

G24M SERIES UNITS

G24M series units are mid-efficiency gas furnaces manufactured with tubular steel heat exchangers formed of aluminum steel. G24M units are available in heating capacities of 45,000 to 140,000 Btuh and cooling applications up to 5 tons. Refer to Engineering Handbook for proper sizing.

Units are factory equipped for use with natural gas. A kit is available for conversion to LPG operation. Early model G24M units use electronic (direct spark) ignition. Late model G24M model units feature the Lennox SureLight™ silicon-nitride ignition system. The G24MX unit meets the California Nitrogen Oxides (NO_x) 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, downflow or horizontal position. The heat exchanger is designed for upright or horizontal use only. When the unit is installed in the downflow position, the heat exchanger is field removed and reinstalled so it is upright when the cabinet is inverted. No field conversion is required when the unit is installed in the horizontal position.

The heat exchanger, burners and manifold assembly can easily be removed for inspection and service by simply disconnecting gas, unplugging wiring harness and spark wires and removing four screws holding the heat exchanger in place. Then the heat exchanger slides out of the cabinet.

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.



SPECIFICATIONS

Model No.	G24M2(X)-45	G24M2-60	G24M3(X)-60	G24M2-75	G24M3(X)-75
Input Btuh (kW)	45,000 (13.2)	60,000 (17.6)		75,000 (22.0)	
Output Btuh (kW)	36,900 (10.8)	49,200 (14.4)		61,700 (18.1)	
☆A.F.U.E.	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 diameter — in. (mm) round	3 (76)			4 (102)	
Temperature rise range — °F (°C)	30 - 60 (17 - 33)		45 - 75 (25 - 42)		
High static certified by A.G.A./C.G.A. — in wg. (Pa)	.50 (125)				
Gas Piping Size I.P.S. Natural or LPG/propane	1/2 (13)				
Blower wheel nominal diameter x width	in.	9 x 7		10 x 7	
	mm	229 x 178		254 x 178	
Blower motor output — hp (W)	1/4 (187)		1/3 (224)		1/4 (187)
Nominal cooling that can be added	Tons	1, 1-1/2 or 2		1, 1-1/2 or 2	
	kW	3.5, 5.3 or 7.0		3.5, 5.3 or 7.0	
Shipping weight — lbs. (kg) 1 package	130 (59)		135 (61)		
Electrical characteristics	120 volts — 60 hertz — 1 phase (less than 12 amps) All models				
↘ Optional Accessories (Must Be Ordered Extra) ↙					
LPG/propane kit	LB-69845L (38K84)				
Twinning Kit	96J69 — 5 lbs. (2 kg)				
Up-Flow/Horizontal Filter and Filter Rack Kits ‡No. & size of filters - in. (mm)	Single (32J02) Ten Pack (66K64) (1) 16 x 20 x 1 (406 x 508 x 25)				
Down-flow Filter Kit	Catalog No.	LB-69843A (32J01) — 3 lbs. (1 kg)			
	No. & Size of Filters — in. (mm)	(2) 16 x 20 x 1 (406 x 508 x 25)			
Down-flow Combustible Floor Base	LB-79239A (67J91) — 10 lbs. (4 kg)				
Sidewall Power Venting Kit	79J15 — 25 lbs. (11 kg)				
Hanging Bracket Kit	LB-69957 (46J66) — 15 lbs. (8 kg)				

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

‡Polyurethane frame type filter is furnished with kit.

☐Filters are not furnished with kit and must be ordered extra.

SPECIFICATIONS

Model No.	G24M4(X)-75	G24M3/4(X)-100	G24M4/5(X)-100
Input Btuh (kW)	75,000 (22.0)	100,000 (29.3)	
Output Btuh (kW)	61,700 (18.1)	82,000 (24.0)	
☆A.F.U.E.	80.0%	80.1%	80.0%
California Seasonal Efficiency	76.3%	76.5%	77.0%
Flue size connection diameter — in. (mm) round	4 (102)		
Temperature rise range — °F (°C)	45 - 75 (25 - 42)		35 - 65 (19 - 36)
High static certified by A.G.A./C.G.A. — in wg. (Pa)	.50 (125)		
Gas Piping Size I.P.S. Natural or LPG/propane	1/2 (13)		
Blower wheel nominal diameter x width	in.	12 x 8	12 x 9
	mm	305 x 203	305 x 229
Blower motor output — hp (W)	1/2 (373)		3/4 (560)
Nominal cooling that can be added	Tons	2, 2-1/2, 3, 3-1/2 or 4	3-1/2, 4, 5 or 6
	kW	7.0, 8.8, 10.6, 12.3 or 14.1	12.3, 14.1, 17.6 or 21.1
Shipping weight — lbs. (kg) 1 package	140 (64)	175 (79)	175 (79)
Electrical characteristics	120 volts — 60 hertz — 1 phase (less than 12 amps) All models		
↕ Optional Accessories (Must Be Ordered Extra) ↕			
LPG/propane kit	LB-69845L (38K84)	LB-69845K (81J14)	
Twinning Kit	96J69 — 5 lbs. (2 kg)		
Up-Flow/Horizontal Filter and Filter Rack Kits ‡No. & size of filters - in. (mm)	Single (32J02) Ten Pack (66K64) (1) 16 x 20 x 1 (406 x 508 x 25)	Single (46J14) Ten Pack (66K65) (1) 20 x 20 x 1 (508 x 508 x 25)	
☐ Down-flow Filter Kit	Catalog No.	LB-69843A (32J01) — 3 lbs. (1 kg)	
	No. & Size of Filters — in. (mm)	(2) 16 x 20 x 1 (406 x 508 x 25)	
Down-flow Combustible floor Base	LB-79239A (67J91) — 10 lbs. (4 kg)	LB-79239B (67J92) — 10 lbs. (4 kg)	
Sidewall Power Venting Kit	79J15 — 25 lbs. (11 kg)		
Hanging Bracket Kit	LB-69957 (46J66) — 15 lbs. (8 kg)		

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

‡Polyurethane frame type filter is furnished with kit.

☐ Filters are not furnished with kit and must be ordered extra.

SPECIFICATIONS

Model No.	G24M3/4-120	G24M4/5(X)-120	G24M4/5-140
Input Btuh (kW)	120,000 (35.2)		140,000 (41.0)
Output Btuh (kW)	98,400 (28.8)		114,800 (33.6)
☆A.F.U.E.	80.0%	80.1%	80.0%
California Seasonal Efficiency	Not Available	75.5%	Not Available
① Flue size connection diameter — in. (mm) round	4 (102)		5 (127)
Temperature rise range — °F (°C)	45 - 75 (25 - 42)		
High static certified by A.G.A./C.G.A. — in wg. (Pa)	.50 (125)		.65 (162)
Gas Piping Size I.P.S. Natural or LPG/propane - in (mm)	1/2 (13)		
Blower wheel nominal diameter x width	in.	12 x 8	12 x 9
	mm	305 x 203	305 x 229
Blower motor output — hp (W)	1/2 (373)		3/4 (560)
Nominal cooling that can be added	Tons	2, 2-1/2, 3, 3-1/2 or 4	
	kW	7.0, 8.8, 10.6, 12.3 or 14.1	
Shipping weight — lbs. (kg) 1 package	175 (79)		190 (86)
Electrical characteristics	120 volts — 60 hertz — 1 phase (less than 12 amps) All models		
↕ Optional Accessories (Must Be Ordered Extra) ↕			
LPG/propane kit	LB-69845K (81J14)		
Twinning Kit	96J69 — 5 lbs. (2 kg)		
Up-Flow/Horizontal Filter and Filter Rack Kits ‡No. and size of filters - in. (mm)	Single (46J14) Ten Pack (66K65) (1) 20 x 20 x 1 (508 x 508 x 25)		Single (58J93) Ten Pack (66K66) (1) 20 x 20 x 1 (508 x 508 x 25)
② Down-flow Filter Rack	Catalog No.		LB-69843A (32J01) — 3 lbs. (1 kg)
	No. & Size of Filters	in.	(2) 16 x 20 x 1
		mm	(2) 406 x 508 x 25
Down-flow Combustible Floor Base	LB-79239B (67J92) — 10 lbs. (4 kg)		LB-79239C (67J93) — 12 lbs. (5 kg)
Sidewall Power Venting Kit	79J15 — 25 lbs. (11 kg)		
Hanging Bracket Kit	LB-69957 (46J66) — 15 lbs. (8 kg)		

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

‡ Polyurethane frame type filter is furnished with kit.

① 2 in. x 5 in. (51 mm x 127 mm) flue adaptor furnished with -140 input furnaces for connection to furnace induced draft blower.

② Filters are not furnished with kit and must be ordered extra.

BLOWER DATA

G24M2-45, G24M2-60 AND G24M2-75 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

BLOWER DATA
G24M3-60 AND G24M3-75 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	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

G24M4-75, G24M3/4-100 AND G24M3/4-120 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
G24M4/5-100, G24M4/5-120 AND G24M4/5-140 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)

G24M PARTS IDENTIFICATION

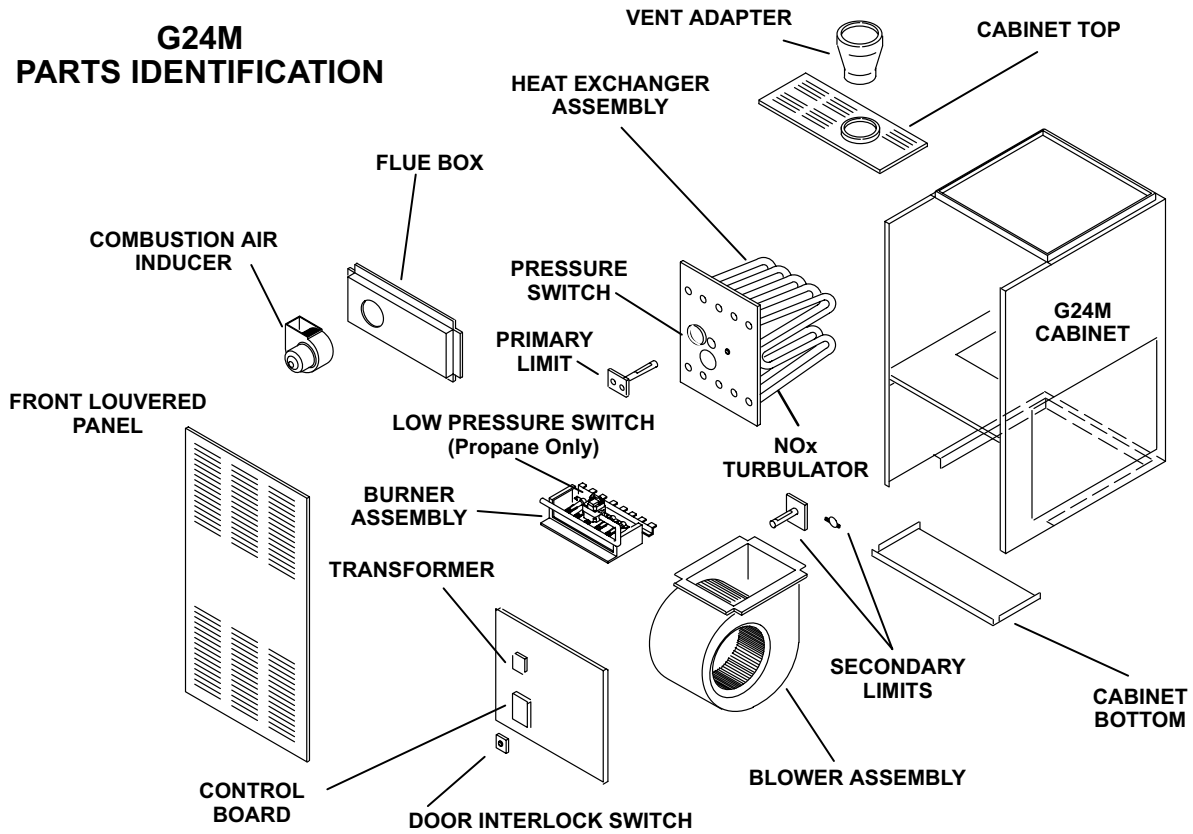


FIGURE 1

HEATING COMPONENTS (shown in horizontal position)

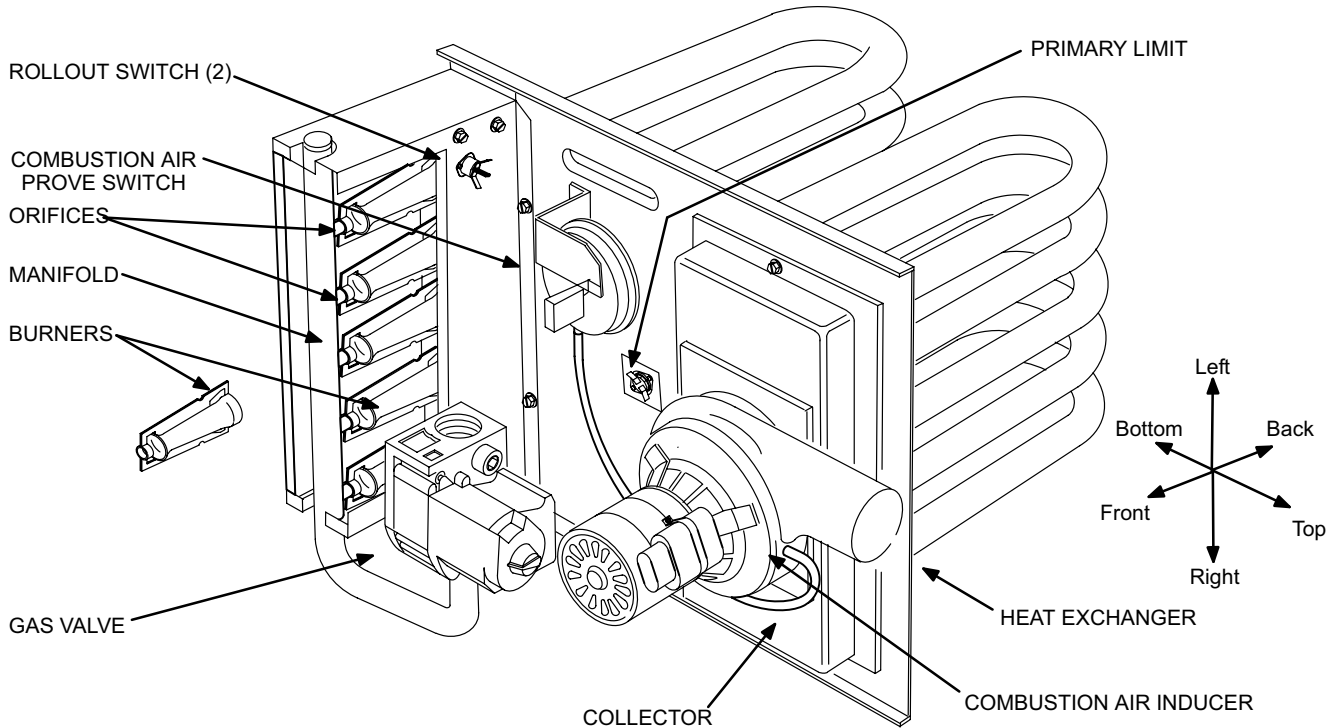


FIGURE 2

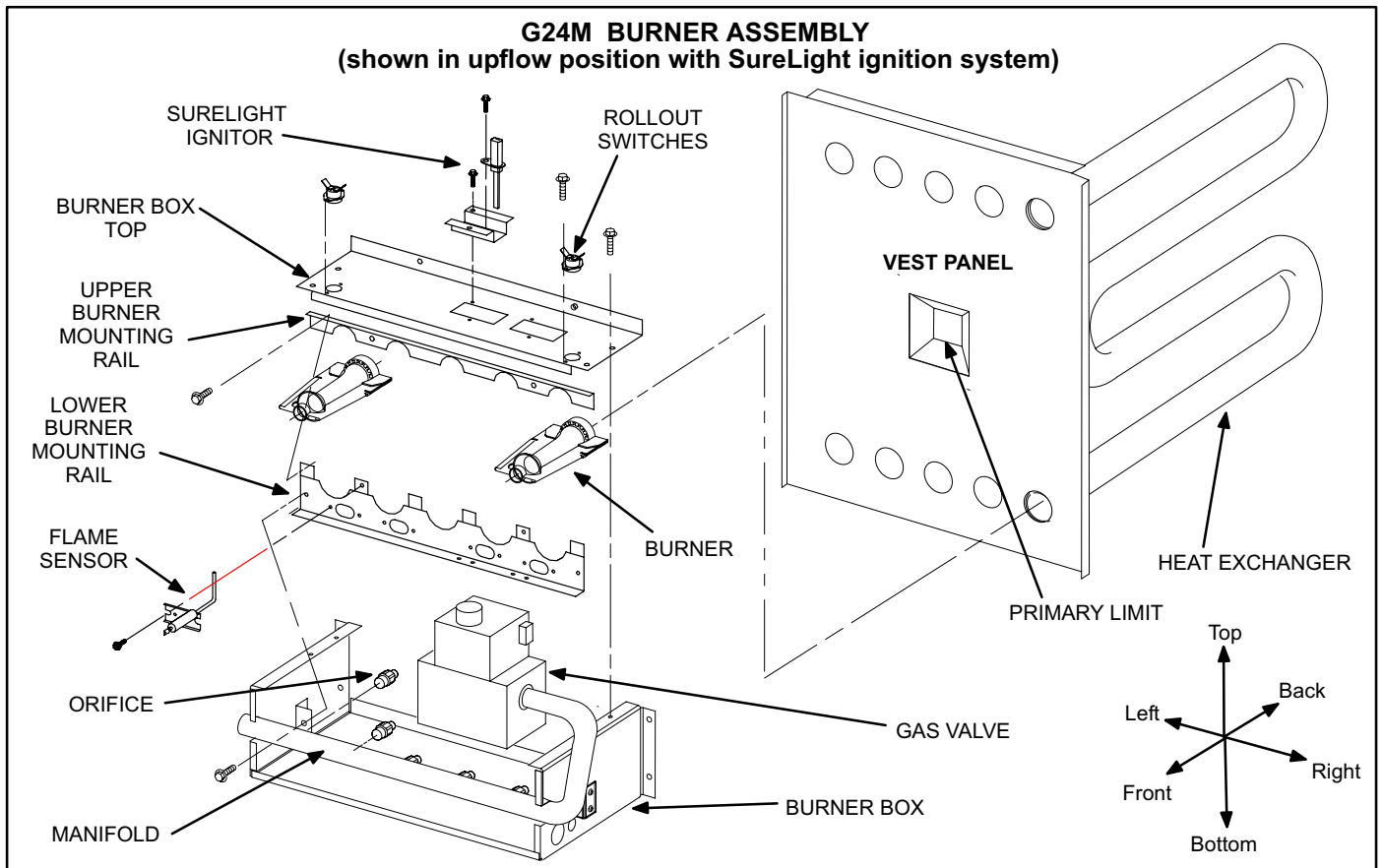


FIGURE 3

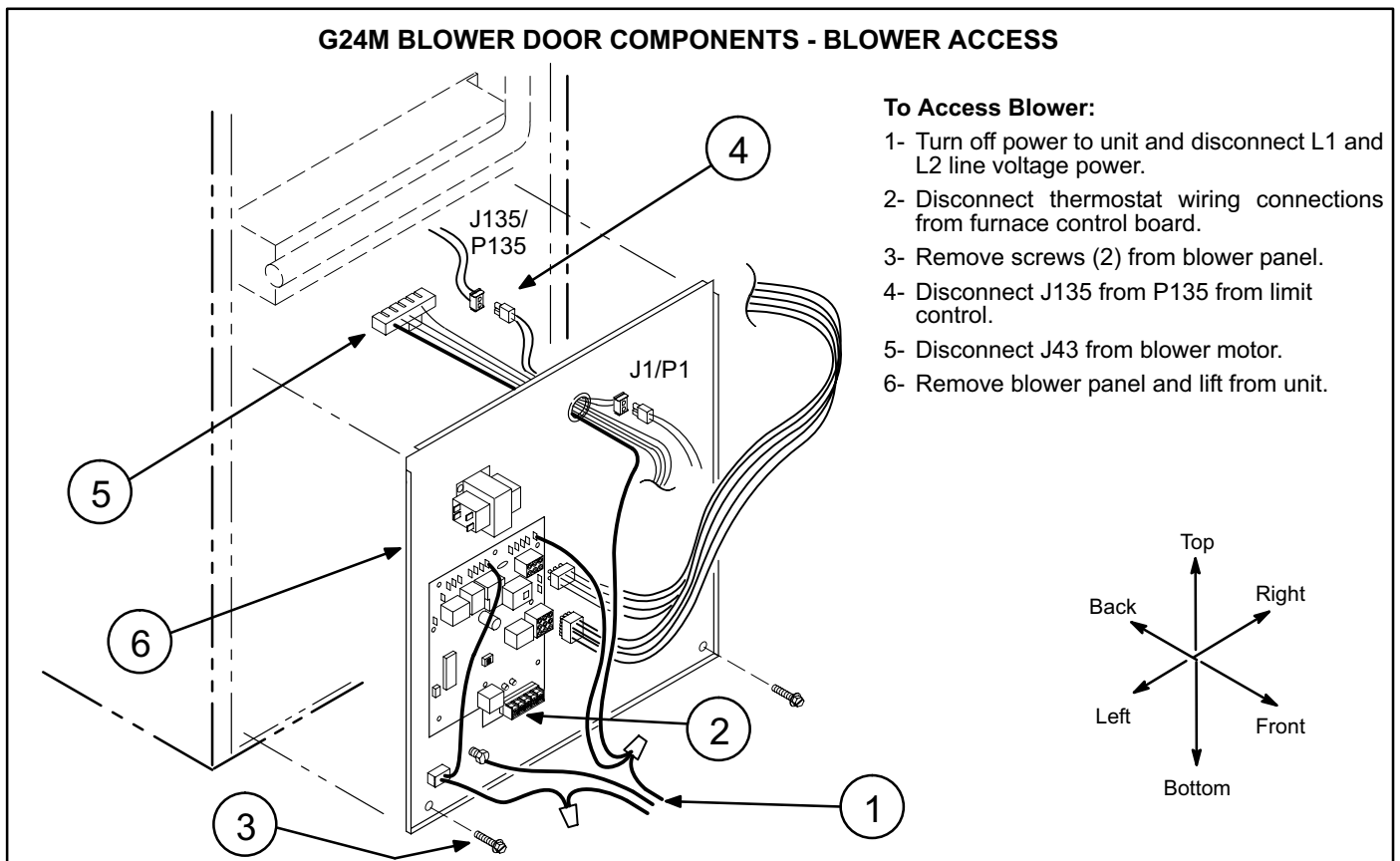


FIGURE 4

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

G24M unit components are shown in figure 1. The blower controls, gas valve and burners can be accessed by removing the front access panel. A separate blower access door is located behind the front access panel. Electrical control components are mounted to the blower access door.

G24M 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. Indentations on side of units, show where side return opening should be cut during installation.

A-Blower Door Components (Figure 4)

Electrical burner control and blower control components are located on the outside surface of the blower access door. Jackplugs allow the blower door to be easily removed for blower service.

Located on the blower door are the unit transformer (T1), the furnace control (A3) and door interlock switch (S51). Furnace control (A3) combines the function of a burner ignition control and blower control.

1- Control Transformer (T1)

A transformer located on the blower door 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 located on the blower access door. The switch is wired in series with line voltage. When the blower door is removed the unit will shut down.

⚠ DANGER

Shock hazard.

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- SureLight Ignition System (A3) Late Model G24M Units

Late model G24M units are equipped with the Lennox SureLight ignition system. The system consists of ignitor (figure 5) and ignition control board (figure 6 with control terminal designations in table 1). The board and ignitor work in combination to ensure furnace ignition and ignitor durability. The SureLight integrated board controls all major furnace operations. The board also features two LED lights for troubleshooting and two accessory terminals rated at (4) four amps. See table 2 for troubleshooting diagnostic codes. Table 3 and 4 show jack plug terminal designations. Units equipped with the SureLight board can be used with either electronic or electro-mechanical thermostats without modification. The SureLight ignitor is made of durable silicon-nitride. Ignitor longevity is also enhanced by voltage ramping by the control board. The board finds the lowest ignitor temperature which will successfully light the burner, thus increasing the life of the ignitor.

a-flame sensor

The flame sensor uses flame rectification to sense combustion. During operation, flame is sensed by current passed through the flame and sensing electrode. Figure 7 shows the gap between tip of the electrode and the burner surface.

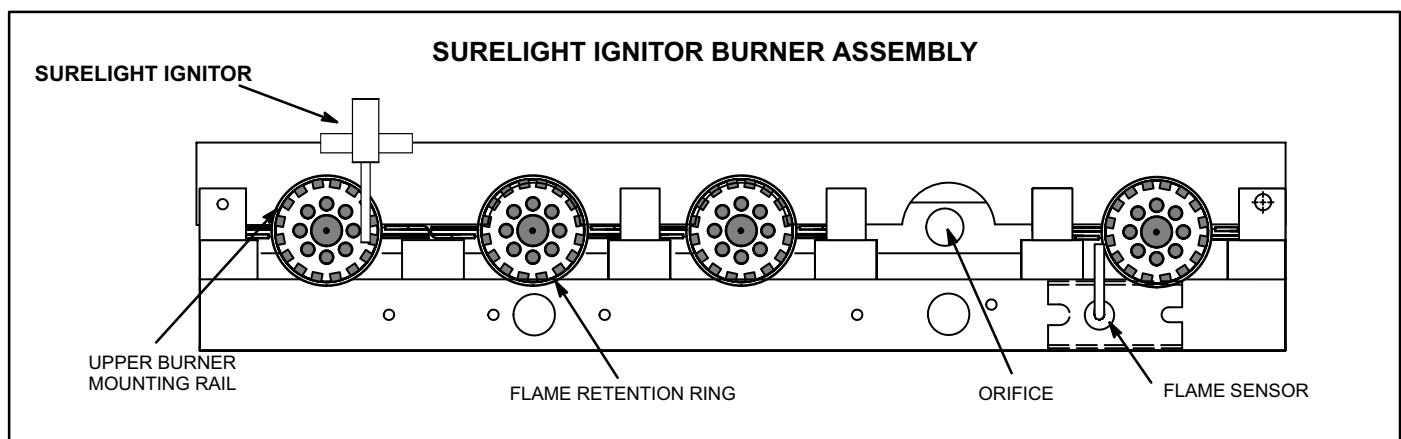


FIGURE 5

SURELIGHT CONTROL BOARD LATE MODEL G24M UNITS

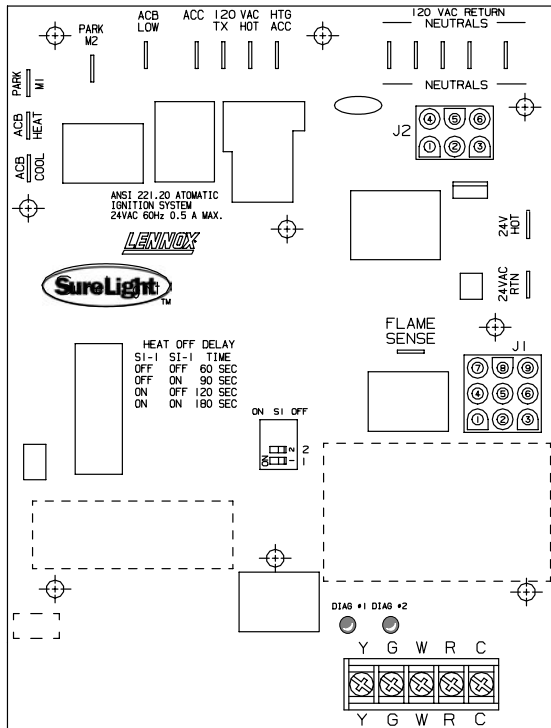


FIGURE 6

TABLE 1

SURELIGHT CONTROL TERMINAL DESIGNATIONS	
ACB COOL	Blower - Cooling Speed (Line Volt)
ACB HEAT	Blower - Heating Speed (Line Volt)
PARK	Alternate Blower Speeds (Dead)
ACB LOW	Continuous Low Speed Blower
ACC	Accessory Terminal (Line Volt)
TX	120VAC Hot to Transformer
HOT	120VAC Hot Input
HTG ACC	Heat Only Accessory (Line Volt)
NEUTRALS	120VAC Neutrals
24VAC HOT	24VAC Hot from Transformer
24VAC RTN	24VAC Return from Transformer
FLAME SENSE	Flame Sense Terminal

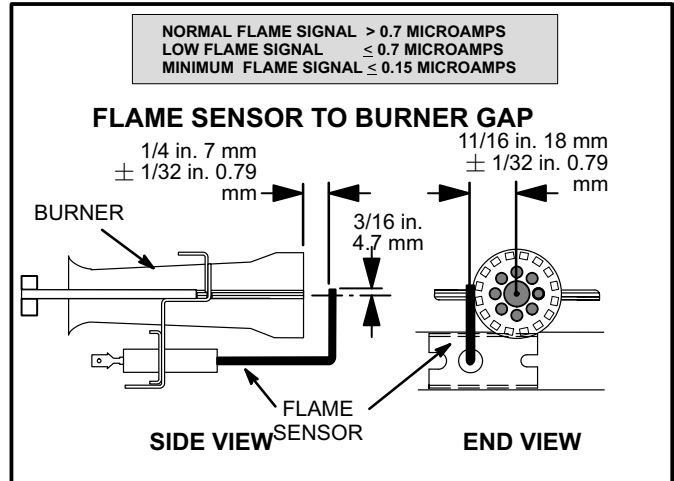


FIGURE 7

TABLE 2

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 63K8901 or 24L85: Limit must close within 5 trials for ignition or board goes into one hour limit Watchguard. Units with board 56L83 or 97L48: 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

TABLE 3

SureLight BOARD J156 (J2) TERMINAL DESIGNATIONS	
PIN #	FUNCTION
1	Ignitor
2	Not Used
3	Ignitor Neutral
4	Combustion Air Blower Line Voltage
5	Not Used
6	Combustion Air Blower Neutral

TABLE 4

SureLight BOARD J58 (J1) TERMINAL DESIGNATIONS	
PIN #	FUNCTION
1	Primary Limit In
2	Gas Valve Common
3	Roll Out Switch Out
4	Gas Valve 24V
5	Pressure Switch In
6	Pressure Switch and Primary Limit Out
7	Not Used
8	Roll Out Switch In
9	Ground

**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.

b-Electronic Ignition

On a call for heat the SureLight control monitors the combustion air inducer prove switch. The control will not begin the heating cycle if the prove switch is closed (by-passed). Once the prove switch is determined to be open, the combustion air inducer is energized. When the differential in the prove switch is great enough, the prove switch closes and a 15-second pre-purge begins. If the prove switch is

not proven within 2-1/2 minutes, the control goes into Watchguard-Pressure Switch mode for a 5-minute re-set period.

NOTE - The G24M furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

After the 15-second pre-purge period, the SureLight ignitor warms up for 20 seconds after which the gas valve opens for a 4-second trial for ignition. The ignitor stays energized for the first second of the 4-second trial. G24M units with 63K89, 24L85 or 56L83: the ignitor stays energized the first second of the 4 second trial. G24M units with board 97L48: ignitor stays energized during the 4-second trial until flame is sensed. 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 35 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.

The SureLight control board has an added feature that prolongs the life of the ignitor. After a successful ignition, the SureLight control utilizes less power to energize the ignitor on successive calls for heat. The control continues to ramp down the voltage to the ignitor until it finds the lowest amount of power that will provide a successful ignition. This amount of power is used for 255 cycles. On the 256th call for heat, the control will again ramp down until the lowest power is determined and the cycle begins again.

c-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 SureLight 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 8.

NOTE—If fan “off” time is set too low, residual heat in heat exchanger may cause primary limit S10 to trip resulting in frequent cycling of blower. If this occurs, adjust blower to longer time setting.

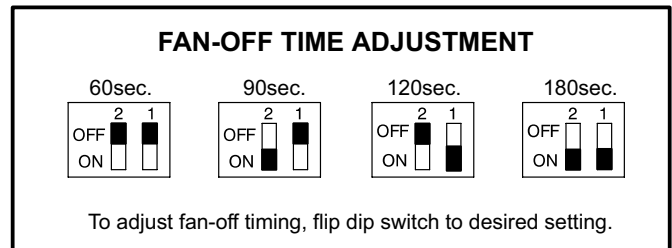


FIGURE 8

4- Ram Control (A3) Early Model G24M Units

The furnace control combines burner ignition functions with blower control functions.

Early model G24M units utilize a furnace control manufactured by RAM Electronics Corporation. The "RAM" board is a printed circuit board which controls the blower, gas valve, combustion air blower and ignition spark. It also monitors the flame, limit and gas valve operation. The control has a non-adjustable, factory preset "on" fan timing (45 seconds). Fan "off" timings are adjustable. The board utilizes both 120 and 24VAC. See figure 9. The board is also equipped with a diagnostic LED for use when troubleshooting the unit.

When the furnace is idle (blower off and no heating or cooling demand), the diagnostic LED flashes at a slow steady rate. On a call for heat, the diagnostic LED begins flashing at a fast rate and the combustion air blower is energized. The LED flashes different codes to indicate problem conditions. The diagnostic LED lights red (not flashing) to indicate control board failure. Table 7 shows how to interpret the other LED modes.

Pre-Purge

On a call for heat, the combustion air blower begins operating. If the combustion air prove switch closes, the combustion air blower continues to operate for 45 seconds (pre-purge) before allowing ignition. Pre-purge allows the heat exchanger to be cleared of combustion products and to introduce fresh air for combustion. If the combustion air prove switch does not close, the combustion air blower continues to run indefinitely (until the prove switch closes).

Post-Purge

After a demand, the combustion air blower continues to operate for 5 seconds (post-purge) before stopping. Post-purge allows the heat exchanger to be cleared of combustion products.

Ignition Control

The ignition control is a direct spark ignition control module integral to the furnace control. See figure 9. When there is a call for heat, the control delays ignition until combustion air blower operation has been proved and pre-purge period has elapsed. It then opens the gas valve and generates a spark to ignite the burners. Trial for ignition lasts for 7 seconds. At the same time, the control begins monitoring the flame sensor. If the flame current is too weak (less than 1 microamp) or if the burners do not ignite (within the 7 second ignition trial), the control will shut off the spark ignitor and the combustion air blower and de-energize the gas valve. Flame current should be between 1 and 5 microamps to keep the gas valve open. See figure 21.

The control will attempt to ignite the burners up to two more times. Each time the control restarts the ignition sequence, it begins with a 45 second pre-purge. If flame is not sensed after the third trial, the control locks out. Lockout means that the control shuts off the gas valve, spark and combustion air blower for 60 minutes. At the end of 60 minutes the control completely resets and will attempt ignition up to three times. The control can be manually reset before the end of 60 minutes by momentarily turning off power to the unit.

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.

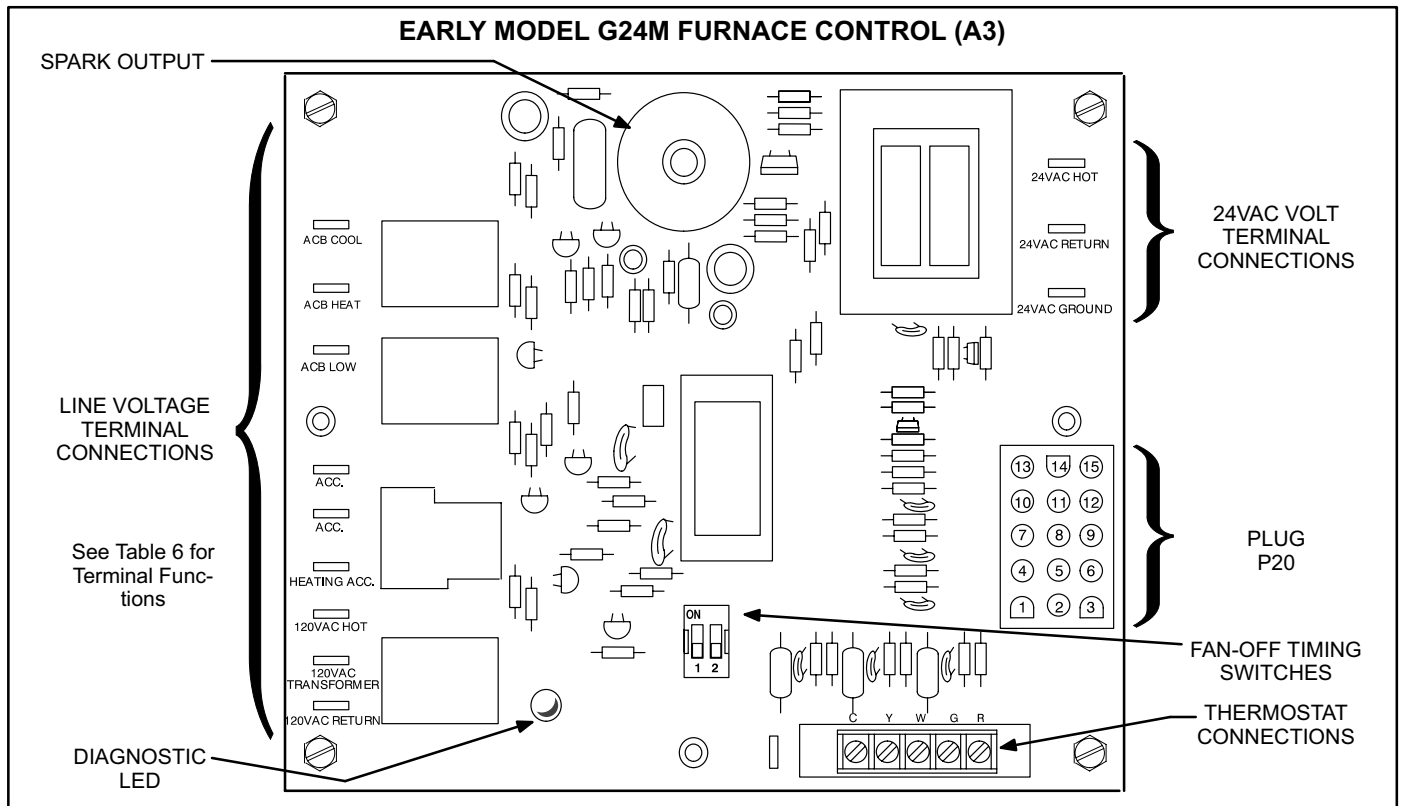


FIGURE 9

TABLE 5

Furnace Control A3 Limit Response During Operation				
Condition	Response			
	Combustion Air Blower	Gas Valve	Supply Air Blower	Diagnostic LED
Loss of Flame Sensed Before End of 45 second Blower On Delay (3 or Fewer Trials for Ignition)	On	On (Spark Starts Within 0.8 seconds)	On	Fast Flash
Loss of Flame Sensed After 45 second Blower On Delay (3 or Fewer Trials for Ignition)	On	Off Then On With Spark After Pre-Purge	On	Fast Flash
Loss of Flame Sensed (More Than 3 Trials for Ignition)	Off	Off	Off	2 Flashes
Flame Sensed Without Demand	On	Off	On	5 Flashes
Primary or Secondary Limit Open	On	Off	On	4 Flashes
Rollout Switch Open	On	Off	On	4 Flashes
Combustion Air Prove Switch Open	On	Off	On	3 Flashes

When flame is sensed, the indoor blower starts after a 45 second delay. Gas valve remains open and blower continues to run until demand stops, flame sensor senses loss of flame, a limit opens or the prove switch opens. If any of these events occur during a thermostat demand, the gas valve closes and the diagnostic LED registers the error condition (table 5).

Blower Control and Timings

⚠ DANGER

Electrical Shock Hazard.
 This control contains field adjustable switches and also contains line voltage. Make sure power is disconnected before making any field adjustments or performing any service procedure.

NOTE—If fan “off” time is set too low, residual heat in heat exchanger may cause primary limit S10 to trip resulting in frequent cycling of blower. If this occurs, adjust blower to longer time setting.

Fan “ON” timing (time that the burners operate before the supply air blower starts) is fixed at 45 seconds and cannot be adjusted.

Fan “OFF” timings (time that the blower operates after a heating or cooling demand has been satisfied) are determined by the arrangement of switches on the furnace control board. See figure 9. To adjust fan “off” timings, gently reposition the switches to a new timing position. Figure 10

shows the various fan “off” timings and how switches should be positioned. Unit is shipped with a factory fan “off” setting of 180 seconds. Fan “off” time will affect comfort and efficiency and is adjustable to satisfy individual applications. The fan “off” timing is initiated after a heating or cooling demand but not after a blower demand (that is, when indoor thermostat switch is changed from ON to AUTO and heating/cooling demand is not present, the blower stops immediately).

TABLE 6

FURNACE CONTROL A3 TERMINAL DESIGNATIONS		
Terminal	Type	Function
24VAC HOT	1/4" Spade	24VAC In From Transformer
GND	1/4" Spade	To Cabinet Ground
Y	Screw Strip	Cooling Demand
G	Screw Strip	Blower Demand
R	Screw Strip	24VAC to Thermostat
W	Screw Strip	Heating Demand
C	Screw Strip	24VAC Common
120VAC HOT	1/4" Spade	Line Voltage In
120VAC RTN	1/4" Spade	Line Voltage Neutral
120VAC TX	1/4" Spade	Line Voltage Out To Transformer
CMB	J20/P20 Pin 1	Switched 120VAC to Combustion Air Blower
CMB RTN	J20/P20 Pin 2	120VAC Common Combustion Air Blower
ACB HEAT	1/4" Spade	Switched 120VAC to Blower Heating Tap
ACB LOW	1/4" Spade	120VAC Output to Supply Air Blower for Continuous Operation During No Demand
ACB COOL	1/4" Spade	Switched 120VAC to Blower Cooling Tap
VLV HOT	J20/P20 Pin 13	24VAC to Gas Valve
VLV RTN	J20/P20 Pin 9	24VAC Common From Gas Valve
PSW IN	J20/P20 Pin 10	24VAC In From Pressure Switch Switch Open: Prohibits Ignition Switch Closed: Allows Ignition
HIL IN	J20/P20 Pin 11	24VAC In From Limits Limit Open: Closes Gas Valve Limits Closed: Allows Ignition
HIL OUT	J20/P20 Pin 14	24VAC to Limit Train and Pressure Switch
RO OUT	J20/P20 Pin 7	24VAC Out To Rollout Switches
RO IN	J20/P20 Pin 15	24VAC In From Rollout Switches
SPARK ELECTRODE	Male Spark Plug Type	High Voltage Out To Spark Electrode
FS	J20/P20 Pin 12	Flame Microamp Sensing

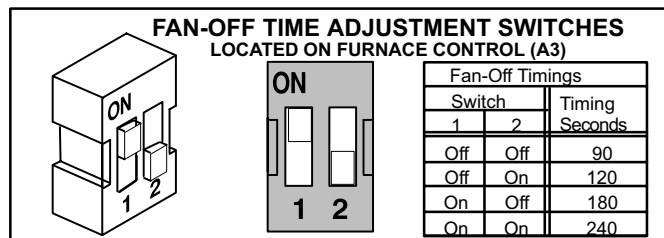


FIGURE 10

Diagnostic LED

The furnace control is equipped with a diagnostic LED used for troubleshooting the unit and the control. LED functions are shown in table 7.

TABLE 7

Furnace Control A3 Diagnostic LED		
LED State	Meaning	Remedy
Steady On	Control Failure	Replace Control
Slow Flash	Normal Operation and No Call For Heat	----
Fast Flash	Normal Operation with Call For Heat	----
Two Flashes	Control Lockout	Failed to Sense or Sustain Flame. Check Gas Valve, Burners, Spark Electrode and Wire, Flame Sensor. Replace Control If All OK.
Three Flashes	Pressure Switch Open	Failed to Prove Combustion Blower Operation or Blocked Vent. Repair or Replace as Necessary.
Four Flashes	Open Limit	Check Primary Limit, Rollout Switches and Secondary Limits. Find source of Overtemperature. If all OK, Reset or Replace Limits as Necessary.
Five Flashes	Flame Sensed and Gas Valve Not Energized.	Check Gas Valve. If OK, Check Flame Sensor.

B-Blower Motors and Capacitors

All G24M units use direct drive blower motors. All motors used are 120V permanent split capacitor motors to ensure maximum efficiency. See table8 for ratings.

TABLE

G24M BLOWER RATINGS 120V 1PH		
BLOWER MOTOR	HP	CAP
G24MQ2	1/4	5MFD 370V
G24MQ3	1/3	5MFD 370V
G24MQ3/4	1/2	7.5MFD 370V
G24MQ4	1/2	7.5MFD 370V
G24MQ4/5	3/4	40MFD 370V
G24MQ5/6	3/4	40MFD 370V

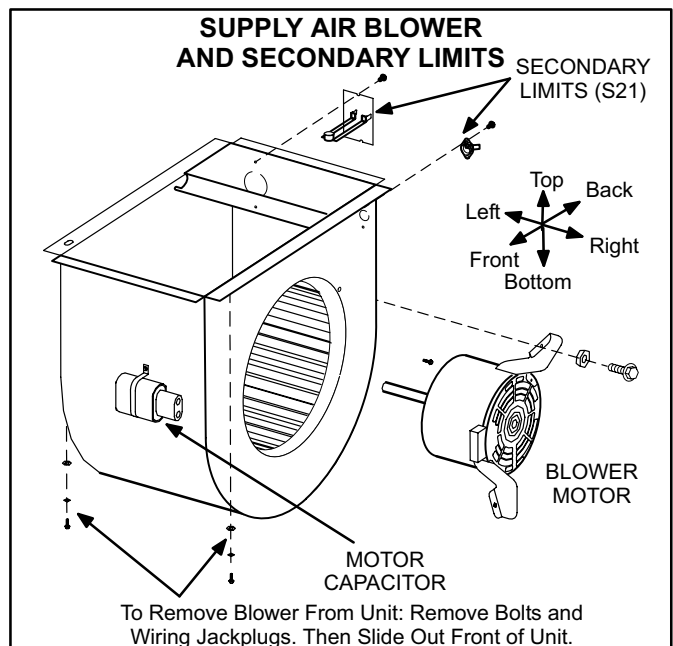


FIGURE 11

C-Combustion Air Inducer (B6)

All G24M units use a combustion air inducer to move air through the burners and heat exchanger during heating operation. Some early model G24M units are equipped with a blower that uses a PSC (Permanent Split Capacitor) 120VAC motor. PSC motors use run capacitors. Other early and late model G24M units are equipped with a blower that uses a shaded pole 120V motor. The motor operates during all heating operation and is controlled by furnace control A3. For G24M units equipped with the Ram ignition system, the blower will operate for 45 seconds before burner ignition (pre-purge) and for 5 seconds after the gas valve closes (post-purge). For G24M units equipped with the SureLight ignition system, the blower will operate for 15 seconds before burner ignition (pre-purge) and for 5 seconds after the 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.

D-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. To manually reset a tripped switch, push the reset button located on the control.

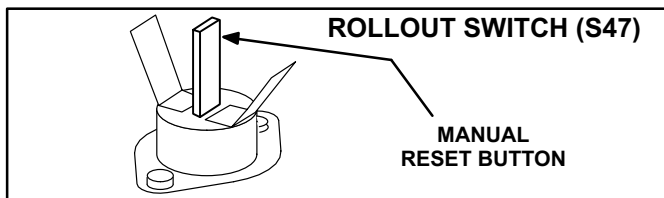


FIGURE 12

E-Primary Limit Control (S10)

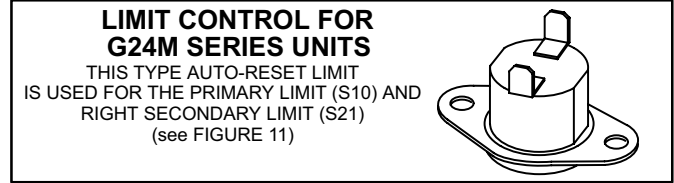


FIGURE 13

The primary limit (S10) on G24M 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 different setpoints for each unit model number. However, the setpoint will be printed on the side of the limit.

F-Secondary Limit Controls (S21)

The secondary limit (S21) on G24M 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. Two limits are supplied in each furnace and each limit is a different style (figures 13 and 14). The setpoint will be printed on the side of the limit. If stick limit (figure 14) suffers from nuisance trips and the furnace is in the horizontal position, replace with limit kit no. 50L98.

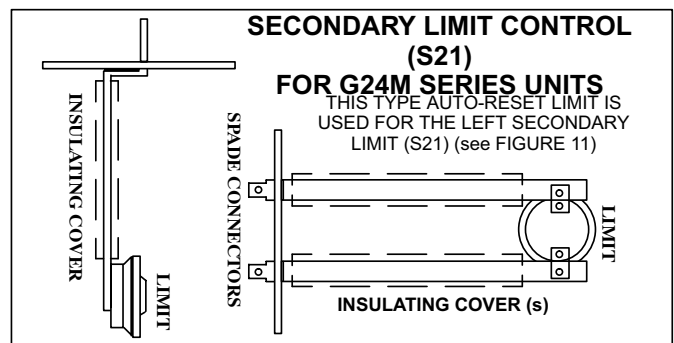


FIGURE 14

G-Spark Electrode and Flame Sensor Early Model G24M Units

Figure 15 shows the arrangement of flame sensor, spark electrode and burners. The ignition control uses direct spark to ignite the rightmost burner and the burners cross-light to the left. The flame sensor uses flame rectification to sense combustion. A flame retention ring in the end of each burner is used to maintain correct flame length and shape and to keep the flame from lifting off the burner head.

Figure 16 shows the gap between tip of the electrodes and the burner surface.

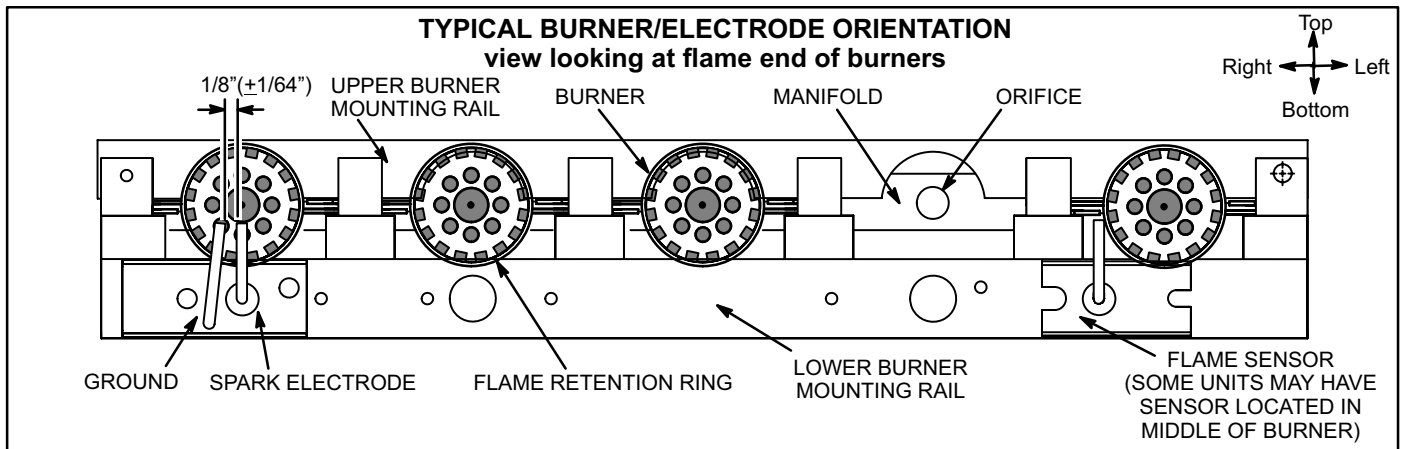


FIGURE 15

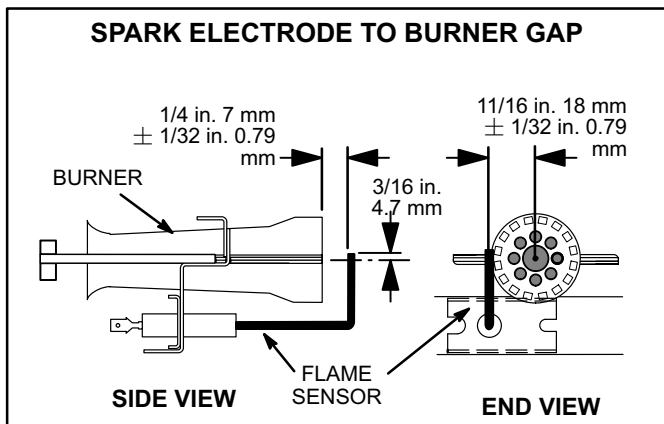


FIGURE 16

H-Gas Valve

The G24M uses a gas valve manufactured by Honeywell (figure 17) or White Rodgers (figure 18). 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. Refer to figure 17 or 18 for location of valve features.

An LPG changeover kit is available from Lennox. The kit includes burner orifices and a regulator conversion kit.

I-Combustion Air Blower Prove (Pressure) Switch (S64)

G24M series units are equipped with a combustion air 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.

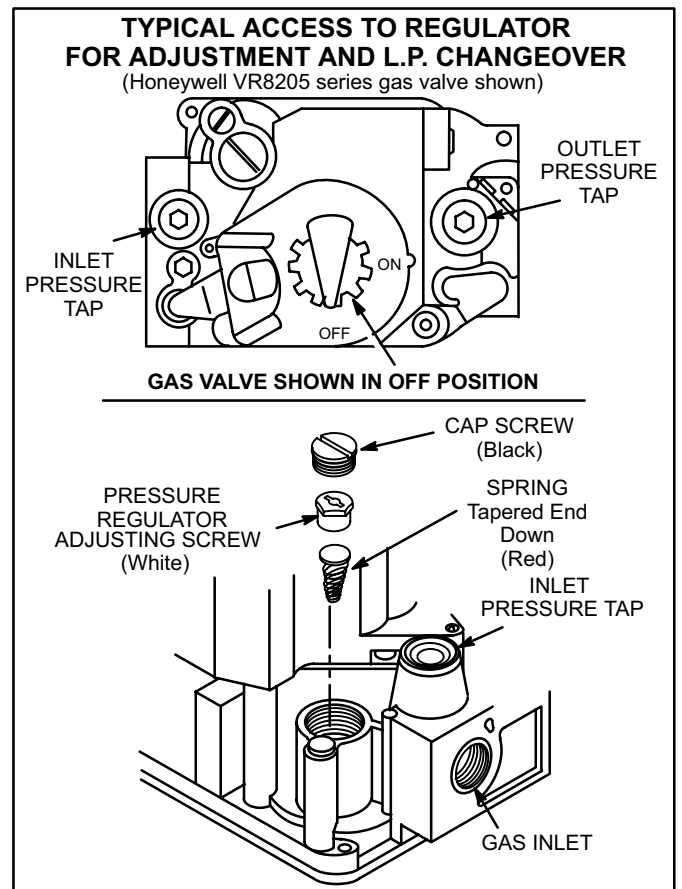


FIGURE 17

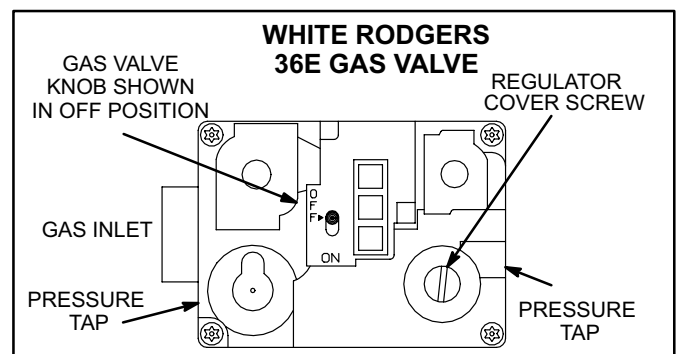


FIGURE 18

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.

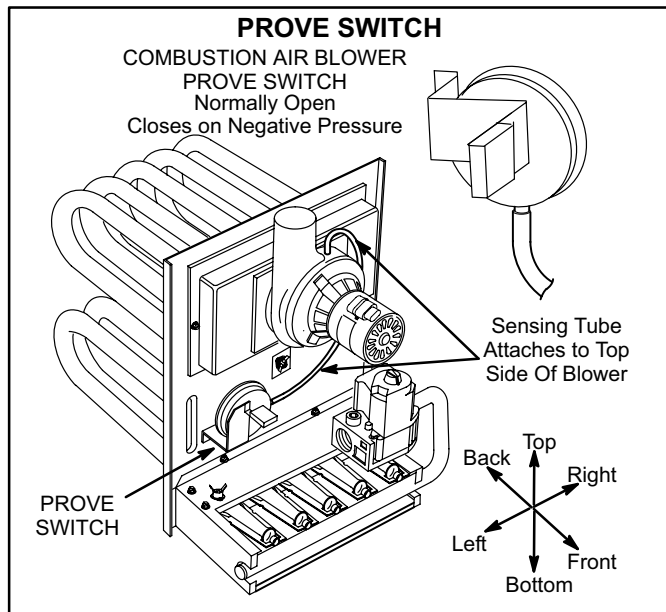


FIGURE 19

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 increases above switch setting (negative) w.c. 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. The switch trip pressure is different depending on unit model number. The trip pressure is printed on the side of the limit.

The switch is factory set and is not field adjustable. It is a safety shut-down control in the furnace and must not be bypassed for any reason.

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

- 1 - Set thermostat to OFF position. Close manual knob on gas valve.
- 2 - Wait 5 minutes.
- 3 - Open manual knob on gas valve, replace burner access door and turn on unit electrical supply.

⚠ WARNING

Shock and burn hazard.

G24M units are equipped with either a direct spark or hot surface ignition system. Do not attempt to light manually.

- 4 - Set fan switch to AUTO or ON and move system selection switch to HEAT. Adjust thermostat to a setting above room temperature.
- 5 - If unit does not light the first time, the SureLight control will attempt four more ignitions, the Ram control will attempt two more ignitions before locking out.
- 6 - If lockout occurs, repeat steps 1, 2, 3 and 4.

C-Safety or Emergency Shutdown

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

⚠ 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.

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. design certified without modifications. Refer to the G24M Operation and Installation Instruction Manual for 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

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 20. 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.

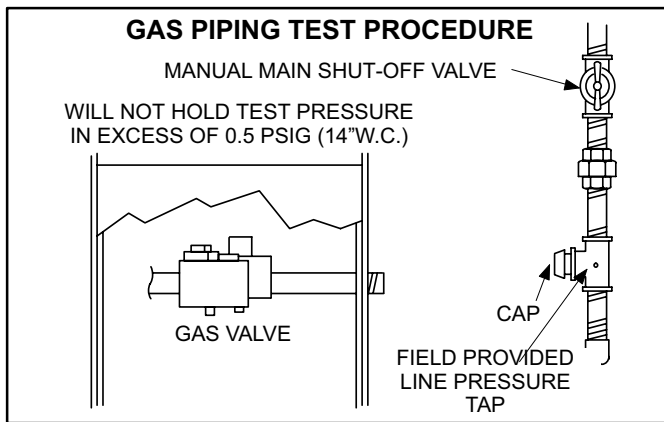


FIGURE 20

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. It is available through Lennox under part number 31B2001. See Corp. 8411-L10, for further details.

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 20. 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 natural gas units, operating pressure at unit gas connection must be between 5.0" W.C. and 13.0" W.C. For L.P. gas units, operating pressure at unit gas connection must be between 10.0" W.C. and 13.0" 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 G24M 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 9
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 9.

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 9.

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

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 10 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 10

GAS METER CLOCKING CHART				
G24M 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
-140	26	52	64	128
Natural-1000 btu/cu ft		LP-2500 btu/cu ft		

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

G-High Altitude Derate

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

G24M-1 through -9 Models

This unit does not require gas pressure adjustment, or pressure switch change when operating at elevations of 0 to 7500 ft. (0 to 2248m). Check gas line pressure with unit firing. The minimum pressure as shown on the nameplate for natural and propane gases must be maintained. No orifice change is required.

NOTE-This is the only permissible field derate for this appliance.

G24M-10 and -11 Models

Table 11 shows manifold pressure settings for installations at different altitudes. Refer to table 12 for pressure switch replacement for models at elevations of 4500 feet (1372m) and greater.

TABLE 11

ALTITUDE feet (m)	GAS FUEL	MANIFOLD PRESSURE in. W.C. (kPa)
0 - 4500 (0 - 1372)	Natural	3.5 (0.87)
	Propane/LP	9.5 (2.36)
4500 - 5500 (1372 - 1676)	Natural	3.4 (0.86)
	Propane/LP	9.2 (2.29)
5500 - 6500 (1676 - 1981)	Natural	3.3 (0.82)
	Propane/LP	8.9 (2.21)
6500 - 7500 (1372 - 2286)	Natural	3.2 (0.80)
	Propane/LP	8.6 (2.14)

TABLE 12

Unit Model	Pressure Switch Part Number
G24M-45	No Change
G24M-60	No Change
G24M-75	88J8001
G24M-100	18L2401
G24M-120	18L2401
G24M-140	No Change

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.

H-Flame Signal

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

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

To Measure Flame Signal:

- 1 - Place meter in series between furnace control and sensor wire. Connect the positive (+) lead of meter to the ignition control sensor connection and the negative (-) lead of the meter to the sensor wire. See figure 21.
- 2 - Set thermostat for a heating demand and check flame signal with unit operating. For G24M series with a RAM control, a reading of 1 to 5 microamps DC should occur. The furnace control must see at least 1.0 microamps in order to keep the gas valve energized. G24M units with the SureLight control should read 0.7 microamps or more.

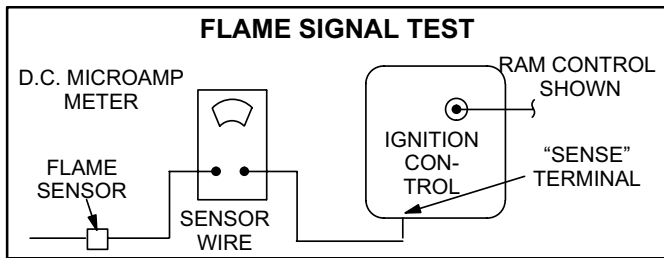


FIGURE 21

Flame signal from the Ram control may rise above 5 microamps for the first few seconds after ignition then level off within the range.

⚠ 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 low speed. With fan switch in AUTO position, blower cycles with demand or runs continuously while heating or cooling circuit cycles.
- 3 - In all cases, blower and entire unit will be off when the system switch is in OFF position.

B-Temperature Rise

Temperature rise for G24M 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 in 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 - Measure tap locations as shown in figure 22.

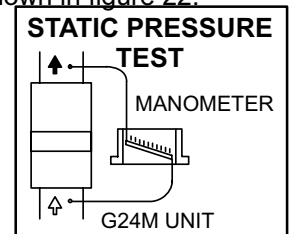


FIGURE 22

- 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. 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 Leadless Motors

Blower speed tap selection is accomplished by changing the taps at the blower motor harness connector. Disconnect harness connector from motor to expose speed selectors. Blower speed selections are listed in table 13.

To Change Blower Speed:

- 1 - Turn off electric power to furnace.
- 2 - Remove front panel and blower access door. See figure 4.
- 3 - Disconnect blower motor harness from motor.
- 4 - Select desired speeds for heating and cooling (refer to unit wiring diagram).
- 5 - Depress harness connector tab to release wire terminal. Select connector location for new speed (refer to unit wiring diagram). Insert wire terminal until it is securely in place. See figure 23.
- 6 - Replace harness connector to motor.

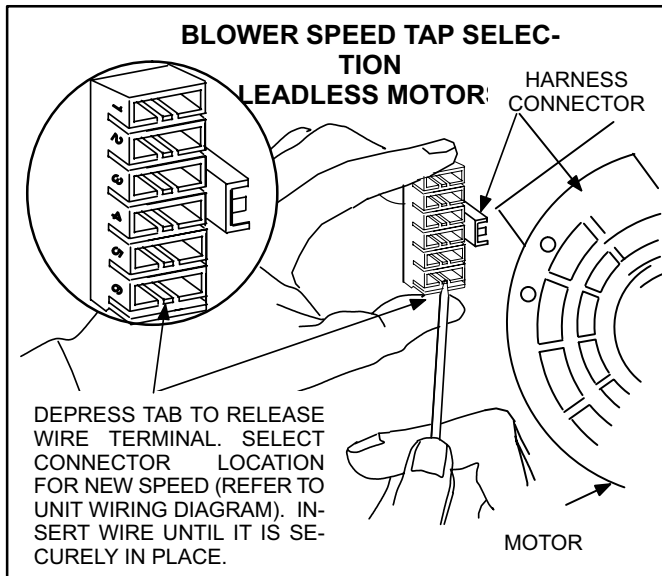


FIGURE 23

E-Blower Speed Taps Leaded Motors

Blower speed tap changes are made on the SureLight control board. See figure 6. Unused taps must be secured on dummy terminals "PARK M1" and or "PARK M2" on the

SureLight board. The heating tap is connected to the "ACB HEAT" terminal and the cooling tap is connected to the "ACB COOL" terminal. The continuous blower tap is connected to the "ACB LOW" terminal.

To change existing heat tap, turn off power then switch out speed tap on "ACB HEAT" with tap connected to "PARK M1" or "PARK M2". See table 14 for blower motor tap colors for each speed.

TABLE 13

UNIT	FACTORY CONNECTED SPEED TAP			MOTOR SPEEDS AVAILABLE	
	COOL	HEAT	CONT		
	02-45/60	2	4		5
03-60/75	2	4	5	4	
04-75, 3/4-100	2	4	5	5	
04/5-100/120	2	5	6	5	
02-75, 3/4-120	2	3	5	4	
04/5-140	2	3	6	5	
BLOWER SPEED SELECTION HI ← → L0					
SPEED TAP	2	3	4	5	4
	2	3	4	5	6

TABLE 14

UNIT	FACTORY CONNECTED SPEED TAPS					MOTOR SPEEDS AVAILABLE
	COOL	HEAT	ACB LOW	M1	M2	
02-45/60		YELLOW		BROWN	----	4
03-60/75		YELLOW		BROWN	----	4
04-75, 3/4-100		BLUE		YELLOW	BROWN	5
04/5-100/120	BLACK	YELLOW	RED	BROWN	BLUE	5
02-75, 4/5-140		BROWN		YELLOW	----	4
03/4-120		BROWN		YELLOW	----	4
BLOWER SPEED SELECTION HI ← → L0						
SPEED TAPS	BLACK	BROWN	YELLOW	RED		4
	BLACK	BROWN	BLUE	YELLOW	RED	5

VI-MAINTENANCE

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

A-Filters

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

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

Due to dimples designed in the heatexchanger, cleaning is not recommended. Removal is for inspection only.

To clean burners:

- 1 - Turn off both electrical and gas power supplies to furnace.
- 2 - Disconnect gas supply piping and remove gas manifold.
- 3 - Disconnect ignitor and flame sensor leads.
- 4 - Remove burner tray and burners.
- 5 - Clean burner retention ring with wire brush.
- 6 - Use test tube brush to clean inside of each burner.
- 7 - Replace burners and burner tray, making sure burners are properly seated in slots on tray and orifice in manifold.
- 8 - Reinstall burner box and gas supply piping. Reconnect ignitor and flame sense leads.
- 9 - Carefully check all piping connections (factory and field) for gas leaks. Use a leak detecting solution or other preferred means.
- 10 - Restore electrical power and gas supply. Follow lighting instructions on front of unit.

⚠ 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 Lennox G24M 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.

HEAT EXCHANGER REMOVAL (unit shown in horizontal position)

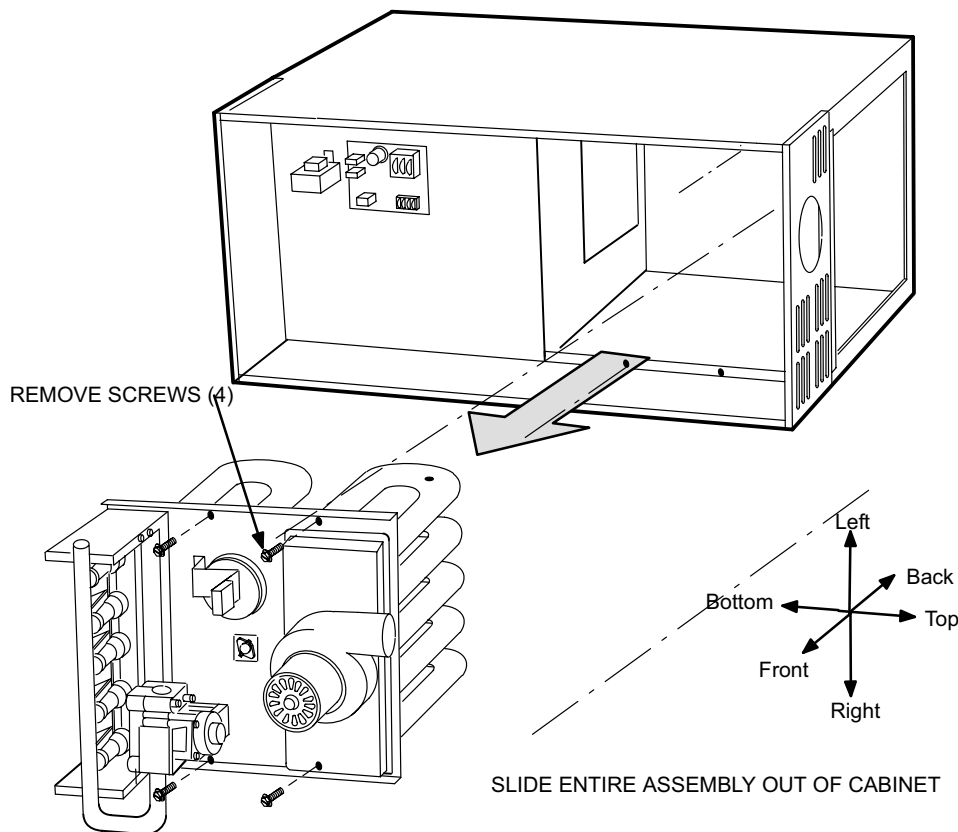


FIGURE 24

VII-WIRING, OPERATION SEQUENCE & TROUBLESHOOTING
A-Field Wiring, Thermostat Connections

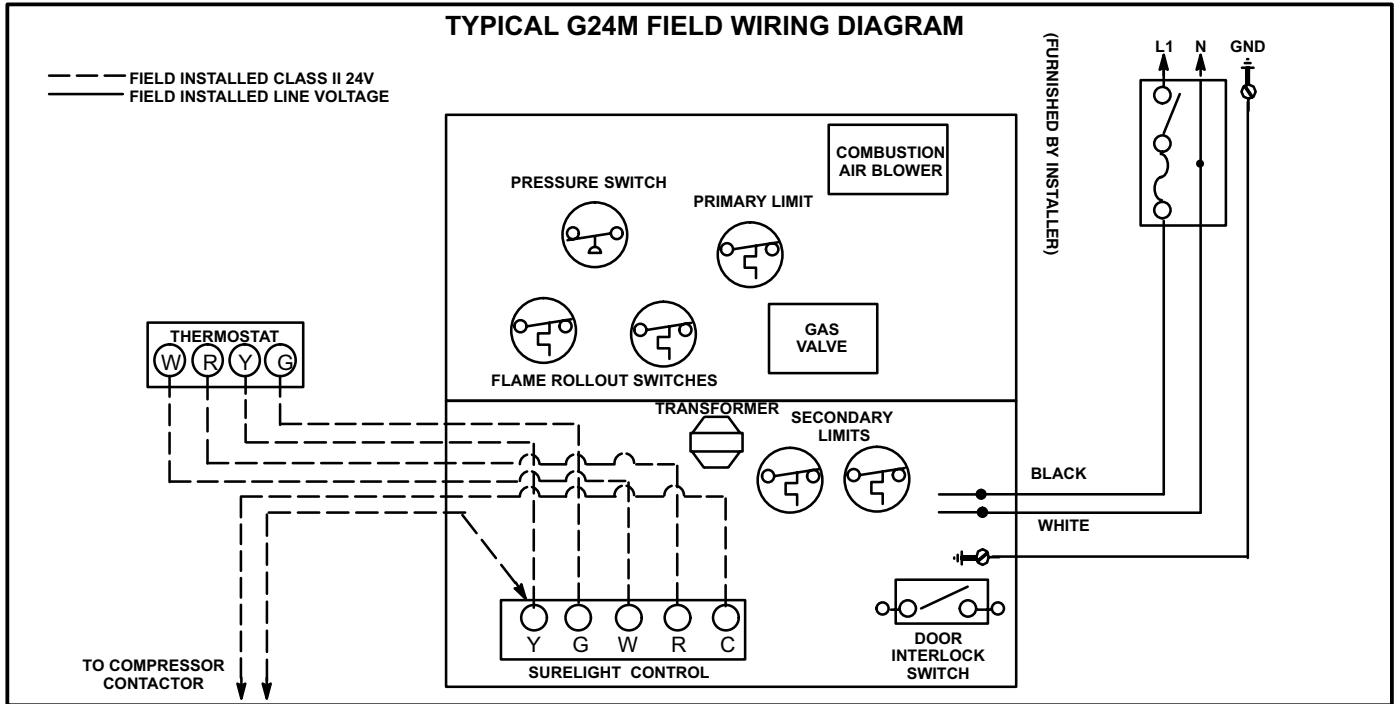


FIGURE 25

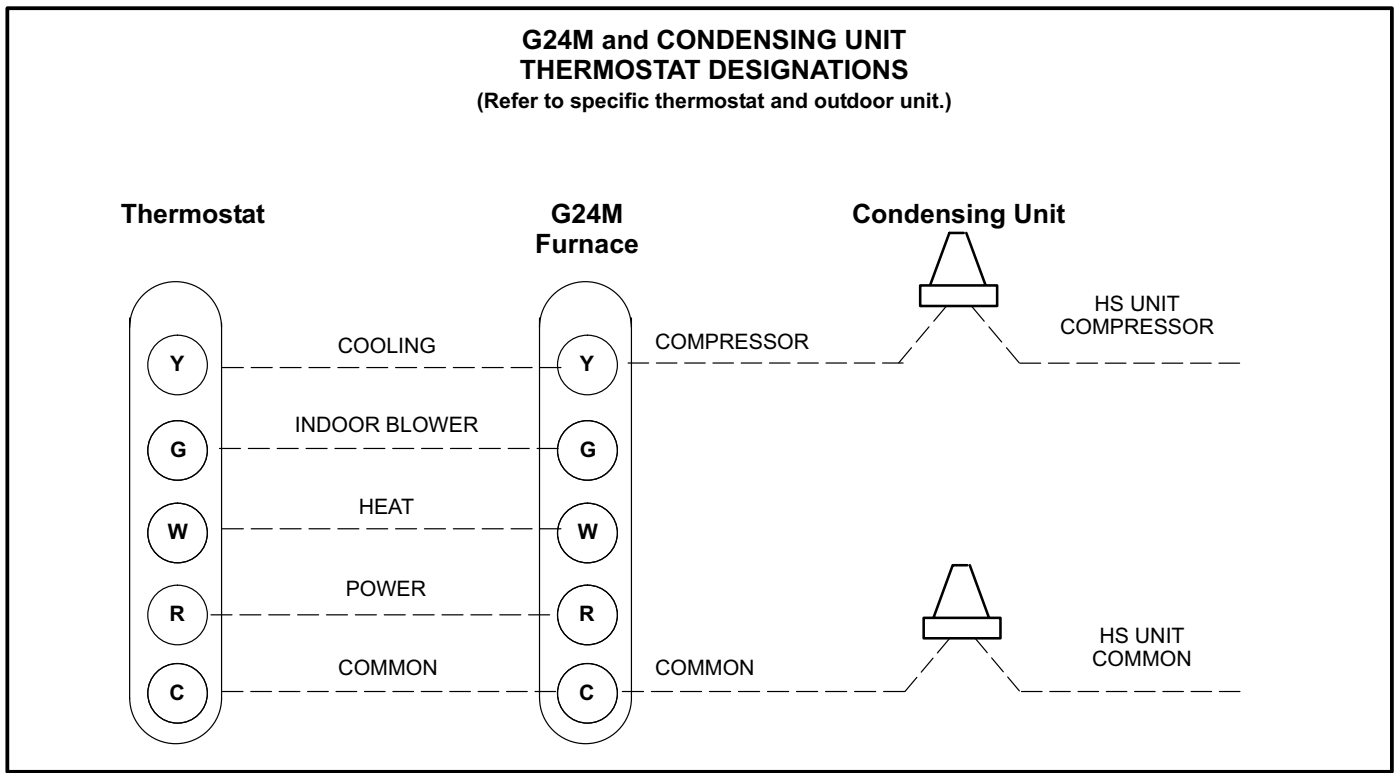
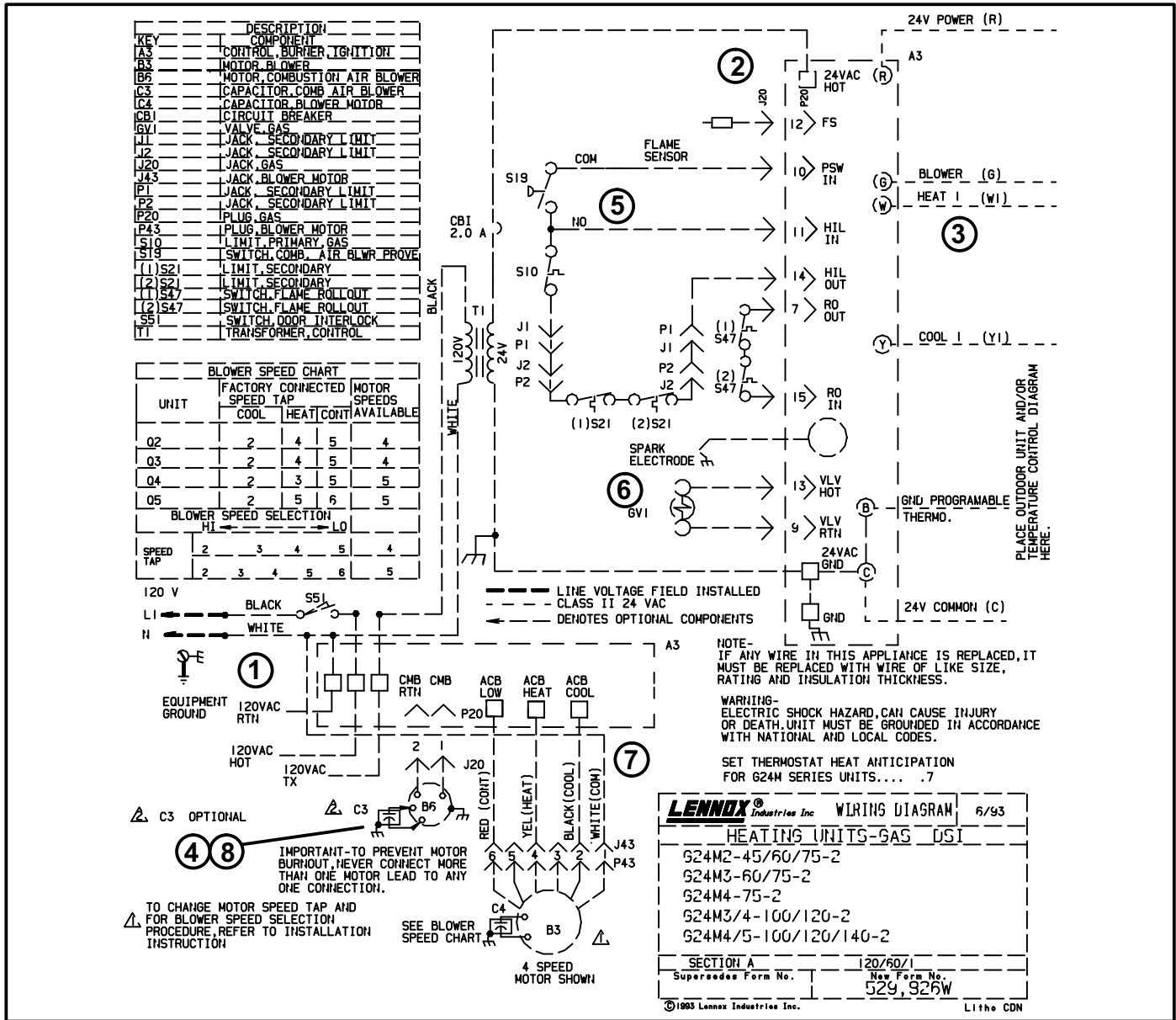


FIGURE 26

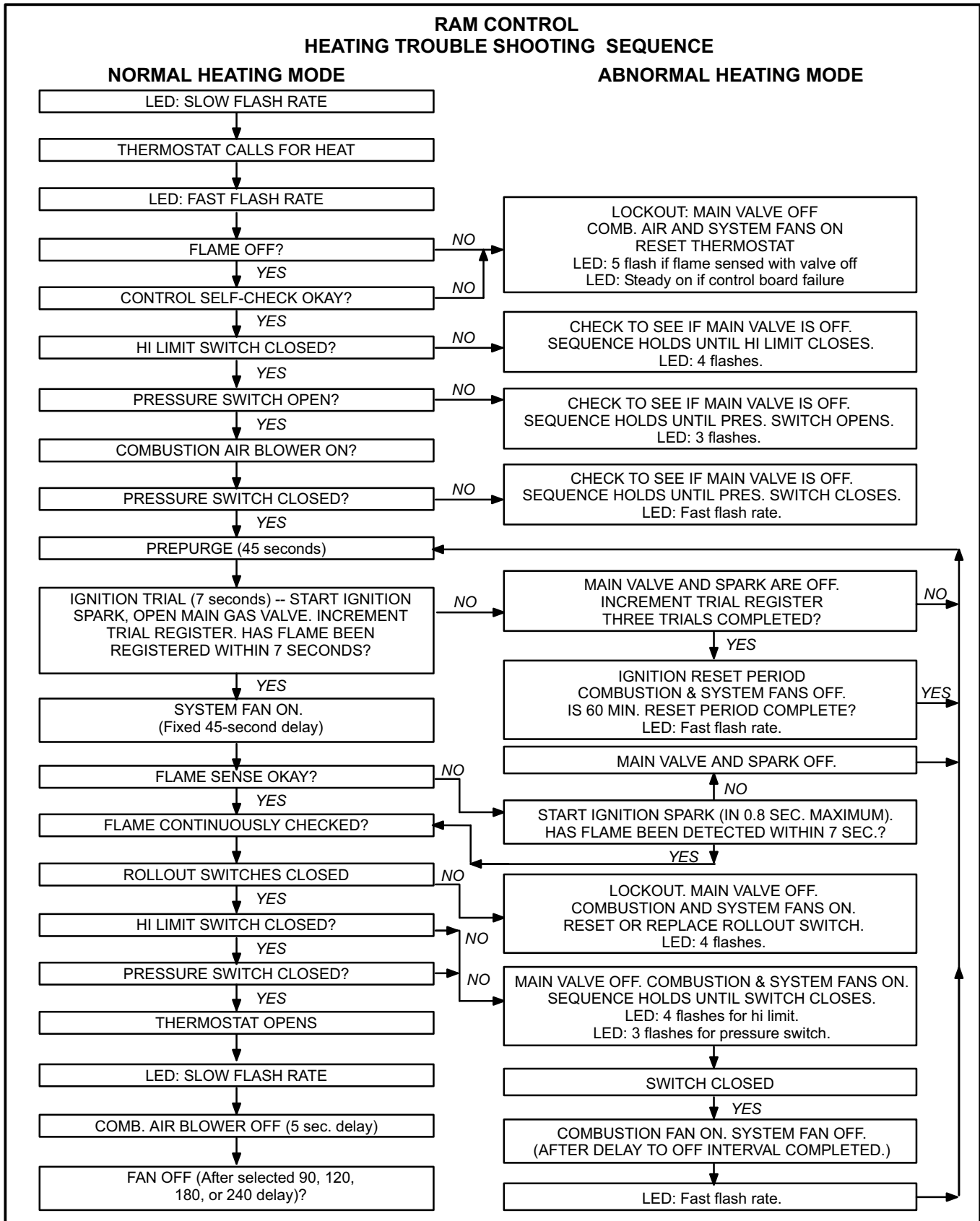
B-Early Model G24M Series With Ram Ignition Control



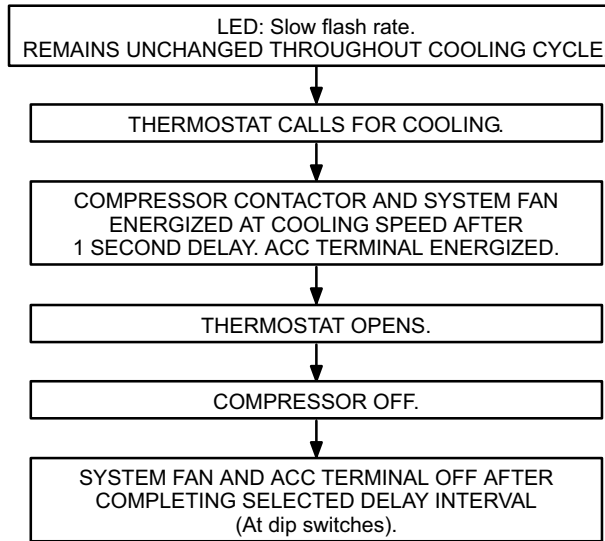
- 1 - When disconnect is closed, 120V is routed through door interlock switch (S51) to feed the line voltage side of the furnace control (A3) and transformer T1 primary. Door interlock switch must be closed for A3 and T1 to receive voltage.
- 2 - T1 supplies 24VAC to terminal "24VAC" on A3. In turn, terminal "R" of A3 supplies 24VAC to terminal "RC" of the indoor thermostat (not shown).
- 3 - When there is a call for heat, W1 of the thermostat energizes W of the furnace control with 24VAC.
- 4 - CMB BLWR of the blower control energizes the combustion air blower (B6). When the combustion air blower nears full speed, combustion air prove switch (S18) closes.
- 5 - When S18 closes, assuming the flame rollout switch

- (S47), primary limit (S10) and secondary limits (S21) are closed, the furnace control begins a 45 second time-delay (pre-purge).
- 6 - At the end of the pre-purge cycle, the furnace control simultaneously opens the gas valve and sends high voltage to the spark electrode.
- 7 - When flame is sensed, the furnace control begins a 45 second delay before energizing the indoor blower.
- 8 - When heat demand is satisfied, W1 of the thermostat de-energizes W of the furnace control and the furnace control immediately de-energizes the gas valve. The combustion air blower runs for 5 seconds (post-purge) before being de-energized. Also, the indoor blower runs for a designated period (90-240 seconds) as set by switches on furnace control.

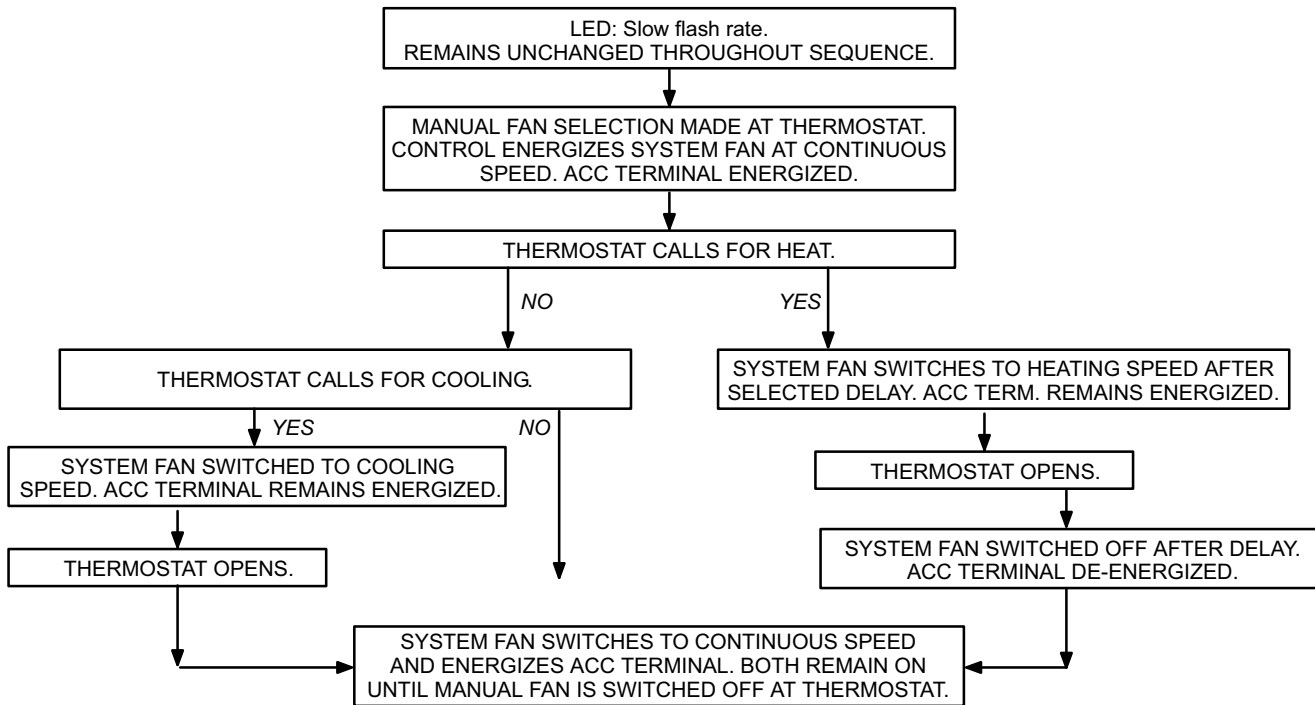
C-Ram Ignition Control Troubleshooting Guide



**RAM CONTROL
COOLING TROUBLE SHOOTING SEQUENCE**



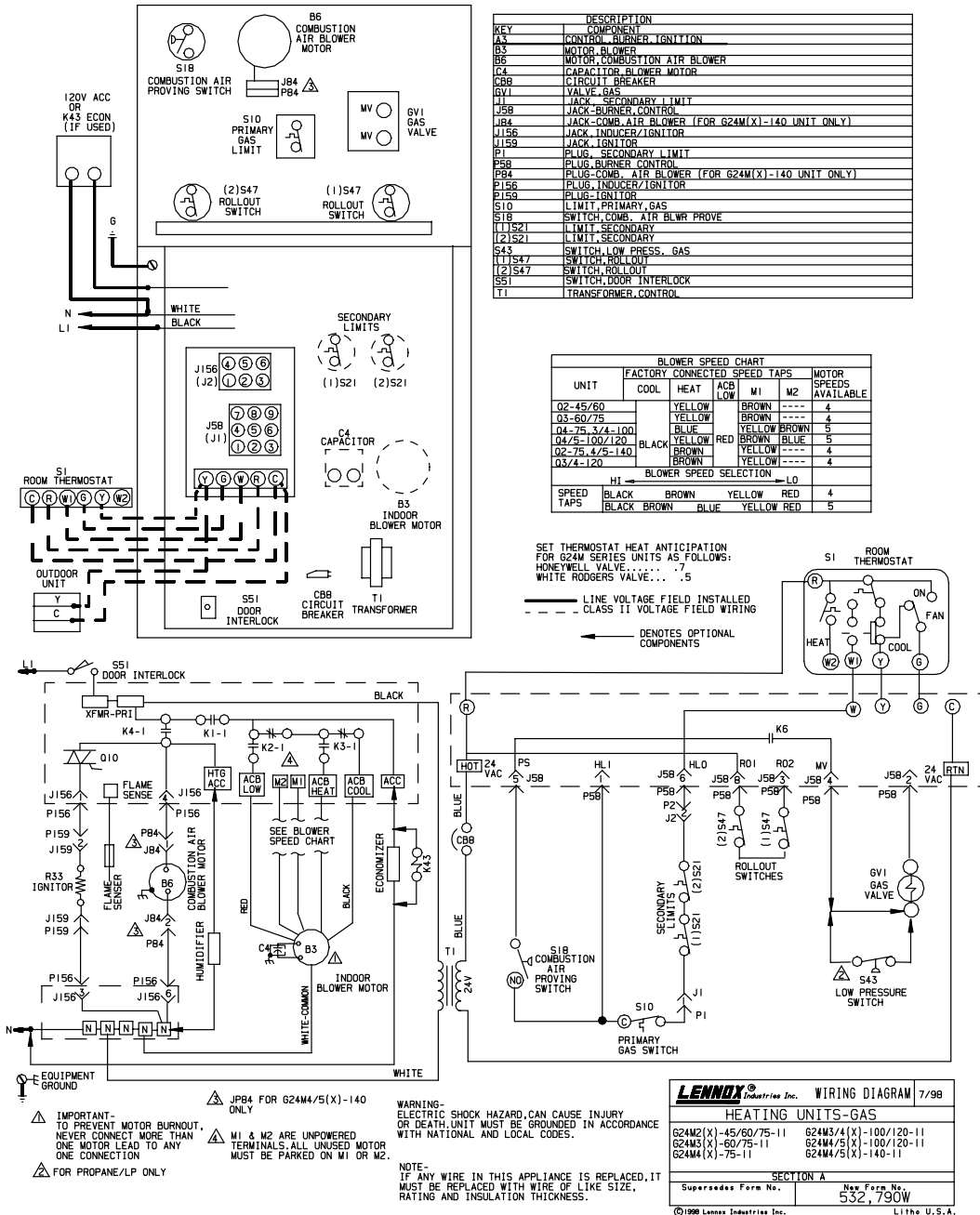
MANUAL FAN TROUBLESHOOTING SEQUENCE



LED CODES	
SLOW FLASH	NORMAL OPERATION. NO CALL FOR HEAT.
FAST FLASH	NORMAL OPERATION. CALL FOR HEAT.
2 FLASH	SYSTEM LOCKOUT. FAILURE TO DETECT OR SUSTAIN FLAME.
3 FLASH	PRESSURE SWITCH OPEN OR CLOSED.
4 FLASH	HIGH LIMIT OR ROLLOUT SWITCH OPEN.
5 FLASH	FLAME SENSED AND GAS VALVE NOT ENERGIZED.
STEADY ON	CONTROL BOARD FAILURE.

D-Late Model G24M Series With SureLight Ignition Control

TYPICAL G24M DIAGRAM (-11 MODEL SHOWN)

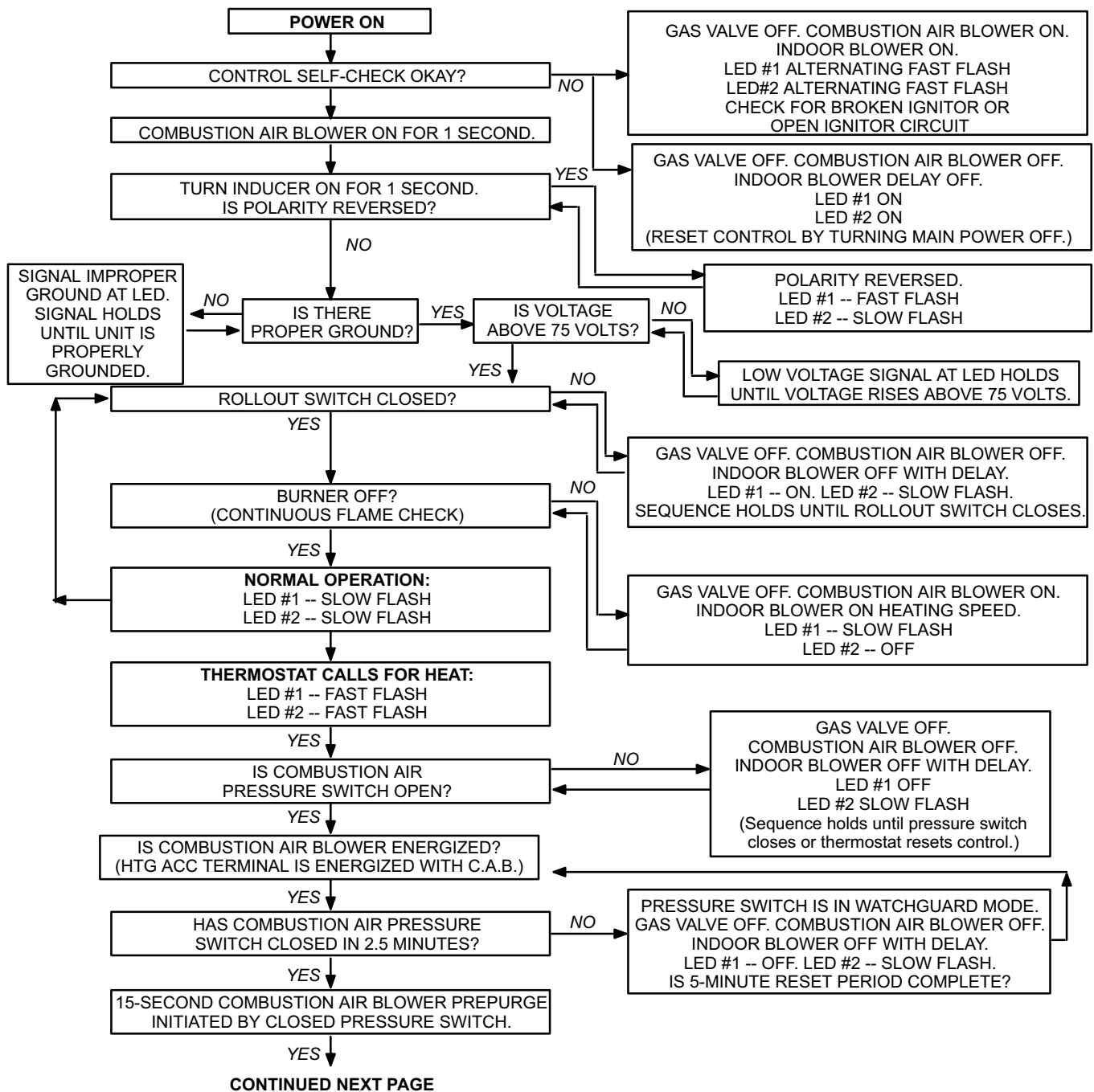


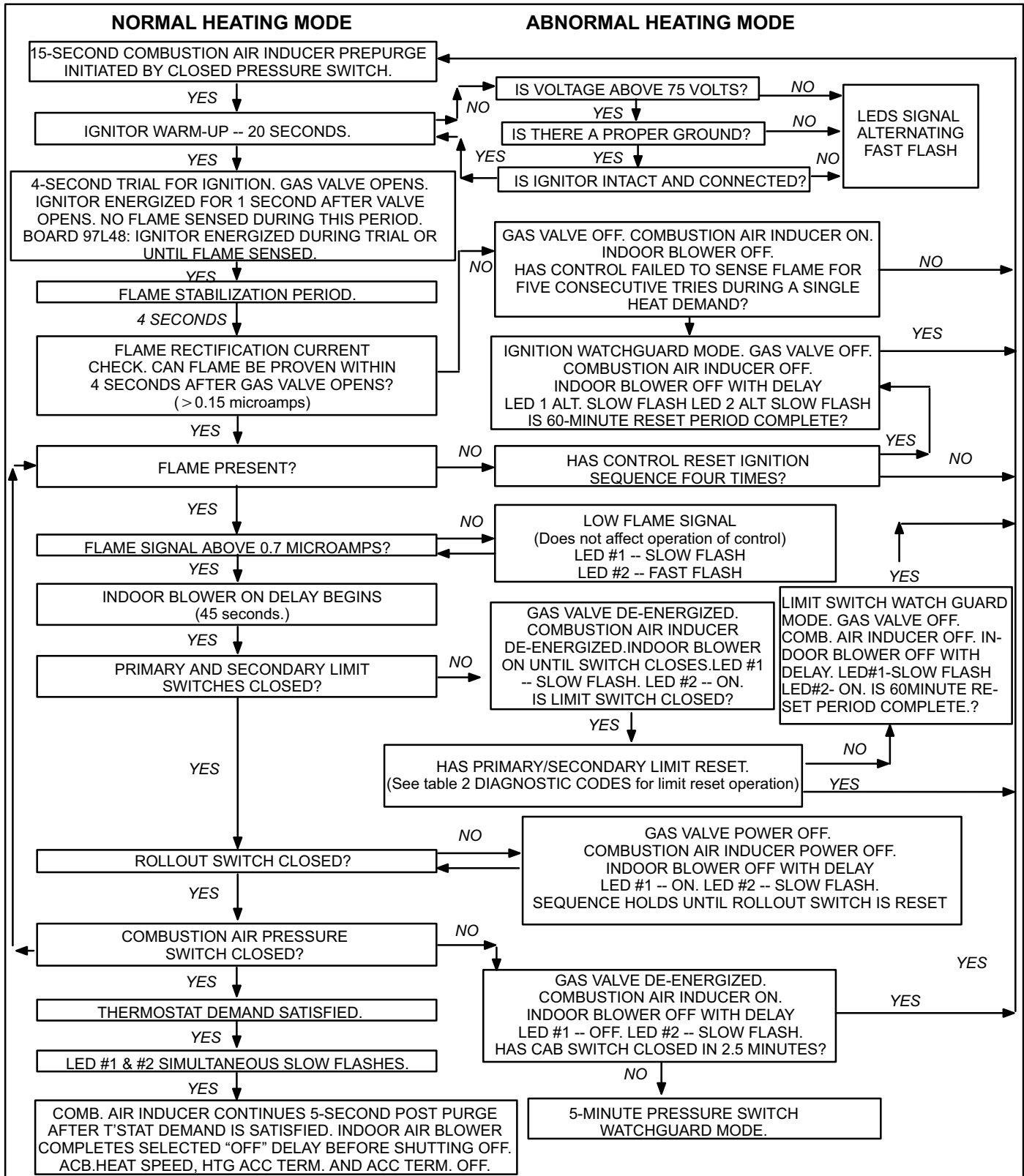
- When there is a call for heat, W1 of the thermostat energizes W of the furnace control with 24VAC.
- S10 primary limit switch and S47 rollout switch are closed. Call for heat can continue.
- SureLight control energizes combustion air blower B6. Combustion air blower runs until S18 combustion air prove 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.
- SureLight control energizes ignitor. A 20-second warm-up period begins.
- Gas valve opens for a 4-second trial for ignition. Ignitor stays energized the first second of trial. (Board 97L48 only: ignitor energized during trial or until flame is sensed).
- Flame is sensed, gas valve remains open for the heat call.
- After 45-second delay, SureLight control energizes indoor blower B3.
- When heat demand is satisfied, W1 of the indoor thermostat de-energizes W of the SureLight control 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.

SURELIGHT CONTROL HEATING SEQUENCE OF OPERATION

NORMAL HEATING MODE

ABNORMAL HEATING MODE

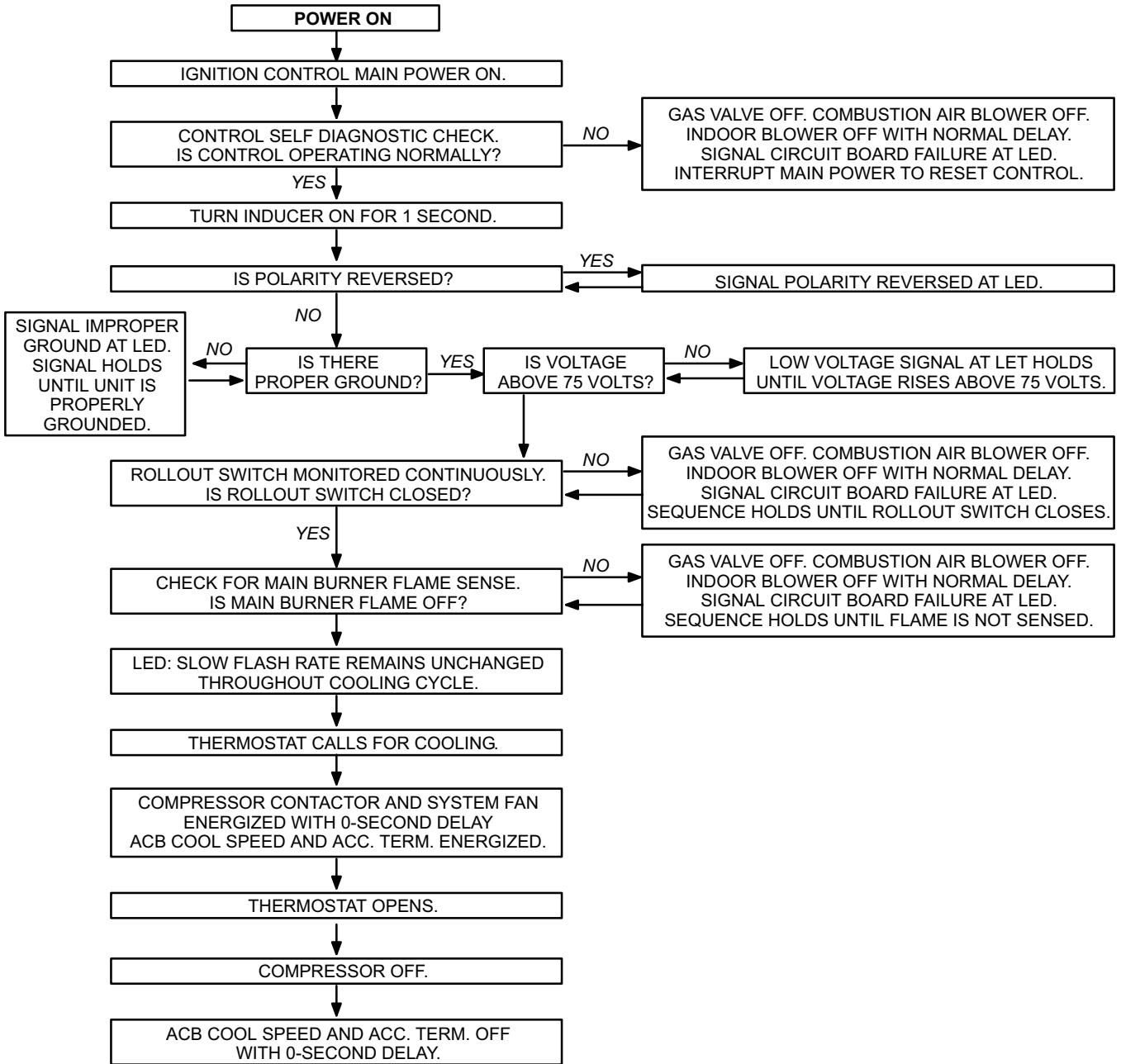




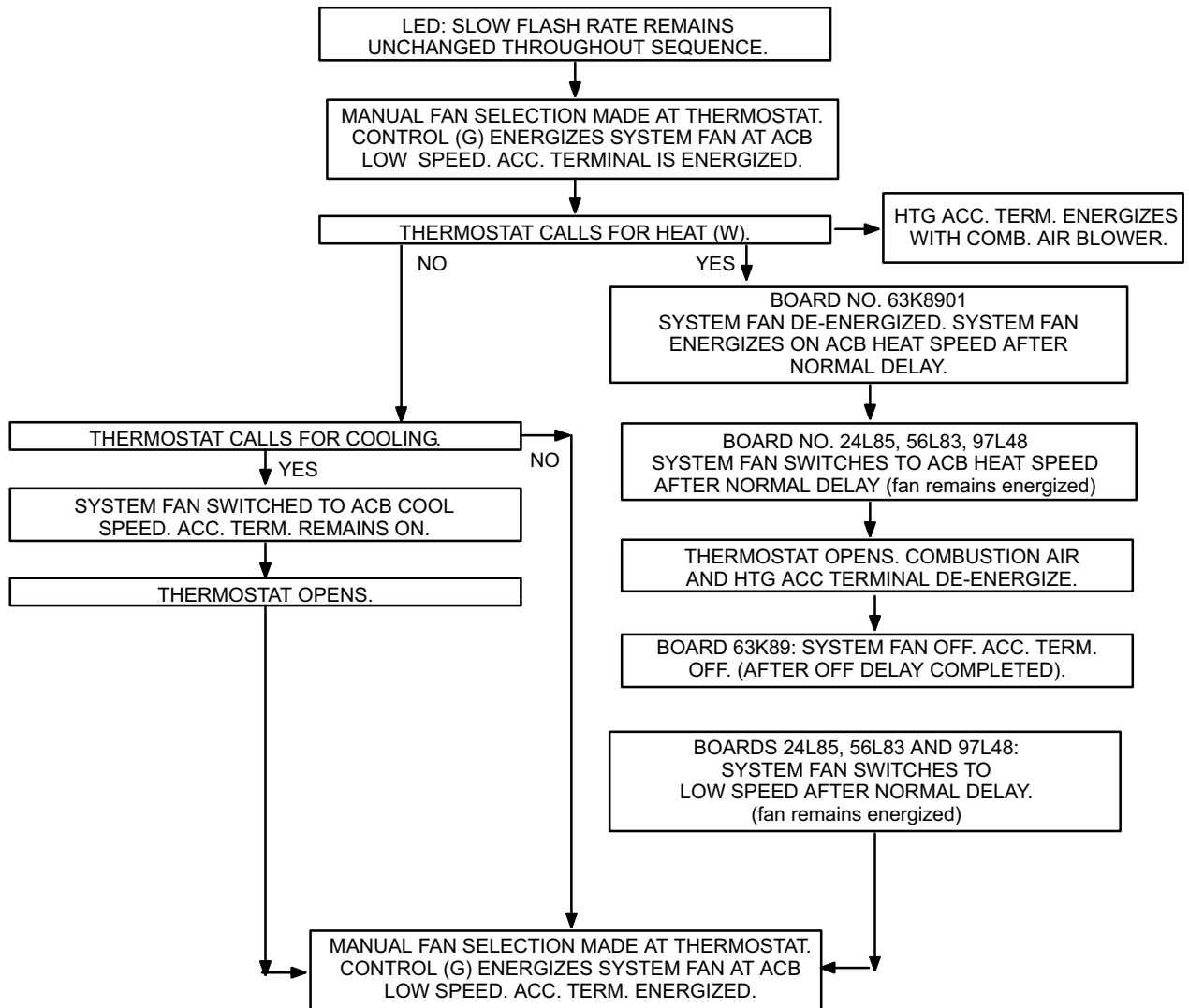
SURELIGHT CONTROL COOLING SEQUENCE

NORMAL COOLING MODE

ABNORMAL COOLING MODE



CONTINUOUS LOW SPEED FAN SEQUENCE OF OPERATION



E-SureLight Ignition Control Troubleshooting Guide

UPON INITIAL POWER UP, REMOVE ALL THERMOSTAT DEMANDS TO THE UNIT

PROBLEM: 1 UNIT FAILS TO OPERATE IN THE COOLING, HEATING, OR CONTINUOUS FAN MODE		
Condition	Possible Cause	Corrective Action / Comments
<p>1.1</p> <p>- Both diagnostic lights fail to light up.</p> <p>LED#1-Off LED#2-Off</p>	<p>1.1.1</p> <p>Main voltage 120V not supplied to unit.</p>	<p>ACTION 1 - Check 120V main voltage. Determine cause of main power failure.</p>
	<p>1.1.2</p> <p>Miswiring of furnace or improper connections.</p>	<p>ACTION 1 - Check for correct wiring of 120V to power make up box and transformer. ACTION 2 - Check 24V wiring to control board.</p>
	<p>1.1.3</p> <p>Circuit breaker tripped or fails to close.</p>	<p>ACTION 1 - Replace circuit breaker if it is reset but does not have continuity. ACTION 2 - If circuit breaker still trips, check for short.</p>
	<p>1.1.4</p> <p>Door interlock switch failure.</p>	<p>ACTION 1 - Check that door switch is activated when door is closed. ACTION 2 - Check wire connections to switch, replace loose connectors. ACTION 3 - Check continuity of switch in closed position. Replace if malfunctioning</p>
	<p>1.1.5</p> <p>Transformer Failure.</p>	<p>ACTION 1 - Check that transformer output is 24V. Replace if malfunctioning</p>
	<p>1.1.6</p> <p>Failed control board.</p>	<p>ACTION 1 - If all the above items have been checked, replace board.</p>
<p>1.2</p> <p>- Diagnostic lights flash the roll-out code.</p> <p>LED#1-On, LED#2-Slow Flash</p>	<p>1.2.1</p> <p>Roll-out switch open.</p>	<p>ACTION 1 - Manually reset the roll-out switch by pushing the top button. ACTION 2 - Determine the cause of the roll-out switch activation before leaving furnace.</p>
	<p>1.2.2</p> <p>Roll-out switch failure.</p>	<p>ACTION 1 - Check continuity across roll-out switch. Replace roll-out switch if switch is reset but does not have continuity.</p>
	<p>1.2.3</p> <p>Miswiring or improper connections at roll-out switch.</p>	<p>ACTION 1 - Check wiring connections to switch.</p>
	<p>1.2.4</p> <p>Nine pin connector failure</p>	<p>ACTION 1 - Check 9-pin connector for proper connection to control board. ACTION 2 - Check continuity of the multi plug pin.</p>
<p>1.3</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>1.3.1</p> <p>120V main power polarity reversed.</p>	<p>ACTION 1 - Check the 120V has line and neutral correctly input into control. ACTION 2 - Reverse the line and neutral at the 120V field connection.</p>
<p>1.4</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>1.4.1</p> <p>Open combustion air blower motor circuit.</p>	<p>ACTION 1 - Check for 120V to combustion air blower. If no power, check wire and connections.</p>
	<p>1.4.2</p> <p>Failed combustion air blower motor.</p>	<p>ACTION 1 - 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>1.5</p> <ul style="list-style-type: none"> - On initial power-up the combustion air blower remains energized. - Diagnostic lights flash the improper main ground. <p>LED#1-Alternating Fast Flash LED#2-Alternating Fast Flash</p>	<p>1.5.1</p> <p>Improper ground to the unit.</p>	<p>ACTION 1 - Check that the unit is properly ground.</p> <p>ACTION 2 - Install a proper main ground to the unit</p>
	<p>1.5.2</p> <p>6-Pin connector is improperly attached to the circuit board.</p>	<p>ACTION 1 - Check 6-pin connector for proper installation. Correctly insert connector into control.</p>
	<p>1.5.3</p> <p>Line voltage is below 75V.</p>	<p>ACTION 1 - Check that the line voltage is above 75V. Determine cause of voltage drop and supply correct voltage to the control.</p>

PROBLEM 2: UNIT OPERATES IN COOLING MODE BUT NOT IN THE HEATING MODE, WITH COMBUSTION AIR BLOWER CYCLING 5 SECONDS ON 55 SECONDS OFF.

Condition	Possible Cause	Corrective Action / Comments
<p>2.1</p> <ul style="list-style-type: none"> - On initial power-up the combustion air blower remains energized. - Diagnostic lights flash the improper main ground. - Combustion air blower cycles 5 seconds on 55 seconds off. <p>LED#1-Alternating Fast Flash LED#2-Alternating Fast Flash</p>	<p>2.1.1</p> <p>Open ignitor circuit.</p>	<p>ACTION 1 - Check for correct wiring and loose connections in the ignitor circuit. Check multi-plug connections for correct installation.</p>
	<p>2.1.2</p> <p>Broken or failed ignitor.</p>	<p>ACTION 1 - 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>3.1</p> <ul style="list-style-type: none"> - Unit operates with a cooling or continuous fan demand. - Combustion air blower will not start with a Heating demand. - Diagnostic lights flash the limit failure mode. <p>LED#1-Slow Flash, LED#2-On</p>	<p>3.1.1</p> <p>Primary or secondary (if equipped) limit open.</p>	<p>ACTION 1 - Check continuity across switch(es). Switches reset automatically upon cool down.</p> <p>ACTION 2 - 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>3.1.2</p> <p>Miswiring of furnace or improper connections at limit switch(es).</p>	<p>ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
<p>3.2</p> <ul style="list-style-type: none"> - Unit operates with a cooling and continuous fan demand. - Combustion air blower will not start with a Heating demand. - Diagnostic lights flash the pressure switch failure code. <p>LED#1-Off, LED#2-Slow Flash</p>	<p>3.2.1</p> <p>Miswiring of furnace or improper connections to combustion air blower.</p>	<p>ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
	<p>3.2.2</p> <p>Pressure switch stuck closed.</p>	<p>ACTION 1 - 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
3.3	3.3.1	
- Unit operates with a cooling and continuous fan demand. - Combustion air blower will not start with a Heating demand. - Diagnostic lights flash the pressure switch failure code 2.5 minutes after heating demand. LED#1-Off, LED#2-Slow Flash	Miswiring of furnace or improper connections to combustion air blower.	ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.
	3.3.2	
	Combustion air blower failure.	ACTION 1 - If there is 120V to combustion air blower and it does not operate, replace combustion air blower.

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

Condition	Possible Cause	Corrective Action/Comments
4.1	4.1.1	
- Unit operates with a cooling and continuous fan demand. - Combustion air blower energizes with a heating demand. - Diagnostic lights flash the pressure switch failure code 2.5 minutes after heating demand. LED#1-Off LED#2-Slow Flash	Pressure switch does not close due to incorrect routing of the pressure switch lines.	ACTION 1 - Check that the pressure switch lines are correctly routed. Correctly route pressure switch lines.
	4.1.2	
	Pressure switch does not close due to obstructions in the pressure lines.	ACTION 1 - Remove any obstructions from the the pressure lines and/or taps.
	4.1.3	
	Pressure switch lines damaged	ACTION 1 - Check pressure switch lines for leaks. Replace any broken lines.
	4.1.4	
	Pressure switch does not close due to a low differential pressure across the pressure switch.	ACTION 1 - Check the differential pressure across the pressure switch. This pressure should exceed the set point listed on the switch. ACTION 2 - Check for restricted inlet and exhaust vent. Remove all blockage. ACTION 3 - Check for proper vent sizing and run length. See installation instructions. ACTION 4 - Check voltage to thre combustion air blower.
4.1.5		
Wrong pressure switch installed in the unit, or pressure switch is out of calibration.	ACTION 1 - Check that the proper pressure switch is installed in the unit. Replace pressure switch if necessary.	
4.1.6		
Miswiring of furnace or improper connections at pressure switch.	ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.	
4.1.7		
Pressure switch failure.	ACTION 1 - 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.	

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

Condition	Possible Cause	Corrective Action/Comments
<p align="center">5.1</p> <ul style="list-style-type: none"> - Unit operates with a cooling and continuous fan demand. - Combustion air blower energizes with Heating demand. - Ignitor is energized but unit fails to light. <p>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</p>	<p>5.1.1</p> <p>Check that gas is being supplied to the unit.</p>	<p>ACTION 1 - 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>5.1.2</p> <p>Miswiring of gas valve or loose connections at multi-pin control amp plugs or valve.</p>	<p>ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
	<p>5.1.3</p> <p>Malfunctioning gas valve or ignition control.</p>	<p>ACTION 1 - Check that 24V is supplied to the gas valve approximately 35 seconds after heat demand is initiated. ACTION 2 - Replace the valve if 24V is supplied but valve does not open (check for excessive gas line pressure before replacing gas valve). ACTION 3 - 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">6.1</p> <ul style="list-style-type: none"> - Burners fire with a heating demand. - Burners light but unit shuts off prior to satisfying T-stat demand. - Diagnostic lights flash the pressure switch code. <p>LED#1-Off LED#2-Slow Flash</p>	<p>6.1.1</p> <p>Low pressure differential at the pressure switch.</p>	<p>ACTION 1 - Check for restricted vent inlet or exhaust. Remove all blockage. ACTION 2: Check for proper vent sizing. See installation instructions.</p>
	<p align="center">6.2</p> <ul style="list-style-type: none"> - Combustion air blower energizes with a heating demand. - Burners light but fail to stay lit. - After 5 tries the control diagnostics flash the watchdog burners failed to ignite code. <p>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</p>	<p>6.2.1</p> <p>Sensor or sense wire is improperly installed.</p>
<p>6.2.2</p> <p>Sensor or sense wire is broken.</p>		<p>ACTION 1 - Check for a broken sensor. ACTION 2 - Test continuity across the sense wire. If wire or sensor are damaged replace the component.</p>
<p>6.2.3</p> <p>Sensor or sensor wire is grounded to the unit.</p>		<p>ACTION 1 - Check for resistance between the sensor rod and the unit ground. ACTION 2 - Check for resistance between the sensor wire and the unit ground. ACTION 3 - Correct any shorts found in circuit.</p>
<p>6.2.4</p> <p>Control does not sense flame.</p>		<p>ACTION 1 - 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. ACTION 2 - Replace, clean, or relocate flame sense rod. If rod is to be cleaned, use steel wool or replace sensor. DO NOT CLEAN ROD WITH SAND PAPER. SAND PAPER WILL CONTRIBUTE TO THE CONTAMINATION PROBLEM. NOTE: 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">6.3</p> <ul style="list-style-type: none"> - Combustion air blower energizes with a heating demand. - Burners light. - Roll-out switch trips during the heating demand. - Diagnostic lights flash roll-out failure. <p>LED#1-On LED#2-Slow Flash</p>	<p align="center">6.3.1</p> <p align="center">Unit is firing above 100% of the nameplate input.</p>	<p>ACTION 1 - Check that the manifold pressure matches value listed on nameplate. See installation instructions for proper procedure.</p> <p>ACTION 2 - Verify that the installed orifice size match the size listed on the nameplate or installation instructions.</p> <p>ACTION 3 - Check gas valve sensing hose to insure no leaks are present.</p> <p>ACTION 4 - Check the input rate to verify rate matches value listed on nameplate.</p>
	<p align="center">6.3.2</p> <p align="center">Gas orifices leak at the manifold connection.</p>	<p>ACTION 1 - Tighten orifice until leak is sealed. NOTE: Be careful not to strip orifice threads. ACTION 2 - Check for gas leakage at the threaded orifice connection. Use approved method for leak detection (see unit instructions).</p>
	<p align="center">6.3.3</p> <p align="center">Insufficient flow through the heat exchanger caused by a sooted or restricted heat exchanger.</p>	<p>ACTION 1 - Check for sooting deposits or other restrictions in the heat exchanger assembly. Clean assembly as outlined in instruction manual.</p> <p>ACTION 2 - For G24M gas furnaces, check for proper combustion and flow. CO2 should measure between 6.0% and 8.0% for NG and between 6.5% and 8.5% for LP. CO should measure below .04% (400PPM) in an air-free sample of flue gases for either NG or LP.</p>
	<p align="center">6.3.4</p> <p align="center">Burners are not properly located in the burner box.</p>	<p>ACTION 1 - 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">6.4</p> <ul style="list-style-type: none"> - Combustion air blower energizes with a heating demand. - Burners light roughly and the unit fails to stay lit. - Diagnostic lights flash watchguard flame failure. <p>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</p>	<p align="center">6.4.1</p> <p align="center">Recirculation of flue gases. This condition causes rough ignitions and operation. Problem is characterized by nuisance flame failures.</p>	<p>ACTION 1 - 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>ACTION 2 - Check for correct intake and exhaust vent installation. See instructions</p>
	<p align="center">6.4.2</p> <p align="center">Improper burner cross-overs</p>	<p>ACTION 1 - 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">6.5</p> <ul style="list-style-type: none"> - Combustion air blower energizes with a heating demand. - Burners light. - Diagnostic lights flash watch guard flame failure. - NOTE” Unit might go into 60 minute Watchguard mode depending on intermittent nature of sensor signal. <p>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</p>	<p align="center">6.5.1</p> <p align="center">Loose sensor wire connection causes intermittent loss of flame signal.</p>	<p>ACTION 1 - Check that the sensor is properly located.</p> <p>ACTION 2 - 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">7.0</p> <ul style="list-style-type: none"> - Unit operates correctly but the diagnostic lights flash low flame sense code. <p>LED#1-Slow Flash LED#2-Fast Flash</p>	<p align="center">7.1.1</p> <p align="center">Sense rod is improperly located on the burner.</p>	<p>ACTION 1 - 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">7.1.2</p> <p align="center">Sense rod is contaminated.</p>	<p>ACTION 1 - 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">8.0</p> <ul style="list-style-type: none"> - Indoor blower fails to operate in continuous fan, cooling, or heating mode. 	<p align="center">8.1.1</p> <p align="center">Miswiring of furnace or improper connections at control or indoor blower motor.</p>	<p>ACTION 1 - Correct wiring and/or replace any loose connections. Check for correct wiring and loose connections.</p>
	<p align="center">8.1.2</p> <p align="center">120V is not being supplied to the indoor air blower or blower motor failure.</p>	<p>ACTION 1 - 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">8.1.3</p> <p align="center">Defective control board</p>	<p>ACTION 1 - 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">9.0</p> <ul style="list-style-type: none"> - AM radio interference. 	<p align="center">9.1.2</p> <p align="center">Ignitor operation</p>	<p>ACTION 1 - Call Technical Support, Dallas.</p>