LENNOX

Service Literature

UNIT INFORMATION

100157

EL180UHNEK

EL180UHNEK With R-454B SERIES UNITS

EL180UHNEK series units are mid-efficiency gas furnaces used for upflow or horizontal applications only, manufactured with heat exchangers formed of aluminized steel tubes. EL180UHNEK units are available in heating capacities of 40,000 to 100,000 Btuh and cooling applications 2 to 5 tons. Refer to Engineering Handbook for proper sizing.

EL180UHNEK model units are equipped with a hot surface ignition system. The EL180UHNEK unit meets the new California 14 ng/J Nitrogen Oxides (NOx) Standards and California Seasonal Efficiency requirements. All units use a redundant gas valve to assure safety shut-off as required by

C.S.A.

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

⚠ WARNING

This furnace is equipped with an ignition control factory enabled for use with A2L refrigerant systems. Disabling the refrigerant detection functionality on A2L system is prohibited by safety codes. Refer to furnace installation instructions for refrigerant system setup.

⚠ 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 licensed professional HVAC installer or equivalent, service agency, or the gas supplier.

⚠ 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.

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SPECIFICATIONS

	Model	EL180UH 040NE36AK	EL180UH 060NE36AK	EL180UH 080NE48BK	EL180UH 100NE60CK
Gas Heating Performance	[1] AFUE	80%	80%	80%	80%
	Input - Btuh	40,000	60,000	80,000	100,000
	Output - Btuh	33,000	48,000	64,000	80,000
	Temperature rise range - °F	20 - 50	30 - 60	30 – 60	35 – 65
Gas Manifold Pressure (in. w.g.) Nat. Gas Only		0.05	0.05	0.05	0.05
High Static - in. w.g.		0.50	0.50	0.50	0.50
Connections	Flue connection - in. round	4	4	4	4
	[2] Air Intake - in. round	2	2	2	2
	Gas pipe size IPS	1/2	1/2	1/2	1/2
Indoor Blower	Wheel diameter x width - in.	10 x 8	10 x 8	10 x 10	11-1/2 x 10
	Motor Type	DC Brushless	DC Brushless	DC Brushless	DC Brushless
	Motor output - hp	1/2	1/2	3/4	1
	Tons of add-on cooling	1.5 - 3	1.5 - 3	2.5 - 4	3 - 5
	Air Volume Range - cfm	350 - 1380	395 - 1415	750 - 1785	920 - 2315
Electrical Data	Voltage	120 volts - 60 hertz - 1 phase			
	Blower motor full load amps	6.8	6.8	8.4	10.9
	Maximum overcurrent protection	15	15	15	15
Shipping Data	lbs. - 1 package	119	119	140	157

NOTE - Filters and provisions for mounting are not furnished and must be field provided.

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

[2] Requires furnished Air Intake Pipe Assembly.

OPTIONAL ACCESSORIES - ORDER SEPARATELY

		"A" Width Models	"B" Width Models	"C" Width Models
CABINET ACCESSORIES				
Horizontal Suspension Kit - Horizontal only		**51W10**	**51W10**	**51W10**
Return Air Base - Upflow only		**N/A**	**50W98**	**50W99**
High Performance Economizer (Commercial Only)		**10U53**	**10U53**	**10U53**
CONTROLS				
E30 Smart Wi-Fi Thermostat		**20A65**	**20A65**	**20A65**
Remote Outdoor Temperature Sensor		**X2658**	**X2658**	**X2658**
Blower Relay Kit (for two-stage outdoor units)		**85W66**	**85W66**	**85W66**
Furnace Twinning Panel		**Y3653**	**Y3653**	**Y3653**
Furnace Twinning Kit		**16W72**	**16W72**	**16W72**
Transformer (75VA)		**27J32**	**27J32**	**27J32**
FILTERS				
[1] Air Filter and Rack Kit	Horizontal (end)	**87L95**	**87L96**	**87L97**
	Size of filter - in.	14 x 25 x 1	18 x 25 x 1	20 x 25 x 1
	Side Return Single	**N/A**	**44J22**	**44J22**
	Ten Pack	**N/A**	**66K63**	**66K63**
	Size of filter - in.	**N/A**	16 x 25 x 1	16 x 25 x 1
INTAKE / VENTING				
Combustion Air Intake Muffler Kit		**29K98**	**29K98**	**29K98**
Low Profile Air Intake Pipe Kit - 2 in.		**25B23**	**25B23**	**25B23**
Vent Adaptor − 6 in. conn. size upflow applications only		**18M79**	**18M79**	**18M79**

[1] Cleanable polyurethane, frame-type filter.

HIGH ALTITUDE OPERATION

Units may be installed at altitudes up to 7500 ft. above sea level without any modification.

REFRIGERANT DETECTION SYSTEM (RDS) COMPONENTS

Description	Order No.
Refrigerant Detection System (RDS) Coil Sensor Kit	**27V53**

BLOWER DATA

EL180UH040NE36AK PERFORMANCE (Less Filter)

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds									
	High (Black)		Medium-High (Brown)		Medium (Blue)		Medium-Low (Yellow)		Low (Red)	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1423	235	1194	141	1079	107	1100	107	1101	109
0.10	1389	251	1146	156	1007	111	963	98	945	94
0.20	1355	267	1098	171	935	115	826	89	789	79
0.30	1315	280	1068	184	881	126	768	97	646	75
0.40	1278	287	1022	194	837	133	709	108	593	84
0.50	1247	303	978	203	782	144	646	116	529	92
0.60	1199	317	948	216	719	151	602	126	471	102
0.70	1176	328	899	228	679	163	537	131	422	106
0.80	1128	344	860	235	627	172	500	141	382	115
0.90	1075	347	821	246	577	179	454	146	320	118
1.00	966	322	771	256	546	188	416	154	292	121

EL180UH060NE36AK PERFORMANCE (Less Filter)

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds									
	High (Black)		Medium-High (Brown)		Medium (Blue)		Medium-Low (Yellow)		Low (Red)	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1423	235	1194	141	1079	107	1100	107	1101	109
0.10	1389	251	1146	156	1007	111	963	98	945	94
0.20	1355	267	1098	171	935	115	826	89	789	79
0.30	1315	280	1068	184	881	126	768	97	646	75
0.40	1278	287	1022	194	837	133	709	108	593	84
0.50	1247	303	978	203	782	144	646	116	529	92
0.60	1199	317	948	216	719	151	602	126	471	102
0.70	1176	328	899	228	679	163	537	131	422	106
0.80	1128	344	860	235	627	172	500	141	382	115
0.90	1075	347	821	246	577	179	454	146	320	118
1.00	966	322	771	256	546	188	416	154	292	121

EL180UH080NE48B PERFORMANCE (Less Filter)

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds									
	High (Black)		Medium-High (Brown)		Medium (Blue)		Medium-Low (Yellow)		Low (Red)	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1881	400	1709	276	1560	221	1495	189	1293	135
0.10	1828	419	1640	297	1503	238	1440	209	1240	147
0.20	1775	438	1571	318	1446	255	1385	229	1187	159
0.30	1727	457	1515	335	1393	275	1323	244	1110	173
0.40	1676	473	1477	349	1340	292	1263	259	1058	190
0.50	1632	490	1422	376	1290	309	1200	276	991	201
0.60	1575	509	1370	391	1227	326	1154	290	922	218
0.70	1502	507	1309	407	1171	343	1092	305	869	232
0.80	1335	460	1267	422	1114	357	1043	320	804	243
0.90	1115	395	1091	381	1047	367	984	334	735	255
1.00	829	310	845	322	846	318	858	321	669	266

EL180UH100NE60CK (Less Filter)

External Static Pressure in. w.g.	Air Volume / Watts at Different Blower Speeds																			
	Bottom Return Air, Side Return Air with Return Air from Both Sides or Return Air from Bottom and One Side.										**Single Side Return Air** - Air volumes in **bold** (over 1800 cfm) require Optional Return Air Base and field fabricated transition to accommodate 20 x 25 x 1 in. air filter in order to maintain proper air velocity.									
	High (Black)		Medium-High (Brown)		Medium (Blue)		Medium-Low (Yellow)		Low (Red)		High (Black)		Medium-High (Brown)		Medium (Blue)		Medium-Low (Yellow)		Low (Red)	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	2267	611	2001	416	1747	286	1637	235	1591	196	**2290**	**613**	**2030**	**401**	**1841**	**275**	1651	227	1629	198
0.10	2216	637	1961	438	1707	305	1576	245	1457	193	**2245**	**633**	**1980**	**427**	1763	299	1592	240	1486	194
0.20	2165	663	1921	460	1667	324	1515	255	1323	190	**2199**	**653**	**1931**	**454**	1685	323	1533	253	1343	189
0.30	2129	684	1853	486	1624	344	1460	275	1262	208	**2147**	**678**	**1876**	**474**	1640	343	1470	273	1276	205
0.40	2060	710	1818	508	1559	365	1401	294	1193	222	**2110**	**702**	**1815**	**491**	1574	358	1424	292	1198	219
0.50	2030	726	1775	526	1515	380	1346	317	1134	238	**2064**	**725**	1777	516	1525	375	1360	312	1134	236
0.60	1985	749	1707	547	1453	401	1312	332	1080	252	**2025**	**744**	1726	533	1476	398	1311	330	1083	253
0.70	1931	769	1662	567	1405	419	1238	346	1012	269	**1973**	**765**	1673	558	1417	420	1243	344	1025	268
0.80	1882	789	1617	586	1364	438	1190	364	946	278	**1925**	**788**	1636	577	1372	436	1193	361	955	277
0.90	1832	807	1565	606	1317	457	1135	381	893	294	**1883**	**806**	1575	597	1312	457	1148	378	908	148
1.00	1727	772	1533	623	1244	468	1059	397	823	304	1785	789	1531	616	1263	469	1089	390	838	301

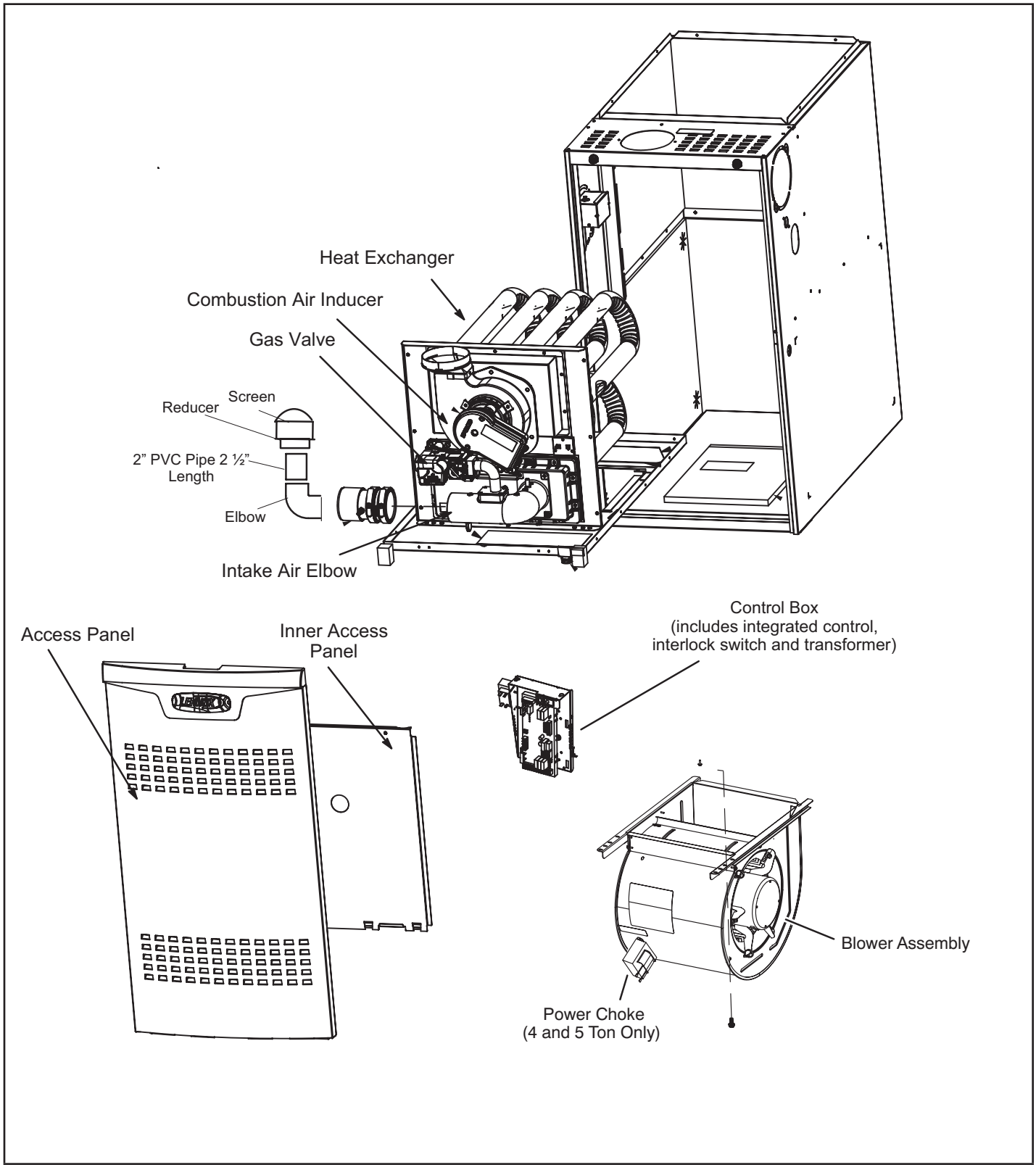

Heat Exchanger
Combustion Air Inducer
Gas Valve
Reducer
Screen
2" PVC Pipe 2 ½" Length
Elbow
Intake Air Elbow
Access Panel
Inner Access Panel
Control Box
(includes integrated control, interlock switch and transformer)
Blower Assembly
Power Choke
(4 and 5 Ton Only)

FIGURE 1

Twinning

The control board in this furnace is equipped with a provision to ”twin” (interconnect) two(2) adjacent furnaces with a common plenum such that they operate as one (1) large unit.

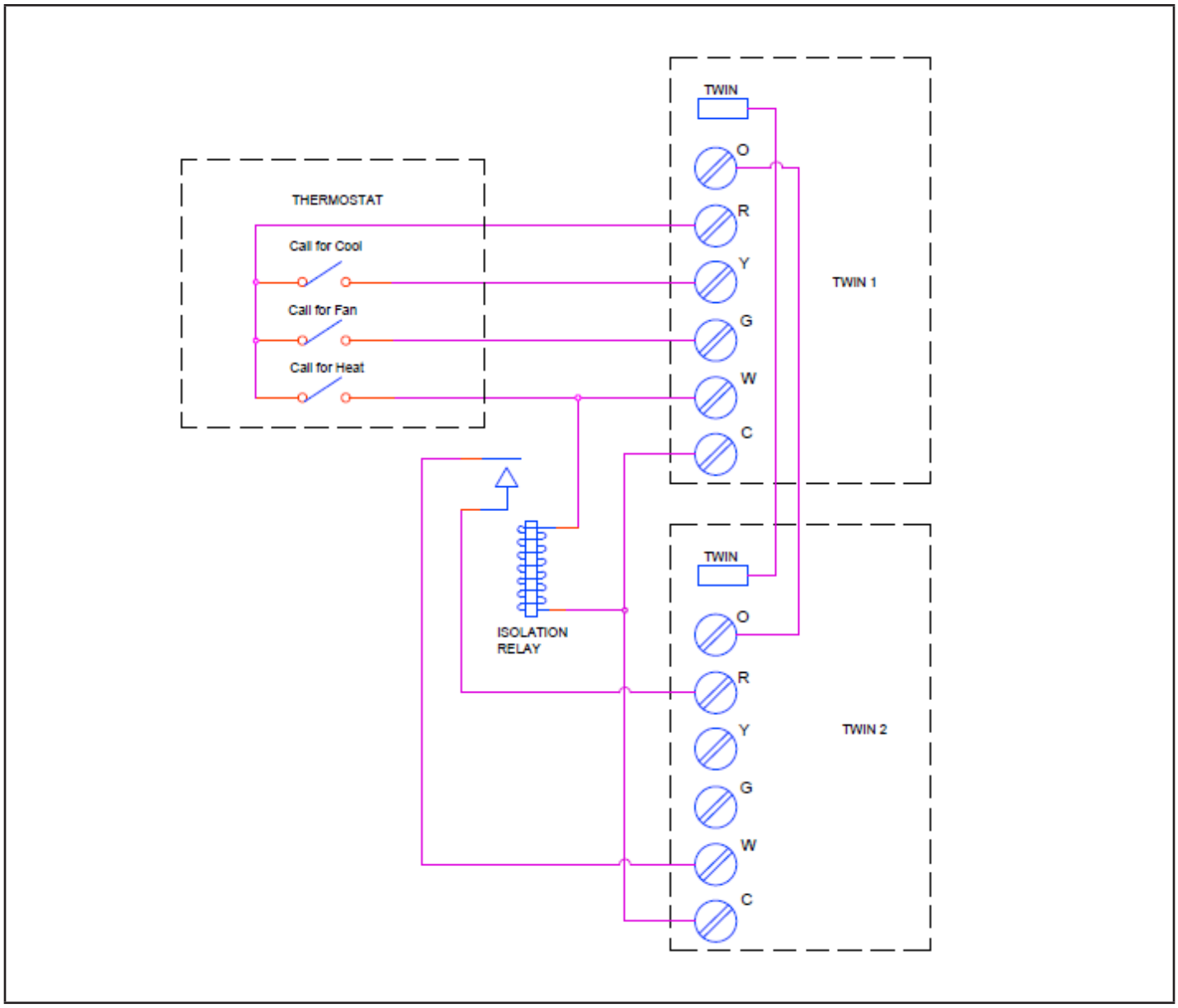
When twinned, the circulating blower speeds are synchronized between the furnaces. If either furnace has a need to run the blower, both furnaces will run the blower on the same speed. The cooling speed has highest priority, followed by heating speed and fan speed.

Field installation of twinning consists of connecting wires between the “C”, ”O” and ”Twin” terminals of the two controls.

The 24 VAC secondary of the two systems must be in phase. All thermostat connections are made to one control only. See diagram below.

The twinned furnace without thermostat connections is to have the call for heat supplied by an external 24VAC isolation relay* to prevent its rollout switch from being bypassed by the other twinned furnace. The coil of the isolation relay connects from the thermostat ”W” to 24 VAC common. The contacts of the relay connect ”R” to ”W” on the non-thermostat twin.

*Wiring and quick connects will be field provided.



I-UNIT COMPONENTS

EL180UHNEK unit components are shown in FIGURE 1.The gas valve, combustion air inducer and burners can be accessed by removing the upper access panel. Electrical components are in the control box (FIGURE 2) found in the blower section.

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions to neutralize electrostatic charge by touching your hand and tools to metal prior to handling the control.

A - Control Box

1. Control Transformer (T1)

A transformer located in the control box provides power to the low voltage section of the unit. Transformers on all models are rated 40VA with a 120V primary and a 24V secondary.

⚠ IMPORTANT

When matching this gas furnace with zoning, dual fuel or other 24V accessories, It is recommended to replace the factory installed transformer with kit 27J32.

Kit 27J32 contains a 75VA transformer, so you do not overload the original 40VA transformer.

2. Door Interlock Switch (S51)

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

NOTE - *The door interlock switch is a safety switch. Do not by-pass or jumper switch*

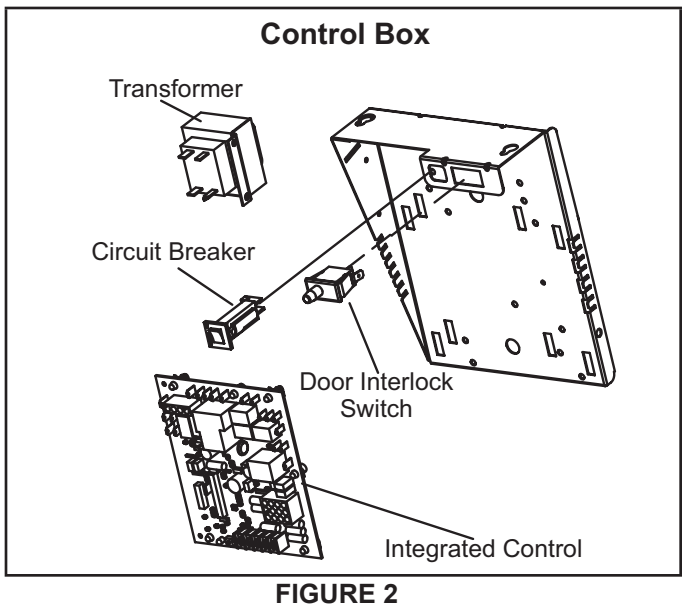


FIGURE 2

3. 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 at 3A at 32V. If the current exceeds this limit the breaker will trip and all unit operation will shutdown. The breaker can be manually reset by pressing the button on the face.

4. Ignition Control 107792-XX (FIGURE 3)

⚠ WARNING

Shock hazard.

Disconnect power before servicing. Control is not field repairable. If control is inoperable, simply replace entire control.

Can cause injury or death. Unsafe operation will result if repair is attempted.

Integrated Control DIP Switch Settings

Units are equipped with a single-stage integrated control. This control manages ignition timing, heating mode fan off delays and indoor blower speeds based on selections made using the control dip switches and jumpers. For Low GWP DIP switch settings see section VII- Low GWP Application The control includes an internal watchguard feature which automatically resets the ignition control when it has been locked out. After one hour of continuous thermostat demand for heat, the watchguard will break and remake thermostat demand to the furnace and automatically reset the control to relight the furnace.

Accessory Terminals

One line voltage “ACC” 1/4” spade terminal is provided on the furnace integrated control. This terminal is energized when the indoor blower is operating. Any accessory rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to one of the provided neutral terminals. If an accessory rated at greater than one amp is connected to this terminal, it is necessary to use an external relay.

One line voltage “HUM” 1/4” spade terminal is provided on the furnace integrated control. See FIGURE 3 for integrated control configuration. This terminal is energized in the heating mode when the combustion air inducer is operating. Any humidifier rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to one of the provided neutral terminals. If a humidifier rated at greater than one amp is connected to this terminal, it is necessary to use an external relay.

One 24V ”H” 1/4” spade terminal is provided on the furnace integrated control. The terminal is energized in the heating mode when the combustion air inducer is operating and the pressure switch is closed. Any humidifier rated up to 0.5 amp can be connected to this terminal with the ground leg of the circuit connected to ground or the ”C” terminal.

Indoor Blower Operation DIP Switch Settings

The heat fan-on time of 30 seconds is not adjustable The heat fan-off delay (amount of time that the blower operates after the heat demand has been satisfied) may be adjusted by changing the two position dip switch on the integrated control, to one of four selections. Blower off delay is factory set at 120 seconds. For other blower off delay settings, please refer to the following chart:

Blower Delay Select		
	SW1-1	SW1-2
90	OFF	ON
120	OFF	OFF
180	ON	OFF
210	ON	ON
Factory Setting is 120		

ON BOARD LINKS (FIGURE 4 and FIGURE 5) and DIAGNOSTIC PUSH BUTTON (FIGURE 3)

⚠ IMPORTANT

Carefully review all configuration information provided. Failure to properly set DIP switches, jumpers and on-board links can result in improper operation!

On-Board Link W951 Heat Pump (R to O)

On-board link W951 is a clippable connection between terminals R and O on the integrated control. W951 must be cut when the furnace is installed in applications which include a heat pump unit and a thermostat which features dual fuel use. If the link is left intact, terminal “O” will remain energized eliminating the HEAT MODE in the heat pump.

Diagnostic Push Button

The diagnostic push button is located adjacent to the seven-segment diagnostic LED. This button is used to enable the Error Code Recall “E” mode and the Flame Signal “F” mode. Press the button and hold it to cycle through a menu of options. Every five seconds a new menu item will be displayed. When the button is released, the displayed item will be selected. Once all items in the menu have been displayed, the menu resumes from the beginning until ther button is released.

The hot surface ignition control system consisting of an integrated control (FIGURE 3 with control terminal designations in TABLE 1, TABLE 2 and TABLE 3) sensor and ignitor. The integrated control and ignitor work in combination to ensure furnace ignition and ignitor durability. The integrated control, controls all major furnace operations. The integrated control also features a RED LED for troubleshooting and two accessory terminals rated at (1) one amp. See TABLE 4 for troubleshooting diagnostic codes. The nitride ignitor is made from a non-porous, high strength proprietary ceramic material that provides long life and trouble free maintenance

TABLE 1

1/4” QUICK CONNECT TERMINALS	
120V HUM	POWER FOR HUMIDIFIER (120 VAC
LINE	INCOMING POWER LINE (120 VAC)
XFMR	TRANSFORMER PRIMARY (120 VAC)
CIRC	INDOOR BLOWER MOTOR (120 VAC)
ACC	ACCESSORY(120 VAC)
24V HUM	HUMIDIFIER (24 VAC)
NEUTRALS	NEUTRAL (5)
3/16” QUICK CONNECT TERMINALS	
COOL	COOL SPEED TAP FROM INDOOR BLOWER MOTOR (24 VAC)
HEAT	HEAT SPEED TAP FROM INDOOR BLOWER MOTOR (24 VAC)
FAN	CONTINUOUS FAN SPEED TAP FROM INDOOR BLOWER MOTOR (24 VAC)
FLAME SENSE	FLAME SENSOR ELECTRODE (120 VAC)
COMMON	COMMON (24 VAC)
TWIN	24V TWINNING COMMUNICATION
PARK	3 TERMINALS TO PARK UNUSED MOTOR SPEED TAPS

TABLE 2

THERMOSTAT INPUT TERMINALS	
W	HEAT
C	COMMON GROUND
R	24V AC
G	FAN
Y	COOL
O	REVERSING VALVE (when W951 is clipped)

TABLE 3

LOW GWP INTERFACE	
LGWP1	LOW GWP SENSOR #1 INTERFACE
LGWP2	LOW GWP SENSOR # 2 INTERFACE
ALARM	INTERFACE TO LOW GWP LEAK AUDIBLE ALARM (DRY CONTACT)
ZONE	INTERFACE TO ZONING CONTROL (DRY CONTACT)
LGWP TEST	PUSH BUTTON TO TEST LOW GWP FUNCTIONALITY

Single Stage, Constant, Torque, Non-Communicating
107792-XX

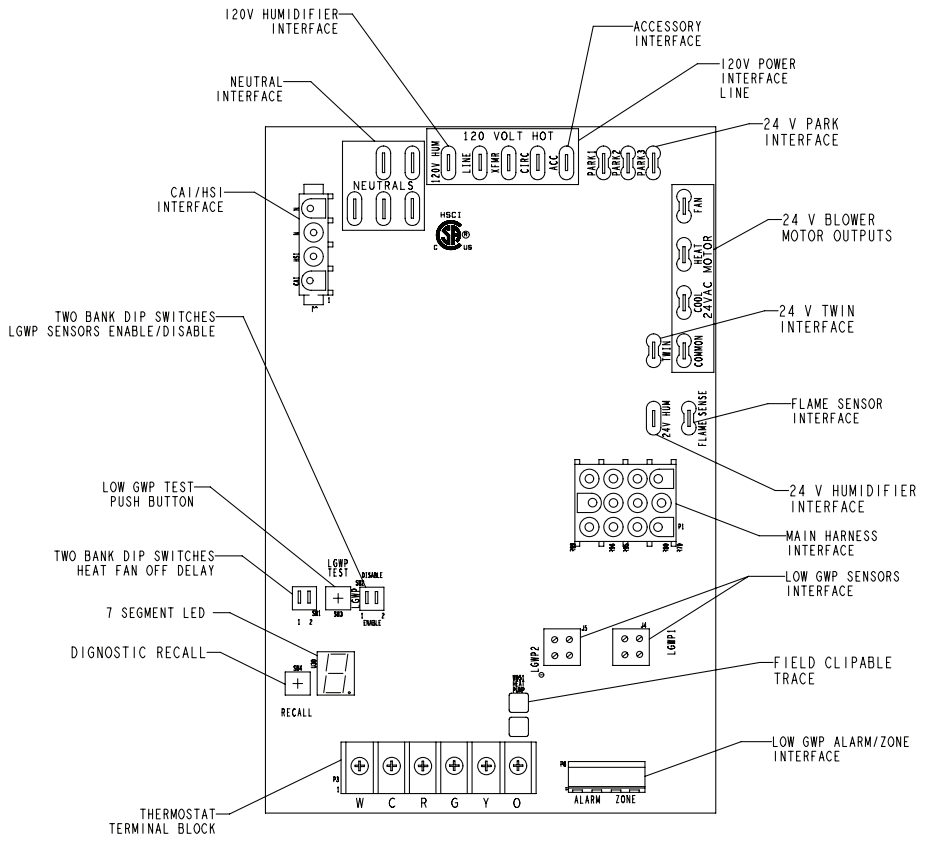


FIGURE 3

Indoor Blower Speeds

1 - When the thermostat is set to “FAN ON,” the indoor blower will run continuously on the fan speed when there is no cooling or heating demand. See TABLE 11

2 - When the EL180UHNEK is running in the heating mode, the indoor blower will run on the heating speed. See below for ‘Allowable Heating Speeds”.

3 - When there is a cooling demand, the indoor blower will run on the cooling speed.

Allowable Heating Speeds					
Model	RED	YELLOW	BLUE	BROWN	BLACK
040HNE	Not Allower	Factory setting	Allowed	Allowed	Not Allowed
060NEK		Allowed	Factory Setting		
080NEK		Factory Setting	Allowed		
100NEKL				Not Allowed	

Allowable Circulation Speeds					
Model	RED	YELLOW	BLUE	BROWN	BLACK
All Modes	Factory Setting	Not Allowed			

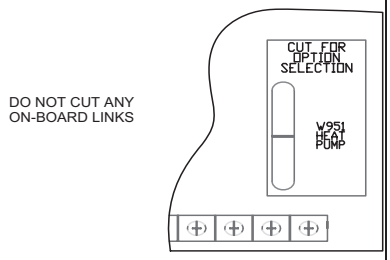
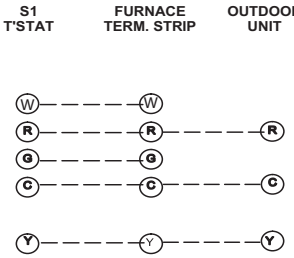
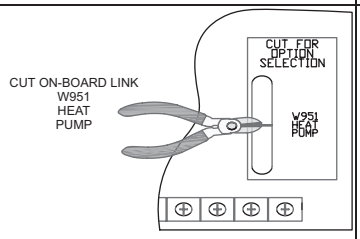
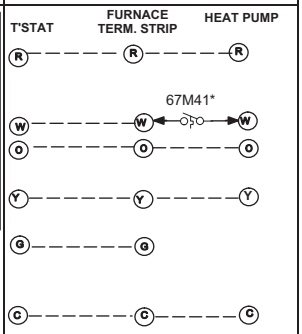
Thermostat	On Board Links Must NOT Be Cut To Select AC ON System Options	Wiring Connections
Heat / Cool		

FIGURE 4

Thermostat	On Board Links Must Be Cut To Select Heat Pump Options	Wiring Connections
Dual Fuel Single Stage Heat Pump ComfortSense thermostat w/ dual fuel capabilities		

Connect W to W ONLY if using defrost tempering kit 67M41

FIGURE 5

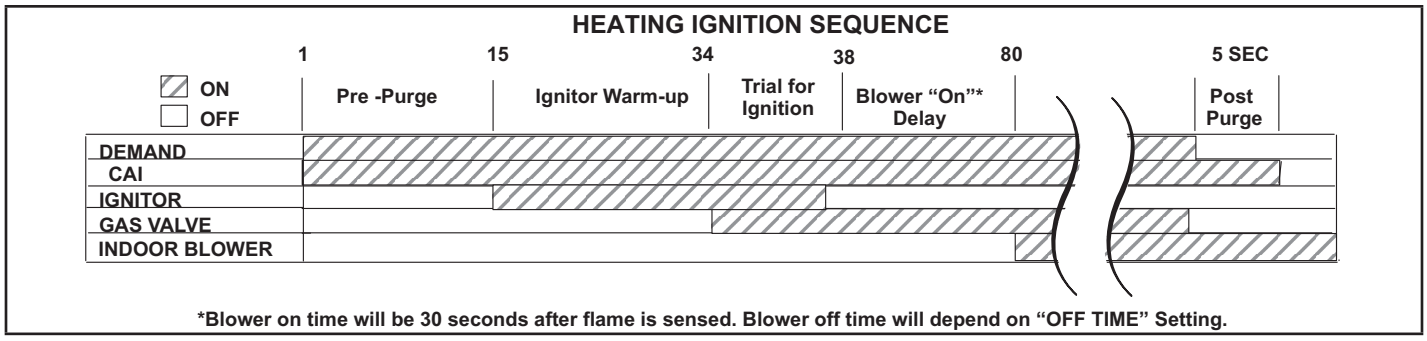


FIGURE 6

Heating Ignition Sequence (FIGURE 6)

On a call for heat the integrated control monitors the combustion air inducer 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 inducer is energized. When the differential in the pressure switch is great enough, the pressure switch closes and a 15-second pre-purge begins. After 5-minute wait period expires, the control shall start the Ignition Sequence from the beginning if the call for heat is still present.

After the 15-second pre-purge period, the ignitor warms up for 20 seconds during which the gas valve opens at 19 seconds for a 4-second trial for ignition. The ignitor remains energized for the first 3 seconds during the 4 second trial. If ignition is not proved during the 4-second period, the integrated 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 integrated control goes into Watchguard-Flame Failure mode. After a 60-minute reset period, the integrated control will begin the ignition sequence again.

TABLE 4

Integrated Diagnostic Codes/Status of Equipment

Code	Diagnostic Codes/Status of Equipment
A	Indoor Blower Operation: Continuous Fan only mode
dF	Defrost mode
.	Idle mode (Decimal blinks at 1 Hertz -- 0.5 second ON, 0.5 second OFF).
C	Cooling stage (1 second ON, 0.5 second OFF) 1 or 2 displayed / Pause / Repeat codes.
d	Dehumidification mode (1 second ON, 1 second OFF) / Pause / Repeat Codes).
H	Gas Heat Stage (1 second ON, 0.5 second OFF) 1 or 2 displayed / Pause / Repeat codes. Blinking during ignition.
h	Heat pump stage.

* No change implies the display will continue to show whatever is currently being displayed for normal operation (blinking decimal, active error code, heat state, etc.)

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E000	No error in memory	No active fault exists, or all faults have been cleared
E106	Twin Communication Fault	This may indicate: 1) The power is removed from one furnace and not the other or/and 2) The 24 VAC supply to the twins are not in phase
E110	Low line voltage.	Line Voltage Low (Voltage lower than nameplate rating). Check power line voltage and correct. Alarm clears 5 seconds after fault recovered.
E111	Line voltage polarity reversed.	Reverse line power voltage wiring. System resumes normal operation 5 seconds after fault recovered.
E112	Ground not detected.	System shuts down. Provide proper earth ground. System resumes normal operation 5 seconds after fault recovered.
E113	High line voltage.	Line Voltage High (Voltage higher than nameplate rating). Provide power voltage within proper range. System resumes normal operation 5 seconds after fault recovered.
E114	Line voltage frequency out-of-range.	No 60 Hertz Power. Check voltage and line power frequency. Correct voltage and frequency problems. System resumes normal operation 5 seconds after fault recovered.
E115	Low 24V - Control will restart if the error recovers.	24-Volt Power Low (Range is 18 to 30 volts). Check and correct voltage. Check for additional power-robbing equipment connected to system. May require installation of larger VA transformer to be installed in furnace / air handler. Clears after fault recovered.
E117	Poor ground detected (Warning only).	Provide proper grounding for unit. Check for proper earth ground to the system. Warning only will clear 30 seconds after fault recovered.

TABLE 4 Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E125	Control failed self-check, internal error, failed hardware. Will restart if error recovers. Integrated control not communicating. Covers hardware errors (flame sense circuit faults, pin shorts, etc.).	Hardware problem on the control. Cycle power on control. Replace if problem prevents service and is persistent. Critical alert. Cleared 300 seconds after fault recovered.
E150	Refrigerant Leak detected	This may indicate the presence of a leak at or in the indoor unit coil of the equipment, that will need to be repaired for proper and safe system operation. Additionally, it may indicate that proper refrigerant charge will need to be verified. This fault cannot be cleared while the refrigerant detection system sensor is reporting the presence of a leak
E151	Refrigerant Leak Detector Sensor #1 fault	The refrigerant detection sensor #1 in the unit is reporting an issue that prevents it from functioning properly, and replacement of the sensor may be necessary. This fault clears when the sensor no longer reports the presence of a fault condition.
E152	Refrigerant Leak Detector Sensor #2 fault	The refrigerant detection sensor #2 in the unit is reporting an issue that prevents it from functioning properly, and replacement of the sensor may be necessary. This fault clears when the sensor no longer reports the presence of a fault condition.
E154	Refrigerant Leak Detector Sensor #1 Communication lost or invalid sensor dip switch configuration (ON/OFF)	There may be an issue with the wiring harness connecting the sensor #1 to the furnace control board, either with the wiring itself or with the connector. Check the wiring and the connector for damage or improper connectivity. Check the sensor for damage or obstruction on the harness plug. This fault clears when communications with the sensor has been reestablished, but blower latches for a minimum of 5 minutes. Retest of the presence of fault can be effected by pressing the Low GWP test button on the furnace unit control board. This may also indicate incorrect Low GWP dip switch settings. Please refer to installation instructions.
E155	Refrigerant Leak Detector Sensor #2 Communication lost	There may be an issue with the wiring harness connecting the sensor #2 to the furnace control board, either with the wiring itself or with the connector. Check the wiring and the connector for damage or improper connectivity. Check the sensor for damage or obstruction on the harness plug. This fault clears when communications with the sensor has been reestablished, but blower latches for a minimum of 5 minutes. Retest of the presence of fault can be effected by pressing the Low GWP test button on the furnace unit control board
E160	Refrigerant Leak Detector Sensor #1 type incorrect	The sensor #1 is of a type not suitable for use in the application. Replace the sensor with a Lennox approved replacement part. This fault clears when a sensor suitable for the application is detected by the furnace control board, but blower will latch for a minimum of 5 minutes. Retest of the presence of the fault can be effected by pressing the Low GWP test button on the furnace unit control board.
E161	Refrigerant Leak Detector Sensor #2 type incorrect	The sensor #2 is of a type not suitable for use in the application. Replace the sensor with a Lennox approved replacement part. This fault clears when a sensor suitable for the application is detected by the furnace control board, but blower will latch for a minimum of 5 minutes. Retest of the presence of the fault can be effected by pressing the Low GWP test button on the furnace unit control board.
E163	Furnace Control Board Failure	There is an issue with the furnace control board, preventing the furnace from operating properly. This may require the replacement of the indoor unit control board. This fault clears when the furnace controller operates normally.

TABLE 4 Continued

Code	Diagnostic Codes/Status of Equipment	Action Required to Clear and Recover
E164	Low GWP Test	Low GWP Test mode activates by manually engaging Low GWP test button. Normal operations resumes and code clears automatically after 1-minute
E200	Hard lockout - Rollout circuit open or previously open.	Correct cause of rollout trip, or replace flame rollout switch. Test furnace operation. Cleared after fault recovered.
E204	Gas valve mis-wired.	Check gas valve operation and wiring. Clears when repaired.
E223	Low pressure switch failed open.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E224	Low pressure switch failed closed.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E227	Low pressure switch open during trial for ignition or run mode.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Resumes normal operation after fault is cleared.
E240	Low flame current - Run mode.	Check micro-amperes of flame sensor using control diagnostics or field-installed mode. Clean or replace sensor. Measure voltage of neutral to ground to ensure good unit ground. Alert clears after current heat call has been completed.
E241	Flame sensed out of sequence - Flame still present.	Shut off gas. Check for gas valve leak. Replace, if necessary. Alert clears when fault is recovered.
E250	Limit switch circuit open.	Check for proper firing rate on furnace. Ensure there is no blockage in heater. Check for proper air flow. If limit not closed within 3 minutes, unit will go into 1-hour soft lockout. Resumes normal operation after fault is cleared.
E270	Soft lockout - Exceeded maximum number of retries. No flame current sensed.	Check for proper gas flow. Ensure that ignitor is lighting burner. Check flame sensor current. Clears when heat call finishes successfully.
E271	Soft lockout - Exceeded maximum number of retries. Last retry failed due to the pressure switch opening.	Check pressure (inches w.c.) of low pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Clears when heat call finishes successfully.
E272	Soft lockout - Exceeded maximum number of recycles. Last recycle due to the pressure switch opening.	Check operation of low pressure switch to see if it is stuck closed on heat call. Check pressure (inches w.c.) of high pressure switch closing on heat call. Measure operating pressure (inches w.c.). Inspect vent and combustion air inducer for correct operation and restriction. Clears when heat call finishes successfully.
E273	Soft lockout - Exceeded maximum number of recycles. Last recycle due to flame failure.	Check micro-amperes of flame sensor using control diagnostics or field-installed mode. Clean or replace sensor. Measure voltage of neutral to ground to ensure good unit ground. Clears when heat call finishes successfully.
E274	Soft lockout - Exceeded maximum number of recycles. Last recycle failed due to the limit circuit opening or limit remained open longer than 3 minutes.	Shut down system. 1-hour soft lockout. Check firing rate and air flow. Check for blockage. Clears when heat call finishes successfully.
E275	Soft lockout - Flame sensed out of sequence. Flame signal is gone.	Shut off gas. Check for gas valve leak. 1-hour soft lockout. Clears when flame has been proven stable.
E290	Ignitor circuit fault - Failed ignitor or triggering circuitry.	Measure resistance of hot surface ignitor. Replace if open or not within specifications. 1-hour soft lockout. Clears when flame has been proven stable.
E390	Low GWP Relay Stuck	This indicates an issue with the Low GWP relay in the furnace control. This may require the replacement of the indoor unit control board. This fault clears when the relay operates normally.

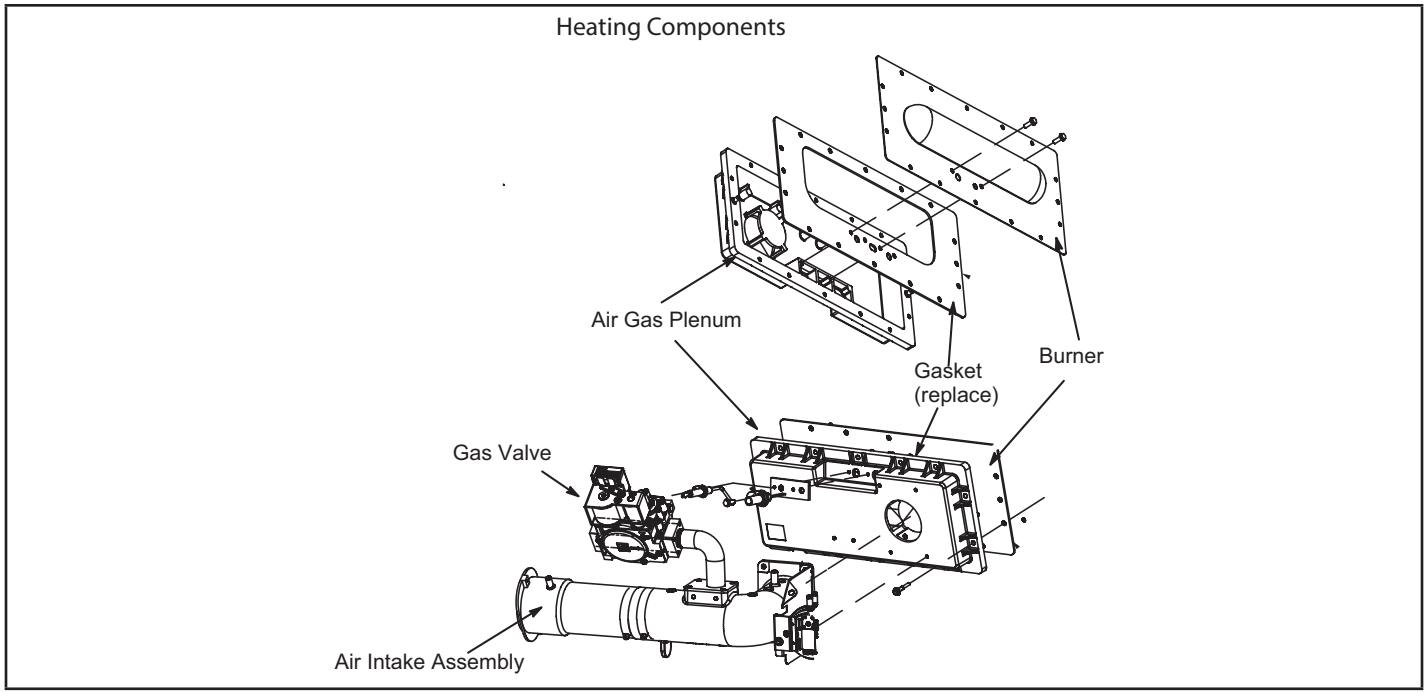


FIGURE 7

B - Heating Components (FIGURE 7)

1. Thermal Switch

The auto-reset switch is located on the front of the intake air elbow. The switch will safely shut the unit down if excessive temperatures are detected. When the switch senses excessive temperature, the circuit breaks and the ignition control immediately stops ignition and closes the gas valve.

2. Primary Limit Control

The primary limit (S10) is located in the heating vestibule panel. When excess heat is sensed in the heat exchanger, the limit will open. If the limit is open, the furnace control energizes the supply air blower and closes the gas valve. The limit automatically resets when unit temperature returns to normal. The switch must reset within three minutes or the SureLight control will go into Watch guard for one hour. The switch is factory set and cannot be adjusted. The switch may have a different set point for each unit model number. See Lennox Repair Parts Handbook if limit switch must be replaced.

3. Gas Valve

The valve is internally redundant to assure safety shut-off. If the gas valve must be replaced, the same type valve must be used.

24VAC terminals and gas control knob are located on the valve. A wire harness connects the terminals from the gas valve to the electronic ignition control. 24V applied to the terminals energizes the valve. Inlet and outlet pressure taps are located on the valve. A regulator adjustment screw is located on the valve.

EL180UHNK units are equipped with a gas valve rated for ambient temperatures between -40º F and +175º F.

4. Flame Sensor

A flame sensor is located on the top of the air gas plenum. The sensor can be removed for service without removing the the burner. 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. To check flame sense signal use TABLE 4 and the recall button found on the integrated control. See TABLE 5 for flame signal.

TABLE 5

Flame Signal in Microamps

Normal	Low	Drop Out
1.5 or greater	0.5 - 1.4	0.4 - or less

5. Combustion Air Inducer (B6)

All EL180UHNEK units use a 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 integrated control A92. The inducer also operates for 15 seconds before burner ignition (pre-purge) and for 5 seconds after the gas valve closes (post-purge).

6. Combustion Air Inducer Prove Switch (S18)

EL180UHNEK series units are equipped with a combustion air pressure switch (FIGURE 8) located near the gas valve. The switch is connected to the combustion air inducer housing by means of a flexible silicone hose. It monitors negative air pressure in the intake air elbow.

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

On heat demand the switch senses that the combustion air inducer is operating. It closes a circuit to the integrated control when pressure inside the combustion air inducer decreases to a certain set point. The pressure sensed by the switch is negative relative to atmospheric pressure. If the flue becomes obstructed during operation, the switch senses a loss of pressure difference and opens the circuit to the furnace control and gas valve. See TABLE 6 for set point.

If replacing the inducer switch or tubing is necessary, make note of the tubing connections to the gas valve. See FIGURE 9.

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

TABLE 6

Unit	inches wc	
	Make	Break ± 0.05
040	0.35	0.20
060	0.35	0.20
080	0.35	0.20
100	0.35	0.20

COMBUSTION AIR PRESSURE SWITCH

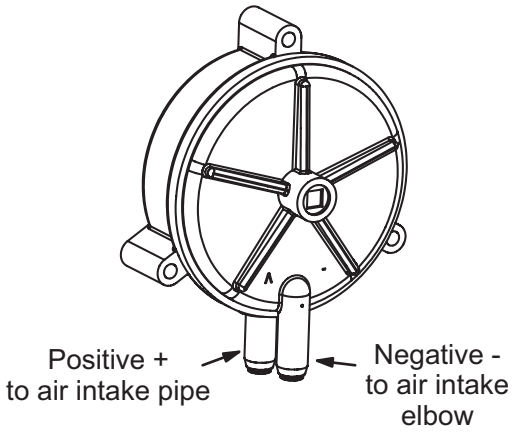


FIGURE 8

7. Burner and Orifice

Burners are factory set and require no adjustment. Always operate the unit with air gas plenum in place. The burner has one orifice located between the gas valve and the air intake assembly. To check or replace the orifice remove the intake air screen, coupling and intake air elbow.

Using a 5/8” socket, go through the elbow and unscrew the gas orifice. The burner uses an orifice (TABLE 7) that is precisely matched to the burner input. The burner can be removed for service. If burner has been removed, it is critical to replace all gaskets.

TABLE 7

Unit Input	Orifice Size
040	0.0650
060	0.0980
080	0.1299
100	0.1495

8. Ignitor

The ignitor is made of durable silicon nitride. Ignitor longevity is enhanced by controlling voltage to the ignitor. The integrated control provides a regulated 120 volts to the ignitor for a consistent ignition and long ignitor life. Ohm value should be 39 to 70. See FIGURE 10 for ignitor check out

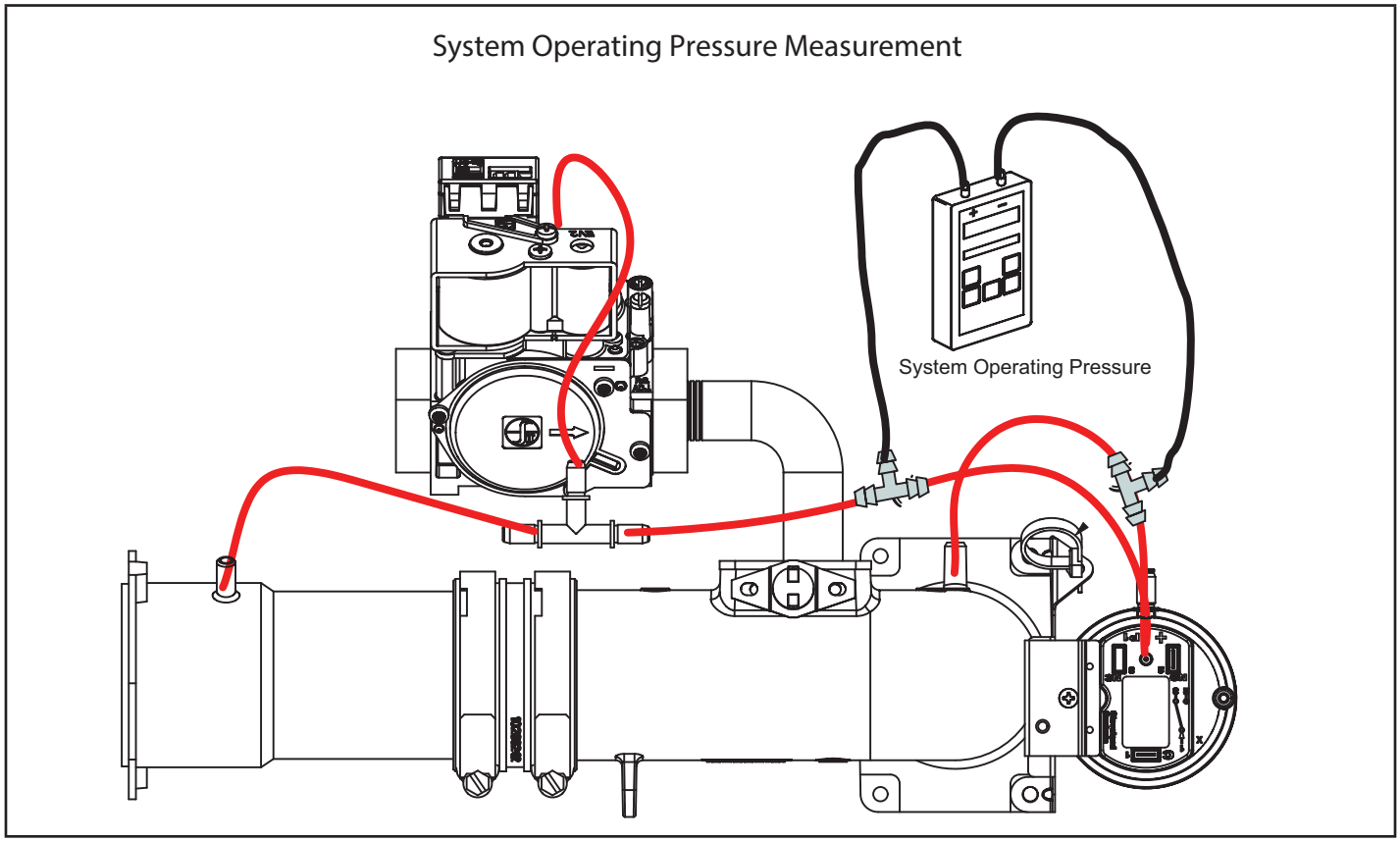
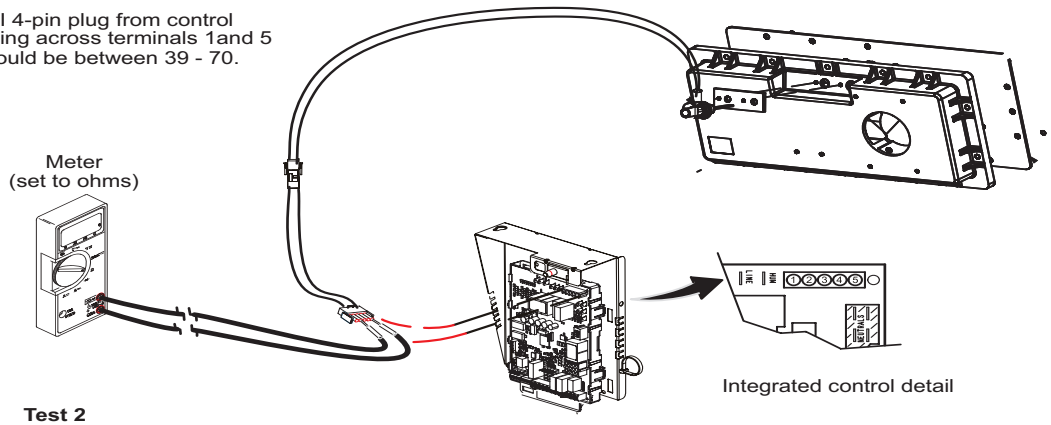

System Operating Pressure Measurement
System Operating Pressure

FIGURE 9

Ignitor Check Out

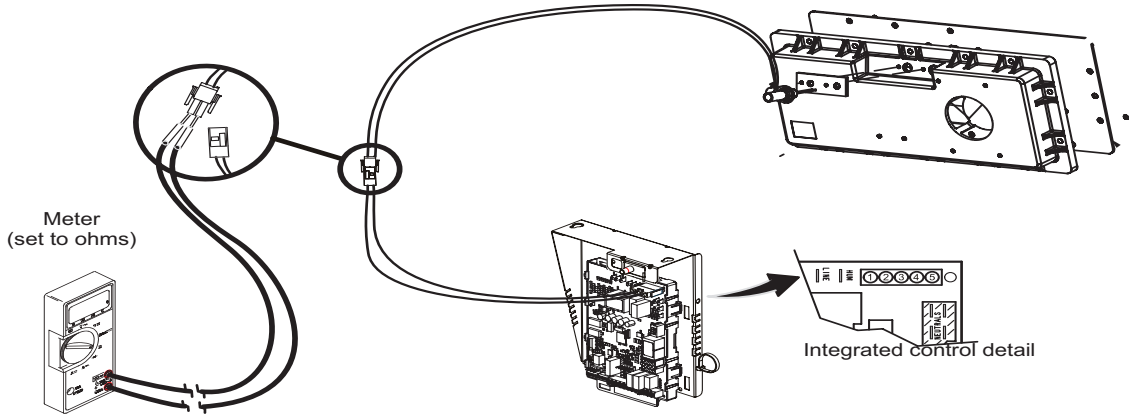
Test 1

Remove HSI/CAI 4-pin plug from control
Check ohms reading across terminals 1and 5
Ohm value should be between 39 - 70.



Test 2

Seperate the 2-pin jack plug near the manifold and check resistance of the ignitor. If the reading is correct, then then there is a problem with the wiring between the jack plug and control. If the reading is not correct the issue is the ignitor.



Test 3

Insert meter probes into the terminals 1 and 5. (Use small diameter probes in order to not damage plug). Check voltage during 20 second warm up period. Voltage should read 120 volts ± 10%. If voltage is above these values, check for correct supply voltage to furnace.

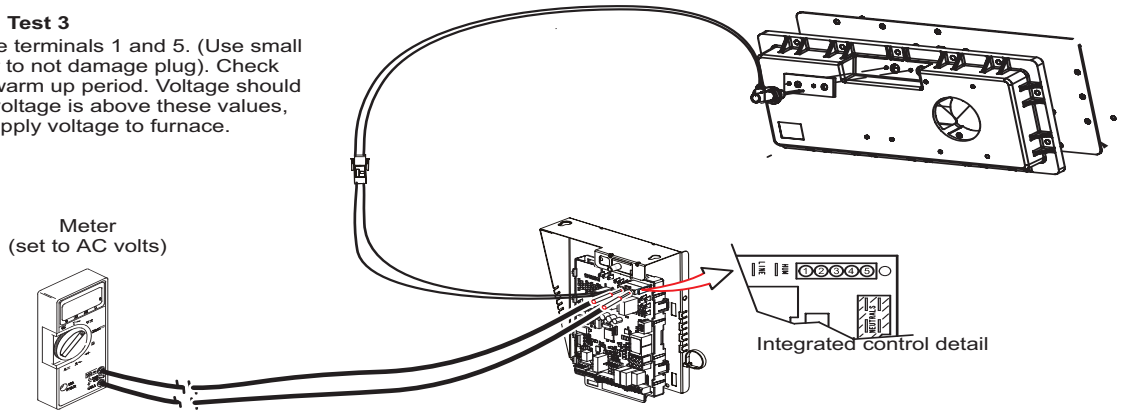


FIGURE 10

C- Blower Compartment

⚠ IMPORTANT

Each blower is statically and dynamically balanced as an assembly before installation in the unit.

1. Indoor Motor

EL180UHNEK units are equipped with a constant torque ECM motor. It has a DC motor coupled to an electronic control module both contained in the same motor housing.

The motor is programmed to provide constant torque at each of the five selectable speed taps. Each tap requires 24 volts to energize.

Input Voltage Requirements

The circuit is designed to be operated with AC voltage. To enable a tap requires 12 to 33VAC. Expected current draw will be less than 20mA.

Troubleshooting the Motor

Troubleshooting the motor is an easy process. Follow steps below.

1 - Shut off power to unit.

2 - Remove input connectors J48 and J49 from motor See FIGURE 13 for troubleshooting procedure.

If correct voltage is present in tests 1 and 2 and motor is not operating properly, replace motor. The motor is not field repairable.

If replacing the indoor blower motor or blower wheel is necessary, placement is critical. The blower wheel must be centered in the blower housing as shown in FIGURE 11. When replacing the indoor blower motor the set screw must be aligned and tightened with the motor shaft as shown in FIGURE 12.

BLOWER WHEEL REPLACEMENT

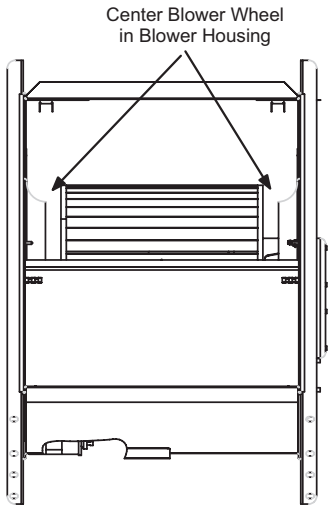


FIGURE 11

ALIGN AND TIGHTEN SET SCREW WITH FLAT SIDE OF MOTOR SHAFT

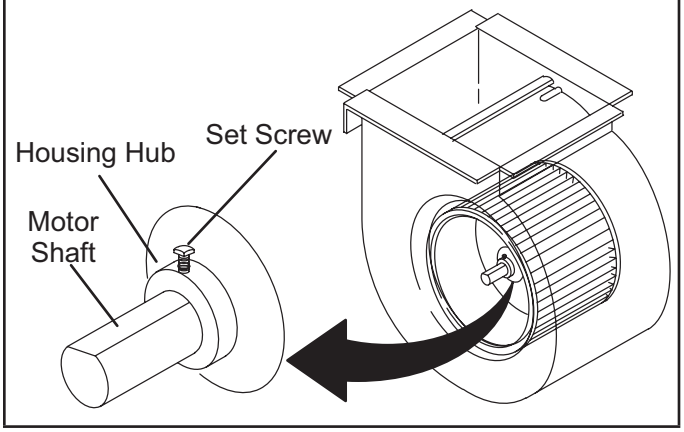
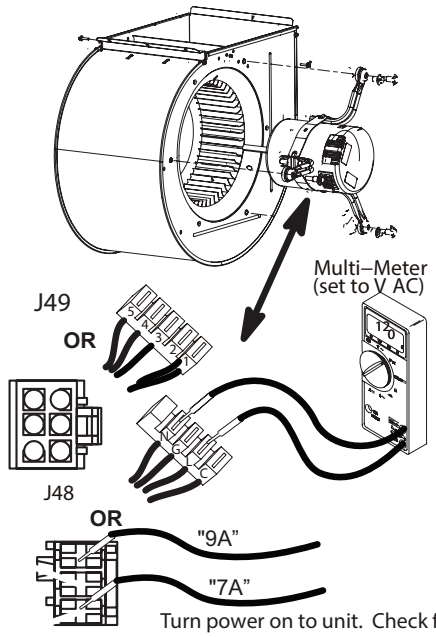
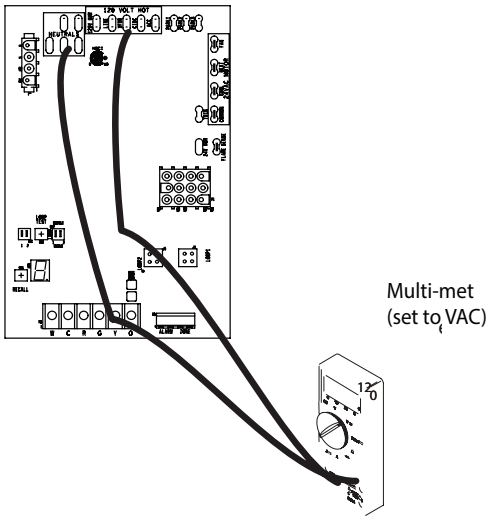


FIGURE 12



Test 1

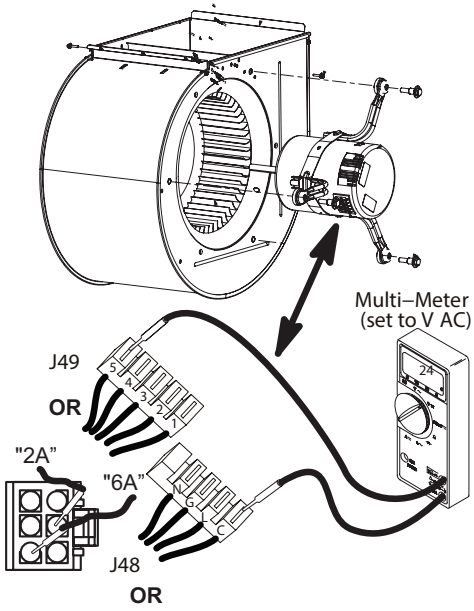
Turn power on to unit. Check for 120 volts across terminals "L" and "N" or terminals "7A" and "9A" of connector J48. If voltage is present continue to test 2. If voltage is not present problem may be upstream of J48. Proceed to test3.

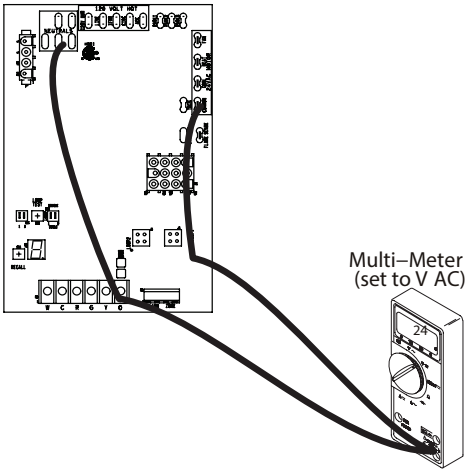


Test 3 (if necessary)

NOTE- *Ignition control illustration is typical*

Check for 120 volts across terminals "L1" and "Neutrals" on the integrated control. If voltage is present, problem is with the har ness. If voltage is not present problem may be may be with the integrated control.





Test 4 (if necessary)

NOTE- *Ignition control illustration is typical*

Check for 24 volts across terminals "24 COM" and the "active speed tap" on the integrated control. If voltage is present, prob lem is with the harness. If voltage is not present problem may be may be with the integrated control

Test 2

Switch thermostat to CONTINUOUS FAN MODE. For units using 4 and 5 position connector blocks, test for 24 volts terminal "C" of J48 and the tap used for continuous fan on J49 (1, 2, 3, 4 or 5). For units using 3 and 6 position connectors, test for 24 volts between pin

FIGURE 13

Replacing the Motor Module

NOTE - *Not all motors have field replaceable control modules. Only motors that utilize a 4 pin power connector and 5 pin signal connector as shown below may have replaceable controls. Motors that use a 3 pin power connector and 6 pin signal connector do not have field replaceable control modules. In the event of failure, the entire motor must be replaced.*

1 - Disconnect electrical power to unit.

2 - Remove unit access panel.

3 - Unplug the two harnesses from the motor control module. See FIGURE 14.

4 - Remove the two hex head bolts securing the motor control module to the motor. See FIGURE 15.

5 - Slide the motor control module away from the motor to access and disconnect the internal three wire connector. It is not necessary to remove blower motor itself. Set both hex head bolts aside

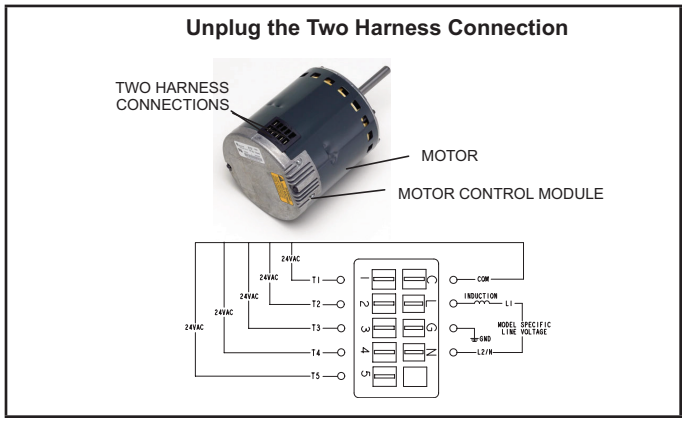


FIGURE 14

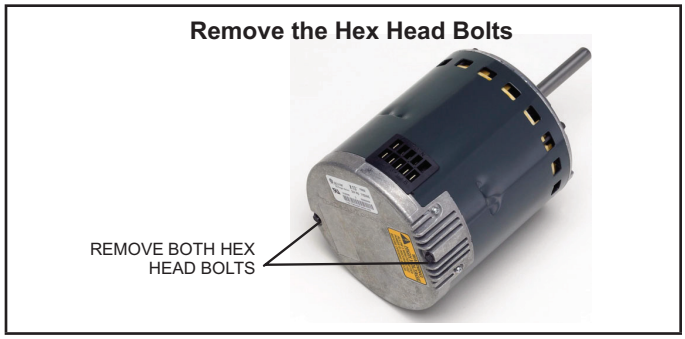


FIGURE 15

Testing the Motor (FIGURE 16)

If any motor fails the below tests, do not install the new control module. The motor is defective and it also must be replaced. The new control can fail if placed on a defective motor.

1 - Using an ohmmeter check the resistance from any one of the motor connector pins to the aluminum end plate of the motor. This resistance should be greater than 100k ohms.

2 - Check the resistances between each of the three motor connector pins. These should all read approximately the same resistance within an ohm.

3 - Check to see if the blower wheel spins freely.

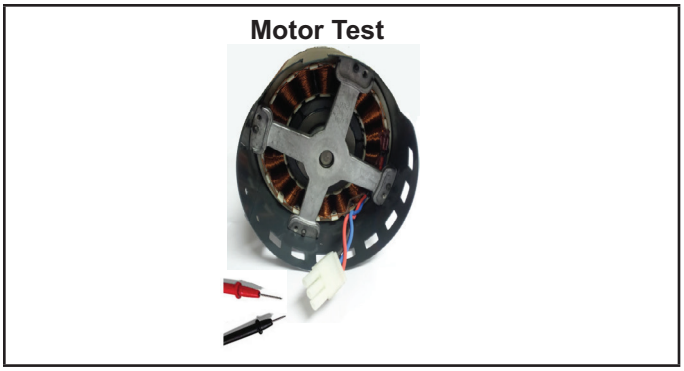


FIGURE 16

TABLE 8

Scale	Measurement range in words	ohms
2 M	two megohm-two million ohms	0 - 2,000,000
200 K	two hundred kilo-ohm-two hundred thousand ohms	0 - 200,000
20 K	twenty kilo-ohm-twenty thousand ohms	0 - 20,000
2 K	two kilo-ohm two-thousand ohms	0 - 2,000
200	two hundred ohms	0 - 200

Motor Module Installation

All replacement motor control modules look similar; however, each module is designed for a specific motor size. It is very important to make sure that you are using the correct replacement motor control module. **USE OF THE WRONG MOTOR CONTROL MODULE MAY RESULT IN UNEXPECTED UNIT OPERATION.**

1 - Verify electrical power to unit is disconnected.

2 - Connect three-wire harness from motor to control module.

3 - Mount new motor control module to motor using two hex head bolts removed in FIGURE 15. Torque bolts to 22 inch pounds or 1/16th clock wise turn.

4 - Reconnect the two harnesses to the motor control module.

5 - The electrical connectors of the motor should be facing down to form a drip loop (FIGURE 17). This will directs moisture away from the motor and its electric connections on the motor

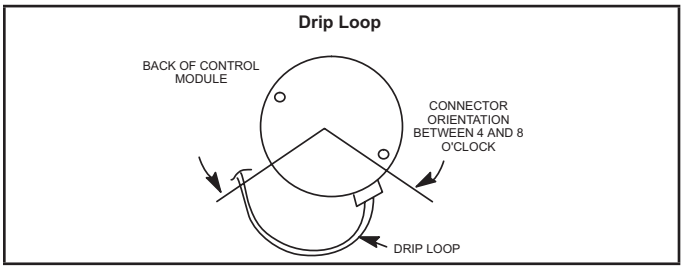


FIGURE 17

II- PLACEMENT AND INSTALLATION

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

NOTE - *For any Low GWP refrigerant systems with exposed line set joints installed in the same space, each non-direct vent furnace system must have a refrigerant detection sensor installed below the level of the burners Any direct vent furnace system is not subject to this requirement.*

III- START-UP

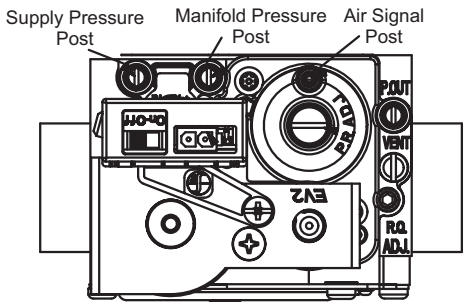
A- Heating Start-Up

⚠ WARNING

Shock and burn hazard.

ML180UHNE units are equipped with a hot surface ignition system. Do not attempt to light manually.

Gas Valve Operation



Gas Valve Shown in **OFF** Position

FIGURE 18

1 - STOP! Read the safety information at the beginning of this section.
2 - Set the thermostat to the lowest setting.
3 - Turn off all electrical power to the unit.
4 - This furnace is equipped with an ignition device which automatically lights the burners. Do not try to light the burners by hand.
5 - Remove the upper access panel.
6 - Move gas valve switch to OFF position. Do not force. See FIGURE 18.
7 - Wait five minutes to clear out any gas. If you then smell gas, STOP! Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas go to next step.
8 - Move gas valve switch to ON position. Do not force. See FIGURE 18.
9 - Replace the upper access panel.
10 - Turn on all electrical power to to the unit.
11 - Set the thermostat to desired setting.

NOTE - *When unit is initially started, steps 1 through 11 may need to be repeated to purge air from gas line.*

12 - If the appliance will not operate, follow the instructions "Turning Off Gas to Unit" and call the gas supplier.

Turning Off Gas to Unit

1 - Set the thermostat to the lowest setting.
2 - Turn off all electrical power to the unit if service is to be performed.
3 - Remove the upper access panel.
4 - Move gas valve switch to OFF position. Do not force. See FIGURE 18.
5 - Replace the upper access panel.

B- Safety or Emergency Shutdown

Disconnect main power to unit. Close manual and main gas valves.

C- 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 leaks into combustion chamber. Turn off power to unit. All access panels and covers must be in place and secured.

IV-HEATING SYSTEM SERVICE CHECKS

A- C.S.A. Certification

All units are C.S.A. design certified without modifications. Refer to the EL180UHNEK Installation Instruction.

B- Gas Piping

Gas supply piping should not allow more than 0.5"W.C. drop in pressure between gas meter and unit. Supply gas pipe must not be smaller than unit gas connection. Compounds used on gas piping threaded joints should be resistant to action of liquefied petroleum gases.

C- Testing Gas Piping

⚠ CAUTION

If a flexible gas connector is required or allowed by the authority that has jurisdiction, black iron pipe shall be installed at the gas valve and extend outside the furnace cabinet.

⚠ 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.

⚠ WARNING

Do not over torque (800 in-lbs) or under torque (350 in-lbs) when attaching the gas piping to the gas valve.

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 19. If the pressure is equal to or less than 0.5psig (14"W.C.), close the manual shut-off valve before pressure testing to isolate furnace from gas supply.

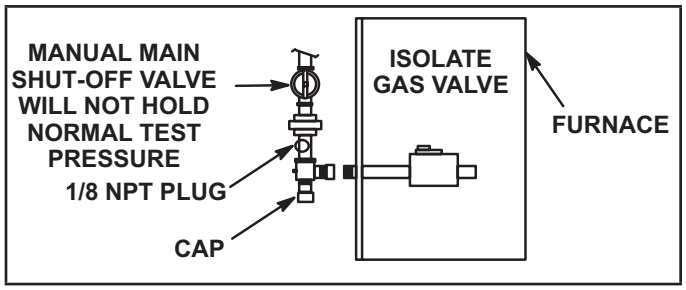


FIGURE 19

When checking piping connections for gas leaks, use preferred means. Kitchen detergents can cause harmful corrosion on various metals used in gas piping. Use of a specialty Gas Leak Detector is strongly recommended. It is available through Lennox under part number 31B2001. See Corp. 8411-L10, for further details.

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

D- Gas Pressure Adjustment

Gas Flow (Approximate)

TABLE 9

GAS METER CLOCKING CHART

Unit	Seconds for One Revolution			
	Natural		LP/Propane	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft Dial
-040	90	180	N/A	N/A
-060	60	120	150	300
-080	45	90	112	224
-100	36	72	N/A	N/A
Natural - 1000btu/cu ft		Propane-2500 btu/cu ft		

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 9. If manifold pressure matches TABLE 11 and rate is incorrect, check gas orifices for proper size and restriction. Remove temporary gas meter if installed.

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

E- Supply Line

Supply Pressure Measurement

A port on the inlet side of the gas valve provides access to the supply pressure tap. See FIGURE 18. Loosen the screw and connect a manometer to measure supply pressure.

See TABLE 10 for supply line pressure. Tighten screw after measurements have been taken.

TABLE 10

Supply Line wc in

Unit	Natural	LP/Propane
040	4.5 - 10.5	N/A
060, 080		
100		

F - Manifold Pressure, Signal Pressure, Combustion and Air Orifice Replacment

Manifold Pressure / Signal Pressure

1 - Turn off the electrical power and gas supply to the furnace.

2 - Check the gas manifold pressure on the SIT gas valve by opening the manifold pressure post. See FIGURE 18. Using a 4.5-5 x 0.8 mm screw driver, loosen the slot headed brass sealing screws. The sealant screws can not be removed.

3 - Install hoses and meter as shown in FIGURE 20 and FIGURE 21 for system operating pressure measurement. The system operating pressure is monitored by the pressure switch and is the pressure drop across the air orifice.

4 - Turn on electrical power and gas supply to the furnace. Start Furnace.

5 - After allowing unit to stabilize for 8 minutes, record manifold pressure and compare to value in TABLE 11. If manifold pressure is within range, rate check is complete move to step 6. If manifold pressure is not within range replace gas valve.

Gas Valve is not adjustable. Do not adjust manifold pressure.

6 - Record system operating pressure and compare to value in TABLE 12. If system operating pressure is within range continue. If the system operating pressure is not within range go to "Troubleshooting".

7 - Shut off unit and remove manometer and signal meter after accurate readings has been obtained. Remove measurement hoses. Tighten the brass sealing screws loosened in step 2. *Sealant screws must be tightened before firing the unit.*

8 - Restart unit and check for gas leaks. Seal any leaks found.

TABLE 11

Capacity	Manifold Pressure
040	0.0 - 0.10
060	
080	
100	

TABLE 12

System Operating Pressures (in. w.c.) at Different Altitudes ft

Capacity	0 - 2000	2001 - 4500	4501 - 7500
040	1.25 - 1.47	1.13 - 1.35	0.96 - 1.18
060	0.56 - 0.66	0.51 - 0.61	0.47 - 0.57
080	1.12 - 1.26	1.04 - 1.18	0.94 - 1.08
100	1.11 - 1.31	1.09 - 1.29	0.95 - 1.15

Combustion

Furnace should operate minimum 15 minutes with correct manifold and system operating pressure before checking combustion. TABLE 13 shows acceptable combustion. The maximum carbon monoxide reading should not exceed 100ppm.

TABLE 13

Acceptable CO_2 Levels

Capacity	CO_2
040	6.3 - 7.3
060	7.0 - 8.2
080	7.0 - 8.2
100	7.0 - 8.2

Gas Manifold Pressure Measurement

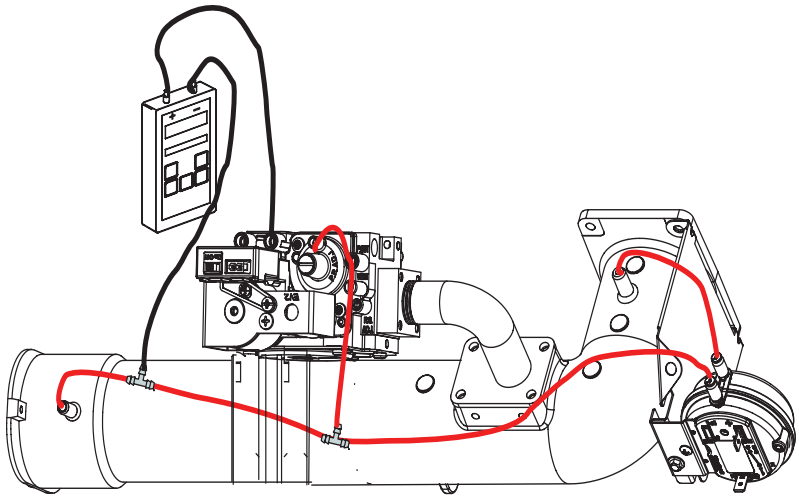


FIGURE 20

System Operating Pressure Measurement

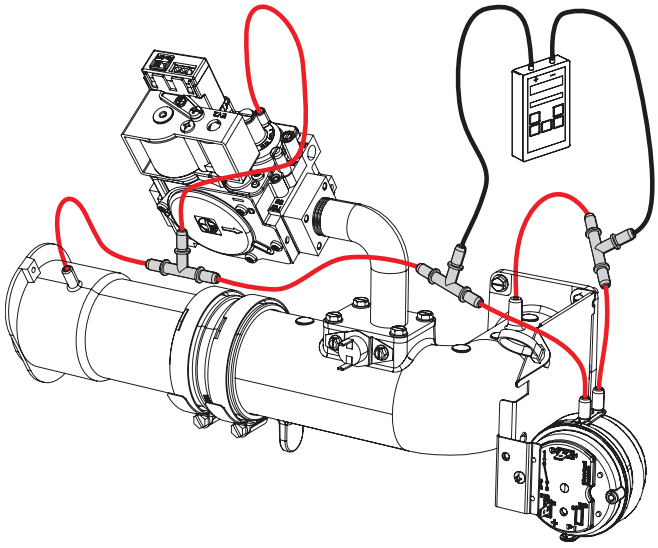


FIGURE 21

Air Orifice Replacement

Do not replace the air orifice until the problem has been determined. If the unit has difficulty igniting the air orifice is oversized and brings in too much combustion air. If the unit ignites but with loud noise, go to Troubleshooting. The air orifice is located inside the gray coupling between the clamps. See FIGURE 24 for air orifice location.

1 - Turn off the electrical power and gas supply to the furnace.

2 - Remove the air pressure tubing from the fitting on the aluminum elbow and air intake coupling.

3 - Use a 5/16" nut driver to loosen the clamp on the right side of the gray coupling.

4 - ***Type A units -*** Remove the air intake adapter by removing the two screws that secure it to the cabinet. Remove the four screws on the aluminum elbow, make note of the pressure switch bracket location. It may be necessary to disconnect the gas pipe to the gas valve before removing the screws. See FIGURE 22.

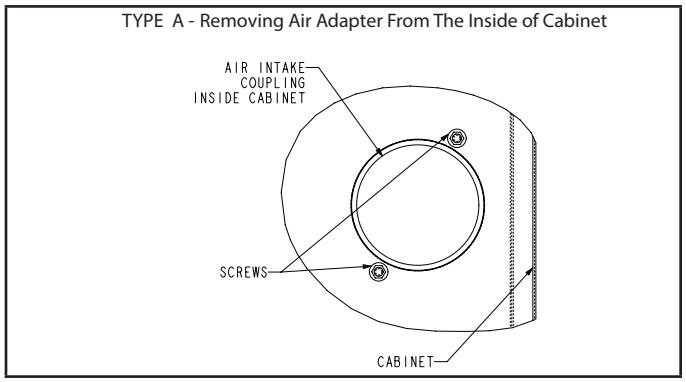


FIGURE 22

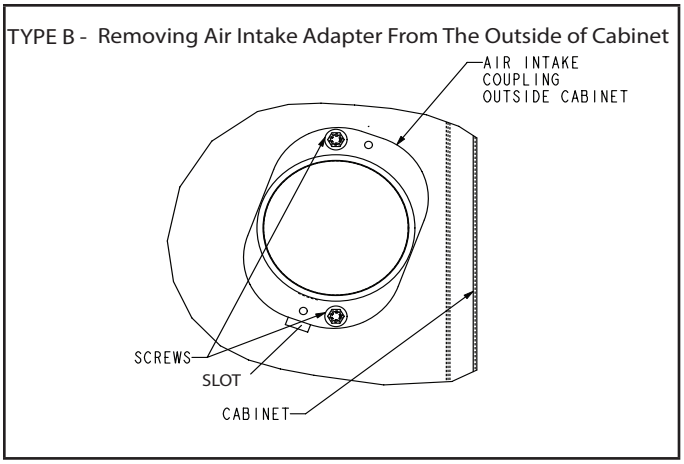


FIGURE 23

5 - Remove the air orifice. See TABLE 14 for replacement.

6 - Reinstall the air orifice on the right side of the coupling and push firmly into place.

7 - ***Type A units -*** Reinstall aluminum elbow with the four screws removed from step 4. Make sure the gray coupling is fully seated again the aluminum elbow and the pressure switch bracket is in the correct location. The bracket should be under the screw head and not under the flange on the aluminum elbow. Tighten clamp to secure the gray coupling. Reinstall the gas pipe to gas valve.

Type B units - Air intake adapter can be removed from the outside of the cabinet by removing the two screws and rotating the pressure switch hose barb through the slot in the cabinet. See FIGURE 23.

8 - Reconnect the air pressure tubing.

9 - Repeat manifold and system operating pressure check. If unit ignites and manifold and system operating pressures are correct, move on to combustion check. If unit still does not ignite or ignites with loud resonance go to Troubleshooting

TABLE 14

Air Orifice Replacement

Capacity & Dash No.	Production		Difficult Igniting or Noisy (Need less combustion air)	
Single-Stage Models	Air Orifice Size (Part #)	Catalog Number	Air Orifice Size (Part #)	Catalog Number
040	0.745 (25)	23A27	0.730 (31)	25B92
060	1.030(30)	24G44	1.000 (02)	19X30
080	1.030 (30)	24G44	1.000 (02)	19X30
100	1.160 (29)	23A32	1.140 (24)	22J97

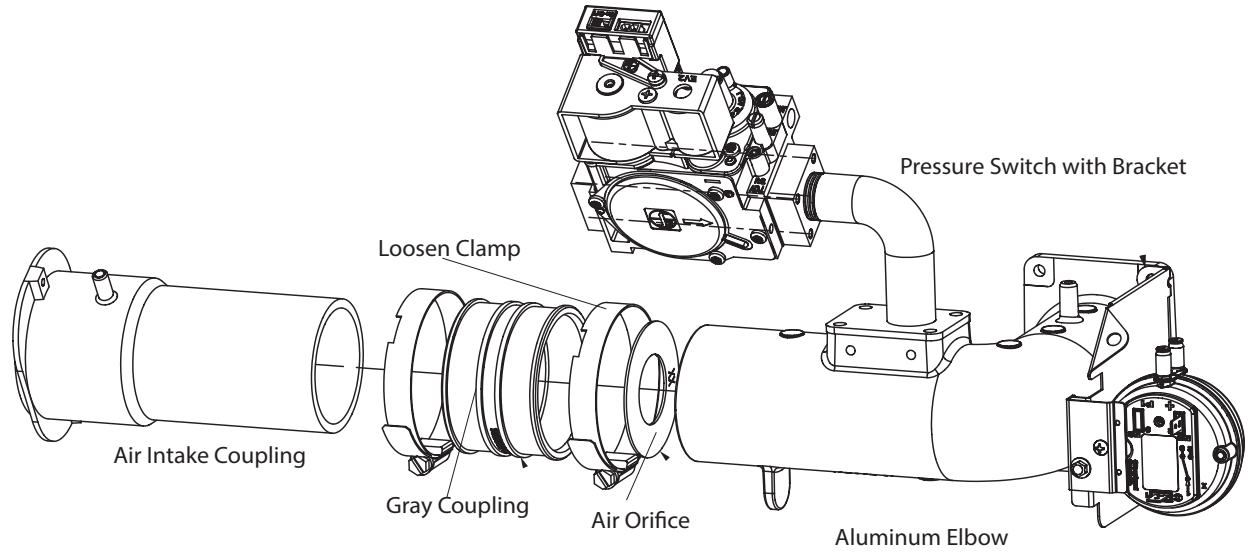


FIGURE 24

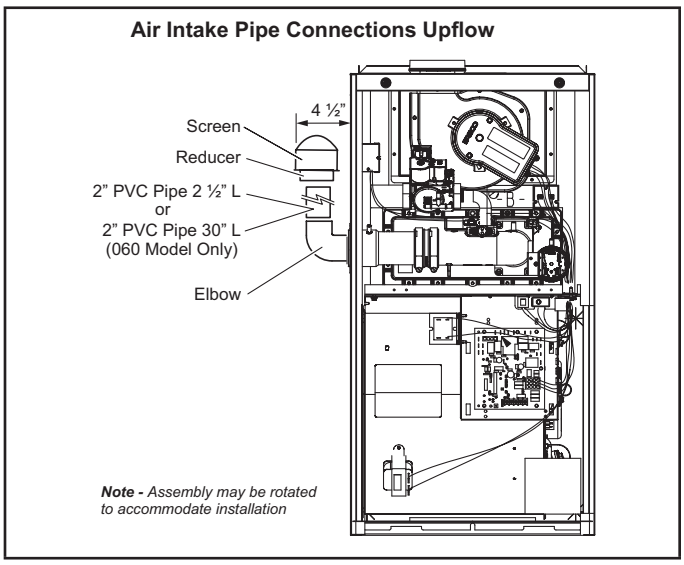
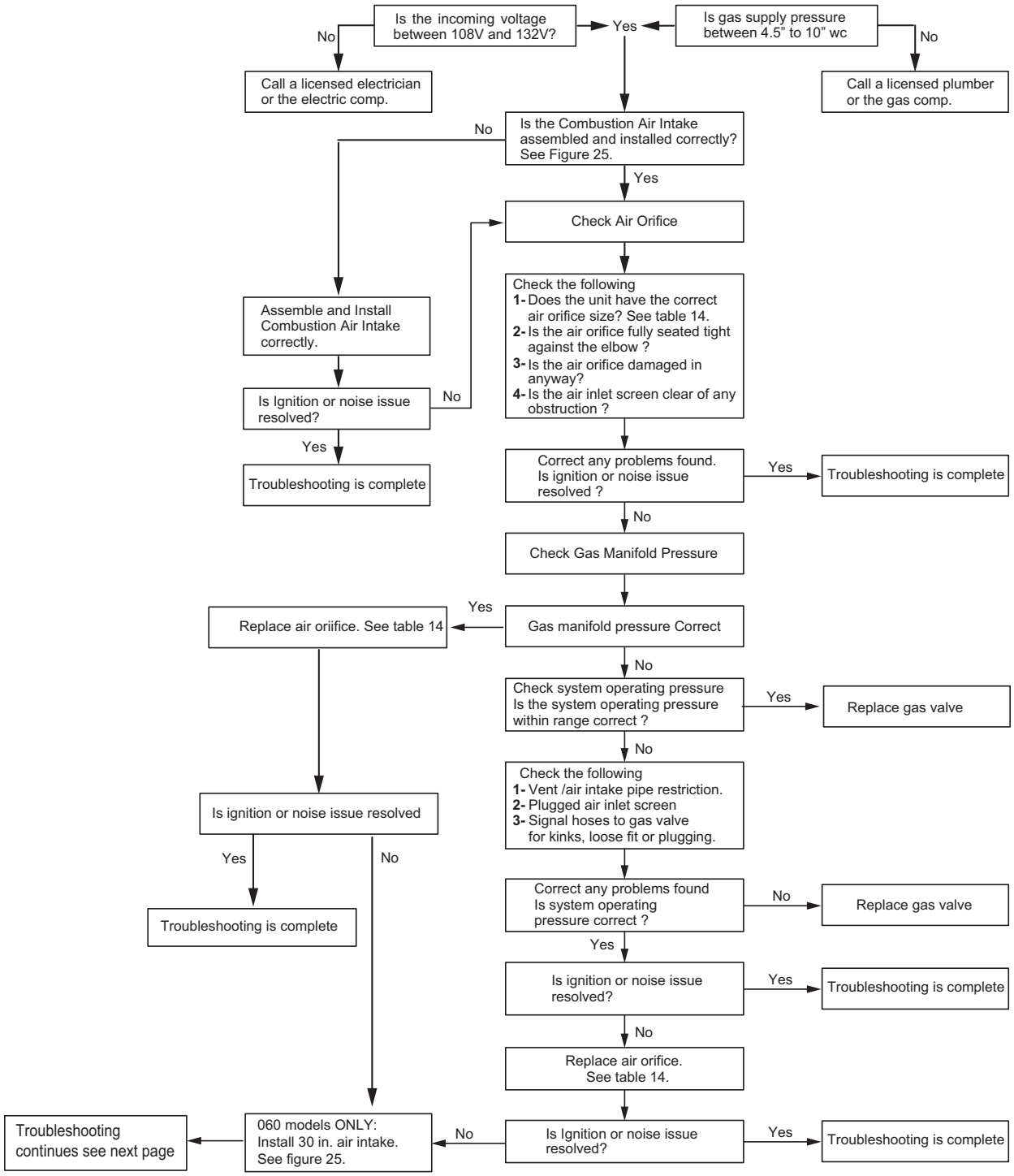
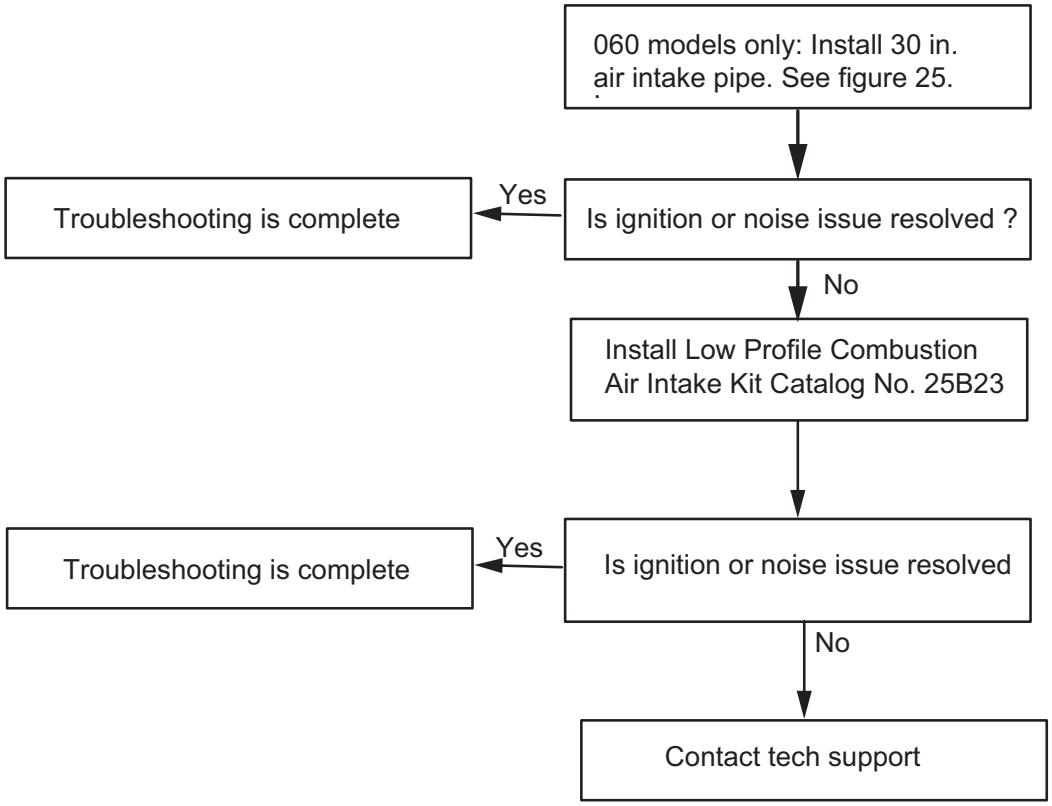


FIGURE 25

Troubleshooting Poor Ignition and Noise Issues



Troubleshooting Poor Ignition and Noise Issues Continued



H- Proper Ground and Voltage

A poorly grounded furnace can contribute to poor flame sense signal. Use the following procedure to check for ground and voltage to the integrated control.

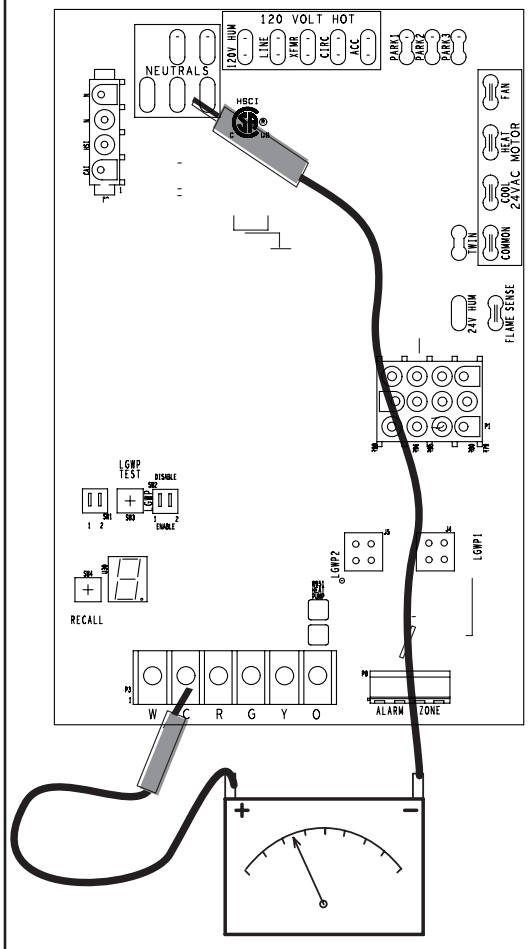
1 - Measure the AC voltage between Line Neutral (spade terminals) and “C” terminal (low voltage terminal block) on the integrated control. See FIGURE 26. A wide variation in the voltage between Line Neutral and “C” as a function of load indicates a poor or partial ground. Compare the readings to the table below. If the readings exceed the maximum shown in TABLE 15, make repairs before operating the furnace.

2 - - In addition, measure the AC voltage from Line Hot to Line Neutral (spade terminals) on the integrated control. See FIGURE 26. This voltage should be in the range of 97 to 132 Vac.

TABLE 15

Furnace Status	Measurement VAC	
	Expected	Maximum
Power On Furnace Idle	0.3	2
CAI / Ignitor Energized	0.75	5
Indoor Blower Energized	Less than 2	10

CHECK VOLTAGE BETWEEN LINE NEUTRAL AND LOW VOLTAGE “C” TERMINAL



CHECK VOLTAGE BETWEEN LINE HOT AND LINE NEUTRAL

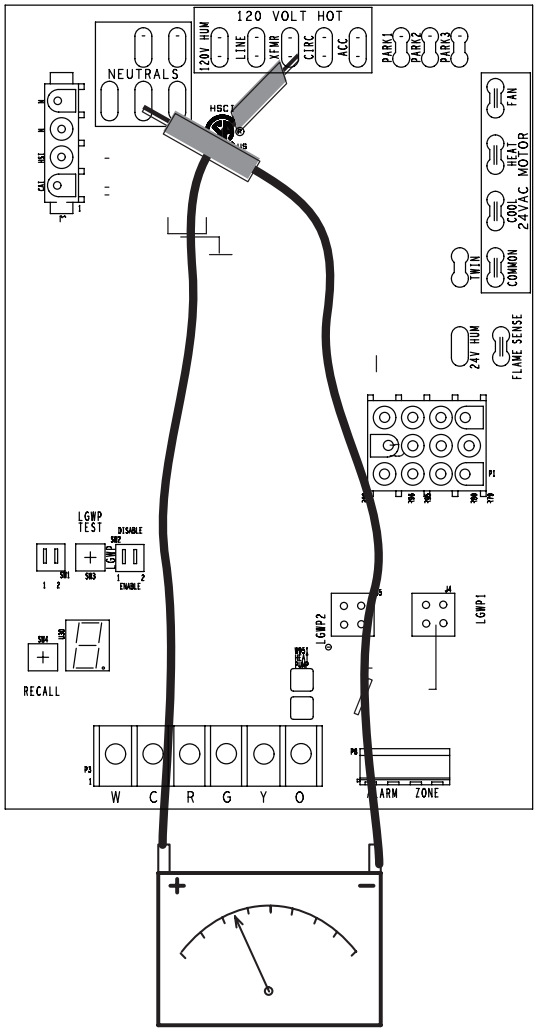


FIGURE 26

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 - Depending on the type of indoor thermostat, blower and entire unit will be off when the system switch is in OFF position.

B-Temperature Rise (FIGURE 27)

Temperature rise for EL180UHNEK 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 “TEMP. RISE °F” listed on the unit rating plate.

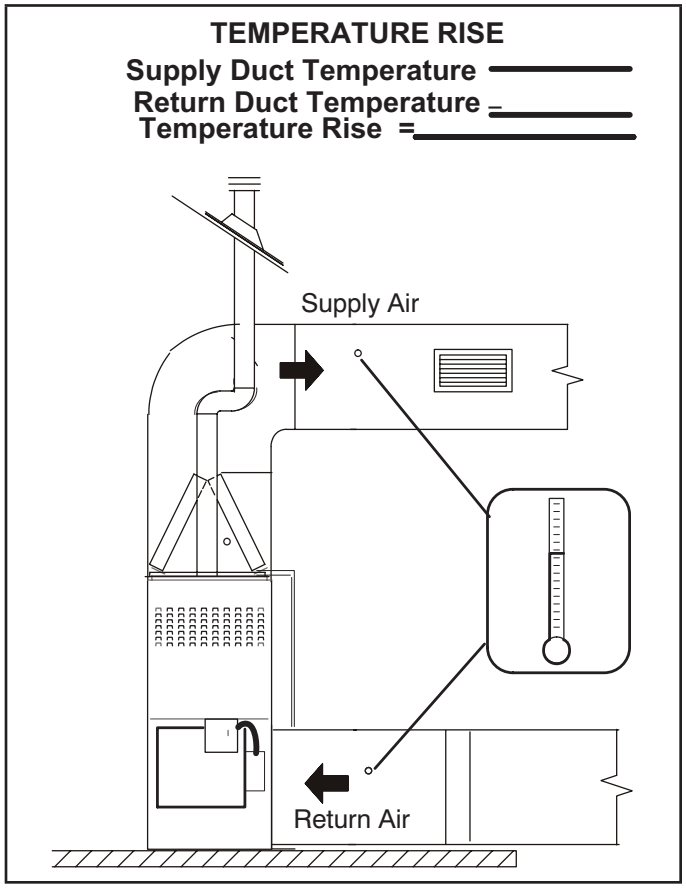


FIGURE 27

C-External Static Pressure

1 - Tap locations shown in FIGURE 28.

2 - Punch a 1/4” diameter hole in supply and return air plenums. Insert manometer hose flush with inside edge of hole or insulation. Seal around the hose with permagum. Connect the zero end of the manometer to the discharge (supply) side of the system. On ducted systems, connect the other end of manometer to the return duct as above.

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. For heating speed external static pressure drop must not be more than 0.5” W.C. For cooling speed external static pressure drop must not be more than 0.8” W.C.

4 - Seal the hole when the check is complete.

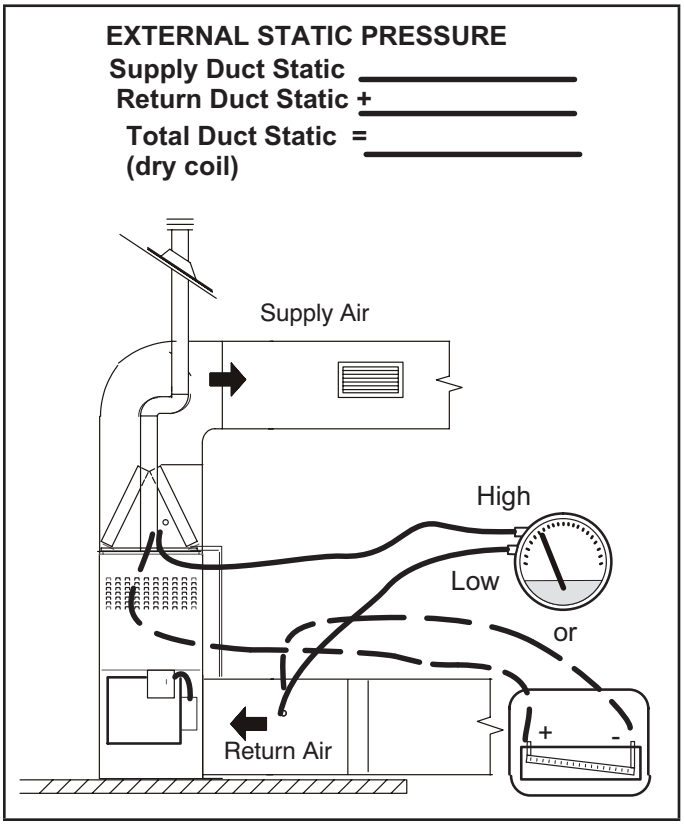


FIGURE 28

D-Blower Speed Taps

Blower speed tap changes are made on the integrated control. The heating tap is connected to the “HEAT” terminal and the cooling tap is connected to the “COOL” terminal. The continuous blower tap is connected to the “FAN” terminal. Unused taps must be secured on dummy terminals labeled ”PARK. To change out existing speed tap, turn off power and switch out speed tap with tap connected to “PARK”. See blower speed tap table on unit diagram for motor tap colors for each speed.

VI-MAINTENANCE

At the beginning of each heating season, and to comply with the Lennox Limited Warranty, your system should be checked by a licensed professional technician (or equivalent) as follows:

NOTE - *Burner inspection and service is not recommended for annual furnace maintenance.*

⚠ IMPORTANT

If a high efficiency filter is being installed as part of this system to ensure better indoor air quality, the filter must be properly sized. High efficiency filters have a higher static pressure drop than standard efficiency glass/foam filters. If the pressure drop is too great, system capacity and performance may be reduced. The pressure drop may also cause the limit to trip more frequently during the winter and the indoor coil to freeze in the summer, resulting in an increase in the number of service calls.

Before using any filter with this system, check the specifications provided by the filter manufacturer against the data given in the appropriate Lennox Product Specifications bulletin. Additional information is provided in Service and Application Note ACC002 (August 2000).

⚠ WARNING

Fire Hazard. Use of aluminum wire with this product may result in a fire, causing property damage, severe injury or death. Use copper wire only with this product.

⚠ CAUTION

Failure to use properly sized wiring and circuit breaker may result in property damage. Size wiring and circuit breaker(s) per Product Specifications bulletin (EHB) and unit rating plate.

1 - Check wiring for loose connections, voltage at indoor unit and amperage of indoor motor.

2 - Inspect all gas pipe and connections for leaks.

3 - Check the cleanliness of filters and change if necessary (monthly).

4 - Check the cleanliness of blower assembly and clean the housing, blower wheel and blower motor if necessary .

5 - Inspect the combustion air inducer and clean if necessary.

TABLE 16

Furnace Cabinet Width	Filter Size in.	
	Side Return	Bottom Return
A - 14- 1/2”	16 X 25 X 1 (1)	14 X 25 X 1 (1)
B - 17-1/2”	16 X 25 X 1 (1)	16 X 25 X 1 (1)
C - 21”	16 X 25 X 1 (1)	20 X 25 X 1 (1)

6 - Evaluate the heat exchanger integrity by inspecting the heat exchanger per the AHRI heat exchanger inspection procedure. This procedure can be viewed at www.ahrinet.org. See “Induced-draft Furnace Heat Exchanger Inspection Procedure”.

7 - Ensure sufficient combustion air is available to the furnace. Fresh air grilles and louvers (on the unit and in the room where the furnace is installed) must be properly sized, open and unobstructed to provide combustion air.

8 - Inspect the furnace venting system to make sure it is in place, structurally sound, and without holes, corrosion, or blockage. Vent system must be free and clear of obstructions and must slope upward away from the furnace . Vent system should be installed per the National Fuel Gas Code

9 - Inspect the furnace return air duct connection to ensure the duct is sealed to the furnace. Check for air leaks on supply and return ducts and seal where necessary.

10 - Check the condition of the furnace cabinet insulation and repair if necessary.

11 - Perform a complete combustion analysis during the furnace inspection to ensure proper combustion and operation. Consult Service Literature for proper combustion values.

12 - Verify operation of smoke detectors and CO detectors and replace batteries as required.

13 - Inspect the Low GWP sensor / sensors and rubber sleeve.

Perform a general system test. Turn on the furnace to check operating functions such as the start-up and shut-off operation.

1 - Check the operation of the ignition system, inspect and clean flame sensor. Check microamps before and after. Check controls and safety devices (gas valve, flame sensor, temperature limits). Consult Service Manual for proper operating range. Thermal Limits should be checked by restricting airflow and not disconnecting the indoor blower. For additional details, please see Service and Application Note H049.

2 - Verify that system total static pressure and airflow settings are within specific operating parameters.

3 - Clock gas meter to ensure that the unit is operating at the specified firing rate. Check the supply pressure and the manifold pressure. Not all gas valves are adjustable. Verify correct temperature rise.

Cleaning the Heat Exchanger and Burners

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

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

2 - Rremove the air intake assembly from outside the cabinet. The assembly is not secured with screws or glue and will remove with ease. See FIGURE 29.

3 - Remove flue pipe and top cap (some applications top cap can remain) from the unit.

4 - Label the wires from gas valve, thermal switch, primary limit switch and make-up box then disconnect them.

5 - Remove the screws that secure the combustion air inducer to the collector box.

6 - Disconnect gas supply piping. Remove the screw securing the air fuel plenum and remove along with the air inake assembly as one component.

7 - Remove screws from both sides, top and bottom of vestibule panel.

8 - Remove heat exchanger. It may be necessary to spread cabinet side to allow more room. If so, remove five screws from the left side or right side of cabinet.See FIGURE 30.

9 - Back wash using steam. Begin from the burner opening on each tube. Steam must not exceed 275°F.

10 - To clean burner, remove from the air gas plenum and run a vacuum cleaner over the face of burner. Visually inspect inside the burner for any blockage caused by foreign matter. Remove any blockage. FIGURE 31 shows burner detail. Replace gasket between burner plate and air fuel plenum then re-install burner plate.

11 - To clean the combustion air inducer visually inspect and using a wire brush clean where necessary. Use compressed air to clean off debris and any rust.

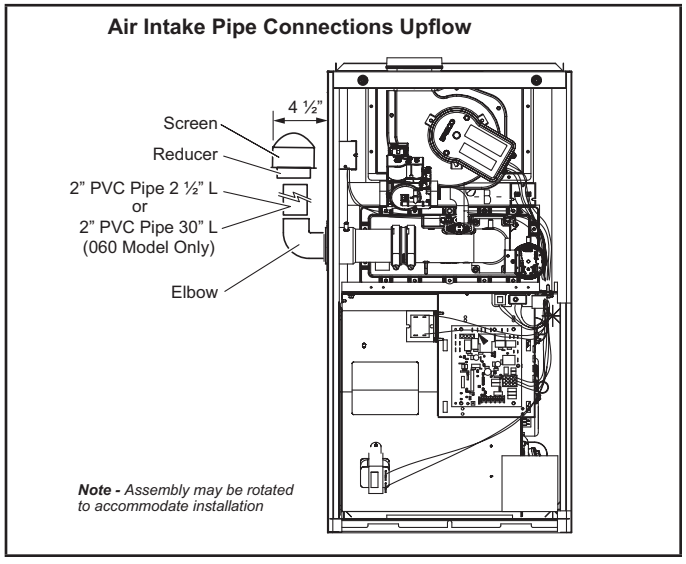


FIGURE 29

12 - |Reinstall heat exchanger in vestibule. (Replace the five screws in the cabinet from step 10 if removed).

13 - |Reinstall the air fuel plenum and air intake assembly. Re-install the combustion air inducer assembly. Make note to re-install all screws. Failure to replace all screws may cause leaks.

14 - Reconnect all wires.

15 - Reconnect top cap and vent pipe to combustion air inducer outlet.

16 - Reconnect gas supply piping.

17 - Using a rubber mallet reconnect the air intake assembly removed from the outside of the cabinet in step 2.

18 - Turn on power and gas supply to unit.

19 - Set thermostat and check for proper operation.

20 - Check all piping connections, factory and field, for gas leaks. Use a leak detecting solution or other preferred means.

⚠ CAUTION

Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed. Do not use matches, candles, flame or other sources of ignition to check for gas leaks.

21 - If a leak is detected, shut gas and electricity off and repair leak.

22 - Repeat steps 20 and 21 until no leaks are detected.

23 - Replace access panel.

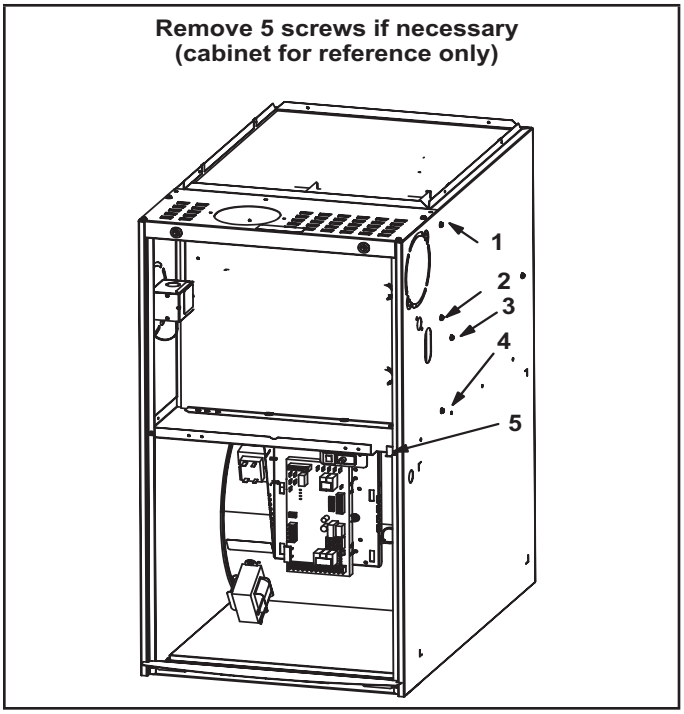


FIGURE 30

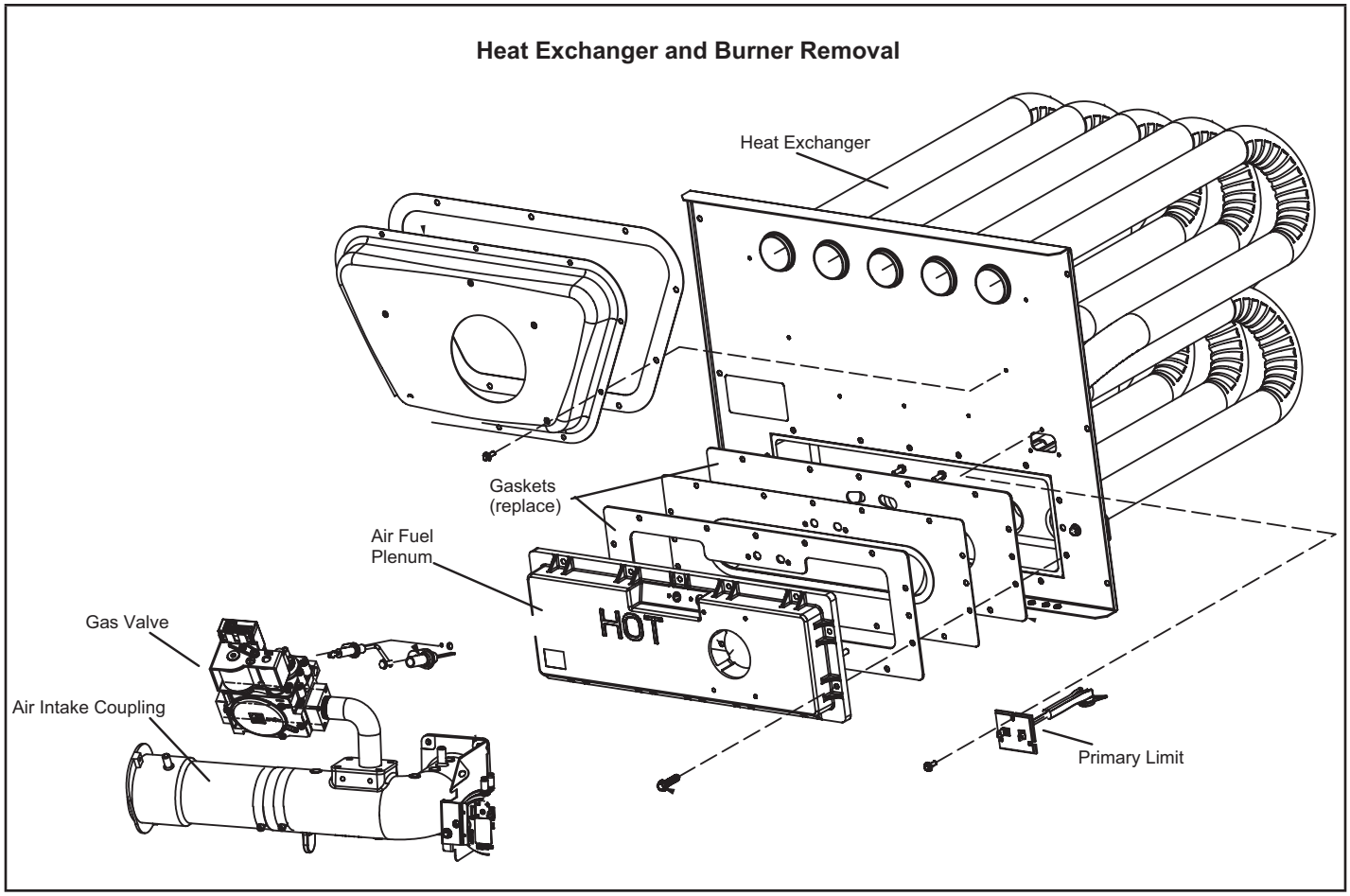

Heat Exchanger and Burner Removal
Heat Exchanger
Gaskets
(replace)
Air Fuel
Plenum
HOT
Gas Valve
Air Intake Coupling
Primary Limit

FIGURE 31

VII- Low GWP Application

⚠ WARNING

For use with Lennox approved evaporator coil and LGWP sensors only. Use original manufacturer recommended LGWP sensors if using non Lennox approved evaporator coil.

CONNECTING THE FURNACE CONTROL BOARD SENSOR.

See FIGURE 34 and follow steps below:

1 - Route sensor wire #1 through provided grommet. Form a drip loop below the control board on upflow installations to prevent condensate dripping on the control board.

2 - Avoid sharp edges when routing sensor wire during installation.

3 - Sensor wire must not block view of 7 segment LED .

Ensure the cable is properly seated into the SENSOR 1 plug (LGWP1). The Molex plug clip should lock into the Molex connection point for a secured connection, as shown below in FIGURE 32 Verify the connection is free of dust, debris, and moisture.

NOTE - *In confined space applications, connect the second sensor to the SENSOR 2 plug (LGWP2). Refer to evaporator coil installation instructions for more detail.*

Single Stage Constant Torque Control

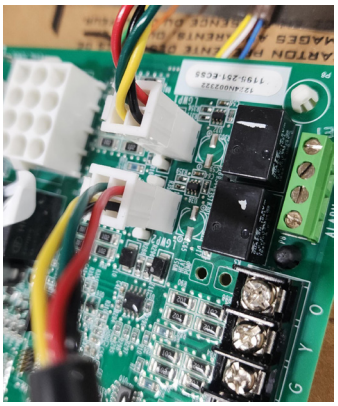


FIGURE 32

LOW GWP DIP SWITCH SETTINGS

Adjust the DIP switch settings to the sensor configuration. Failure to do so will cause faults on power-up. See FIGURE 33 and TABLE 17.

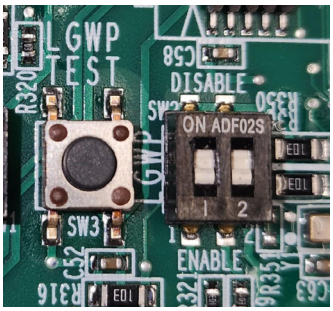


FIGURE 33

TABLE 17

DIP Switch Settings

Configuration	Switch 1	Switch 2
One (1) sensor, connected to SENSOR 1 plug	OFF (enable)	ON (disable)
Two (2) sensors, connected to SENSOR 1 plug and SENSOR 2 plug	OFF (enable)	OFF (enable)

In single sensor configurations, the sensor must be connected to the SENSOR 1 plug (LGWP1). Configurations other than the ones shown in TABLE 17 will cause a servicing fault.

Each DIP switch corresponds to a sensor position (i.e., DIP switch 1 to sensor 1; DIP switch 2 to sensor 2). The default factory switch positions are set to OFF (ENABLED)

The furnace control board software reads the OFF position as an active sensor. A sensor should be present for the corresponding sensor connector. Setting the DIP switch to ON disables the sensor position.

SECONDARY SENSOR REQUIREMENTS

Additional Line Sets

If additional refrigerant line joints are present outside of the line set sleeve and a secondary refrigerant detection sensor is required, its installation must comply with the requirements listed in Refrigerant Detection Sensor Kit (27V53). See FIGURE 34 for routing the secondary sensor cable through the furnace cabinet

Non-Low GWP Applications

⚠ WARNING

For Furnace only applications or Furnace replacement in a Non-Low GWP applications, the LOW GWP sensors should be disabled, otherwise the blower will operate continuously. To do this, the Low GWP Dip switches setting for both – Sensor 1 and the Sensor 2 must be moved to the ON position.

FURNACE CONTROL BOARD LOW GWP MODES OF OPERATION

The modes of operation for the furnace control board are Initializing, Normal, Leak Detected, and Fault.

Initializing

The furnace control board is establishing connection with the refrigerant detection sensor and is completing an initial five-minute purge sequence.

Normal

The HVAC system is functioning normally. The furnace control board has not detected a refrigerant leak.

Leak Detected

When the furnace control board detects a refrigerant leak:

1. The furnace control board shuts off the (R) input (24VAC power) to the thermostat, which de-energizes the outdoor unit compressor and heat sources, such as gas and/or electric strip heat. No heating or cooling demands will be met.
2. The furnace control board activates the blower (high speed). The blower purges refrigerant from the cabinet, plenum, and ductwork.
3. After the furnace control board determines the refrigerant levels are below the safety threshold, the blower will continue to operate for the remainder of the seven (7) -minute cycle.
4. After the blower sequence is complete, the HVAC system resumes normal operation.

NOTE - *The HVAC system may not maintain a cooling or heating setpoint if a significant leak exists. Any refrigerant leaks that remain unaddressed for an extended time may cause the HVAC system to shut down on a low refrigerant pressure limit condition.*

Fault

When a Low GWP fault is detected by the furnace control board, the indoor unit blower engages and remains engaged at a constant air flow output until the fault is cleared.

NOTE - *See TABLE 4 "Ignition control diagnostic codes"*

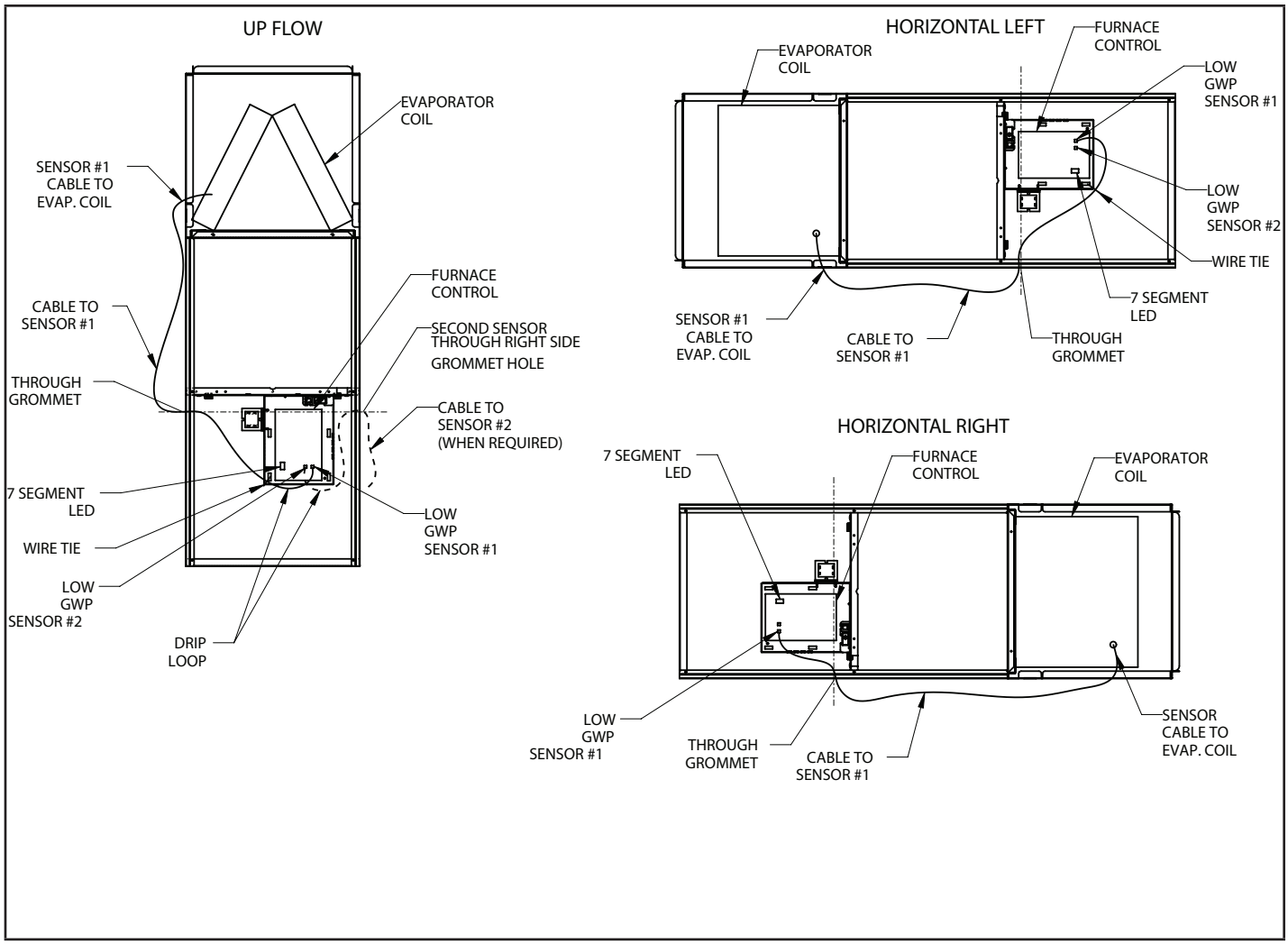


FIGURE 34

LGWP TEST BUTTON FUNCTIONALITY

The furnace control board is equipped with a Test/Reset push button. The Test button can be used to perform several functions, depending on the mode of operation of the furnace control board.

TABLE 18 lists the functions of the Test button during each mode of operation.

TABLE 18

LGWP Test Button Function

Mode of Operation	Press the Test Button to:
Normal	Trigger a leak detection response. Verify all equipment is wired correctly into the furnace blower control board (after installation).
Leak Detected	Reset the furnace control board to a normal mode of operation after a previous leak has been detected and purged from the HVAC system
Fault	Reset the furnace control board after troubleshooting and resolving a fault condition. If the fault is not resolved, the furnace control board will enter the Fault mode again.

LGWP Test Button - Additional Functions

TABLE 19 lists the additional functions of the Test Button while the furnace control board is functioning within the states of Initializing, Monitoring, Leak Detection, Servicing and Fault.

TABLE 19

Additional Button Functions

State	Press	Action
Initializing	Short	Skips remaining pre-purge after sensors are recognized by the furnace control board
Initializing	Long	Reset control
Monitoring	Short	Clear purge-counter if prior mitigation has occurred; Test mitigation
Monitoring	Long	Reset control
Mitigating	Short	If testing mitigation, end test
Servicing	Short	Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator
Servicing	Long	Reset control
Fault	Short	Reevaluate fault condition - if cleared return to monitoring, otherwise update indicator
Fault	Long	Reset control

External Alarm

(*For applications with external alarms wired directly to the furnace control board*)

The furnace control board triggers the external alarm system when it enters Leak Detected mode. For alarm notifications, the furnace control board provides a dry relay contact that is rated 3A at 30 VAC/DC.

THERMOSTAT COMPATIBILITY

Thermostats that preserve memory settings are compatible with the furnace control board. Examples include:

- Battery-powered thermostats
- Analog Thermostat
- Late-model programmable thermostats

NOTE - *Early-generation digital and programmable thermostats may not retain the operation mode and temperature setpoints after a power outage.*

The following scenarios are likely to occur when home occupants are not available to adjust the thermostat setpoints as the system is recovering from leak detection and resuming normal operation:

- Heating could be lost during a cold night
- Cooling could be lost during a hot day
- The thermostat could reset to an incorrect temperature setpoint

START UP PROCEDURE

The furnace control board is equipped with a LGWP Test/Reset button, see Test Button Functionality. After the furnace control board has been mounted and wired, restore power to the HVAC system. The system will then run through a purge sequence for five minutes. After the purge sequence is complete, proceed to testing cooling demand and heating demand.

Cooling Demand

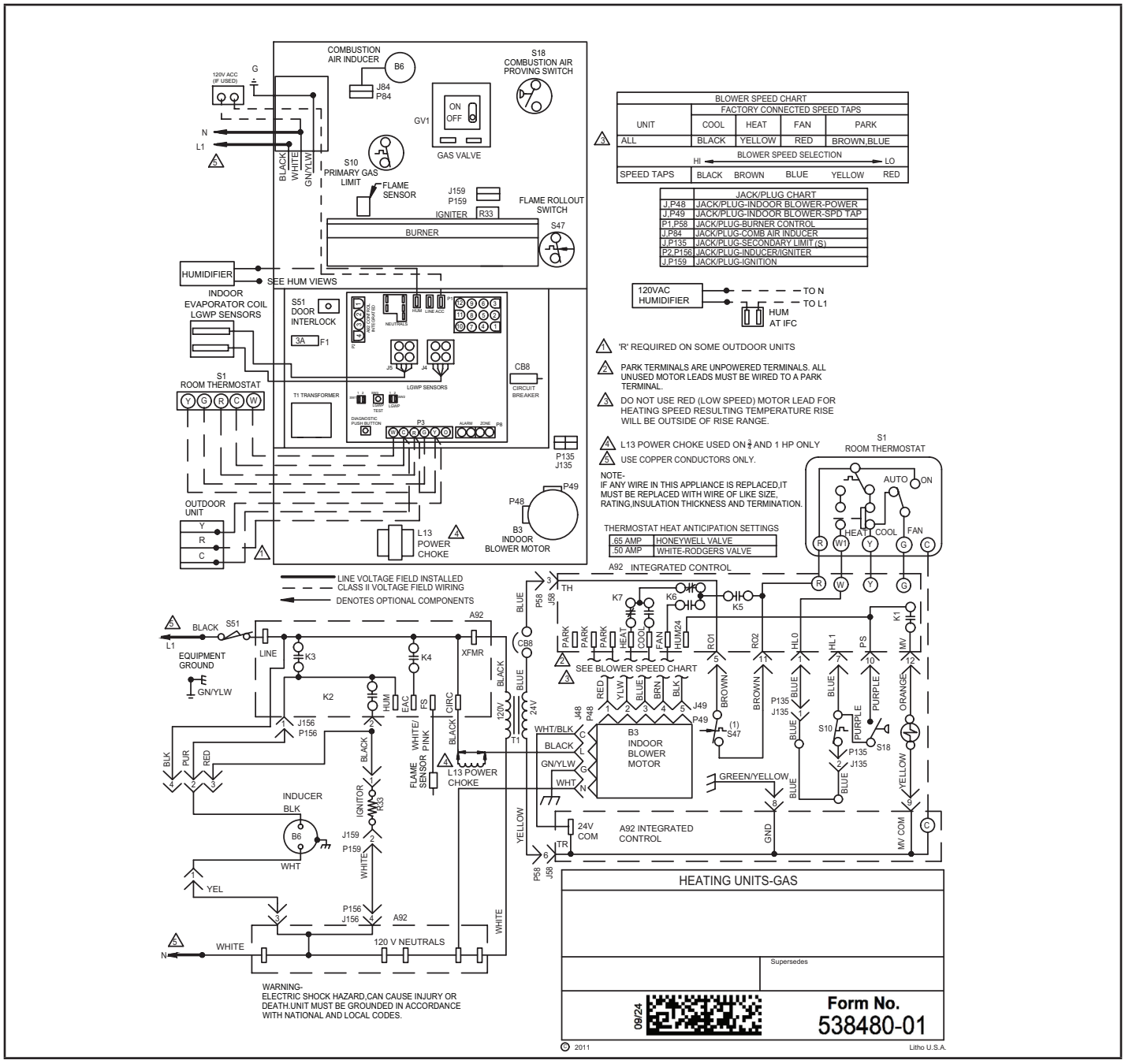
1. Prompt a cooling demand at the thermostat.
2. Press the LGWP Test button on the furnace control board.

   The system then executes a leak detection response.
3. Observe the following sequence:
   a. The LED indicator for leak detection. See TABLE 4 ”Igntion control diagnostic codes”
   b. The blower powers up.
   c. The outdoor compressor powers down.
4. Press the LGWP Test button to terminate the simulated Leak Detected mode upon test completion
5. ***Heating Demand***

1. Prompt a heating demand at the thermostat.
2. Observe the following sequence:
   a. The LED indicator for leak detection. See TABLE 4 “Ignition control diagnostoc codes”.
   b. The blower powers up.
   c. The gas burners power down.
   d. The outdoor compressor powers down.
3. Press the LGWP Test button to terminate the simulated Leak Detected mode upon test completion.

The installation of the furnace control board is complete after both sequences are successfully completed.

VIII- Wiring and Sequence of Operation / Troubleshooting



1 - Line voltage is applied to L1 and N. the T1 low voltage transformer is energized, and line voltage is applied to B3 indoor blower.

2 - S47 rollout switch(es) must be closed in order for 24V from transformer to be output on integrated control ”R” to power thermostat.

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

4 - A92 integrated control runs a self-check. S10 primary limit and S21 secondary limit contacts are found to be closed. Call for heat can continue.

5 - A92 integrated control energizes B6 combustion air inducer. S18 combustion air pressure switch closes . Once S18 closes, a 15-second pre-purge follows.

6 - A92 integrated control energizes R33 ignitor. A 20-second warm-up period begins.

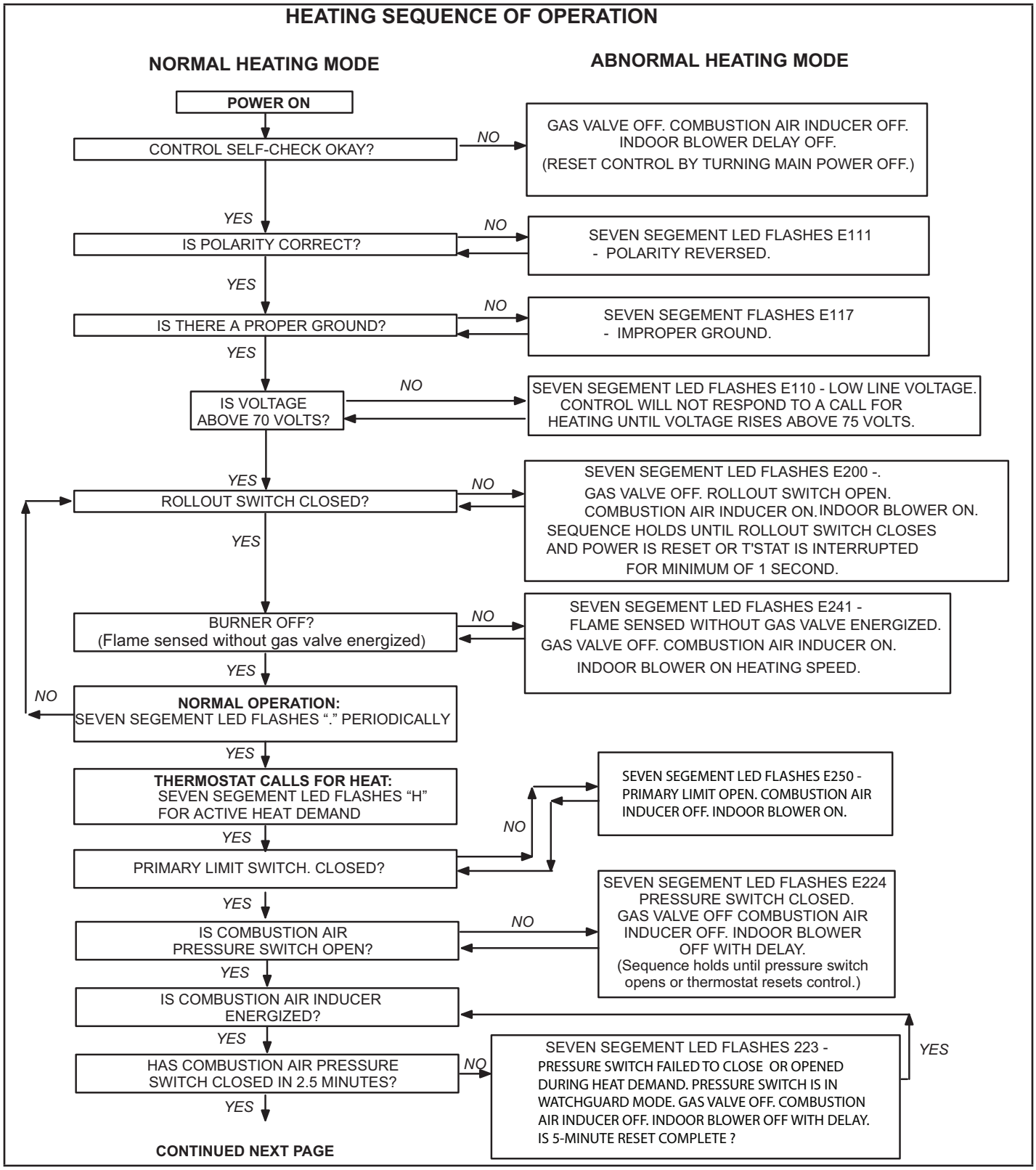
7 - GV1 gas valve opens for a 4-second trial for ignition

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

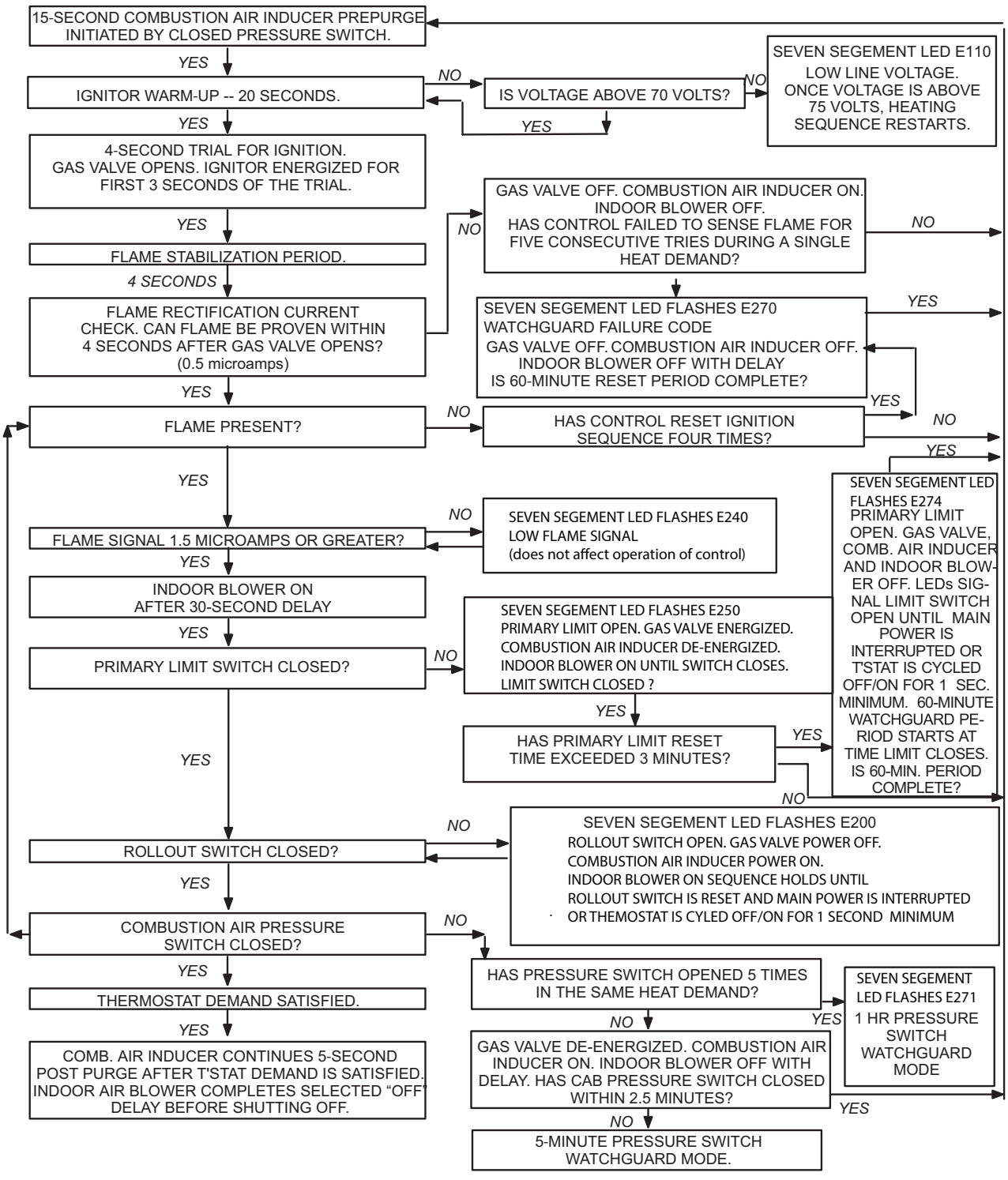
9 - After 30-second delay (from flame sensed), A92 integrated control applies 24VAC to Heat speed of B3 indoor blower.

10 - When heat demand is satisfied, W1 of the indoor thermostat de-energizes W of A92ignition control which de-energizes GV1 gas valve. B6 combustion air inducer continues a 5-second post-purge period, and B3 indoor blower completes a selected OFF time delay

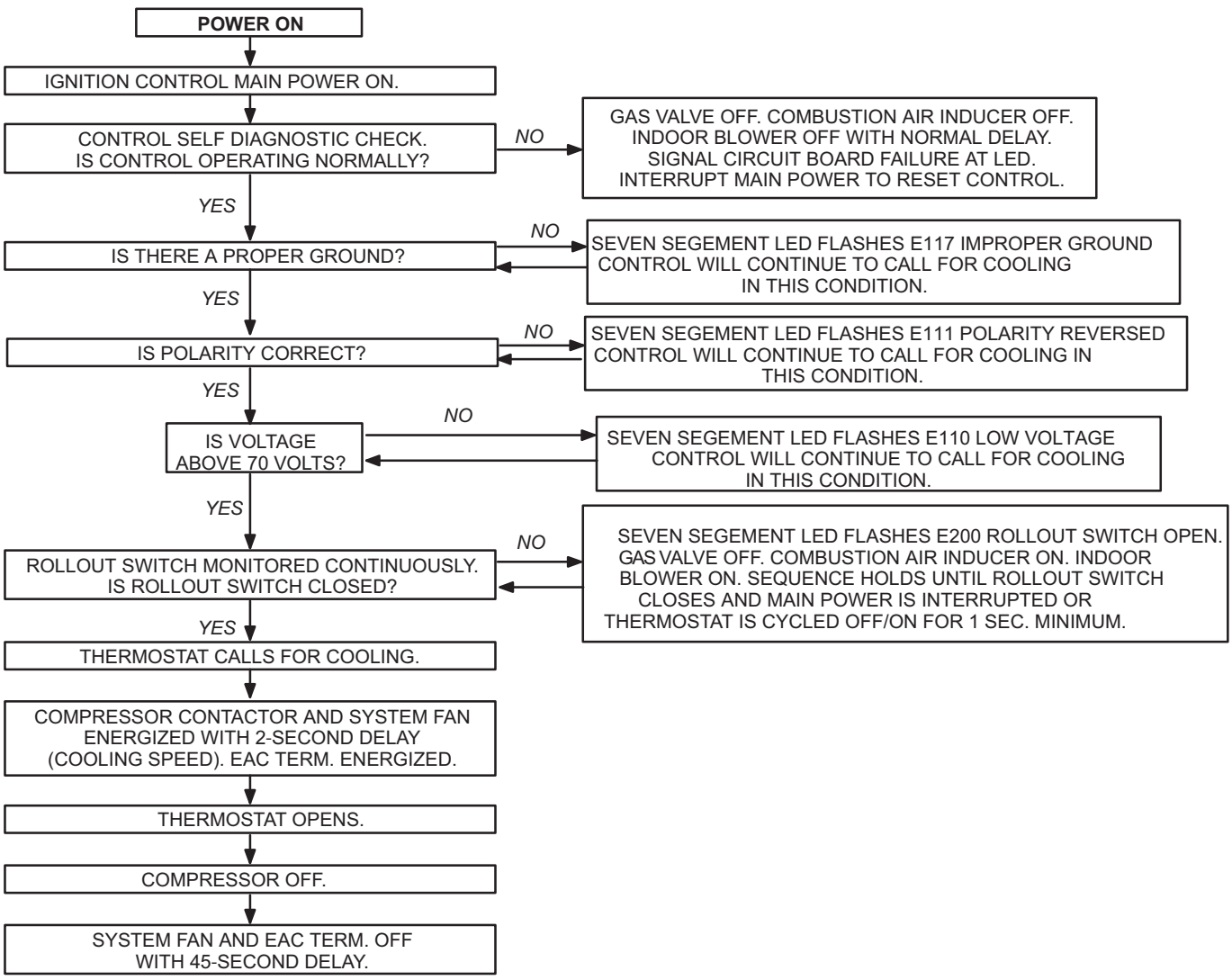
HEATING SEQUENCE OF OPERATION



HEATING SEQUENCE CONTINUED



COOLING SEQUENCE OF OPERATION



CONTINUOUS FAN SEQUENCE OF OPERATION