 6-pin connector for proper installation. Correctly insert connector into control.</p>

**PROBLEM 2: UNIT FAILS TO OPERATE IN THE COOLING OR HEATING MODE, BUT COMBUSTION AIR BLOWER OPERATES CONTINUOUS. UNITS WITH CONTROL BOARDS DATE CODED AFTER NOV.1 1997, WILL OPERATE IN COOLING WITH COMBUSTION AIR BLOWER CYCLING 5 SECONDS ON 55 SECONDS OFF, BUT NOT IN THE HEATING MODE.**

Condition	Possible Cause	Corrective Action / Comments
<p><b>2.1</b></p> <ul style="list-style-type: none"> <li>- On initial power-up the combustion air blower remains energized.</li> <li>- Diagnostic lights flash the improper main ground.</li> <li>- Units with control boards date coded after Nov.1 1997; combustion air blower will cycle 5 seconds on 55 seconds off.</li> </ul> <p>LED#1-Alternating Fast Flash LED#2-Alternating Fast Flash</p>	<p><b>2.1.1</b></p> <p>Open ignitor circuit.</p>	<p><b>ACTION 1</b> - Check for correct wiring and loose connections in the ignitor circuit. Check multi - plug connections for correct installation.</p>
	<p><b>2.1.2</b></p> <p>Broken or failed ignitor.</p>	<p><b>ACTION 1</b> - Unplug ignitor and read resistance across ignitor. If resistance does not read between 10.9 and 19.7 ohms, replace the ignitor.</p>

**PROBLEM 3: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER DOES NOT ENERGIZE**

Condition	Possible Cause	Corrective Action / Comments
<p><b>3.1</b></p> <ul style="list-style-type: none"> <li>- Unit operates with a cooling or continuous fan demand.</li> <li>- Combustion air blower will not start with a Heating demand.</li> <li>- Diagnostic lights flash the limit failure mode.</li> </ul> <p>LED#1-Slow Flash, LED#2-On</p>	<p><b>3.1.1</b></p> <p>Primary or secondary (if equipped) limit open.</p>	<p><b>ACTION 1</b> - Check continuity across switch(es). Switches reset automatically upon cool down.</p> <p><b>ACTION 2</b> - Check for restrictions on blower inlet air (including filter) and outlet air. Determine cause for limit activation before placing unit back in operation.</p>
	<p><b>3.1.2</b></p> <p>Miswiring of furnace or improper connections at limit switch(es).</p>	<p><b>ACTION 1</b> - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
<p><b>3.2</b></p> <ul style="list-style-type: none"> <li>- Unit operates with a cooling and continuous fan demand.</li> <li>- Combustion air blower will not start with a Heating demand.</li> <li>- Diagnostic lights flash the pressure switch failure code.</li> </ul> <p>LED#1-Off, LED#2-Slow Flash</p>	<p><b>3.2.1</b></p> <p>Miswiring of furnace or improper connections to combustion air blower.</p>	<p><b>ACTION 1</b> - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
	<p><b>3.2.2</b></p> <p>Pressure switch stuck closed.</p>	<p><b>ACTION 1</b> - Check that the pressure switch is open without the combustion air blower operating. Replace if malfunctioning</p>



**PROBLEM 3: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER DOES NOT ENERGIZE (CONT.).**

Condition	Possible Cause	Corrective Action/Comments
<p align="center"><b>3.3</b></p> <ul style="list-style-type: none"> <li>- Unit operates with a cooling and continuous fan demand.</li> <li>- Combustion air blower will not start with a Heating demand.</li> <li>- Diagnostic lights flash the pressure switch failure code 2.5 minutes after heating demand.</li> </ul> <p>LED#1-Off, LED#2-Slow Flash</p>	<p><b>3.3.1</b></p> <p>Miswiring of furnace or improper connections to combustion air blower.</p>	<p><b>ACTION 1</b> - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
	<p><b>3.3.2</b></p> <p>Combustion air blower failure.</p>	<p><b>ACTION 1</b> - If there is 120V to combustion air blower and it does not operate, replace combustion air blower.</p>

**PROBLEM 4: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER ENERGIZES, IGNITOR IS NOT ENERGIZED.**

Condition	Possible Cause	Corrective Action/Comments
<p align="center"><b>4.1</b></p> <ul style="list-style-type: none"> <li>- Unit operates with a cooling and continuous fan demand.</li> <li>- Combustion air blower energizes with a heating demand.</li> <li>- Diagnostic lights flash the pressure switch failure code 2.5 minutes after heating demand.</li> </ul> <p>LED#1-Off LED#2-Slow Flash</p>	<p><b>4.1.1</b></p> <p>Pressure switch does not close due to incorrect routing of the pressure switch tubing.</p>	<p><b>ACTION 1</b> - Check that the pressure switch tubing is correctly routed. Correctly route pressure switch tubing.</p>
	<p><b>4.1.2</b></p> <p>Pressure switch does not close due to obstructions in the pressure tubing.</p>	<p><b>ACTION 1</b> - Remove any obstructions from the pressure tubing and/or taps.</p>
	<p><b>4.1.3</b></p> <p>Pressure switch tubing damaged</p>	<p><b>ACTION 1</b> - Check pressure switch tubing for leaks. Replace any broken tubing.</p>
	<p><b>4.1.4</b></p> <p>Pressure switch does not close due to a low differential pressure across the pressure switch.</p>	<p><b>ACTION 1</b> - Check the differential pressure across the pressure switch. This pressure should exceed the set point listed on the switch.</p> <p><b>ACTION 2</b> - Check for restricted inlet and exhaust vent. Remove all blockage.</p> <p><b>ACTION 3</b> - Check for proper vent sizing and run length. See installation instructions.</p> <p><b>ACTION 4</b> - Check voltage to combustion air blower.</p>
	<p><b>4.1.5</b></p> <p>Wrong pressure switch installed in the unit, or pressure switch is out of calibration.</p>	<p><b>ACTION 1</b> - Check that the proper pressure switch is installed in the unit. Replace pressure switch if necessary.</p>
	<p><b>4.1.6</b></p> <p>Miswiring of furnace or improper connections at pressure switch.</p>	<p><b>ACTION 1</b> - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
	<p><b>4.1.7</b></p> <p>Pressure switch failure.</p>	<p><b>ACTION 1</b> - If all the above modes of failure have been checked, the pressure switch may have failed. Replace pressure switch and determine if unit will operate.</p>

**PROBLEM 5: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER ENERGIZES, IGNITOR IS ENERGIZED.**

Condition	Possible Cause	Corrective Action/Comments
<p align="center"><b>5.1</b></p> <ul style="list-style-type: none"> <li>- Unit operates with a cooling and continuous fan demand.</li> <li>- Combustion air blower energizes with Heating demand.</li> <li>- Ignitor is energized but unit fails to light.</li> </ul> <p>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</p>	<p align="center"><b>5.1.1</b></p> <p>Check that gas is being supplied to the unit.</p>	<p><b>ACTION 1</b> - Check line pressure at the gas valve. Pressure should not exceed 13" WC for both natural and propane. Line pressure should read a minimum 4.5" WC for natural and 8.0"WC for propane.</p>
	<p align="center"><b>5.1.2</b></p> <p>Miswiring of gas valve or loose connections at multi-pin control amp plugs or valve.</p>	<p><b>ACTION 1</b> - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
	<p align="center"><b>5.1.3</b></p> <p>Malfunctioning gas valve or ignition control.</p>	<p><b>ACTION 1</b> - Check that 24V is supplied to the gas valve approximately 35 seconds after heat demand is initiated. <b>ACTION 2</b> - Replace the valve if 24V is supplied but valve does not open (check for excessive gas line pressure before replacing gas valve). <b>ACTION 3</b> - Replace the control board if 24V is not supplied to valve.</p>

**PROBLEM 6: BURNERS LIGHT WITH A HEATING DEMAND BUT UNIT SHUTS DOWN PREMATURELY**

Condition	Possible Cause	Corrective Action/Comments
<p align="center"><b>6.1</b></p> <ul style="list-style-type: none"> <li>- Burners fire with a heating demand.</li> <li>- Burners light but unit shuts off prior to satisfying T-stat demand.</li> <li>- Diagnostic lights flash the pressure switch code.</li> </ul> <p>LED#1-Off LED#2-Slow Flash</p>	<p align="center"><b>6.1.1</b></p> <p>Low pressure differential at the pressure switch.</p>	<p><b>ACTION 1</b> - Check for restricted vent inlet or exhaust. Remove all blockage. <b>ACTION 2:</b> Check for proper vent sizing. See installation instructions.</p>
	<p align="center"><b>6.2</b></p> <ul style="list-style-type: none"> <li>- Combustion air blower energizes with a heating demand.</li> <li>- Burners light but fail to stay lit.</li> <li>- After 5 tries the control diagnostics flash the watchguard burners failed to ignite code.</li> </ul> <p>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</p>	<p align="center"><b>6.2.1</b></p> <p>Sensor or sense wire is improperly installed.</p>
	<p align="center"><b>6.2.2</b></p> <p>Sensor or sense wire is broken.</p>	<p><b>ACTION 1</b> - Check for a broken sensor. <b>ACTION 2</b> - Test continuity across the sense wire. If wire or sensor are damaged replace the component.</p>
	<p align="center"><b>6.2.3</b></p> <p>Sensor or sensor wire is grounded to the unit.</p>	<p><b>ACTION 1</b> - Check for resistance between the sensor rod and the unit ground. <b>ACTION 2</b> - Check for resistance between the sensor wire and the unit ground. <b>ACTION 3</b> - Correct any shorts found in circuit.</p>
	<p align="center"><b>6.2.4</b></p> <p>Control does not sense flame.</p>	<p><b>ACTION 1</b> - Check the microamp signal from the burner flame. If the microamp signal is below 0.70 microamps, check the sense rod for proper location or contamination. <b>ACTION 2</b> - Replace, clean, or relocate flame sense rod. If rod is to be cleaned, use steel wool or replace sensor. <b>DO NOT CLEAN ROD WITH SAND PAPER. SAND PAPER WILL CONTRIBUTE TO THE CONTAMINATION PROBLEM. NOTE:</b> Do not attempt to bend sense rod.</p>

**PROBLEM 6: BURNERS LIGHT WITH HEATING DEMAND BUT UNIT SHUTS DOWN  
PREMATURELY (CONT.)**

Condition	Possible Cause	Corrective Action/Comments
<p align="center"><b>6.3</b></p> <ul style="list-style-type: none"> <li>- Combustion air blower energizes with a heating demand.</li> <li>- Burners light.</li> <li>- Roll-out switch trips during the heating demand.</li> <li>- Diagnostic lights flash roll-out failure.</li> </ul> <p>LED#1-On LED#2-Slow Flash</p>	<p><b>6.3.1</b></p> <p>Unit is firing above 100% of the nameplate input.</p>	<p><b>ACTION 1</b> - Check that the manifold pressure matches value listed on nameplate. See installation instructions for proper procedure.</p> <p><b>ACTION 2</b> - Verify that the installed orifice size match the size listed on the nameplate or installation instructions.</p> <p><b>ACTION 3</b> - Check gas valve sensing hose to insure no leaks are present.</p> <p><b>ACTION 4</b> - Check the input rate to verify rate matches value listed on nameplate.</p>
	<p><b>6.3.2</b></p> <p>Gas orifices leak at the manifold connection.</p>	<p><b>ACTION 1</b> - Tighten orifice until leak is sealed. <b>NOTE:</b> Be careful not to strip orifice threads.</p> <p><b>ACTION 2</b> - Check for gas leakage at the threaded orifice connection. Use approved method for leak detection (see unit instructions).</p>
	<p><b>6.3.3</b></p> <p>Insufficient flow through the heat exchanger caused by a sooted or restricted heat exchanger.</p>	<p><b>ACTION 1</b> - Check for sooting deposits or other restrictions in the heat exchanger assembly. Clean assembly as outlined in instruction manual.</p> <p><b>ACTION 2</b> - Check for proper combustion and flow. CO<sub>2</sub> should measure between 6.0% and 8.0% for natural and 6.5% and 8.5% for L.P. CO should measure below .04% (400PPM) in an air-free sample of flue gases.</p>
	<p><b>6.3.4</b></p> <p>Burners are not properly located in the burner box.</p>	<p><b>ACTION 1</b> - Check that the burners are firing into the center of the heat exchanger openings. Correct the location of the burners if necessary.</p>
<p align="center"><b>6.4</b></p> <ul style="list-style-type: none"> <li>- Combustion air blower energizes with a heating demand.</li> <li>- Burners light roughly and the unit fails to stay lit.</li> <li>- Diagnostic lights flash watchguard flame failure.</li> </ul> <p>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</p>	<p><b>6.4.1</b></p> <p>Recirculation of flue gases. This condition causes rough ignitions and operation. Problem is characterized by nuisance flame failures.</p>	<p><b>ACTION 1</b> - Check for proper flow of exhaust gases away from intake vent. Remove any obstacles in front of the intake and exhaust vent which would cause recirculation.</p> <p><b>ACTION 2</b> - Check for correct intake and exhaust vent installation. See instructions</p>
	<p><b>6.4.2</b></p> <p>Improper burner cross-overs</p>	<p><b>ACTION 1</b> - Remove burner and inspect the cross-overs for burrs, or any restriction or if crossover is warped. Remove restriction or replace burners.</p>

**PROBLEM 6: BURNERS LIGHT WITH HEATING DEMAND BUT UNIT SHUTS DOWN PREMATURELY (CONT.)**

<p align="center"><b>6.5</b></p> <ul style="list-style-type: none"> <li>- Combustion air blower energizes with a heating demand.</li> <li>- Burners light.</li> <li>- Diagnostic lights flash watch guard flame failure.</li> <li>- NOTE” Unit might go into 60 minute Watchguard mode depending on intermittent nature of sensor signal.</li> </ul> <p>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</p>	<p align="center"><b>6.5.1</b></p> <p align="center">Loose sensor wire connection causes intermittent loss of flame signal.</p>	<p><b>ACTION 1</b> - Check that the sensor is properly located.</p> <p><b>ACTION 2</b> - Check that the sense wire is properly attached to both the sensor and the control. Pay extra attention to the pin connectors.</p>
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**PROBLEM 7: CONTROL SIGNALS LOW FLAME SENSE DURING HEATING MODE**

Condition	Possible Cause	Corrective Action/Comments
<p align="center"><b>7.0</b></p> <ul style="list-style-type: none"> <li>- Unit operates correctly but the diagnostic lights flash low flame sense code.</li> </ul> <p>LED#1-Slow Flash LED#2-Fast Flash</p>	<p align="center"><b>7.1.1</b></p> <p align="center">Sense rod is improperly located on the burner.</p>	<p><b>ACTION 1</b> - Check the sense rod for proper location on the burner. Properly locate the sense rod or replace if rod cannot be located correctly.</p>
	<p align="center"><b>7.1.2</b></p> <p align="center">Sense rod is contaminated.</p>	<p><b>ACTION 1</b> - Check sense rod for contamination or coated surface. Clean the sense rod with steel wool or replace sensor. DO NOT USE SAND PAPER TO CLEAN ROD. SAND PAPER WILL CONTRIBUTE TO THE CONTAMINATION PROBLEM.</p>

**PROBLEM 8: INDOOR BLOWER FAILS TO OPERATE IN COOLING, HEATING, OR CONTINUOUS FAN MODE**

Condition	Possible Cause	Corrective Action/Comments
<p align="center"><b>8.0</b></p> <ul style="list-style-type: none"> <li>- Indoor blower fails to operate in continuous fan, cooling, or heating mode.</li> </ul>	<p align="center"><b>8.1.1</b></p> <p>Miswiring of furnace or improper connections at control or indoor blower motor.</p>	<p><b>ACTION 1</b> - Correct wiring and/or replace any loose connections. Check for correct wiring and loose connections.</p>
	<p align="center"><b>8.1.2</b></p> <p>120V is not being supplied to the indoor air blower or blower motor failure.</p>	<p><b>ACTION 1</b> - Check for 120V at the various calls for indoor blower by energizing "Y", "G", and "W" individually on the low voltage terminal strip. Note that when "W" is energized, the blower is delayed 45 seconds. If there is 120V to each motor tap but the blower does not operate, replace the motor.</p>
	<p align="center"><b>8.1.3</b></p> <p align="center">Defective control board</p>	<p><b>ACTION 1</b> - If there is not 120V when "Y", "G", or "W" is energized, replace the control.</p>

**PROBLEM 9: RF STATIC DURING TIME FOR IGNITION**

Condition	Possible Cause	Corrective Action/Comments
<p align="center"><b>9.0</b></p> <ul style="list-style-type: none"> <li>- AM radio interference</li> </ul>	<p align="center"><b>9.1.2</b></p> <p align="center">Ignitor operation</p>	<p><b>ACTION 1</b>- Call Technical Support, Dallas</p>