G32V SERIES UNITS

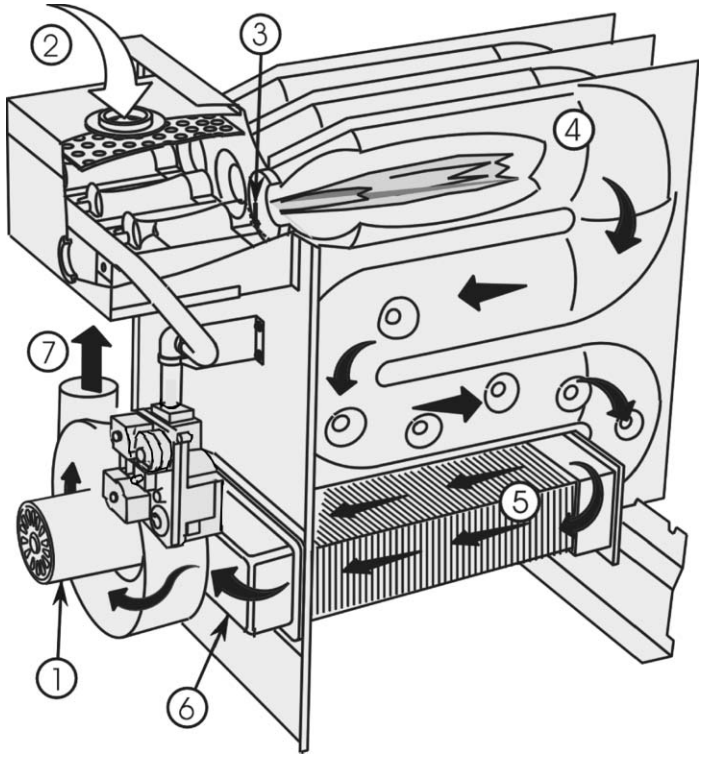
G32V series units are high-efficiency upflow gas furnaces manufactured with DuralokPlus™ aluminized steel clamshell-type heat exchangers. G32V units are available in heating capacities of 75,000 to 125,000 Btuh and cooling applications up to 5 tons. Refer to Engineering Handbook for proper sizing.

Units are factory equipped for use with natural gas. **LP kits are available.** All G32V-1 through -4 units feature the Lennox SureLight™ silicon nitride ignition system. G32V-5 and later units feature the two stage variable speed SureLight integrated control board.The G32V units meet the California Nitrogen Oxides (NO_x) Standards and California Seasonal Efficiency requirements without modification. All units use a two-stage gas valve along with a two-stage combustion air blower. The gas valve is redundant to assure safety shut-off as required by A.G.A. or C.G.A.

All G32V units are equipped with an electronic variable speed (VSM) fan motor. The VSM consists of an ICM2 motor and control module assembly. The VSM maintains a specified air volume throughout the entire external static range.

Information contained in this manual is intended for use by qualified service technicians only. All specifications 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.

G32V FURNACE▲



◀G32V HEAT EXCHANGE ASSEMBLY

Combustion Process:

1. A call for heat starts the combustion air blower.
2. Outdoor air is drawn through pipe into the burner compartment where it mixes with gas in a conventional style inshot burner.
3. The SureLight ignition system lights the burners.
4. Combustion products are drawn downward through the heat exchanger. Heat is extracted as indoor air passes across the outside surface of the metal.
5. Latent heat is removed from the combustion products as air passes through the coil. Condensate (water) is formed as the combustion products cool.
6. As the combustion products exit the coil, condensate is collected and drained away.
7. Combustion products are pulled from the heat exchanger and forced into the flue.

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⚠WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer or service agency.

⚠WARNING

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

SPECIFICATIONS

Model No.		G32V3-75	G32V5-100	G32V5-125
Input Btuh (kW) - High		75,000 (22.0)	100,000 (29.3)	125,000 (36.6)
Input Btuh (kW) - Low		51,000 (14.9)	68,000 (19.9)	85,000 (24.9)
Output Btuh (kW) - High		67,500 (19.8)	90,000 (26.4)	112,500 (32.9)
Output Btuh (kW) - Low		45,900 (13.4)	61,200 (17.9)	76,500 (22.4)
[1]A.F.U.E.		92.7%	93.2%	94.2%
[2]California Seasonal Efficiency		89.4%	90.1%	91.1%
[3]Exhaust pipe connection (PVC) diameter— in. (mm)		2 (51)		
[3]Intake pipe connection (PVC) diameter— in. (mm)		2 (51)		3 (76)
Condensate drain connection (PVC)— in. (mm)		1/2 (12.7)		
Temperature rise range — °F (°C)	Low Fire	30 - 60(16 - 33)		35 - 65 (19 - 36)
	High Fire	40 - 70 (22 - 39)		50 - 80 (28 - 44)
High static certified by (A.G.A./C.G.A.) — in. wg. (Pa)		.80 (200)		
Gas Piping Size I.P.S. - Natural - in. (mm)		1/2 (12.7)		
Blower wheel nominal diameter x width - in. (mm)		10 x 8 (254 x 203)	11-1/2 x 9 (292 x 229)	
Blower motor output — hp (W)		1/2	1	
Nominal cooling that can be added - Tons (kW)		2 to 3 (7 to 10.6)	3-1/2 to 5 (12.3 to 17.6)	
[4]No. & size of filters - in. (mm)		(1) 14 x 25 x 1 (356 x 635 x 25)	(1) 20 x 25 x 1 (508 x 635 x 25)	
Shipping weight — lbs. (kg) 1 package		161 (73)	201 (91)	221 (100)
Electrical characteristics		120 volts — 60 hertz — 1 phase (less than 12 amps)		
OPTIONAL ACCESSORIES (Must Be Ordered Extra)				
Concentric Vent/Intake Air/Roof Termination Kit		**60G77** — 1/1/2 inch (38 mm)	**33K97** — 2 inch (51 mm)	**33K97-** 2 inch (51 mm) 60L46 - 3 inch (76 mm)
[3]Vent/Intake Air Roof Termination Kit — vent size	2 inch (51 mm)	**15F75**		
	3 inch (76 mm)	**44J41**		
[3]Vent/Intake Air Wall Termination Kit — vent size	2 inch (51 mm)	**15F74** (ring kit) — **22G44** (close couple) **—30G28** (WTK close couple) **30G79** (WTKX close couple with extension riser)		
	3 inch (76 mm)	**44J40** (close couple) — **81J20** (WTK close couple)		
Condensate Drain Heat Cable		**26K68** 6 ft. (1.8 m) - **26K69** 24 ft. (7.3 m) - **26K70** 50 ft. (15.2 m)		
Heat Cable Tape	Fiberglass - 1/2 in. (38 mm)	**39G04**		
	Aluminum foil - 2 in. (25 mm)	**39G03**		
L.P. Kit		**34L29** (-1, -2 models) **11M55** (-3 and later models)		

[1]Annual Fuel Utilization Efficiency based on U.S. DOE test procedures and FTC labeling regulations. Isolated combustion system rating for non-weatherized furnaces.
[2]Meets California Nitrogen Oxides (NO_x) Standard and California Seasonal Efficiency requirements.
[3]Determine from venting tables proper intake and exhaust pipe size and termination kit required.
[4]Polyurethane frame type filter.
NOTE - 2 inch x 3 inch (51 mm x 76 mm) adaptor is furnished with -100 and -125 furnaces for exhaust pipe connection.

BLOWER PERFORMANCE

Table 1
G32V3-75-1 through -3 Units
0 THROUGH 0.80 IN. W.G. (0 THROUGH 200 PA) EXTERNAL STATIC PRESSURE

VSP2-1 Blower Control Factory Settings
Low Speed — 3
High Speed — 4
Heat Speed — 3

"ADJUST" Jumper Setting	VSP2-1 Jumper Speed Positions																							
	"LOW" Speed (Cool, Low Heat Or Continuous Fan)								"HIGH" Speed (Cool)								"HEAT" Speed							
	1		2		3		4		1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
NORM	880	415	930	440	980	465	1040	490	1060	500	1105	520	1260	595	1330	630	1075	510	1150	545	1270	600	1350	635
- 15%	775	365	810	380	850	400	910	430	930	440	970	460	1070	505	1130	535	930	440	990	465	1080	510	1140	540

NOTE — The effect of static pressure and filter resistance is included in the air volumes listed.

Table 2
G32V5-100/125-1 through -3 Units
0 THROUGH 0.80 IN. W.G. (0 THROUGH 200 PA) EXTERNAL STATIC PRESSURE

VSP2-1 Blower Control Factory Settings
G32V5-100
Low Speed — 2
High Speed — 4
Heat Speed — 1
G32V5-125
Low Speed — 3
High Speed — 4
Heat Speed — 2

"ADJUST" Jumper Setting	VSP2 Jumper Speed Positions																							
	"LOW" Speed (Cool Or Continuous Fan)								"HIGH" Speed (Cool)								"HEAT" Speed							
	1		[1]2		3		4		1		2		3		4		[1]1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
NORM	1140	540	1250	590	1440	680	1550	730	1620	765	1820	860	2000	945	2100	990	1560	735	1720	810	2030	960	2150	1015
-	970	460	1060	500	1280	605	1320	625	1380	650	1550	730	1700	800	1780	840	1330	630	1460	690	1730	815	1830	865

NOTE — The effect of static pressure and filter resistance is included in the air volumes listed.
[1] G32V5-125 unit only - do not place jumper on tap 1 ("—") for high speed or tap 2 ("NORM" or "—") for low speed.

Table 3
G32V3-75-4 Units
0 THROUGH 0.80 IN. W.G. (0 THROUGH 200 PA) EXTERNAL STATIC PRESSURE

VSP3-1 Blower Control Factory Settings
ADJUST - NORM
Heat Speed - 3
Cool Speed - 4

"ADJUST" Jumper Positions	VSP Jumper Speed Positions															
	"HEAT" Jumper															
	Low Speed								High Speed							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
"**NORM**" (Normal)	880	415	930	440	980	465	1040	490	1075	510	1150	545	1270	600	1350	635
[1] "—" (Minus) 15%	775	365	810	380	850	400	910	430	930	440	990	460	1080	510	1140	540
"ADJUST" Jumper Positions	"COOL" Jumper															
	Low Speed								High Speed							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
"**NORM**" (Normal)	880	415	930	440	980	465	1040	490	1060	500	1105	520	1260	600	1350	635
[1] "—" (Minus) 15%	775	365	810	380	850	400	910	430	930	440	970	460	1080	510	1140	540

[1] 15% lower motor speed than NORM jumper setting.
NOTE - The effect of static pressure and filter resistance is included in air volumes shown.
NOTE - Continuous Fan only speed is approximately 800 cfm (380 L/s) - non adjustable.
NOTE - Lennox Harmony II™ zone control applications - MAX CFM is determined by COOL jumper placement with a minimum of approximately 850 cfm (400 L/s) for all positions.

Table 4
G32V5-100/125-4 Units
0 THROUGH 0.80 IN. W.G. (0 THROUGH 200 PA) EXTERNAL STATIC PRESSURE

VSP3-1 Blower Control Factory Settings	G32V5-100 ADJUST - NORM Heat Speed - 2 Cool Speed - 4	G32V5-125 ADJUST - — (minus) Heat Speed - 4 Cool Speed - 4

"ADJUST" Jumper Positions	VSP Jumper Speed Positions															
	"HEAT" Jumper															
	Low Speed								High Speed							
	[2]1		[2]2		3		4		[2]1		[2]2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
"**NORM**" (Normal)	1140	540	1250	590	1440	680	1550	730	1560	735	1720	810	2030	955	2150	1015
[1] "—" (Minus) 15%	970	455	1060	500	1280	605	1320	595	1330	625	1460	690	1730	815	1830	865
"ADJUST" Jumper Positions	**"COOL" Jumper**															
	Low Speed								High Speed							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
"**NORM**" (Normal)	1140	540	1250	590	1440	680	1550	730	1620	765	1820	860	2000	945	2100	990
[1] "—" (Minus) 15%	970	455	1060	500	1280	605	1320	595	1380	650	1550	730	1700	800	1780	840

[1] 15% lower motor speed than NORM jumper setting.
[2] G32V5-125 Models Only - Do not place jumper on position #1 (at NORM or "—" setting) or position #2 (at "—" setting) for HEAT speed.
NOTE - The effect of static pressure and filter resistance is included in air volumes shown.
NOTE - Continuous Fan only speed is approximately 1150 cfm (545 L/s) - non adjustable.
NOTE - Lennox Harmony II™ zone control applications - MAX CFM is determined by COOL jumper placement with a minimum of approximately 1140 cfm (540 L/s) for all positions.

TABLE 5
G32V3-75-5 Units BLOWER MOTOR PERFORMANCE
0.0" to 0.8" w.g. (0 through 200 Pa) External Static Pressure Range

"Adjust" Setting	Blower Speed Adjustment Settings (Switches 5 and 6) Cool															
	Low Speed								High Speed							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
Norm	880	415	930	440	980	465	1040	490	1060	500	1105	520	1260	595	1330	630
–[1]	775	365	810	380	850	400	910	430	930	440	970	460	1070	505	1130	535
"Adjust" Setting	Blower Speed Adjustment Settings (Switches 7 and 8) Heat															
	Low Speed								High Speed							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
Norm	945	446	1025	484	1125	531	1270	599	1080	510	1172	533	1286	607	1452	685
–[1]	803	379	871	411	956	451	1080	510	918	433	996	470	1093	516	1234	582

[1] 15% lower motor speed than NORM switch setting.
NOTE - The effect of static pressure and filter resistance is included in air volumes shown.
NOTE - Continuous Fan only speed is approximately 800 cfm (380 L/s) - non adjustable.
NOTE - Lennox Harmony II ™ zone control applications - MAX CFM is determined by COOL switch setting with a minimum of approximately 850 cfm (400 L/s) for all positions.

TABLE 6
G32V5-100/125-5 Units BLOWER MOTOR PERFORMANCE
0.0” to 0.8” w.g. (0 through 200 Pa) External Static Pressure Range

“Adjust” Setting	Blower Speed Adjustment Settings (Switches 5 and 6) Cool															
	Low Speed								High Speed							
	1[2]		2[2]		3		4		1[2]		2[2]		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
Norm	1140	540	1250	590	1440	680	1550	730	1620	765	1820	860	2000	945	2100	990
–[1]	970	455	1060	500	1280	605	1320	595	1380	650	1550	730	1700	800	1780	840
“Adjust” Setting	Blower Speed Adjustment Settings (Switches 7 and 8) Heat															
	Low Speed								High Speed							
	1		2		3		4		1		2		3		4	
	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s	cfm	L/s
Norm	1140	540	1250	590	1440	680	1550	730	1560	735	1720	810	2030	960	2150	1015
–[1]	970	455	1060	500	1280	605	1320	595	1330	660	1460	690	1730	815	1830	865

[1] 15% lower motor speed than NORM switch setting.
[2] G32V5-125 Models Only - Do not set switches for position #1 (at NORM or “–” setting) or position #2 (at “-” setting) for HEAT speed.
NOTE - The effect of static pressure and filter resistance is included in air volumes shown.
NOTE - Continuous Fan only speed is approximately 1150 cfm (545 L/s) - non adjustable.
NOTE - Lennox Harmony II ™ zone control applications - MAX CFM is determined by COOL switch setting with a minimum of approximately 1140 cfm (540 L/s) for all positions.

FILTER AIR RESISTANCE

cfm (L/s)	in. w.g. (Pa)
0 (0)	0.00 (0)
200 (95)	0.01 (0)
400 (190)	0.03 (5)
600 (285)	0.04 (10)
800 (380)	0.06 (15)
1000 (470)	0.09 (20)
1200 (565)	0.12 (30)
1400 (660)	0.15 (35)
1600 (755)	0.19 (45)
1800 (850)	0.23 (55)
2000 (945)	0.27 (65)
2200 (1040)	0.33 (80)
2400 (1130)	0.38 (95)
2600 (1225)	0.44 (110)

HIGH ALTITUDE INFORMATION

No gas pressure adjustment is needed when operating from 0 to 4500 ft. (0 to 8 m). See below for correct manifold pressures for altitudes greater that 4500 ft. (1372 m) for natural and L.P. gas.

Model No.	**Manifold Absolute Pressure (outlet)** in. w.g. (kPa)			
	0 to 4500 ft. (0 to 1372 m) above sea level	**4501 to 5500 ft. (1373 to 1676 m) above sea level**	**5501 to 6500 ft. (1677 to 1981 m) above sea level**	**6501 to 7500 ft. (1982 to 2286 m) above sea level**
G32V-75 natural	no adjustment			
G32V-100 natural	3.5 (0.88)	3.4 (0.85)	3.3 (0.82)	3.2 (0.80)
G32V-125 natural				
G32V-75 L.P.	no adjustment			
G32V-100 L.P.	7.5 (0.19)	7.3 (0.185)	7.1 (0.180)	7.0 (0.177)
G32V-125 L.P.	7.5 (0.19)	7.3 (0.185)	7.1 (0.180)	7.0 (0.177)

INTAKE AND EXHAUST PIPE VENTING TABLE

Vent Pipe Maximum Equivalent Length		**Minimum Vent Pipe Diameter Required**					
		75,000 Btuh (22.0 kW)		**100,000 Btuh (29.3 kW)**		**125,000 Btuh (36.6 kW)**	
Feet	**Meters**	**in.**	**mm**	**in.**	**mm**	**in.**	**mm**
15	4.6	2	51	2	51	2	51
20	6.1	2	51	2	51	3	76
25	7.6	2	51	2	51	3	76
30	9.1	2	51	3	51	3	76
40	12.2	2	51	3	51	3	76
50	15.2	2	51	3	51	3	76
55	16.8	2	51	3	76	3	76
60	18.3	3	76	3	76	3	76
70	21.3	3	76	3	76	3	76
80	24.4	3	76	3	76	3	76
90	27.4	3	76	3	76	3	76
100	30.5	3	76	3	76	3	76
110	33.5	3	76	3	76	3	76
120	36.6	3	76	3	76	3	76
130	39.6	3	76	3	76	- - - -	- - - -

MINIMUM PIPE LENGTHS FOR FURNACES — **G32V-75** — 5 feet (1.5 m) with two 90° elbows of 2 inch (51 mm) diameter pipe. (15 equivalent feet (4.6 m) total).
G32V-100 — 5 feet (1.5 m) with two 90° elbows of 2 inch (51 mm) diameter pipe. (15 equivalent feet (4.6 m) total).
G32V-125 — 5 feet (1.5 m) with two 90° elbows of 2 inch (51 mm) diameter pipe. (15 equivalent feet (4.6 m) total).

VENTING NOTES — One 90°elbow is equivalent to 5 feet (1.5 m) of straight vent pipe.
Two 45° elbows are equal to one 90° elbow.
One 45° elbow is equivalent to 2.5 feet (.75 m) of straight vent pipe.
One foot (305 mm) length of 2 in. (51 mm) diameter pipe is equivalent to 8 feet (2.4 m) of 3 in. (76 mm) diameter pipe.
Intake and Exhaust pipes must be the same diameter.
2 inch x 3 inch (51 mm x 76 mm) adaptor is furnished with -100 and -125 furnaces for exhaust pipe connection.
Exhaust pipe must terminate with 1-1/2 inch (38 mm) diameter pipe for furnaces using1-1/2 (38 mm) or 2 inch (51 mm) diameter pipe runs.
Exhaust pipe must terminate with 2 inch (51 mm) diameter pipe for furnaces using 3 inch (76 mm) diameter pipe runs.

G32V PARTS ARRANGEMENT

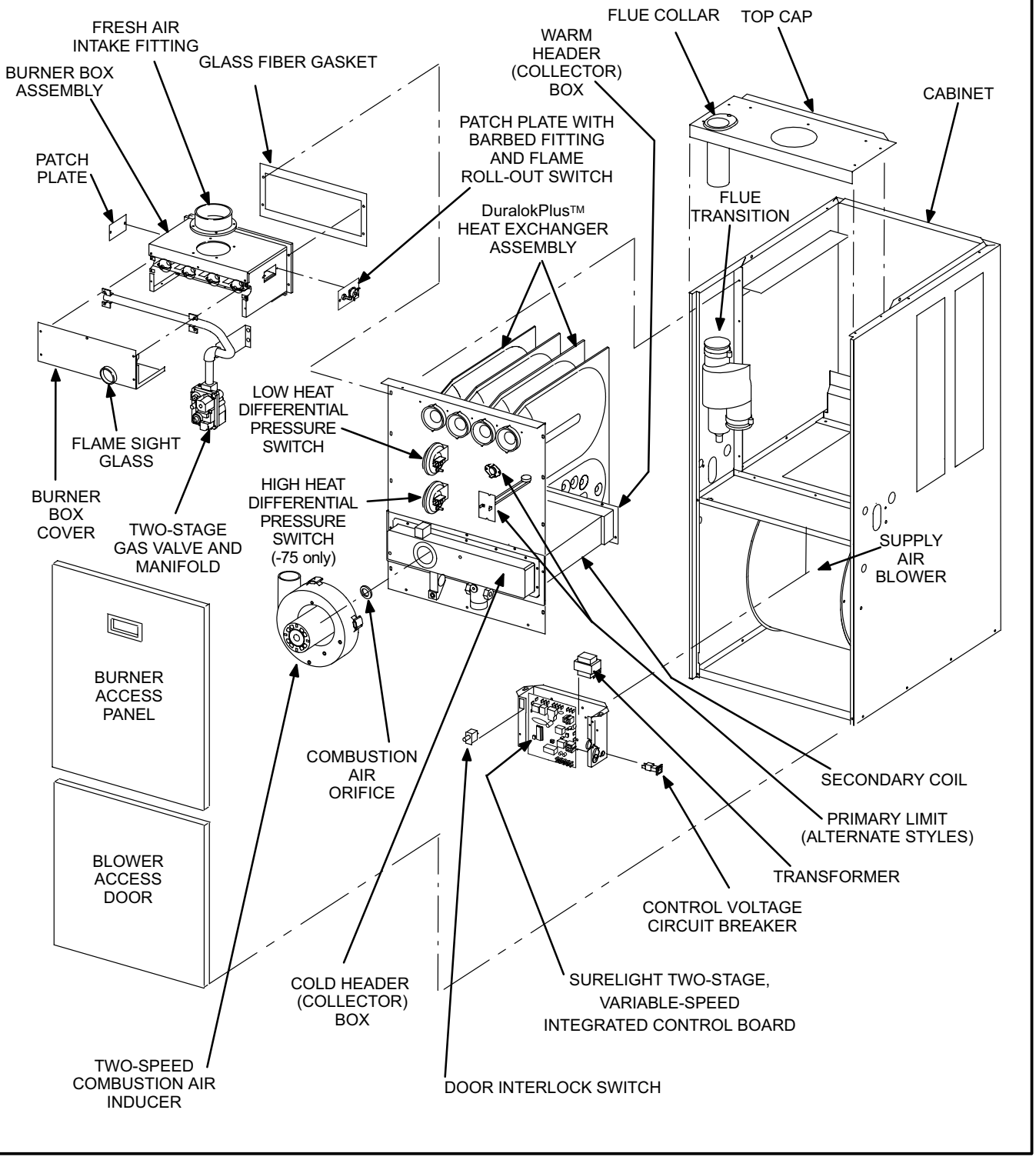


FIGURE 1

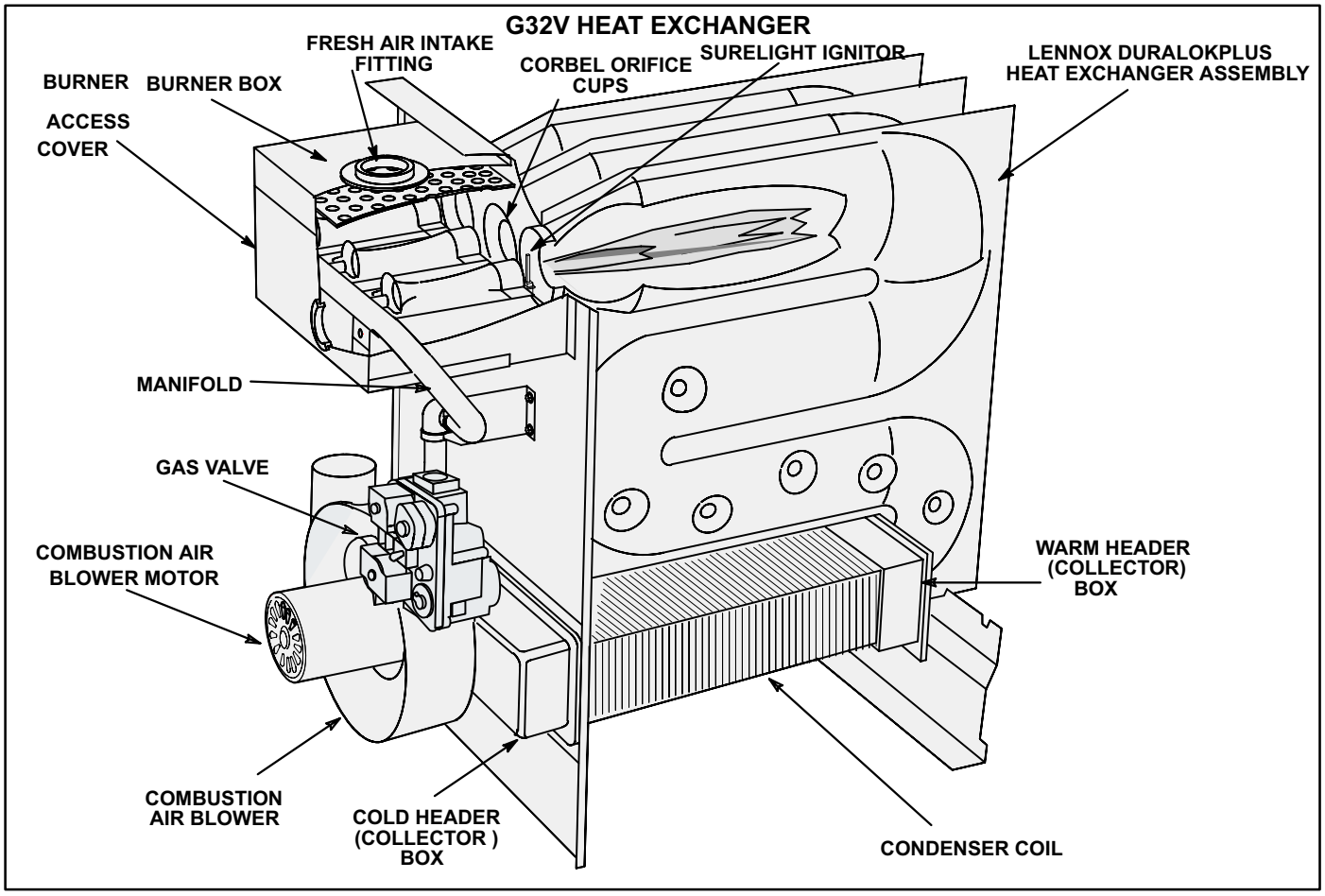


FIGURE 2

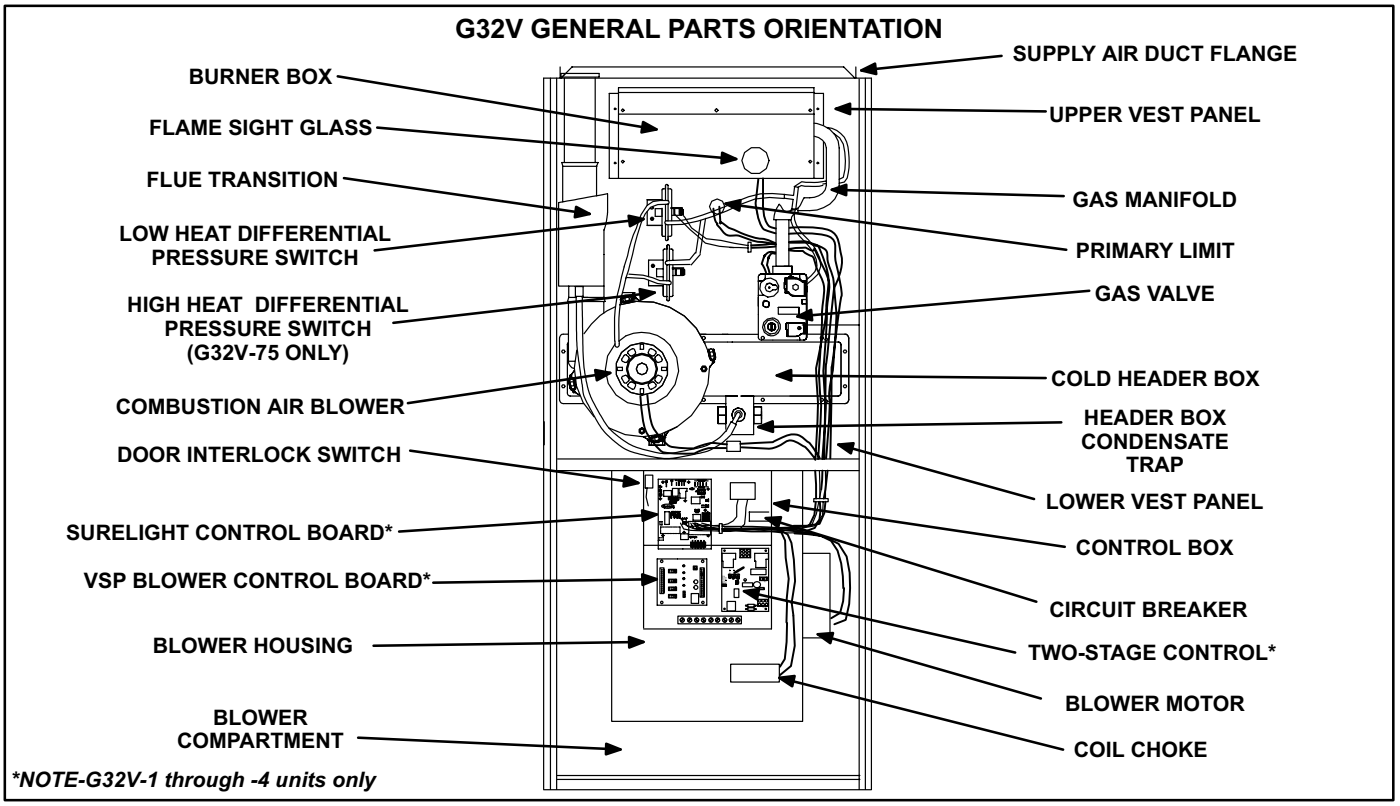


FIGURE 3

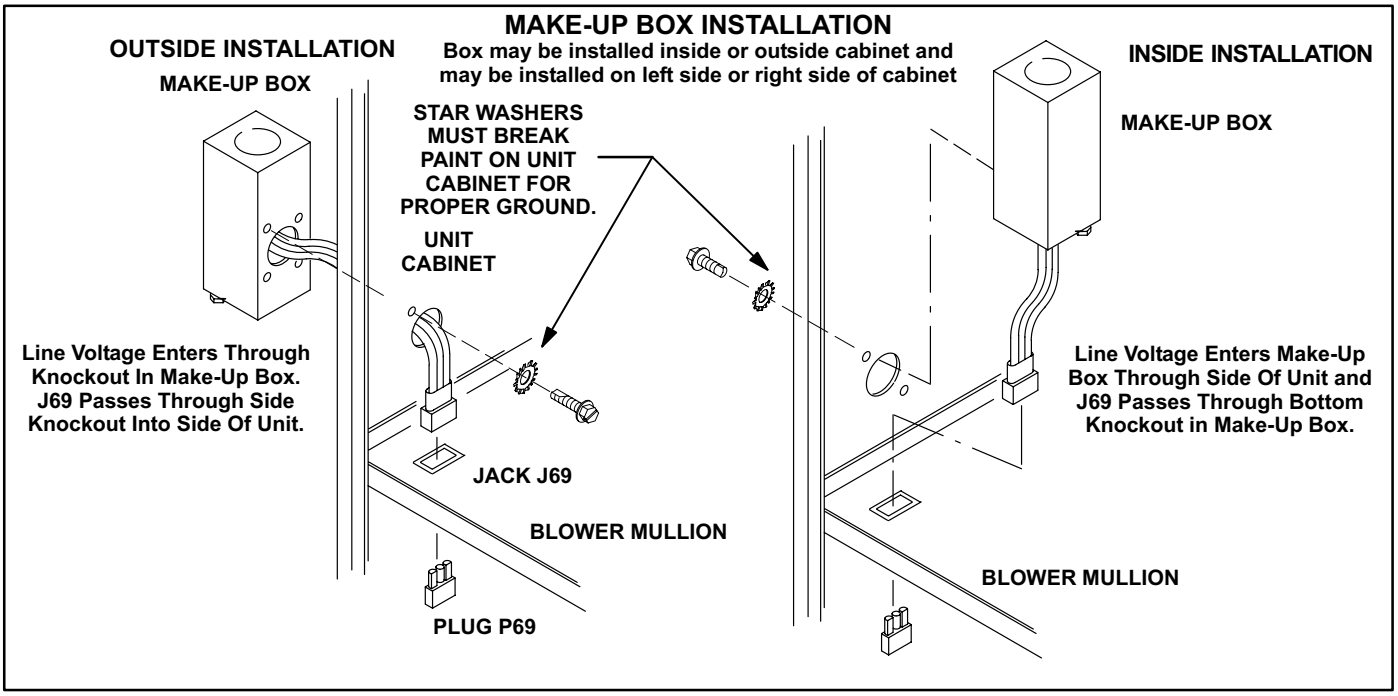


FIGURE 4

I-UNIT COMPONENTS

G32V unit components are shown in figures 1 and 2. General parts orientation is shown in figure 3. The gas valve, ignition control and burners can be accessed by removing the burner access panel. The blower and blower controls can be accessed by removing the blower access door.

G32V units are designed for bottom and side return air. The panels are designed to be knocked-out (bottom return) or cut-out (side return) as required for return air duct connection.

A-Make-Up Box (Figure 5)

The line voltage make-up box is shown in figure 5. The box may be installed inside or outside the unit and may be installed on the unit left or right side (figure 4).

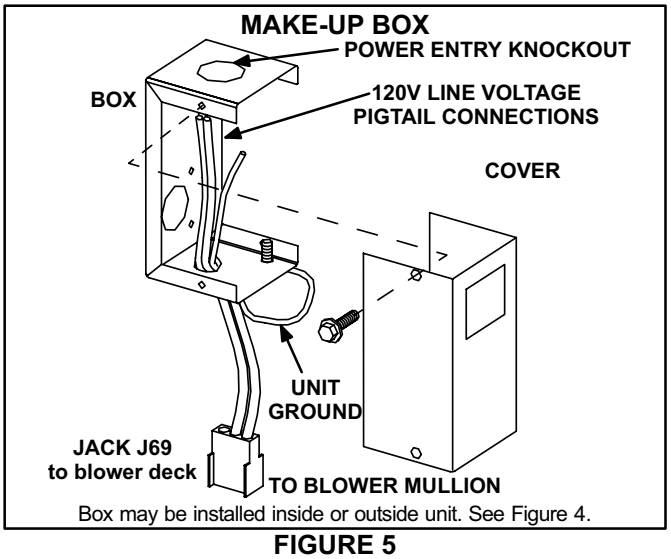


FIGURE 5

An accessory (brown) output wire is provided with the make-up box. The wire provides a 120V connection for optional accessories such as electronic air cleaner or humidifier. If used, the wire is field installed in J69 jack plug by inserting the pin of the brown wire into the open socket of the jack. See figure 6. 120V accessories rated up to 4 amps total may be connected to this wire. The neutral leg of the accessory is connected to the neutral white wire in the make-up box. The accessory terminal is energized whenever the blower is in operation.

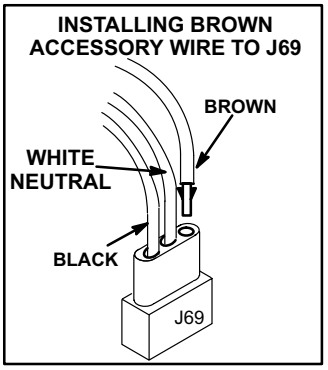


FIGURE 6

B-Control Box Components

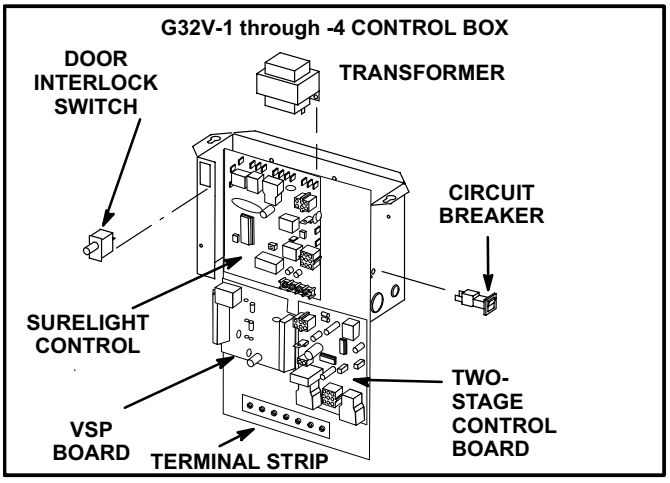


FIGURE 7

Integrated ignition and blower control components (A92), unit transformer (T1) and 24V circuit breaker (CB8) are located in the control box. In addition, a door interlock switch (S51) is located in the control box. Jackplugs allow the control box to be easily removed for blower service.

1. Control Transformer (T1)

A transformer located in the control box provides power to the low voltage 24volt section of the unit. Transformers on all models are rated 50VA with a 120V primary and a 24V secondary.

2. Circuit Breaker (CB8)

A 24V circuit breaker is also located in the control box. The switch provides overcurrent protection to the transformer (T1). The breaker is rated 3A . If the current exceeds this limit the breaker will trip and all unit operation will shut-down. The breaker can be manually reset by pressing the button on the face.

3.Door Interlock Switch (S51)

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

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.

⚠ DANGER

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.

4.SureLight Ignition System A92

G32V-1 through -4 units are equipped with the Lennox SureLight ignition system. The system consists of ignition control board (figure 8 with control terminal designations in table 1) and ignitor (figure 9). 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 8 for troubleshooting diagnostic cod*es.*

NOTE - Do not remove blower access panel to read SureLight LED lights. A sight glass is provided on the access panel for viewing.

Tables 9 and 10 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.

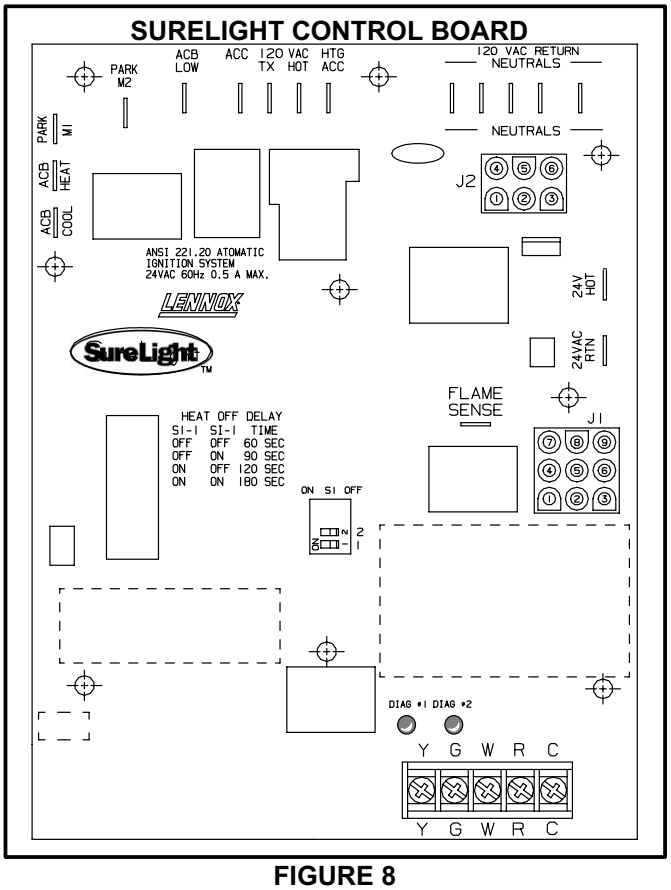


FIGURE 8

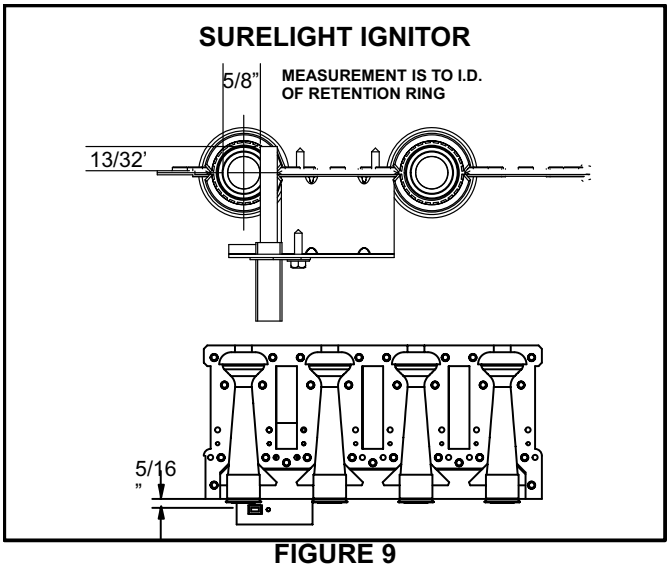


FIGURE 9

TABLE 7

SURELIGHT CONTROL TERMINAL DESIGNATIONS	
ACB COOL	NOT USED
ACB HEAT	NOT USED
PARK	NOT USED
ACB LOW	NOT USED
ACC	ACCESSORY TERMINAL (LINE VOLT)
TX	120VAC 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

TABLE 8

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 63K89 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 .61 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 < 0.20 microAmps

TABLE 9

SureLight BOARD J156 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 10

SureLight BOARD J58 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

Electronic Ignition (See Ignition Sequence Below)
On a call for heat the SureLight control 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.

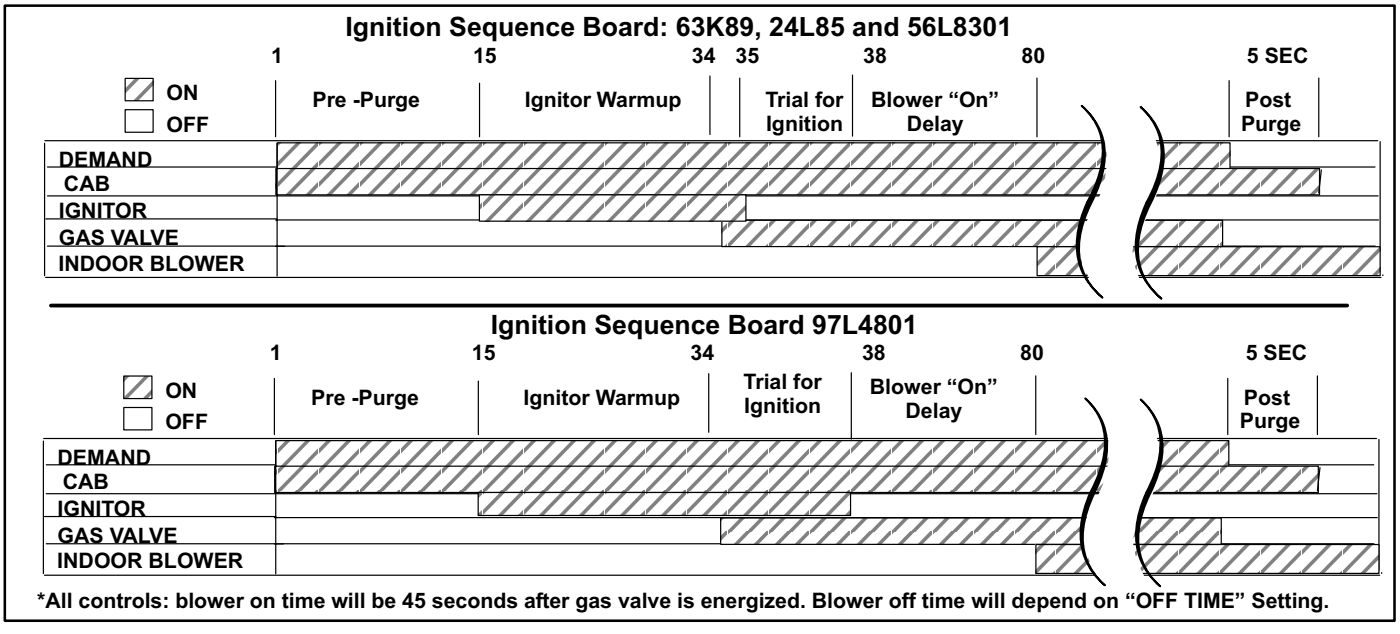
After the 15-second pre-purge period, the SureLight ignitor warms up for 20 seconds after which the gas valve opens for a 4-second trial for ignition. G32V units with board 24L85, 56L83 or 63K89: the ignitor energizes for the first second of the 4-second trial. Units equipped with board 97L48: ignitor energizes during the 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.

5. Two-Stage Control (A86) G32V-1 through -4 units

G32V-1 through -4 units are equipped with a two-stage control (figure 10). The two-stage board acts as a go between from the indoor thermostat to the SureLight ignition board. The board can be utilized in three modes: with a SINGLE-STAGE thermostat, a TWO-STAGE thermostat or with a second-stage (high fire) delay called W2 TIMED. The two-stage board is equipped with a jumper (see figure 10) which changes operating modes and a jumper which adjusts second-stage heat delay during W2 TIMED mode.

While in the single-stage thermostat mode (one-stage jumper setting), the unit will always operate on second-stage heat. The combustion air blower (B6) will operate on high speed and indoor blower (B3) will operate on heating speed. While in the two-stage thermostat mode the unit will operate on first-stage heat (low fire). The combustion air blower (B6) and indoor blower will operate on low speed. The unit will switch to second-stage heat (high fire) on call from the indoor thermostat W2. While in the W2 TIMED mode (factory setting 8 minutes) the unit will fire on first-stage heat (low fire) with the combustion air blower (B6) and indoor blower (B3) operating on low speed. After a set time delay the unit switches to second-stage heat (high fire). The combustion air blower and indoor blower also switch to second-stage heat mode.



***All controls: blower on time will be 45 seconds after gas valve is energized. Blower off time will depend on "OFF TIME" Setting.**

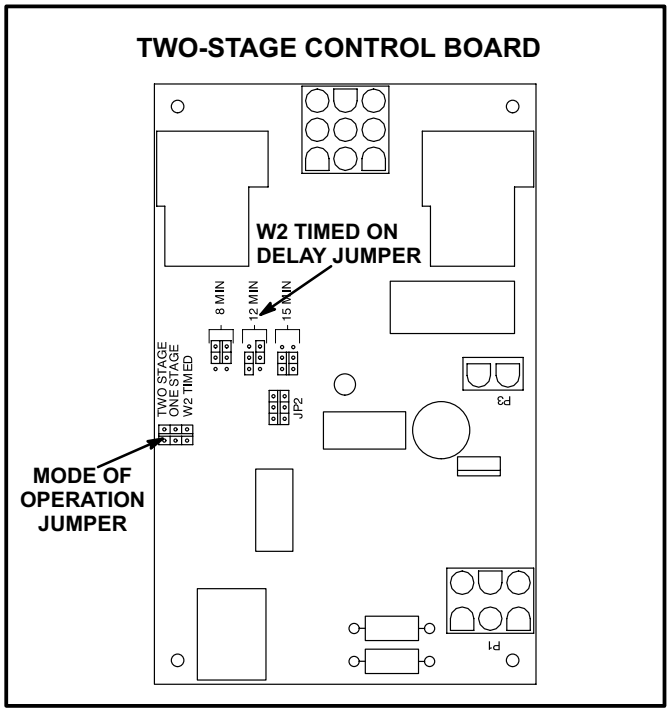


FIGURE 10

6.VSP2-1 Blower Control Board (A24) G32V -1 / -3 units

G32V units are equipped with a variable speed motor that is capable of maintaining a specified CFM throughout the external static range. The unit uses the VSP2-1 variable speed control board, located in the blower compartment, which controls the blower speed and provides diagnostic LEDs. The control has both a non-adjustable, factory preset "ON" fan timing delay and an adjustable "OFF" fan timing delay (see figure 13).

The VSP2-1 also senses limit trip condition and turns on the blower. The G32V limit switch is located in the middle of the vestibule wall. When excess heat is sensed in the heat exchanger, the limit switch will open and interrupt the current to the gas valve, while at the same time the VSP2-1 energizes the blower on heating speed. The limit automatically resets when the unit temperature returns to normal and the blower is de-energized.

Diagnostic LEDs located on the VSP2-1 control board are provided to aid in identifying the unit's mode of operation. Certain scenarios will arise depending on the jumper positions. Refer to figure 11 for identification.

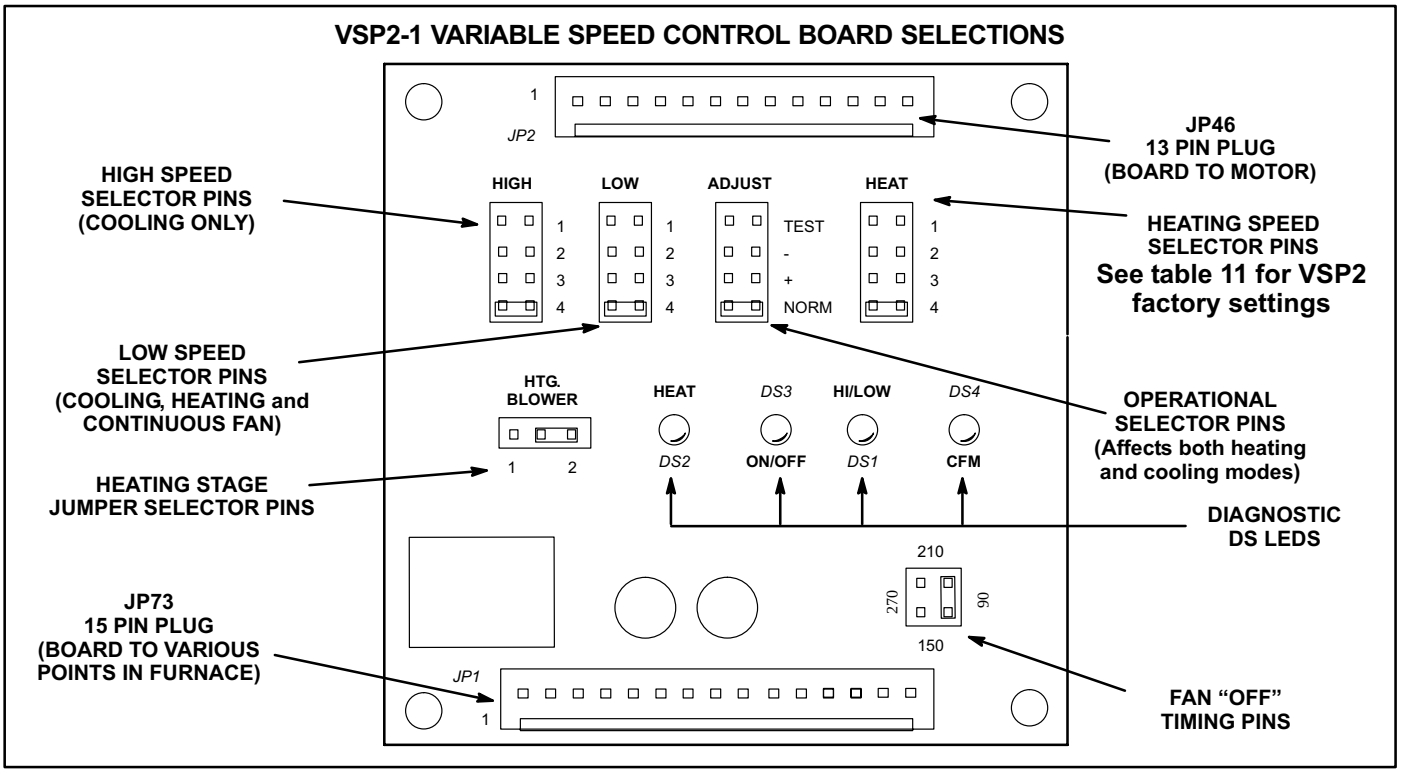
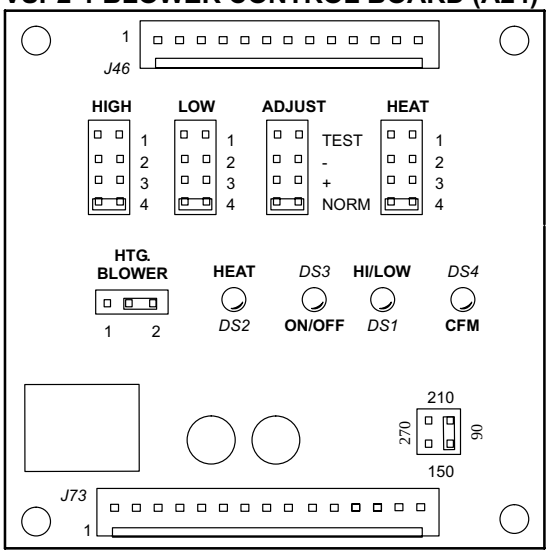


FIGURE 11

VSP2-1 BLOWER CONTROL BOARD (A24)

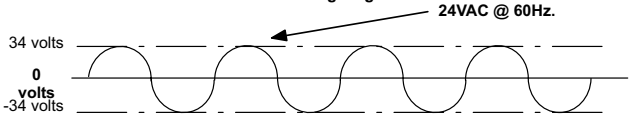


J73
PIN 1 - C - 24 VAC common.
PIN 2 - G - Input signal from thermostat's fan signal.
PIN 3 - W2 - Input signal for second stage heat from the thermostat.
PIN 4 - DS - Input signal for the blower speed regulation.
PIN 5 - Limit - Input signal from the external limit.
PIN 6 - R - 24 VAC power to the thermostat.
PIN 7 - C - 24 VAC common.
Pin 8 - C - 24 VAC common.
PIN 9 - CI - Input signal from the fan limit control.
PIN 10 - CO - Output signal to the burner control.
PIN 11 - HT - Input signal from the fan limit control.
PIN 12 - ACC - 24 VAC accessory output.
PIN 13 - 24V - Input 24 VAC power for the VSP2-1.
PIN 14 - 24V - Input 24 VAC power for the VSP2-1.
PIN 15 - V - Input signal from the gas line.

J46
PIN 1 - Heat - Heat speed input signal to the ICM2 motor.
PIN 2 - C - 24 VAC common.
PIN 3 - C - 24 VAC common.
PIN 4 - High Tap - High Speed programming input.
PIN 5 - Low Tap - Low speed programming input.
PIN 6 - On / Off - On / off output signal to the ICM2 motor.
PIN 7 - Adjust Tap - ICM2 mode selection.
PIN 8 - Hi / Low - Speed regulate input signal to the ICM2 motor.
PIN 9 - Hi / Low - Speed regulate input signal to the ICM2 motor.
PIN 10 - Ref. V - ICM2 reference voltage.
PIN 11 - Heat Tap - Heating blower speed programming.
PIN 12 - C - 24 VAC common.
PIN 13 - cfm - Motor speed diagnostic signal.

VOLTAGES INTO VSP2-1

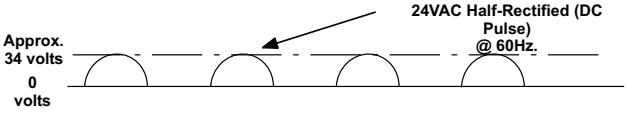
Voltage across J73 pins 13 to 1 and 6 to 1 is 24VAC as shown here. Refer to unit wiring diagram.



Voltage across J73 pins 4 to 1 is approximately 15-20VDC (straight voltage) if CCB is used. If Harmony is used a voltage of 0-25VDC should be present. If CCB or Harmony is not used, pin 4 to 1 voltage is 21VAC.

VOLTAGES FROM VSP2-1 TO ELECTRONICALLY CONTROLLED BLOWER MOTOR

Voltage across J46 pins 6 to 3 and 1 to 3 is half-rectified AC as shown here. Refer to unit wiring diagram.



Voltage across J46 pins 8 and 9 to 3, is approximately 15-20VDC if CCB is used. If CCB or Harmony is not used, pins 8 and 9 to 3 voltage is approximately 21VAC. If Harmony is used a voltage of 0-25VDC should be present.

FIGURE 12

⚠ IMPORTANT

24 VAC half wave rectified (DC pulse), when measured with a meter, may appear as a lower or higher voltage depending on the make of the meter. Rather than attempting to measure the output voltage of A24, see G32V BLOWER & VSP2 BLOWER CONTROL BOARD TROUBLE-SHOOTING FLOW CHART in the TROUBLE-SHOOTING section of this manual.

Diagnostic LED Lights

a - DS3 "ON/OFF"

ON/OFF-DS3 indicates there is a demand for the blower motor to run. When the **ON/OFF** LED-DS3 is lit, a demand is being sent to the motor. In heating mode only, there is a 45 second fan "ON" delay in energizing **ON/OFF** LED-DS3. The light will not go off until adjustable fan "OFF" delay has expired.

If **ON/OFF** LED-DS3 is on and both **HIGH/LOW** LED-DS1 & **HEAT** LED-DS2 are off, the motor will operate in low speed.

b - DS2 "HEAT"

If **HEAT** LED-DS2 is on, the blower is running in the heat speed according to the "HEAT" jumper setting. The **HEAT** LED-DS2 comes on instantaneous and switches off when the call for heat is satisfied.

*NOTE-When the blower is in "OFF" delay mode, the motor runs at low speed, therefore the **HEAT** LED-DS2 is off. It switches off when the call for heat is satisfied.*

c - DS1 "HI/LOW"

HIGH/LOW LED-DS1 indicates whether the blower is operating in high or low speed. When the light is off, the blower is running in low speed according to the "LOW" jumper setting. When **HIGH/LOW** LED-DS1 is on, the blower is operating in high speed according to the "HIGH" jumper setting.

d - DS4 "CFM"

CFM LED-DS4 indicates the CFM the unit is operating, according to the jumper settings. The light flashes once for approximately every 100 CFM. For example, if the unit is operating at 1000 CFM, **CFM** LED-DS4 will flash 10 times. If the CFM is 2050, **CFM** LED-DS4 will flash 20 full times plus one fast or half flash.

At times the light may appear to flicker or glow. This takes place when the control is communicating with the motor between cycles. This is normal operation.

The appropriate speed according to application and CFM need is selected by moving jumper pins.

NOTE-On Harmony II zoning applications in the heating mode, the highest speed obtainable is the same as the highest cooling speed selection. Also, the heating speed (heat jumper position) is only used when the primary limit has been tripped. In non-zoning applications, refer to the section on the VSP2-1 control.

Jumper Settings

⚠ IMPORTANT

Before changing jumper setting, make sure the motor has completely stopped. Any jumper setting change will not take place while the motor is running.

To change jumper positions, gently pull the jumper off the pins and place it on the desired set of pins. The following section outlines the different jumper selections available and conditions associated with each one. Refer to figure 11 for identification.

After the CFM for each application has been determined, the jumper settings must be adjusted to reflect those given in the tables on page 3. Using the tables, determine which row of CFM volumes most closely matches the desired CFM. Once a specific row has been chosen (NORMAL or -), CFM volumes from other rows cannot be used. Below are the descriptions of each of the jumper selections.

Refer to table 11 for factory settings. Refer to the tables on page 3 for the approximate air volume for each setting.

TABLE 11
VSP2-1 FACTORY SETTINGS

MODEL NUMBER	HIGH	LOW	ADJUST	HEAT
G32V3-75	4	3	NORM	2
G32V5-100	4	2	NORM	1
G32V5-120	4	3	NORM	2

a-"ADJUST"

The **ADJUST** pins allow the motor to run at normal speed or approximately 15% lower than normal speed. The tables on page 2 give two rows (NORMAL and -) with their respective CFM volumes. The + adjustment setting is not operable. Notice that the normal adjustment setting for heat speed position #3 is 2000 CFM (944 L/s). After the adjustment setting has been determined, chose the remaining speed jumper settings from those offered in the table.

The TEST pin is available to bypass the VSP2-1 control and run the motor at approximately 70% to test that the motor is operational. This is beneficial primarily in troubleshooting. G must be energized for motor to run.

b-"HEATING BLOWER"

For G32V units, place the **HEATING BLOWER** jumper across the second and third pins (position #2).

When W1 is energized, the **LOW** jumper selections are activated. The **HEAT** jumper selections are activated when W2 is energized.

NOTE-In Harmony II zoning applications, HEATING BLOWER jumper must be in position #2.

c-"HEAT"

The **HEAT** jumper is used to set the blower speed to obtain the required CFM as outlined in HEAT SPEED section of the tables on page 3.

The **HEAT** jumper selections are activated with a call for second-stage heating (W2).

⚠ IMPORTANT

Before changing jumper setting, make sure the motor has completely stopped. Any jumper setting change will not take place while the motor is running.

d-"HIGH"

The **HIGH** jumper is used to determine the CFM during cooling speed. These jumper selections are activated when G and DS terminals are energized.

e-"LOW"

The **LOW** jumper is used to determine CFM during low speed cooling. These jumper selections are activated when G is energized. The **LOW** jumper may also be used for low speed heating. See the "HEAT" section for details.

f-FAN "OFF"

Fan "OFF" timings (time that the blower operates after the heat demand has been satisfied) are determined by the arrangement of a jumper on the VSP2-1 board. See figure 13. To adjust fan "OFF" timings, gently disconnect the jumper and reposition it across pins corresponding with the new timing. Fan "OFF" time is adjustable from 90 to 330 seconds. The control has a non-adjustable, factory preset "on" fan timing (45 seconds).

WARNING - MAKE SURE TO DISCONNECT POWER BEFORE CHANGING FAN "OFF" TIMINGS.

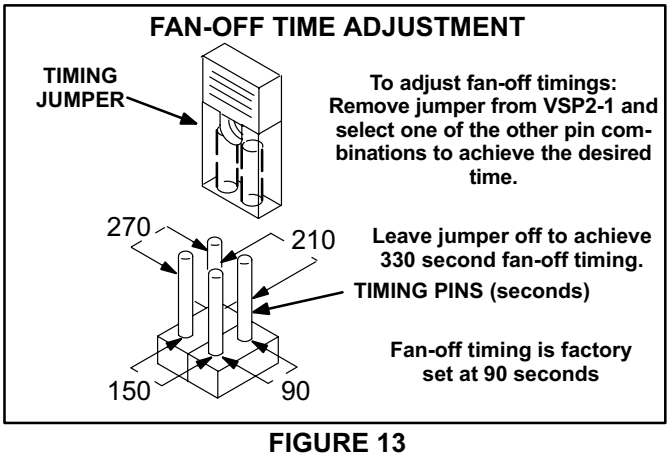


FIGURE 13

NOTE—If fan "OFF" time is 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.

Table 12 outlines the operation of the variable speed motor in relation to specific modes of operation. Some information has been repeated from the previous section to provide an example. Refer to each diagnostic LED or jumper settings section for more information.

TABLE 12
VSP2-1 G32V-1 / -3 units OPERATION

HEATING MODE		COOLING MODE	
UNITS WITH SINGLE-STAGE HEATING	**UNITS WITH TWO-STAGE HEATING**	**UNITS WITH SINGLE-SPEED COMPRESSOR**	**UNITS WITH TWO-SPEED COMPRESSOR**
NON-ZONED APPLICATIONS Using a single-stage thermostat with "one-stage" heating, the **HEAT** LED-DS2 is lit when the thermostat calls for heat. The **ON/OFF** LED-DS3 is lit after 110 seconds (65 seconds pre-purge and 45 seconds fan "ON" time) from the time a call for heat is made. This indicates the blower is operating in heating speed. Using a single-stage thermostat with "W2 TIMED," and W1 calling, the ON/OFF LED-DS3 is lit to indicate the blower is operating on low speed. When the HEAT LED-DS2 is lit, the blower is operating in heating speed, and second-stage (W2) heating is calling.	**NON-ZONED APPLICATIONS** Using a two-stage thermostat with first-stage (W1) calling, the **ON/OFF** LED-DS3 is lit to indicate the blower is operating in low speed. When the **ON/OFF** LED-DS3 and **HEAT** LED-DS2 are lit, the blower is operating in heating speed and second-stage (W2) heating is calling. **HEAT** LED-DS2 is lit with a call for heat from the thermostat. **ON/OFF** LED-DS3 is lit after 110 seconds from the time a call for heat is made.	**NON-ZONED APPLICATIONS** The terminals DS and Y must be jumpered together. With a call for cooling, terminals G, Y and DS on the unit control board are energized from the thermostat. **HI/LOW** LED-DS1 and **ON/OFF** LED-DS3 are lit to indicate the blower is operating on high speed. *NOTE—Y and DS are factory jumpered for single-stage cooling, non-zoned.* *NOTE—For low speed during single-stage cooling remove jumper from Y and Ds.*	**NON-ZONED APPLICATIONS** The **ON/OFF** LED-DS3 is lit to indicate the blower is operating in first stage cooling. This LED is energized on when a 24VAC thermostat demand is supplied to the control (terminal "G" on the control board terminal strip). In second stage, the **ON/OFF** LED-DS3 and **HI/LOW** LED-DS1 are lit to indicate the blower is operating on high speed (24VAC is supplied to the unit terminal strip Y2 from Y2 on the thermostat). *NOTE— Jumper must be moved from Y1 to Y2 In two-speed, non-zoned applications.*
HARMONY ZONED APPLICATIONS The blower speed is controlled by the PWM (pulse width modulation) signal sent from the control center of the zoning system to the terminal strip's DS terminal. **HI/LOW** LED-DS1 and **ON/OFF** LED-DS3 are lit to indicate the blower is operating. *NOTE-In Harmony II zoning applications, HTG. BLOWER jumper must be in position #2.*	**HARMONY ZONED APPLICATIONS** The blower speed is controlled by the PWM (pulse width modulation) signal sent from the control center of the zoning system to the terminal strip's DS terminal. **HI/LOW** LED-DS1 and **ON/OFF** LED-DS3 are lit to indicate the blower is operating. *NOTE-In Harmony II zoning applications, HTG. BLOWER jumper must be in position #2.*	**HARMONY ZONED APPLICATIONS** The blower speed is controlled by the PWM (pulse width modulation) signal sent from the control center of the zoning system to the terminal strip's DS terminal. **HI/LOW** LED-DS1 and **ON/OFF** LED-DS3 are lit to indicate the blower is operating.	**HARMONY ZONED APPLICATIONS** The blower speed is controlled by the PWM (pulse width modulation) signal sent from the control center of the zoning system to the terminal strip's DS terminal. **HI/LOW** LED-DS1 and **ON/OFF** LED-DS3 are lit to indicate the blower is operating.

NOTE: For zone applications with Harmony, remove the wire from the pin #3 of the J73 terminal on the VSP control board, insulate the end, and secure it to prevent from shorting.

7. VSP3-1 Blower Control Board (A24) G32V-4 Units

G32V-4 units are equipped with a variable speed motor that is capable of maintaining a specified CFM throughout the external static range. The unit uses the VSP3-1 variable speed control board, located in the blower compartment, which controls the blower speed and provides diagnostic LEDs. The control has both a non-adjustable, factory preset "ON" fan timing delay and an adjustable "OFF" fan timing delay (see figure 13).

The VSP3-1 also senses limit trip condition and turns on the blower. The G32V limit switch is located in the middle of the vestibule wall. When excess heat is sensed in the heat exchanger, the limit switch will open and interrupt the current to the gas valve, while at the same time the VSP3-1 energizes the blower on heating speed. The limit automatically resets when the unit temperature returns to normal and the blower is de-energized.

Diagnostic LEDs located on the VSP3-1 control board are provided to aid in identifying the unit's mode of operation. Certain scenarios will arise depending on the jumper positions. Refer to figure 14 for identification.

⚠ IMPORTANT

24 VAC half wave rectified (DC pulse), when measured with a meter, may appear as a lower or higher voltage depending on the make of the meter. Rather than attempting to measure the output voltage of A24, see G32V BLOWER & VSP3 BLOWER CONTROL BOARD TROUBLESHOOTING FLOW CHART in the TROUBLESHOOTING section of this manual.

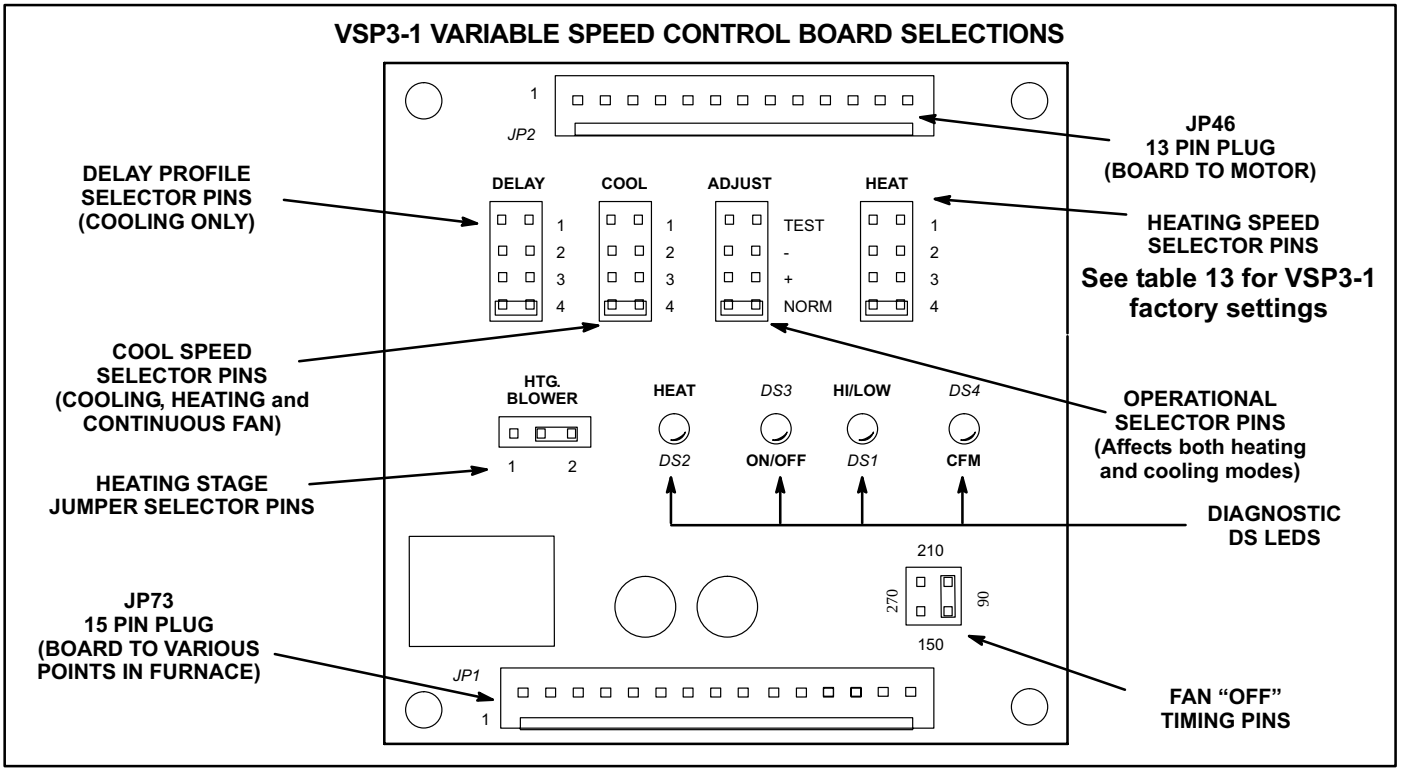
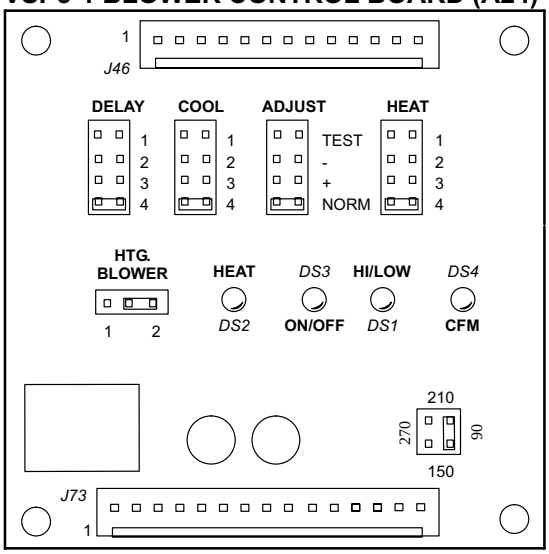


FIGURE 14

VSP3-1 BLOWER CONTROL BOARD (A24)

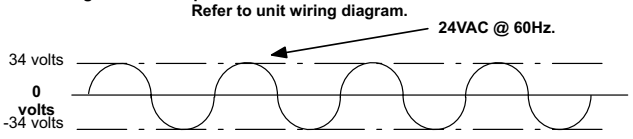


J73
PIN 1 - C - 24 VAC common.
PIN 2 - G - Input signal from thermostat's fan signal.
PIN 3 - W2 - Input signal for second stage heat from the thermostat.
PIN 4 - DS - Input signal for the blower speed regulation.
PIN 5 - Limit - Input signal from the external limit.
PIN 6 - R - 24 VAC power to the thermostat.
PIN 7 - C - 24 VAC common.
Pin 8 - C - 24 VAC common.
PIN 9 - CI - Input signal from the fan limit control.
PIN 10 - CO - Output signal to the burner control.
PIN 11 - HT - Input signal from the fan limit control.
PIN 12 - ACC - 24 VAC accessory output.
PIN 13 - 24V - Input 24 VAC power for the VSP2-1.
PIN 14 - 24V - Input 24 VAC power for the VSP2-1.
PIN 15 - V - Input signal from the gas line.

J46
PIN 1 - Not Used.
PIN 2 - C - 24 VAC common.
PIN 3 - C - 24 VAC common.
PIN 4 - Delay Tap - Delay profile programming input.
PIN 5 - Cool Tap - Cooling blower programming input.
PIN 6 - On / Off - On / off output signal to the ICM2 motor.
PIN 7 - Adjust Tap - ICM2 mode selection.
PIN 8 - NOT USED
PIN 9 - Hi / Low - Speed regulate input signal to the ICM2 motor with CCB1 and HARMONY only
PIN 10 - Ref. V - ICM2 reference voltage.
PIN 11 - Heat Tap - Heating blower speed programming.
PIN 12 - C - 24 VAC common.
PIN 13 - cfm - Motor speed diagnostic signal.

VOLTAGES INTO VSP3-1

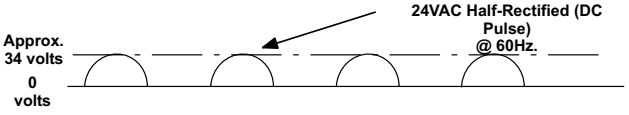
Voltage across J73 pins 13 to 1 and 6 to 1 is 24VAC as shown here. Refer to unit wiring diagram.



Voltage across J73 pins 4 to 1 is approximately 15-20VDC (straight voltage) if CCB is used. If Harmony is used a voltage of 0-25VDC should be present. If CCB or Harmony is not used, pin 4 to 1 voltage is 21VAC.

VOLTAGES FROM VSP3-1 TO ELECTRONICALLY CONTROLLED BLOWER MOTOR

Voltage across J46 pins 6 to 3 and 1 to 3 is half-rectified AC as shown here. Refer to unit wiring diagram.



Voltage across J46 pin 9 to 3 is approximately 15-20VDC if CCB is used. If CCB or Harmony is not used, pin 9 to 3 voltage is approximately 21VAC. If Harmony is used a voltage of 0-25VDC should be present.

FIGURE 15

Diagnostic LED Lights

DS3 ON/OFF

ON/OFF-DS3 indicates there is a demand for the blower motor to run. When the **ON/OFF** LED-DS3 is lit, a demand is being sent to the motor. In heating mode only, there is a 45-second fan "ON" delay in energizing **ON/OFF** LED-DS3. Light will not go off until adjustable fan "OFF" delay has expired.

If **ON/OFF** LED-DS3 is on and both **HIGH/LOW** LED-DS1 & **HEAT** LED-DS2 are off, the motor will operate in low speed (heating).

DS2 HEAT

If **HEAT** LED-DS2 is on, the blower is running in second-stage heat speed according to the "HEAT" jumper setting. In heating mode only, there is a 45 second delay in energizing **HEAT** LED-DS2. Light will not go off until adjustable fan "OFF" delay has expired.

DS1 HI/LOW

HIGH/LOW LED-DS1 indicates the blower is operating in the cooling mode.

DS4 CFM

CFM LED-DS4 indicates the CFM the blower is providing, according to the jumper settings.

Jumper Settings

⚠ IMPORTANT

Before changing jumper setting, make sure the motor has completely stopped. Any jumper setting change will not take place while the motor is running.

To change jumper positions, gently pull the jumper off the pins and place it on the desired set of pins. The following section outlines the different jumper selections available and conditions associated with each one. Refer to figure 14 for identification.

After the CFM for each application has been determined, the jumper settings must be adjusted to reflect those given in the tables on page 3 and 4. Using the tables, determine which row of CFM volumes most closely matches the desired CFM. Once a specific row has been chosen (NORMAL or -), CFM volumes from other rows cannot be used. Below are the descriptions of each of the jumper selections. Refer to table 13 for factory settings. Refer to CFM tables for approximate air volume for each setting.

TABLE 13
VSP FACTORY SETTINGS FOR G32V-4 UNITS

MODEL NUMBER	DELAY	COOL	ADJUST	HEAT
G32V3-75	4	4	NORM	3
G32V5-100	4	4	NORM	2
G32V5-125	4	4	"—"	4

NOTE - In Harmony II zoning applications in the heating mode, the highest cooling speed selected is the highest blower speed obtainable. Also, the fan-only speed is used when the primary limit has been tripped. In non-zoning applications, refer to the section on the VSP3-1 control.

ADJUST

The **ADJUST** pins allow the motor to run at normal speed or approximately 15% lower than normal speed. Blower tables and the front of this manualgive two rows (NORMAL and -) with their respective CFM volumes. The + adjustment setting is not operable. Notice that the normal adjustment setting for heat speed position #3 is 2030 CFM (955 L/s) in table 4. After the adjustment setting has been determined, choose the remainder speed jumper settings from those in the table.

The TEST pin is available to bypass the VSP3-1 control and run the motor at approximately 70% to test that the motor is operational. This is beneficial primarily in troubleshooting. G must be energized for motor to run.

HTG. BLOWER

For G32V-4 units only, place the **HTG. BLOWER** jumper across the second and third pins (position #2).

NOTE - In Harmony II zoning applications, HTG. BLOWER jumper must be in position #2.

HEAT

The **HEAT** jumper is used to set the blower speed to obtain the required CFM as outlined in HEAT SPEED section of tables 3 and 4.

The **HEAT** jumper selections are activated with a call for first-stage heating (W1) and second-stage heating (W2).

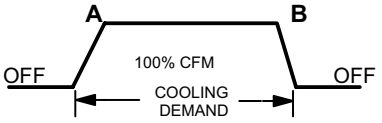
DELAY

The **DELAY** jumper is used to set the specific motor fan mode of operation during cooling. Depending on the application, one of four fan options may be chosen by moving the jumper to the appropriate set of pins.

Options 1, 2, 3, or 4 will have an increased dehumidification effect on the system. Option 1 will have the least effect and option 4 will have the greatest effect.

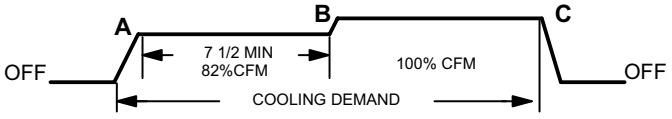
#1 PIN JUMPERED

A - Motor runs at 100% until demand is satisfied.
B - Once demand is met, motor ramps down to off.



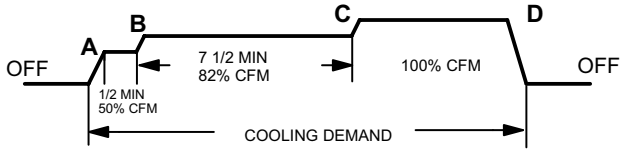
#2 PIN JUMPERED

A - Motor runs at 82% for approximately 7-1/2 minutes.
B - If demand has not been satisfied after 7-1/2 minutes, the motor runs at 100% until demand is satisfied.
C - Once demand is met, motor ramps down to off.



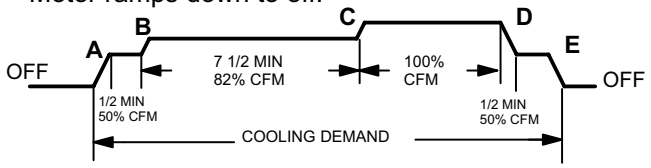
#3 PIN JUMPERED

A - Motor runs at 50% for 1/2 minute.
B - Motor then runs at 82% for approximately 7-1/2 minutes.
C - If demand has not been satisfied after 7-1/2 minutes, motor runs at 100% until demand is satisfied.
D - Once demand is met, motor ramps down to off.



#4 PIN JUMPERED

A - Motor runs at 50% for 1/2 minute.
B - Motor then runs at 82% for approximately 7-1/2 minutes.
C - If demand has not been satisfied after 7-1/2 minutes, motor runs at 100% until demand is satisfied.
D - Once demand is met, motor runs at 50% for 1/2 minute.
E - Motor ramps down to off.



COOL

The cool jumper is used to set the blower speed to obtain the required CFM as outlined in tables 3 and 4.

VSP Operation

Table 14 and 15 outline the operation of the variable speed motor in relation to specific modes of operation. Some information has been repeated from the previous section to provide an example. Refer to each diagnostic LED or jumper settings section for more information.

TABLE 14
G32V-4 UNITS WITH CCB1, & TWO-SPEED OUTDOOR UNIT OPERATING SEQUENCE

Operating Sequence		System Demand		System Response		
System Condition	**Step**	**Thermostat Demand**	***Relative Humidity (Efficiency*Plus* Lights)**	****Compressor Speed**	**Blower CFM (COOL)**	**Comments**
Normal operation	1	Y1	Acceptable (None)	Low	55% of HIGH COOL	Compressor demand and indoor blower speed follow thermostat demand
	2	Y2	Acceptable (None)	High	HIGH COOL	
Call for humidity removal during 1st stage thermostat demand	1	Y1	Acceptable (None)	Low	55% of HIGH COOL	Dehumidification mode begins with next thermostat demand, after initial thermostat demand is satisfied.
	2	Y1	Change to slightly over setpoint (1)	Low	55% of HIGH COOL	
	3	Demand satisfied	Slightly over setpoint (1)	Off	Off	
	4	Y1	Slightly over setpoint (1)	High	**77%/74% of HIGH COOL	
Significant increase in humidity during thermostat demand.	1	Y1	Acceptable (None)	Low	55% of HIGH COOL	If humidity increases significantly over setpoint, or if slide switch is moved significantly, unit will immediately go into dehumidification mode (in presence of thermostat demand).
	2	Y1	Change to significantly over setpoint (2 or more)	High	**77%/74% of HIGH COOL	
Humidity demand satisfied during thermostat demand.	1	Y1	Over Setpoint	High	**77%/74% of HIGH COOL	When humidity demand is satisfied, blower immediately shifts to the HIGH COOL CFM in order to hasten the end of the cycle. Unit can only shift out of high speed compressor operation at beginning of next cycle.
	2	Y1	Change to Acceptable (None)	High	HIGH COOL	
	3	None	Acceptable (None)	Off	Off	
	4	Y1	Acceptable (None)	Low	55% of HIGH COOL	
Call for humidity removal during 2nd stage thermostat demand	1	Y2	Acceptable (None)	High	HIGH COOL	Blower immediately changes speed in response to thermostat demand.
	2	Y2	Change to slightly over setpoint (1)	High	**77%/74% of HIGH COOL	
	3	Y2	Acceptable (None)	High	HIGH COOL	
*Call for 1st stage cooling after call for humidity removal.	1	None	Slightly over setpoint (1)	Off	Off	Dehumidification mode (high speed compressor) begins with next thermostat demand after initial demand is satisfied.
	2	Y1	Slightly over setpoint (1)	Low	55% of HIGH COOL	
Call for 2nd stage cooling after call for humidity removal	1	None	Slightly over setpoint (1)	Off	Off	Reduced blower speed (dehumidification speed) begins immediately with thermostat demand
	2	Y2	Slightly over setpoint (1)	High	**77%/74% of HIGH COOL	
Call for cooling after significant increase in humidity	1	None	Significantly over setpoint (2 or more)	Off	Off	If humidity increases significantly over setpoint, or if slide switch is moved, unit immediately goes into dehumidification mode (in presence of thermostat demand).
	2	Y1 or Y2	Significantly over setpoint (2 or more	High	**77%/74% of HIGH COOL	
Humidity demand satisfied between thermostat demands (unit off cycle).	1	None	Over setpoint (1 or more)	Off	Off	While unit is not operating (no thermostat demand), slide switch is moved down and back up. Blower and compressor operate at high speed until next thermostat demand.
	2	Y1 or Y2	Change to acceptable (None)	High	HIGH COOL	

Note - When changing unit mode of operation from cooling to heating, indicating lights that are on will stay on until the first thermostat heating demand.

**IMPORTANT - If power to unit is turned on with CCB1 calling for humidity removal, outdoor unit may be locked into high speed indefinitely. To reset, move humidity slide switch all the way down then back up to desired setpoint (with unit running)*
*** Reduced blower speed is 77% of COOL for the V3 units; 74% of COOL for V5.*
****If the two-speed control on a two-speed outdoor unit is set for LATCH 2 (15 minutes) or LATCH 3 (30 minutes), the compressor will latch into high speed after a Y1 demand has occurred for that period of time.*

TABLE 15
G32V-4 Units with VSP3-1

Heating Mode		Cooling Mode	
Units With Single-Stage Heating	**Units With Two-Stage Heating**	**Units With Single-speed Compressor**	**Units With Two-speed Compressor**
Non-Zoned Applications Using a single-stage thermostat with "one-stage" heating, the **HEAT** LED-DS2 is lit when the thermostat calls for heat. The **ON/OFF** LED-DS3 is lit after 110 seconds (65 seconds prepurge and 45 seconds fan "ON" time) from the time a call for heat is made. This indicates the blower is operating in high speed heat. Using a single-stage thermostat with "W2 TIMED" and W1 calling, the ON/OFF LED-DS3 is lit to indicate the blower is operating on low speed heat. When HEAT LED-DS2 is lit, the blower is operating in high speed heat and second-stage (W2) is calling.	**Non-Zoned Applications** Using a two-stage thermostat with first-stage (W1) calling, the **ON/OFF** LED-DS3 is lit to indicate the blower is operating in low speed heat. When the **ON/OFF** LED-DS3 and **HEAT** LED-DS2 are lit, the blower is operating in high speed heat and second-stage (W2) is calling. **HEAT** LED-DS2 is lit with a call for heat from the thermostat. **ON/OFF** LED-DS3 is after 110 seconds from the time a call for heat is made.	**Non-Zoned Applications** Y1-DS and Y1-Y2 must be jumpered together. With a call for cooling, G, Y1, Y2 and DS on the unit control board are energized from the thermostat. **HI/LOW** LED-DS1 and **ON/OFF** LED-DS3 are lit to indicate a call for cooling. *Note - Y1 to DS and Y1 to Y2 are factory jumpered for single-stage cooling, non-zoned applications.*	**Non-Zoned Applications** Y1-DS must be jumpered together. With a call for single-stage cooling, G, Y1, and DS on the unit control board are energized from the Thermostat. With a call for second-stage cooling, G, Y1, Y2, and DS on the unit control board are energized from the thermostat. In both cases, **HI/LOW** LED-DS1 and **ON/OFF** LED-DS3 are lit to indicate a call for cooling. *Note - Jumper Y1-Y2 must be removed for units with two-speed compressor.*
Harmony Zoned Applications The blower speed is controlled by the PWM (pulse width modulation) signal sent from the control center of the zoning system to the terminal strip's DS terminal. **HI/LOW** LED-DS1 and **ON/OFF** LED-DS3 are lit to indicate the blower is operating. *Note - In Harmony II zoning applications, HTG BLOWER jumper must be in position #2.*	**Harmony Zoned Application** The blower speed is controlled by the PWM (pulse width modulation) signal sent from the control center of the zoning system to the terminal strip's DS terminal. **HI/LOW** LED-DS1 and **ON/OFF** LED-DS3 are lit to indicate the blower is operating. *Note - In Harmony II zoning applications, HTG BLOWER jumper must be in position #2.*	**Harmony Zoned Application** The blower speed is controlled by the PWM (pulse width modulation) signal sent from the control center of the zoning system to the terminal strip's DS terminal. **HI/LOW** LED-DS1 and **ON/OFF** LED-DS3 are lit to indicate the blower is operating.	**Harmony Zoned Application** The blower speed is controlled by the PWM (pulse width modulation) signal sent from the control center of the zoning system to the terminal strip's DS terminal. **HI/LOW** LED-DS1 and **ON/OFF** LED-DS3 are lit to indicate the blower is operating.

NOTE - For zone applications with Harmony, remove the wire from pin #2 and pin #13 of the J49 terminal at the motor and the wire from pin #3 of the J73 terminal on the VSP control board, insulate the ends and secure to prevent shorting.

8. Two Stage Variable Speed Control (A24) G32V-5 and later Units

⚠ WARNING

Shock hazard.
Disconnect power before servicing. Integrated Control Board 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.

G32V-5 and later units are equipped with the Lennox two-stage, variable speed integrated SureLight control board. The system consists of a ignition / blower control board (figure 16 with control terminal designations in tables 16 through 19) and ignitor (figure 9). 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 features two LED lights, DS1 and DS2 for troubleshooting and four LED lights (DS3, DS6, DS7 and DS8) to show furnace status. The board also has two accessory terminals rated at (1) one amp each. See table 20 for status code and table 21 for troubleshooting diagnostic codes.

Electronic Ignition

At the beginning of the heat cycle 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 on low (first stage) heat speed.

G32V-75 Only

At the beginning of the heat cycle the SureLight control monitors the first and second stage combustion air inducer prove switches. The control will not begin the heating cycle if the first stage prove switch is closed (by-passed). Like wise the control will not begin second stage heat if the second stage prove switch is closed and will allow first stage heat only. However, if the second stage prove switch closes DURING first stage pre-purge, the control will still respond to second stage heat.

Once the prove switch (first stage prove switch for G32V-75) is determined to be open, the combustion air inducer is energized on low (first stage) heat speed. When the differential in the prove switch is great enough, the prove switch closes and a 15-second pre-purge begins. If the 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 SureLight ignitor warms up for 20 seconds after which the gas valve opens for a 4-second trial for ignition. The ignitor energizes during the 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.

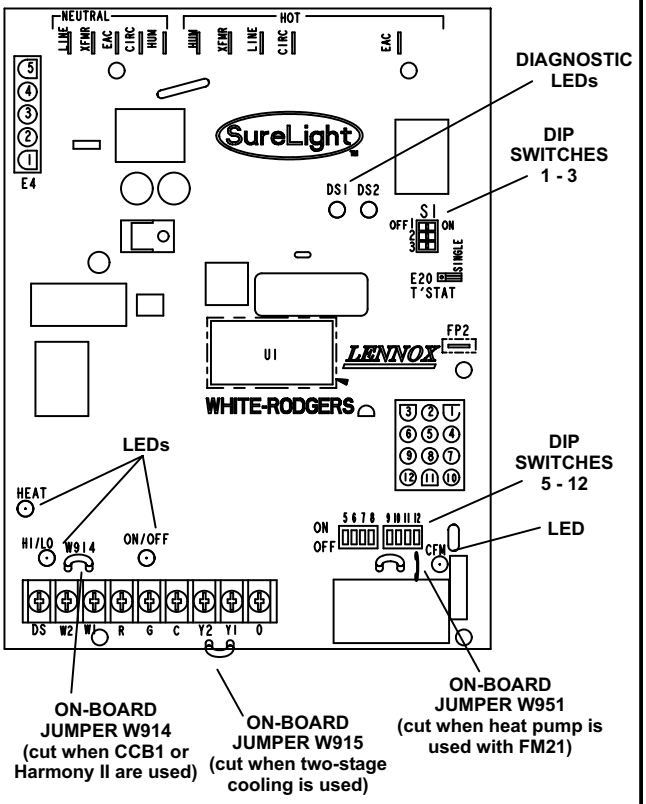
The SureLight control board has an added feature that prolongs the life of the ignitor. After a successful ignition, the SureLight control utilizes less power to energize the ignitor on successive calls for heat. The control continues to ramp down the voltage to the ignitor until it finds the lowest 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.

Two Stage Operation / Thermostat Selection Jumper

The control can be utilized in two modes: SINGLE-STAGE thermostat or TWO-STAGE thermostat. The thermostat selection jumper E20, located just below dip switches 1 through 3 (figure 16), must be positioned for the particular application. The jumper is factory set on “TWO” for use with a two-stage thermostat with two stage heat. Re-position jumper to “SINGLE” for use with a single stage thermostat with two stage heat.

While in the single-stage thermostat mode (*single* jumper setting), the burners will always fire on first-stage heat. The combustion air inducer will operate on low speed and indoor blower will operate on low heat speed. After a 10 minute recognition period, the unit will switch to second stage heat. While in the two-stage thermostat mode (*two* jumper setting) the burners will fire on first-stage heat. The combustion air inducer will operate on low speed and indoor blower will operate on low heat speed. The unit will switch to second-stage heat on call from the indoor thermostat. If there is a simultaneous call for first and second stage heat, the unit will fire an first stage heat and switch to second stage heat after 30 seconds of operation. See Sequence of Operation flow charts in the back of this manual for more detail.

TW0-STAGE, VARIABLE SPEED INTEGRATED CONTROL BOARD



THERMOSTAT CONNECTIONS (TB1)

DS= DEHUMIDIFICATION SIGNAL
W2= HEAT DEMAND FROM 2ND STAGE T'STAT
W1= HEAT DEMAND FROM 1ST STAGE T'STAT (WHITE)
R= CLASS 2 VOLTAGE TO THERMOSTAT
G= MANUAL FAN FROM T'STAT (GREEN)
C= THERMOSTAT SIGNAL GROUND CONNECTED TO TRANSFORMER GROUND (TR) & CHASIS GROUND (GRD)
Y1= THERMOSTAT 1st STAGE COOL SIGNAL
Y2= THERMOSTAT 2nd STAGE COOL SIGNAL
O= THERMOSTAT SIGNAL TO HEAT PUMP REVERSING VALVE

DIP SWITCH FUNCTIONS

DIP SWITCH(ES)	FUNCTION
1 and 2	Blower Off Delay
3	Second Stage ON Delay (Single-stage t'stat)
4	Not used
5 and 6	Cooling Mode Blower Speed
7 and 8	Blower Speed Adjustment
9 and 10	Cooling Mode Blower Ramping Profile
11 and 12	Heating Mode Blower Speed

FIGURE 16

TABLE 16

Two Stage Ignition / Blower Control Terminals	
LINE	Line 120VAC Neutral
XFMR	Transformer 120VAC Neutral
EAC	Electronic Air Cleaner 120VAC Neutral
CIRC	Indoor Blower 120VAC Neutral
HUM	Humidifier 120VAC Neutral
HUM	Humidifier 120VAC Hot
XMFR	Transformer 120VAC Hot
LINE	Line 120VAC Hot
CIRC	Indoor Blower 120VAC Hot
EAC	Electronic Air Cleaner 120VAC Hot

TABLE 17

SureLight Board 5 Pin Terminal Designation	
PIN #	**Function**
1	Ignitor
2	Combustion Air Inducer High Speed
3	Combustion Air Inducer Low Speed
4	Combustion Air Inducer Neutral
5	Ignitor Neutral

TABLE 18

SureLight Board 12Pin Terminal Designation	
PIN #	**Function**
1	Gas Valve High Fire
2	Second Stage Prove Switch (G32V-75)
3	Not Used
4	Ground
5	24V Hot
6	Primary Limit In
7	Gas Valve Low Stage
8	Gas Valve Common
9	24V Neutral
10	Ground
11	Primary Limit Out
12	1st Stage Prove Switch

TABLE 19

SureLight Board 16 Pin Blower Control Terminals	
PIN #	**Function**
1	Ground
2	Low Heat Speed
3	Ground
4	“DELAY” Dip Switch Selection
5	“COOL” Dip Switch Selection
6	“Y1” Signal
7	“ADJUST” Dip Switch Selection
8	Ground
9	“0” From Thermostat
10	“DS” Output Signal
11	“HEAT” Dip Switch Selection
12	24 VAC
13	HIGH HEAT Speed
14	“Y2” Signal
15	“G”
16	CFM LED

TABLE 20

STATUS CODES		
STATUS LED	**COLOR**	**FUNCTION**
DS3 “ON / OFF ’	GREEN	DS3-ON indicates that the motor has a demand to operate. (This LED must be on in all modes).
DS6 “CFM”	GREEN	DS6-blinking indicates the airflow (CFM) demand in the motor. The air flow is determine by counting blinks between two (2) second pauses. One blink equals roughly 100 CFM.
DS7 “HI / LO”	YELLOW	DS7-ON indicaties the “DS to R” jumper has not been cut. When the jumper is cut the system will be operating with LENNOX HARMONY II™ (See Harmony Installation Instructions) or with the CCB1 Efficiency Plus control. CCB1: When ON, a 24 VAC is being applied and when OFF, it has been removed. This on/off operation varies the indoor blower’s performance so dehumidification can be enhanced.
DS8 “HEAT”	YELLOW	DS8-ON indicates the system is in HEAT mode.

TABLE 21

DIAGNOSTIC CODES **Diagnostic LEDs are labeled DS1 and DS2. See figure 16 for location of diagnostic LEDs.**		
DS1	**DS2**	**DESCRIPTION**
SIMULTANEOUS SLOW FLASH	SIMULTANEOUS SLOW FLASH	Power on - Normal operation. Also signaled during cooling and continuous fan.
SIMULTANEOUS FAST FLASH	SIMULTANEOUS FAST FLASH	Normal operation - signaled when heating demand initiated at thermostat.
SLOW FLASH	ON	Primary, secondary or rollout limit switch open. Limits must close within 3 minutes or unit goes into 1 hour Watchguard.
OFF	SLOW FLASH	Low pressure switch open; (G32V-75 only) OR: Blocked inlet/exhaust vent; OR: Low pressure switch closed prior to activation of combustion air inducer.
OFF	FAST FLASH	High pressure switch open; OR: Blocked inlet/exhaust vent; OR: High pressure switch closed prior to activation of combustion air inducer.
ALTERNATING SLOW FLASH	ALTERNATING SLOW FLASH	Watchguard -- burners failed to ignite; OR limit open more than 3 minutes; OR lost flame sense 5 times in one heating cycle; OR pressure switch opened 5 times in one heating cycle.
SLOW FLASH	OFF	Flame sensed without gas valve energized.
ON ON OFF	ON OFF ON	Circuit board failure or control wired incorrectly. Check 24 and 115 volts to board.
FAST FLASH	SLOW FLASH	Main power polarity reversed. Switch line and neutral.
SLOW FLASH	FAST FLASH	Low flame signal. Measures below 0.23 microAmps. Replace flame sense rod.
ALTERNATING FAST FLASH	ALTERNATING FAST FLASH	The following conditions are sensed during the ignitor warm-up period only: 1) Improper main ground; 2) Broken ignitor; OR: Open ignitor circuit; 3) Line voltage below 75 volts. (If voltage lower than 75 volts prior to ignitor warm-up, control will signal waiting on call from thermostat, and will not respond.

NOTE - Slow flash rate equals 1 Hz (one flash per second). Fast flash rate equals 3 Hz (three flashes per second). Minimum flame sense current = 0.17-0.22 microAmps.

Dip Switch Settings

Switches 1 and 2 -- Blower Off Delay -- The blower-on delay of 45 seconds is not adjustable. The blower-off delay (time that the blower operates after the heating demand has been satisfied) can be adjusted by moving switches 1 and 2 on the integrated control board. The unit is shipped from the factory with a blower-off delay of 90 seconds. The blower off delay affects comfort and is adjustable to satisfy individual applications. Adjust the blower off delay to achieve a supply air temperature between 90° and 110°F at the exact moment that the blower is de-energized. Longer off delay settings provide lower supply air temperatures; shorter settings provide higher supply air temperatures.The table below provides the blower off timings that will result from different switch settings.

TABLE 22
Blower Off Delay Switch Settings

Blower Off Delay (Seconds)	Switch 1	Switch 2
60	Off	Off
90	Off	On
120	On	Off
180	On	On

Switch 3 -- Second Stage Delay (Used with Single-Stage Thermostat Only) -- This switch is used to determine the second stage on delay when a single-stage thermostat is being used. The switch is factory-set in the ON position, which provides a 10-minute delay before second-stage heat is initiated. If the switch is toggled to the OFF position, it will provide a 15-minute delay before second-stage heat is initiated. This switch is only activated when the thermostat selector jumper is positioned for SINGLE-stage thermostat use.

Switch 4 -- Not used.

Switches 5 and 6 -- Cooling Mode Blower Speed -- Switches 5 and 6 are used to select cooling blower motor speed. The unit is shipped from the factory with the dip switches positioned for high speed (4) indoor blower motor operation during the cooling mode. The table below provides the cooling mode blower speeds that will result from different switch settings. Refer to blower data tables at the front of this manual for corresponding cfm values.

TABLE 23
Cooling Mode Blower Speeds

Speed	Switch 5	Switch 6
1 - Low	On	On
2 - Medium Low	Off	On
3 - Medium High	On	Off
4 - High (Factory)	Off	Off

Switches 7 and 8 -- Blower Speed Adjustment -- Switches 7 and 8 are used to select blower speed adjustment settings. The unit is shipped from the factory with the dip switches positioned for NORMAL (no) adjustment. The dip switches may be positioned to adjust the blower speed by +10% or -10% to better suit the application. The table below provides blower speed adjustments that will result from different switch settings. Refer to blower data tables at the front of this manual for corresponding cfm values.

TABLE 24
Blower Speed Adjustment

Adjustment	Switch 7	Switch 8
+10% (approx.)	On	Off
NORMAL (Factory)	Off	Off
-10% (approx.)	Off	On

Switches 9 and 10 -- Cooling Mode Blower Speed Ramping -- Switches 9 and 10 are used to select cooling mode blower speed ramping options. Blower speed ramping may be used to enhance dehumidification performance. The switches are factory set at option A which has the greatest effect on blower motor performance. The table below provides the cooling mode blower speed ramping options that will result from different switch settings. The cooling mode blower speed ramping options are detailed on the next page. See unit nameplate for manufacturing date.

TABLE 25
Cooling Mode Blower Speed Ramping

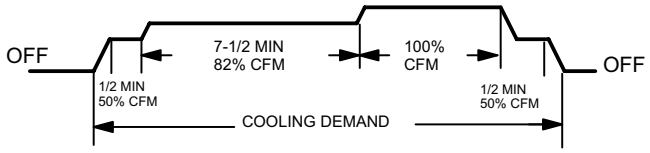
Ramping Option	Switch 9	Switch 10
A (Factory)	Off	Off
B	On	Off
C	Off	On
D*	On	On

**Only option for CCB1*

G32V units manufactured before April 2003

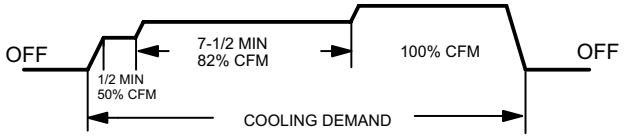
Ramping Option A (Factory Selection)

- Motor runs at 50% for 1/2 minute.
- Motor then runs at 82% for approximately 7-1/2 minutes.
- If demand has not been satisfied after 7-1/2 minutes, motor runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 50% for 1/2 minute.
- Motor ramps down to off.



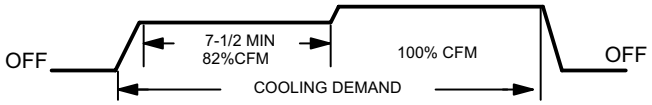
Ramping Option B

- Motor runs at 50% for 1/2 minute.
- Motor then runs at 82% for approximately 7-1/2 minutes.
- If demand has not been satisfied after 7-1/2 minutes, motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to off.



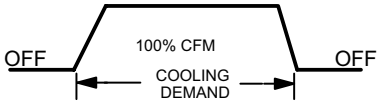
Ramping Option C

- Motor runs at 82% for approximately 7-1/2 minutes.
- If demand has not been satisfied after 7-1/2 minutes, the motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to off.



Ramping Option D

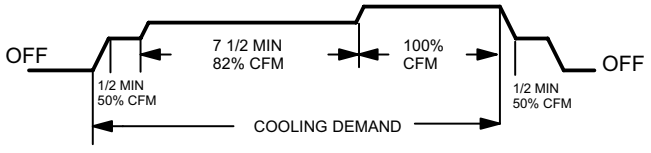
- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to off.



G32V units manufactured April 2003 and later

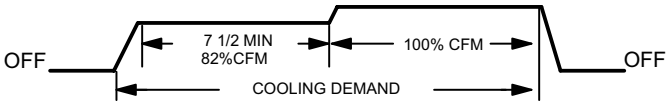
Ramping Option A (Factory Selection)

- Motor runs at 50% for 30 seconds.
- Motor then runs at 82% for approximately 7-1/2 minutes. If demand has not been satisfied after 7-1/2 minutes.
- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 50% for 30 seconds then -
- ramps down to stop.



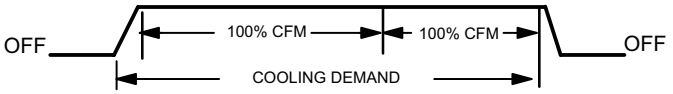
Ramping Option B

- Motor runs at 82% for approximately 7-1/2 minutes. If demand has not been satisfied after 7-1/2 minutes -
- motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to stop.



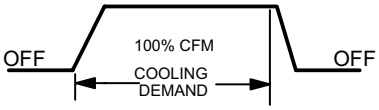
Ramping Option C

- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 100% for 60 seconds. Then,
- ramps down to stop.



Ramping Option D

- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor ramps down to stop.



Switches 11 and 12 -- Heating Mode Blower Speed -- Switches 11 and 12 are used to select heating mode blower motor speed. The unit is shipped from the factory with the dip switches positioned for medium low (2) speed indoor blower motor operation during the heating mode. The table below provides the heating mode blower speeds that will result from different switch settings. Refer to blower data tables at the front of this manual for corresponding cfm values.

TABLE 26
Heating Mode Blower Speeds

Speed	Switch 11	Switch 12
1 - Low	On	On
2 - Medium Low (Factory)	Off	On
3 - Medium High	On	Off
4 - High	Off	Off

On-Board Jumper W914

On-board jumper W914, which connects terminals DS and R on the integrated control board, must be cut when the furnace is installed with either the Harmony II zone control board or the CCB1 EfficiencyPlus humidity control. Refer to table 27 for operation sequence in applications including a G32V, CCB1 and single-speed outdoor unit. Table 28 gives the operation sequence in applications with a two-speed outdoor unit.

On-Board Jumper W951

On-board jumper W951, which connects terminals R and O on the integrated control board, must be cut when the furnace is installed in applications which include a heat pump unit and the FM21 FuelMaster control board.

On-Board Jumper W915

On board jumper W915, which connects Y1 to Y2 terminals on the integrated control board terminal strip must be cut if two-stage cooling will be used.

On-Board Jumper W6

On board jumper W6 is an external measuring device for indoor blower CFM. If by chance W6 is cut, the CFM LED will not operate but the furnace will operate as normal. The jumper has no affect on furnace operation.

Diagnostic LEDs (DS1 and DS2)

Two diagnostic LEDs are located on the two-stage, variable speed integrated control just to the left of the first bank of dip switches. These lights' flashes correspond with diagnostic codes detailed on in table 21.

Status LEDs (HEAT, HI/LO, ON/OFF and CFM)

The integrated control includes four LEDs which indicate operating status. The green ON/OFF LED is lit any time the blower is operating. The green CFM LED indicates the blower motor speed. Count the number of blinks between the two-second pauses to determine the CFM. Each blink represents approximately 100 CFM. The yellow HI/LO LED is lit when the W914 (DS to R) jumper **has not** been clipped for CCB1 or Harmony operation. The yellow HEAT LED is lit when the indoor blower is operating at the HEATING speed.

TABLE 27
G32V-5, CCB1 and Single-Speed Outdoor Unit

OPERATING MODE	SYSTEM DEMAND		SYSTEM RESPONSE	
System Condition	**Thermostat Demand**	***Relative Humidity (Efficiency*Plus* Lights)**	**Blower CFM (COOL)**	**Comments**
Normal operation	Y1	No demand. Humidity level is acceptable	COOL	Compressor demand and indoor blower speed controlled by thermostat demand.
*Call for humidity removal during cooling demand	Y1	Humidity level rises above setpoint. Demand initiated.	77%/74% of COOL	Call for dehumidification initiated by CCB1 control. Indoor blower speed reduced by CCB1 control.
Dehumidification demand satisfied during cooling demand.	Y1	Humidity level falls below setpoint. No demand	COOL	When humidity demand is satisfied, blower speed immediately increases to the COOL CFM to hasten the end of the cycle.
Call for cooling after call for humidity removal.	None	Humidity level above setpoint. Demand initiated.	Off	Dehumidification mode begins when relative humidity is greater than setpoint.
	Y1	Humidity level above setpoint. Demand initiated.	77%/74% of COOL	
Humidity demand satisfied between thermostat demands (unit off cycle).	None	Over setpoint (1 or more)	Off	While unit is not operating (no thermostat demand), slide switch is moved down and back up. Blower operates at COOL CFM.
	Y1	Change to acceptable	COOL	

NOTE - When changing unit mode of operation from cooling to heating, indicating lights that are on will stay on until the first thermostat heating demand.

** Reduced blower speed is 77% of COOL for V3 units and 74% of COOL for the V5 units.*

TABLE 28
G32V-5, CCB1 and Two-Speed Outdoor Unit

OPERATING MODE	SYSTEM DEMAND		SYSTEM RESPONSE		
System Condition	**Thermostat Demand**	***Relative Humidity (Efficiency*Plus* Lights)**	****Compressor Speed**	**Blower CFM (COOL)**	**Comments**
Normal operation	Y1	No demand. Acceptable	Low	55% of HIGH COOL	Compressor demand and indoor blower speed controlled by thermostat demand
	Y2	No demand. Acceptable	High	HIGH COOL	
Call for humidity removal during 1st-stage cooling demand	Y1	No demand. Acceptable	Low	55% of HIGH COOL	Dehumidification mode does not begin until after initial thermostat demand is satisfied and new cooling demand is initiated.
	Y1	Humidity level rises slightly (1) above setpoint. Demand initiated.	Low	55% of HIGH COOL	
	Demand satisfied	Humidity level remains slightly (1) above setpoint. Demand continues.	Off	Off	
	Y1	Humidity level remains slightly (1) above setpoint. Demand continues.	High	**77%/74% of HIGH COOL	
Significant increase in humidity during thermostat cooling demand.	Y1	No demand. Acceptable	Low	55% of HIGH COOL	If humidity rises significantly above setpoint, or if slide switch is moved significantly, unit will immediately go into dehumidification mode (in presence of thermostat demand).
	Y1	Humidity level rises significantly (2 or more) above setpoint. Demand initiated.	High	**77%/74% of HIGH COOL	
Humidity demand satisfied during thermostat demand.	Y1	Humidity level above setpoint.	High	**77%/74% of HIGH COOL	When humidity demand is satisfied, blower immediately shifts to the COOL CFM in order to hasten the end of the cycle. Unit can only shift out of high speed compressor operation at beginning of next cycle.
	Y1	Humidity level falls below setpoint. No demand.	High	HIGH COOL	
	None	No demand. Acceptable	Off	Off	
	Y1	No demand. Acceptable	Low	55% of HIGH COOL	
Call for humidity removal during 2nd stage thermostat demand	Y2	No demand. Acceptable	High	HIGH COOL	Blower immediately changes speed in response to thermostat demand.
	Y2	Humidity level rises slightly (1) above setpoint. Demand initiated.	High	**77%/74% of HIGH COOL	
	Y2	No demand. Acceptable	High	HIGH COOL	
*Call for 1st stage cooling after call for humidity removal.	None	Humidity level is slightly (1) above setpoint.	Off	Off	Dehumidification mode (high speed compressor) begins with next thermostat demand after initial demand is satisfied.
	Y1	Humidity level is slightly (1) above setpoint.	Low	55% of HIGH COOL	
Call for 2nd stage cooling after call for humidity removal	None	Humidity level is slightly (1) above setpoint.	Off	Off	Reduced blower speed (dehumidification speed) begins immediately with thermostat demand
	Y2	Humidity level is slightly (1) above setpoint.	High	**77%/74% of HIGH COOL	
Call for cooling after significant increase in humidity	None	Humidity level is significantly above setpoint (2 or more).	Off	Off	If humidity increases significantly over setpoint, or if slide switch is moved, unit immediately goes into dehumidification mode (in presence of thermostat demand).
	Y1 or Y2	Humidity level is significantly above setpoint (2 or more).	High	**77%/74% of HIGH COOL	
Humidity demand satisfied between thermostat demands (unit off cycle).	None	Humidity level is slightly (1) above setpoint.	Off	Off	While unit is not operating (no thermostat demand), slide switch is moved down and back up. Blower and compressor operate at high speed until next thermostat demand.
	Y1 or Y2	Humidity level falls below setpoint. No demand.	High	HIGH COOL	

Note - During mode of operation change from cooling to heating, indicating lights will not change until the first thermostat heating demand.

**IMPORTANT - If power to unit is turned on with CCB1 calling for humidity removal, outdoor unit may be locked into high speed indefinitely. To reset, move the humidity slide switch all the way down then back up to desired setpoint while the unit is running.*
*** Reduced blower speed is 77% of COOL for the V3 units; 74% of COOL for V5.*
****If the two-speed control on a two-speed outdoor unit is set for LATCH 2 (15 minutes) or LATCH 3 (30 minutes), the compressor will latch into high speed after a Y1 demand has occurred for that period of time.*

C-Blower Compartment (Figure 17)

Located inside the blower compartment are the variable speed blower motor (B3), coil choke (L13), and the secondary limit switches [(1)S21 and (2)S21]. To access the blower compartment follow the steps outlined below:

1. Blower Motor (B3)

G32V units use a three-phase, electronically controlled D.C. brushless motor (controller converts single phase a.c. to three phase D.C.), with a permanent-magnet-type rotor (figure 18). Because this motor has a permanent magnet rotor it does not need brushes like conventional D.C. motors. Internal components are shown in figure 19. The stator windings are split into three poles which are electrically connected to the controller. This arrangement allows motor windings to turn on and off in sequence by the controller.

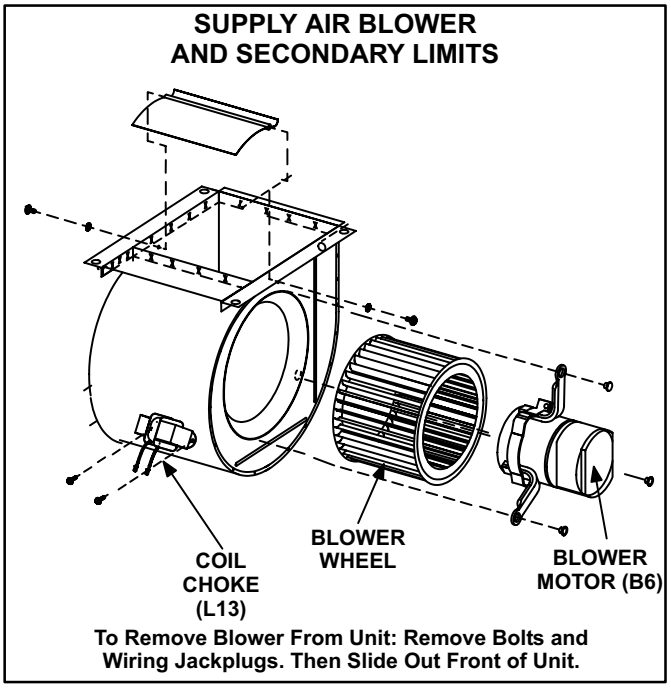


FIGURE 17

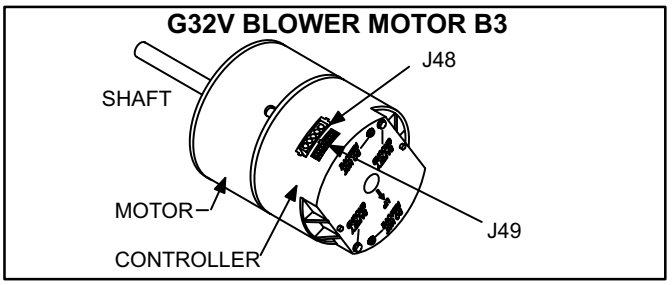


FIGURE 18

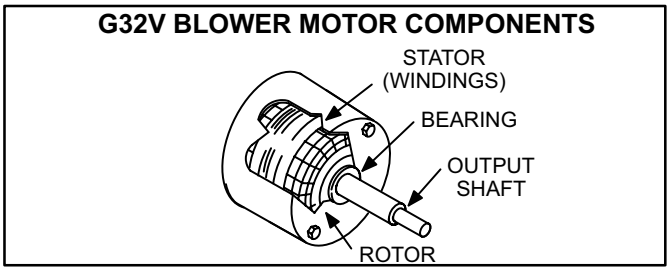


FIGURE 19

A solid-state controller is permanently attached to the motor. The controller is primarily an A.C. to D.C. converter. Converted D.C. power is used to drive the motor. The controller contains a microprocessor which monitors varying conditions inside the motor (such as motor workload).

The controller uses sensing devices to sense what position the rotor is in at any given time. By sensing the position of the rotor and then switching the motor windings on and off in sequence, the rotor shaft turns the blower.

G32V series blower motor ratings are listed in table 29. All G32V blower motors use single phase power. An external run capacitor is not used. The motor uses permanently lubricated ball-type bearings.

To Remove Blower:

1. Turn off line voltage power. Unplug J69 from P69 located on blower deck.
2. Disconnect thermostat wiring connections at the terminal strip.
3. Disconnect J58/P58 and located on blower deck.
4. Disconnect J43/P43 and J49/P49 from blower motor.
5. Disconnect wires from power choke.
6. Remove screw from control panel bracket at the blower.
7. Loosen screws (2) and remove control box assembly from unit. Holes are slotted so screws do not need to be removed.
8. Remove screws (2) and remove blower from unit.

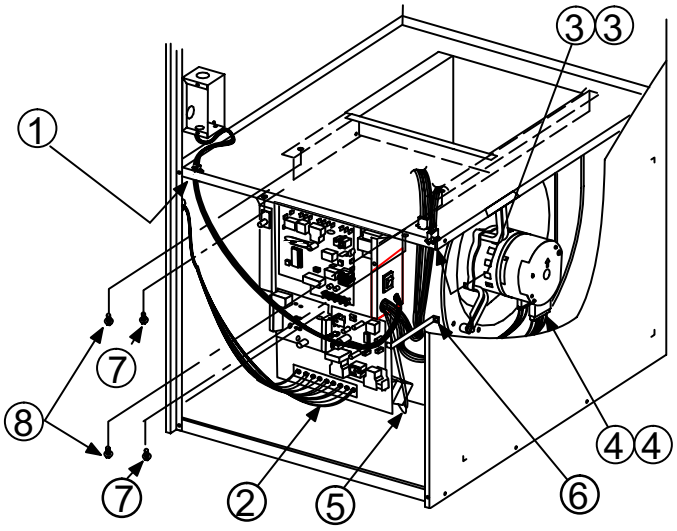


FIGURE 20

TABLE 29

ELECTRONICALLY CONTROLLED BLOWER MOTOR CCW ROTATION			
Unit	**Volts**	**Phase**	**HP**
G32V3	120	1	1/2
G32V5	120	1	1

Internal Operation

Each time the controller switches a stator winding (figure 19) on and off, it is called a “pulse.” The length of time each pulse stays on is called the “pulse width.” By varying the pulse width (figure 21), the controller varies motor speed (called “pulse-width modulation”). This allows for precise control of motor speed and allows the motor to compensate for varying load conditions as sensed by the controller. In this case, the controller monitors the static workload on the motor and varies motor rpm in order to maintain constant airflow (cfm).

The motor is equipped with 11 incremental taps which are driven by the integral controller. The controller is capable of controlling three of the 11 taps.

The motor controller is driven by the VSP2-1, VSP3-1 or two-stage variable speed SureLight control. The control receives its demand (PWM signal or fixed 24 VAC or VDC signal) from optional controls such as the Harmony zone control system, Efficiency Plus Humidity Control (CCB1) or a conventional thermostat.

Motor rpm is continually adjusted internally to maintain constant static pressure against the blower wheel. The controller monitors the static work load on the motor and motor amp-draw to determine the amount of rpm adjustment. Blower rpm may be adjusted any amount in order to maintain a constant cfm as shown in Blower Ratings Tables. The amount of adjustment is determined by the incremental taps which are used and the amount of motor loading sensed internally. The cfm remains relatively stable over a broad range of static pressure. Since the blower constantly adjusts rpm to maintain a specified cfm, motor rpm is not rated. Hence, the terms “blower speed” and “speed tap” in this manual, on the unit wiring diagram and on blower B3 refer to blower cfm regardless of motor rpm.

When Harmony is used, speed taps are overridden and a PWM signal generated by the Harmony controller continuously varies motor speed based upon zone demands.

Initial Power Up

When line voltage is applied to B3, there will be a large inrush of power lasting less than 1/4 second. This inrush charges a bank of DC filter capacitors inside the controller. If the disconnect switch is bounced when the disconnect is closed, the disconnect contacts may become welded. Try not to bounce the disconnect switch when applying power to the unit.

Motor Start-Up

When B3 begins start-up, the motor gently vibrates back and forth for a moment. This is normal. During this time the electronic controller is determining the exact position of the rotor. Once the motor begins turning, the controller slowly eases the motor up to speed (this is called “soft-start”). The motor may take as long as 10-15 seconds to reach full speed. If the motor does not reach 200rpm within 13 seconds, the motor shuts down. Then the motor will immediately attempt a restart. The shutdown feature provides protection in case of a frozen bearing or blocked blower wheel. The motor may attempt to start eight times. If the motor does not start after the eighth try, the controller locks out. Reset controller by momentarily turning off power to unit.

The DC filter capacitors inside the controller are connected electrically to the speed tap wires. The capacitors take approximately 5 minutes to discharge when the disconnect is opened. For this reason it is necessary to wait at least 5 minutes after turning off power to the unit before attempting to change speed taps.

⚠ DANGER

Disconnect power from unit and wait at least five minutes to allow capacitors to discharge before attempting to adjust motor speed tap settings. Failure to wait may cause personal injury or death.

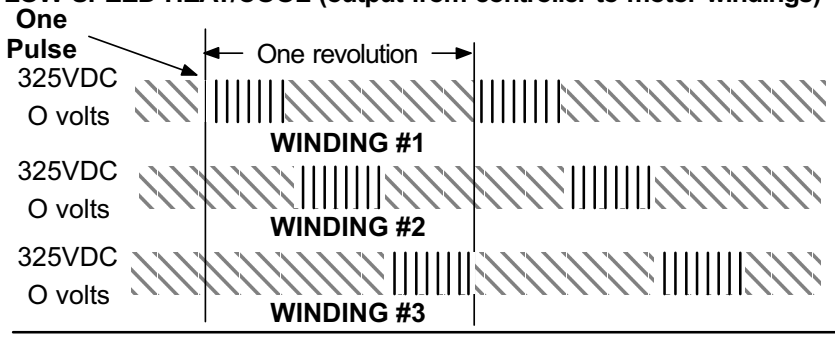
MOTOR SPEED CONTROL WITH D.C. PULSE-WIDTH MODULATION

Motor speed is determined by the size of the electrical pulse sent to the motor windings. The longer the pulse, the faster the motor.

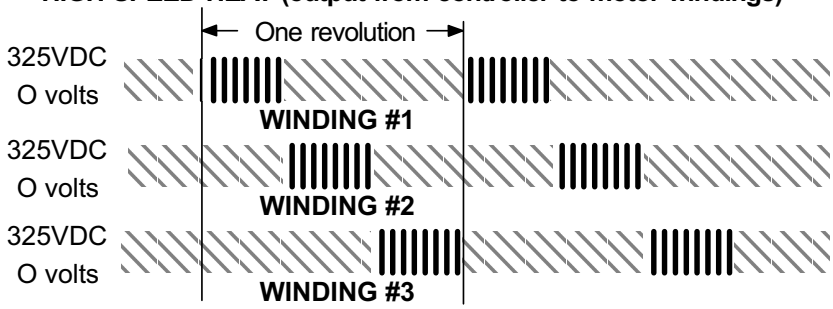
OUTPUT FROM CONTROLLER TO MOTOR WINDINGS	
WINDINGS TURNED OFF	**WINDINGS TURNED ON**
	ON PULSE **OFF PULSE**

The frequency of the pulses to the windings is 20KHz.
DO NOT ATTEMPT TO MEASURE THESE VOLTAGES.

LOW SPEED HEAT/COOL (output from controller to motor windings)



HIGH SPEED HEAT (output from controller to motor windings)



HIGH SPEED COOL (output from controller to motor windings)

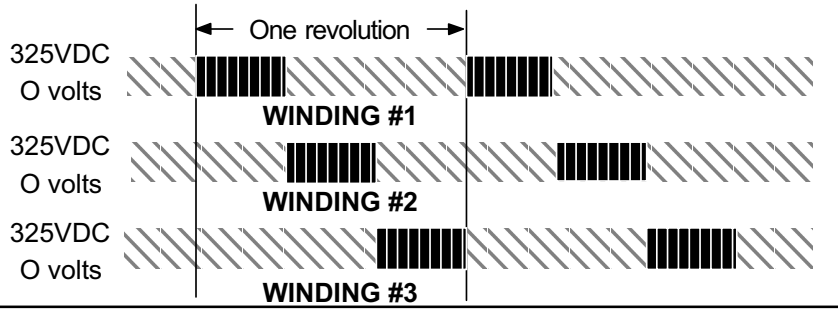


FIGURE 21

External Operation (Speed Tap Priority)

Figure 22 shows the two quick-connect jacks (J48 and J49) which connect the motor to the G32V. Jack J48 is the power plug and jack J49 connects the unit controls to the motor.

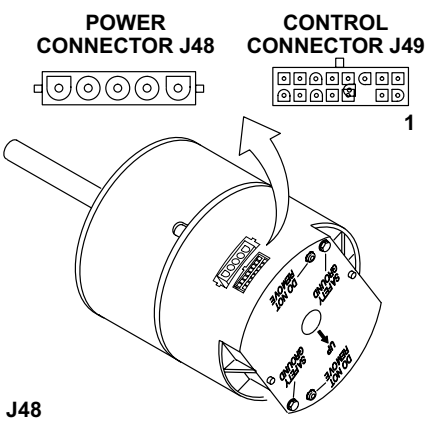
Line voltage must be applied to J48 pin 5 in order for the motor to operate. When using 120VAC pins 1 and 2 must be jumpered. When control voltage is applied to J49 pin 3 and 15 (single stage heating and cooling), the motor is energized on the low speed heat/cool tap.

When voltage is applied to J49 pin 2 in addition to pin 3 and 15 (second stage heating), the blower is energized on the high speed heating tap. When voltage is applied to J49 pin 10 in addition to pin 3 and 15 (second stage cooling), the blower is energized on the high speed cooling tap. The motor assigns priority to J49 pin 2 so that if a call for cooling and a call for heating are concurrent, heating call overrides and the blower operates on high speed heating tap.

ICM2 with VSP3 and Two Stage Variable Speed Control

The ICM2 operates slightly different than stated above when matched with the VSP3 control. When control voltage is applied to J49 pin 3 and 15, the motor is energized on continuous fan. When voltage is applied to J49 pin 2 in addition to pin 3 and 15 (first stage heating), the blower is energized on the low speed heating tap. When voltage is applied to J49 pin 13 in addition to pin 3 and 15 (second stage heating), the blower is energized on the high speed heating tap. The motor assigns priority to J49 pin 2 so that if a call for cooling and a call for heating are concurrent, heating call overrides and the blower operates on high speed heating tap.

BLOWER B3 HARNESS CONNECTORS



J49
PIN 1 - C1
PIN 2 - W / W1
PIN 3 - C2
PIN 4 - Delay
PIN 5 - Cool
PIN 6 - Y1
PIN 7 - Adjust
PIN 8 - 0ut
PIN 9 - 0
PIN 10 - BK / PWM
PIN 11 - Heat
PIN 12 - R
PIN 13 - EM / W2
PIN 14 - Y / Y2
PIN 15 - G
PIN 16 - Out +

J48
PIN 1 - Jumper PIN 1 to PIN2 for 120VAC line input only.
PIN 2 - Jumper PIN 1 to PIN2 for 120VAC line input only.
PIN 3 - Ground
PIN 4 - AC Line
PIN 5 - AC Line

FIGURE 22

⚠ DANGER

Do not attempt to repair electronically controlled blower motor or VSP. There are no field serviceable parts. If either component appears to be faulty after following checkout procedure, replace entire component then recheck for proper operation.

2-Choke Coil (L13)

A choke coil is used on all G32V units. The choke is located on the blower housing and is used to block radio frequency interference.

Precautions

If the G32V or its electronically controlled blower motor is improperly or inadequately grounded, it may cause television interference (commonly known as RFI or radio frequency interference).

This interference is caused by internal switching frequencies of the motor controller. TV interference may show up as small specks or lines which randomly appear on the TV screen accompanied by pops or clicks in the sound. Before attempting any service, make sure the indoor unit is causing the interference. To check, disconnect power to indoor unit then check TV for continued signs of interference.

TV interference may be stopped by making sure the motor is solidly grounded to the cabinet (metal to metal) and by making sure the cabinet is solidly grounded. If TV interference persists, make sure the television (and all affected RF appliances) are moved away from the G32V. Also make sure affected appliances are connected to a separate electrical circuit.

D-Heating Components

1.Flame Sensor

A flame sensor is located on the left side of the burner support. See figure 23. 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 SureLight control allows the gas valve to remain open as long as flame signal is sensed.

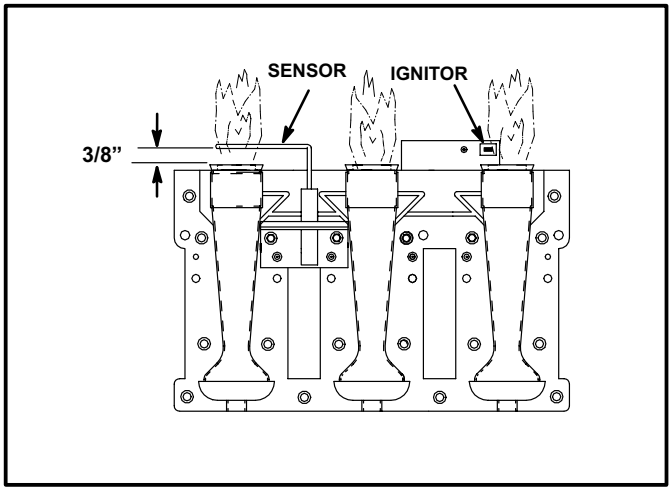


FIGURE 23

NOTE - The G32V furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

2.Combustion Air Inducer (B6)

All G32V units use a two-stage combustion air inducer 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 the SureLight integrated control A92 and the two-stage control board A86. The combustion air inducer operates for 15 seconds before burner ignition (pre-purge) and for 5 seconds after the gas valve closes (post-purge). The combustion air inducer operates on low speed during first-stage heat (low fire), then switches to high speed for second-stage heat (high fire).

3.Primary Limit Control (S10) Figure 24

The primary limit (S10) on G32V 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 de-energizes 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 outside face of the limit.

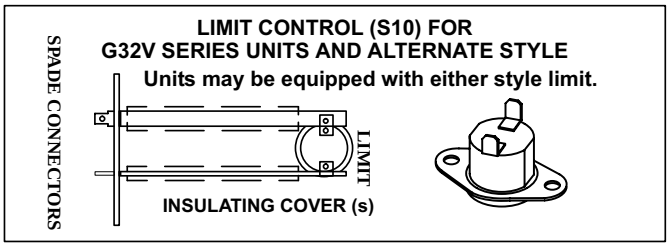


FIGURE 24

4.Flame Rollout Switch (S47)

Flame rollout switch S47 is a SPST N.C. high temperature limit located on the right side of the burner box assembly (see figure 25). S47 is wired to the burner ignition control A92. When S47 senses flame rollout (indicating a blockage in the combustion passages), the flame rollout switch trips, and the ignition control immediately closes the gas valve. Switch S47 in all G32V units is factory preset to open at 200°F ± 12°F (93°C ± 6.7°C) on a temperature rise. All flame rollout switches are manually reset.

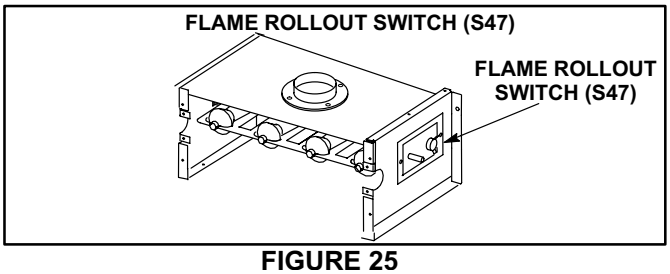


FIGURE 25

5.Burners

All units use inshot burners (see figure 26). Burners are factory set and do not require adjustment. A sight glass is furnished in the burner box assembly for flame viewing. Always operate the unit with the burner box cover in place. Burners can be removed as an assembly for service. Burner maintenance and service is detailed in the MAINTENANCE section of this manual. Each burner uses an orifice which is precisely matched to the burner input (see nameplate for orifice size). The orifice is threaded into the burner manifold. The burner is supported by the orifice and will easily slide off for service. Each orifice and burner are sized specifically to the unit. Refer to Lennox Repair Parts Listing for correct sizing information. A flame retention ring in the end of each burner maintains correct flame length and shape and keeps the flame from lifting off the burner head. In addition, the burner entrance to each clamshell (Figure 2) is fitted with a corbel cup (orifice) used to direct the flow of combustion products.

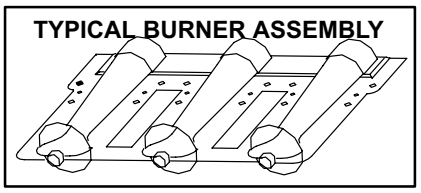


FIGURE 26

6.Gas Valve

The G32V uses gas valves manufactured by White Rodgers or Honeywell. The valves are two-stage internally redundant to assure safety shut-off. If the gas valve must be replaced, the same type valve must be used. The Honeywell valve (figure 27) is adjustable on low fire and high fire and is field convertible for LP. WhiteRodgers supplies two separate valves for natural and LP (figures 28 and 29) . White Rodgers valves are not adjustable on low fire.

24VAC terminals and gas control knob are located on top of the valve. Terminals on the gas valve are connected to wires from the SureLight integrated control and the two-stage control. 24V applied to the terminals energizes the valve.

⚠ IMPORTANT

WhiteRodgers valve is NOT adjustable on low fire. Do not attempt to adjust low fire on WhiteRodgers valve.

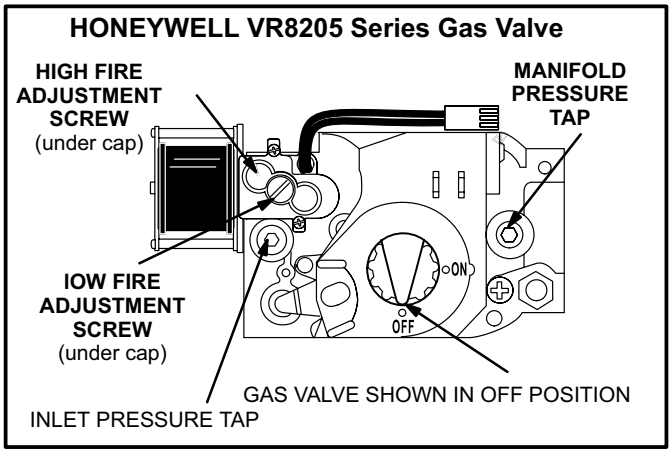


FIGURE 27

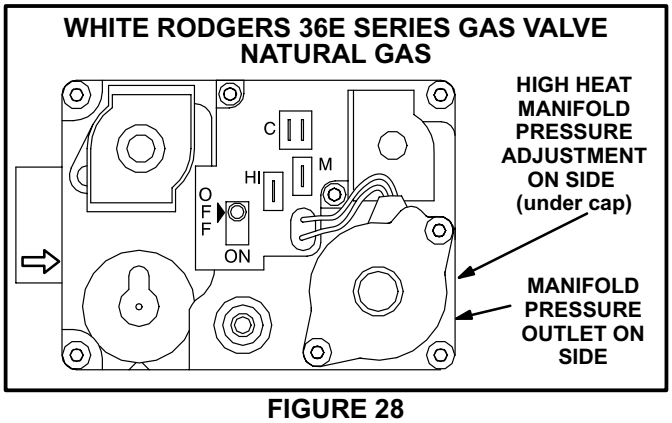


FIGURE 28

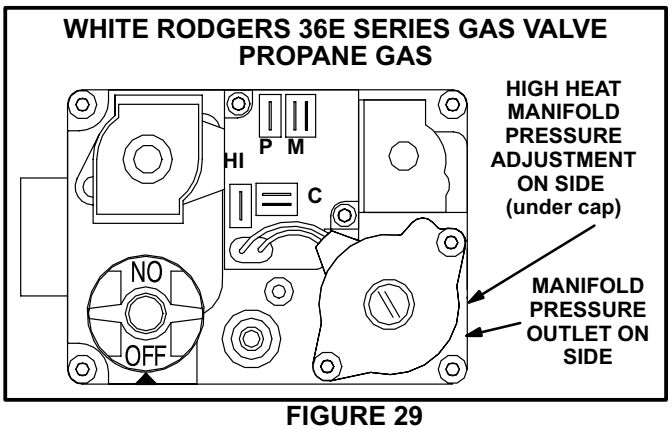
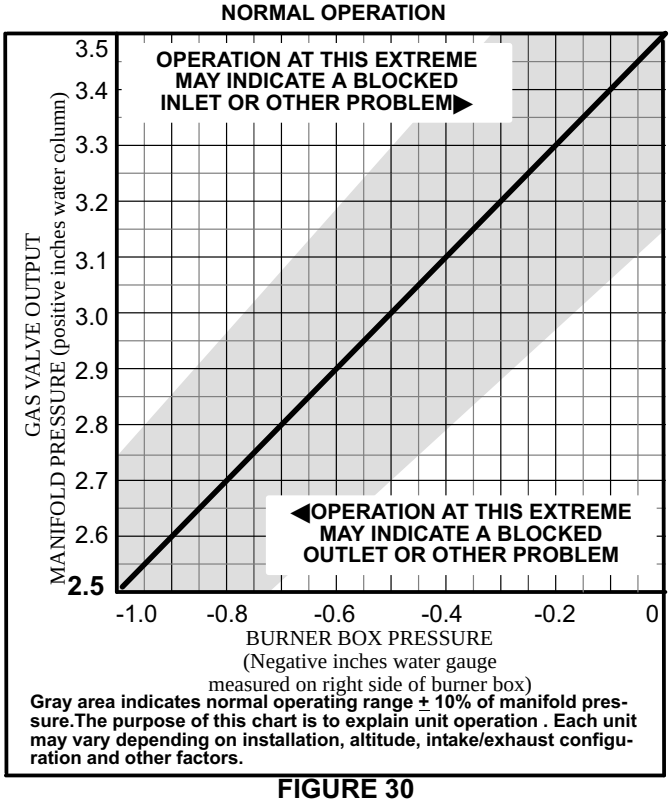


FIGURE 29

100% Sealed Combustion

The burner box is completely sealed and operates under a negative pressure. A pressure hose is connected from the burner box to the gas valve regulator and differential pressure switch. The gas valve senses the pressure in the burner box and changes gas valve output based on changes in burner box pressure. The intent is to compensate for different vent configurations which can greatly affect the rate of the unit.

Figure 30 show how gas valve output changes as burner box pressure changes. Generally, a lower burner box pressure produces a leaner gas/air mixture and a higher burner box pressure produces a richer mixture. Burner box pressure pressure will be between 0" and -1.0". Manifold pressure for natural units should be 3.5" W.C. + or - .30" and 7.0" W.C. + or - .30" for propane units. A procedure showing how to check manifold pressure is shown on page 32.



Gray area indicates normal operating range ± 10% of manifold pressure.The purpose of this chart is to explain unit operation . Each unit may vary depending on installation, altitude, intake/exhaust configuration and other factors.

FIGURE 30

7.Differential Pressure Switch (S102) all units, (S128) G32V-75 units only (Combustion Air Prove Switch)

All G32V series units are equipped with a proving switch S102 located on the vestibule panel.The G32V-75 unit only, is equipped with a second prove switch S128. The switches are connected to the combustion air inducer housing by means of a flexible silicon hose. A separate hose connects the prove switch to the burner box and the gas valve regulator. The silicon hose on S128 will tee into S102. See figure31. The switch monitors air pressure in the combustion air inducer housing and burner box.

Both switches are a single-pole single-throw normally open pressure switch electrically connected in series with the ignition control. The purpose of the switch is to prevent burner operation if the combustion air inducer is not operating. The switch also guards against insufficient combustion air, due to restrictions in the intake and exhaust piping.

On start-up, the switch senses that the combustion air inducer is operating. It closes a circuit to the ignition control when the difference in pressure across the prove switch increases above a particular setting. See table 30. The pressure sensed by the switch is relative to the pressure in the burner box. **In order for the furnace to operate, the larger negative must always be on the combustion air inducer side of the switch. I**f the flue or air inlet become obstructed during operation, the switch senses a loss of pressure differential (drops below set point) and opens the circuit to the ignition control.

The switch is factory set and is not adjustable. It is a safety shut-down control and **MUST** not be bypassed.

Figure 32 shows an example of the pressure differential (.25" W.C.. shown) required to obtain unit operation. If the switch does not successfully sense the required differential, the switch cannot close and the furnace cannot operate.

When measuring the pressure differential, readings should be taken at the prove switch.

TABLE 30

G32V model	Pressure Switch	Pressure Switch Setting in. negative W.C..
75,000 btuh	S102	.40 ± .05
	S128	.20 ± .05
100,000 btuh	S102	.25 ± .05
125,000 btuh	S102	.20 ± .05

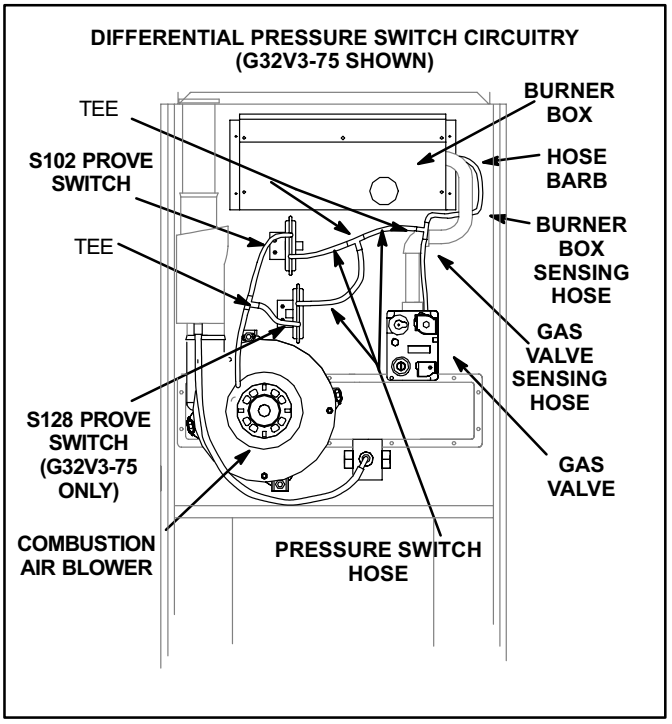


FIGURE 31

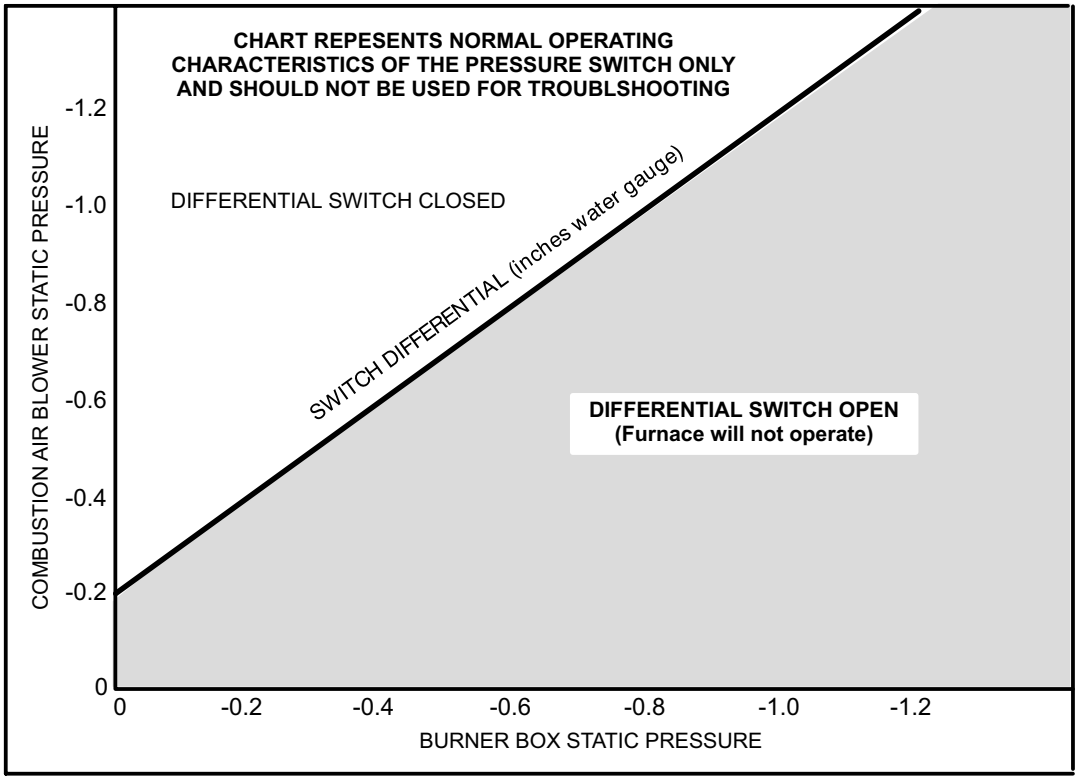


FIGURE 32

Temporarily jumpering the pressure switch when troubleshooting will determine if the pressure switch and furnace are operating properly. However, this may not indicate if the sealed combustion system is operating properly. If the unit cannot attain the required inches differential (see table 30) , the unit will not operate. Be sure to remove jumper when finished. See Warning this page.

⚠ WARNING

Safety Hazard. Turn off gas supply before jumpering switch or testing switch differential. If switch is operating properly and sealed combustion system is operating improperly, a potentially lethal situation will be created when switch is bypassed. DO NOT ALLOW UNIT TO OPERATE WITH SAFETY SYSTEMS BYPASSED.

Checks of pressure differential can be made as an aid in troubleshooting. It is important to remember that the switch must see the required differential in order for the furnace to operate. Lack of differential usually indicates problems in the intake or exhaust piping but may indicate problems in the heat exchanger, condenser coil, header boxes, combustion blower or other components. Generally, if both readings are closer to zero (figure 32) the unit may have a restricted flue outlet or other problem. If both readings are farther from zero (figure 32) the unit may have a restricted flue inlet or other problem.

Measuring pressure differential

The differential pressure is the difference in pressure measured on either side of the pressure switch:

1 - Remove thermostat demand and allow to cycle off.
2 - Disconnect hose from left side of pressure switch and install Tee as shown in figure 33.

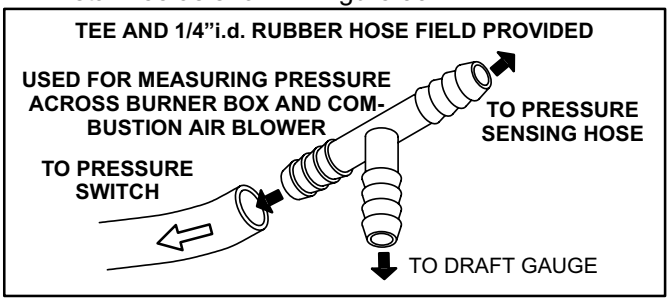


FIGURE 33

3 - Install draft gauge to open end of Tee.
4 - Operate unit and observe draft gauge reading. *Readings will change as heat exchanger warms.*
a. Take one reading immediately after startup.
b. Take a second reading after unit has reached steady state (approximately 5 minutes).
5 - Remove thermostat demand and allow to cycle off.
6 - Remove draft gauge and Tee. Reinstall combustion air sensing hose to left side of pressure switch.
7 - Disconnect hose from right side of pressure switch and install Tee as shown in figure 33.
8 - Install draft gauge to open end of Tee.

9 - Operate unit and observe draft gauge reading. *Readings will change as heat exchanger warms.*
a. Take one reading immediately after startup.
b. Take a second reading after unit has reached steady state (approximately 5 minutes). Both readings should fall above the line shown in figure 32.

10- Compare readings to figure 32. Be sure to compare only like readings (compare startup reading to startup reading, then compare steady state reading to steady state reading). Subtract the absolute steady state readings from one another. This will be the pressure differential. **In order for the furnace to operate, the larger negative must always be on the combustion air blower side of the switch.**
Example - one side of the pressure switch reads .60" and the other side of the pressure switch reads .10". Pressure differential is .60" - .10"= .50"

The pressure differential should be greater than the settings in table 30.

11- When test is complete, remove thermostat demand and allow unit to cycle off.

12- Remove draft gauge and Tee. Reinstall pressure switch sensing hose to left side of pressure switch.

If pressure switch does not close at start up or differential is less than set point the following should be checked.

1 - Restriction in exhaust and or intake vent.
2 - Pressure switch lines are routed correctly and for damage.
3 - Condensate in pressure switch lines.
4 - Wiring of pressure switch to furnace.
5 - Blocked heat exchanger or leak in heat exchanger.

II-PLACEMENT AND INSTALLATION

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

A-PVC Joint Cementing Procedure

⚠ WARNING

DANGER OF EXPLOSION! Fumes from PVC glue may ignite during system check. Remove spark plug wire from ignition control before 120V power is applied. Reconnect wire after two minutes.

1 - Measure and cut vent pipe to desired length.
2 - Debur and chamfer end of pipe, removing any ridges or rough edges. If end is not chamfered, edge of pipe may remove cement from fitting socket and result in a leaking joint.
3 - Clean and dry surfaces to be joined.
4 - Test fit joint and mark depth of fitting on outside of pipe.
5 - Uniformly apply liberal coat of PVC primer for PVC or ABS cleaner for ABS for at least 5 to 15 seconds to inside socket surface of fitting and male end of pipe to depth of fitting socket. Remove puddles of primer before applying cement.
6 - Promptly apply solvent cement to end of pipe and inside socket surface of fitting. Cement should be applied lightly but uniformly to inside of socket. Take care to keep excess cement out of socket. Apply second coat to end of pipe.

NOTE-Time is critical at this stage. Do not allow primer to dry before applying cement.

7 - Immediately after applying last coat of cement to pipe, and while both inside socket surface and end of pipe are wet with cement, forcefully insert end of pipe into socket until it bottoms out. Turn pipe 1/4 turn during assembly (but not after pipe is fully inserted) to distribute cement evenly. Once joint is made, PVC may swell. Hold joint together until bonded (approximately 20 seconds).

NOTE-Assembly should be completed within 20 seconds after last application of cement. Hammer blows should not be used when inserting pipe.

8 - After assembly, wipe excess cement from pipe at end of fitting socket. A properly made joint will show a bead around its entire perimeter. Any gaps may indicate a defective assembly due to insufficient solvent.
9 - Handle joints carefully and support properly until completely set.

B-Venting Considerations

The thickness of construction through which vent/air intake pipes may be installed is 24" (610mm) maximum and 3" (76mm) minimum. If a G32V furnace replaces a furnace which was commonly vented with another gas appliance, the size of the existing vent pipe for that gas appliance must be checked. Without the heat of the original furnace flue products, the existing vent pipe may be oversized for the single water heater or other appliance. The vent should be checked for proper draw with the remaining appliance.

⚠ CAUTION

Insufficient combustion air can cause headaches, nausea, dizziness or asphyxiation. Excessive exposure to contaminated combustion air will result in safety and performance related problems. Avoid exposure to the following substances in the combustion air supply:
Permanent wave solutions;
Chlorinated waxes and cleaners;
Chlorine base swimming pool chemicals;
Water softening chemicals;
De-icing salts or chemicals;
Carbon tetrachloride;
Halogen type refrigerants;
Cleaning solvents (such as perchloroethylene);
Printing inks, paint removers, varnishes, etc.;
Hydrochloric acid;
Cements and glues;
Antistatic fabric softeners for clothes dryers; and
Masonry acid washing materials.

Intake Piping

1 - Cement intake piping in slip connector located at top of unit.

2 - Route piping to outside of structure. Continue with installation following instructions given in exhaust and intake piping termination section.

Exhaust Piping

1 - Cement exhaust piping into flue collar socket located on the left side of the top cap.

2 - All horizontal runs of exhaust pipe must slope back toward unit. A minimum of 1/4" (6mm) drop for each 12" (305mm) of horizontal run is mandatory for drainage. Horizontal runs of exhaust piping must be supported every 5 ft. (1.52m) using hangers for schedule 40 pipe. All other pipe must be supported every 3 ft. (.91m).

NOTE - Exhaust piping should be checked carefully to make sure there are no sags or low spots.

NOTE - Exhaust piping must be insulated with 1/2" (13mm) Armaflex or equivalent when run through unheated space. Do not leave any area of exhaust pipe open to outside air; exterior exhaust must be insulated with 1/2" (13mm) Armaflex or equivalent.

⚠ CAUTION

Do not discharge exhaust into an existing stack or stack that also serves another gas appliance. If vertical discharge through an existing unused stack is required, insert PVC pipe inside the stack until the end is beyond the top or outlet end of the metal stack.

⚠ CAUTION

The exhaust vent pipe operates under positive pressure and must be completely sealed to prevent leakage of combustion products into the living space.

Removal of Unit from Common Venting System

In the event that an existing furnace is removed from a venting system commonly run with separate gas appliances, the venting system may be too large to properly vent the remaining attached appliances. The following test should be conducted while all appliances (both in operation and those not in operation) are connected to the common venting system. If the venting system has been installed improperly, corrections must be made as outlined in the previous section.

1 - Seal any unused openings in the common venting system.

2 - Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.

3 - Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.

4 - Follow the lighting instruction. Place the appliance being inspected in operation. Adjust thermostat so appliance will operate continuously.

5 - Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use a draft gauge or the flame of match or candle, or smoke from a cigarette, cigar.

6 - After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use.

7 - If improper venting is observed during any of the above tests, the common venting system must be corrected. The common venting system should be re-sized to approach the minimum size as determined by using the appropriate tables in appendix G in the current standards of the National Fuel Gas Code ANSI Z223-1 in the U.S.A., and the appropriate Category 1 Natural Gas and Propane appliances venting sizing tables in the current standards of the CAN/CGA-B149.1 and .2 in the Natural Gas and Propane Installation Code in Canada.

Intake and Exhaust Piping Terminations

Intake and exhaust pipes may be routed either horizontally through an outside wall or vertically through the roof. In attic or closet installations, vertical termination through the roof is preferred. Figures 34 through 46 show typical terminations.

1 - Use recommended piping materials for both intake and exhaust piping.

2 - Secure all joints, including drain leg, gas tight using approved primer and cement.

3 - Piping diameters should be determined according to length of pipe run. See vent pipe specifications on page 6. Locate intake piping upwind (prevailing wind) from exhaust piping. To avoid re-circulation of exhaust gas on roof terminations, end of exhaust pipe must be higher than intake pipe.

Exhaust and intake exits must be in same pressure zone. Do not exit one through the roof and one on the side. Also, do not exit the intake on one side and the exhaust on another side of the house or structure.

4 - Intake and exhaust pipes should be placed as close together as possible at termination end (refer to illustrations). Maximum separation is 3" (76mm) on roof terminations and 6" (152mm) on side wall terminations.

5 - Exhaust piping must terminate straight out or up as shown. In rooftop applications, a 2" X 1-1/2" reducer for 2" venting, 3" x 2" reducer for 3" venting must be used on the exhaust piping after it exits the structure to improve the velocity of exhaust away from the intake piping.

On roof terminations, the intake piping should terminate straight down using two 90° elbows (See figure 34).

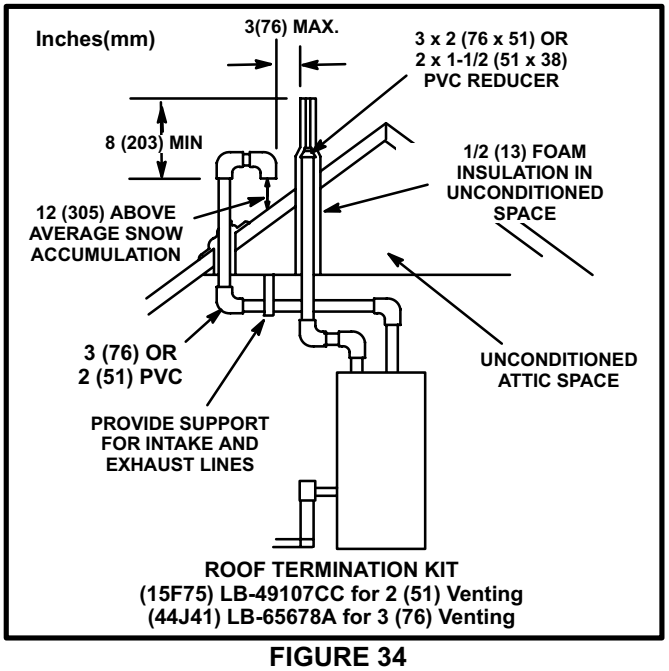


FIGURE 34

⚠ IMPORTANT

Do not use screens or perforated metal in intake and exhaust terminations. Doing so will cause freeze-ups and may block the terminations.

NOTE - If winter design temperature is below 32° F (0° C), exhaust piping must be insulated with 1/2" (13mm), Armaflex or equivalent when run through unheated space. Do not leave any surface area of exhaust pipe open to outside air; exterior exhaust pipe must be insulated with 1/2" (13mm) Armaflex or equivalent. In extreme cold climate areas, 3/4" (19mm) Armaflex or equivalent is recommended. Insulation on outside runs of exhaust pipe must be painted or wrapped to protect insulation from deterioration.

NOTE - During extremely cold temperatures, below approximately 20° F (6.67° C), units with long runs of vent pipe through unconditioned space, even when insulated, may form ice in the exhaust termination that prevents the unit from operating properly. Longer run times of at least 5 minutes will help to alleviate most icing problems. Also, a heating cable may be installed on exhaust piping and termination to prevent freeze-ups. Heating cable installation kit is available from Lennox. See Condensate Piping section for part numbers.

NOTE - Care must be taken to avoid re-circulation of exhaust back into intake pipe.

6 - On field supplied terminations for side wall exits, exhaust piping should extend a minimum of 12" (305mm) beyond the outside wall. Intake piping should be as short as possible. See figure 35.

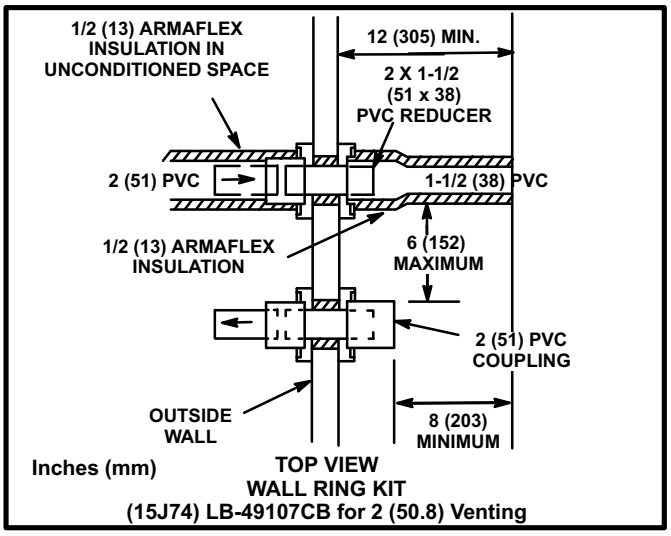


FIGURE 35

7 - On field supplied terminations, a minimum separation distance between the end of the exhaust pipe and the end of the intake pipe is 8” (203mm).

8 - If intake and exhaust piping must be run up a side wall to position above snow accumulation or other obstructions, piping must be supported every 3 ft. (.91m) as shown in figure 41. Refer to figures 39 and 40 for proper piping method. WTK wall termination kit must be extended for use in this application. See figure 44 or use kit WTKX shown in figure 45. When exhaust and intake piping must be run up an outside wall, the exhaust piping is reduced to 1-1/2” (38mm) after the final elbow. The intake piping may be equipped with a 90° elbow turndown. Using turndown will add 5ft. (1.5m) to the equivalent length of the pipe.

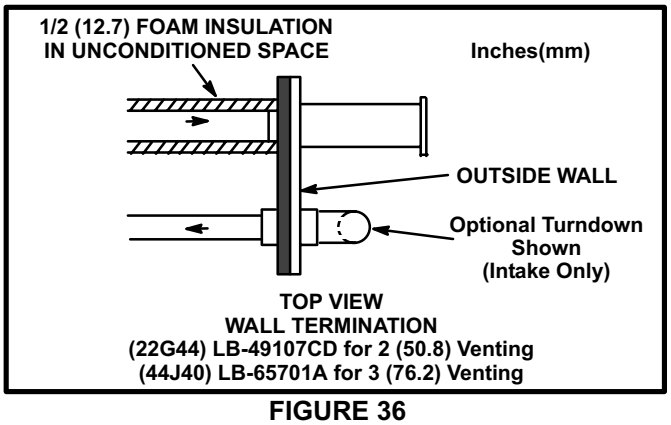


FIGURE 36

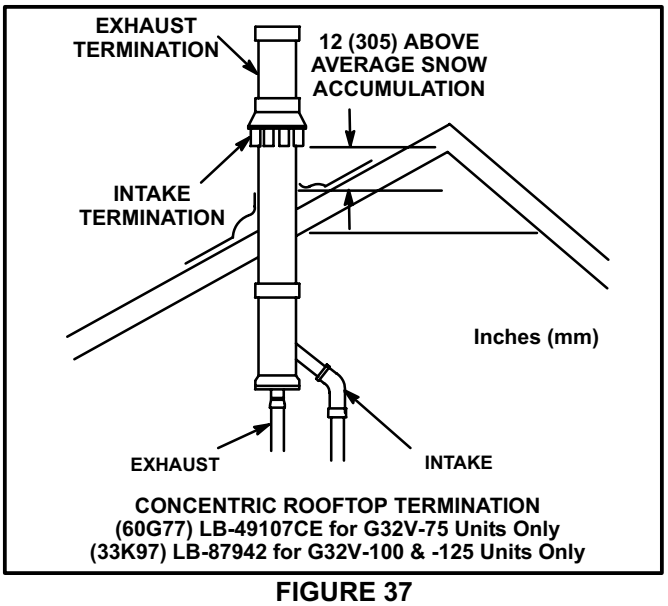


FIGURE 37

⚠ IMPORTANT

For Canadian Installations Only:
In accordance to CAN/CGA-B149.1 and .2, the minimum allowed distance between the combustion air intake inlet and the exhaust outlet of other appliances shall not be less than 12” (305mm).

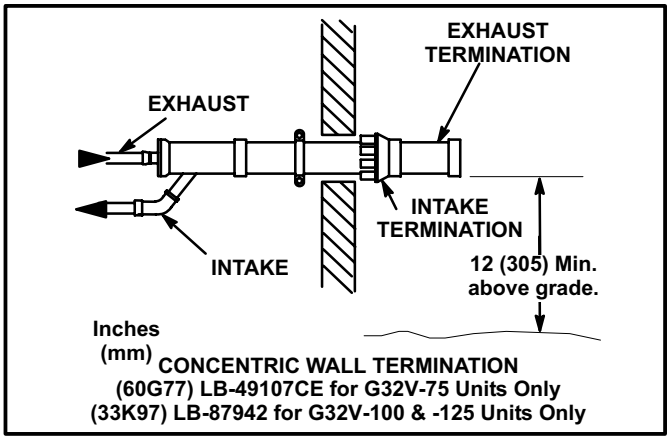


FIGURE 38

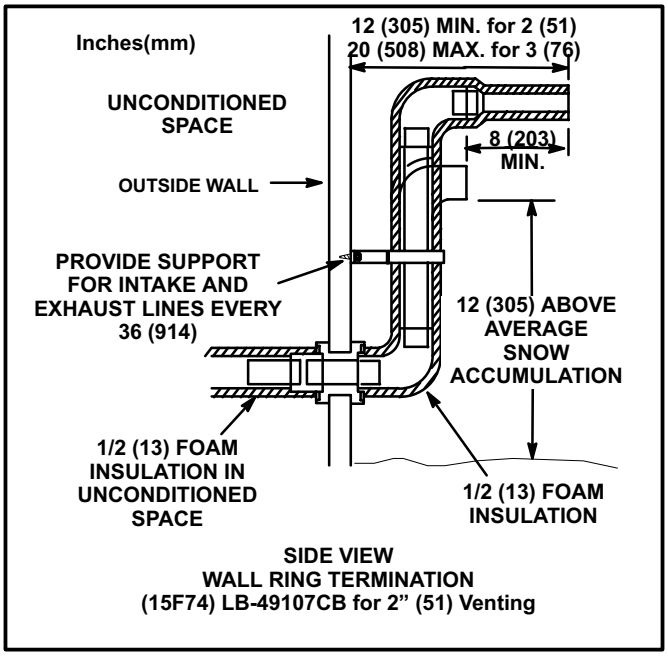


FIGURE 39

9 - Position termination ends so they are free from any obstructions and above the level of snow accumulation (where applicable). Termination ends must be a minimum of 12” (305mm) above grade level. Do not point into window wells, stairwells, alcoves, courtyard areas or other recessed areas. Do not position termination ends closer than 12” below roof eaves or above a walkway. Since the G32V is a certified direct vent, Category IV gas furnace, the location of the termination is limited by building codes. In the absence of local codes, refer to the current National Fuel Gas Code ANSI Z223-1 in U.S.A., and current standards CAN/CGA-B149.1 /.2 of

the Natural Gas and Propane Installation Instructions in Canada for details. The termination should be at least 12" (305mm) from any opening through which flue products could enter the building.

When horizontally vented, minimum clearance for termination from electric meters, gas meters, regulators and relief equipment is 4 ft. (1.2m) for US installations. Refer to the current CAN/CGA-B149.1 and .2 for installations in Canada or with authorities having local jurisdiction.

At vent termination, care must be taken to maintain protective coatings over building materials (prolonged exposure to exhaust condensate can destroy protective coatings). It is recommended that the exhaust outlet not be located within 6 feet (1.8m) of a condensing unit because the condensate can damage the painted coating.

⚠ IMPORTANT

Combustion air intake inlet and exhaust outlet should not be located within 6 ft. (1.8m) of dryer vent or combustion air inlet or outlet of another appliance. Piping should not exit less than 3 ft. (.91m) from opening into another building.

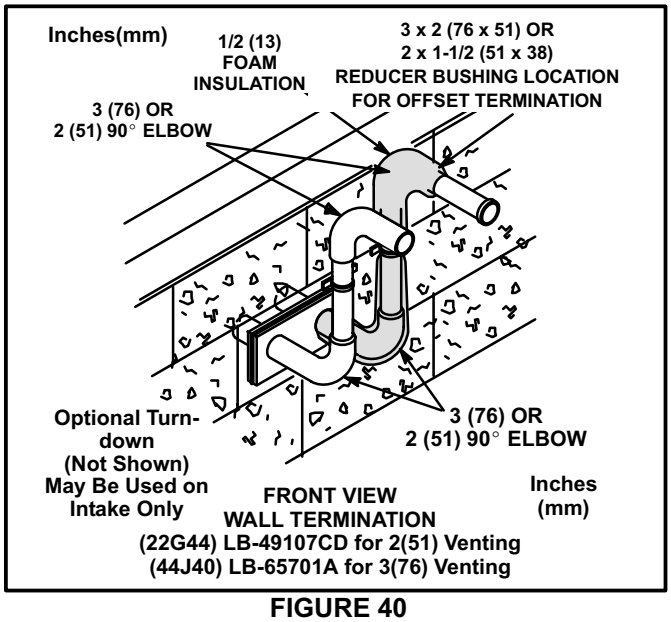


FIGURE 40

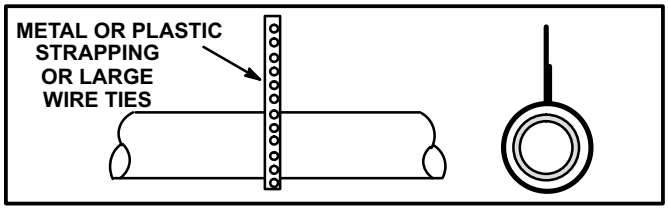


FIGURE 41

10- Suspend piping using hangers at a minimum of every 5 feet (1.52m) for schedule 40 PVC and every 3 feet (.91m) for ABS-DWV, PVC-DWV, SPR-21 PVC, and SDR-26 PVC piping. A suitable hanger can be fabricated by using metal or plastic strapping or a large wire tie.

11- In areas where piping penetrates joists or interior walls, hole must be large enough to allow clearance on all sides of pipe through center of hole using a hanger.

12- Isolate piping at the point where it exits the outside wall or roof.

13- When furnace is installed in a residence where unit is shut down for an extended period of time, such as a vacation home, make provisions for draining condensate collection trap and lines.

14- Based on the recommendation of the manufacturer, a multiple furnace installation may use a group of up to four termination kits WTK assembled together horizontally, as shown in figure 43.

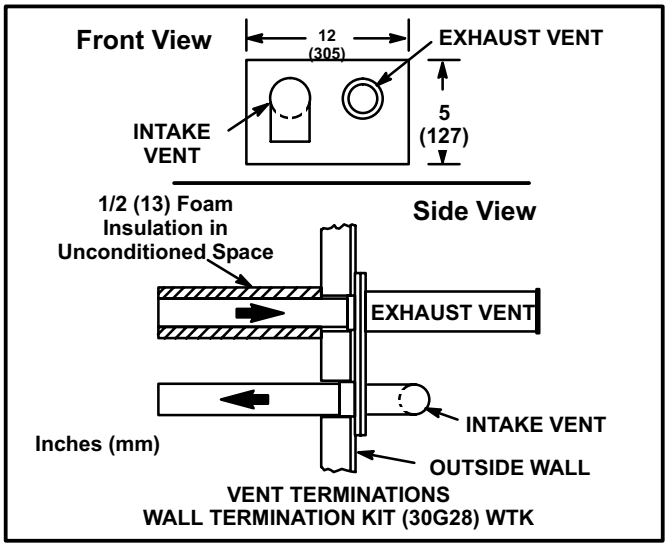
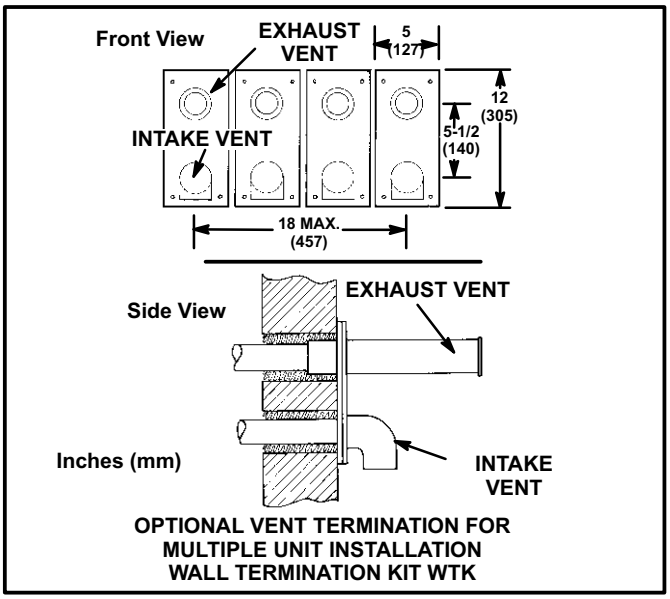
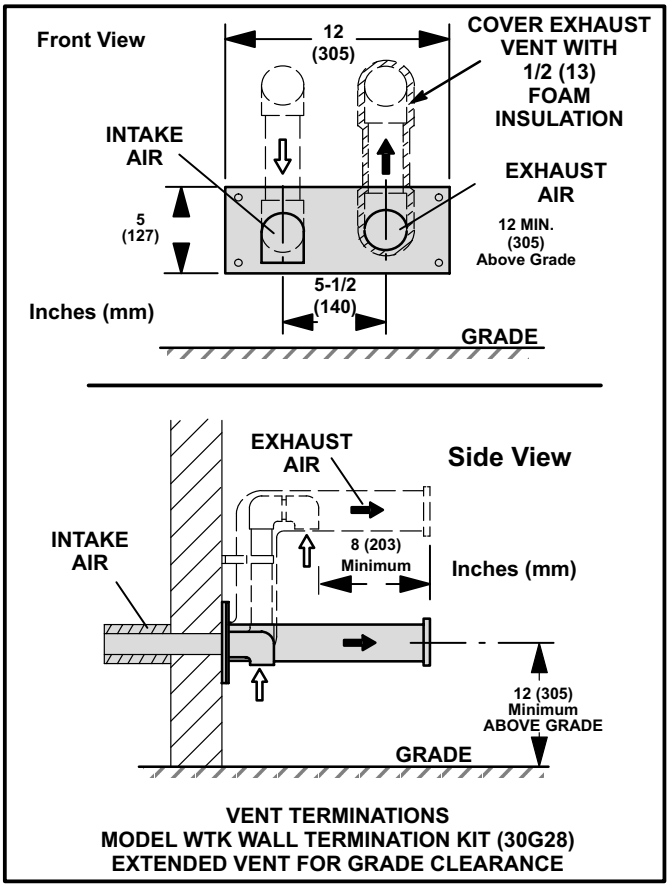


FIGURE 42



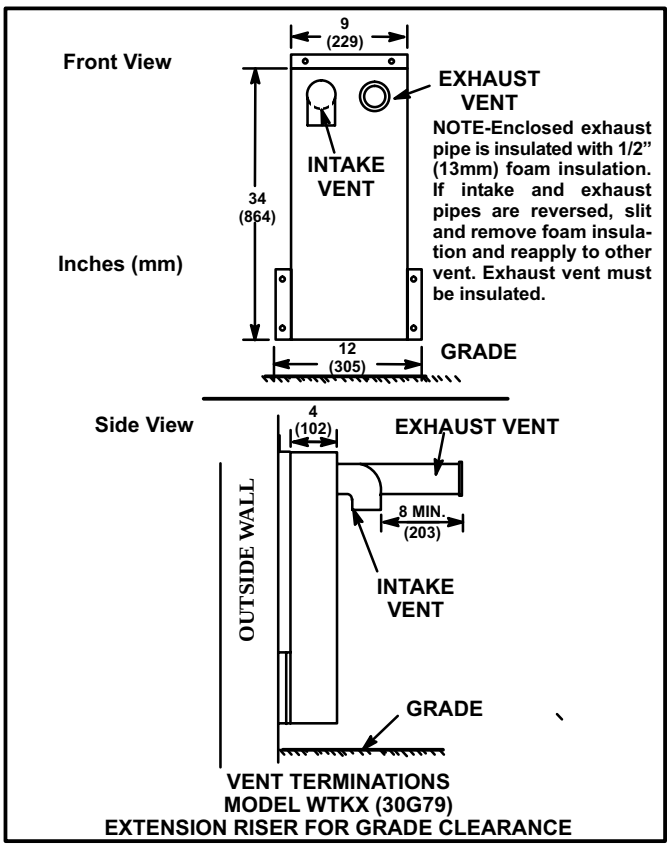
OPTIONAL VENT TERMINATION FOR MULTIPLE UNIT INSTALLATION WALL TERMINATION KIT WTK

FIGURE 43



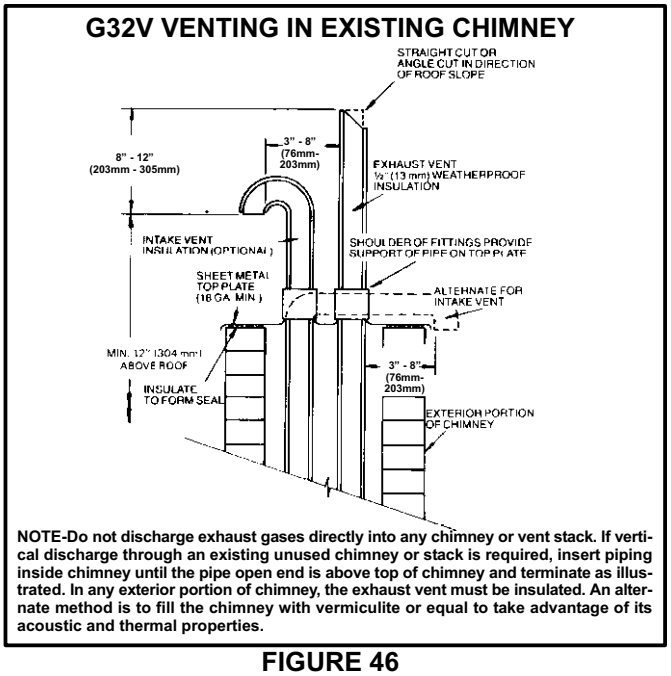
VENT TERMINATIONS
MODEL WTK WALL TERMINATION KIT (30G28)
EXTENDED VENT FOR GRADE CLEARANCE

FIGURE 44



VENT TERMINATIONS
MODEL WTKX (30G79)
EXTENSION RISER FOR GRADE CLEARANCE

FIGURE 45



NOTE-Do not discharge exhaust gases directly into any chimney or vent stack. If vertical discharge through an existing unused chimney or stack is required, insert piping inside chimney until the pipe open end is above top of chimney and terminate as illustrated. In any exterior portion of chimney, the exhaust vent must be insulated. An alternate method is to fill the chimney with vermiculite or equal to take advantage of its acoustic and thermal properties.

FIGURE 46

Condensate Piping

This unit is designed for either right- or left-side exit of condensate piping. Condensate drain line should be routed only within the conditioned space to avoid freezing of condensate and blockage of drain line. An electric heat cable should be used where condensate drain is exposed to unconditioned areas. The following procedure is for all G32V units.

1 - Determine which side condensate will exit the unit.

2 - Connect 1/2" (13mm) plastic pipe plug (provided) in the unused end of the condensate trap. Install plug so that it is sealed water tight yet able to be removed. Do not permanently seal the connection. Teflon tape is recommended to seal joint. See figure 47.

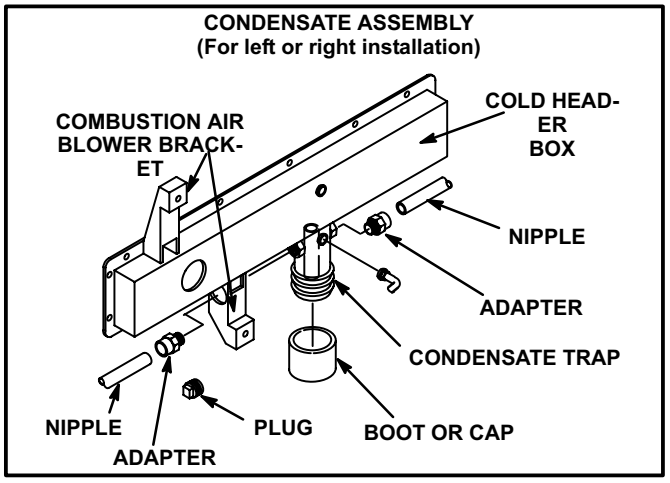


FIGURE 47

3 - Use the provided adapter (1/2" PVC x 1/2" MPT) and the nipple (1/2" PVC) to carry drainage outside the cabinet. If a field substitute is needed, 1/2" CPVC x 1/2" MPT adapter and 1/2" CPVC is acceptable for use.

4 - Glue nipple to the adapter using the procedures outlined in the "Joint Cementing Procedures" section. The nipple/adapter assembly should be connected in a non-permanent manner and must be water tight. Teflon tape is recommended to seal the joint.

For Right-Hand Side Condensate Exit:

Install the nipple/adapter assembly from the outside of the cabinet and insert the adapter into the threaded opening in the condensate trap.

For Left-Hand Side Condensate Exit:

Insert nipple/adapter assembly from the left hand side of the cabinet and through the combustion air blower mounting structure into the threaded opening in the condensate trap.

5 - Connect field supplied plumbing to nipple and route to open drain. Plumbing should be vented to a point higher than the condensing coil. See figure 48.

⚠ CAUTION

Do not use copper tubing or existing copper condensate lines for drain line.

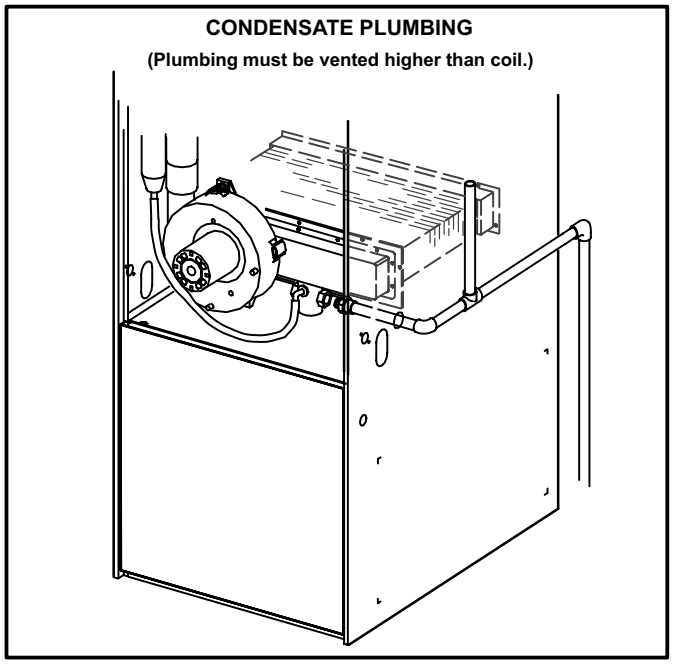


FIGURE 48

6 - Connect condensate drain line (1/2" [13mm] SDR 11 plastic pipe or tubing) to condensate connection on condensate trap assembly and route to open drain. Condensate line must be sloped downward away from condensate trap to thedrain. If drain level is above condensate outlet, use a condensate pump to pump condensate to the higher level. Condensate drain line should be routed within the conditioned space to avoid freezing of condensate and blockage of drain line. If this is not possible, a heat cable kit may be used on the condensate trap and condensate line. Heating cable kit is available from Lennox in various lengths; 6ft. (1.8m) - kit no. **18K48**; 24ft. (7.3m) - kit no. **18K49**; and 50ft. (15.2m) - kit no. **18K50**.

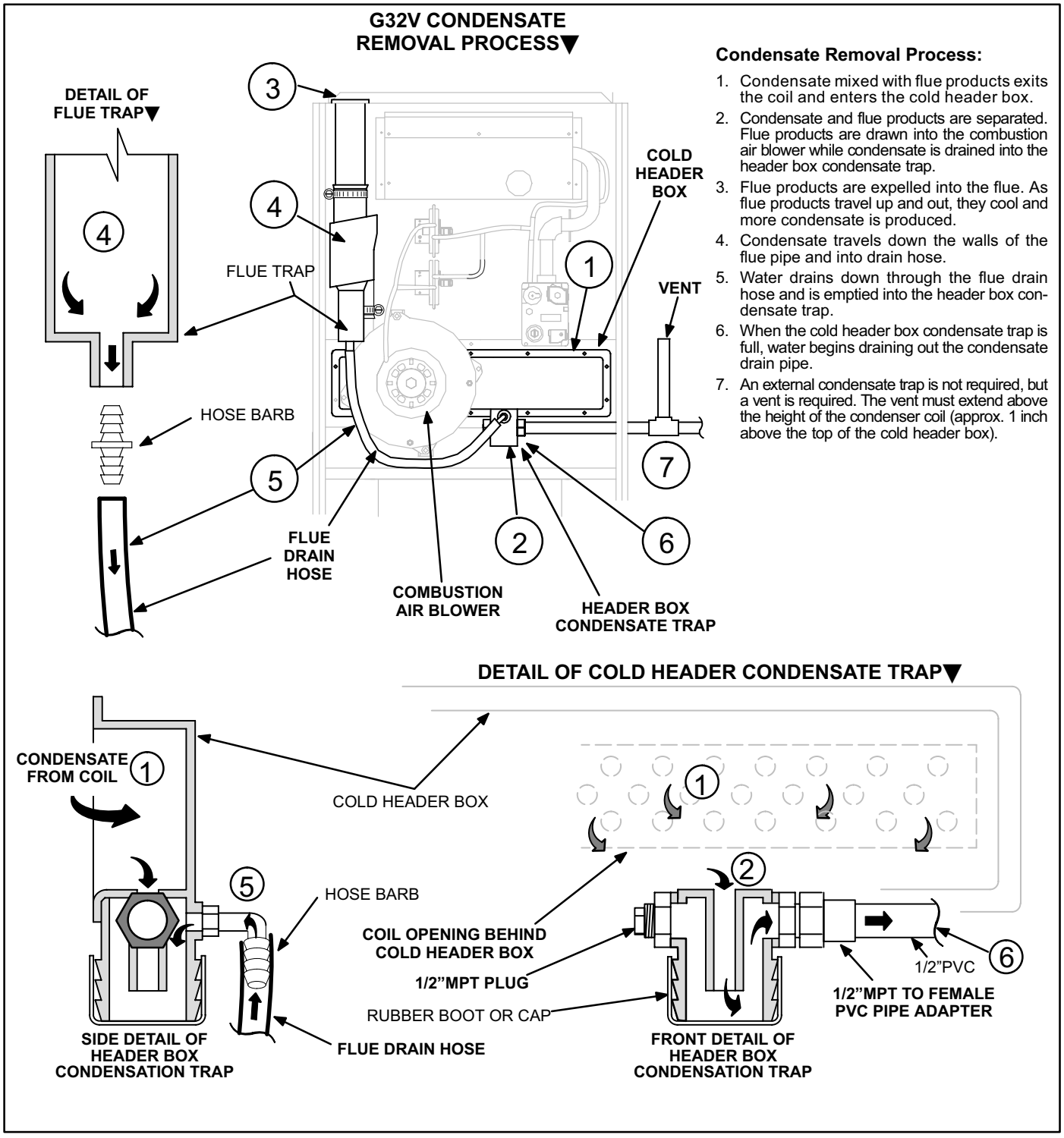

G32V CONDENSATE REMOVAL PROCESS▼
DETAIL OF FLUE TRAP▼
3
4
4
FLUE TRAP
COLD HEADER BOX
1
VENT
HOSE BARB
5
7
2
6
FLUE DRAIN HOSE
COMBUSTION AIR BLOWER
HEADER BOX CONDENSATE TRAP
Condensate Removal Process:
1. Condensate mixed with flue products exits the coil and enters the cold header box.
2. Condensate and flue products are separated. Flue products are drawn into the combustion air blower while condensate is drained into the header box condensate trap.
3. Flue products are expelled into the flue. As flue products travel up and out, they cool and more condensate is produced.
4. Condensate travels down the walls of the flue pipe and into drain hose.
5. Water drains down through the flue drain hose and is emptied into the header box condensate trap.
6. When the cold header box condensate trap is full, water begins draining out the condensate drain pipe.
7. An external condensate trap is not required, but a vent is required. The vent must extend above the height of the condenser coil (approx. 1 inch above the top of the cold header box).
DETAIL OF COLD HEADER CONDENSATE TRAP▼
CONDENSATE FROM COIL
1
COLD HEADER BOX
1
5
HOSE BARB
2
COIL OPENING BEHIND COLD HEADER BOX
1/2"MPT PLUG
RUBBER BOOT OR CAP
1/2"PVC
6
1/2"MPT TO FEMALE PVC PIPE ADAPTER
FLUE DRAIN HOSE
SIDE DETAIL OF HEADER BOX CONDENSATION TRAP
FRONT DETAIL OF HEADER BOX CONDENSATION TRAP

FIGURE 49

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.

3 - Inspect condition of condensate traps and drain assembly. Disassemble and clean seasonally.

B-Heating Start-Up

FOR YOUR SAFETY READ BEFORE LIGHTING

⚠ CAUTION

Shock and burn hazard.
G32V units are equipped with the SureLight ignition system. Do not attempt to light manually.

⚠ WARNING

Do not use this furnace if any part has been underwater. Inspect the furnace and replace any part of the control system and any gas control which has been under water.

⚠ WARNING

If overheating occurs or if gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off electrical supply.

⚠ CAUTION

Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch.

BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

Use only your hand to turn the gas control switch. Never use tools. If the switch will not turn by hand, do not try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

G32V units are equipped with the SureLight ignition system. DO NOT attempt to manually light burners on this furnace. Each time thermostat calls for heat, burners will be automatically lit. The ignitor does not get hot when there is no call for heat on units with SureLight ignition system.

How To Operate Gas Valve (Figure 50)

⚠ WARNING

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

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 furnace.

4 - This appliance is equipped with an ignition device which automatically lights the burner. Do **not** try to light the burner by hand.

5 - Remove unit access panel.

6 - WhiteRodgers natural valve, move lever to **OFF**. WhiteRodgers propane and Honeywell valve, turn knob to **OFF.** Do not force. See figure 50.

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.

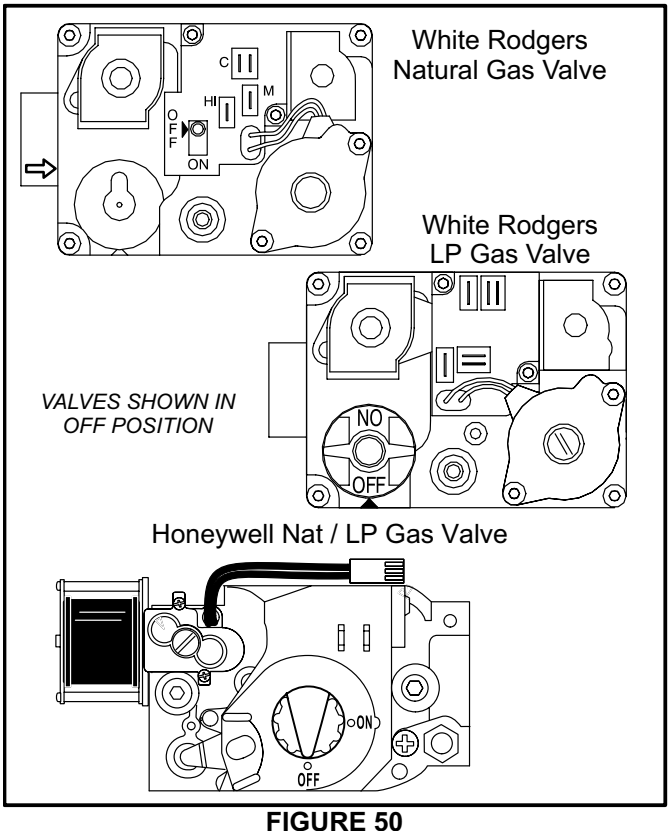


FIGURE 50

8 - WhiteRodgers natural valve, move lever to **ON**. WhiteRodgers propane and Honeywell valve, turn knob 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 - WhiteRodgers natural valve, move lever to **OFF**. WhiteRodgers propane and Honeywell valve, turn knob to **OFF.** Do not force.

5 - Replace access panel.

NOTE-On initial start-ups and when condensate trap is dry, unit may turn itself off and on to allow condensate trap to fill. This is normal operation.

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.

Refer to "Maintenance" section of this manual for instructions on how to prepare condensate assembly for extended period shutdown.

IV-HEATING SYSTEM SERVICE CHECKS

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

All units are A.G.A. and C.G.A. design certified without modifications. Refer to the G32V Operation and Installation Instruction Manual Information.

B-Exhaust CO^2 and CO content

Carbon Dioxide is a colorless and odorless gas produced in small amounts by all furnaces, including the G32V, during combustion process. See table 31 or 32 for CO^2 levels when the unit is properly installed and operating normally. If unit appears to be operating normally at or beyond the upper limit of the CO^2 range, the unit should be checked for abnormally high CO.

CO content will be less than 0.04% (400 PPM) in an air free sample regardless of the firing rate used.

TABLE 31
Natural Gas

G32VUnit	Hi Fire CO^2		Low Fire CO^2	
	Min Vent	Max Vent	Min Vent	Max Vent
75,000	7.4-8.4	7.8-8.8	5.0-6.0	5.4-6.4
100,000	6.9-7.9	7.3-8.3	4.5-5.5	5.6-6.0
125,000	6.9-7.9	7.7-8.7	5.0-6.0	54.-6.4

TABLE 32
Propane Gas

G32VUnit	Hi Fire CO^2		Low Fire CO^2	
	Min Vent	Max Vent	Min Vent	Max Vent
75,000	7.5-8.5	8.2-9.2	5.5-6.5	5.9-6.9
100,000	8.0-9.0	8.5-9.5	5.2-6.2	5.6-6.6
125,000	7.9-8.9	8.4-9.4	5.3-6.3	6.0-7.0

Testing for abnormally high CO^2 and CO.

One method for testing the CO^2/CO content is the Bacharach CO^2 test with the Fyrite CO^2 indicator. Other methods of testing CO^2/CO are available. Closely follow the instructions included in the test kit you choose. Follow the procedure below in order to check CO^2/CO on the G32V furnace.

1 - Drill size "R" or 11/32 in. on the exhaust vent, just exiting the cabinet and tap 1/8-27 NPT. This hole will be used to draw your CO^2/CO sample.

2 - Install a hose barb connector into test hole.

3 - Attach one end of Fyrite sampling tube to hose barb.

4 - Set thermostat to highest setting and allow unit to run 15 minutes.

5 - When CO^2/CO testing is complete, turn off unit, remove hose barb from exhaust vent and use a**1/8" plastic plug (46F4801) to close off port.**

C-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.

D-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 51. 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.

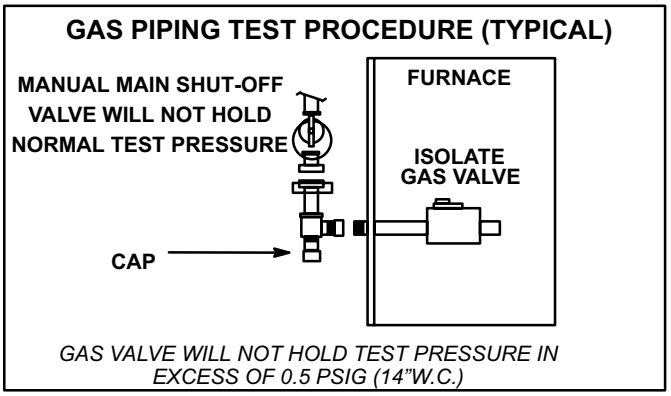


FIGURE 51

⚠ 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 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**.

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

E-Testing Gas Supply Pressure

When testing supply gas pressure, connect test gauge to inlet pressure tap (field provided). Check gas line pressure with unit firing at maximum rate or high fire. Low pressure may result in erratic operation or underfire. High pressure can result in permanent damage to gas valve or overfire. For G32V units, operating pressure at unit gas connection must be between 4.5" W.C. and 13.0" W.C.

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

F-Check Manifold Pressure

⚠ IMPORTANT

WhiteRodgers valve is NOT adjustable on low fire. Do not attempt to adjust low fire on WhiteRodgers valve.

Manifold *Operating* Pressure is the manifold pressure measured during normal operation (sensing burner box pressure). Manifold *Absolute* Pressure is the manifold pressure measured when the gas valve regulator is operating at factory preset level (sensing atmospheric pressure).

After line pressure has been checked and adjusted, check manifold absolute pressure. Move pressure gauge to outlet pressure tap located on unit gas valve (GV1). Checks of manifold absolute pressure are made as verification of proper regulator adjustment.

Manifold operating pressure for the G32V can be measured at any time the gas valve is open and is supplying gas to the unit. For natural gas units, normal manifold absolute pressure for high fire is 3.5 in. W.C. (see figure 30 for changes due to burner box pressure). and 1.7 in. W.C. for low fire. For propane units, normal manifold absolute pressure for high fire is 7.5 in. W.C. and 3.5 in. W.C for low fire. See tale below.

⚠ 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.

The gas valve is factory set and should not require adjustment. Also, gas valve regulation varies with burner box pressure (figure 30).

Manifold Absolute Pressure Measurement and Adjustment

1 - Connect test gauge to outlet tap on gas valve.
2 - Disconnect pressure sensing hose from gas valve and plug hose. Leave hose barb on valve open to atmosphere. See figure 52.
3 - Start unit on high fire and allow 5 minutes for unit to reach steady state.

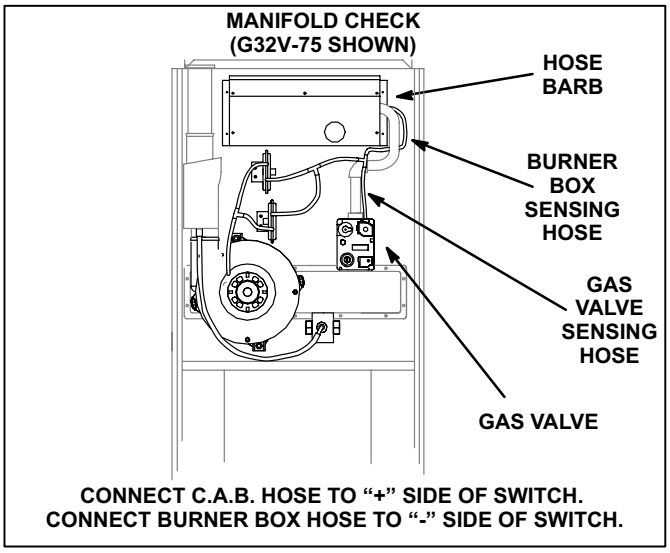


FIGURE 52

4 - 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.
5 - After allowing unit to stabilize for 5 minutes, record manifold pressure. Manifold pressure should read 3.5"W.C. + or - 0.3 W.C. for natural gas units and 7.5" W.C + or - 0.3" W.C for propane gas units. Regulator cap must be installed when reading pressures.

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

NOTE-During this test procedure, the unit will be overfiring:

- *Operate unit only long enough to obtain accurate reading to prevent overheating heat exchanger.*
- *Attempts to clock gas valve during this procedure will be inaccurate. Measure gas flow rate only during normal unit operation.*

6 - When test is complete remove obstruction from hose and return hose to gas valve barb.

⚠ 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.

G- 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 33 below.

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

TABLE 33

GAS METER CLOCKING CHART				
G32V Unit	Seconds for One Revolution			
	Natural		LP	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft DIAL
-75	48	96	120	240
-100	36	72	90	180
-125	29	58	72	144
Natural-1000 btu/cu ft LP-2500 btu/cu ft				

H-High Altitude Derate

See specifications section in this manual for manifold pressure settings for installations at altitudes from 0 to 7500ft. (0 to 2286m).

⚠ 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.

I-Flame Signal

A microamp DC meter is needed to check the flame signal on the SureLight control. Use a flame signal transducer (part number 78H5401) available from Lennox to measure the flame signal, if meter used will not read microamp signal.

Flame (microamp) signal is an electrical current which passes from the ignition 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 - 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 flame sensor lead from terminal of ignition control.
4 - Connect (+) lead of transducer to ignition control sensor connection.
5 - Connect (-) lead of the transducer to sensor wire.
6 - Turn supply voltage on and close thermostat contacts to cycle system.
7 - When unit lights, read voltage on meter display. Remember 1 DC volt = 1 DC microamp.

TABLE 34

FLAME SIGNAL MICROAMPS		
Boards 18M34 46M99 18M99 49M59	Normal	≥0.23
	Low	0.17 to 0.22
	Drop Out	0.16
Boards 63K89 24L85 56L83 97L48	Normal	≥0.61
	Low	0.21 to 0.60
	Drop Out	0.20

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 subbase fan switch. With fan switch in ON position, blower operates continuously. 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 G32V 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 - Measure tap locations as shown in figure 53.
2 - Punch a 1/4" diameter hole in supply upstream of evaporator 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.

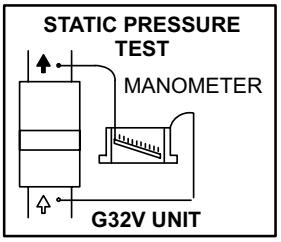


FIGURE 53

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 - Pressure drop must not exceed 0.8" W.C.
5 - Seal around the hole when the check is complete.

VI-MAINTENANCE

Retainers for factory supplied return air filter are shown in figure 54.

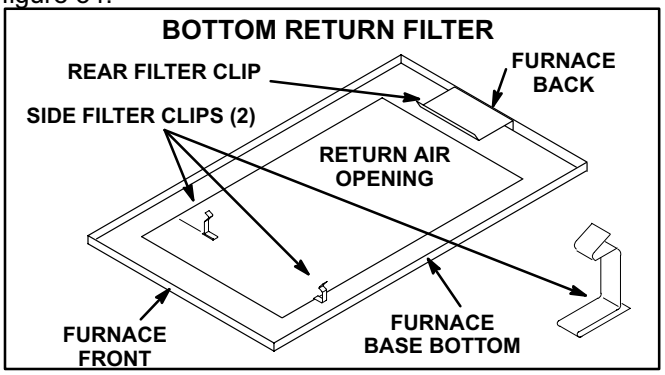


FIGURE 54

A-Filters

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

1 - Filters should be inspected monthly and must be cleaned or replaced when dirty to ensure proper furnace operation.

2 - Reusable foam filters used with the G32V can be washed with water and mild detergent. When dry, they should be sprayed with filter handicoater prior to reinstallation. Filter handicoater is RP Products coating no. 418 and is available as Lennox part no. **P-8-5069**.

3 - If replacement is necessary, order Lennox part no. **31J81** for 14" x 25" (356 x 635mm) filter for G32VQ3-75 units and **P-8-7831** for 20" x 25" (508 x 635mm) filter for G32V-100 and -125 units.

B-Cleaning Heat Exchanger and Burners

If cleaning the heat exchanger becomes necessary, follow the below procedures and refer to figure 1 when disassembling unit. Use papers or protective covering in front of furnace while removing heat exchanger assembly.

1 - Turn off electrical and gas power supplies to furnace.

2 - Remove upper and lower furnace access panels.

3 - Remove four (4) screws around air intake fitting and lift intake pipe up and away.

4 - Loosen hose clamp securing top of flue transition to bottom of flue collar. Remove screw securing flue collar to top cap and lift exhaust pipe and flue collar up and away.

5 - If electrical field make up box is located inside the unit, it must be removed.

6 - Remove gas supply line to connected to gas valve.

7 - Mark all gas valve wires and disconnect them from valve. Mark and remove wires from flame roll-out switch.

8 - Remove top cap of unit.

9 - Remove sensor wire from SureLight control. Disconnect 2-pin plug from the ignitor.

10- Mark and disconnect pressure switch tubing from both sides of the pressure switch.

11- Loosen two (2) screws holding gas manifold support at vestibule panel.

12- Remove four (4) burner box screws at the vestibule panel and remove burner box and gas valve/manifold assembly with bracket.

13- Drain condensate trap. Disconnect condensate line from the outside of unit. Remove condensate line from condensate trap by turning the adapter fitting counterclockwise. The fitting has standard right hand threads.

14- Disconnect the drain hose from the flue transition to the elbow on the cold header (collector) box trap.

15- Disconnect the 3-pin plug from the combustion air blower at the blower deck. Remove four (4) screws from combustion air blower and remove flue transition and blower assembly from cabinet. Take care not to lose the combustion air orifice.

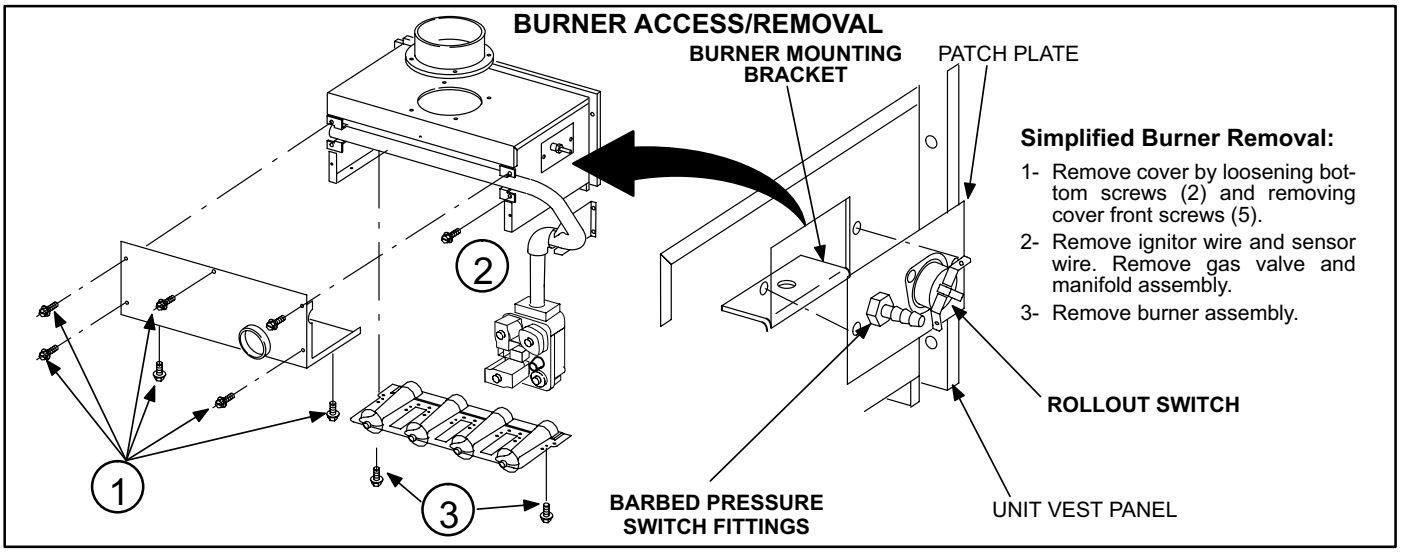


FIGURE 55

16- Disconnect 9-pin plug from the blower compartment at the blower deck.

17- Remove 9-pin plug above the blower deck.

18- Remove the limit switch and the pressure switch from the vestibule panel.

19- Remove two (2) screws from the front cabinet flange at the blower deck. Remove front screws from cabinet at blower deck on left and right sides. Cabinet sides must be slightly spread to clear heat exchanger passage.

20- Remove screws along vestibule sides and bottom which secure vestibule panel and heat exchanger assembly to cabinet. Remove heat exchanger then remove cold end header box.

21- Back wash heat exchanger with soapy water solution or steam. **If steam is used it must be below 275°F (135°C) .**

22- Thoroughly rinse and drain the heat exchanger. Soap solution can be corrosive so take care that entire assembly is completely rinsed.

23- Re-install heat exchanger into cabinet making sure that the clamshells of the heat exchanger assembly are resting in the notches of the support located at the rear of the cabinet. This can be viewed by removing the indoor blower and examining through the blower opening.

24- Re-secure the supporting screws along the vestibule sides and bottom to the cabinet.

25- Re-install cabinet screws on sides and front flange at blower deck.

26- Re-install the limit switch and pressure switch (-75 unit will have a second switch) on the vestibule panel.

27- Re-install 9-pin plug to blower deck and connect it to the 9-pin plug from below the blower deck.

28- Re-install the combustion air blower. Be careful that the plastic orifice on the blower inlet has not fallen out. See figure 1. Reconnect the 3-pin plug to the wire harness. Re-install the flue transition in the cabinet and reattach the drain tube. Route the drain tube below the combustion air blower housing and to the elbow on the cold header (collector) box trap. See figure 31.

29- Re-install condensate line with adapter to condensate trap. Use fresh Teflon tape to ensure a leak-free joint. Re-connect to condensate line outside of the unit.

30- Re-install the burner box. Tighten the screws holding the support bracket. It is important that the glass fiber gasket not be damaged so it will provide a continuous seal between the burner box and the vestibule panel.

31- Reconnect pressure switch tubing by connecting the tubing from the burner box to the barb on the bottom and the tubing from the combustion air blower to the barb on the top. See figure 31.

Note-G32V-75 units will have two pressure switches.

32- Reconnect the sensor and ignitor wires.

33- Re-install top cap to unit.

34- Re-install electrical connections to gas valve. Brown wire to H1, yellow wire to C2 and orange wire to M. Reconnect wires to flame roll-out switch.
NOTE - Unit is polarity-sensitive. 120V supply wiring must be installed correctly.

35- Reconnect main gas line to gas valve.

36- Re-install field make-up box if removed.

37- Re-install exhaust pipe/flue collar and secure flue collar to the unit top cap using existing screw. Insert the bottom of the flue collar into the top of the flue transition and tighten hose clamp.

38- Re-install intake pipe fitting to burner box with screws.

39- Replace both upper and lower access panels.

40- Refer to instruction on verifying gas and electrical connections when re-establishing supply.

41- Following lighting instructions from installation manual, light and run unit for 5 minutes to ensure heat exchanger is clean, dry and operating safely.

Cleaning the Burner Assembly

1 - Turn off electrical and gas power supplies to furnace. Remove upper and lower furnace access panels.

2 - Disconnect the gas supply line to gas valve. Depending on gas plumbing installation, the gas manifold may move aside enough that breaking the union may not be necessary.

3 - Remove five (5) screws from edges of burner box cover.

4 - Loosen two (2) screws on bottom of burner box front. The cover is key holed at these screw point so screws do not need to be removed. Pull off cover and set aside.

6 - Mark gas valve wires and disconnect them from valve.

7 - Mark and disconnect sensor wire from the burner box at the SureLight control. Disconnect 2-pin plug from the ignitor at the burner box.

8 - Loosen two (2) screws at the gas manifold support bracket.

9 - Pull on the left side of the gas manifold and follow with tension to the right side. The manifold support bracket will be free of the mounting screws on the vestibule panel. Set the gas manifold/gas valve assembly aside. Take care not to damage foam gaskets on each end of the gas manifold.

10- Using a 1/4” nut driver, remove the burner mounting screws from underneath the burners.

11- While supporting ignitor and sensor lines at the grommet, grasp burners and simultaneously pull burners and grommet out of the burner box.

12- Remove ignitor and sensor assemblies from burners using a 1/4” nut driver to remove two screws from each bracket.

13- Clean burner by running a vacuum with a soft brush attachment over face of burners. Visually inspect inside of burners and crossovers for any blockage caused by foreign matter. Remove any blockage.

14- Re-install ignitor and sensor bracket assemblies on burners.

NOTE - Ignitor must be installed on the opposite side of the burner from the metal button protrusions. Screws which attached the ignitor bracket must be installed from the same side as the ignitor and through the bracket to engage in the smaller holes located in the burner. The correct burner orientation is with metal button protrusions always pointing up.

15- Replace burner ignitor assembly back into burner box so that grommet groove fits back into sheet metal notch and makes a good seal. The burners sit on top of the burner box flanges. Make certain that the screws from underneath the box pass through the larger holes in the flange and engage in the smaller holes in the burner. Re-install the two screws.

16- Re-install the gas manifold/gas valve assembly by first inserting the right hand side of the gas manifold into the burner box. Swing left side of manifold into box while engaging support bracket to vestibule panel screws. Check that foam gaskets are providing a seal around each end of the gas manifold. All gas orifices should be engaged. If at this point the burners were mounted in the wrong holes, this needs to be corrected. The saddle brackets on the gas manifold should be flush with the front surfaces on the burner box sides.

17- Inspect the dual layered metal pieces at the front lip of the cover. These pieces must sandwich around the metal. Re-install burner box cover.

18- Re-install the screws to secure the burner box cover. Make sure screws are tight to ensure a leak tight burner box. Tighten the two screws underneath the box. Again, inspect the grommet to ensure a tight seal.

19- Tighten the two screws holding the manifold bracket to the vestibule panel.

20- Re-install the electrical connections to the gas valve. Brown wire to H1, yellow wire to C2 and orange wire to M.

21- Re-install the sensor wire to the spade connector on the SureLight control. Re-install the 2-pin ignitor plug at the burner box.

22- Reconnect gas line to gas valve.

23- Replace lower access panel.

24- Following lighting instructions and gas line connection test procedures from installation manual.

25- Replace upper access panel.

C-Supply Air Blower

1 - Check and clean blower housing and blower wheel.

2 - Motors are prelubricated for extended life; no further lubrication is required.

D-Electrical

1 - Check all wiring for loose connections.

2 - Check circuit breaker located in unit control box.

3 - Check for correct voltage at unit (unit operating).

4 - Check amp-draw on blower motor.
Motor Nameplate_____Actual_____

E-Intake and Exhaust Lines

Check intake and exhaust lines and all connections for tightness and make sure there is no blockage. Also check condensate line for free flow during operation.

F-Insulation

Outdoor piping insulation should be inspected yearly for deterioration. If necessary, replace with same materials.

G-Winterizing and Condensate Trap Care

1 - Turn off power to unit.

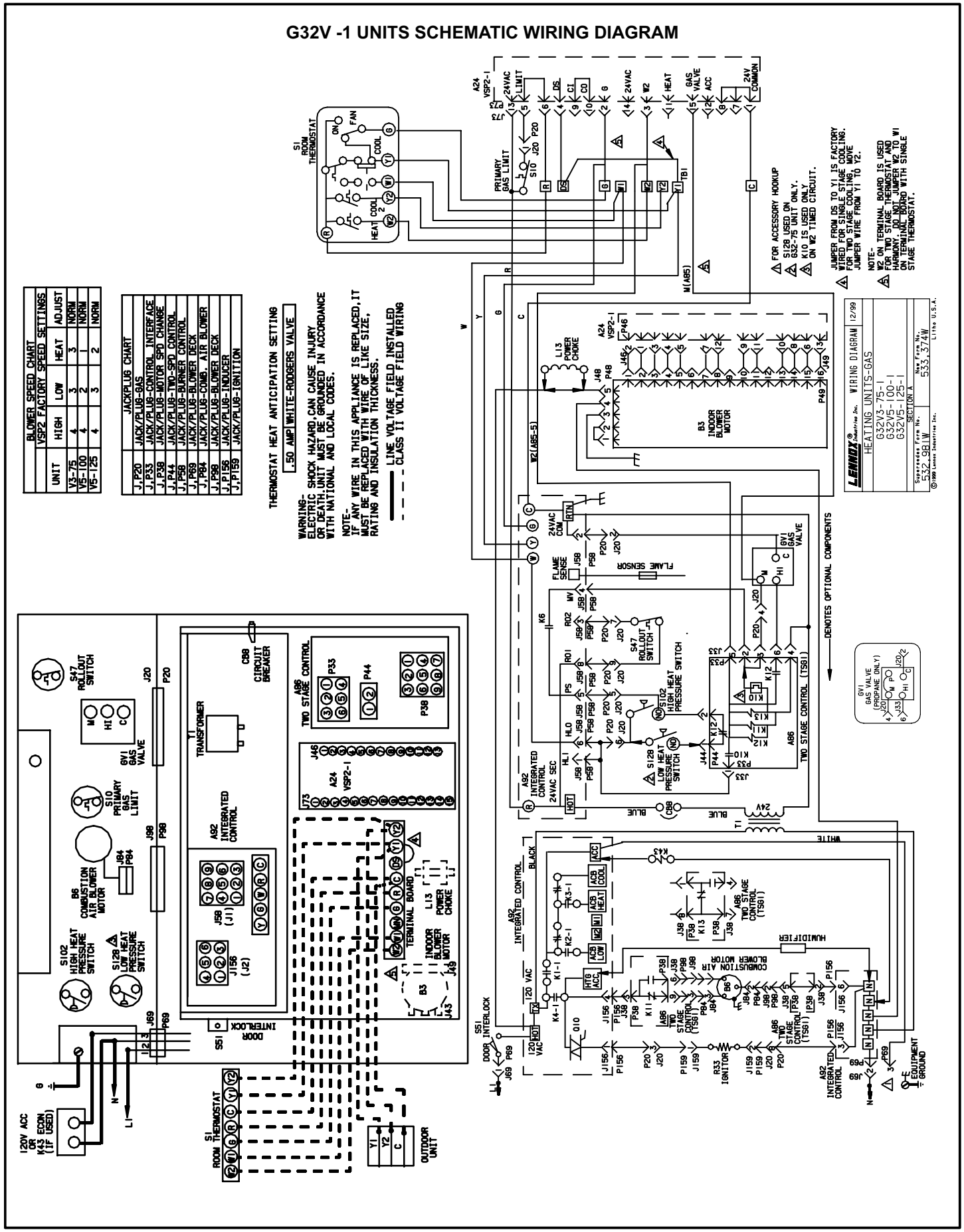
2 - Have a shallow pan ready to empty condensate water. Avoid spilling water into the control box.

3 - Remove clamp from flue assembly and remove boot or cap. Empty water from cap. Visually inspect bottom of flue assembly. Replace boot and clamp.

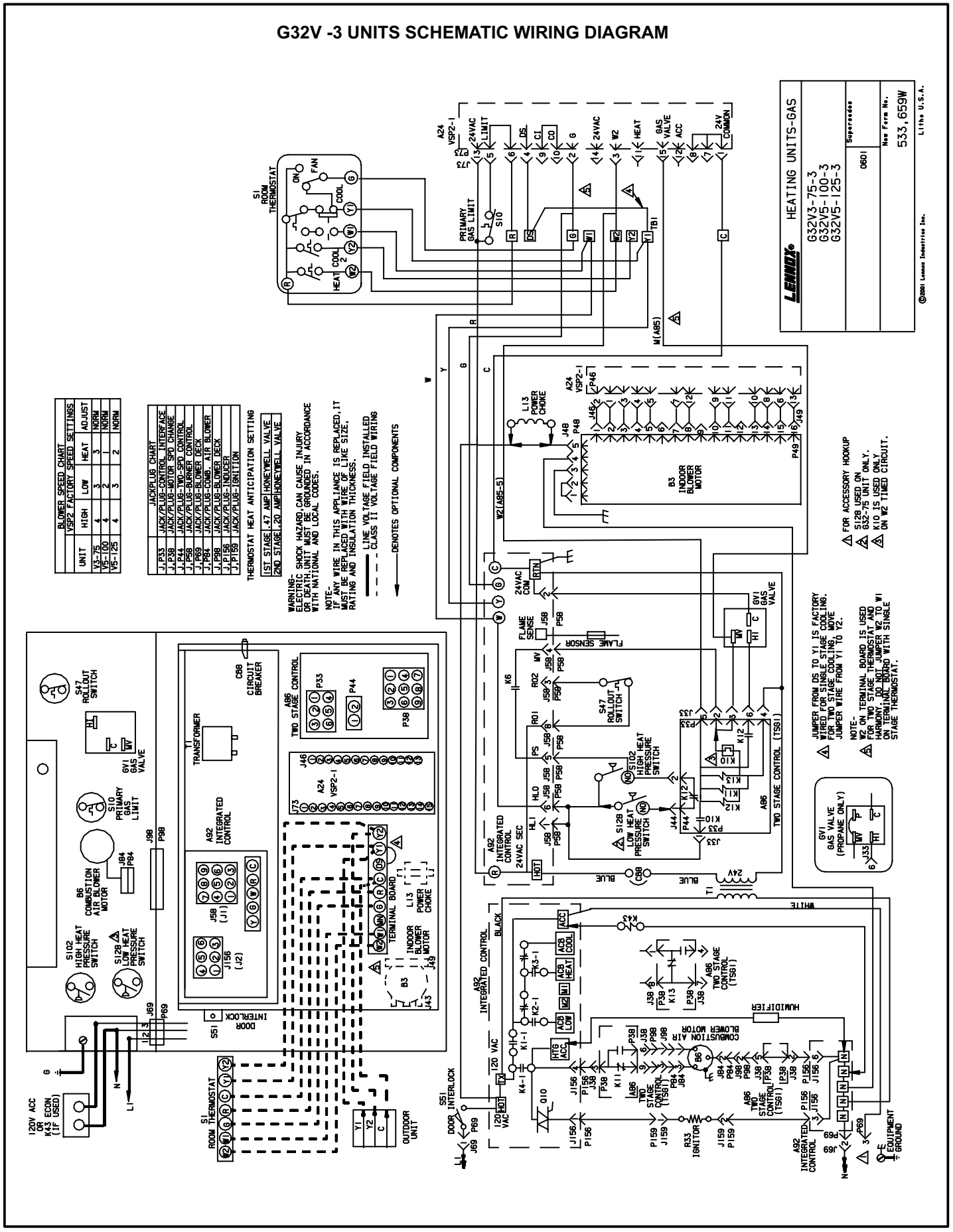
4 - Remove boot from condensate trap and empty water. Inspect trap then replace boot.

VII-WIRING DIAGRAM & SEQUENCE OF OPERATION

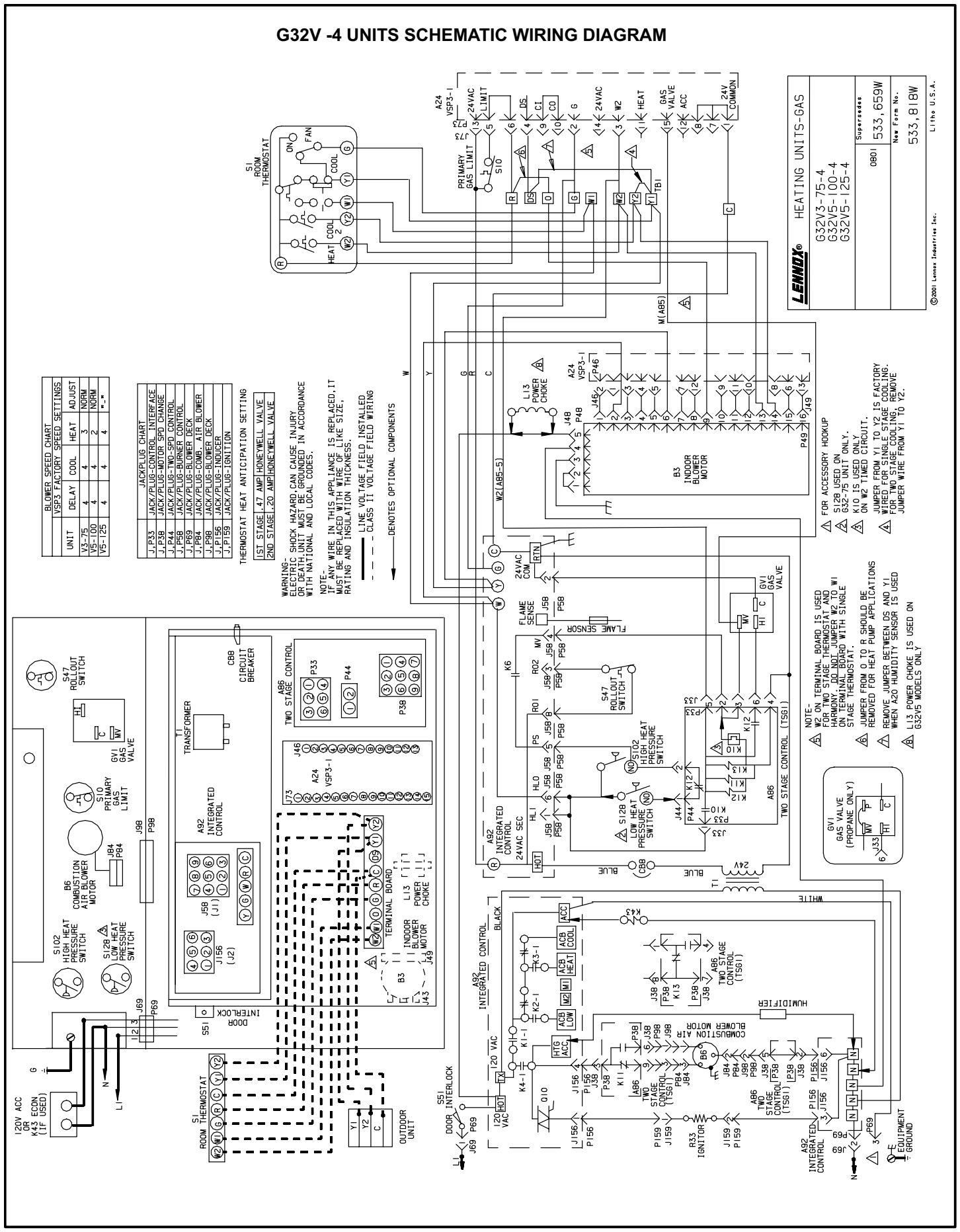
G32V -1 UNITS SCHEMATIC WIRING DIAGRAM



G32V -3 UNITS SCHEMATIC WIRING DIAGRAM



G32V -4 UNITS SCHEMATIC WIRING DIAGRAM



A-Sequence of Operation

Ignitor operation will vary between SureLight boards. Board 63K89, 56L83 and 24L85 will energize ignitor for the first second of the 4 second ignition trial. Board 97L48, will energize ignitor during the entire trial until flame is sense.

1 - When there is a call for heat, W1 of the thermostat energizes W of the furnace control with 24VAC.

2 - SureLight control runs self-check for S10 primary limit switch normally closed contacts. The control also checks S128 combustion air prove switch and S102 high fire prove switch normally open contacts. Follow steps 4 through 8 per respective thermostat.

Single-stage Mode, Single-stage Thermostat

3 - SureLight control energizes combustion air inducer B6 on high speed. Combustion air blower runs until S102 high fire prove switch closes (switch will close within 2-1/2 minutes or control goes into Watchguard-PROVE Switch mode). A 15-second pre-purge follows after S102 closes.

4 - SureLight control energizes ignitor. A 20-second warm-up period begins.

5 - Gas valve is energized on first stage heat (low). Gas valve opens for a 4 second trial for ignition.

6 - Flame is sensed. After 8 seconds from when gas valve opens, valve energizes on second stage (high heat).

7 - After 45-second delay, indoor blower B3 is energized on heating speed.

Two-stage Mode, Single-stage Thermostat

1 - SureLight control energizes combustion air inducer B6 on low speed. Combustion air inducer runs until combustion air prove switch S102 (or S128 onG32V3-75 units) closes (switch will close within 2-1/2 minutes or control goes into Watchguard-PROVE Switch mode). A 15-second pre-purge follows once S102 closes.

2 - SureLight control energizes ignitor. A 20-second warm-up period begins.

3 - Gas valve is energized on first stage. Gas valve opens for a 4-second trial for ignition. Signal is sent from control module to two-stage control board to begin W2 (second-stage) ON delay.

4 - Flame is sensed, gas valve remains open for the heat call.

5 - After 45-second delay, indoor blower B3 is energized on low speed.

6 - Second stage time on delay complete (8, 12, or 15 minutes). Combustion air inducer B6 switches to high speed, indoor blower B3 switches to heating speed and gas valve opens on high fire (second stage.)

Two-stage Mode, Two-stage Thermostat

1 - SureLight control energizes combustion air inducer B6 on low speed. Combustion air inducer runs until combustion air prove switch S102 closes (or S128 on G32V3-75 units. Switch will close within 2-1/2 minutes or control goes into Watchguard-PROVE Switch mode). A 15-second pre-purge follows once S102 closes.

2 - SureLight control energizes ignitor. A 20-second warm-up period begins.

3 - Gas valve is energized on first stage only. Gas valve opens for a 4-second trial for ignition.

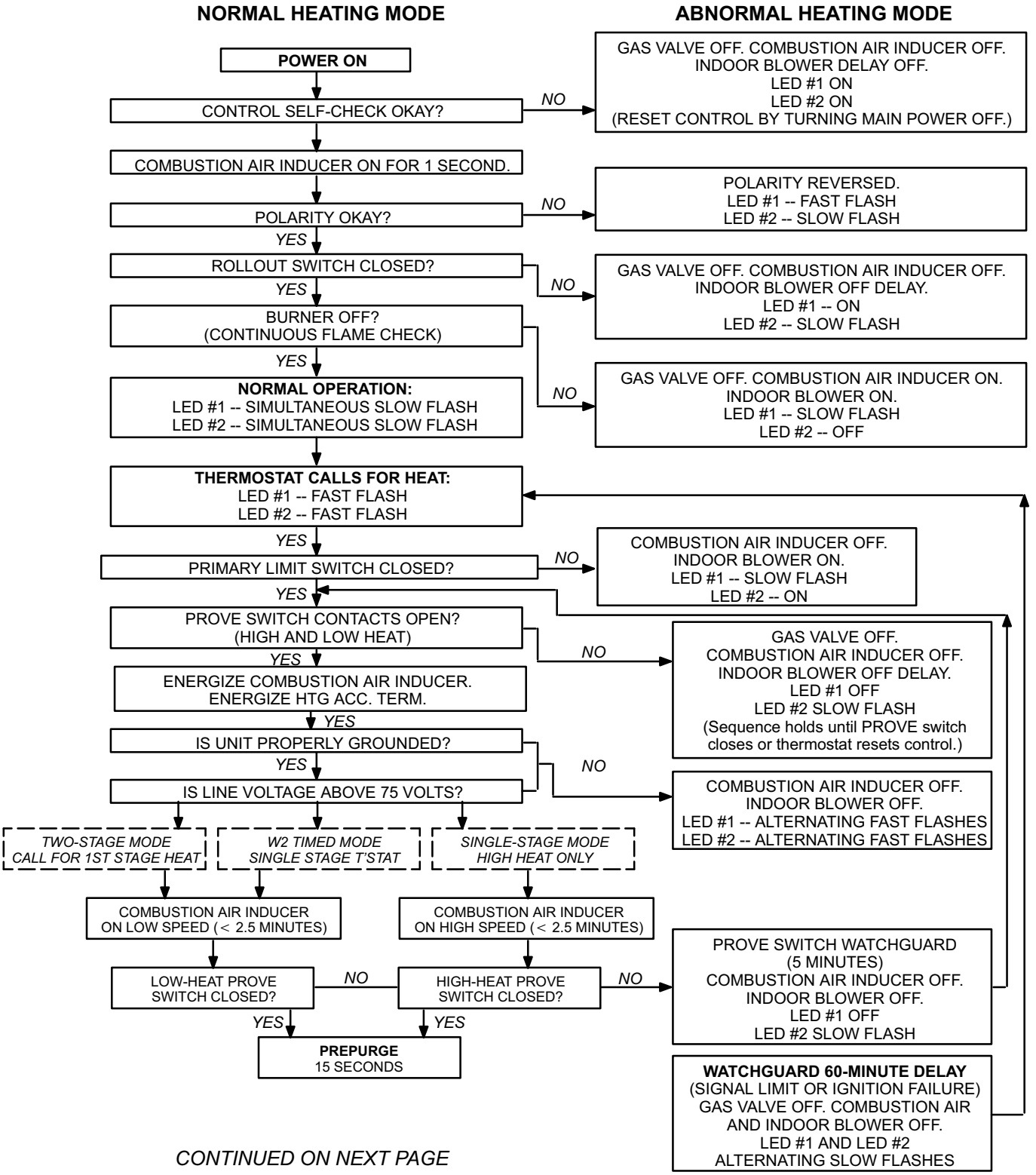
4 - Flame is sensed, gas valve remains open for the heat call.

5 - After 45-second delay, indoor blower B3 is energized on low speed.

6 - Call for second stage heat comes from indoor thermostat (W2).

HEATING SEQUENCE OF OPERATION

NOTE: LED REFERS TO SURELIGHT CONTROL . LED-DS REFERS TO VSP CONTROL.



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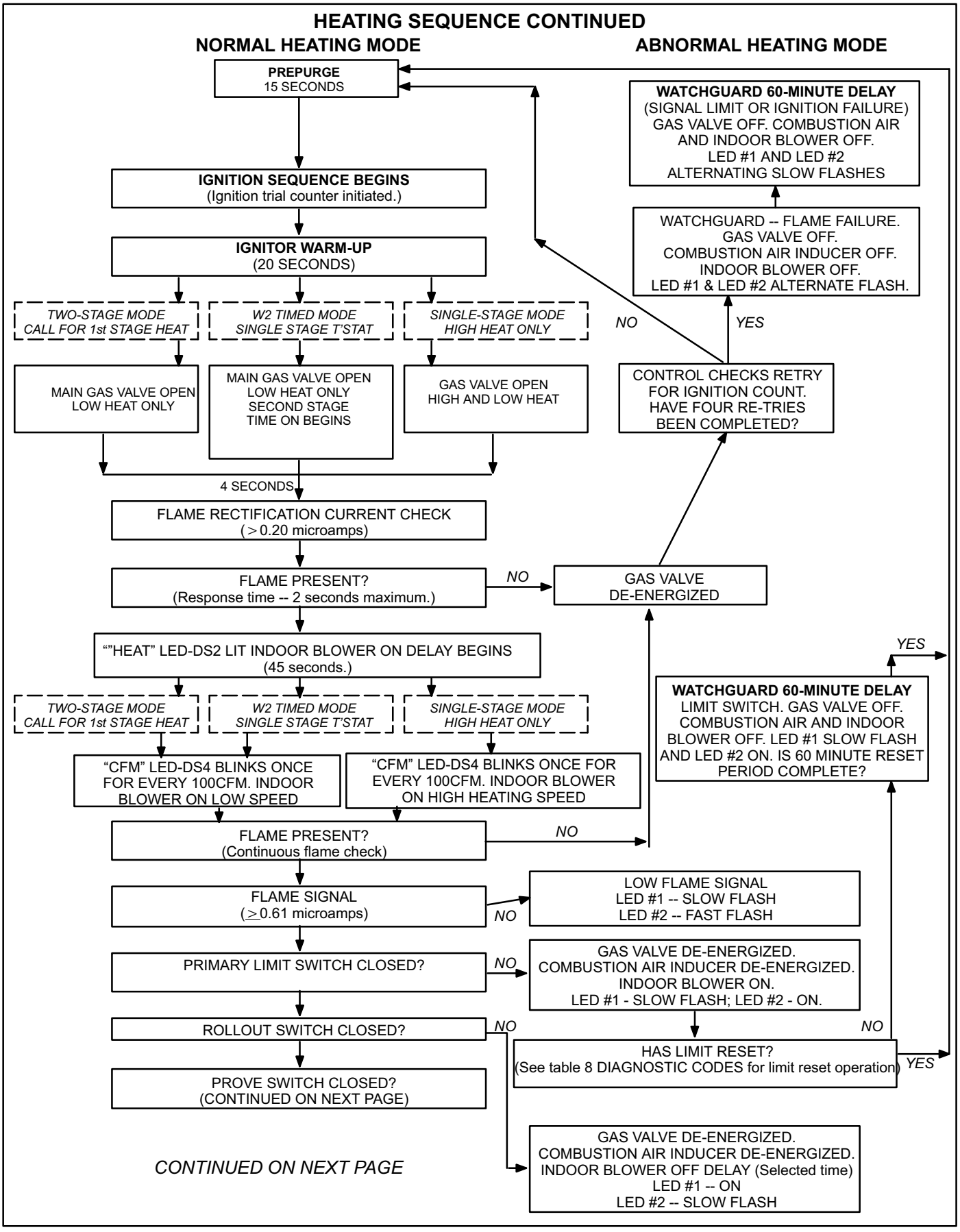
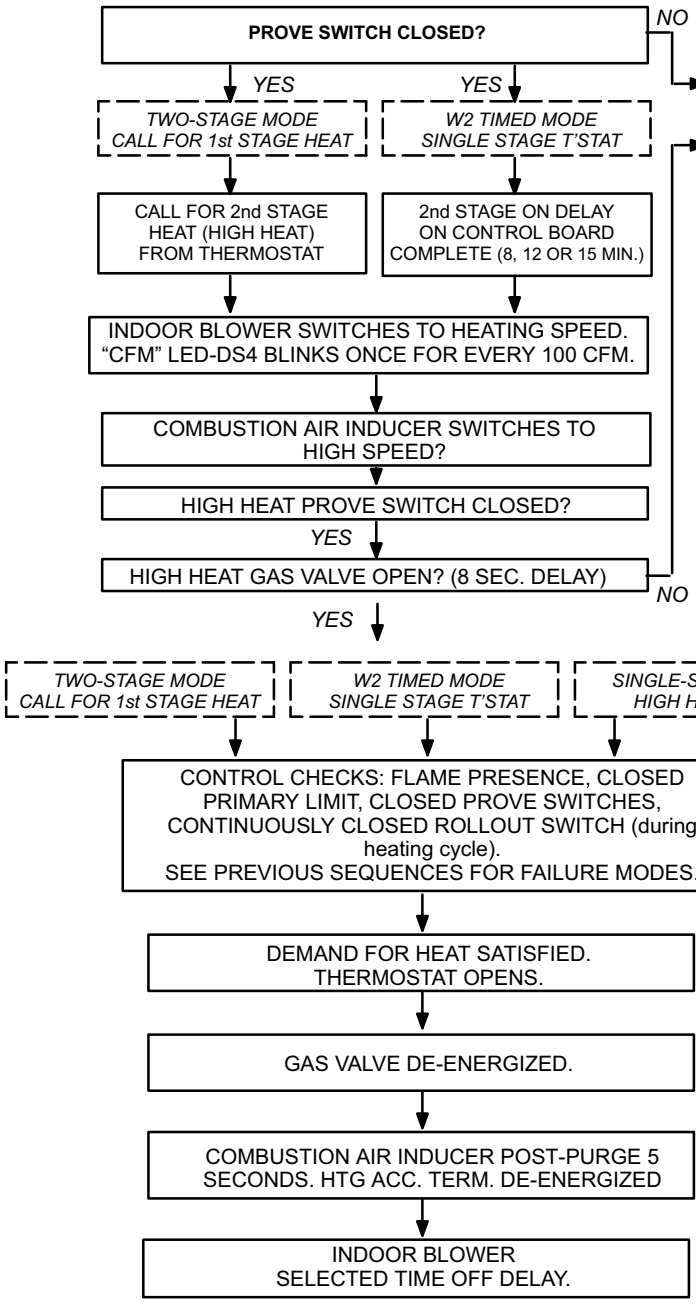
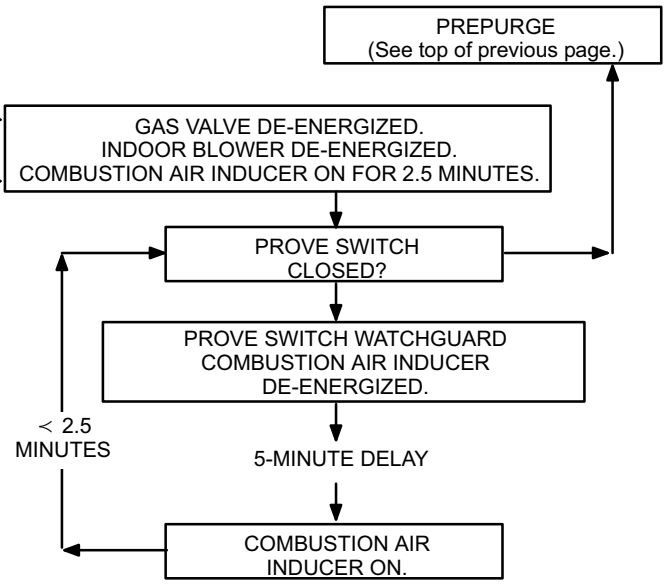

HEATING SEQUENCE CONTINUED
NORMAL HEATING MODE
ABNORMAL HEATING MODE
PREPURGE
15 SECONDS
IGNITION SEQUENCE BEGINS
(Ignition trial counter initiated.)
IGNITOR WARM-UP
(20 SECONDS)
TWO-STAGE MODE
CALL FOR 1st STAGE HEAT
W2 TIMED MODE
SINGLE STAGE T'STAT
SINGLE-STAGE MODE
HIGH HEAT ONLY
MAIN GAS VALVE OPEN
LOW HEAT ONLY
MAIN GAS VALVE OPEN
LOW HEAT ONLY
SECOND STAGE
TIME ON BEGINS
GAS VALVE OPEN
HIGH AND LOW HEAT
4 SECONDS
FLAME RECTIFICATION CURRENT CHECK
(>0.20 microamps)
FLAME PRESENT?
(Response time -- 2 seconds maximum.)
NO
GAS VALVE
DE-ENERGIZED
""HEAT" LED-DS2 LIT INDOOR BLOWER ON DELAY BEGINS
(45 seconds.)
TWO-STAGE MODE
CALL FOR 1st STAGE HEAT
W2 TIMED MODE
SINGLE STAGE T'STAT
SINGLE-STAGE MODE
HIGH HEAT ONLY
"CFM" LED-DS4 BLINKS ONCE
FOR EVERY 100CFM. INDOOR
BLOWER ON LOW SPEED
"CFM" LED-DS4 BLINKS ONCE FOR
EVERY 100CFM. INDOOR BLOWER
ON HIGH HEATING SPEED
FLAME PRESENT?
(Continuous flame check)
NO
FLAME SIGNAL
(≥0.61 microamps)
NO
LOW FLAME SIGNAL
LED #1 -- SLOW FLASH
LED #2 -- FAST FLASH
PRIMARY LIMIT SWITCH CLOSED?
NO
GAS VALVE DE-ENERGIZED.
COMBUSTION AIR INDUCER DE-ENERGIZED.
INDOOR BLOWER ON.
LED #1 - SLOW FLASH; LED #2 - ON.
ROLLOUT SWITCH CLOSED?
NO
NO
HAS LIMIT RESET?
(See table 8 DIAGNOSTIC CODES for limit reset operation)
YES
PROVE SWITCH CLOSED?
(CONTINUED ON NEXT PAGE)
CONTINUED ON NEXT PAGE
GAS VALVE DE-ENERGIZED.
COMBUSTION AIR INDUCER DE-ENERGIZED.
INDOOR BLOWER OFF DELAY (Selected time)
LED #1 -- ON
LED #2 -- SLOW FLASH
WATCHGUARD 60-MINUTE DELAY
(SIGNAL LIMIT OR IGNITION FAILURE)
GAS VALVE OFF. COMBUSTION AIR
AND INDOOR BLOWER OFF.
LED #1 AND LED #2
ALTERNATING SLOW FLASHES
WATCHGUARD -- FLAME FAILURE.
GAS VALVE OFF.
COMBUSTION AIR INDUCER OFF.
INDOOR BLOWER OFF.
LED #1 & LED #2 ALTERNATE FLASH.
NO
YES
CONTROL CHECKS RETRY
FOR IGNITION COUNT.
HAVE FOUR RE-TRIES
BEEN COMPLETED?
YES
WATCHGUARD 60-MINUTE DELAY
LIMIT SWITCH. GAS VALVE OFF.
COMBUSTION AIR AND INDOOR
BLOWER OFF. LED #1 SLOW FLASH
AND LED #2 ON. IS 60 MINUTE RESET
PERIOD COMPLETE?

HEATING SEQUENCE CONTINUED

NORMAL HEATING MODE

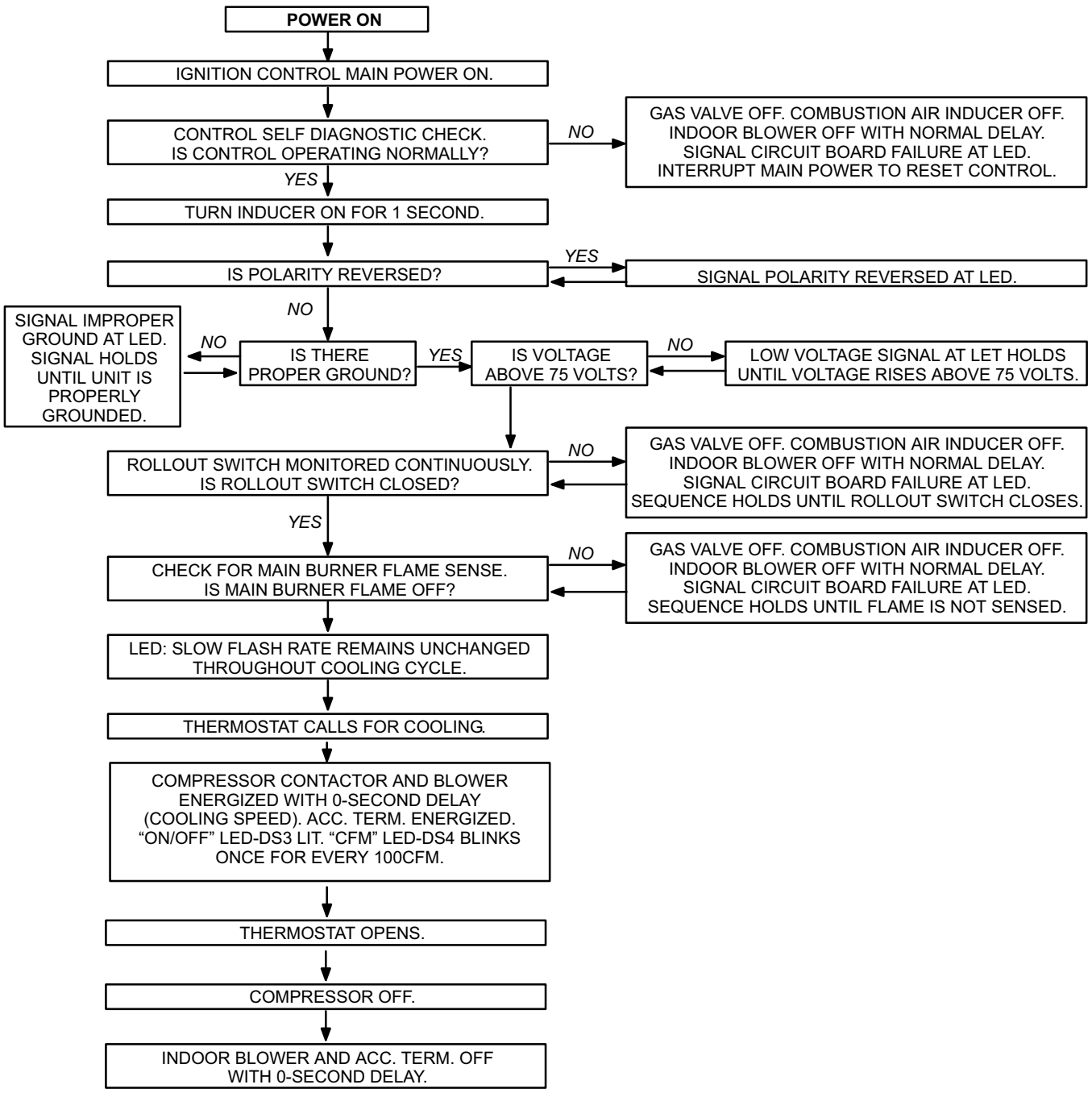


ABNORMAL HEATING MODE

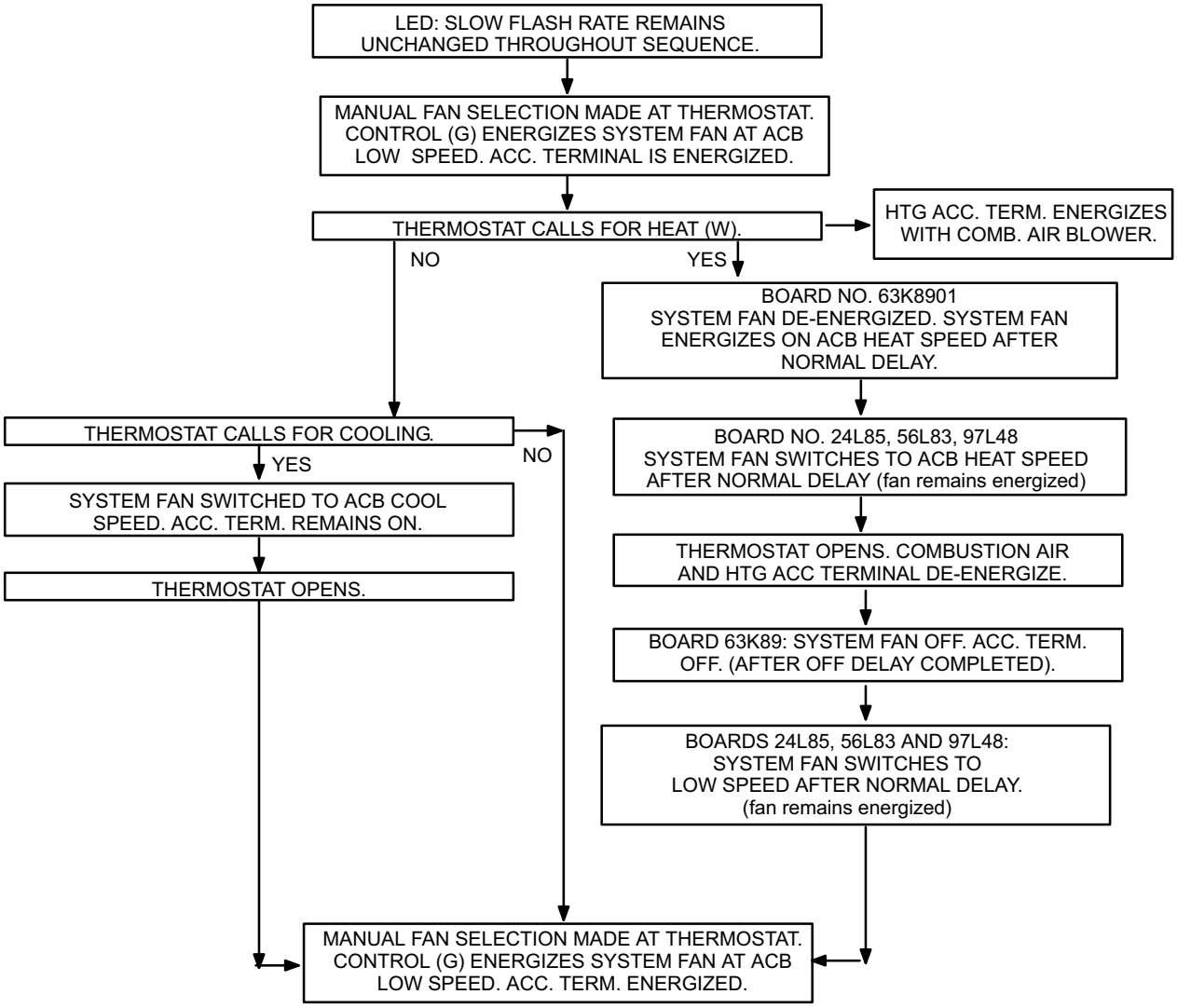


DIAGNOSTIC CODES		
LED #1	**LED #2**	**DESCRIPTION**
SLOW FLASH	ON	Primary or secondary limit open
ON	SLOW FLASH	Rollout switch open
SLOW FLASH	OFF	Flame sensed without gas valve energized
OFF	SLOW FLASH	PROVE switch open
SLOW FLASH	SLOW FLASH	Power on
FAST FLASH	FAST FLASH	Heating demand
FAST FLASH	SLOW FLASH	Polarity reversed
SLOW FLASH	FAST FLASH	Low flame signal
ON	ON	Circuit board failure
ALTERNATING SLOW FLASH		Watchguard -- burners failed to ignite
ALTERNATING FAST FLASH		Watchguard -- low voltage, below 75V or improper main ground.

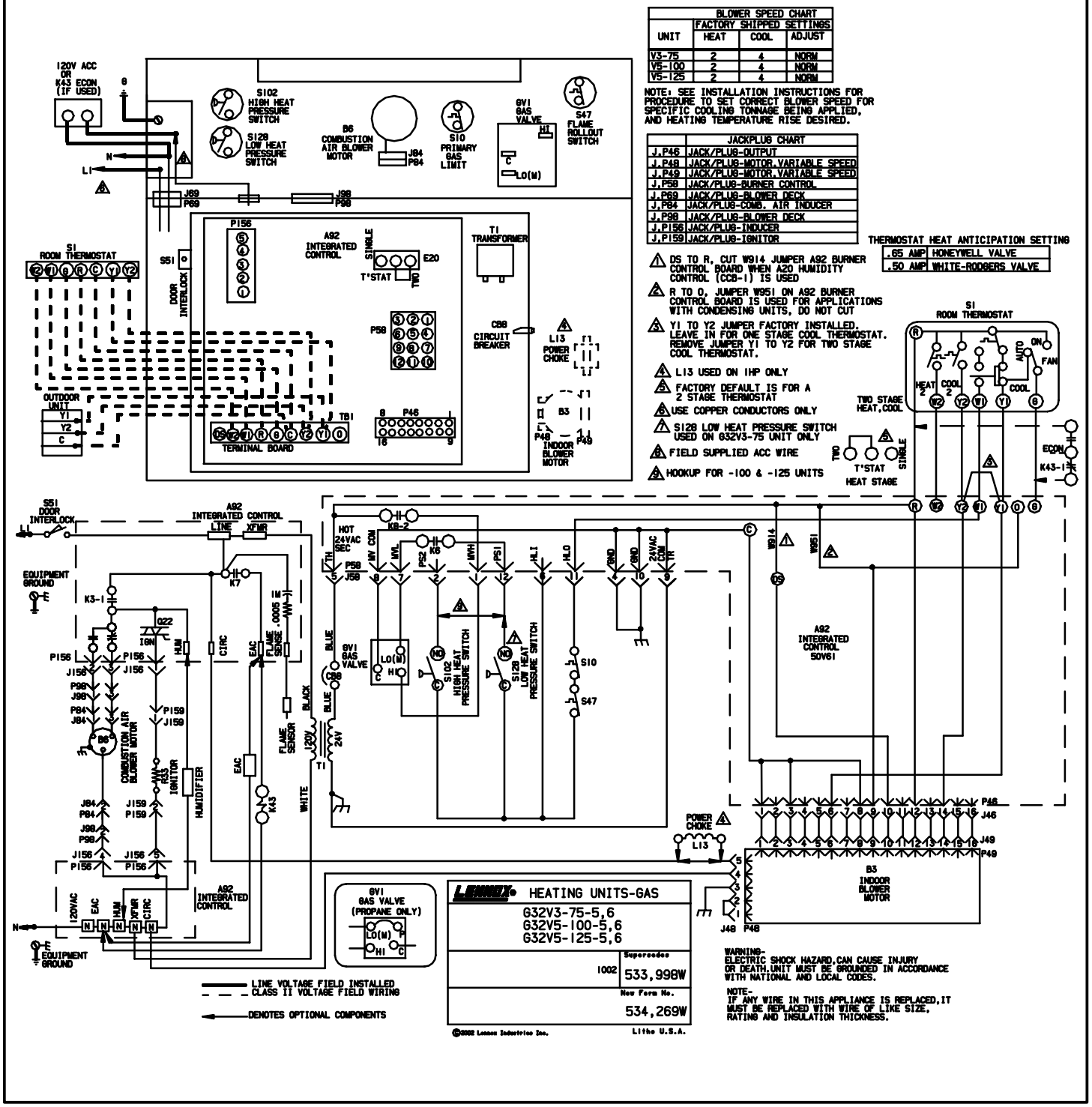
COOLING SEQUENCE OF OPERATION



SURELIGHT CONTROL
CONTINUOUS LOW SPEED FAN SEQUENCE OF OPERATION



G32V -5, -6 UNITS SCHEMATIC WIRING DIAGRAM



B-Sequence of Operation.

Sequence depends on type thermostat used. Units are applicable for single stage or two stage thermostats. Both type thermostats are described below. Thermostat jumper E20 dictates which mode unit will operate in. See flow chart for more sequence detail.

SureLight Control Self Check

When there is a call for heat, the SureLight integrated control runs a self check. The control checks for S10 primary limit, S21 secondary limit (s) and S47 rollout switch normally closed contacts. The control also checks for prove switch S102 and low heat prove switch S128 (G32V-75 only) normally open contacts. Once self check is complete and all safety switches are operational, heat call can continue.

Two-Stage Thermostat, Two Stage Heat. Jumper E20 set at *"TWO".*

1- SureLight control energizes combustion air inducer B6 on low heat speed. Combustion air inducer runs until S102 prove switch contacts close (switch must close within 2 1/2 minutes or control goes into Watchguard PROVE Switch mode.
G32V-75 ONLY - Combustion air inducer runs until S128 prove switch contacts close (switch must close within 2 1/2 minutes or control goes into Watchguard PROVE Switch mode. Prove switch S102 may also close). A 15 second pre-purge follows once S128 closes.

2- SureLight control begins 20 second ignitor warm up period.

3- Gas valve opens on first stage for a 4 second trial for ignition. Ignitor stays energized during the trial or until flame sensed.

4- Flame is sensed, gas valve remains on first stage heat, ignitor de-energizes.

5- After 45 second delay, indoor blower B3 is energized on low heat speed.
The furnace will stay in this mode until first stage demand is satisfied OR a second stage heat demand is initiated.

6- Second stage heat demand initiated. A 30 second second stage recognition period begins.

7- The combustion air inducer ramps up to high heat speed.
G32V-75 - S102 high heat prove switch closes.

8- Gas valve energizes second stage heat.

9- B3 indoor blower ramps up to high heat speed.

Single-Stage Thermostat, Two Stage Heat. Jumper E20 set at "*SINGLE*"

1- SureLight control energizes combustion air inducer B6 on low heat speed. Combustion air inducer runs until S102 prove switch contacts close (switch must close within 2 1/2 minutes or control goes into Watchguard PROVE Switch mode.
G32V-75 ONLY - Combustion air inducer runs until S128 prove switch contacts close (switch must close within 2 1/2 minutes or control goes into Watchguard PROVE Switch mode. Prove switch S102 may also close). A 15 second pre-purge follows once S128 closes.

2- SureLight control begins 20 second ignitor warm up period.

3- Gas valve opens on first stage for a 4 second trial for ignition. Ignitor stays energized during the trial or until flame sensed.

4- Flame is sensed, gas valve remains on first stage heat, ignitor de-energizes.

5- After 45 second delay, indoor blower B3 is energized on low heat speed.

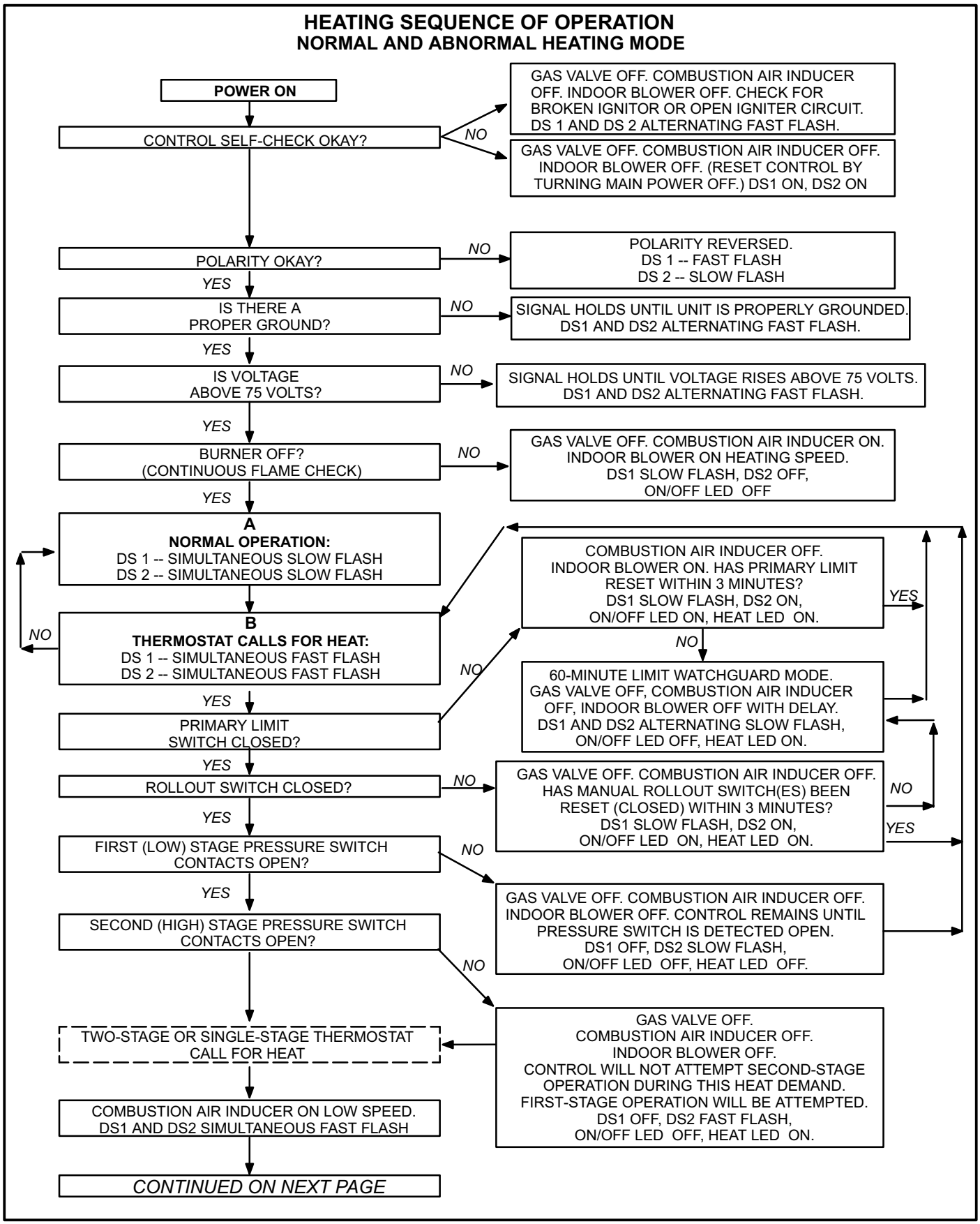
6- A 10 minute (factory set) or 15 minute (field set) second stage heat delay period begins.

7- The combustion air inducer ramps up to high heat speed.
G32V-75 - S102 high heat prove switch closes.

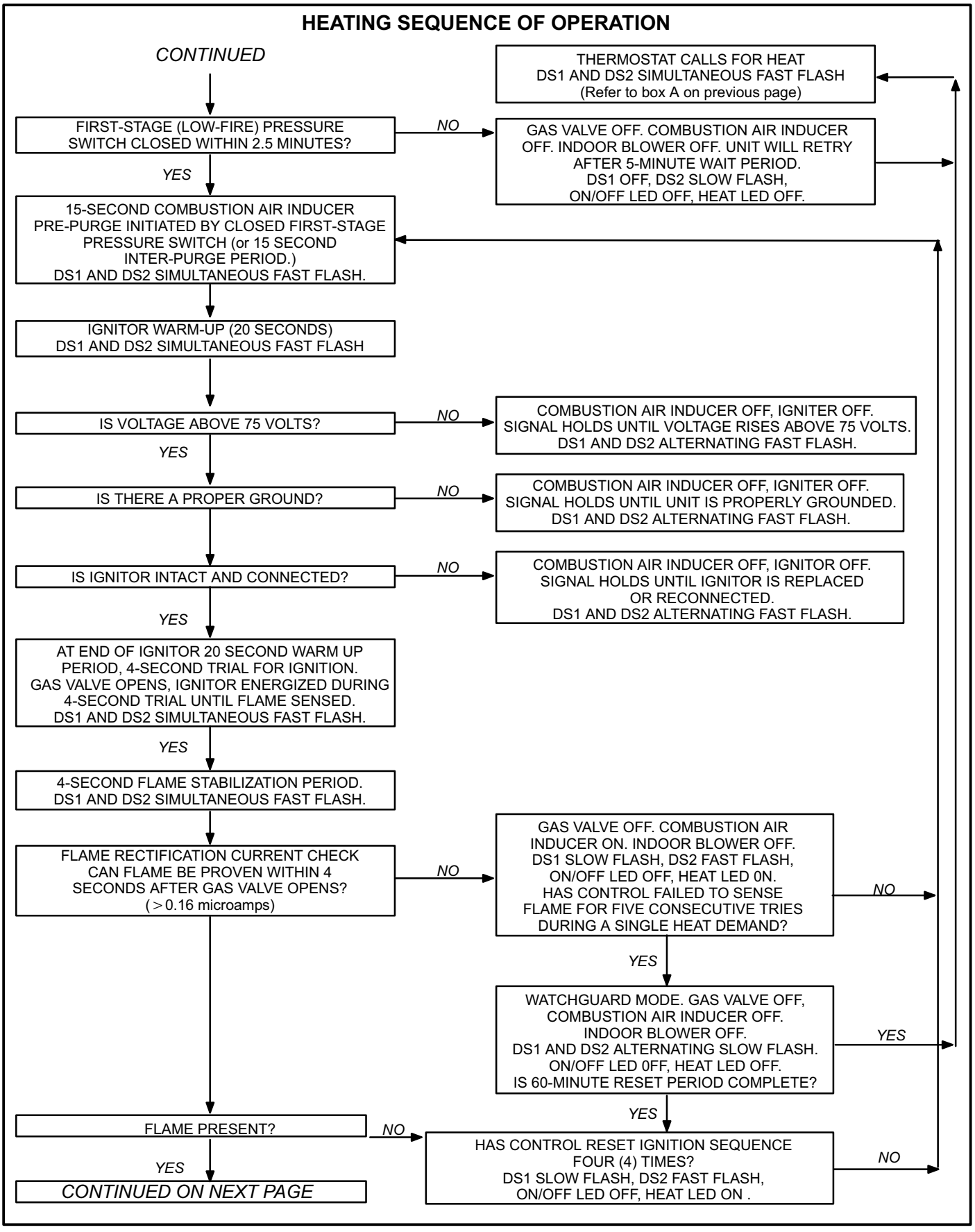
8- Gas valve energizes second stage heat.

9- B3 indoor blower ramps up to high heat speed.

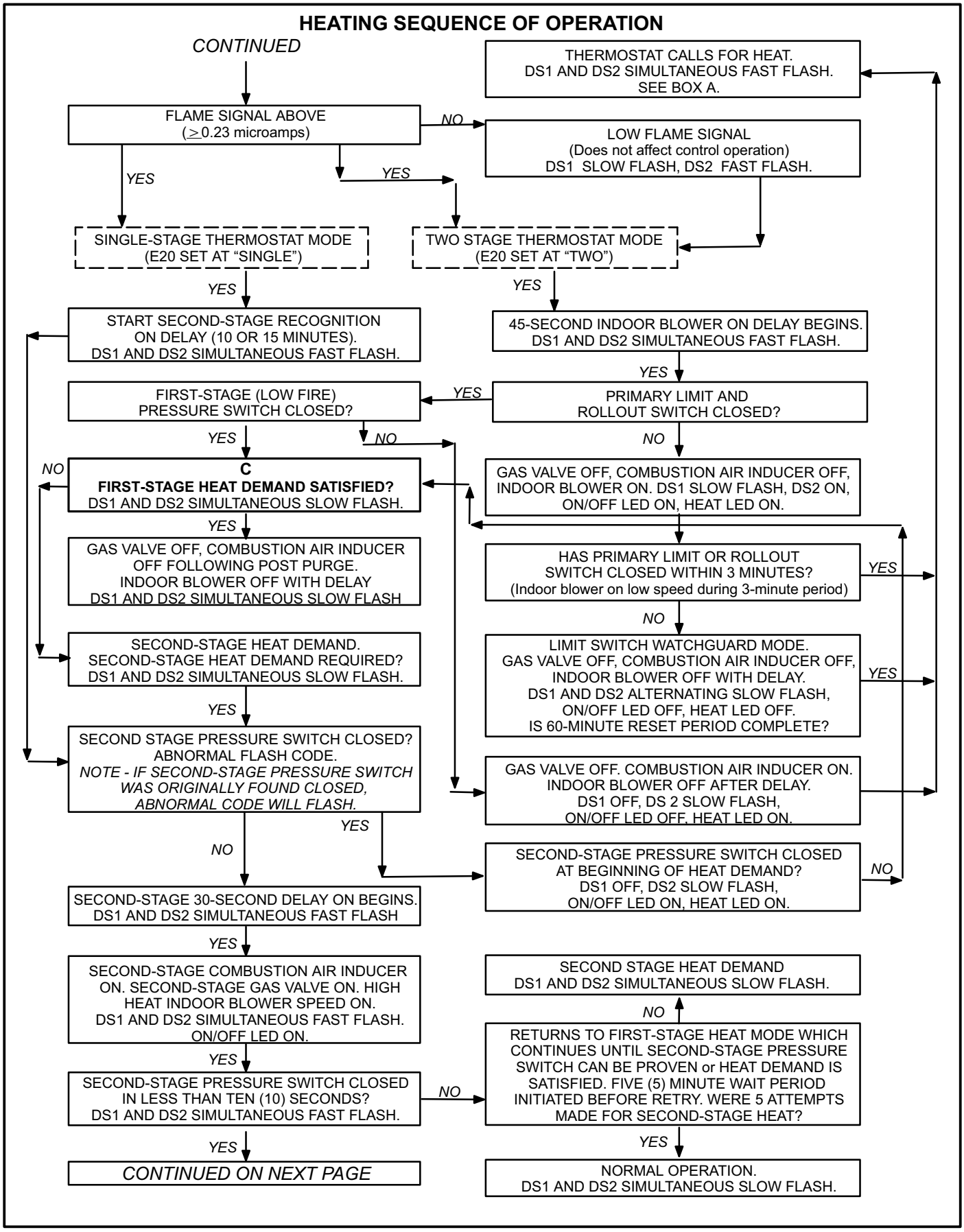
HEATING SEQUENCE OF OPERATION
NORMAL AND ABNORMAL HEATING MODE



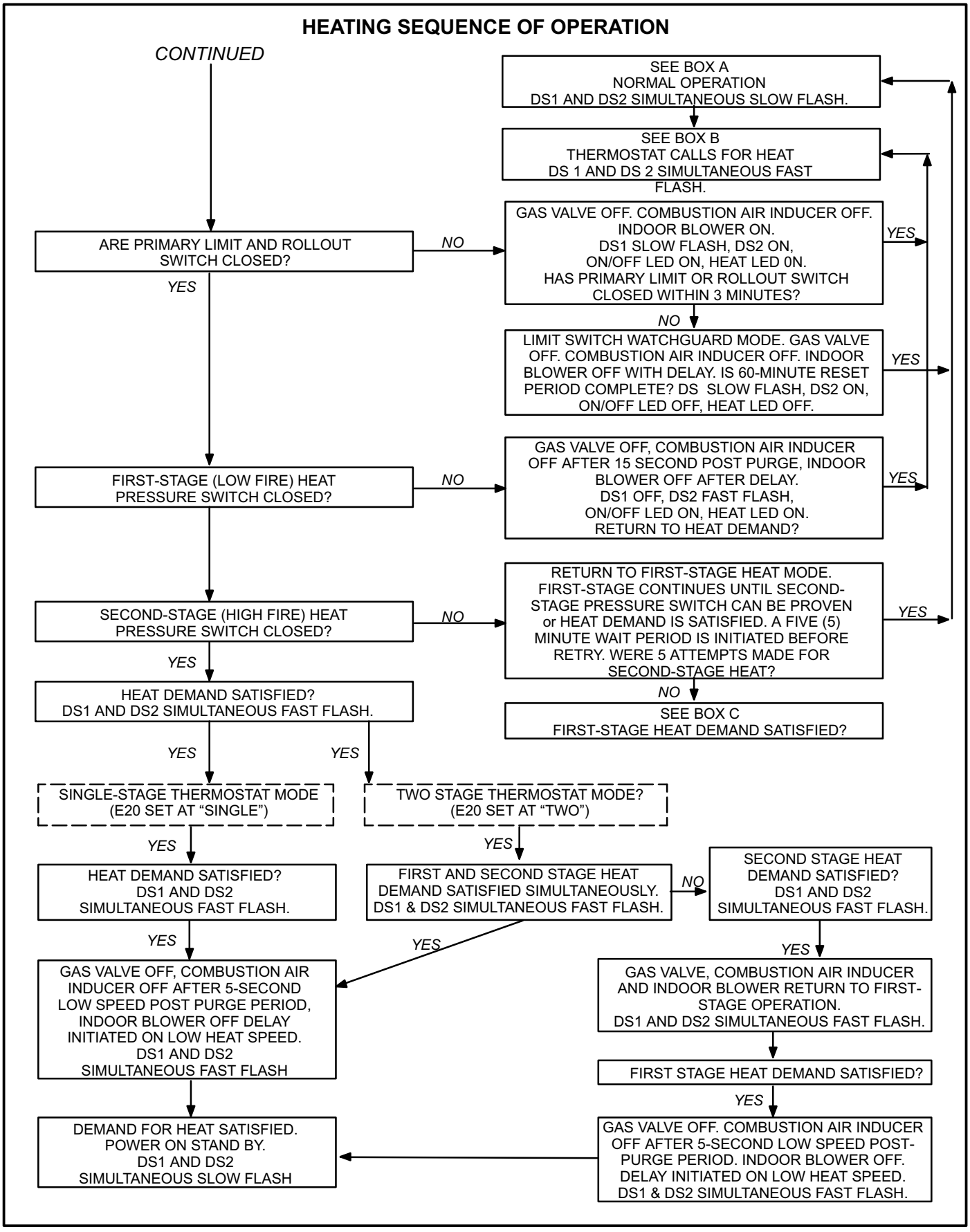
HEATING SEQUENCE OF OPERATION



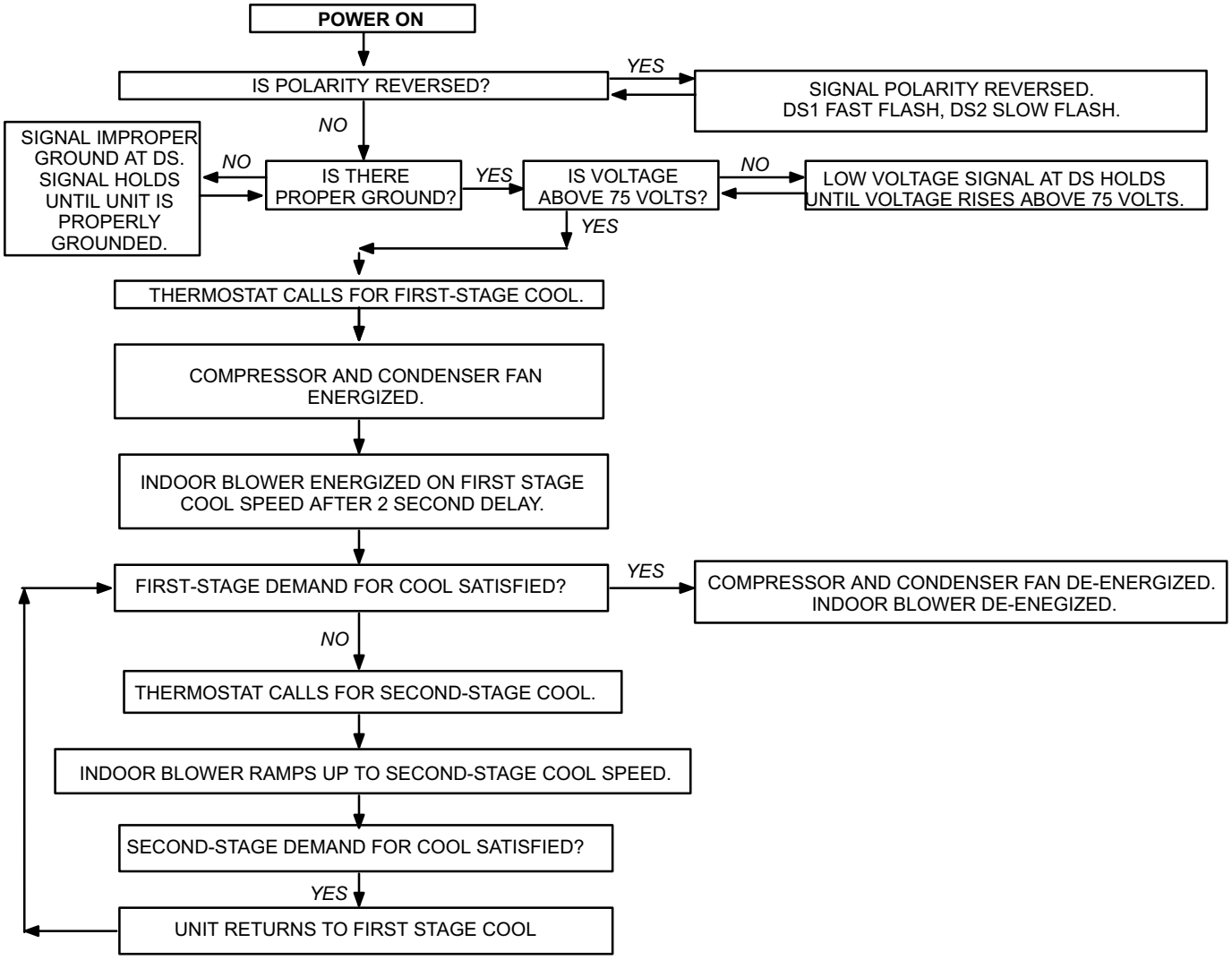
HEATING SEQUENCE OF OPERATION



HEATING SEQUENCE OF OPERATION



COOLING SEQUENCE OF OPERATION



CONTINUOUS LOW SPEED FAN SEQUENCE OF OPERATION

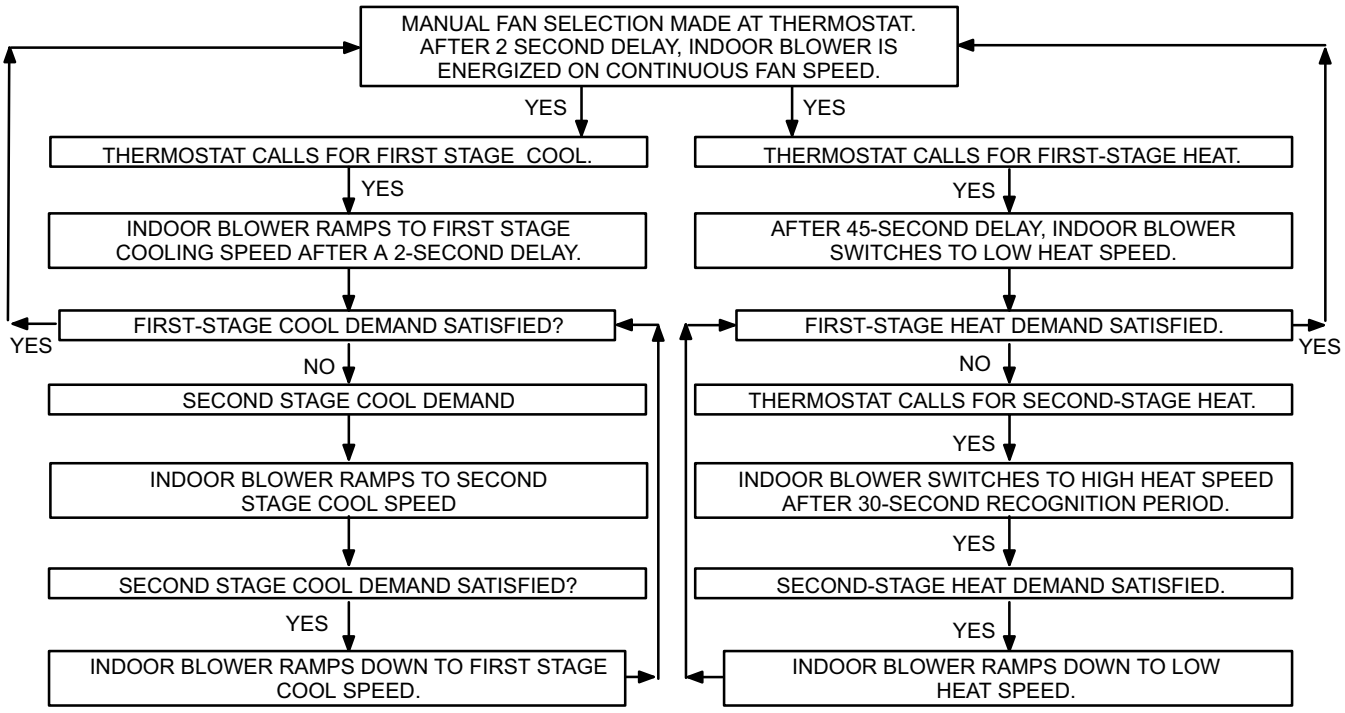
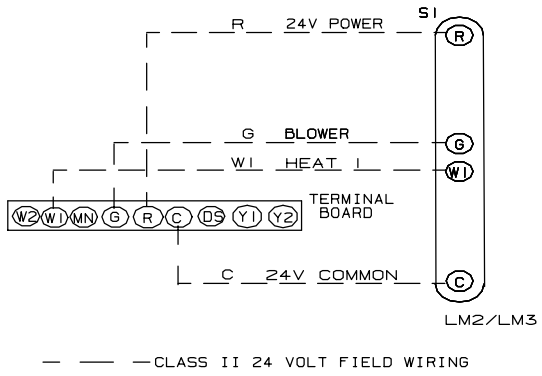
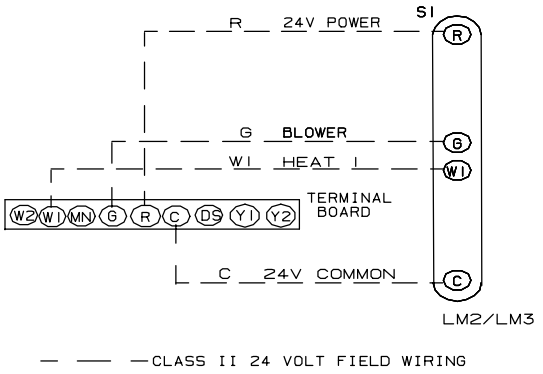
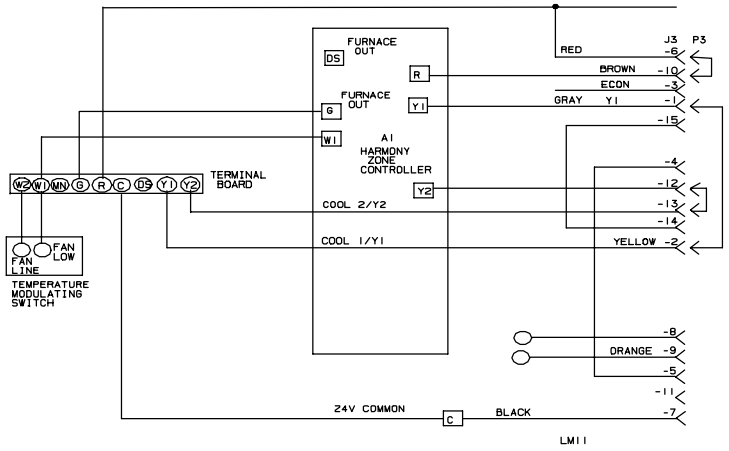


TABLE 35

G32V-1 / -3 OPERATION SEQUENCE AND JUMPERS SUMMARY WITH VSP2 (HEATING)

MATCH UP	T-Strip Jumper	Mode of Operation Jumper	COMMENTS OR SEQUENCE	
FOR COOLING JUMPERS SEE COOLING SECTION BELOW Single-Stage Heating with Single-Stage Thermostat	No Jumpers	One-Stage	Blower operates on the high speed heat tap during the heating mode.	
Two-Stage Heating With Single-Stage Thermostat	No Jumpers	W2 Timed	Blower operates on the low speed heat/cool tap during the first stage of heating. Blower operates on the high speed heat tap during second stage heating.	
Harmony Heating	No Jumpers	Two-Stage	Remove pin #3 of the J73 plug on the VSP control. See figure 12. Insulate end to prevent it from shorting. Blower operates on PWM signal generated by Harmony. Harmony overrides blower speed taps. Blower speed varies according to zone demand. Low and high fire controlled by temperature modulating switch.	

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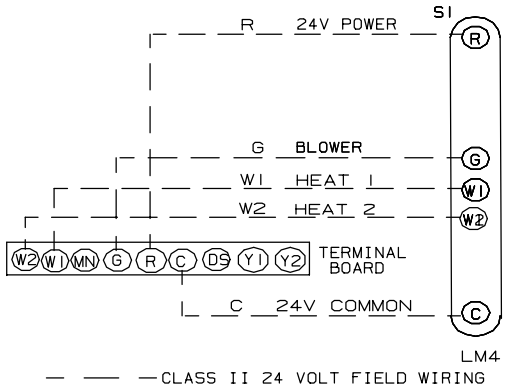
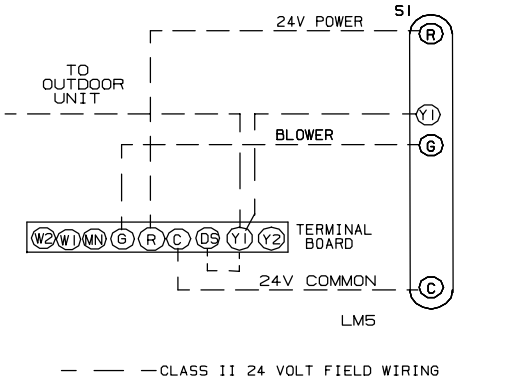
G32V-1 / -3 OPERATION SEQUENCE AND JUMPERS SUMMARY WITH VSP2 (HEATING CONTINUED)

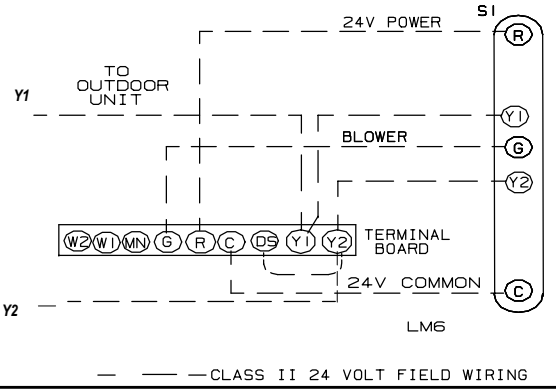
MATCH UP	T-Strip Jumper	Mode of Operation Jumper	COMMENTS OR SEQUENCE
Two-Stage Heating With Two-Stage Thermostat	No Jumpers	Two-Stage	Blower operates on the low speed heat/cool tap during first stage heating. Blower operates on high speed heat tap during second stage heating.



G32V-1 / -3 OPERATION SEQUENCE AND JUMPERS SUMMARY WITH VSP2 (COOLING)

MATCH UP	T-STRIP JUMPER	COMMENTS OR SEQUENCE
FOR HEATING JUMPERS SEE HEATING SECTION ABOVE Single-Speed Compressor, no CCB1, no Harmony	"DS to "Y1" (factory wired)	Blower operates on high speed cool tap during cooling.
	Remove Jumper "DS to Y1"	Blower operates on low speed heat/cool tap during cooling
Two-Speed Compressor, no CCB1, no Harmony	"DS" to "Y2" Move factory wired jumper from "Y1 to "Y2".	Blower operates on low speed heat/cool tap when compressor is in first stage cooling. Blower operates on high speed cool tap when compressor is in second stage cooling.





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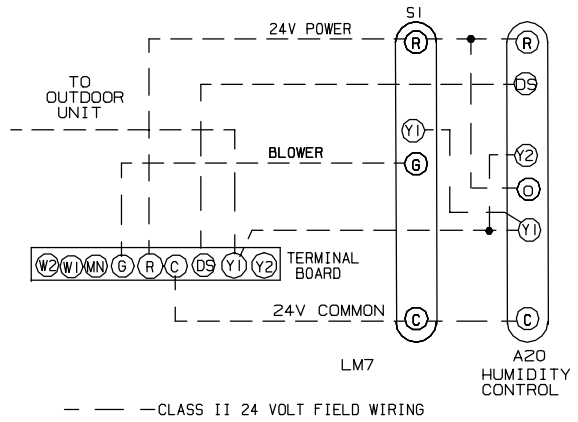
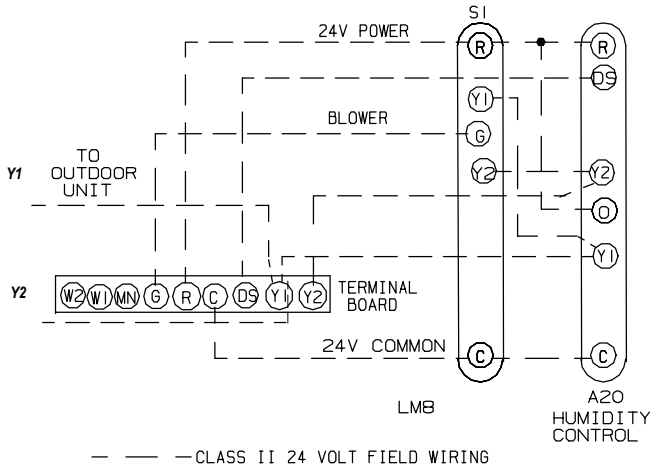
G32V-1 / -3 OPERATION SEQUENCE AND JUMPERS SUMMARY WITH VSP2 (COOLING CONTINUED)

MATCH UP	T-STRIP JUMPER	COMMENTS OR SEQUENCE	
FOR HEATING JUMPERS SEE HEATING SECTION ABOVE CCB1 with Single-Speed Compressor, no Harmony	No Jumpers (Remove jumper from “Y1 to “DS”)	Blower speed is controlled by the DC signal from CCB1. Blower operates on low speed heat/cool tap during dehumidification. Otherwise, blower operates on high speed cool tap during cooling cycle.	
CCB1 with Two-Speed Compressor, no Harmony	No Jumpers (Remove jumper from “Y1 to “DS”)	Blower speed is controlled by the DC signal from CCB1. Blower operates on low speed heat/cool tap during dehumidification. Otherwise, blower operates on high speed cool tap during high speed compressor operation and low speed heat/cool tap during low speed compressor operation.	

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G32V-1 / -3 OPERATION SEQUENCE AND JUMPERS SUMMARY WITH VSP2 (COOLING CONTINUED)

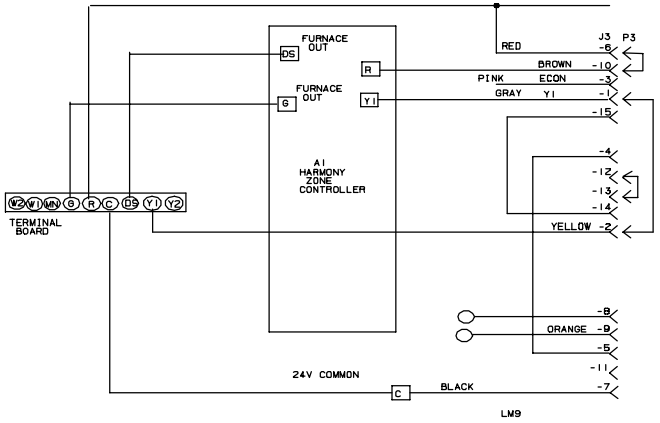
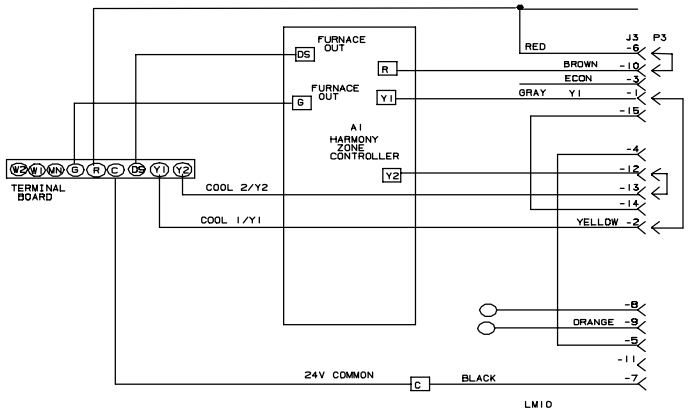
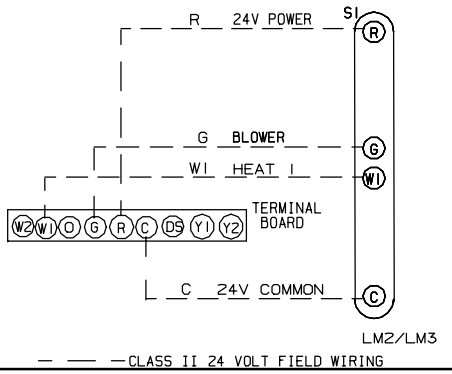
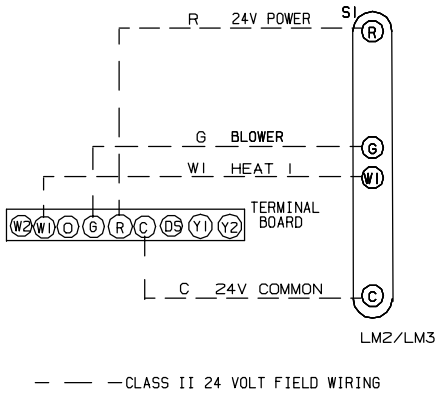
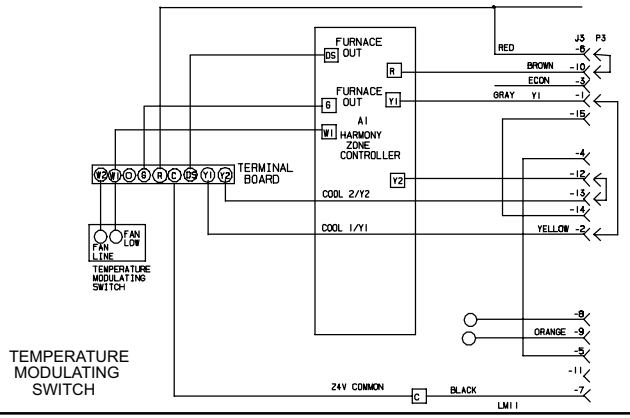
MATCH UP	T-STRIP JUMPER	COMMENTS OR SEQUENCE	WIRING CONNECTIONS
FOR HEATING JUMPERS SEE SEE HEATING SECTION ABOVE Harmony and Single-Speed Compressor	No Jumpers (Remove jumper from “Y1 to “DS”).	Remove pin #3 of the J73 terminal on the VSP control. Insulate end to prevent shorting. Blower operates on PWM signal generated by Harmony. Harmony overrides blower speed taps. Blower speed varies according to zone demand.	
Harmony and Two-Speed Compressor	No Jumpers (Remove jumper from “Y1 to “DS”).	Remove pin #3 of the J73 terminal on the VSP control. Insulate end to prevent shorting. Blower operates on PWM signal generated by Harmony. Harmony overrides blower speed taps. Blower speed varies according to zone demand.	

TABLE 36

G32V-4 OPERATION SEQUENCE AND JUMPERS SUMMARY WITH VSP3 (HEATING)

MATCH UP	T-Strip Jumper	Mode of Operation Jumper	COMMENTS OR SEQUENCE	WIRING CONNECTIONS
FOR COOLING JUMPERS SEE COOLING SECTION BELOW Single-Stage Heating with Single-Stage Thermostat	No Jumpers	One-Stage	Blower operates on high speed during the heating mode.	
Two-Stage Heating With Single-Stage Thermostat	No Jumpers	W2 Timed	Blower operates on low speed during the first stage of heating. Blower operates on high speed during second-stage heating.	
Harmony Heating	No Jumpers	Two-Stage	Remove pin #3 of the J73 plug on the VSP control, and pins #2 and 13 of the J49 plug at the motor. See figure 15 and 22. Insulate ends to prevent them from shorting. Blower operates on PWM signal generated by Harmony. Harmony overrides blower speed taps. Blower speed varies according to zone demand. Low and high fire controlled by temperature modulating switch.	

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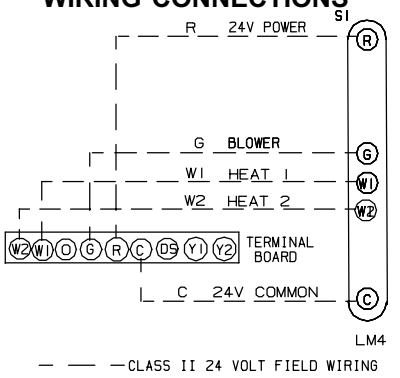
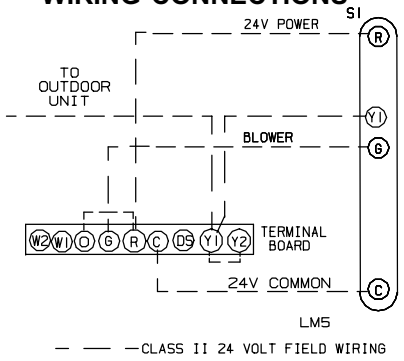
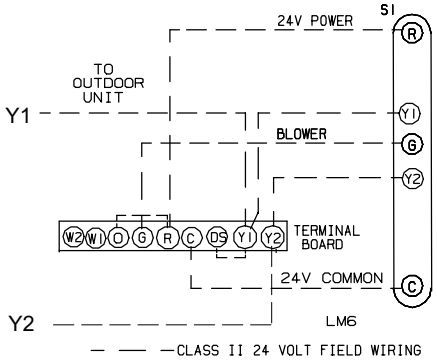
G32V-4 OPERATION SEQUENCE AND JUMPERS SUMMARY WITH VSP3 (HEATING CONTINUED)

MATCH UP	T-Strip Jumper	Mode of Operation Jumper	COMMENTS OR SEQUENCE	WIRING CONNECTIONS
Two-Stage Heating With Two-Stage Thermostat	No Jumpers	Two-Stage	Blower operates on low speed during first stage heating. Blower operates on high speed during second stage heating.	

G32V-4 OPERATION SEQUENCE AND JUMPERS SUMMARY WITH VSP3 (COOLING)

MATCH UP	T-STRIP JUMPER	COMMENTS OR SEQUENCE	WIRING CONNECTIONS
FOR HEATING JUMPERS SEE HEATING SECTION ABOVE Single-Speed Compressor, no CCB1, no Harmony	DS to Y1 and Y1 to Y2 and O to R (factory wired)	Blower operates on high speed during cooling.	
	Remove jumper DS to Y1	Blower operates on low speed during cooling.	
Two-Speed Compressor, no CCB1, no Harmony	DS to Y1 and O to R Remove factory-wired jumper Y1 to Y2.	Blower operates on low speed cool when compressor is in first stage cooling. Blower operates on high speed cool when compressor is in second stage cooling.	

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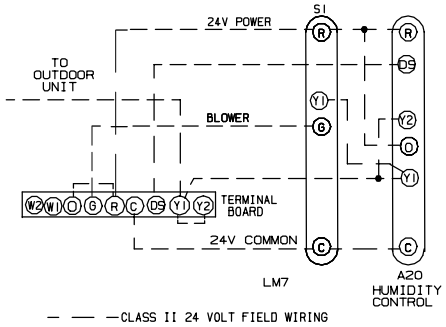
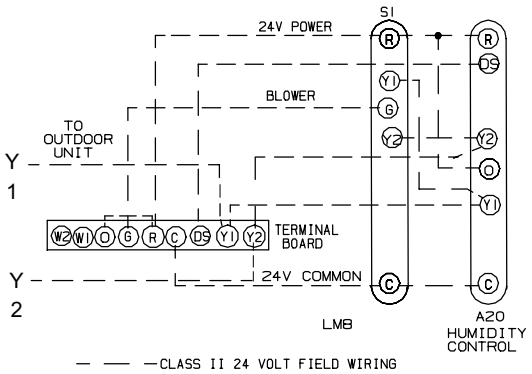
G32V-4 OPERATION SEQUENCE AND JUMPERS SUMMARY WITH VSP3 (COOLING CONTINUED)

MATCH UP	T-STRIP JUMPER	COMMENTS OR SEQUENCE	WIRING CONNECTIONS
FOR HEATING JUMPERS SEE HEATING SECTION ABOVE CCB1 with Single-Speed Compressor, no Harmony	Y1 to Y2 and O to R Remove the factory-wired jumper Y1 to DS.	Blower speed is controlled by the DC signal from CCB1. Blower operates on low speed during dehumidification. Otherwise, blower operates on high speed during cooling cycle.	
CCB1 with Two-Speed Compressor, no Harmony	O to R Remove jumper from Y1 to DS and Y1 to Y2.	See table 14.	

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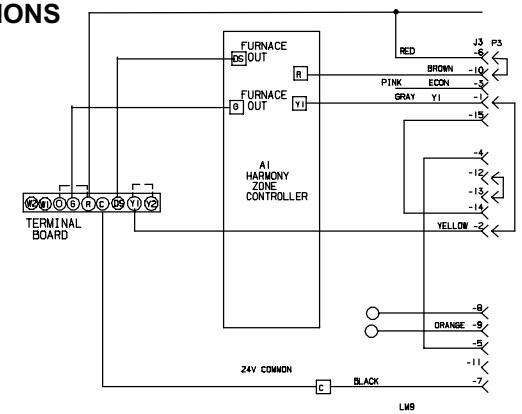
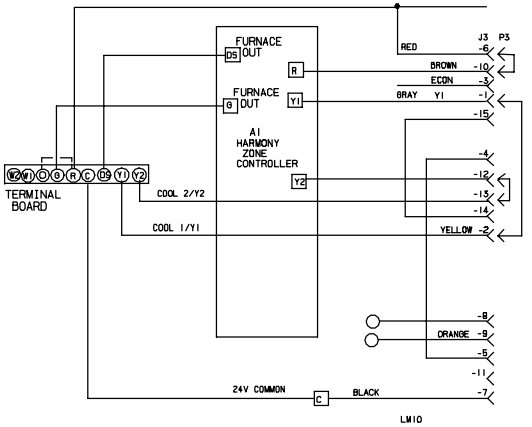
G32V-4 OPERATION SEQUENCE AND JUMPERS SUMMARY WITH VSP3 (COOLING CONTINUED)			
MATCH UP	**T-STRIP JUMPER**	**COMMENTS OR SEQUENCE**	**WIRING CONNECTIONS**
FOR HEATING JUMPERS SEE SEE HEATING SECTION ABOVE Harmony and Single-Speed Compressor	Y1 to Y2 and O to R (Remove jumper from Y1 to DS.)	Remove the wire from Pin #2 and Pin #13 of the J49 harness connector at the motor and the wire from Pin #3 of the J73 harness connector on the VSP control board. Insulate the wire ends and secure them to prevent shorting. Blower operates on PWM signal generated by the Harmony control board control board. The Harmony control board overrides blower speed taps. Blower speed varies according to the zone's demand.	
Harmony and Two-Speed Compressor	O to R (Remove jumper from Y1 to DS and Y1 to Y2.)	Remove the wire from Pin #2 and Pin #13 of the J49 harness connector at the motor and the wire from Pin #3 of the J73 harness connector on the VSP control board. Insulate the wire ends and secure them to prevent shorting. Blower operates on PWM signal generated by the Harmony control board. The Harmony control board overrides blower speed taps. Blower speed varies according to zone's demand.	

G32V-5 Units with Two Stage Variable Speed Control

TABLE 37
Field Wiring Applications

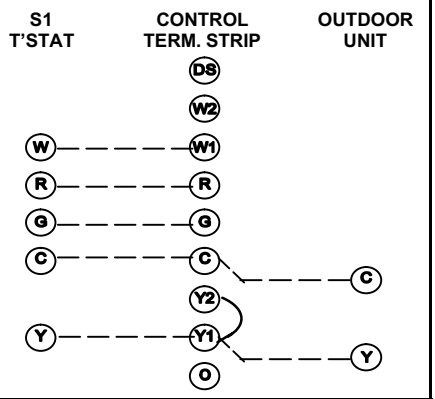
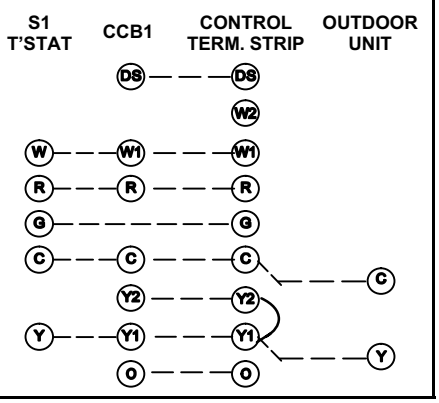
Thermostat	Jumper Settings (See figure 16)				Wiring Connections
	E20	W915	W914	W951	
1 Heat / 1 Cool *NOTE - Use dip switch 3 to set second-stage heat ON delay. ON-10 minutes. OFF-15 minutes.*	SINGLE	Yes	Intact	Intact	
1 Heat / 1 Cool with CCB1 *NOTE - Use dip switch 3 to set second-stage heat ON delay. ON-10 minutes. OFF-15 minutes.*	SINGLE	Yes	Cut	Intact	

TABLE 37
Field Wiring Applications (Continued)

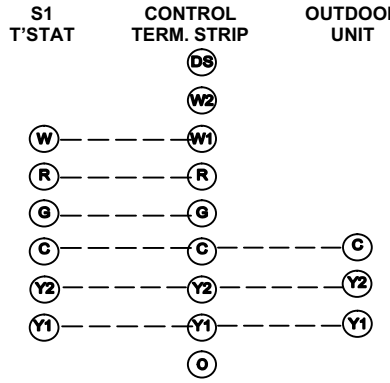
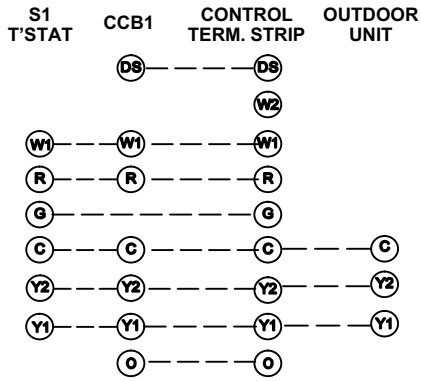
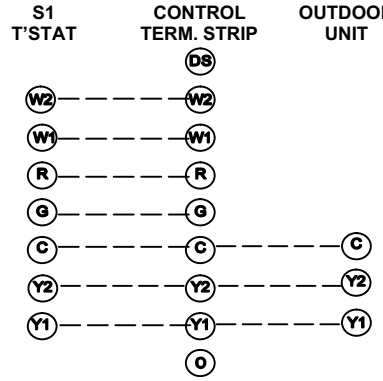
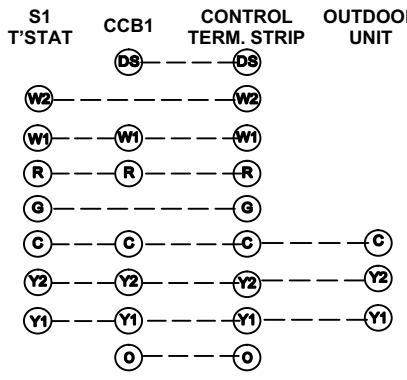
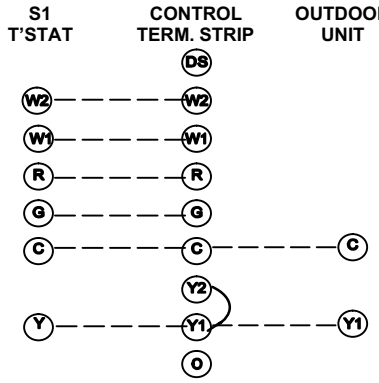
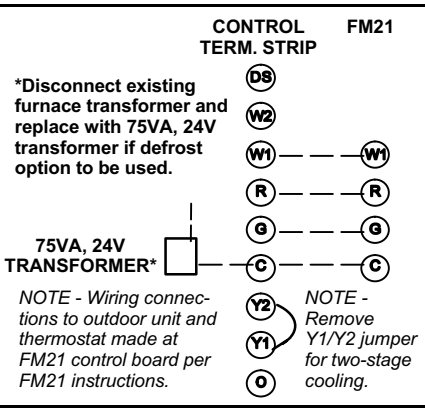
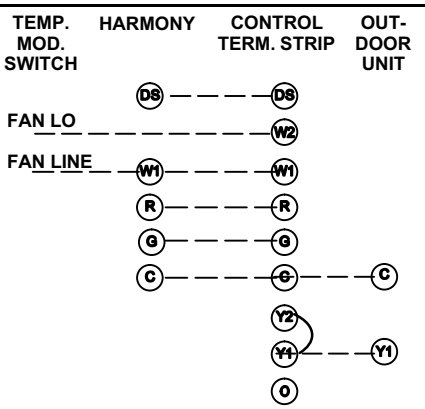
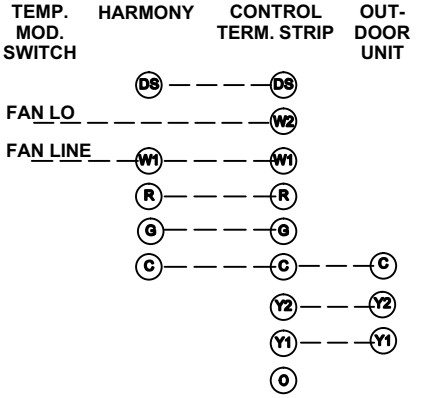
Thermostat	Jumper Settings (See figure 16)				Wiring Connections
	E20	W915	W914	W951	
1 Heat / 2 Cool *NOTE - Use dip switch 3 to set second-stage heat ON delay. ON-10 minutes. OFF-15 minutes.*	SINGLE	No	Intact	Intact	
1 Heat / 2 Cool with CCB1 *NOTE - Use dip switch 3 to set second-stage heat ON delay. ON-10 minutes. OFF-15 minutes.*	SINGLE	No	Cut	Intact	
2 Heat / 2 Cool	TWO	No	Intact	Intact	
2 Heat / 2 Cool with CCB1	TWO	No	Cut	Intact	

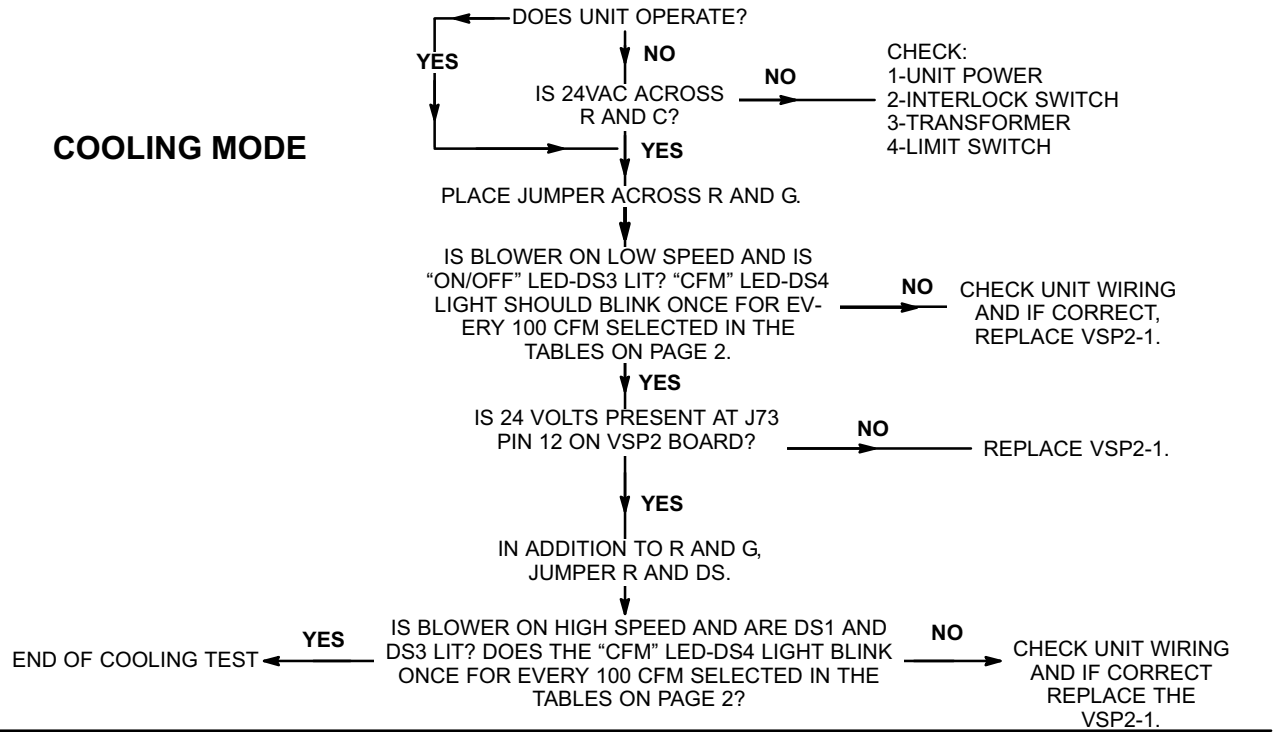
TABLE 37
Field Wiring Applications (Continued)

Thermostat	Jumper Settings (See figure 16)				Wiring Connections
	E20	W915	W914	W951	
2 Heat / 1 Cool	TWO	Yes	Intact	Intact	
FM21 Heat Pump / 1 Cool	SINGLE	Yes	Intact	Cut	
Harmony Application* 2 Heat / 1 Cool	TWO	Yes	Cut	Intact	
Harmony Application* 2 Heat / 2 Cool	TWO	No	Cut	Intact	

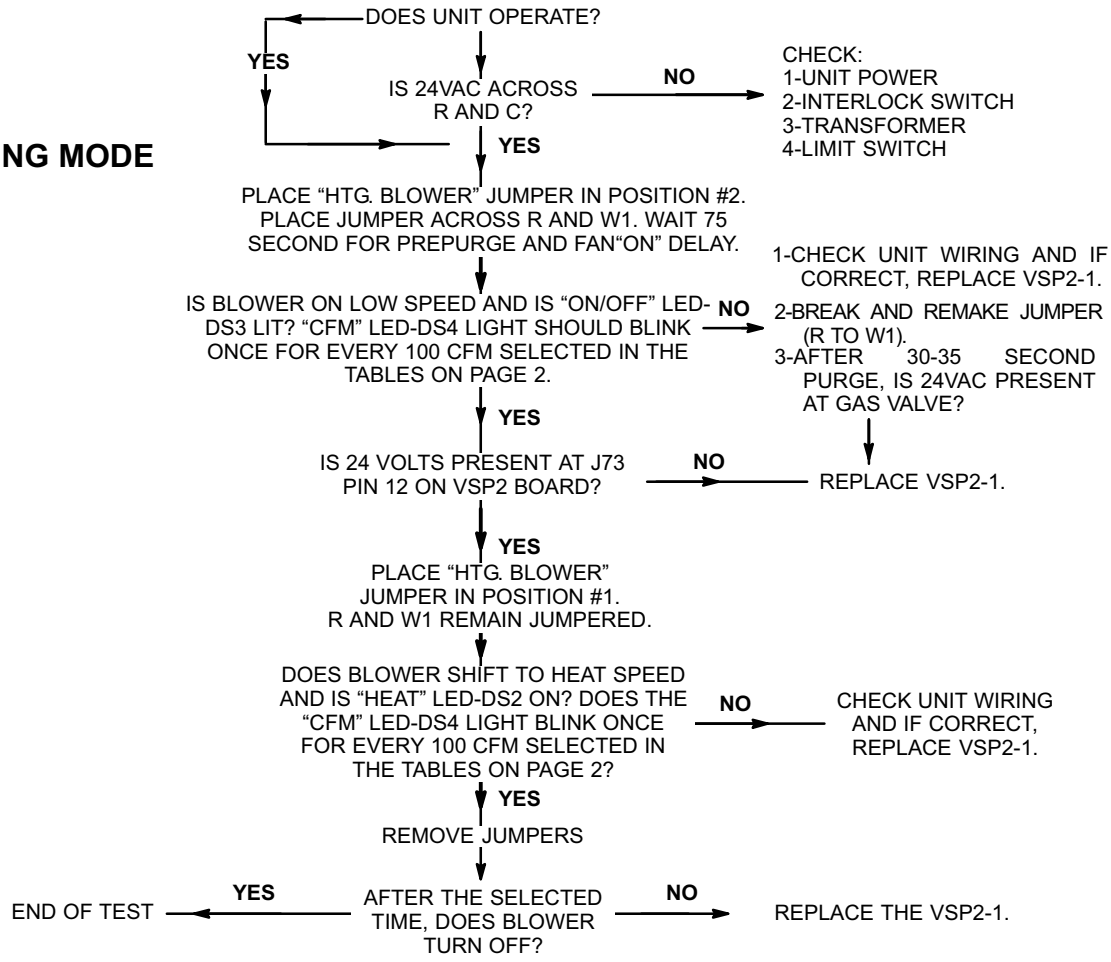
**Cut wires at pin positions 2 and 13 of J/P46. Insulate ends to prevent a short. Blower operates on PWM signal generated by Harmony. Harmony overrides blower speed taps. Blower speed varies according to zone demand. Low and high-fire controlled by temperature modulating switch.*

VIII- Troubleshooting
1- VSP2-1 Blower Control Board G32V-1 / -3 Units

COOLING MODE

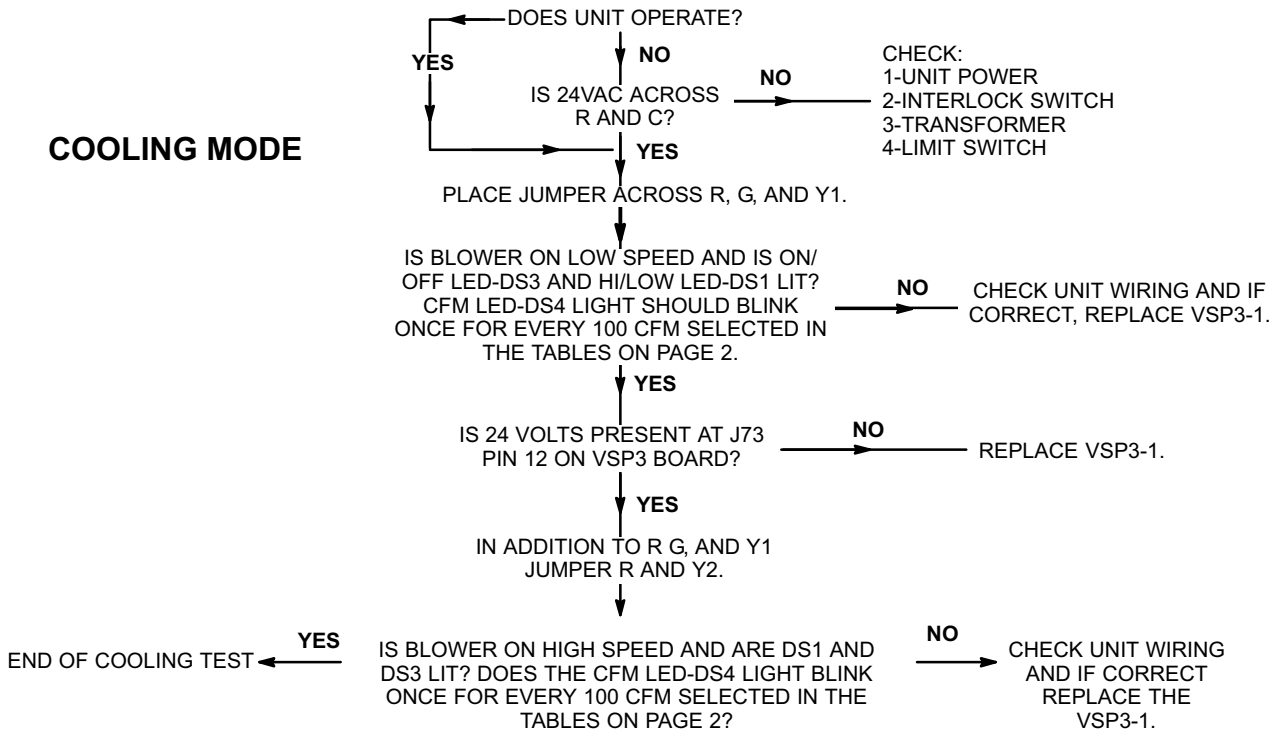


HEATING MODE

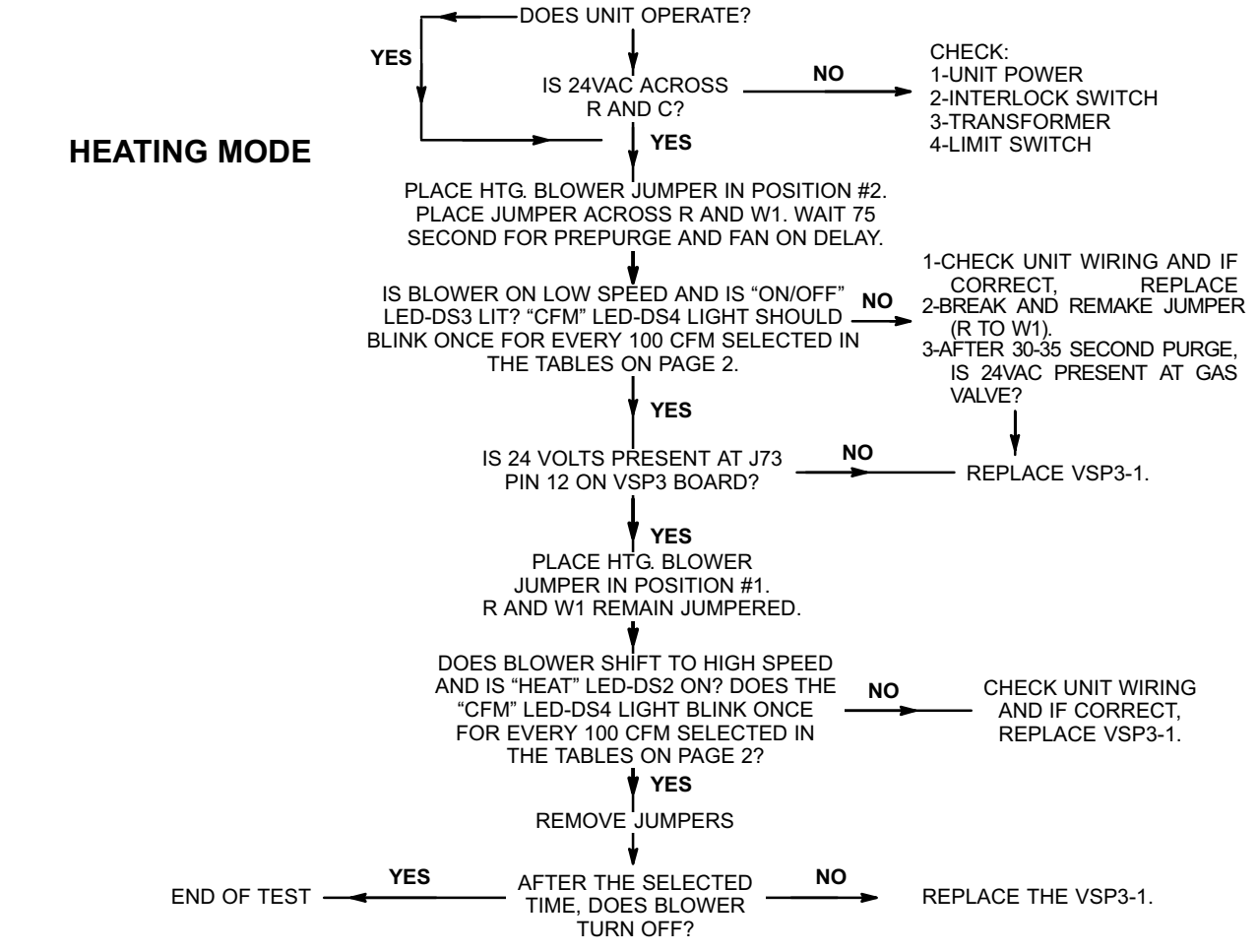


2- VSP3-1 Blower Control Board G32V-4 Units

COOLING MODE



HEATING MODE

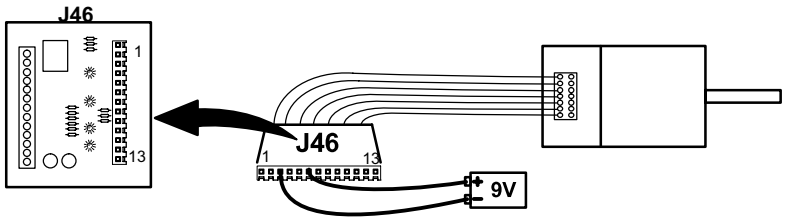


3- Variable Speed Blower Motor

To check-out the VSM blower and the blower control board, begin with the ICM2 motorand follow the check-out procedure as outlined. The ICM2 consist of a control module and motor. The control module can be replaced separately from the motor if necessary. However, if the motor fails the motor/module assembly must be replaced. To verify proper operation of the blower control board, check the board as outlined in the troubleshooting flowcharts on the previous page.

ICM-2 WITH VSP2

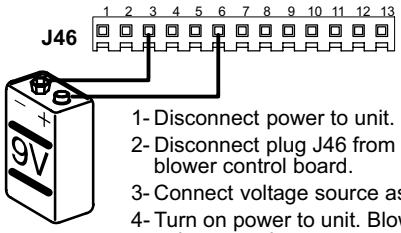
120V to the motor must not be interrupted. All connections for check out will be from the voltage source below (battery or 24V) to plug J46, after disconnecting from blower control board.



CHECK-OUT PROCEDURE USING BATTERY

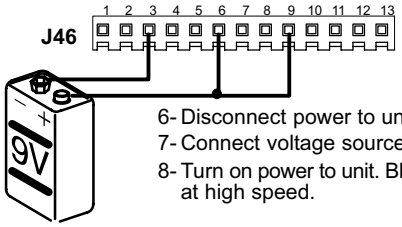
An ordinary 9 volt battery with maximum DC 20volts is recommended. A 9 volt battery will last for about one day of normal operation.

LOW SPEED CHECK-OUT



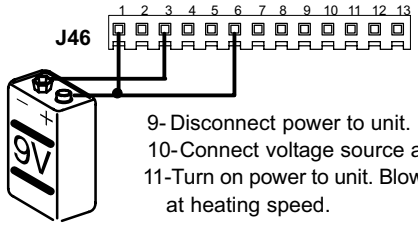
1- Disconnect power to unit.
2- Disconnect plug J46 from P46 located on the blower control board.
3- Connect voltage source as shown above.
4- Turn on power to unit. Blower should operate at low speed.

HIGH SPEED CHECK-OUT



6- Disconnect power to unit.
7- Connect voltage source as shown above.
8- Turn on power to unit. Blower should operate at high speed.

HEATING SPEED CHECK-OUT

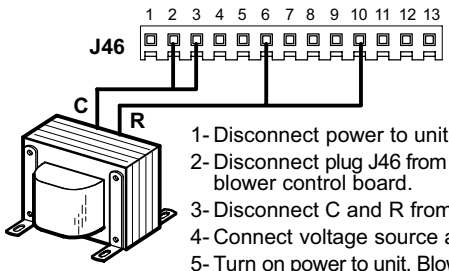


9- Disconnect power to unit.
10- Connect voltage source as shown above.
11- Turn on power to unit. Blower should operate at heating speed.

CHECK-OUT PROCEDURE USING 24V SOURCE

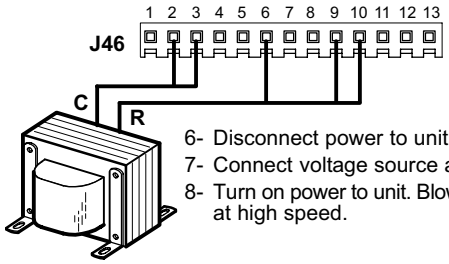
Unit transformer T1 with a maximum AC 30 volts may be used in lieu of a battery. If transformer T1 is used, double check all wiring connections before placing unit back in operation.

LOW SPEED CHECK-OUT



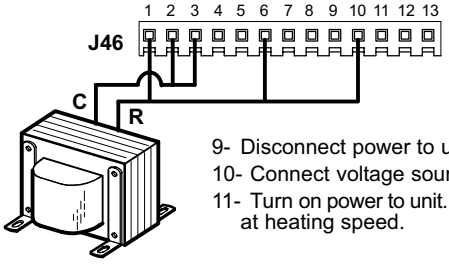
1- Disconnect power to unit.
2- Disconnect plug J46 from P46 located on the blower control board.
3- Disconnect C and R from control board.
4- Connect voltage source as shown above.
5- Turn on power to unit. Blower should operate at low speed.

HIGH SPEED CHECK-OUT



6- Disconnect power to unit.
7- Connect voltage source as shown above.
8- Turn on power to unit. Blower should operate at high speed.

HEATING SPEED CHECK-OUT



9- Disconnect power to unit.
10- Connect voltage source as shown above.
11- Turn on power to unit. Blower should operate at heating speed.

A kit is available from the Lennox parts center to use in testing the variable speed motor. The kit 70J11 includes a test plug harness to facilitate ICM-2 check-out. **Follow testing procedures outlined in the instructions provided with the kit. The testing procedures are different than those listed above.**

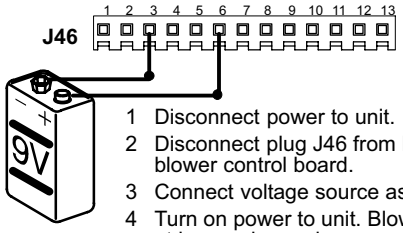
ICM-2 WITH VSP3

120V to the motor must not be interrupted. All connections for check out will be from the voltage source below (battery or 24V) to plug J46, after disconnecting from blower control board.

CHECK-OUT PROCEDURE USING BATTERY

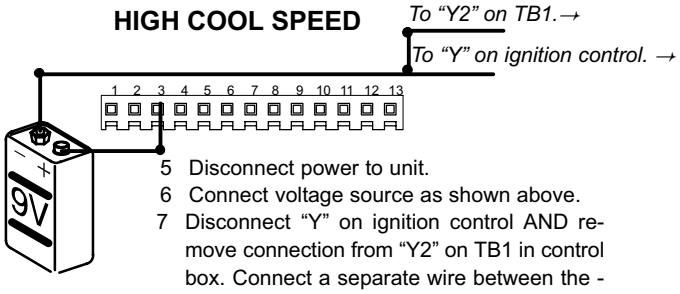
An ordinary 9 volt battery with maximum DC 20volts is recommended. A 9 volt battery will last for about one day of normal operation.

LOW COOL SPEED



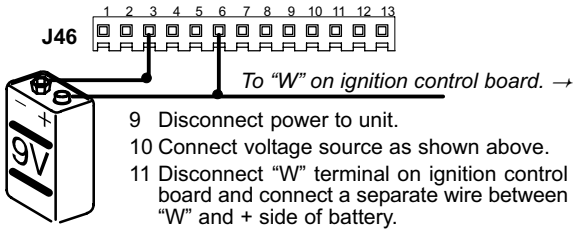
1 Disconnect power to unit.
2 Disconnect plug J46 from P46 located on the blower control board.
3 Connect voltage source as shown above.
4 Turn on power to unit. Blower should operate at low cool speed.

HIGH COOL SPEED



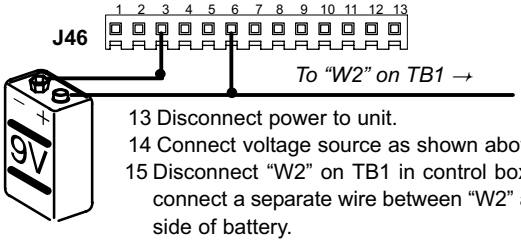
5 Disconnect power to unit.
6 Connect voltage source as shown above.
7 Disconnect "Y" on ignition control AND remove connection from "Y2" on TB1 in control box. Connect a separate wire between the - side of the battery and BOTH "Y" on the ignition control and Y2" on TB1.
8 Turn on power to unit. Blower should operate at high cool speed.

LOW HEAT SPEED



9 Disconnect power to unit.
10 Connect voltage source as shown above.
11 Disconnect "W" terminal on ignition control board and connect a separate wire between "W" and + side of battery.
12 Turn on power to unit. Blower should operate at low heat speed.

HIGH HEAT SPEED

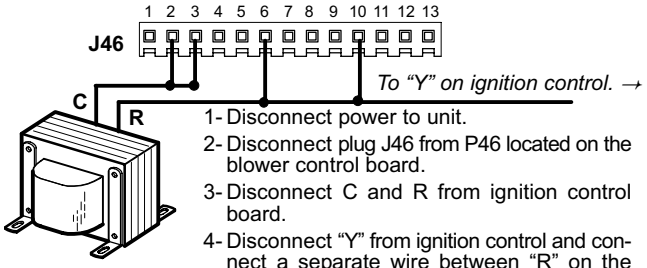


13 Disconnect power to unit.
14 Connect voltage source as shown above.
15 Disconnect "W2" on TB1 in control box and connect a separate wire between "W2" and + side of battery.
16 Turn on power to unit. Blower should operate at high heat speed.

CHECK-OUT PROCEDURE USING 24V SOURCE

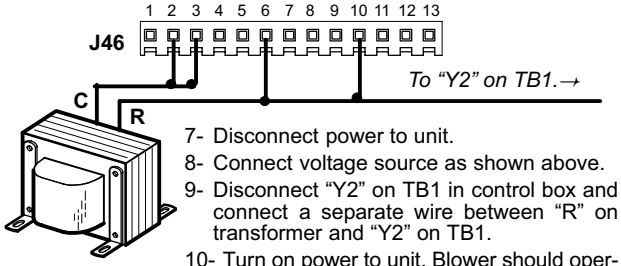
Unit transformer T1 with a maximum AC 30 volts may be used in lieu of a battery. If transformer T1 is used, double check all wiring connections before placing unit back in operation.

LOW COOL SPEED



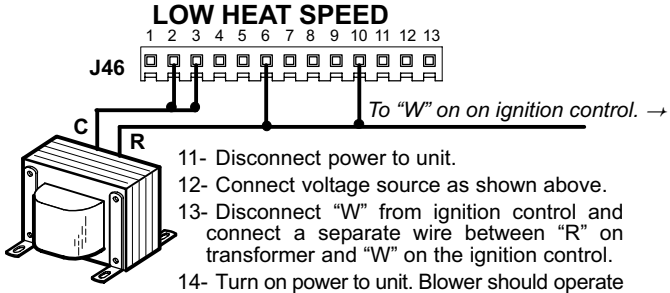
1- Disconnect power to unit.
2- Disconnect plug J46 from P46 located on the blower control board.
3- Disconnect C and R from ignition control board.
4- Disconnect "Y" from ignition control and connect a separate wire between "R" on the transformer and "Y" on the ignition control.
5- Connect voltage source as shown above.
6- Turn on power to unit. Blower should operate at low cool speed.

HIGH COOL SPEED



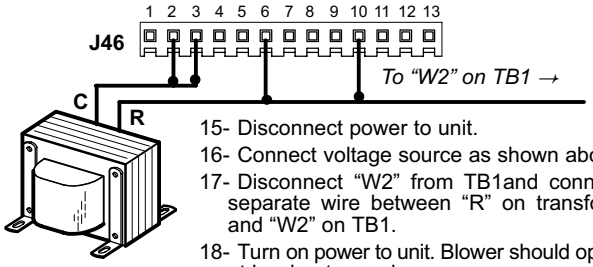
7- Disconnect power to unit.
8- Connect voltage source as shown above.
9- Disconnect "Y2" on TB1 in control box and connect a separate wire between "R" on transformer and "Y2" on TB1.
10- Turn on power to unit. Blower should operate at high cool speed.

LOW HEAT SPEED



11- Disconnect power to unit.
12- Connect voltage source as shown above.
13- Disconnect "W" from ignition control and connect a separate wire between "R" on transformer and "W" on the ignition control.
14- Turn on power to unit. Blower should operate at low heat speed.

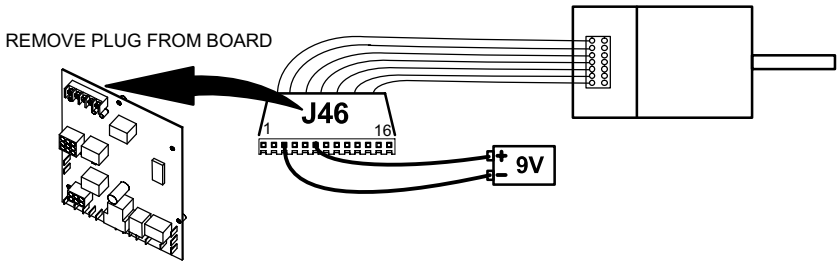
HIGH HEAT SPEED



15- Disconnect power to unit.
16- Connect voltage source as shown above.
17- Disconnect "W2" from TB1and connect a separate wire between "R" on transformer and "W2" on TB1.
18- Turn on power to unit. Blower should operate at low heat speed.

ICM-2 WITH TWO STAGE VARIABLE SPEED CONTROL BOARD

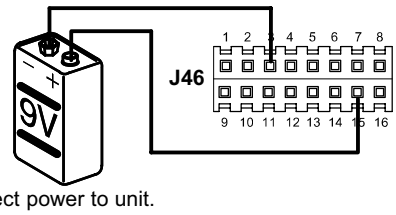
120V to the motor must not be interrupted. All connections for check out will be from the voltage source below (battery or 24V) to plug J46, after disconnecting from blower control board.



CHECK-OUT PROCEDURE USING BATTERY

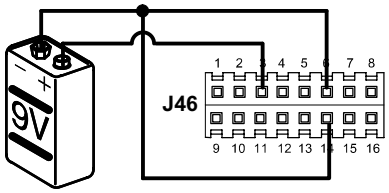
An ordinary 9 volt battery with maximum DC 20volts is recommended. A 9 volt battery will last for about one day of normal operation.

LOW COOL SPEED



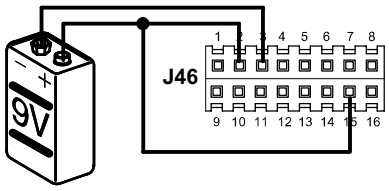
1 Disconnect power to unit.
2 Disconnect plug J46 from P46 located on the blower control board.
3 Connect voltage source as shown above.
4 Turn on power to unit. Blower should operate at low cool speed.

HIGH COOL SPEED



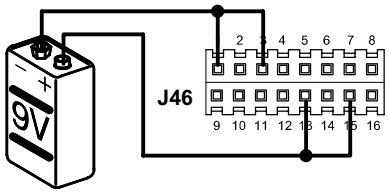
5 Disconnect power to unit.
6 Connect voltage source as shown above.
7 Turn on power to unit. Blower should operate at high cool speed.

LOW HEAT SPEED



8 Disconnect power to unit.
9 Connect voltage source as shown above.
10 Turn on power to unit. Blower should operate at low heat speed.

HIGH HEAT SPEED

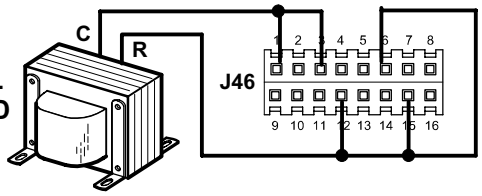


11 Disconnect power to unit.
12 Connect voltage source as shown above.
13 Turn on power to unit. Blower should operate at high heat speed.

CHECK-OUT PROCEDURE USING 24V SOURCE

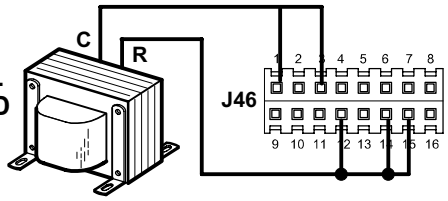
Unit transformer T1 with a maximum AC 30 volts may be used in lieu of a battery. If transformer T1 is used, double check all wiring connections before placing unit back in operation.

LOW COOL SPEED



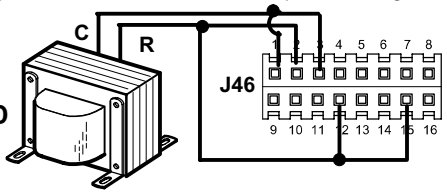
1 Disconnect power to unit.
2 Disconnect plug J46 from P46 located on the blower control board.
3 Connect voltage source as shown above.
4 Turn on power to unit. Blower should operate at low cool speed.

HIGH COOL SPEED



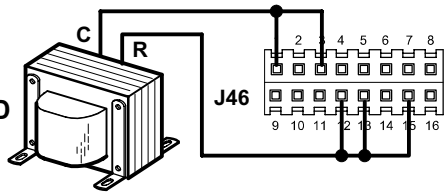
5 Disconnect power to unit.
6 Connect voltage source as shown above.
7 Turn on power to unit. Blower should operate at high cool speed.

LOW HEAT SPEED



8 Disconnect power to unit.
9 Connect voltage source as shown above.
10 Turn on power to unit. Blower should operate at low heat speed.

HIGH HEAT SPEED



11 Disconnect power to unit.
12 Connect voltage source as shown above.
13 Turn on power to unit. Blower should operate at high heat speed.

4- SureLight Control Board

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

Unless otherwise noted, condition applies to all G32V units.

PROBLEM: 1 UNIT FAILS TO OPERATE IN THE COOLING, HEATING, OR CONTINUOUS FAN MODE		
Condition	**Possible Cause**	**Corrective Action / Comments**
1.1 - Both diagnostic lights fail to light up. LED#1-Off LED#2-Off	**1.1.1** Main voltage 120V not supplied to unit.	**ACTION 1 -** Check 120V main voltage. Determine cause of main power failure.
	1.1.2 Miswiring of furnace or improper connections.	**ACTION 1 -** Check for correct wiring of 120V to power make up box and transformer. **ACTION 2** - Check 24V wiring to control board.
	1.1.3 Circuit breaker tripped or fails to close.	**ACTION 1 -** Replace circuit breaker if it is reset but does not have continuity. **ACTION 2 -** If circuit breaker still trips, check for short.
	1.1.4 Door interlock switch failure.	**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
	1.1.5 Transformer Failure.	**ACTION 1 -** Check that transformer output is 24V. Replace if malfunctioning
	1.1.6 Failed control board.	**ACTION 1 -** If all the above items have been checked, replace board.
1.2 **G32V-1 through -4 Units Only** - Diagnostic lights flash the roll-out code. LED#1-On, LED#2-Slow Flash	**1.2.1** Roll-out switch open.	**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.
	1.2.2 Roll-out switch failure.	**ACTION 1 -** Check continuity across roll-out switch. Replace roll-out switch if switch is reset but does not have continuity.
	1.2.3 Miswiring or improper connections at roll-out switch.	**ACTION 1 -** Check wiring connections to switch.
	1.2.4 Nine pin connector failure	**ACTION 1 -** Check 9-pin connector for proper connection to control board. **ACTION 2 -** Check continuity of the multi plug pin.
1.3 - On initial power-up the comb. air blower does not energize. - Diagnostic lights flash the reverse polarity code. LED#1-Fast Flash, LED#2-Slow Flash.	**1.3.1** 120V main power polarity reversed.	**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.
1.4 **G32V-1 through -4 Units Only** - On initial power up the combustion air blower does not energize. - Diagnostic lights flash normal power on operation. LED#1-Slow Flash LED#2-Slow Flash	**1.4.1** Open combustion air blower motor circuit.	**ACTION 1 -** Check for 120V to combustion air blower. If no power, check wire and connections.
	1.4.2 Failed combustion air blower motor.	**ACTION 1 -** If power is present at blower, replace blower.

PROBLEM 1: UNIT FAILS TO OPERATE IN THE COOLING, HEATING, OR CONTINUOUS FAN MODE		
Condition	**Possible Cause**	**Corrective Action / Comments**
1.5 - On initial power-up the combustion air blower remains energized. - Diagnostic lights flash the improper main ground. LED#1-Alternating Fast Flash LED#2-Alternating Fast Flash	**1.5.1** Improper ground to the unit.	**ACTION 1 -** Check that the unit is properly grounded. **ACTION 2 -** Install a proper main ground to the unit
	1.5.2 6-Pin connector is improperly attached to the circuit board.	**ACTION 1 -** Check 6-pin connector for proper installation. Correctly insert connector into control.
	1.5.3 Line voltage is below 75V.	**ACTION 1 -** Check that the line voltage is above 75V. Determine cause of voltage drop and supply correct voltage to the control.
PROBLEM 2: UNIT FAILS TO OPERATE IN THE COOLING OR HEATING MODE, BUT COMBUSTION AIR BLOWER OPERATES CONTINUOUS. G32V-1 through -4 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**
2.1 - On initial power-up the combustion air blower remains energized. - Diagnostic lights flash the improper main ground. - G32V-1 to -4 Units with control boards date coded after Nov.1 1997; combustion air blower will cycle 5 seconds on 55 seconds off. LED#1-Alternating Fast Flash LED#2-Alternating Fast Flash	**2.1.1** Open ignitor circuit.	**ACTION 1 -** Check for correct wiring and loose connections in the ignitor circuit. Check multi - plug connections for correct installation.
	2.1.2 Broken or failed ignitor.	**ACTION 1 -** Unplug ignitor and read resistance across ignitor. If resistance does not read between 10.9 and 19.7 ohms, replace the ignitor.
PROBLEM 3: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER DOES NOT ENERGIZE		
Condition	**Possible Cause**	**Corrective Action / Comments**
3.1 - 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. LED#1-Slow Flash, LED#2-On	**3.1.1** Primary or secondary (if equipped) or rollout limit switch open.	**ACTION 1 -** Check continuity across switch(es). Switches reset automatically upon cool down. **Rollout switch must be reset manually.** **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.
	3.1.2 Miswiring of furnace or improper connections at limit switch(es).	**ACTION 1 -** Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.
3.2 - 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. LED#1-Off, LED#2-Slow Flash	**3.2.1** 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.
	3.2.2 Pressure switch stuck closed.	**ACTION 1 -** Check that the pressure switch is open without the combustion air blower operating. Replace if malfunctioning

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 - 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	**3.3.1** 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 - 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	**4.1.1** Pressure switch does not close due to incorrect routing of the pressure switch tubing.	**ACTION 1 -** Check that the pressure switch tubing is correctly routed. Correctly route pressure switch tubing.
	4.1.2 Pressure switch does not close due to obstructions in the pressure tubing.	**ACTION 1 -** Remove any obstructions from the pressure tubing and/or taps.
	4.1.3 Pressure switch tubing damaged	**ACTION 1 -** Check pressure switch tubing for leaks. Replace any broken tubing.
	4.1.4 Condensate in pressure switch tubing.	**ACTION 1 -** Check pressure switch tubing for condensate. Remove condensate from tubing. Check that the condensate tubing is located correctly.
	4.1.5 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.
	4.1.6 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.
	4.1.7 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.
	4.1.8 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**
5.1 - Unit operates with a cooling and continuous fan demand. - Combustion air blower energizes with Heating demand. - Ignitor is energized but unit fails to light. LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash	**5.1.1** Check that gas is being supplied to the unit.	**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.
	5.1.2 Miswiring of gas valve or loose connections at multi-pin control amp plugs or valve.	**ACTION 1 -** Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.
	5.1.3 Malfunctioning gas valve or ignition control.	**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.
PROBLEM 6: BURNERS LIGHT WITH A HEATING DEMAND BUT UNIT SHUTS DOWN PREMATURELY		
Condition	**Possible Cause**	**Corrective Action/Comments**
6.1 - 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. LED#1-Off LED#2-Slow Flash	**6.1.1** Wrong concentric vent kit used for terminating the unit.	**ACTION 1 -** Check vent termination kit installed. 1-1/2" dia. concentric vent (kit60G77) for 50 and 75 inputs and 2" dia. concentric vent (kit 33K97) for 100 &125 inputs.
	6.1.2 Condensate drain line is not draining properly.	**ACTION 1 -** Check condensate line for proper vent slope, and any blockage. Condensate should flow freely during operation of furnace. Repair or replace any improperly installed condensate lines.
	6.1.3 Low pressure differential at the pressure switch.	**ACTION 1 -** Check for restricted vent inlet or exhaust. Remove all blockage. **ACTION 2:** Check for proper vent sizing. See installation instructions.
6.2 - Combustion air blower energizes with a heating demand. - Burners light but fail to stay lit. - After 5 tries the control diagnostics flash the watchguard burners failed to ignite code. LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash	**6.2.1** Sensor or sense wire is improperly installed.	**ACTION 1 -** Check that sensor is properly located (page 10) and that the sense wire is properly attached to both the sensor and the control.
	6.2.2 Sensor or sense wire is broken.	**ACTION 1 -** Check for a broken sensor. **ACTION 2 -** Test continuity across the sense wire. If wire or sensor are damaged replace the component.
	6.2.3 Sensor or sensor wire is grounded to the unit.	**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.
	6.2.4 Control does not sense flame.	**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.

PROBLEM 6: BURNERS LIGHT WITH HEATING DEMAND BUT UNIT SHUTS DOWN PREMATURELY (CONT.)		
Condition	**Possible Cause**	**Corrective Action/Comments**
6.3 - Combustion air blower energizes with a heating demand. - Burners light. - Roll-out switch trips during the heating demand. - Diagnostic lights flash roll-out failure. **G32V-1 through -4 Units Only** LED#1-On LED#2-Slow Flash **G32V-5 Units** LED#1-Slow Flash LED#2-On	**6.3.1** Unit is firing above 100% of the nameplate input.	**ACTION 1 -** Check that the manifold pressure matches value listed on nameplate. See installation instructions for proper procedure. **ACTION 2 -** Verify that the installed orifice size match the size listed on the nameplate or installation instructions. **ACTION 3 -** Check gas valve sensing hose to insure no leaks are present. **ACTION 4 -** Check the input rate to verify rate matches value listed on nameplate.
	6.3.2 Gas orifices leak at the manifold connection.	**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).
	6.3.3 Air leakage at the connections between the primary heat exchanger, secondary heat exchanger, and combustion air blower.	**ACTION 1 -** Check for air leakage at all joints in the heat exchanger assembly. Condition may cause high CO2 with high CO. **ACTION 2 -** Seal leakage if possible (high temperature silicon is recommended), replace heat exchanger if necessary, tag and return heat exchanger to proper Lennox personnel.
	6.3.4 Insufficient flow through the heat exchanger caused by a sooted or restricted heat exchanger.	**ACTION 1 -** Check for sooting deposits or other restrictions in the heat exchanger assembly. Clean assembly as outlined in instruction manual. **ACTION 2 -** For G32V gas furnaces, check for proper combustion and flow. CO2 should measure between 7.9% and 8.5% for high fire and between 5.5% and 6.3% for low fire. CO should measure below .04% (400PPM) in an air-free sample of flue gases.
	6.3.5 Burners are not properly located in the burner box.	**ACTION 1 -** Check that the burners are firing into the center of the heat exchanger openings. Correct the location of the burners if necessary.
6.4 **-** Combustion air blower energizes with a heating demand. - Burners light roughly and the unit fails to stay lit. - Diagnostic lights flash watchguard flame failure. LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash	**6.4.1** Recirculation of flue gases. This condition causes rough ignitions and operation. Problem is characterized by nuisance flame failures.	**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. **ACTION 2 -** Check for correct intake and exhaust vent installation.
	6.4.2 Improper burner cross-overs	**ACTION 1 -** Remove burner and inspect the cross-overs for burrs, or any restriction or if cross-over is warped. Remove restriction or replace burners.

PROBLEM 6: BURNERS LIGHT WITH HEATING DEMAND BUT UNIT SHUTS DOWN PREMATURELY (CONT.)		
6.5 - 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. LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash	**6.5.1** Loose sensor wire connection causes intermittent loss of flame signal.	**ACTION 1 -** Check that the sensor is properly located. **ACTION 2 -** Check that the sense wire is properly attached to both the sensor and the control. Pay extra attention to the pin connectors.
PROBLEM 7: CONTROL SIGNALS LOW FLAME SENSE DURING HEATING MODE		
Condition	**Possible Cause**	**Corrective Action/Comments**
7.0 - Unit operates correctly but the diagnostic lights flash low flame sense code. LED#1-Slow Flash LED#2-Fast Flash	**7.1.1** Sense rod is improperly located on the burner.	**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.
	7.1.2 Sense rod is contaminated.	**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.
PROBLEM 8: RF STATIC DURING TIME FOR IGNITION		
Condition	**Possible Cause**	**Corrective Action/Comments**
8.0 - AM radio interference	**8.1.1** Ignitor operation	**ACTION 1-** Call Technical Support, Dallas