EL280DF SERIES UNITS

EL280DF series units are 80% efficiency gas furnaces used for downflow applications only, manufactured with Lennox Duralok™ heat exchangers formed of aluminized steel. Units are available in heating capacities of 66,000 to 110,000 Btuh and cooling applications up to 5 tons. Refer to Engineering Handbook for proper sizing.

Units are factory equipped for use with natural gas. Kits are available for conversion to LPG operation. EL280DF model units are equipped with the SureLight® integrated control. All units use a redundant gas valve to assure safety shut-off as required by CSA.

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 recommendations only and do not constitute code.

TABLE OF CONTENTS

⚠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.

⚠CAUTION

As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.

SPECIFICATIONS

			EL280DF070P36A	EL280DF090P48B	EL280DF110P60C
Gas Heating Performance		**Model No.**			
		[1] AFUE	80%	80%	80%
	High Fire	Input - Btuh	66,000	88,000	110,000
		Output - Btuh	52,000	69,000	87,000
		Temperature rise range - °F	30 - 60	35 - 65	40 - 70
		Gas Manifold Pressure (in. w.g.) Nat. Gas / LPG/Propane	3.5 / 10.0	3.5 / 10.0	3.5 / 10.0
	Low Fire	Input - Btuh	43,000	57,000	72,000
		Output - Btuh	35,000	46,000	59,000
		Temperature rise range - °F	20 - 50	20 - 50	25 - 55
		Gas Manifold Pressure (in. w.g.) Nat. Gas / LPG/Propane	1.7 / 4.9	1.7 / 4.9	1.7 / 4.9
High static - in. w.g.		Heating	0.5	0.5	0.5
		Cooling	0.5	0.5	0.5
Connections in.		Flue connection - in. round	4	4	4
		Gas pipe size IPS	1/2	1/2	1/2
Indoor Blower		Wheel nominal diameter x width - in.	10 x 8	10 x 10	11-1/2 x 10
		Motor output - hp	1/3	1/2	1
		Tons of add-on cooling	2 - 3.5	3 - 4	4 - 5
		Air Volume Range - cfm	717 - 1562	917 - 1929	1517 - 2760
Electrical Data		Voltage	120 volts - 60 hertz - 1 phase		
		Blower motor full load amps	6.1	8.2	11.5
		Maximum overcurrent protection	15	15	15
Shipping Data		lbs. - 1 package			

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.

OPTIONAL ACCESSORIES - ORDER SEPARATELY

	"A" Width Models	"B" Width Models	"C" Width Models
CABINET ACCESSORIES			
Downflow Combustible Flooring Base	**11M59**	**11M60**	**11M61**
DOWNFLOW FILTER KITS			
Downflow Filter Kit	**51W06**	**51W07**	**51W08**
No. and Size of filter - in.	(1) 20 x 20 x 1	(2) 16 x 20 x 1	(2) 16 x 20 x 1
SERVICE KITS			
Night Service Kit	**84W46**	**84W46**	**84W46**
Universal Service Kit - Switches	**89W19**	**89W19**	**89W19**

BLOWER DATA

EL280DF070P36A PERFORMANCE (Less Filter)

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.10	1562	591	1386	539	1159	436	956	374
0.20	1506	553	1355	504	1149	418	953	361
0.30	1459	528	1314	473	1119	392	941	343
0.40	1390	500	1264	442	1082	374	915	323
0.50	1306	477	1200	415	1048	352	904	305
0.60	1213	441	1129	391	987	332	849	288
0.70	1140	417	1066	361	901	304	798	270
0.80	1038	395	975	342	836	283	717	244

NOTES - All air data is measured external to unit without filter
(not furnished - field provided)

EL280DF090P48B PERFORMANCE (Less Filter)

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.10	1929	755	1794	668	1585	572	1332	489
0.20	1864	717	1745	623	1544	540	1321	463
0.30	1779	683	1676	588	1496	510	1296	440
0.40	1694	647	1600	558	1443	473	1265	417
0.50	1596	607	1502	511	1363	440	1212	393
0.60	1483	577	1413	485	1258	406	1148	370
0.70	1340	544	1273	449	1148	374	1042	339
0.80	1221	505	1138	416	1018	350	917	307

NOTES - All air data is measured external to unit without filter
(not furnished - field provided)

EL280DF110P60C PERFORMANCE (Less Filter)

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.10	2760	1401	2325	1045	1888	871	1531	686
0.20	2670	1362	2319	1003	1937	847	1565	679
0.30	2557	1292	2257	964	1945	832	1605	674
0.40	2536	1287	2220	949	1935	812	1622	661
0.50	2384	1230	2152	911	1918	782	1626	644
0.60	2273	1191	2063	884	1884	762	1617	630
0.70	2197	1151	2021	875	1822	737	1574	610
0.80	2115	1140	1950	854	1749	708	1517	579

NOTES - All air data is measured external to unit without filter
(not furnished - field provided)

PARTS IDENTIFICATION

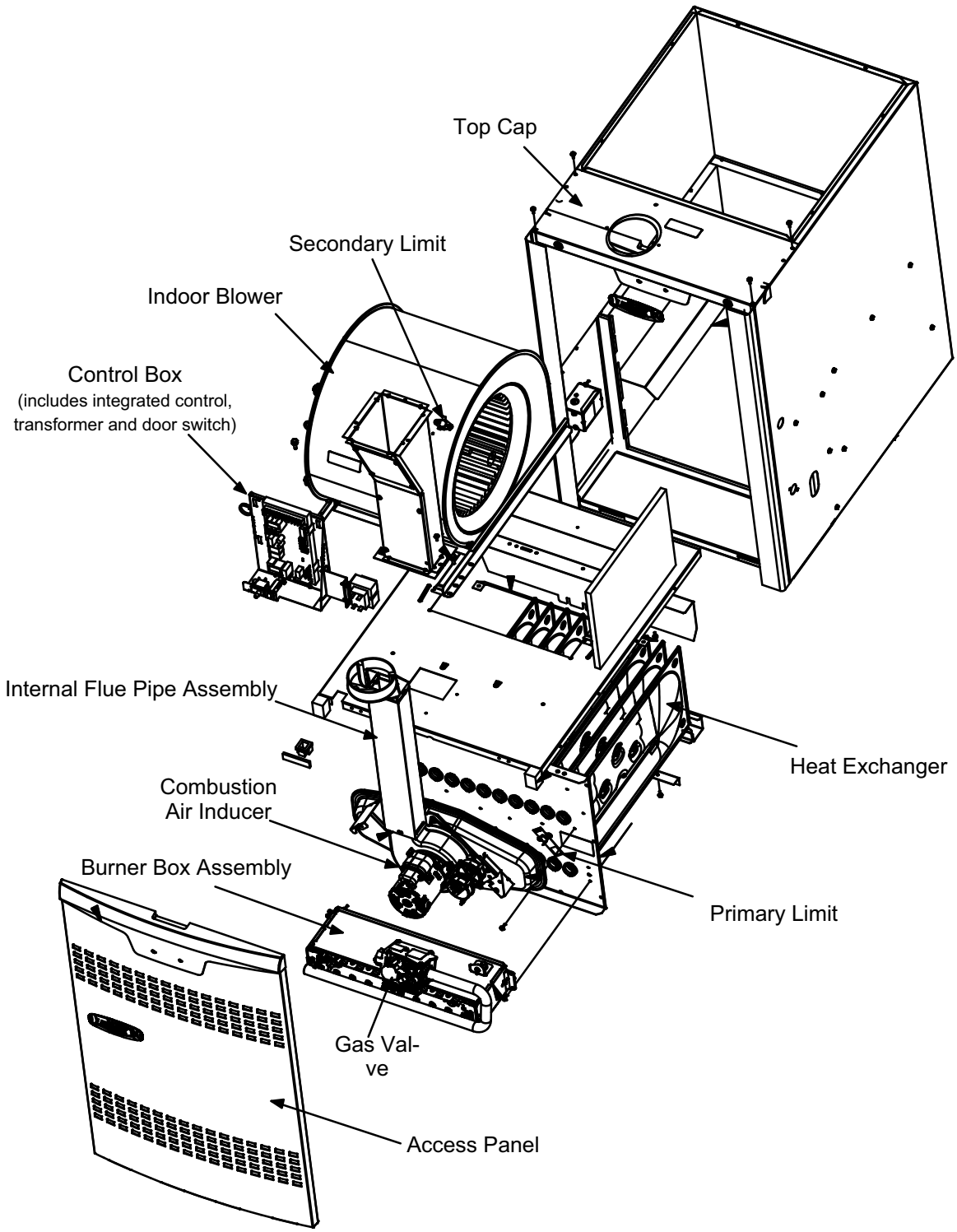


FIGURE 1

I-UNIT COMPONENTS

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

⚠ 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.

2. Door Interlock Switch (S51)

An interlock switch rated 14A at 125VAC is wired in series with line voltage. When the indoor blower access panel is removed the unit will shut down.

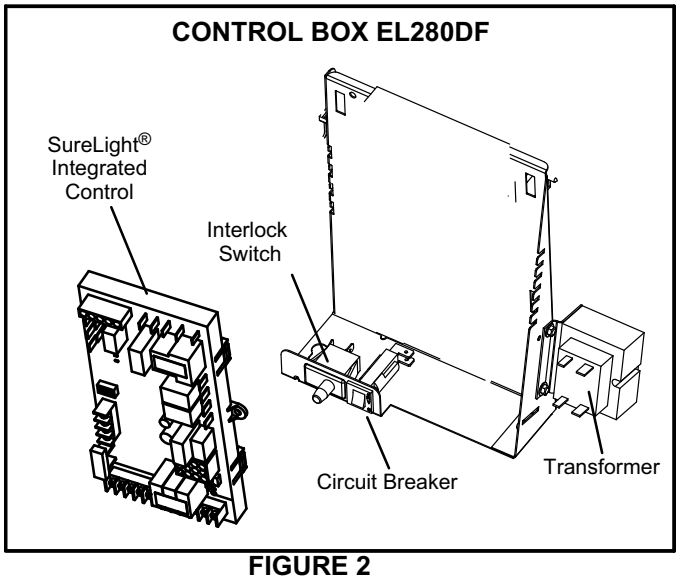


FIGURE 2

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 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. See figure 3.

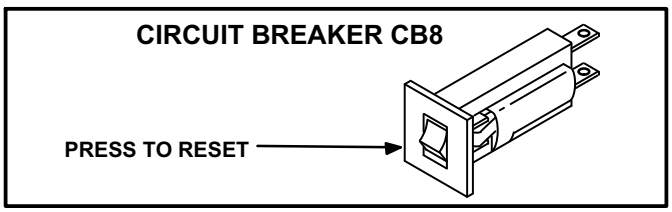


FIGURE 3

⚠ WARNING

Shock hazard.
Disconnect power before servicing. Integrated 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 Integrated Control (A92)

EL280DF units are equipped with the Lennox two-stage integrated SureLight® control. The system consists of a ignition / blower control (figures 5 and 6) with control pin designations in tables 2 and 3 and and ignitor. The control and ignitor work in combination to ensure furnace ignition and ignitor durability. The SureLight integrated control, controls all major furnace operations. The control features a red LED light, for furnace status and troubleshooting. The LED flashes in “X” + “Y” codes. For example using table 4 under “PRESSURE SWITCH CODES”, if the red LED flashes 2 times, then off for 2 seconds then flashes 3 times, the low pressure switch is failed open. The control also has two 120 volt accessory terminals rated at (1) one amp each and one 24 volt accessory terminal rated at 0.5 an amp.

Electronic Ignition

At the beginning of the heat cycle the SureLight control monitors the first stage and second stage combustion air inducer pressure switch. The control will not begin the heating cycle if the first stage pressure switch is closed (bypassed). Likewise the control will not begin the second stage heating cycle if the second stage pressure switch is closed, and will remain in first stage heat. However, if the second stage pressure switch closes during the first stage heat pre-purge, the control will allow second stage heat. Once the first stage pressure switch is determined to be open, the combustion air inducer is energized on low (first stage) heat speed. When the differential in the pressure switch is great enough, the pressure 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.

NOTE - *During abnormal conditions such as low supply voltage or low outdoor temperatures and the low fire pressure switch does not close, the combustion air inducer will switch to high fire. After a 15 second pre-purge the high fire pressure switch will close and the unit will begin operation on high fire. After 10 to 20 seconds of high fire operation the unit will switch to low fire.*

Two Stage Operation / Thermostat Selection Jumper

The control can be utilized in two modes: SINGLE-STAGE thermostat or TWO-STAGE thermostat. The thermostat selection is made using a dip switch (figure 5) and must be positioned for the particular application. The dip switch is factory set to "*OFF*" for use with a two-stage thermostat with two stage heat. Re-position dip switch to "*ON*" for use with a single stage thermostat with two stage heat.

While in the single-stage thermostat mode (*ON* DIP switch 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 or 15 minute field selectable recognition period, the unit will switch to second stage heat. While in the two-stage thermostat mode (*OFF* DIP switch 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.

DIP Switch Settings

Switch 1 -- Thermostat Selection -- This unit may be used with either a single-stage or two-stage thermostat. The thermostat selection is made using a DIP switch which must be properly positioned for the particular application. The DIP switch is factory-positioned for use with a two-stage thermostat. If a single-stage thermostat is to be used, the DIP switch must be repositioned.

a - *Select "OFF"* for two-stage heating operation controlled by a two-stage heating thermostat (factory setting);

b - *Select "ON"* for two-stage heating operation controlled by a single-stage heating thermostat. This setting provides a timed delay before second-stage heat is initiated.

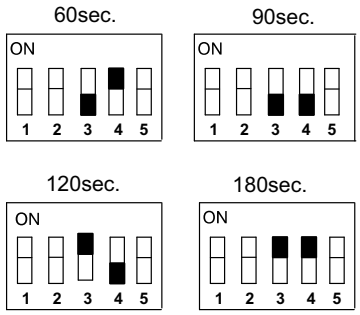
Switch 2 -- Second Stage Delay (Used with Single-Stage Thermostat Only) -- This switch is used to determine the second stage on delay when a single-stage thermostat is being used. The switch is factory-set in the OFF position, which provides a 10-minute delay before second-stage heat is initiated. If the switch is toggled to the ON 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.

Switches 3 and 4 -- Heating Blower-Off Delay -- The heating blower-on delay of 30 seconds is not adjustable. The heating blower-off delay (time that the blower operates after the heating demand has been satisfied) can be adjusted by moving switches 3 and 4 on the integrated control. The unit is shipped from the factory with a heating blower-off delay of 90 seconds. The heating 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.Table 1 (with figure 4) provides the blower off timings that will result from different switch settings.

TABLE 1
Heating Blower-Off Delay Switch Settings

Blower Off Delay (Seconds)	Switch 3	Switch 4
60	Off	On
90 (factorysetting)	Off	Off
120	On	Off
180	On	On

HEAT FAN-OFF TIME IN SECONDS



To adjust fan-off timing, flip dip switch to desired setting.

FIGURE 4

Switch 5 -- Cooling Blower-Off Delay -- The cooling blower-off delay (time that the blower operates after the cooling demand has been satisfied) can be adjusted by moving switch 5 on the integrated control. The switch is factory-set in the OFF position, which provides a cooling blower-off delay of 45 seconds. If the switch is toggled to the ON position, it will provide a 2-second cooling blower-off delay

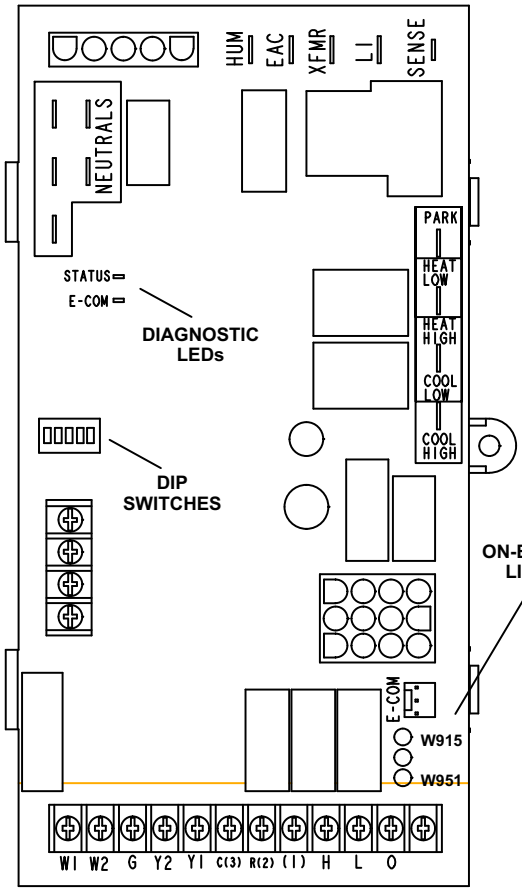
On-Board Link W951 Heat Pump (R to O)

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.

On-Board Link W915 2 Stage Compr (Y1 to Y2)

On-board link W915 is a clippable connection between terminals Y1 and Y2 on the integrated control. W915 must be cut if two-stage cooling will be used. If the Y1 to Y2 link is not cut the outdoor unit will operate in second-stage cooling only.

TWO-STAGE INTEGRATED CONTROL



1/4" QUICK CONNECT TERMINALS

HUM = 120 VAC OUTPUT TO HUMIDIFIER
EAC = 120 VAC OUTPUT TO ELECTRONIC AIR CLEANER
XMFR = 120 VAC OUTPUT TO TRANSFORMER
LI = 120 VAC INPUT TO CONTROL

SENSE = 120 VAC OUTPUT TO FLAME SENSOR
NEUTRALS= 120 VAC NEUTRAL
PARK = DEAD TERMINAL FOR UNUSED BLOWER LEAD
HEAT LOW = 120 VAC OUTPUT TO CIRC BLWR -- LOW HT SPEED & CONT FAN
HEAT HIGH/ COOL LOW = 120 VAC OUTPUT TO CIRC BLWR -- HIGH HEAT AND LOW COOL SPEED
COOL HIGH = 120 VAC OUTPUT TO CIRC BLWR -- HIGH COOL SPEED

THERMOSTAT CONNECTIONS (TB1)

W1= HEAT DEMAND FROM 1ST STAGE T'STAT
W2= HEAT DEMAND FROM 2ND STAGE T'STAT
G= MANUAL FAN FROM T'STAT
Y2= THERMOSTAT 2nd STAGE COOL SIGNAL
Y1= THERMOSTAT 1st STAGE COOL SIGNAL
C= THERMOSTAT SIGNAL GROUND CONNECTED TO TRANSFORMER GROUND (TR) & CHASIS GROUND (GRD)
R= CLASS 2 VOLTAGE TO THERMOSTAT
1= ERROR CODE RECALL
H= 24V HUMIDIFIER OUTPUT
L= LENNOX SYSTEM OPERATION MONITOR
O= THERMOSTAT SIGNAL TO HEAT PUMP REVERSING VALVE

DIP SWITCH FUNCTIONS

DIP SWITCH(ES)	FUNCTION
1 -- 2 Stage T'stat	Selects t/stat type (single or two-stage)
2 -- 2nd Stage Delay	Second stage ON delay (single-stage t'stat)
3 & 4 -- Heat Off Delay	Heating fan OFF delay
5 -- Cool Off Delay	Cooling fan OFF delay

FIGURE 5

TABLE 2

SureLight control 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 3

SureLight control 12Pin Terminal Designation	
PIN #	**Function**
1	Gas Valve High Fire
2	Second Stage pressure Switch
3	Rollout In
4	Ground
5	24V Hot
6	Primary Limit In
7	Gas Valve Low Stage
8	Gas Valve Common
9	24V Neutral
10	Ground
11	Rollout Switch Out
12	1st Stage pressure Switch

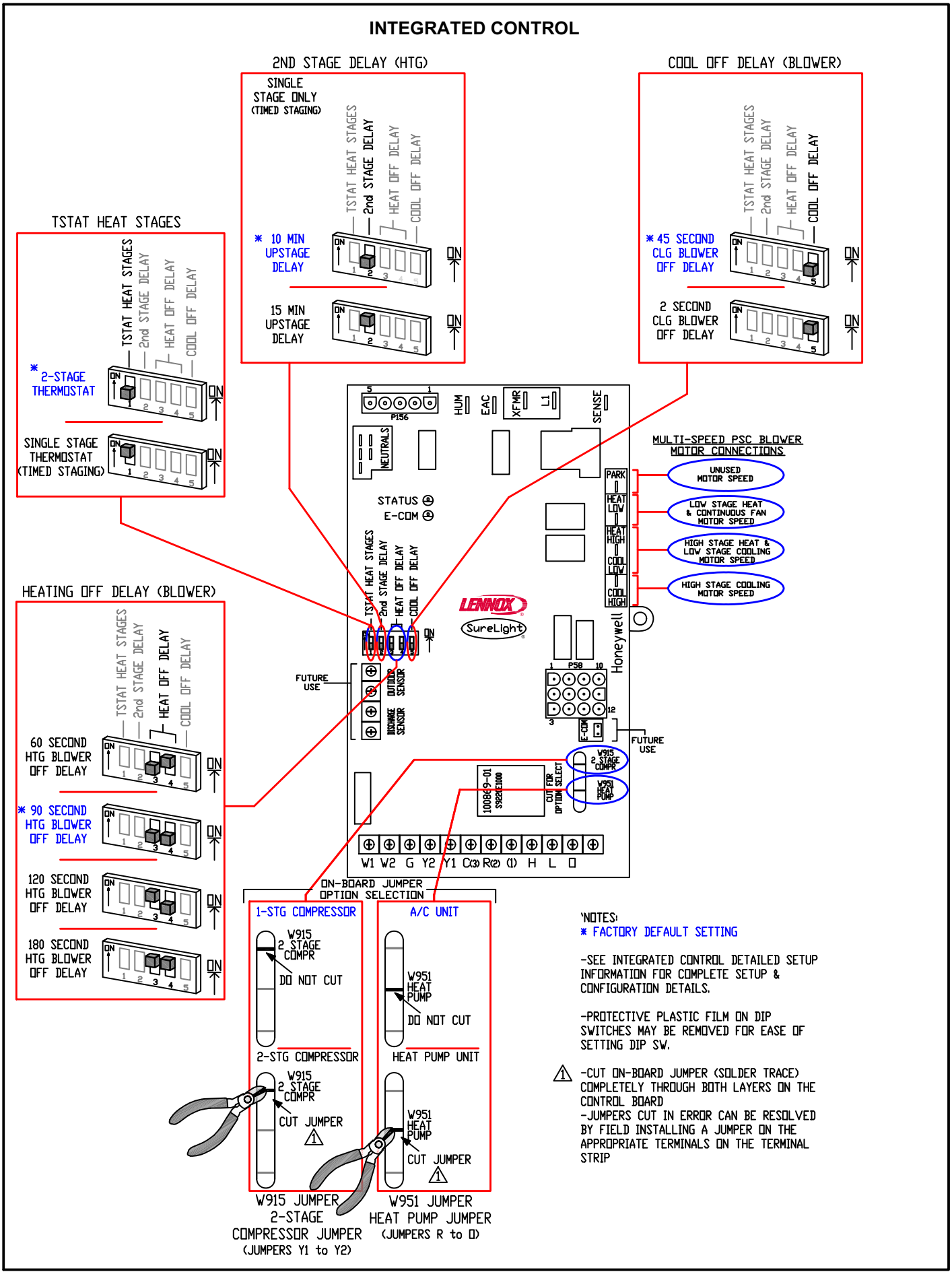

INTEGRATED CONTROL
2ND STAGE DELAY (HTG)
SINGLE STAGE ONLY (TIMED STAGING)
* 10 MIN UPSTAGE DELAY
15 MIN UPSTAGE DELAY
COOL OFF DELAY (BLOWER)
* 45 SECOND CLG BLOWER OFF DELAY
2 SECOND CLG BLOWER OFF DELAY
TSTAT HEAT STAGES
* 2-STAGE THERMOSTAT
SINGLE STAGE THERMOSTAT (TIMED STAGING)
HEATING OFF DELAY (BLOWER)
60 SECOND HTG BLOWER OFF DELAY
* 90 SECOND HTG BLOWER OFF DELAY
120 SECOND HTG BLOWER OFF DELAY
180 SECOND HTG BLOWER OFF DELAY
TSTAT HEAT STAGES
2nd STAGE DELAY
HEAT OFF DELAY
COOL OFF DELAY
P156
HUM
EAC
XFMR
L1
SENSE
NEUTRALS
STATUS
E-COM
MULTI-SPEED PSC BLOWER MOTOR CONNECTIONS
PARK
HEAT LOW
HEAT HIGH
COOL LOW
COOL HIGH
UNUSED MOTOR SPEED
LOW STAGE HEAT & CONTINUOUS FAN MOTOR SPEED
HIGH STAGE HEAT & LOW STAGE COOLING MOTOR SPEED
HIGH STAGE COOLING MOTOR SPEED
LENNOX
SureLight
Honeywell
FUTURE USE
OUTDOOR SENSOR
DISCHARGE SENSOR
P58
E-COM
W915 2 STAGE COMPR
W951 HEAT PUMP
CUT FOR OPTION SELECT
W1 W2 G Y2 Y1 C(3) R(2) (1) H L O
ON-BOARD JUMPER OPTION SELECTION
1-STG COMPRESSOR
A/C UNIT
DO NOT CUT
2-STG COMPRESSOR
HEAT PUMP UNIT
CUT JUMPER
W915 JUMPER 2-STAGE COMPRESSOR JUMPER (JUMPERS Y1 to Y2)
W951 JUMPER HEAT PUMP JUMPER (JUMPERS R to O)
NOTES:
* FACTORY DEFAULT SETTING
-SEE INTEGRATED CONTROL DETAILED SETUP INFORMATION FOR COMPLETE SETUP & CONFIGURATION DETAILS.
-PROTECTIVE PLASTIC FILM ON DIP SWITCHES MAY BE REMOVED FOR EASE OF SETTING DIP SW.
1 -CUT ON-BOARD JUMPER (SOLDER TRACE) COMPLETELY THROUGH BOTH LAYERS ON THE CONTROL BOARD
-JUMPERS CUT IN ERROR CAN BE RESOLVED BY FIELD INSTALLING A JUMPER ON THE APPROPRIATE TERMINALS ON THE TERMINAL STRIP

FIGURE 6

TABLE 4

FLASH CODE (X + Y)	STATUS / ERROR DESCRIPTION
FLASH CODE DESCRIPTIONS	
Pulse	A 1/4 second flash followed by four seconds of off time.
Heartbeat	Constant 1/2 second bright and 1/2 second dim cycles.
X + Y	LED flashes X times at 2Hz, remains off for two seconds, flashes Y times at 2Hz, remains off for four seconds, then repeats.
Pulse	Power on - Standby.
Heartbeat	Normal operation - signaled when heating demand initiated at thermostat.
FLAME CODES	
1 + 2	Low flame current -- run mode.
1 + 3	Flame sensed out of sequence -- flame still present.
PRESSURE SWITCH CODES	
2 + 3	Low pressure switch failed open.
2 + 4	Low pressure switch failed closed.
2 + 5	High pressure switch failed open.
2 + 6	High pressure switch failed closed.
2 + 7	Low pressure switch opened during ignition trial or heating demand.
LIMIT CODE	
3 + 1	Limit switch open.
WATCHGUARD CODES	
4 + 1	Watchguard -- Exceeded maximum number of retries.
4 + 2	Watchguard -- Exceeded maximum number of retries or last retry was due to pressure switch opening.
4 + 3	Watchguard -- Exceeded maximum number of retries or last retry was due to flame failure.
4 + 5	Watchguard -- Limit remained open longer than three minutes.
4 + 6	Watchguard -- Flame sensed out of sequence; flame signal gone.
4 + 7	Ignitor circuit fault -- Failed ignitor or triggering circuitry.
4 + 8	Low line voltage.
HARD LOCKOUT CODES	
5 + 1	Hard lockout -- Rollout circuit open or previously opened.
5 + 2	Control failed self check, internal error (control will restart if error recovers).
5 + 3	No Earth ground (control will restart if error recovers).
5 + 4	Reversed line voltage polarity (control will restart if the error recovers).
5 + 6	Low secondary (24VAC) voltage.

Error Code Storage

The ignition control stores the last ten error codes in memory. The codes are retained in case of power loss.

Error Code Review

1 - Short R (2) to (1). Within 1/2 second, the STATUS LED will stay lit continuously to indicate that the short was sensed.

2 - Continue to hold the short between R (2) to (1). After 5 seconds, STATUS LED will go from being continuously lit to off. This indicates that error code review is pending.

3 - Remove R (2) to (1) short within ten seconds of STATUS LED turning off. This activates error code review.

4 - Last ten error codes will be flashed on the STATUS LED.

5 - After final error code is indicated, STATUS LED will flash to indicate normal operation.

Clearing Error Codes

1 - Short R (2) to (1). Within 1/2 second, the STATUS LED will stay lit continuously to indicate that the short was sensed.

2 - Continue to hold the short between R (2) to (1). After 5 seconds, STATUS LED will go from being continuously lit to off.

3 - Continue to hold the short between R (2) to (1) beyond ten seconds after STATUS LED has turned off. STATUS LED will turn on, indicating that error codes have been cleared.

4 - Remove R (2) to (1) short. STATUS LED will flash to indicate normal operation.

B- Indoor Blower

1. Blower Motors and Capacitors

All EL280DF units use direct drive blower motors. All motors are 120V permanent split capacitor motors to ensure maximum efficiency. Ratings for capacitors will be on motor nameplate. See SPECIFICATIONS section for motor specifications.

2. Secondary Limit Control (S21)

The secondary limit (S21) is located in the blower compartment. See figure 1. When excess heat is sensed in the blower compartment, 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.

C- Heating Components

1. Ignitor

The SureLight® 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 7 for ignitor location and figure 8 for ignitor check out.

NOTE - *The EL280DF furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.*

2. Flame Sensor

A flame sensor is located on the left side of the burner support. See figure 7. The sensor protrudes into the flame envelope of the left-most burner. The sensor 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. A microamp DC meter is needed to check the flame signal on the integrated control. See figure 9 and table 5 for flame signal check and measurement.

3. Gas Valve

The two-stage gas valve (figure 11) 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 ON/OFF switch 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.

LPG change over kits are available from Lennox. Kits include burner orifices.

4. Flame Rollout Switches (S47)

The EL280DF is equipped with a single rollout switch. See figure 7 for location. The limit is a N.C. SPST manual-reset limit. When S47 senses rollout, the circuit breaks and the ignition control immediately stops ignition and closes the gas valve. Rollout can be caused by a blocked heat exchanger, flue or lack of combustion air. The switches are factory set to trip (open) at 210°F and cannot be adjusted. To manually reset a tripped switch, push the reset button located on the control.

5. Burners

All units use inshot burners. Burners are factory set and require no adjustment. Always operate the unit with the burner box front panel in place. Each burner uses an orifice that is precisely matched to the burner input. Burners can be removed as a one piece assembly for service. If burner assembly has been removed, it is critical to align center of each burner to the center of the clamshell when re-installing.

6. Primary Limit Control (S10)

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 Watchguard 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,

EL280DF HEATING COMPONENTS

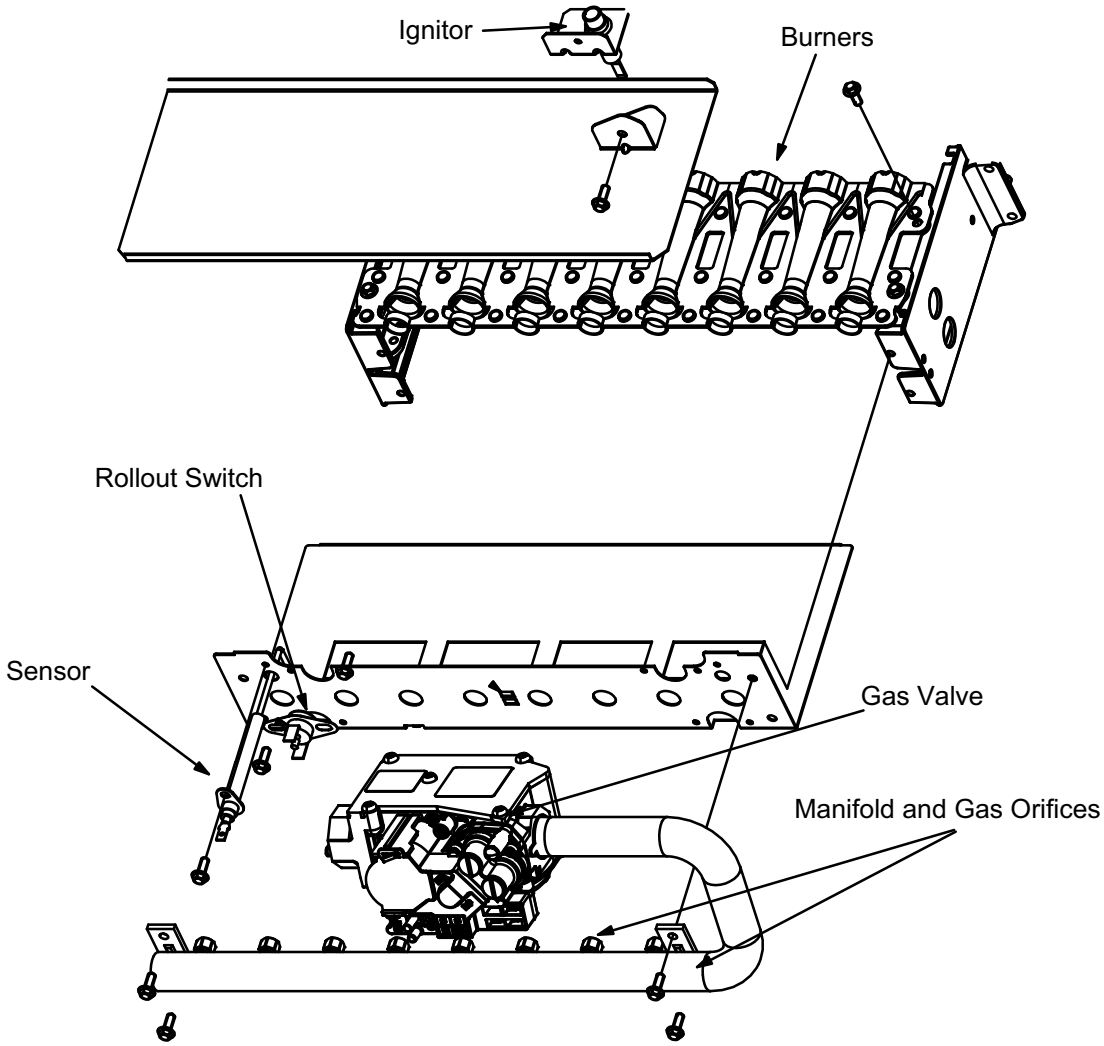
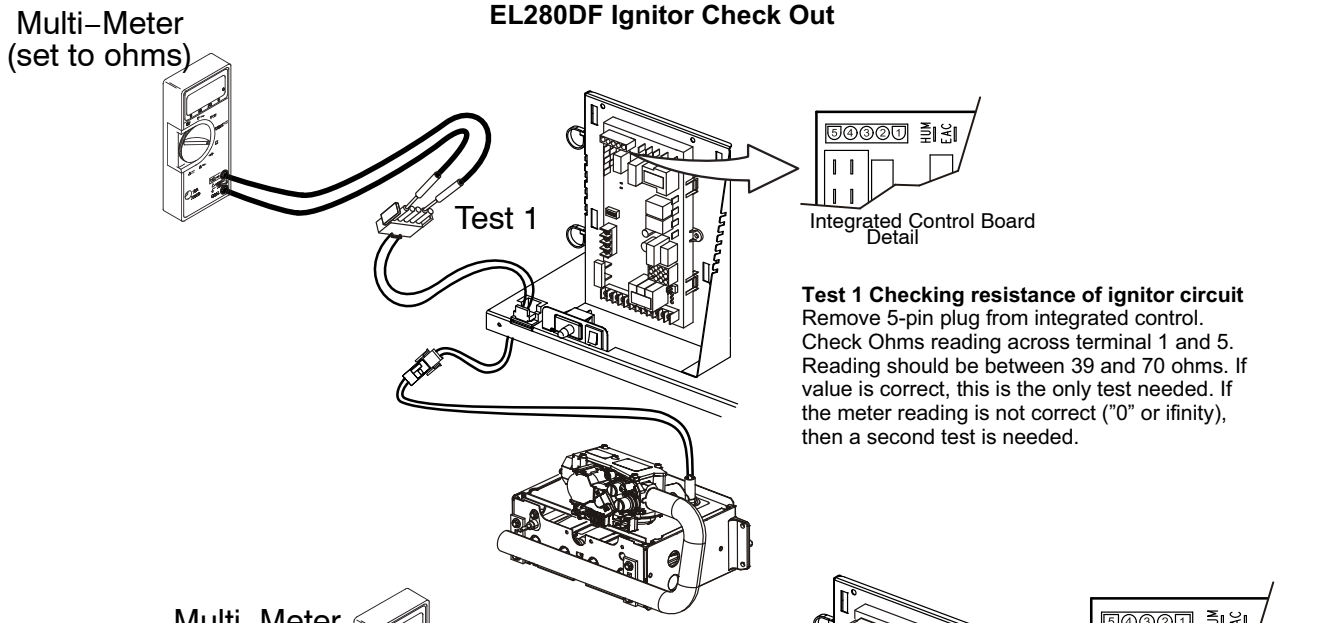
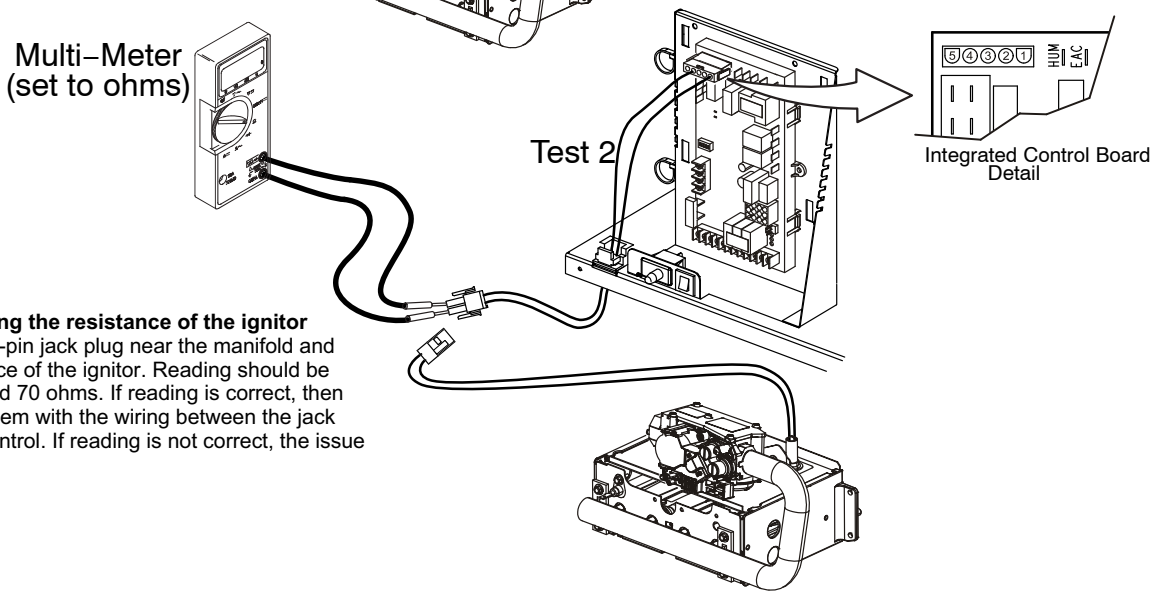


FIGURE 7

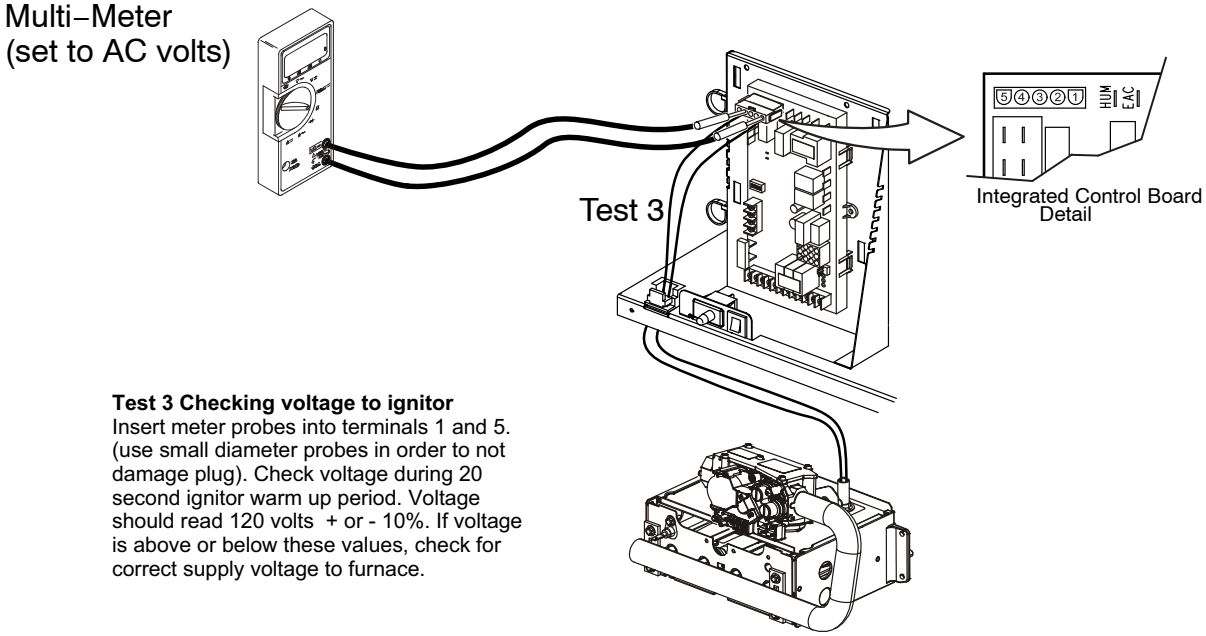
EL280DF Ignitor Check Out



Test 1 Checking resistance of ignitor circuit
Remove 5-pin plug from integrated control. Check Ohms reading across terminal 1 and 5. Reading should be between 39 and 70 ohms. If value is correct, this is the only test needed. If the meter reading is not correct (”0” or ifinity), then a second test is needed.



Test 2 Checking the resistance of the ignitor
Seperate the 2-pin jack plug near the manifold and check resistance of the ignitor. Reading should be betwenn 39 and 70 ohms. If reading is correct, then there is a problem with the wiring between the jack plug anf the control. If reading is not correct, the issue is the ignitor.



Test 3 Checking voltage to ignitor
Insert meter probes into terminals 1 and 5. (use small diameter probes in order to not damage plug). Check voltage during 20 second ignitor warm up period. Voltage should read 120 volts + or - 10%. If voltage is above or below these values, check for correct supply voltage to furnace.

FIGURE 8

To Measure Flame Signal - Integrated Control:

Use a digital readout meter capable of reading DC microamps. See figure 9 and table 5 for flame signal check.

1 - Set the meter to the DC amps scale.
2 - Turn off supply voltage to control.
3 - Disconnect integrated control flame sensor wire from the flame sensor.
4 - Connect (-) lead to flame sensor.
5 - Connect (+) lead to the ignition control sensor wire.
6 - Turn supply voltage on and close thermostat contacts to cycle system.
7 - When main burners are in operation for two minutes, take reading.

TABLE 5
Flame Signal in Microamps

Normal	Low	Drop Out
1.9 or greater	1.4 or less	.20

Measuring Flame Signal
(upflow furnace shown)

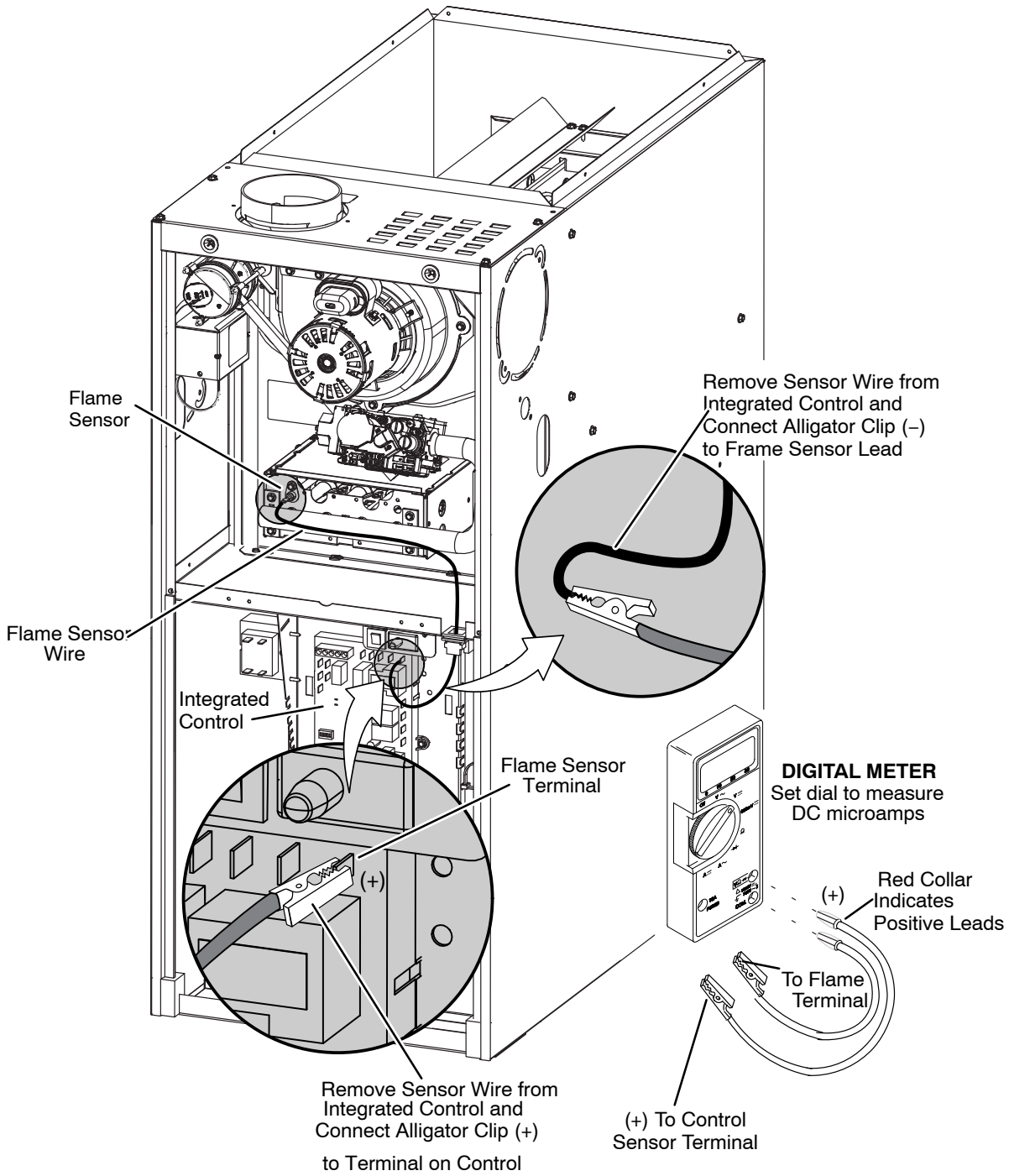


FIGURE 9

7. Combustion Air Inducer (B6)

All 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 furnace / blower 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). The inducer operates on low speed during first-stage heat, then switches to high speed for second stage heat.

NOTE - *Each furnace model uses a unique CAI. Refer to Lennox Repair Parts listing for correct inducer for replacement.*

A pressure switch connected to the combustion air inducer orifice plate is used to prove inducer operation. The combustion air inducer orifice will be different for each model. See table 6 for orifice sizes. The switch monitors air pressure in the inducer housing. During normal operation, the pressure in the housing is negative. If pressure becomes less negative (signifying an obstruction) the proving switch opens. When the proving switch opens, the furnace control (A92) immediately closes the gas valve to prevent burner operation.

TABLE 6

EL280DF Unit	C.A.I. Orifice Size
-070	1.406”
-090	1.690”
-110	1.844”

8. Combustion Air Inducer Pressure Switch (S18)

S18 is a dual combustion air pressure switch (first and second stage) located on the combustion air inducer orifice bracket. The switch is connected to the combustion air inducer housing by means of a flexible silicone hose. It monitors negative air pressure in the combustion air inducer housing.

The switches are 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 (first or second stage) the switch senses that the combustion air inducer is operating. It closes a circuit to the furnace control when pressure inside the combustion air inducer decreases to a certain set point.

Set points vary depending on unit size. See table 7. 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 negative pressure (pressure becomes more equal with atmospheric pressure) and opens the circuit to the furnace control and gas valve. A bleed port on the switch allows relatively dry air in the vestibule to purge switch tubing, to prevent condensate build up.

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 by-passed, the control will not initiate ignition at start up.*

COMBUSTION AIR PRESSURE SWITCH

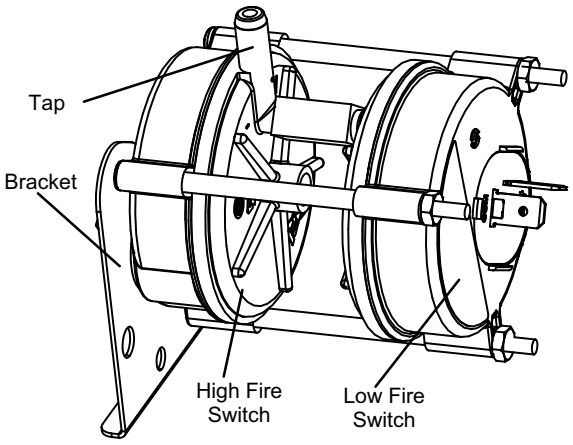


FIGURE 10

TABLE 7

EL280DF Unit	Set Point High Heat	Set Point Low Heat
-070	0.55”	0.25”
-090	0.55”	0.25'
-110	0.60”	0.25”

II-PLACEMENT AND INSTALLATION

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

III-START-UP

A-Preliminary and Seasonal Checks

1 - Inspect electrical wiring, both field and factory installed for loose connections. Tighten as required.

2 - Check voltage at disconnect switch. Voltage must be within range listed on the nameplate. If not, consult the power company and have voltage condition corrected before starting unit.

B-Heating Start-Up

⚠ WARNING

Shock and burn hazard.

EL280DF units are equipped with a hot surface ignition system. Do not attempt to light manually.

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.

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 - Turn switch on gas valve to **OFF**. Do not force. See figure 11.

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.

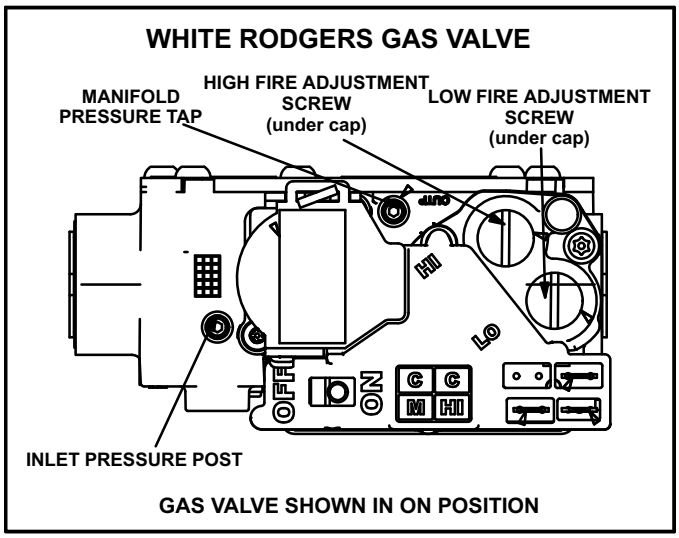


FIGURE 11

8 - Turn switch on gas valve to **ON**. Do not force. See figure 11.

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.

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 - Turn switch on gas valve to **OFF**. Do not force. See figure 11.

5 - Replace access panel.

Failure To Operate

If the unit fails to operate, check the following:

1 - Is the thermostat calling for heat?

2 - Are access panels securely in place?

3 - Is the main disconnect switch closed?

4 - Is there a blown fuse or tripped circuit breaker?

5 - Is the filter dirty or plugged? Dirty or plugged filters will cause the limit control to shut the unit off.

6 - Is gas turned on at the meter?

7 - Is the manual main shut-off valve open?

8 - Is the internal manual shut-off valve open?

9 - Is the unit ignition system in lock out? If the unit locks out again, call the service technician to inspect the unit for blockages.

10 -Is pressure switch closed? Obstructed flue will cause unit to shut off at pressure switch. Check flue and outlet for blockages.

11 -Are flame rollout switches tripped? If flame rollout switches are tripped, call the service technician for inspection.

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 and covers must be in place and secured.

IV-HEATING SYSTEM SERVICE CHECKS

A-CSA Certification

All units are CSA design certified without modifications. Refer to the EL280DF Installation Instruction.

B-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. The flexible connector can then be added between the black iron pipe and the gas supply line.

⚠ WARNING

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

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

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

C-Testing Gas Piping

⚠ IMPORTANT

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

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig (14" W.C.). See figure 12. 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.

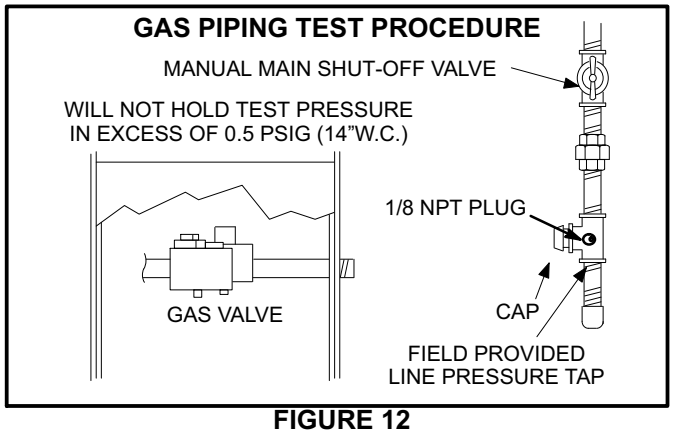


FIGURE 12

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

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

D-Testing Gas Supply Pressure

An inlet post located on the gas valve provides access to the supply pressure. See figure 11. Back out the 3/32 hex screw one turn, connect a piece of 5/16 tubing and connect to a manometer to measure supply pressure. See table 10 for supply line pressure.

E-Check Manifold Pressure

After line pressure has been checked and adjusted, check manifold pressure. Move pressure gauge to outlet pressure tap located on unit gas valve (GV1). Checks of manifold pressure are made as verification of proper regulator adjustment. Manifold pressure can be measured at any time the gas valve is open and is supplying gas to the unit. See table 10 for normal operating manifold pressure.

⚠ 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. All gas valves are factory regulated.

Manifold Adjustment Procedure:

1 - Connect test gauge to manifold pressure tap (figure 11) on gas valve.

2 - Ignite unit on **low fire** and let run for 5 minutes to allow for steady state conditions.

3 - After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in table 10.

4 - If necessary, make adjustments. Figure 11 shows location of high fire and low fire adjustment screw.

5 - Repeat steps 2, 3 and 4 on high fire.

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

7 - Start unit and perform leak check. Seal leaks if found.

F- Proper Gas Flow (Approximate)

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for **two** revolutions of gas through the meter. (Two revolutions assures a more accurate time.) **Divide by two** and compare to time in table 8 below. If manifold pressure matches table 8 and rate is incorrect, check gas orifices for proper size and restriction.

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

TABLE 8

GAS METER CLOCKING CHART				
EL280DF Unit	Seconds for One Revolution			
	Natural		LP	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft DIAL
-045	80	160	200	400
-70	55	110	136	272
-90	41	82	102	204
-110	33	66	82	164
-135	27	54	68	136
Natural-1000 btu/cu ft LP-2500 btu/cu ft				

⚠ IMPORTANT

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

G- Proper Combustion

Furnace should operate minimum 15 minutes with correct manifold pressure and gas flow rate before checking combustion. See sections E- and F-. Take combustion sample beyond the flue outlet and compare to the table below. The maximum carbon monoxide reading should not exceed 100 ppm.

TABLE 9

Firing Rate	CO_2% For Nat	CO_2% For L.P.
High Fire	6.0 - 7.5	7.0 - 8.5
Low Fire	5.0 - 6.5	5.8 - 7.3
The carbon monoxide reading should not exceed 100 ppm.		

H-High Altitude

The manifold pressure, gas orifice and pressure switch may require adjustment or replacement to ensure proper operation at higher altitudes. See table 10 for manifold pressures and table 11 for pressure switch kits and gas conversion kits.

TABLE 10
Manifold Pressure Settings at all Altitudes

Unit Input	Gas	Manifold Pressure in.wg. 0-4500 ft.		Manifold Pressure in.wg. 4501-7500 ft.[1]		Manifold Pressure in.wg. 7501 - 10,000 ft.[2]		Supply Line Pressure in. w.g.	
		Low Fire	High Fire	Low Fire	High Fire	Low Fire	High Fire	Min	Max
070	Natural	1.7	3.5	1.5	3.2	1.7	3.5	4.5	13.0
	LP/propane[3]	4.9	10.0	4.9	10.0	4.9	10.0	11.0	13.0
090	Natural	1.7	3.5	1.5	3.0	1.7	3.5	4.5	13.0
	LP/propane[3]	4.9	10.0	4.9	10.0	4.9	10.0	11.0	13.0
110	Natural	1.7	3.5	1.5	3.2	1.7	3.5	4.5	13.0
	LP/propane[3]	4.9	10.0	4.9	10.0	4.9	10.0	11.0	13.0

[1] This is the only permissible derate for these units.

[2] Natural gas high altitude orifice kit required.

[3] A natural to L.P. propane gas changeover kit is necessary to convert this unit. Refer to the changeover kit installation instruction for the conversion procedure.

NOTE - Units may be installed at altitudes up to 4500 ft. above sea level without modifications.

TABLE 11
Pressure Switch and Gas Conversion Kits at all Altitudes

Unit Input	High Altitude Pressure Switch Kit			High Altitude Natural Gas Kit	LP/Propane Gas Kit		LP/Propane to Natural Kit
	0 - 4500 ft.	4501 - 7500 ft.	7501 - 10,000 ft.	7501 - 10,000 ft.	0 - 7500 ft	7501 - 10,000 ft.	0 - 7500 ft.Min
070	No Change	No Change	73W36	73W37	11K51	11K46	77W09
090			73W36				
110			73W35				

NOTE - *A natural to L.P. propane gas changeover kit is necessary to convert this unit. Refer to the changeover kit installation instruction for the conversion procedure.*

V-TYPICAL OPERATING CHARACTERISTICS

A-Blower Operation and Adjustment

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 13)

Temperature rise for EL280DF 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.

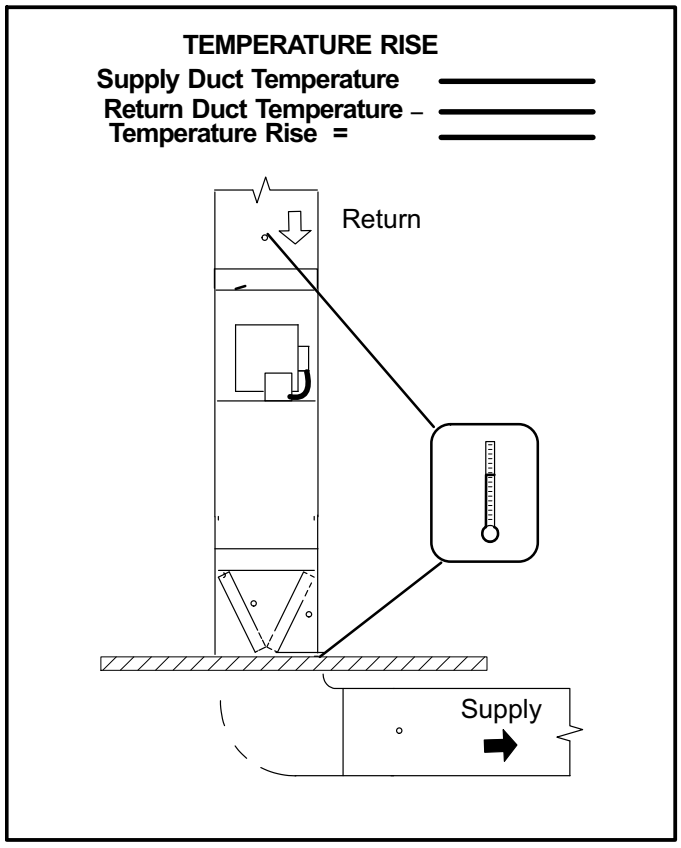


FIGURE 13

C-External Static Pressure

1 - Tap locations shown in figure 14.

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.

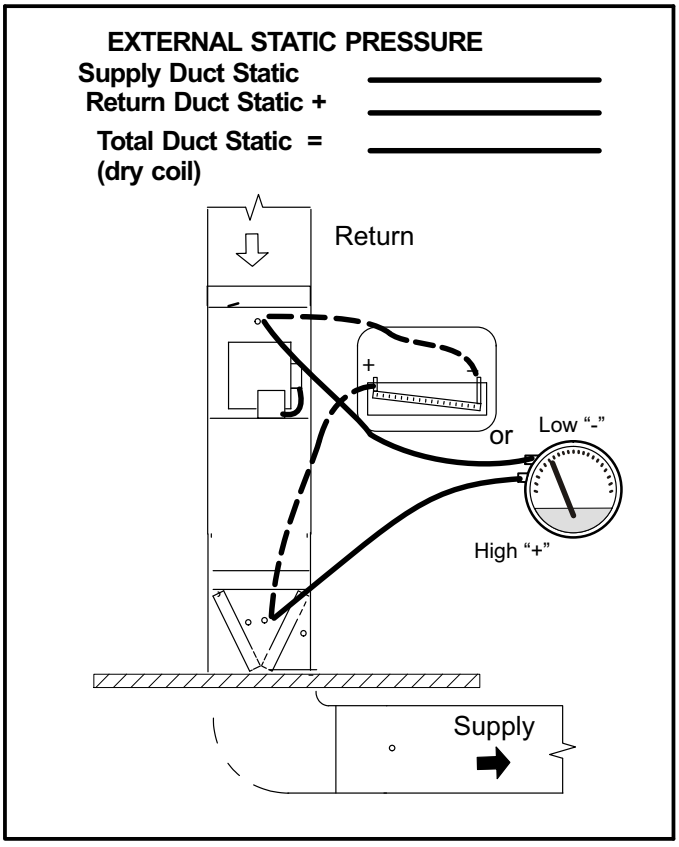


FIGURE 14

VI-MAINTENANCE

Annual Furnace 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:

⚠WARNING

Disconnect power before servicing unit.

⚠CAUTION

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

⚠WARNING

The inner blower access panel and vent pipe must be securely in place when the blower and burners are operating. Gas fumes, which could contain carbon monoxide, can be drawn into living space resulting in personal injury or death.

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

2- Check the condition of the belt and shaft bearings if applicable.

3- Inspect all gas pipe and connections for leaks.

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

5- Check the condition and cleanliness of burners and heat exchanger and clean if necessary.

6- Check the cleanliness of blower assembly and clean the housing, blower wheel and blower motor if necessary. The blower motors are prelubricated for extended bearing life. No further lubrication is needed.

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

8- 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

9- 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.

10 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

11 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.

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

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

14 Verify operation of CO detectors and replace batteries as required.

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 H-04-9.

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. On two-stage gas furnaces check the manifold pressure on high fire and low fire. If manifold pressure adjustment is necessary, consult the Service Literature for unit specific information on adjusting gas 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 - Remove flue pipe, top cap, flue chase and internal flue pipe assembly from the unit.

3 - Label the wires from gas valve, rollout switches, primary limit switch and make-up box then disconnect them.

4 - Remove the screws that secure the combustion air inducer/pressure switch assembly to the collector box. Carefully remove the combustion air inducer to avoid damaging blower gasket. If gasket is damaged, it must be replaced to prevent leakage.

5 - Remove the collector box located behind the combustion air inducer. Be careful with the collector box gasket. If the gasket is damaged, it must be replaced to prevent leakage.

6 - Disconnect gas supply piping. Remove the screw securing the burner box cover and remove cover. Remove the four screws securing the burner manifold assembly to the vestibule panel and remove the assembly from the unit.

7 - Remove screws securing burner box and remove burner box.

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

9 - 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 16.

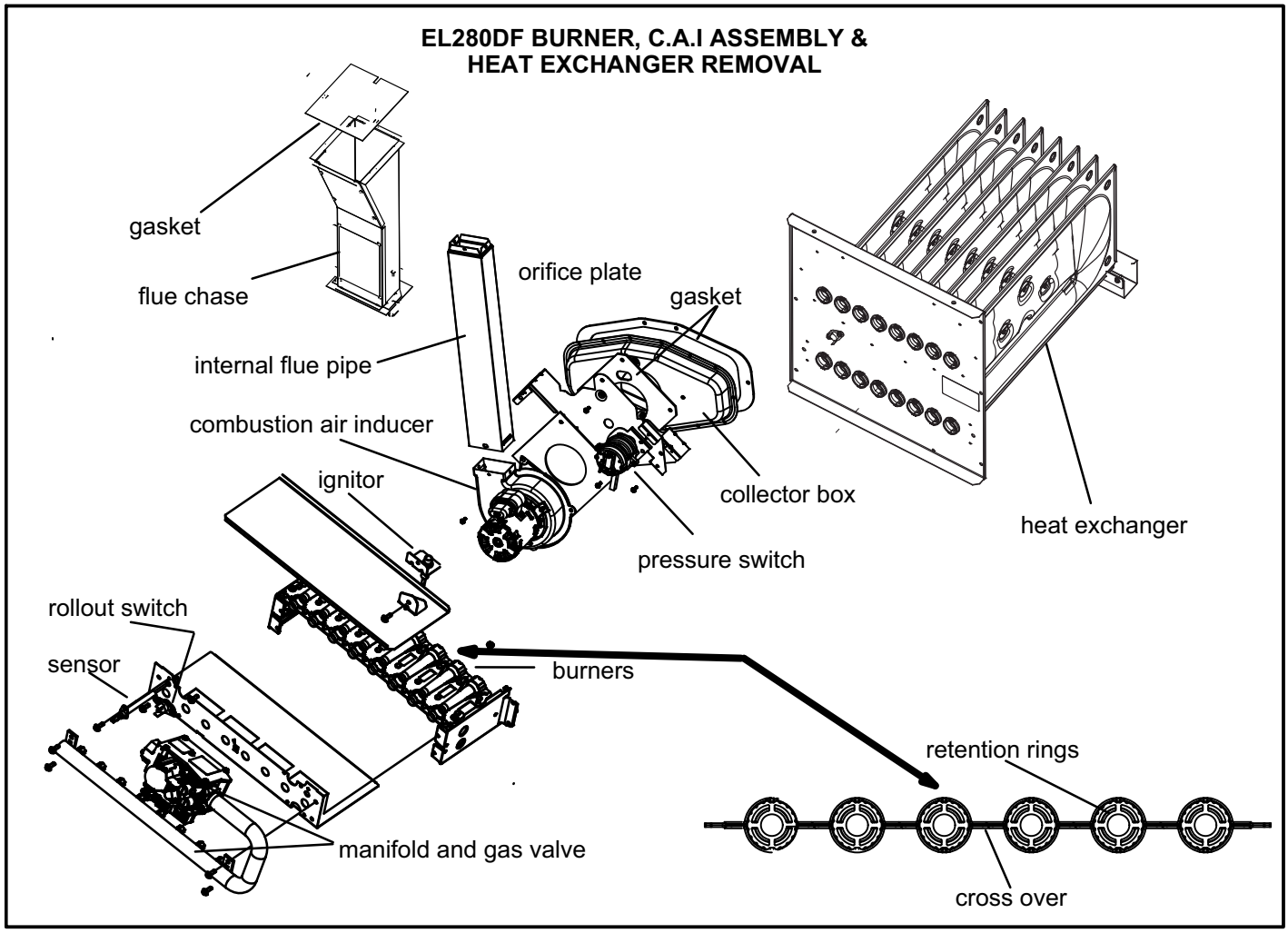


FIGURE 15

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

11- To clean burners, run a vacuum cleaner with a soft brush attachment over the face of burners. Visually inspect inside the burners and crossovers for any blockage caused by foreign matter. Remove any blockage. Figure 15 shows burner detail.

12- 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.

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

14- Reinstall collector box, combustion air assembly, internal flue pipe and flue chase. **Seal with high temperature RTV**. Reinstall all screws to the collector box and combustion air inducer. Failure to replace all screws may cause leaks. Inspect gaskets for any damage and replace if necessary.

15- Reinstall burner box, manifold assembly and burner box cover.

16- Reconnect all wires.

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

18- Reconnect gas supply piping.

19- Turn on power and gas supply to unit.

20- Set thermostat and check for proper operation.

21- 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.

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

23- Repeat steps 21 and 23 until no leaks are detected.

24- Replace access panel.

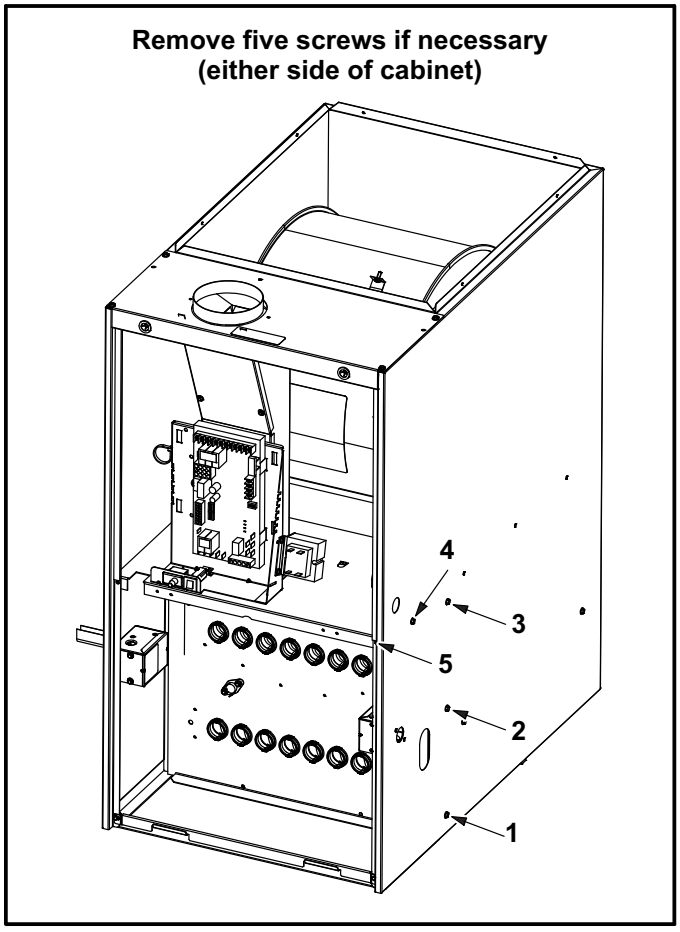
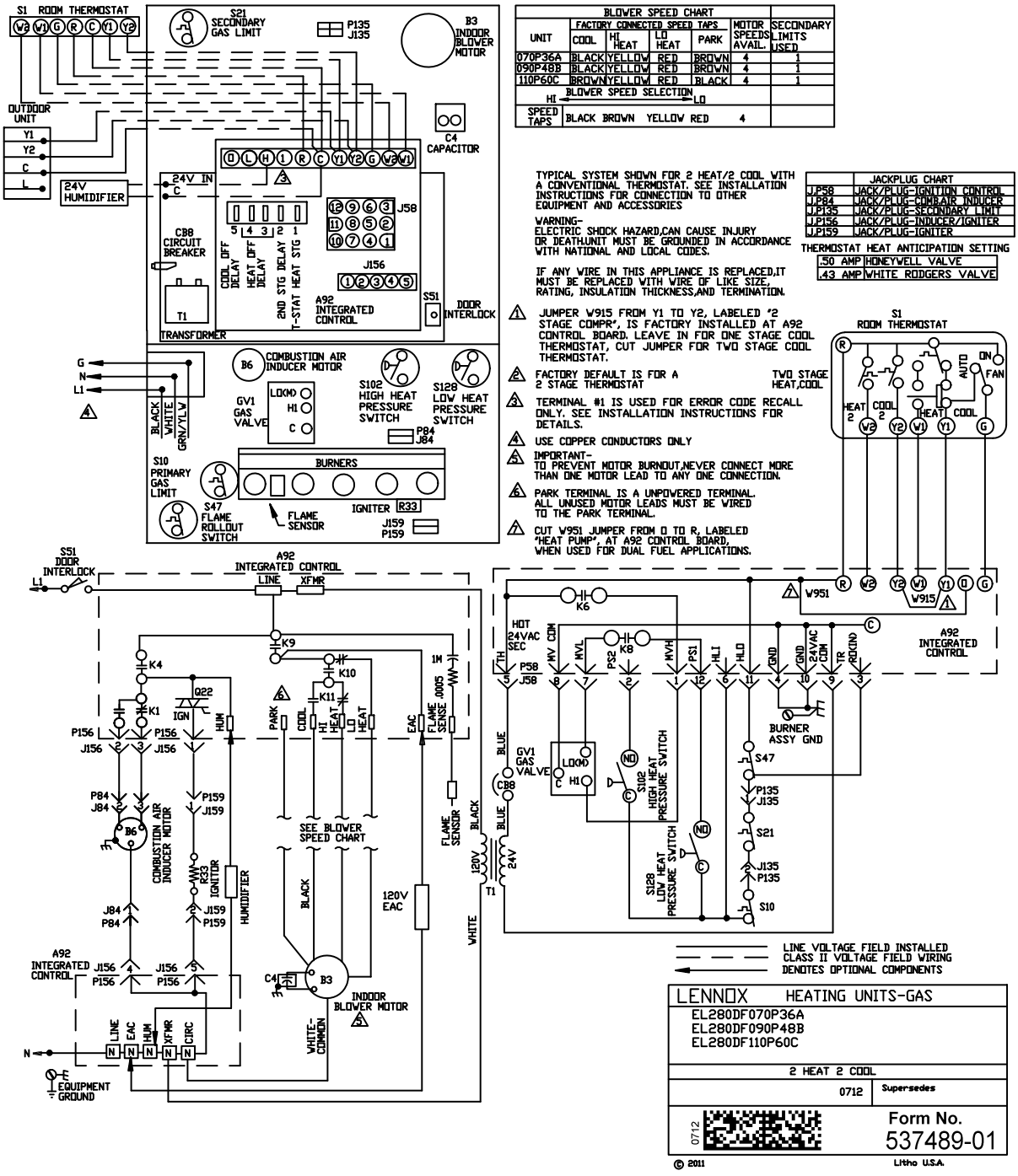


FIGURE 16

VII- Wiring and Sequence of Operation

EL280DF Schematic Wiring Diagram



Integrated Control Self Check

When there is a call for heat, the 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 S102 high heat and S128 low heat pressure switch normally open contacts. Once self check is complete and all safety switches are operational, heat call can continue.

Two-Stage Thermostat, Two Stage Heat. Dip Switch set at *"OFF".*

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

NOTE - *If the low fire pressure switch does not close the combustion air inducer will switch to high fire. After a 15 second pre-purge the high fire pressure switch will close and the unit will begin operation on high fire. After 10 to 20 seconds of high fire operation the unit will switch to low fire.*

NOTE - *If the furnace is operating on continuous fan mode (terminal "R" and "G" are energized), the combustion air inducer will energize on high speed, the gas valve will energize on second-stage heat and the furnace will operate on high fire. Furnace will stay on high fire for 60 seconds then switch to low fire.*

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 30 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.

8- S102 high heat pressure switch closes and the gas valve energizes second stage heat.

9- B3 indoor blower switches to high heat speed.

Single-Stage Thermostat, Two Stage Heat. Dip Switch set at "*ON*"

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

NOTE - *If the low fire pressure switch does not close the combustion air inducer will switch to high fire. After a 15 second pre-purge the high fire pressure switch will close and the unit will begin operation on high fire. After 10 to 20 seconds of high fire operation the unit will switch to low fire.*

NOTE - *If the furnace is operating on continuous fan mode (terminal "R" and "G" are energized), the combustion air inducer will energize on high speed, the gas valve will energize on second-stage heat and the furnace will operate on high fire. Furnace will stay on high fire for 60 seconds then switch to low fire.*

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 30 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- After the delay the combustion air inducer ramps up to high heat speed.

8- S102 high heat pressure switch closes and the gas valve energizes second stage heat.

9- B3 indoor blower switches to high heat speed.

VIII- Field Wiring and DIP Switch Settings

TABLE 12
Field Wiring Applications

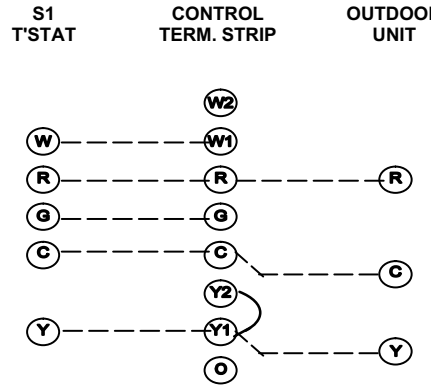
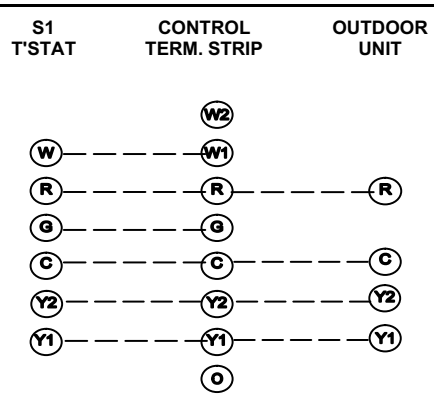
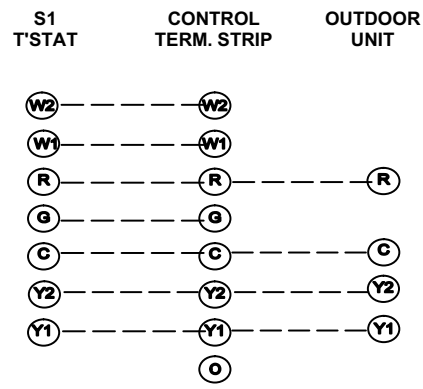
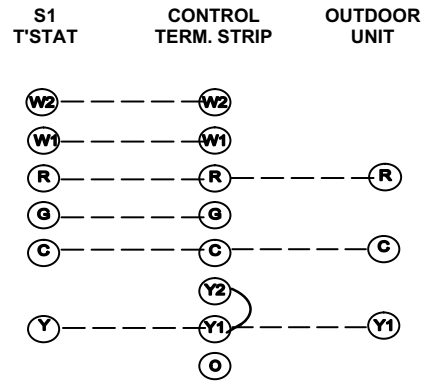
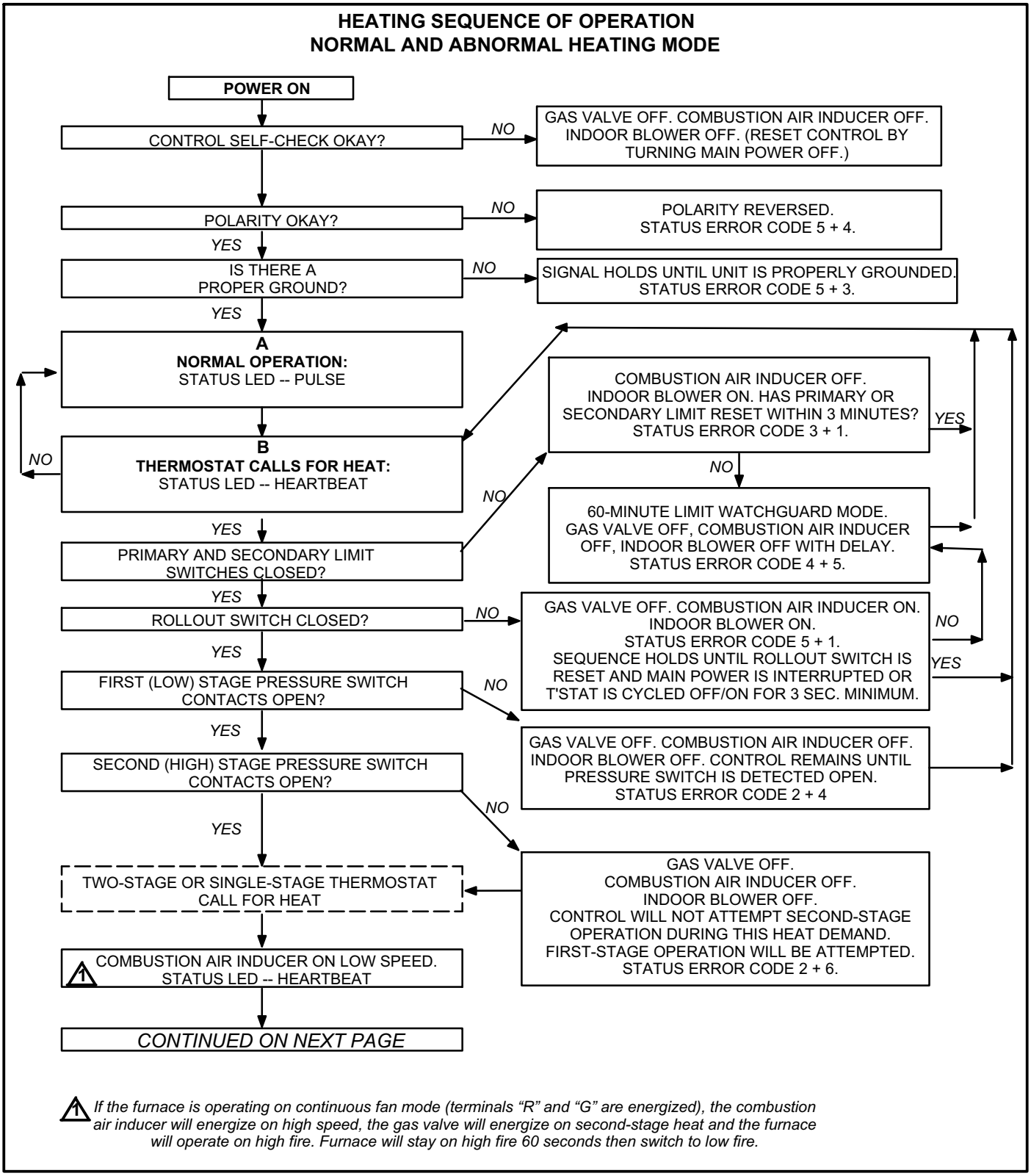
Thermostat	DIP Switch Settings and On-Board Links (See figure 6)			Wiring Connections
	DIP Switch 1	W915 Two-Stage Cooling	W951 Heat Pumps	
1 Heat / 1 Cool *NOTE - Use DIP switch 2 to set second-stage heat ON delay.* *OFF10 minutes.* *ON-15 minutes.*	ON	Intact	Intact	
1 Heat / 2 Cool *NOTE - Use DIP switch 2 to set second-stage heat ON delay.* *OFF-10 minutes.* *ON-15 minutes.*	ON	Cut	Intact	

TABLE 12
Field Wiring Applications (Continued)

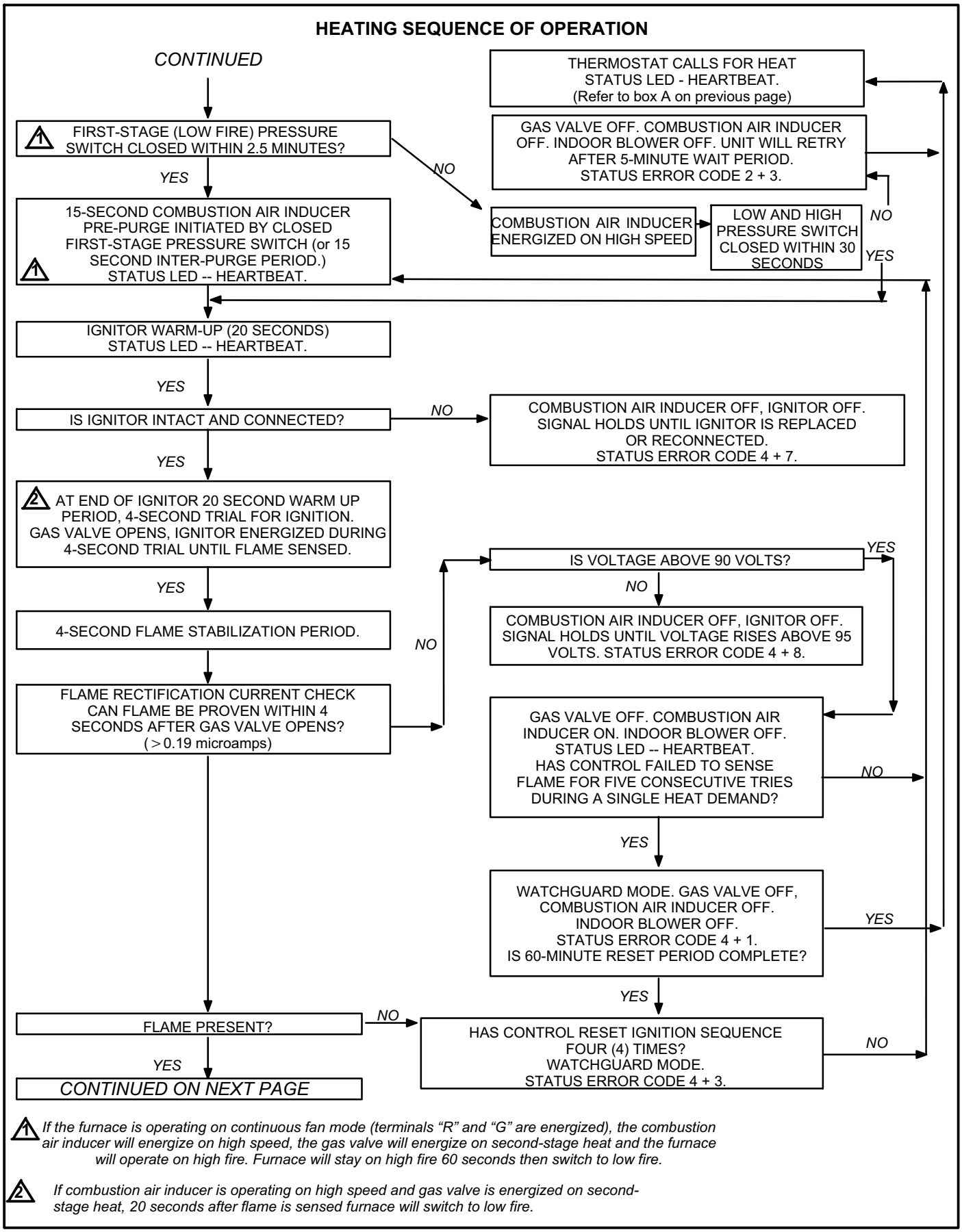
Thermostat	DIP Switch Settings and On-Board Links (See figure 6)			Wiring Connections
	DIP Switch 1	W915 Two-Stage Cooling	W951 Heat Pumps	
2 Heat / 2 Cool	OFF	Cut	Intact	
2 Heat / 1 Cool	OFF	Intact	Intact	

IX- Troubleshooting

Troubleshooting: Heating Sequence of Operation



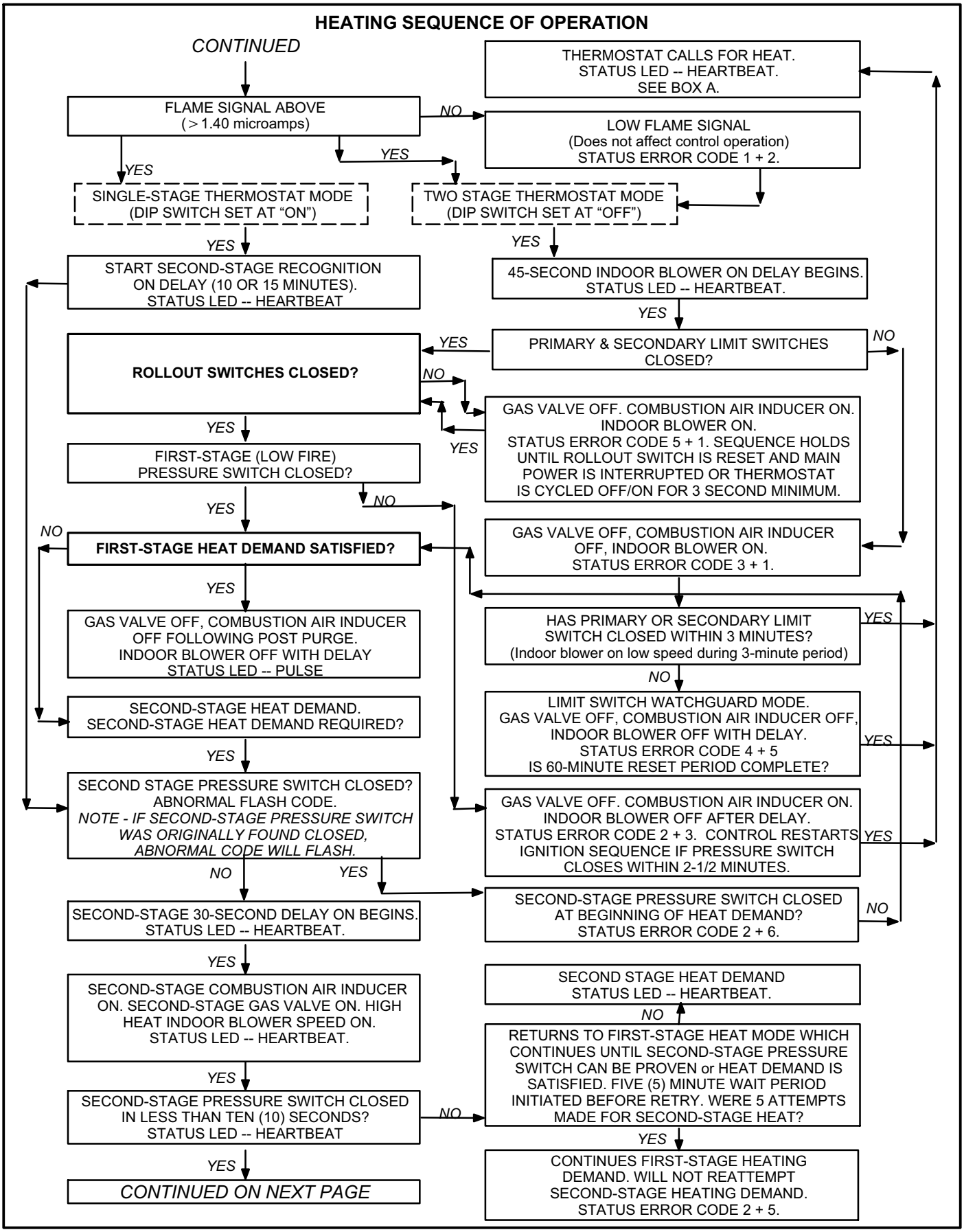
Troubleshooting: Heating Sequence of Operation (Continued)



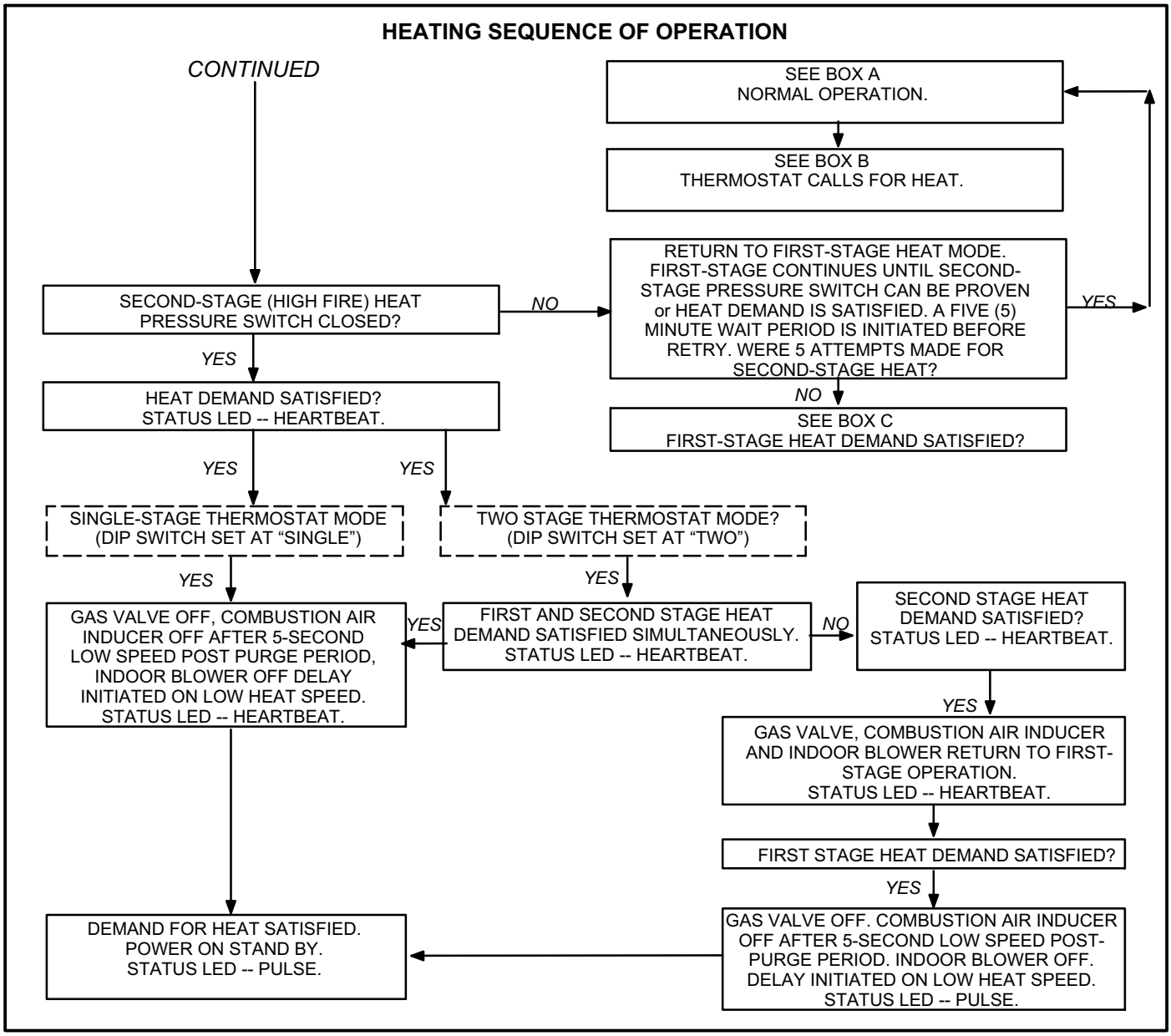
1 *If the furnace is operating on continuous fan mode (terminals "R" and "G" are energized), the combustion air inducer will energize on high speed, the gas valve will energize on second-stage heat and the furnace will operate on high fire. Furnace will stay on high fire 60 seconds then switch to low fire.*

2 *If combustion air inducer is operating on high speed and gas valve is energized on second-stage heat, 20 seconds after flame is sensed furnace will switch to low fire.*

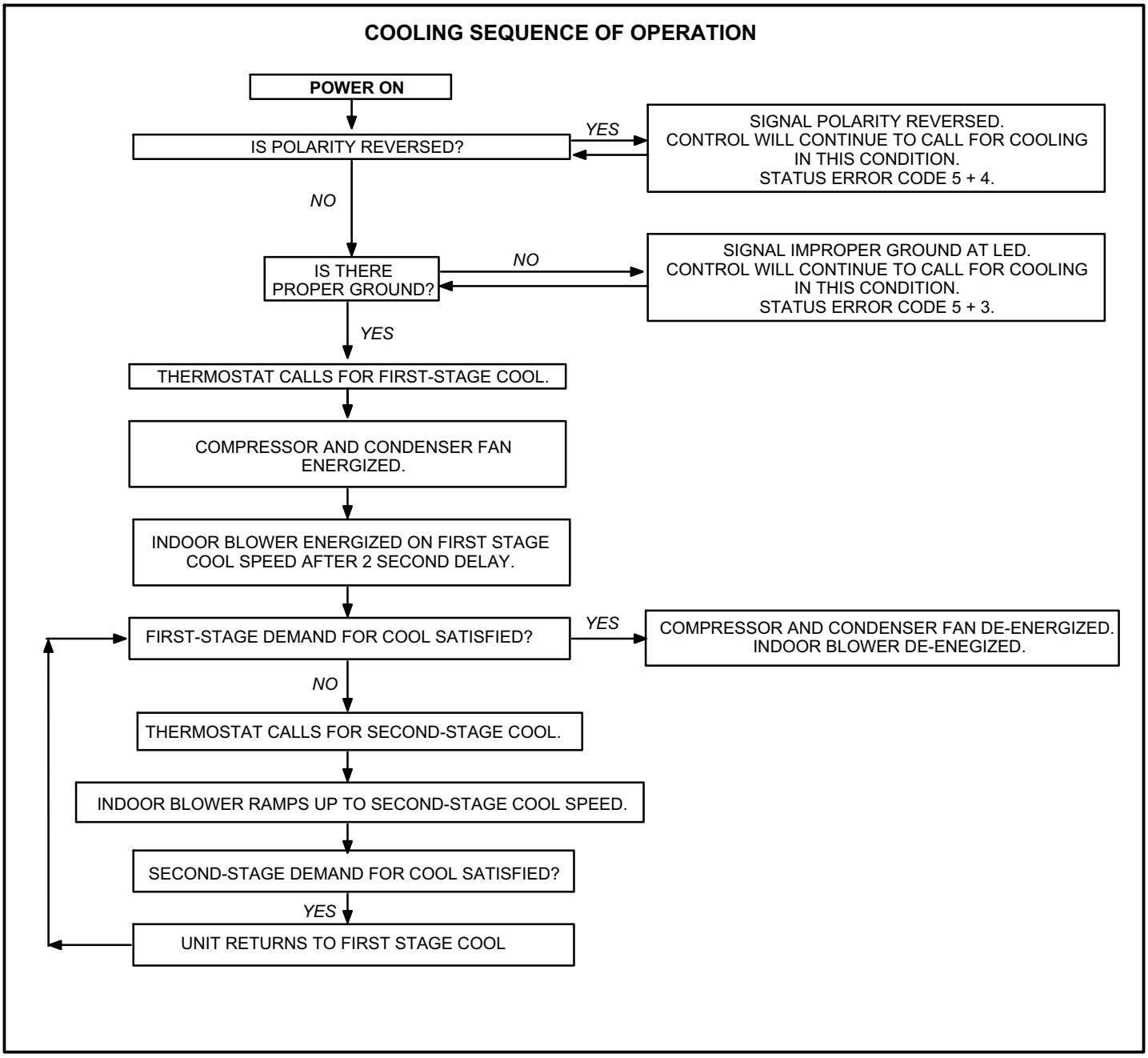
Troubleshooting: Heating Sequence of Operation (Continued)



Troubleshooting: Heating Sequence of Operation (Continued)



Troubleshooting: Cooling Sequence of Operation



Troubleshooting: Continuous Fan Sequence of Operation