

TWO STAGE IGNITION SYSTEM & TWO STAGE VARIABLE SPEED IGNITION SYSTEM

I-GENERAL

The two stage SureLight (figure 1)and two stage variable speed SureLight (figure 2) ignition systems, consists of a Lennox control board and hot surface ignitor. Both type control boards are similar except the two stage variable speed board controls an ICM2 indoor blower motor. Boards and ignitor work in combination to ensure furnace ignition and ignitor durability. Boards control all major furnace operations. Tables 1 through 4 show jack plug terminal designations.

Two stage boards 18M3401 and 46M9901 feature two LED lights, DS1 and DS2 for troubleshooting (see table 5 for diagnostic codes). The boards also have two accessory terminals rated at (1) one amp each. Terminal EAC energizes an electronic air cleaner with the indoor blower. Terminal HUM energizes the humidifier when CAI is energized on a call for heat. The SureLight board has a built in heating isolation relay. See wiring diagram for heat anticipator settings.

Two stage board 100869 features a red LED light, for furnace status and troubleshooting. The LED flashes in "X" + "Y" codes. For example using table 7 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 board also has two 120 volt accessory terminals rated at (1) one amp each. In addition there is a 24 volt humidifier terminal located on TB1.

Two stage variable speed boards 18M9901 and 49M5901 features two LED lights, DS1 and DS2 for troubleshooting (see table 5 for diagnostic codes) and four LED lights (DS3, DS6, DS7 and DS8) to show furnace status (see table 6 for status codes). The boards also have two accessory terminals rated at (1) one amp each. Terminal EAC energizes an electronic air cleaner with the indoor blower. Terminal HUM energizes the humidifier when CAI is energized on a call for heat. The SureLight board has a built in heating isolation relay. See wiring diagram for heat anticipator settings.

Two stage variable speed board 100870 features a red LED light, for furnace status and troubleshooting. The LED flashes in "X" + "Y" codes. For example using table 7 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. Two green LEDs show indoor blower status and CFM. See for more detail. The board also has two 120 volt accessory terminals rated at (1) one amp each. In addition there is a 24 volt humidifier terminal located on TB1.

IMPORTANT

Ignition control will not operate unless unit is properly grounded. 120V supply must be installed with correct polarity.

ELECTROSTATIC DISCHARGE (ESD) Precautions and Procedures

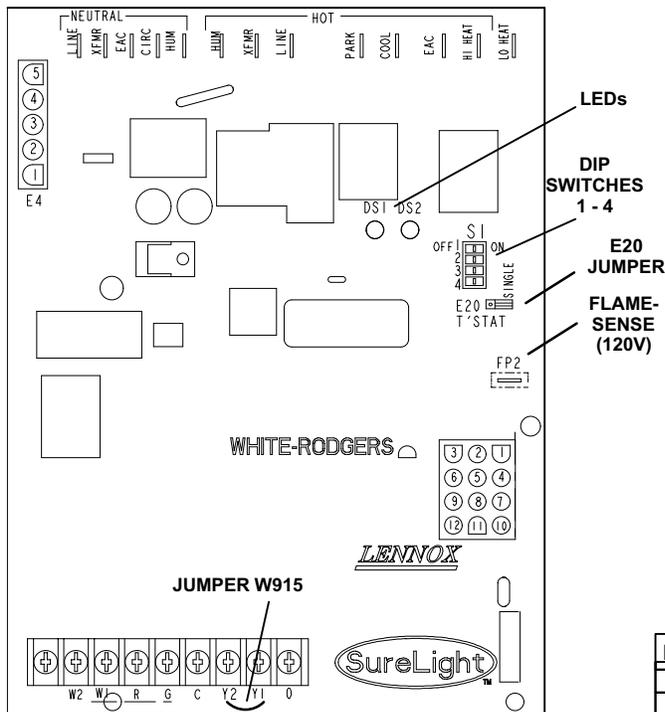
CAUTION

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

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TWO-STAGE INTEGRATED CONTROL BOARD 18M3401 & 46M9901



1/4" QUICK CONNECT TERMINALS

NEUTRAL

LINE - 120 VAC
XFMR - Transformewr
EAC - Electronic Air Cleaner
CIRC - Indoor Blower
HUM - Humidifier

HOT

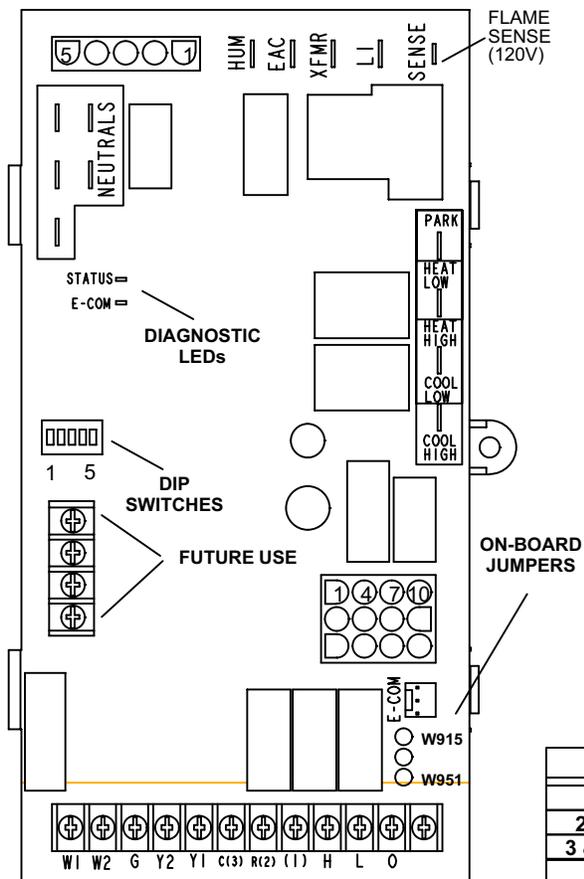
HUM - Humidifier
XFMR - Transformer
LINE - 120 VAC
PARK - Unused Leads
COOL - Cooling Speed
EAC - Electronic Air Cleaner
HI HEAT - High Heat Speed
LO HEAT - Low Heat, Low Cool, Cont. Blower Speed

THERMOSTAT CONNECTIONS (TB1)

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

DIP SWITCH(ES)	FUNCTION
1 and 2	Blower Off Delay (Heating Mode)
3	Second Stage ON Delay (Single-stage t'stat)
4	Blower Off Delay (Cooling Mode)

TWO-STAGE INTEGRATED CONTROL BOARD 100869



1/4" QUICK CONNECT TERMINALS

HUM = 120 VAC OUTPUT TO HUMIDIFIER
EAC = 120 VAC OUTPUT TO ELECTRONIC AIR CLEANER
XFMR = 120 VAC OUTPUT TO TRANSFORMER
LI = 120 VAC INPUT TO CONTROL
SENSE = 120 VAC OUTPUT TO FLAME SENSER

NEUTRALS= 120 VAC NEUTRAL

PARK = DEAD TERMINAL FOR UNUSED BLOWER LEAD
HEAT LOW = 120 VAC OUTPUT TO CIRC BLWR -- LOW HT SPEED
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)

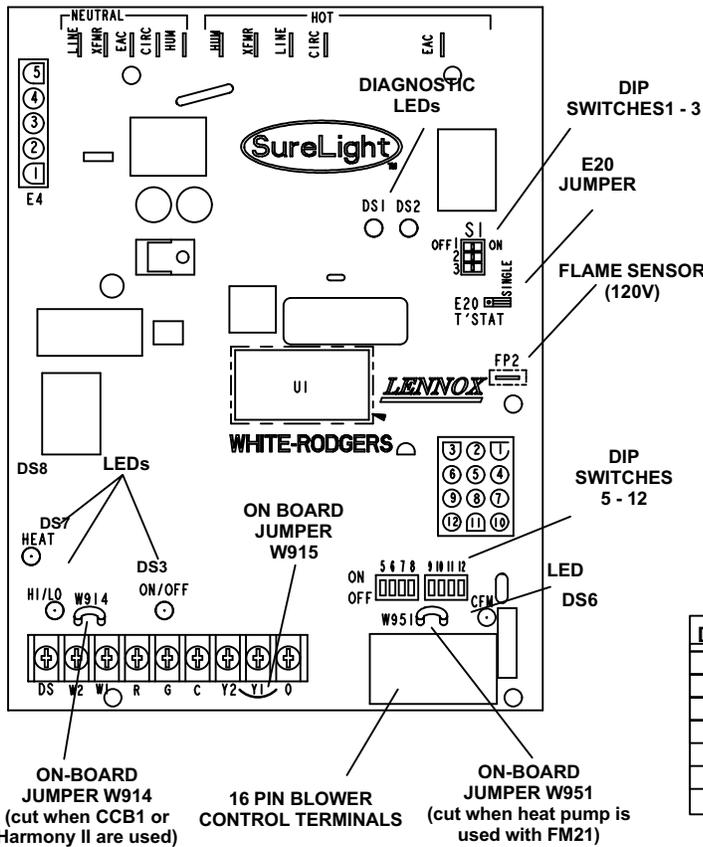
W1= HEAT DEMAND FROM 1ST STAGE T'STAT
W2= HEAT DEMAND FROM 2ND STAGE T'STAT
G= MANUAL FAN FROM T'STAT
Y2= THERMOSTAT 2nd STAGE COOL SIGNAL
Y1= THERMOSTAT 1st STAGE COOL SIGNAL
C= THERMOSTAT SIGNAL GROUND CONNECTED TO TRANSFORMER GROUND (TR) & CHASIS GROUND (GRD)
R= CLASS 2 VOLTAGE TO THERMOSTAT
1= ERROR CODE RECALL
H= 24V HUMIDIFIER OUTPUT DURING HEAT DEMAND
L= LENNOX SYSTEM OPERATION MONITOR
0= 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 1

**TWO-STAGE VARIABLE SPEED INTEGRATED CONTROL BOARD
18M9901 & 49M5901**



1/4" QUICK CONNECT TERMINALS

- NEUTRAL**
LINE - 120 VAC
XFMR - Transformewr
EAC - Electronic Air Cleaner
CIRC - Indoor Blower
HUM - Humidifier
HOT
HUM - Humidifier
XFMR - Transformer
LINE - 120 VAC
CIRC - Indoor Blower
EAC - Electronic Air Cleaner

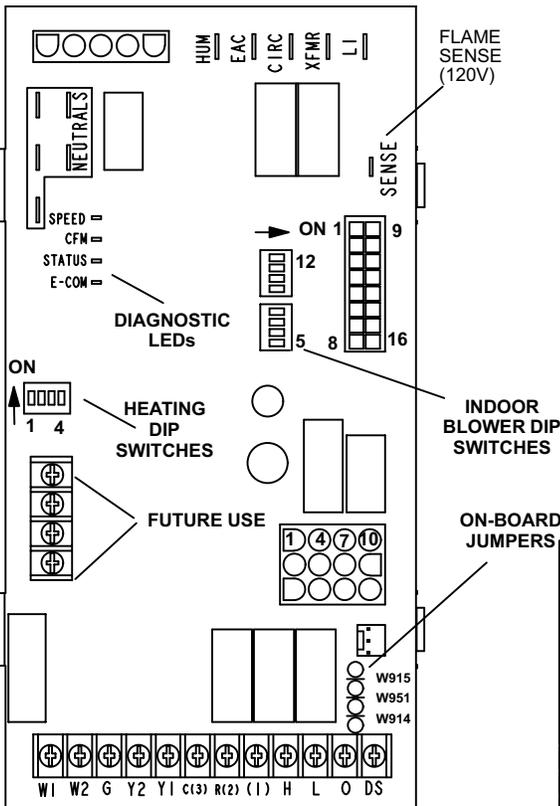
THERMOSTAT CONNECTIONS (TB1)

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

DIP SWITCH FUNCTIONS

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

**TWO-STAGE VARIABLE SPEED INTEGRATED CONTROL BOARD
100870**



1/4" QUICK CONNECT TERMINALS

- HUM = 120 VAC OUTPUT TO HUMIDIFIER
XFMR = 120 VAC OUTPUT TO TRANSFORMER
L = 120 VAC INPUT TO CONTROL
CIRC = 120 VAC OUTPUT TO CIRCULATING BLOWER
EAC = 120 VAC OUTPUT TO ELECTRONIC AIR CLEANER
NEUTRALS= 120 VAC NEUTRAL

THERMOSTAT CONNECTIONS (TB1)

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

DIP SWITCH FUNCTIONS

HTG DIP SWITCH(ES)	FUNCTION
1	T'stat Heat Stages (single or two-stage)
2	Second Stage ON Delay (single-stage t'stat)
3 and 4	Heating Fan OFF Delay
INDOOR BLOWER DIP SWITCH(ES)	
FUNCTION	
5 and 6	Cooling Mode Blower Speed
7 and 8	Blower Speed Adjustment
9 and 10	Cooling Mode Blower Ramping Profile
11 and 12	Heating Mode Blower Speed

FIGURE 2

TABLE 1**SureLight 18M3401, 46M9901, 18M9901, 49M5901**

Two Stage & Two Stage Variable Speed Control 12Pin Terminal Designation	
PIN #	Function
1	Gas Valve 2nd. Stage (High Fire)
2	Second Stage Pressure Switch
3	Not Used
4	Ground
5	24V Hot
6	Primary Limit In
7	Gas Valve 1st. Stage (Low Fire)
8	Gas Valve Common
9	24V Neutral
10	Ground
11	Primary Limit Out
12	1st Stage Pressure Switch

TABLE 2**All SureLight Ignition Control Boards**

Two Stage & Two Stage Variable Speed 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 100869, 100870**

Two Stage & Two Stage Variable Speed Control 12Pin Terminal Designation	
PIN #	Function
1	Gas Valve 2nd. Stage (High Fire)
2	Second Stage Pressure Switch
3	Rollout In
4	Ground
5	24V Hot
6	Primary Limit In
7	Gas Valve 1st. Stage (Low Fire)
8	Gas Valve Common
9	24V Neutral
10	Ground
11	Rollout Out / Limit Out
12	1st Stage Pressure Switch

TABLE 4**SureLight 18M9901, 49M5901, 100870**

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

TABLE 5
SureLight® Boards 18M3401, 46M9901, 18M9901, 49M5901

DIAGNOSTIC CODES		
Diagnostic LEDs are labeled DS1 and DS2. See figure 1 for location of diagnostic LEDs.		
DS1	DS2	DESCRIPTION
SIMULTANEOUS SLOW FLASH	SIMULTANEOUS SLOW FLASH	Power on - Normal operation. Also signaled during cooling and continuous fan.
SIMULTANEOUS FAST FLASH	SIMULTANEOUS FAST FLASH	Normal operation - signaled when heating demand initiated at thermostat.
SLOW FLASH	ON	Primary, secondary or rollout limit switch open. Limits must close within 3 minutes or unit goes into 1 hour Watchguard.
OFF	SLOW FLASH	Low pressure switch open; OR: Blocked inlet/exhaust vent; OR: Low pressure switch closed prior to activation of combustion air inducer.
OFF	FAST FLASH	High pressure switch open; OR: Blocked inlet/exhaust vent; OR: High pressure switch closed prior to activation of combustion air inducer.
ALTERNATING SLOW FLASH	ALTERNATING SLOW FLASH	Watchguard -- burners failed to ignite; OR limit open more than 3 minutes; OR lost flame sense 5 times in one heating cycle; OR pressure switch opened 5 times in one heating cycle.
SLOW FLASH	OFF	Flame sensed without gas valve energized.
ON ON OFF	ON OFF ON	Circuit board failure or control wired incorrectly. Check 24 and 115 volts to board.
FAST FLASH	SLOW FLASH	Main power polarity reversed. Switch line and neutral.
SLOW FLASH	FAST FLASH	Low flame signal. Measures below 0.2 microAmps. Replace flame sense rod.
ALTERNATING FAST FLASH	ALTERNATING FAST FLASH	The following conditions are sensed during the ignitor warm-up period only: 1) Improper main ground; 2) Broken ignitor; OR: Open ignitor circuit; 3) Line voltage below 75 volts. (If voltage lower than 75 volts prior to ignitor warm-up, control will signal waiting on call from thermostat, and will not respond.

NOTE - Slow flash rate equals 1 Hz (one flash per second). Fast flash rate equals 3 Hz (three flashes per second). Minimum flame sense current = 0.15-0.17 microAmps.

TABLE 6
SureLight Boards 18M9901, 49M5901

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

TABLE 7
SureLight® Boards 100869, 100870

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.

II-Operation (all control boards)

Electronic Ignition

At the beginning of each heating cycle, the SureLight® control monitors the first stage and second stage combustion air inducer prove switch. The control will not begin the heating cycle if the first stage prove switch is closed (by-passed). Likewise the control will not begin the second stage heating cycle if the second stage prove switch is closed, and will allow first stage heat only. However if the second stage prove switch closes during the first stage pre-purge, the control WILL respond to second stage heat call. Once the first stage prove switch is determined to be open, the combustion air inducer is energized on low (first stage) heat speed. When the differential in the prove switch is great enough, the prove switch closes and a 15-second pre-purge begins. If the switch is not proven within 2-1/2 minutes, the control goes into Watchguard-Pressure Switch mode for a 5-minute re-set period.

After the 15-second pre-purge period, the SureLight ignitor warms up for 20 seconds after which the gas valve opens for a 4-second trial for ignition. The ignitor energizes during the trial until flame is sensed. If ignition is not proved during the 4-second period, the control will try four more times with an inter purge and warm-up time between trials of 35 seconds. After a total of five trials for ignition (including the initial trial), the control goes into Watchguard-Flame Failure mode. After a 60-minute reset period, the control will begin the ignition sequence again.

The SureLight control board has an added feature that prolongs the life of the ignitor. After a successful ignition, boards **18M3401**, **46M9901**, **18M9901** and **49M5901** utilizes less power to energize the ignitor on successive calls for heat. The boards continue to ramp down the voltage to the ignitor until it finds the lowest amount of power that will provide a successful ignition. This amount of power is used for 255 cycles. On the 256th call for heat, the boards again ramp down until the lowest power is determined and the cycle begins again. SureLight boards **100869** and **100870** regulate 95 volts to the ignitor for consistent ignition and long ignitor life.

A-Two Stage Operation / Thermostat Selection

SureLight Boards 18M3401, 46M9901, 18M9901 & 49M5901

The control can be utilized in two modes: SINGLE-STAGE thermostat or TWO-STAGE thermostat. The thermostat selection jumper E20 must be positioned for the particular application. The jumper is factory set on "TWO" for use with a two-stage thermostat with two stage heat. Re-position jumper to "SINGLE" for use with a single stage thermostat with two stage heat.

While in the single-stage thermostat mode (*single* jumper setting), the burners will always fire on first-stage heat. The combustion air inducer will operate on low speed and indoor blower will operate on low heat speed. After a field selectable 10 or 15 minute delay (dip switch 3), the unit will switch to second stage heat. While in the two-stage thermostat mode (*two* jumper setting) the burners will fire on first-stage heat. The combustion air inducer will operate on low speed and indoor blower will operate on low heat speed. The unit will switch to second-stage heat on call from the indoor thermostat. If there is a simultaneous call for W1 and W2 (first and second stage heat) the unit will fire on 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.

SureLight Boards 100869 & 100870

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 2) and must be positioned for the particular application. The dip switch is factory set on "TWO" for use with a two-stage thermostat with two stage heat. Re-position dip switch to "SINGLE" for use with a single stage thermostat with two stage heat.

While in the single-stage thermostat mode (*single* 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 minute recognition period, the unit will switch to second stage heat. While in the two-stage thermostat mode (*two* 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.

B-Dip Switch Settings

SureLight Boards 18M3401 & 46M9901

Dip Switches 1 and 2 - Heating Fan off Delay - The fan on time of 45 seconds is not adjustable. Fan off time (time that the blower operates after the heat demand has been satisfied) can be adjusted by flipping the dip switches 1 and 2 located on the SureLight integrated control. The unit is shipped with a factory fan off setting of 90 seconds. Fan off time will affect comfort and is adjustable to satisfy individual applications. For customized comfort, monitor the supply air temperature once the heat demand is satisfied. Note the supply air temperature at the instant the blower is de-energized. Adjust the fan-off delay to achieve a supply air temperature between 90° - 110° at the instant the blower is de-energized. (Longer delay times allow for lower air temperature, shorter delay times allow for higher air temperature). See table 8 for dip switch settings.

TABLE 8
Heating Fan Off Delay

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

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

Switch 4 - Cooling Fan off Delay - The fan on delay time of 2 seconds is not adjustable. Fan off time (time that the blower operates after the cool demand has been satisfied) can be adjusted by flipping dip switch 4. The unit is shipped with a factory fan off setting of 45 seconds. Fan off time will affect comfort and is adjustable to satisfy individual applications. See table 9 for cool fan off time settings.

TABLE 9
Cooling Fan Off Delay

Delay (Seconds)	Switch 4
2	Off
45	On

Diagnostic LED's (DS1 and DS2)

Two diagnostic LED'S are located on the two-stage integrated control board. See figure 1 . These light flashes correspond with the codes detailed in table 5.

On-Board Jumper W915

A factory-installed jumper from Y1 to Y2 terminals on the integrated control board terminal strip must be removed for two-stage cooling. On board 18M3401 remove the jumper, on board 46M9901 clip the jumper.

SureLight® Board 100869

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 45 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 board. 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 10 provides the blower off timings that will result from different switch settings.

TABLE 11
Heating Blower-Off Delay Switch Settings

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

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 board. 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 Jumper W951

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

On-Board Jumper W915

On-board jumper W915, which connects terminals Y1 and Y2 on the integrated control board, must be cut if two-stage cooling will be used. If the jumper is not cut the outdoor unit will operate in second-stage cooling only.

Variable Speed SureLight® Board 18M9901 & 49M5901

Dip Switch Settings

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

TABLE 12
Blower Off Delay Switch Settings

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

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

Switch 4 - Not used

Switches 5 and 6 - Cooling Mode Blower Speed

Switches 5 and 6 are used to select cooling blower motor speed. The unit is shipped from the factory with the dip switches positioned for high speed (4) indoor blower motor operation during the cooling mode. Table 13 provides the cooling mode blower speeds that will result from different switch settings.

TABLE 13
Cooling Mode Blower Speeds

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

Switches 7 and 8 - Blower Speed Adjustment Switches 7 and 8 are used to select blower speed adjustment settings. The unit is shipped from the factory with the dip switches positioned for NORMAL (no) adjustment. The dip switches may be positioned to adjust the blower speed by +10% or -10% to better suit the application. Table 14 provides blower speed adjustments that will result from different switch settings.

TABLE 14
Blower Speed Adjustment

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

Switches 9 and 10 - Cooling Mode Blower Speed Ramping --

Switches 9 and 10 are used to select cooling mode blower speed ramping options. Blower speed ramping may be used to enhance dehumidification performance. The switches are factory set at option A which has the greatest effect on blower motor performance. Table 15 provides the cooling mode blower speed ramping options that will result from different switch settings. The cooling mode blower speed ramping options are detailed on Page 12.

TABLE 15
Cooling Mode Blower Speed Ramping

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

**Only option for Dehumidification*

Switches 11 and 12 - Heating Mode Blower Speed

Switches 11 and 12 are used to select heating mode blower motor speed. The unit is shipped from the factory with the dip switches positioned for medium low (2) speed indoor blower motor operation during the heating mode. Table 16 provides the heating mode blower speeds that will result from different switch settings.

TABLE 16
Heating Mode Blower Speeds

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

On-Board Jumper W914

On-board jumper W914, which connects terminals DS and R on the integrated control board, must be cut when the furnace is installed with either the Harmony II zone control board or a humidity control. Refer to furnace Installation Instructions for more detail.

On Board Jumper W915

A factory-installed jumper from Y1 to Y2 terminals on the integrated control board terminal strip must be removed for two-stage cooling. On board 18M9901 remove the jumper, on board 49M5901 clip the jumper.

On-Board Jumper W951

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

Diagnostic LEDs (DS1 and DS2)

Two diagnostic LEDs are located on the two-stage, variable speed integrated control just to the left of the first bank of dip switches. These lights' flashes correspond with diagnostic codes detailed in table 5.

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

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

Variable Speed SureLight® Board 100870

Heating Operation 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 -- Blower-Off Delay -- The blower-on delay of 45 seconds is not adjustable. The blower-off delay (time that the blower operates after the heating demand has been satisfied) can be adjusted by moving switches 3 and 4 on the integrated control board. The unit is shipped from the factory with a blower-off delay of 90 seconds. The blower off delay affects comfort and is adjustable to satisfy individual applications. Adjust the blower off delay to achieve a supply air temperature between 90° and 110°F at the exact moment that the blower is de-energized. Longer off delay settings provide lower supply air temperatures; shorter settings provide higher supply air temperatures. Table 17 provides the blower off timings that will result from different switch settings.

**TABLE 17
Blower Off Delay Switch Settings**

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

Indoor Blower Operation DIP Switch Settings

Switches 5 and 6 -- Cooling Mode Blower Speed --

Switches 5 and 6 are used to select cooling blower motor speed. The unit is shipped from the factory with the DIP switches positioned for high speed (4) indoor blower motor operation during the cooling mode. The table below provides the cooling mode blower speeds that will result from different switch settings.

**TABLE 18
Cooling Mode Blower Speeds**

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

Switches 7 and 8 -- Blower Speed Adjustment --

Switches 7 and 8 are used to select blower speed adjustment settings. The unit is shipped from the factory with the DIP switches positioned for NORMAL (no) adjustment. The DIP switches may be positioned to adjust the blower speed by +10% or -10% to better suit the application. The table below provides blower speed adjustments that will result from different switch settings.

**TABLE 19
Blower Speed Adjustment**

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

Switches 9 and 10 -- Cooling Mode Blower Speed Ramping --

Switches 9 and 10 are used to select cooling mode blower speed ramping options. Blower speed ramping may be used to enhance dehumidification performance. The switches are factory set at option A which has the greatest effect on blower motor performance. Table 20 provides the cooling mode blower speed ramping options that will result from different switch settings. The cooling mode blower speed ramping options are detailed on Page 12 .

NOTE - The off portion of the selected ramp profile also applies during heat pump operation in dual fuel applications.

TABLE 20
Cooling Mode Blower Speed Ramping

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

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

TABLE 21
Heating Mode Blower Speeds

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

On-Board Jumper W914

On-board jumper W914, which connects terminals DS and R on the integrated control board, must be cut when the furnace is installed with either the Harmony III zone control board or a thermostat which features humidity control. If the jumper is left intact the PWM signal from the HARMONY III control will be blocked and also lead to control damage.

On-Board Jumper W951

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

On-Board Jumper W915

On-board jumper W915, which connects terminals Y1 and Y2 on the integrated control board, must be cut if two-stage cooling will be used. If the jumper is not cut the outdoor unit will operate in second-stage cooling only.

Status LEDs (SPEED, CFM, E-COM)1

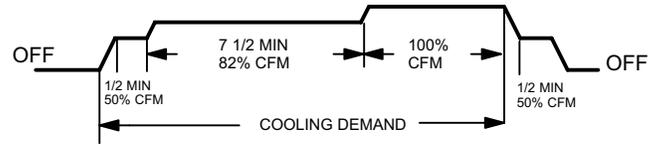
The green SPEED LED indicates circulating blower speed in response to the DS signal. The LED is lit during normal blower operation and is off during a dehumidification demand. In Harmony III applications, the brightness of the LED indicates the requested blower speed.

The green CFM LED indicates the blower air flow. Count the number of blinks between the two-second pauses to determine the CFM. Each blink represents approximately 100 CFM.

The green E-COM LED indicates that the control is receiving and processing of commands and inputs. The LED may flash rapidly or may display a single flash, depending upon the activity.

Ramping Option A (Factory Selection)10-

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



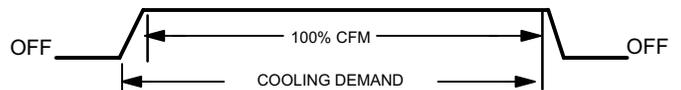
Ramping Option B

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



Ramping Option C

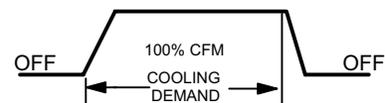
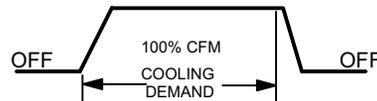
- Motor runs at 100% until demand is satisfied.
- Once demand is met, motor runs at 100% for 45* seconds then ramps down to stop.



* G60UHV units date coded prior to 2-2006 will delay 60 seconds

Ramping Option D

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



III-Additional Components

Ignitor

SureLight® ignitors are made of durable silicon nitride. Ignitor longevity is enhanced by controlling voltage to the ignitor. SureLight boards 18M3401, 46M9901, 18M9901 and 49M5901 finds the lowest ignitor temperature which will successfully light the burner. SureLight boards 100869 and 100870 regulate 95 volts to the ignitor. Due to this feature of the boards, voltage cannot be measured so ignitor must be ohmed. See table 22 for Ohm values and figure 3 for ignitor location.

NOTE - Electronic components are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

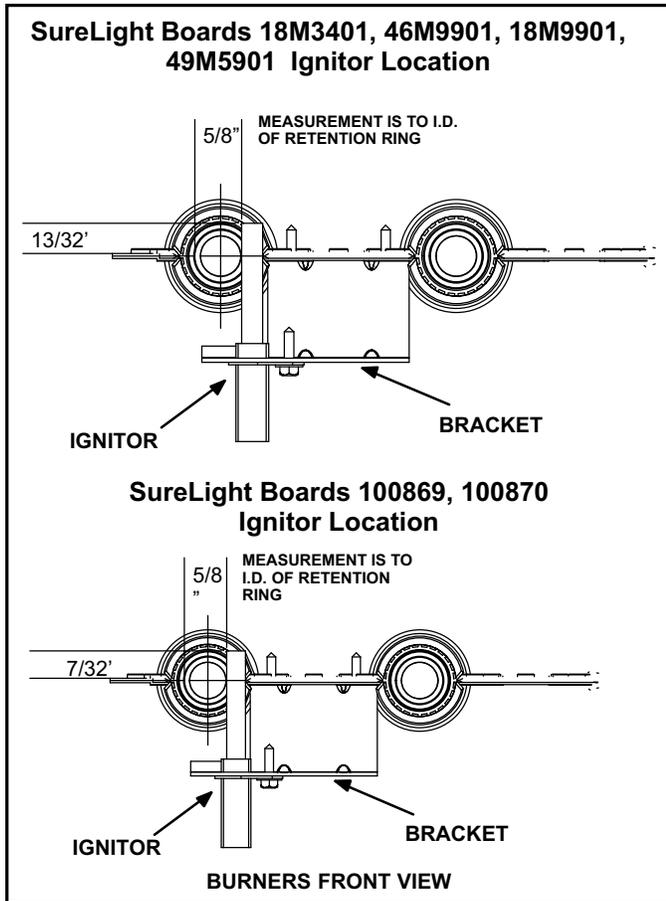


FIGURE 3

TABLE 22

SureLight Board	Ohm Value
18M3401 46M9901 18M9901 49M5901	10.9 - 19.7
100869 100870	25 - 47

Flame Sensor

A flame sensor is located on the left side of the burner support. See figure 4 . The sensor is mounted on the flame rollout plate and the tip 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. See table 23 for flame signal.

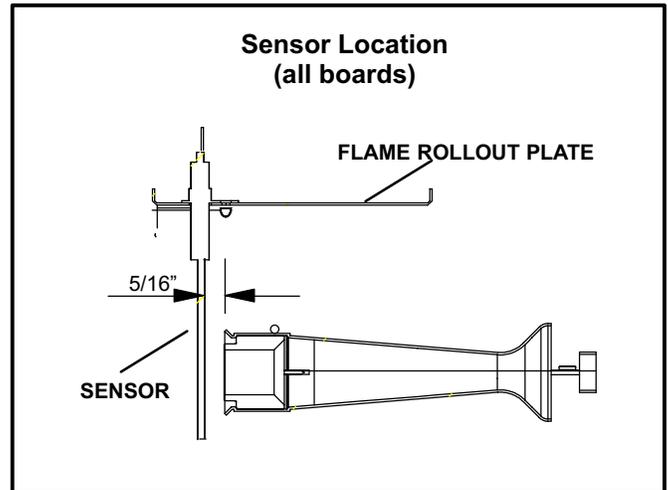


FIGURE 4

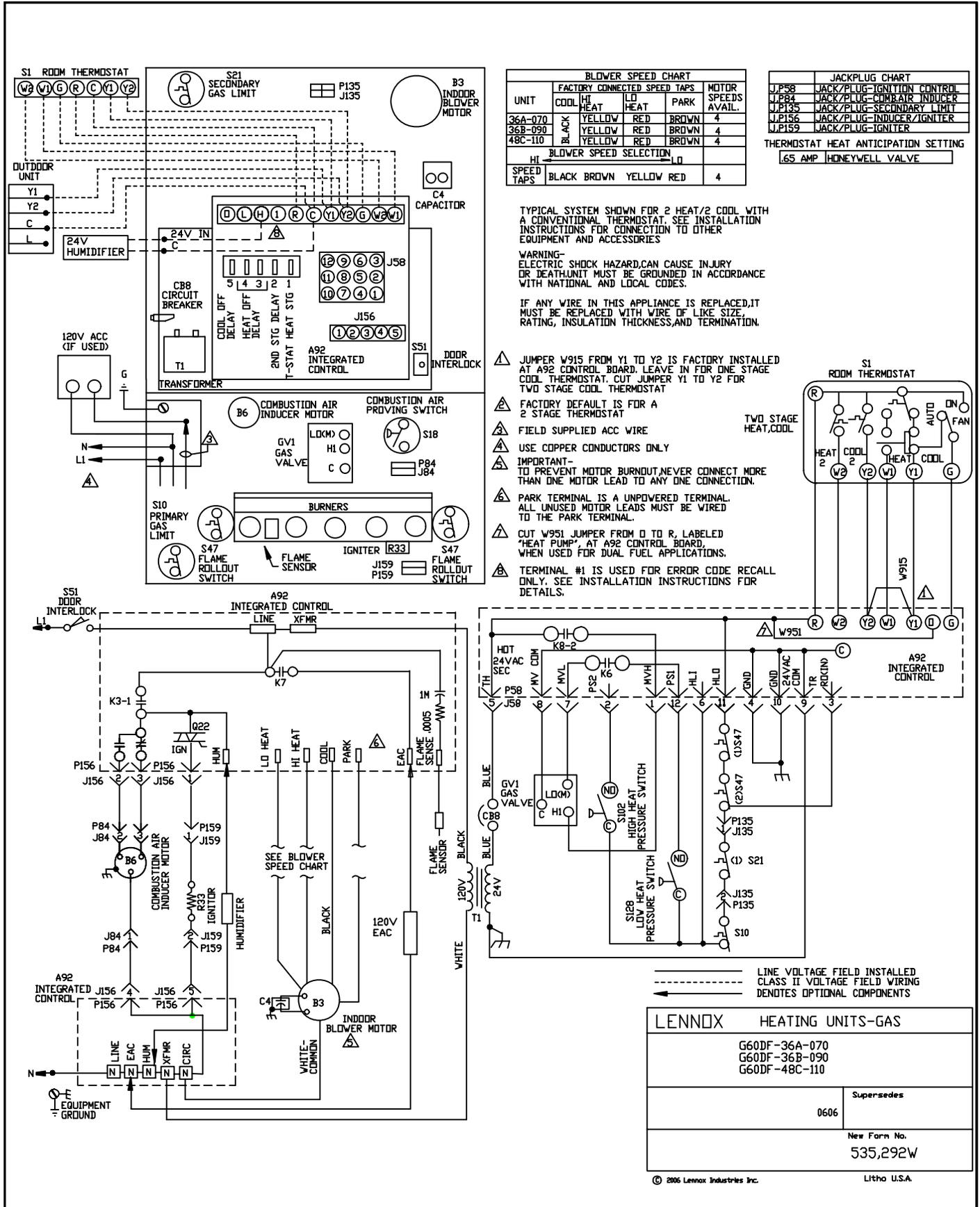
TABLE 23

Flame Signal in Microamps

SureLight Board	Normal	Low	Drop Out
18M3401 46M9901 18M9901 49M5901	≥ 0.23	≤ 0.22	0.16
100869 100870	≥ 1.50	≤ 1.40	0.20

IV-Wiring Diagrams and Sequence of Operation

A-G60DF with SureLight® Board 18M3401 or 46M9901



Sequence of Operation

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

SureLight® Control Self Check

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

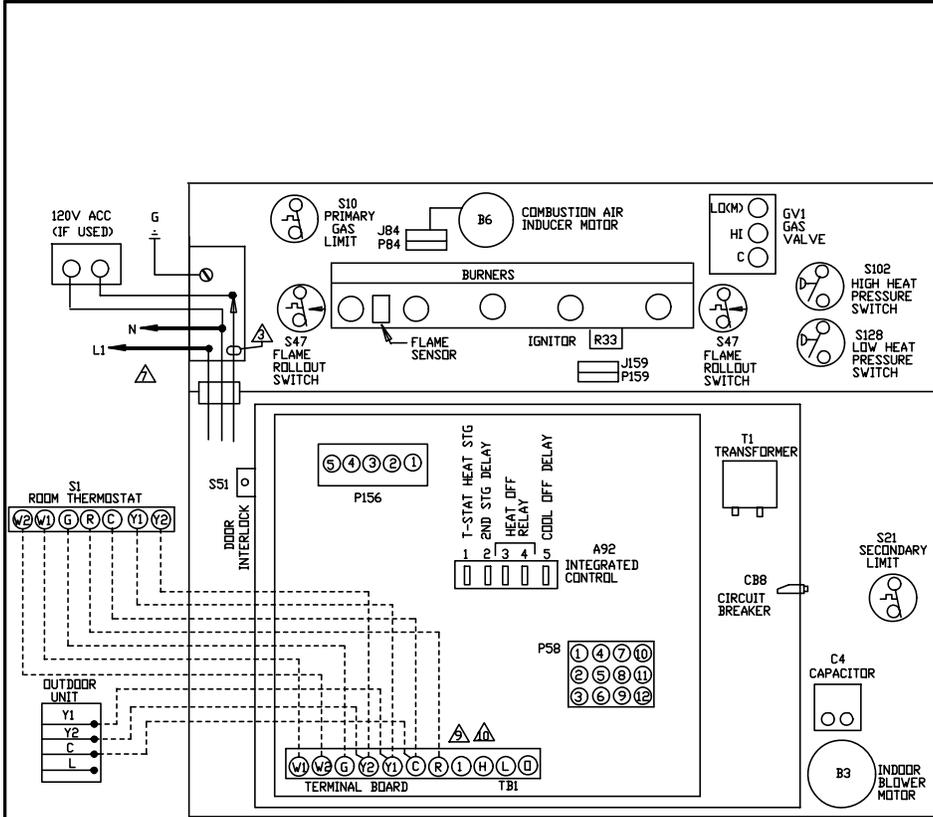
Two-Stage Thermostat, Two Stage Heat. Jumper E20 set at "TWO".

- 1- SureLight® control energizes combustion air inducer B6 on low heat speed. Combustion air inducer runs until S128 low heat prove switch contacts close (switch must close within 2 1/2 minutes or control goes into Watchguard Pressure Switch mode. High heat prove switch S102 may also close). A 15 second pre-purge follows once S128 closes.
- 2- SureLight control begins 20 second ignitor warm up period.
- 3- Gas valve opens on first stage for a 4 second trial for ignition. Ignitor stays energized during the trial or until flame sensed.
- 4- Flame is sensed, gas valve remains on first stage heat, ignitor de-energizes.
- 5- After 45 second delay, indoor blower B3 is energized on low heat speed.
The furnace will stay in this mode until first stage demand is satisfied OR a second stage heat demand is initiated.
- 6- Second stage heat demand initiated. A 30 second, second stage recognition period begins.
- 7- The combustion air inducer ramps up to high heat speed.
- 8- S102 high heat prove switch closes and the gas valve energizes second stage heat.
- 9- B3 indoor blower ramps up to high heat speed.

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

- 1- SureLight control energizes combustion air inducer B6 on low heat speed. Combustion air inducer runs until S128 low heat prove switch contacts close (switch must close within 2 1/2 minutes or control goes into Watchguard Pressure Switch mode. High heat prove switch S102 may also close). A 15 second pre-purge follows once S128 closes.
- 2- SureLight control begins 20 second ignitor warm up period.
- 3- Gas valve opens on first stage for a 4 second trial for ignition. Ignitor stays energized during the trial or until flame sensed.
- 4- Flame is sensed, gas valve remains on first stage heat, ignitor de-energizes.
- 5- After 45 second delay, indoor blower B3 is energized on low heat speed.
- 6- A 10 minute (factory set) or 15 minute (field set) second stage heat delay period begins.
- 7- The combustion air inducer ramps up to high heat speed.
- 8- S102 high heat prove switch closes and the gas valve energizes second stage heat.
- 9- B3 indoor blower ramps up to high heat speed.

B-G60UH with SureLigh[®] Board 100869



BLOWER SPEED CHART

UNIT	FACTORY CONNECTED SPEED TAPS				MOTOR SPEEDS AVAIL.	SECONDARY LIMITS USED
	COOL	HI HEAT	LO HEAT	PARK		
24A-070	YELLOW	RED	---	---	3	2
36A-070	YELLOW	RED	BROWN	---	4	2
36B-090	BROWN	YELLOW	RED	---	4	1 (RIGHT)
48B-090	YELLOW	RED	BROWN	---	4	2
36C-110	BROWN	YELLOW	RED	---	4	1 (RIGHT)
48C-110	BROWN	YELLOW	RED	---	4	1 (RIGHT)
60C-110	YELLOW	RED	BROWN	---	4	1 (RIGHT)
60D-135	YELLOW	RED	BROWN	---	4	2

HI, BLOWER SPEED SELECTION → LO

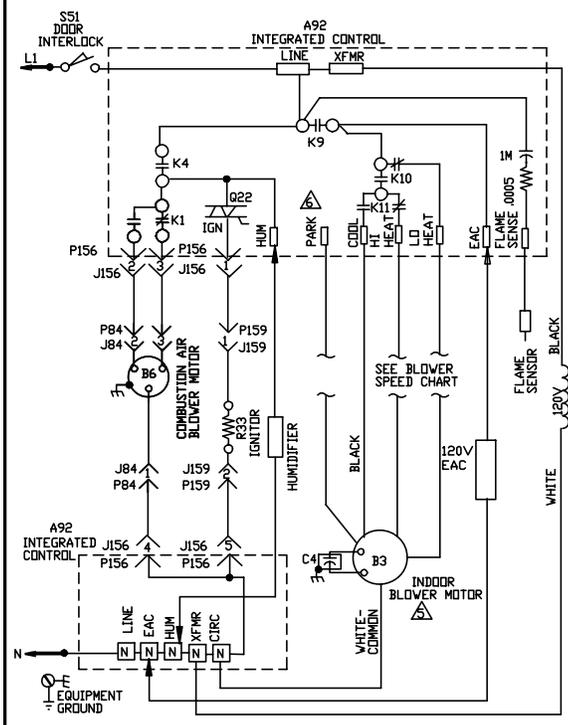
SPEED TAPS	BLACK YELLOW RED				MOTOR SPEEDS AVAIL.	SECONDARY LIMITS USED
	BLACK	BROWN	YELLOW	RED		
					3	

JACKPLUG CHART

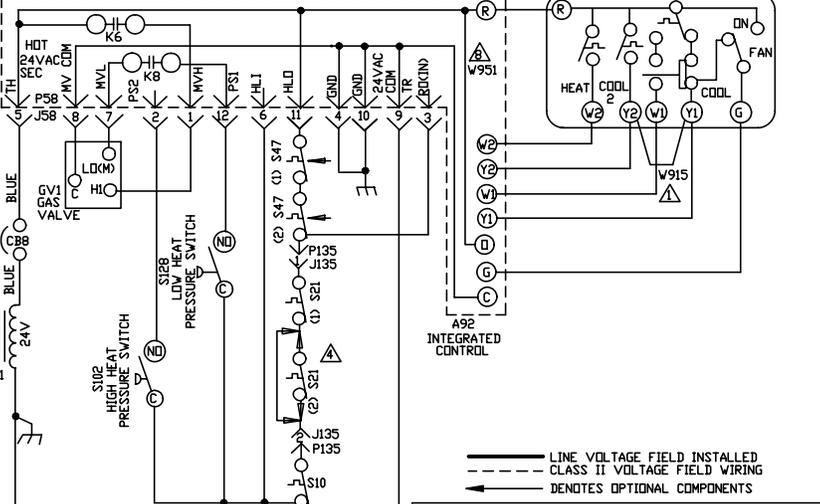
J.P58	JACK/PLUG-BURNER CONTROL
J.P84	JACK/PLUG-COMB. AIR INDUCER
J.P135	JACK/PLUG-SECONDARY LIMIT
J.P156	JACK/PLUG-INDUCER
J.P159	JACK/PLUG-IGNITOR

THERMOSTAT HEAT ANTICIPATION SETTING
 [65 AMP] HONEYWELL VALVE

- ⚠ JUMPER W915 FROM Y1 TO Y2 IS FACTORY INSTALLED AT A92 CONTROL BOARD. LEAVE IN FOR ONE STAGE COOL THERMOSTAT. CUT JUMPER Y1 TO Y2 FOR TWO STAGE COOL THERMOSTAT.
- ⚠ FACTORY DEFAULT IS FOR A 2 STAGE THERMOSTAT
- ⚠ FIELD SUPPLIED ACC WIRE
- ⚠ FOR CORRECT NUMBER OF SECONDARY LIMITS USED, SEE SECONDARY LIMIT SECTION OF BLOWER SPEED CHART.
- ⚠ IMPORTANT- TO PREVENT MOTOR BURNOUT, NEVER CONNECT MORE THAN ONE MOTOR LEAD TO ANY ONE CONNECTION.
- ⚠ PARK TERMINAL IS AN UNPOWERED TERMINAL. ALL UNUSED MOTOR LEADS MUST BE WIRED TO THE PARK TERMINAL.
- ⚠ USE COPPER CONDUCTORS ONLY
- ⚠ CUT W951 JUMPER FROM O TO R, LABELED "HEAT PUMP", AT A92 CONTROL BOARD, WHEN USED FOR DUAL FUEL APPLICATIONS.
- ⚠ TERMINAL #1 IS USED FOR ERROR CODE RECALL ONLY. SEE INSTALLATION INSTRUCTIONS FOR DETAILS.



⚠ 24V POWER IS PROVIDED FOR OPTIONAL HUMIDIFIER DURING HEAT DEMAND



LENNOX HEATING UNITS-GAS

G60UH-24A-070	G60UH-36C-110
G60UH-36A-070	G60UH-48C-110
G60UH-36B-090	G60UH-60C-110
G60UH-48B-090	G60UH-60D-135

2 HEAT 2 COOL

Supersedes 0906

New Form No. 535,291W

WARNING-
 ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

NOTE-
 IF ANY WIRE IN THIS APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING, INSULATION THICKNESS AND TERMINATION.

TYPICAL SYSTEM SHOWN FOR 2 HEAT/2 COOL WITH A CONVENTIONAL THERMOSTAT. SEE INSTALLATION INSTRUCTIONS FOR CONNECTION TO OTHER EQUIPMENT AND ACCESSORIES

Sequence of Operation.

Sequence depends on type thermostat used. G60UH units are applicable for single stage or two stage thermostats. Both type thermostats are described below. Thermostat dip switch selection dictates which mode unit will operate in. See flow chart for more sequence detail.

SureLight® Control Self Check

When there is a call for heat, the SureLight integrated control runs a self check. The control checks for S10 primary limit, S21 secondary limit (s) and S47 rollout switch normally closed contacts. The control also checks for S102 high heat and S128 low heat prove 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 "TWO".

- 1- SureLight control energizes combustion air inducer B6 on low heat speed. Combustion air inducer runs until S128 low heat prove switch contacts close (switch must close within 2 1/2 minutes or control goes into Watchguard Pressure Switch mode. High heat prove switch S102 may also close). A 15 second pre-purge follows once S128 closes.
- 2- SureLight control begins 20 second ignitor warm up period.
- 3- Gas valve opens on first stage for a 4 second trial for ignition. Ignitor stays energized during the trial or until flame sensed.
- 4- Flame is sensed, gas valve remains on first stage heat, ignitor de-energizes.
- 5- After 45 second delay, indoor blower B3 is energized on low heat speed.
The furnace will stay in this mode until first stage demand is satisfied OR a second stage heat demand is initiated.
- 6- Second stage heat demand initiated. A 30 second second stage recognition period begins.
- 7- The combustion air inducer ramps up to high heat speed.
- 8- S102 high heat prove switch closes and the gas valve energizes second stage heat.
- 9- B3 indoor blower energizes on high heat speed.

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

- 1- SureLight control energizes combustion air inducer B6 on low heat speed. Combustion air inducer runs until S128 low heat prove switch contacts close (switch must close within 2 1/2 minutes or control goes into Watchguard Pressure Switch mode. High heat prove switch S102 may also close). A 15 second pre-purge follows once S128 closes.
- 2- SureLight control begins 20 second ignitor warm up period.
- 3- Gas valve opens on first stage for a 4 second trial for ignition. Ignitor stays energized during the trial or until flame sensed.
- 4- Flame is sensed, gas valve remains on first stage heat, ignitor de-energizes.
- 5- After 45 second delay, indoor blower B3 is energized on low heat speed.
- 6- A 10 minute (factory set) or 15 minute (field set) second stage heat delay period begins.
- 7- After the delay the combustion air inducer ramps up to high heat speed.
- 8- S102 high heat prove switch closes and the gas valve energizes second stage heat.
- 9- B3 indoor blower energizes on high heat speed.

C-G60DFV with SureLight® Board 18M9901 or 49M5901

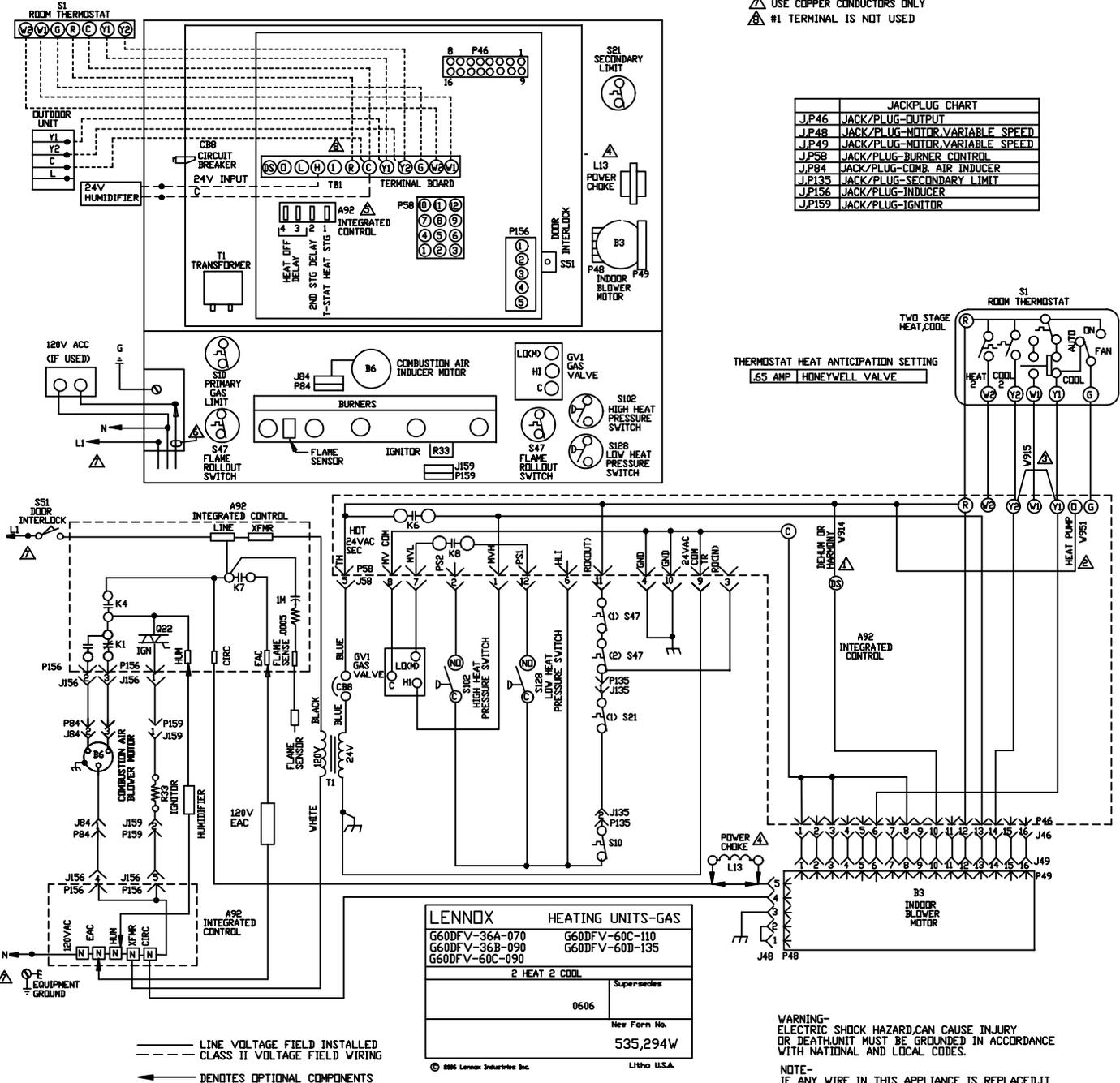
UNIT	BLOWER SPEED CHART		
	FACTORY SHIPPED SETTINGS		
	HEAT	COOL	ADJUST
36A-070	2	4	NORM
36B-090	2	4	NORM
60C-090	2	4	NORM
60C-110	2	4	NORM
60D-135	2	4	NORM

NOTE: SEE INSTALLATION INSTRUCTIONS FOR PROCEDURE TO SET CORRECT BLOWER SPEED FOR SPECIFIC COOLING TONNAGE BEING APPLIED, AND HEATING TEMPERATURE RISE DESIRED.

TYPICAL SYSTEM SHOWN FOR 2 HEAT/2 COOL WITH CONVENTIONAL THERMOSTAT. SEE INSTALLATION INSTRUCTIONS FOR CONNECTIONS TO OTHER EQUIPMENT AND ACCESSORIES.

- ⚠ CUT W914 JUMPER LABELED "DEHUM OR HARMONY" FROM DS TO R, AT A92 CONTROL BOARD WHEN USED WITH SIGNATURE STAT.
- ⚠ CUT W951 JUMPER FROM 0 TO R, LABELED "HEAT PUMP", AT A92 CONTROL BOARD, WHEN USED FOR DUAL FUEL APPLICATIONS.
- ⚠ JUMPER W915 FROM Y1 TO Y2 IS FACTORY INSTALLED AT A92 CONTROL BOARD. LEAVE IN FOR ONE STAGE COOL THERMOSTAT. CUT JUMPER Y1 TO Y2 FOR TWO STAGE COOL THERMOSTAT.
- ⚠ L13 USED ON 1HP ONLY
- ⚠ FACTORY DEFAULT IS FOR A 2 STAGE THERMOSTAT
- ⚠ FIELD SUPPLIED ACC WIRE
- ⚠ USE COPPER CONDUCTORS ONLY
- ⚠ #1 TERMINAL IS NOT USED

JACKPLUG CHART	
J.P46	JACK/PLUG-OUTPUT
J.P48	JACK/PLUG-MOTOR, VARIABLE SPEED
J.P49	JACK/PLUG-MOTOR, VARIABLE SPEED
J.P58	JACK/PLUG-BURNER CONTROL
J.P84	JACK/PLUG-COMB. AIR INDUCER
J.P135	JACK/PLUG-SECONDARY LIMIT
J.P156	JACK/PLUG-INDUCER
J.P159	JACK/PLUG-IGNITOR



LENNOX HEATING UNITS-GAS	
G60DFV-36A-070	G60DFV-60C-110
G60DFV-36B-090	G60DFV-60D-135
G60DFV-60C-090	
2 HEAT 2 COOL	
Supersedes	
0606	
New Form No.	
535,294W	

WARNING - ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH. UNIT MUST BE REWIRED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

NOTE - IF ANY WIRE IN THIS APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING, INSULATION THICKNESS, AND TERMINATION

Sequence of Operation

Sequence depends on type thermostat used. G60UDFV units are applicable for single stage or two stage thermostats. Both type thermostats are described below. Thermostat jumper E20 dictates which mode unit will operate in. See flow chart for more sequence detail.

SureLight® Control Self Check

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

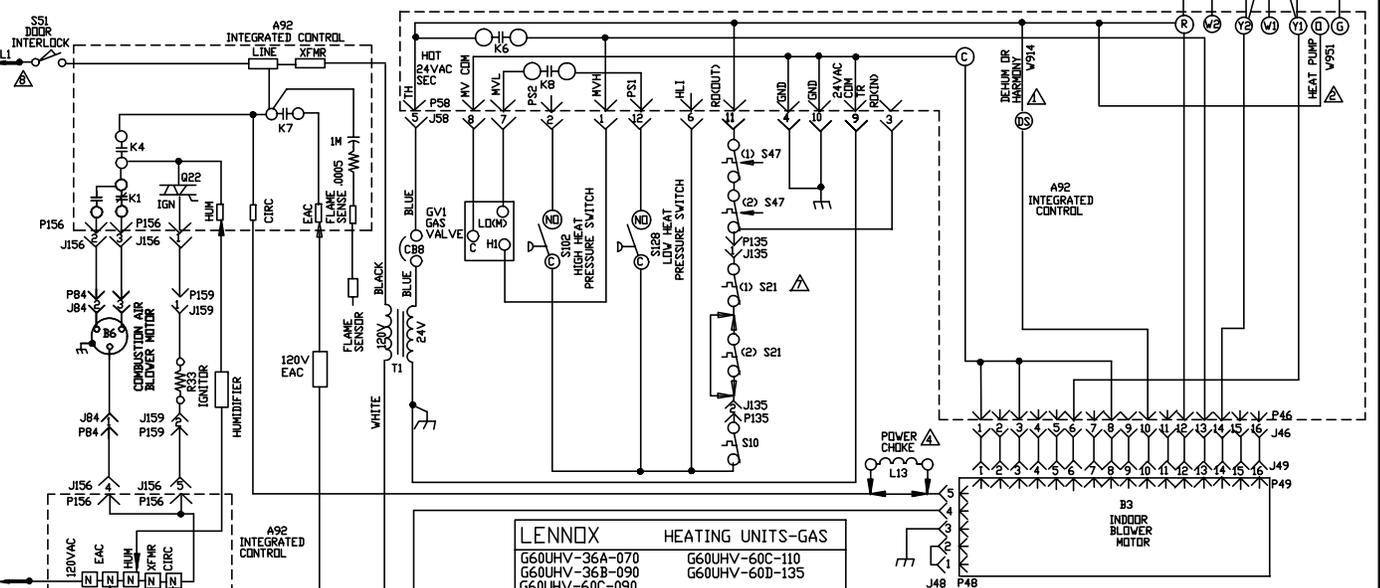
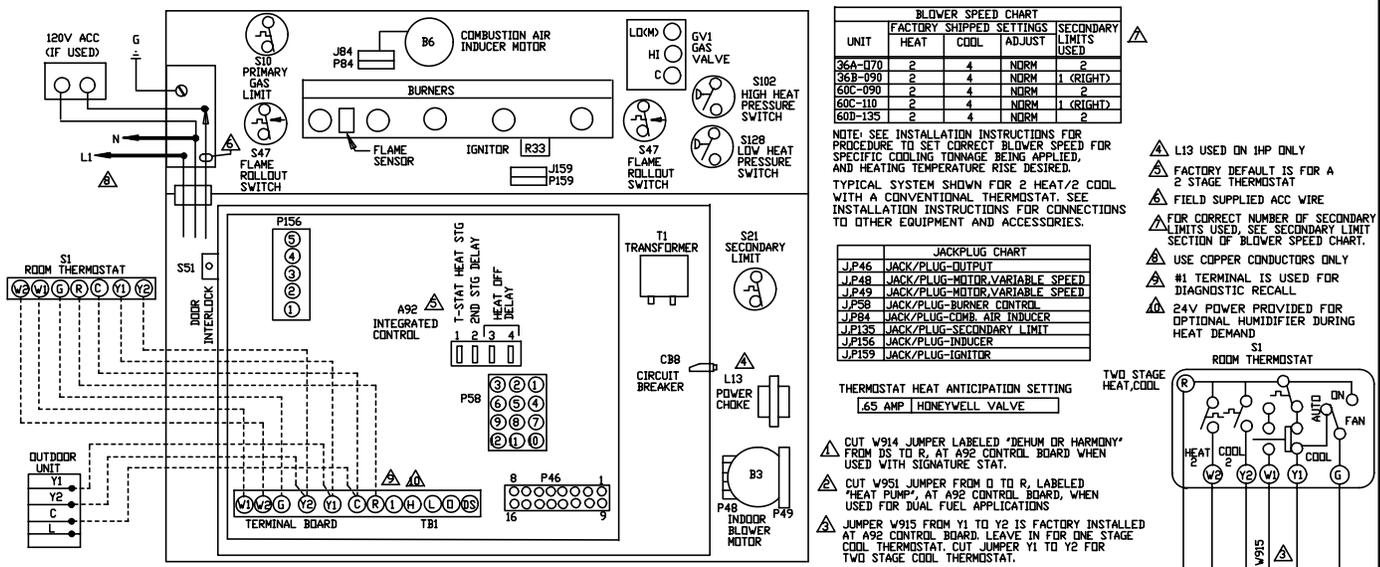
Two-Stage Thermostat, Two Stage Heat. Jumper E20 set at "TWO".

- 10- SureLight control energizes combustion air inducer B6 on low heat speed. Combustion air inducer runs until S128 low heat prove switch contacts close (switch must close within 2 1/2 minutes or control goes into Watchguard Pressure Switch mode. High heat prove switch S102 may also close). A 15 second pre-purge follows once S128 closes.
- 11- SureLight control begins 20 second ignitor warm up period.
- 12- Gas valve opens on first stage for a 4 second trial for ignition. Ignitor stays energized during the trial or until flame sensed.
- 13- Flame is sensed, gas valve remains on first stage heat, ignitor de-energizes.
- 14- After 45 second delay, indoor blower B3 is energized on low heat speed.
The furnace will stay in this mode until first stage demand is satisfied OR a second stage heat demand is initiated.
- 15- Second stage heat demand initiated. A 30 second second stage recognition period begins.
- 16- The combustion air inducer ramps up to high heat speed.
- 17- S102 high heat prove switch closes and the gas valve energizes second stage heat.
- 18- B3 indoor blower ramps up to high heat speed.

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

- 1- SureLight control energizes combustion air inducer B6 on low heat speed. Combustion air inducer runs until S128 low heat prove switch contacts close (switch must close within 2 1/2 minutes or control goes into Watchguard Pressure Switch mode. High heat prove switch S102 may also close). A 15 second pre-purge follows once S128 closes.
- 2- SureLight control begins 20 second ignitor warm up period.
- 3- Gas valve opens on first stage for a 4 second trial for ignition. Ignitor stays energized during the trial or until flame sensed.
- 4- Flame is sensed, gas valve remains on first stage heat, ignitor de-energizes.
- 5- After 45 second delay, indoor blower B3 is energized on low heat speed.
- 6- A 10 minute (factory set) or 15 minute (field set) second stage heat delay period begins.
- 7- After the delay the combustion air inducer ramps up to high heat speed.
- 8- S102 high heat prove switch closes and the gas valve energizes second stage heat.
- 9- B3 indoor blower ramps up to high heat speed.

D-G60UHV with SureLight® Board 100870



— LINE VOLTAGE FIELD INSTALLED
 - - - CLASS II VOLTAGE FIELD WIRING
 ← DENOTES OPTIONAL COMPONENTS

Sequence of Operation.

Sequence depends on type thermostat used. G60UHV units are applicable for single stage or two stage thermostats. Both type thermostats are described below. Thermostat dip switch selection dictates which mode unit will operate in. See flow chart for more sequence detail.

SureLight® Control Self Check

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

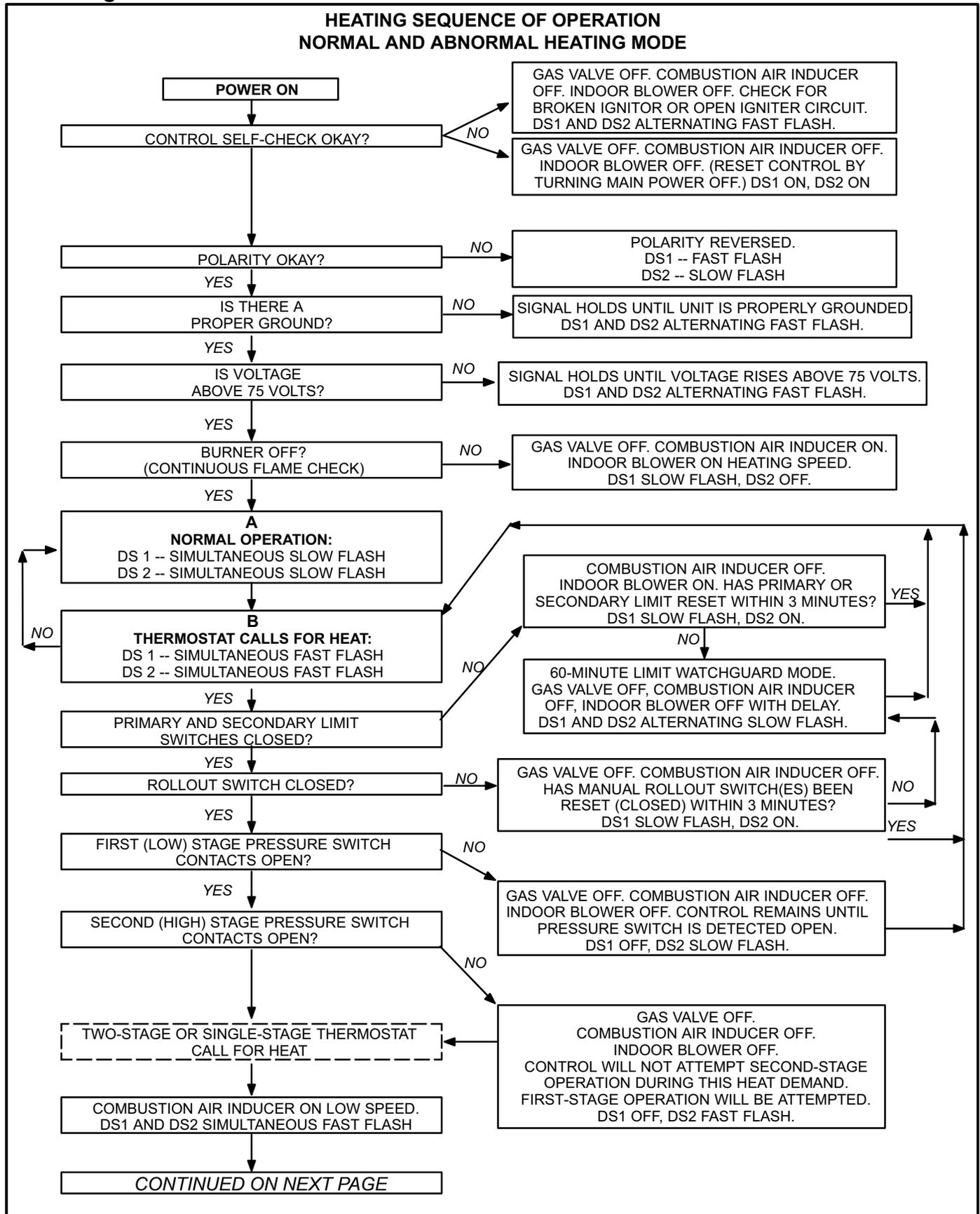
Two-Stage Thermostat, Two Stage Heat. Dip Switch set at "TWO".

- 10- SureLight control energizes combustion air inducer B6 on low heat speed. Combustion air inducer runs until S128 low heat prove switch contacts close (switch must close within 2 1/2 minutes or control goes into Watchguard Pressure Switch mode. High heat prove switch S102 may also close). A 15 second pre-purge follows once S128 closes.
- 11- SureLight control begins 20 second ignitor warm up period.
- 12- Gas valve opens on first stage for a 4 second trial for ignition. Ignitor stays energized during the trial or until flame sensed.
- 13- Flame is sensed, gas valve remains on first stage heat, ignitor de-energizes.
- 14- After 45 second delay, indoor blower B3 is energized on low heat speed.
The furnace will stay in this mode until first stage demand is satisfied OR a second stage heat demand is initiated.
- 15- Second stage heat demand initiated. A 30 second second stage recognition period begins.
- 16- The combustion air inducer ramps up to high heat speed.
- 17- S102 high heat prove switch closes and the gas valve energizes second stage heat.
- 18- B3 indoor blower ramps up to high heat speed.

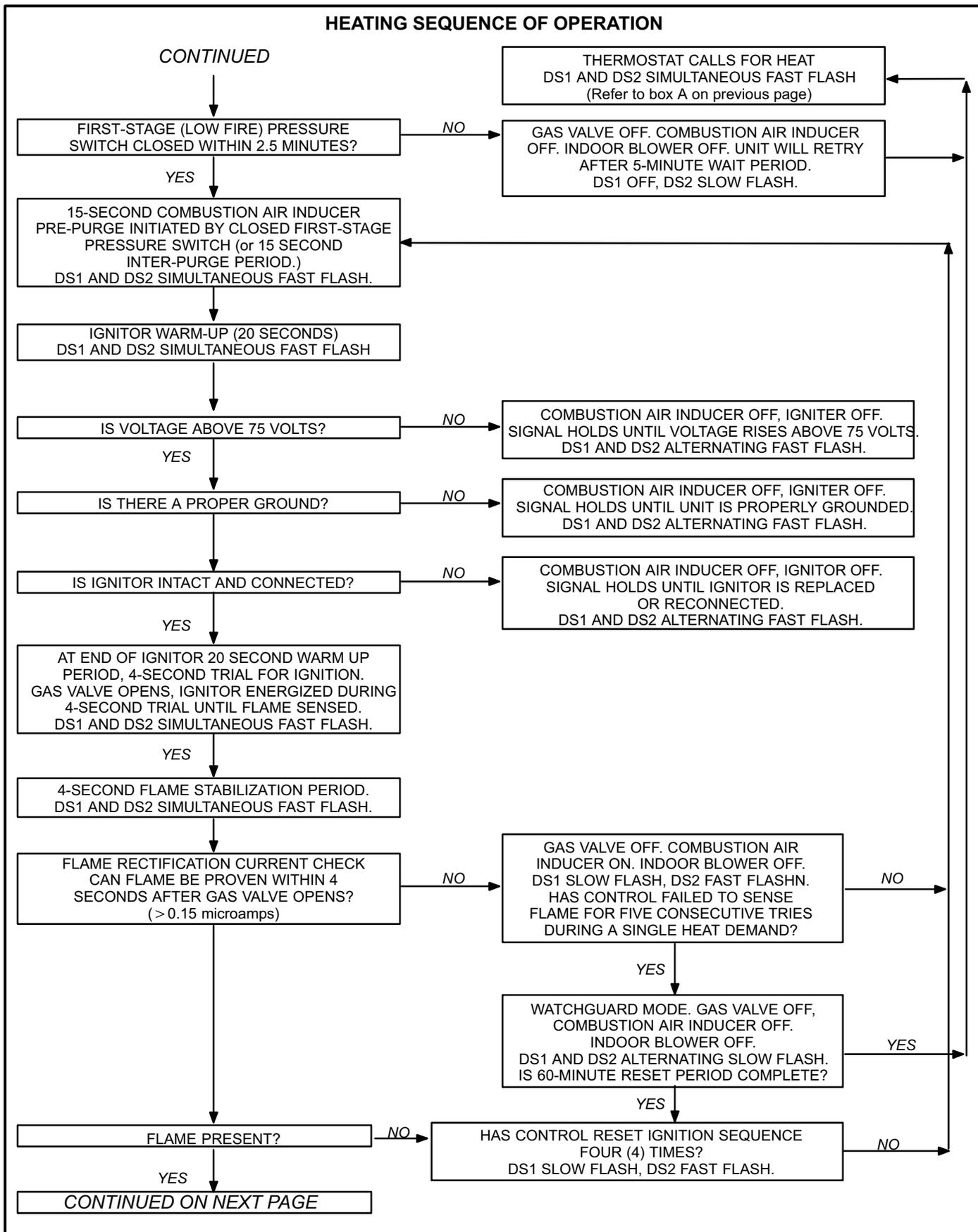
Single-Stage Thermostat, Two Stage Heat. Dip Switch set at "SINGLE"

- 1- SureLight control energizes combustion air inducer B6 on low heat speed. Combustion air inducer runs until S128 low heat prove switch contacts close (switch must close within 2 1/2 minutes or control goes into Watchguard Pressure Switch mode. High heat prove switch S102 may also close). A 15 second pre-purge follows once S128 closes.
- 2- SureLight control begins 20 second ignitor warm up period.
- 3- Gas valve opens on first stage for a 4 second trial for ignition. Ignitor stays energized during the trial or until flame sensed.
- 4- Flame is sensed, gas valve remains on first stage heat, ignitor de-energizes.
- 5- After 45 second delay, indoor blower B3 is energized on low heat speed.
- 6- A 10 minute (factory set) or 15 minute (field set) second stage heat delay period begins.
- 7- After the delay the combustion air inducer ramps up to high heat speed.
- 8- S102 high heat prove switch closes and the gas valve energizes second stage heat.
- 9- B3 indoor blower ramps up to high heat speed.

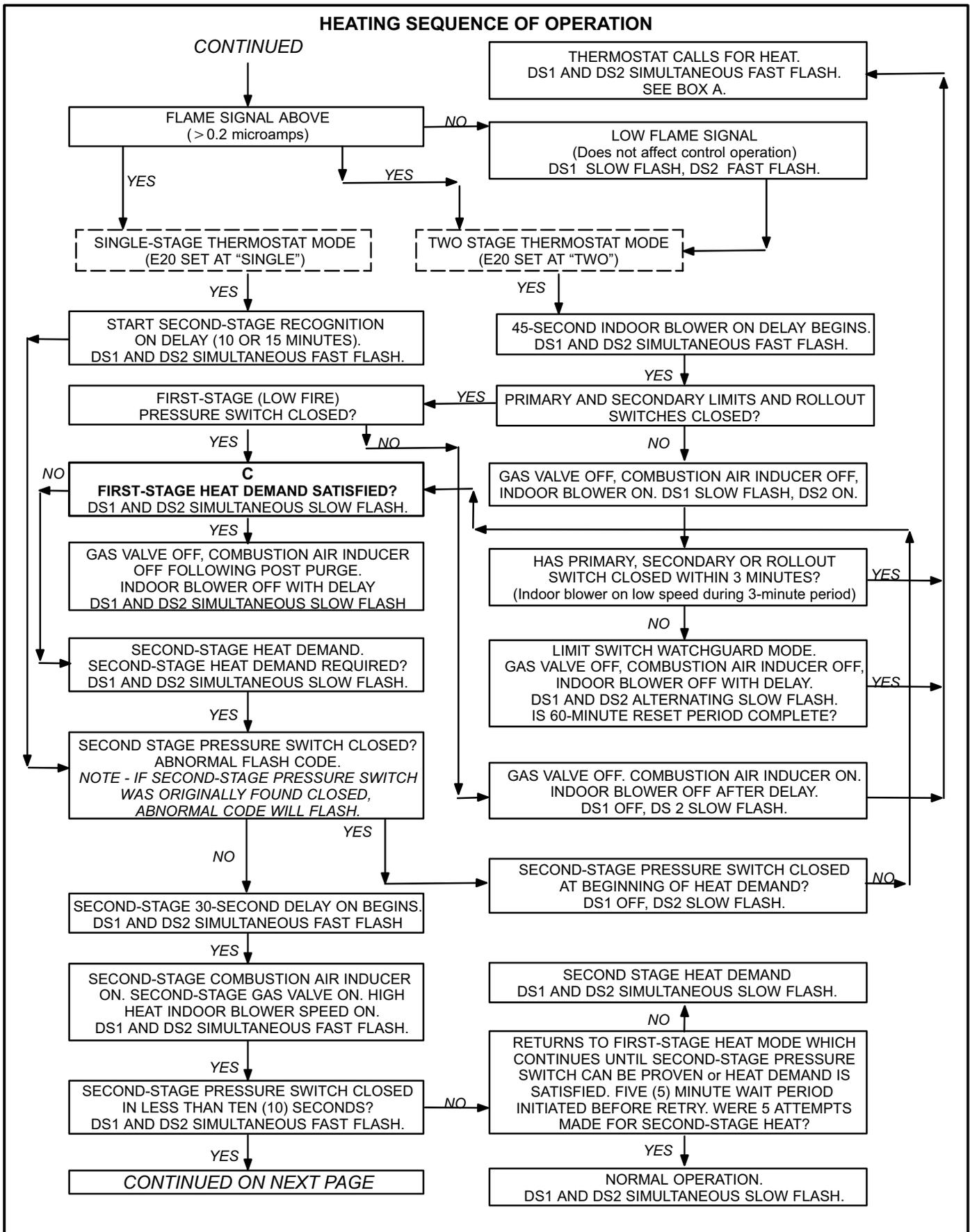
V-Troubleshooting Flow Charts
E- SureLight® Boards 18M3401 & 46M9901



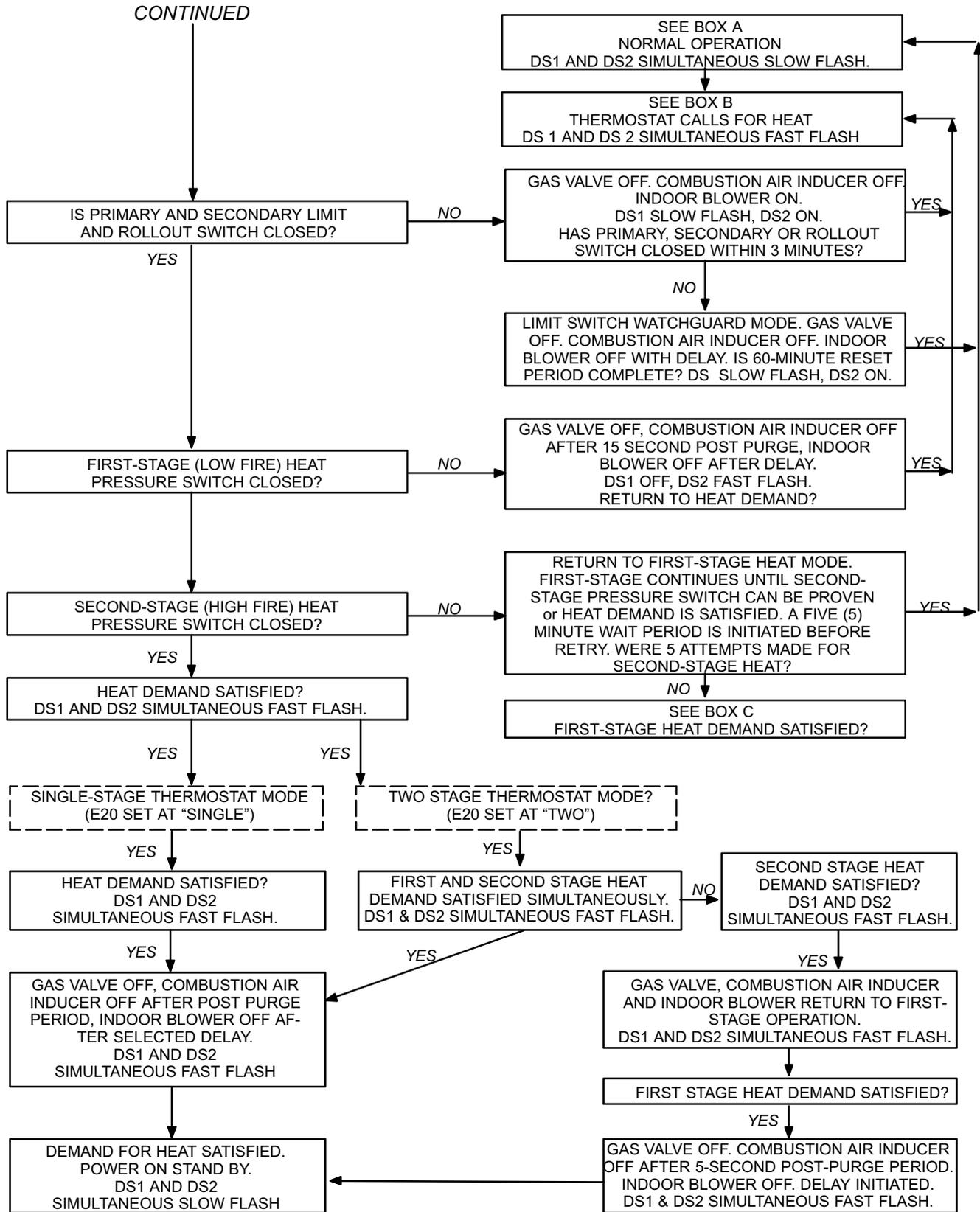
HEATING SEQUENCE OF OPERATION

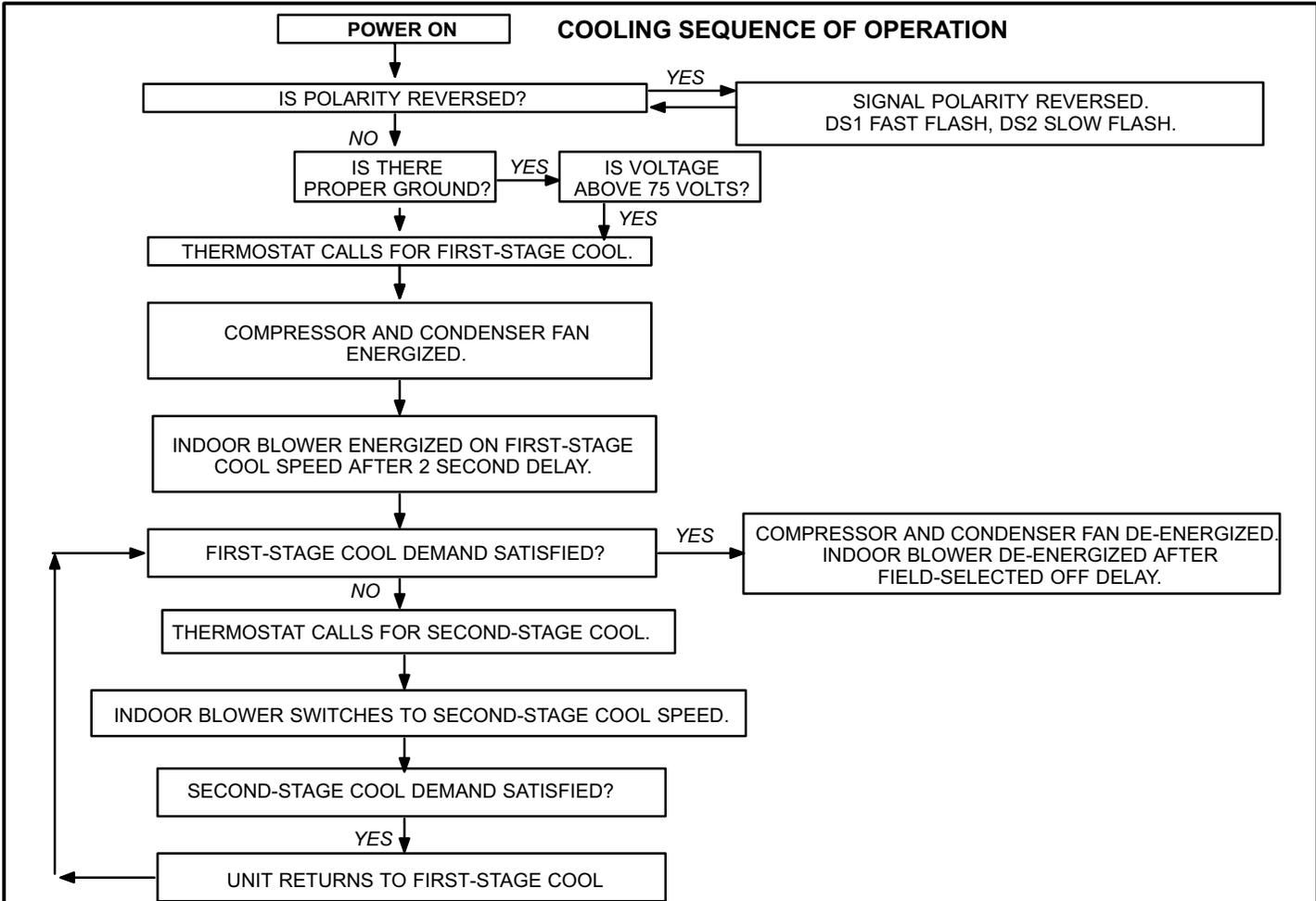


HEATING SEQUENCE OF OPERATION



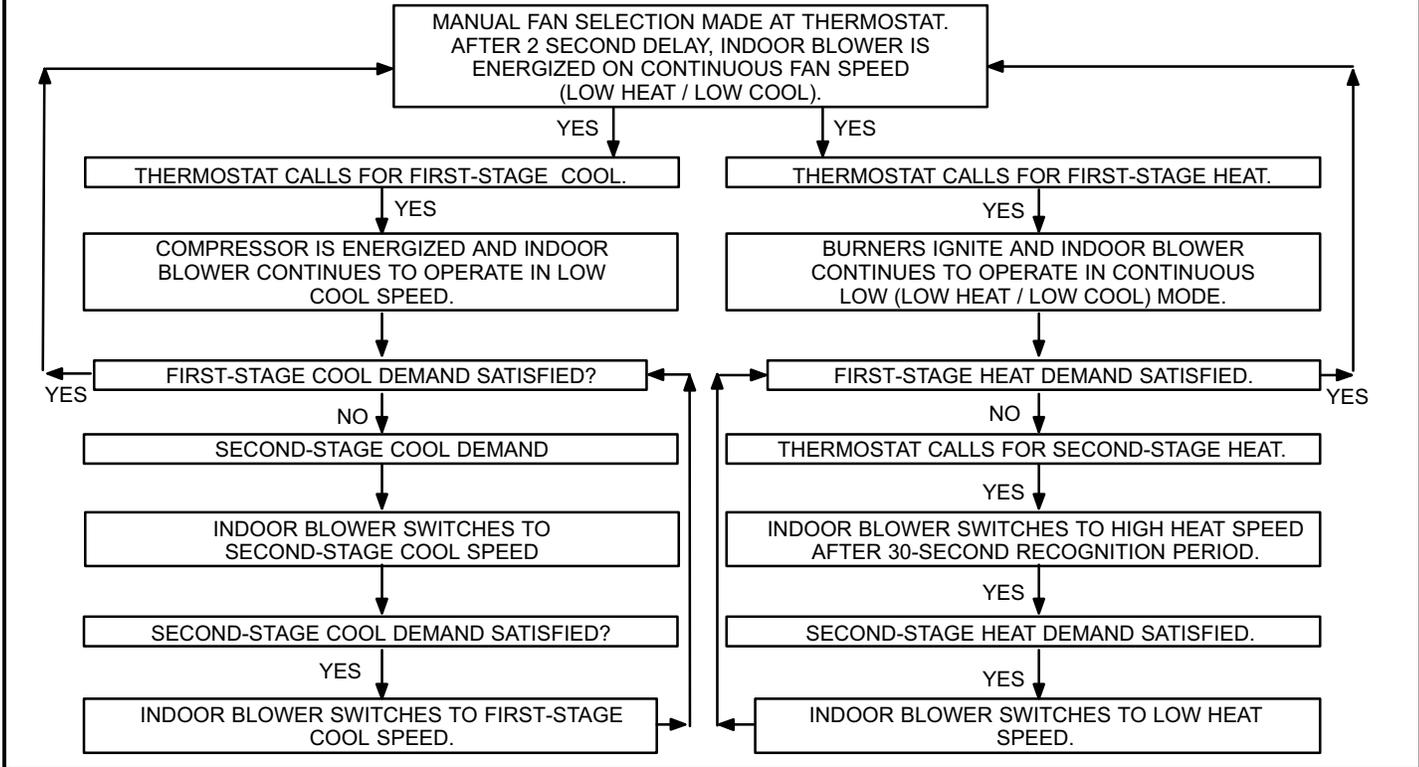
HEATING SEQUENCE OF OPERATION



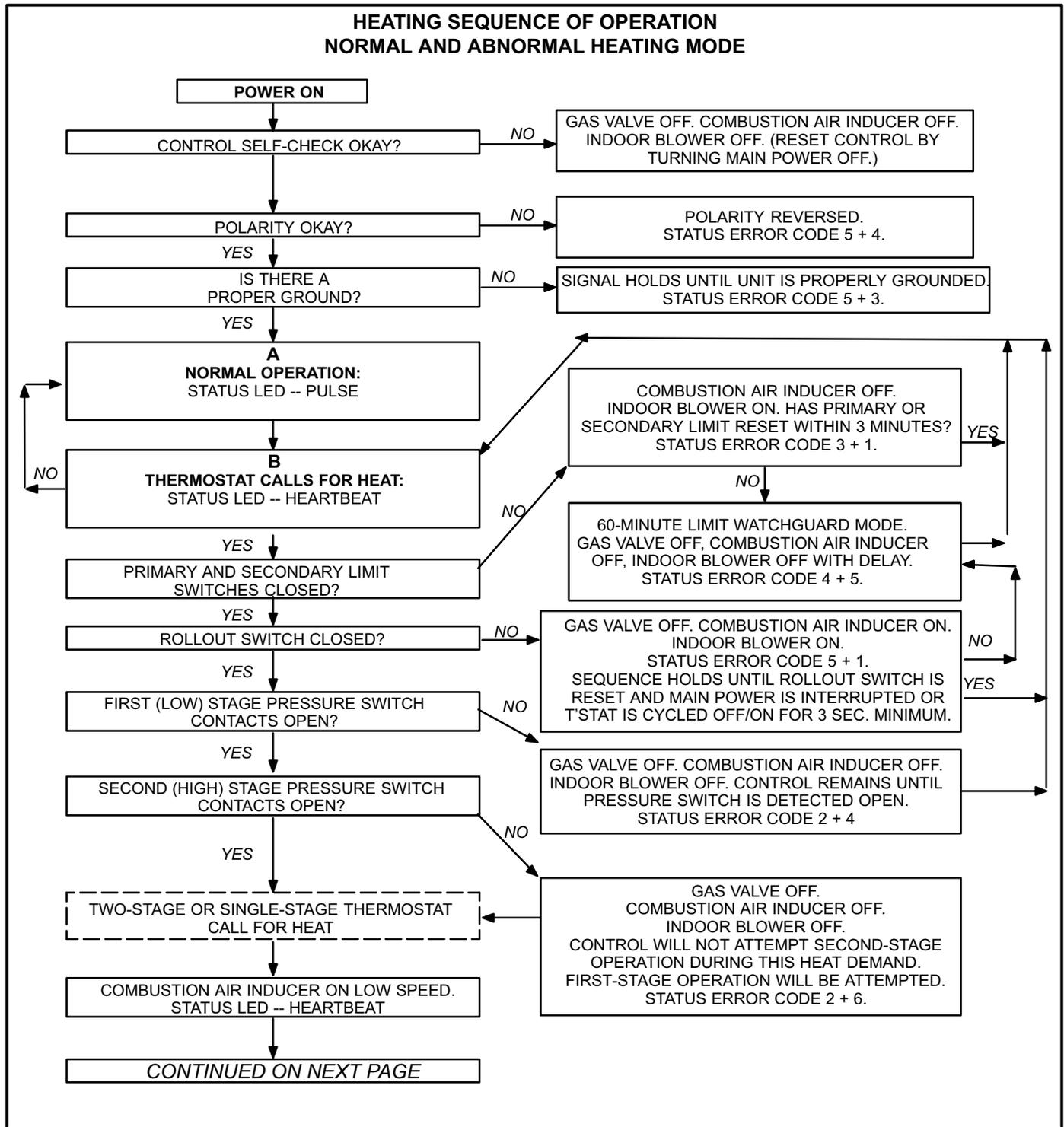


CONTINUOUS LOW SPEED FAN SEQUENCE OF OPERATION

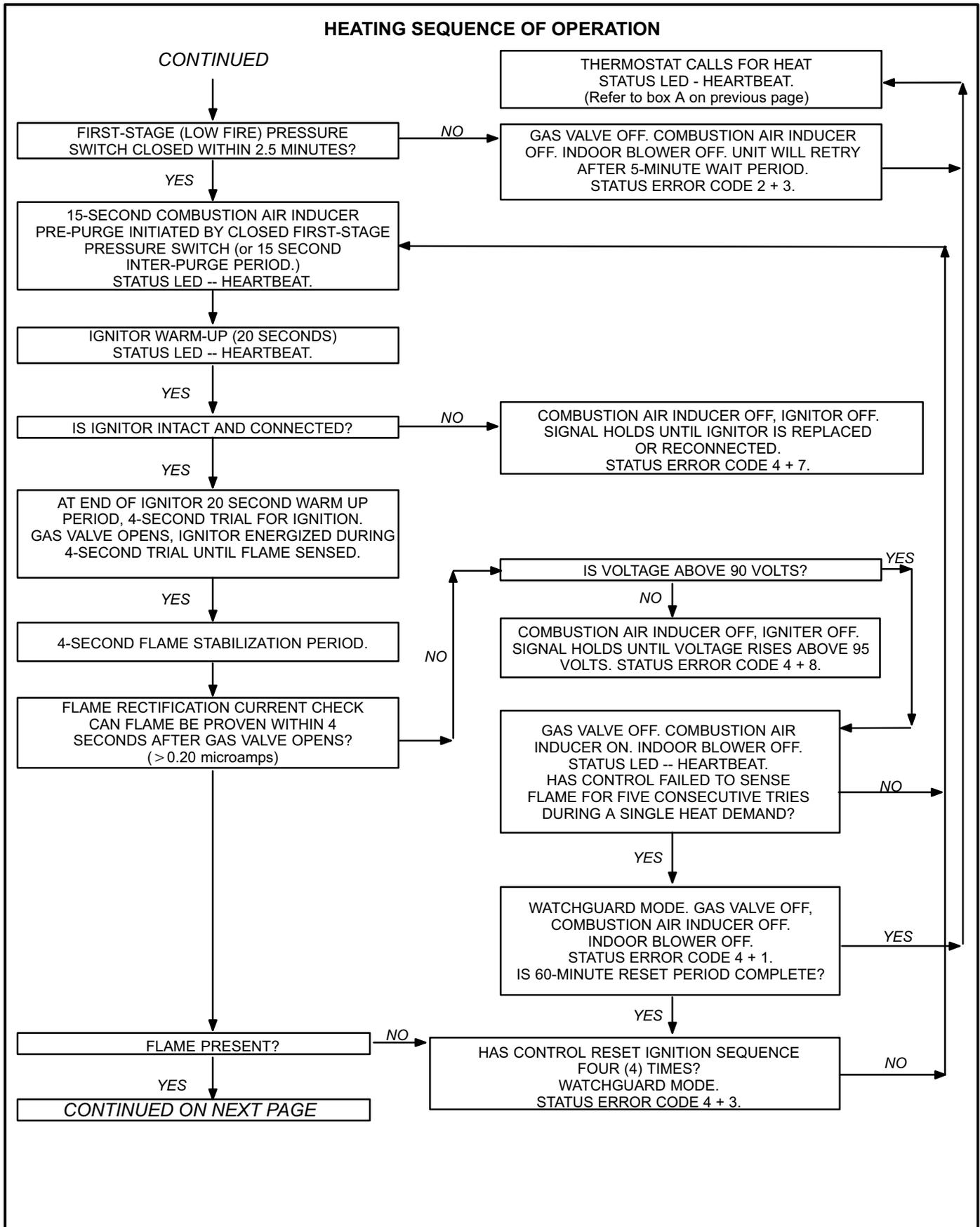
NOTE - Continuous low speed fan and cooling low speed are equal to the low heat fan speed.



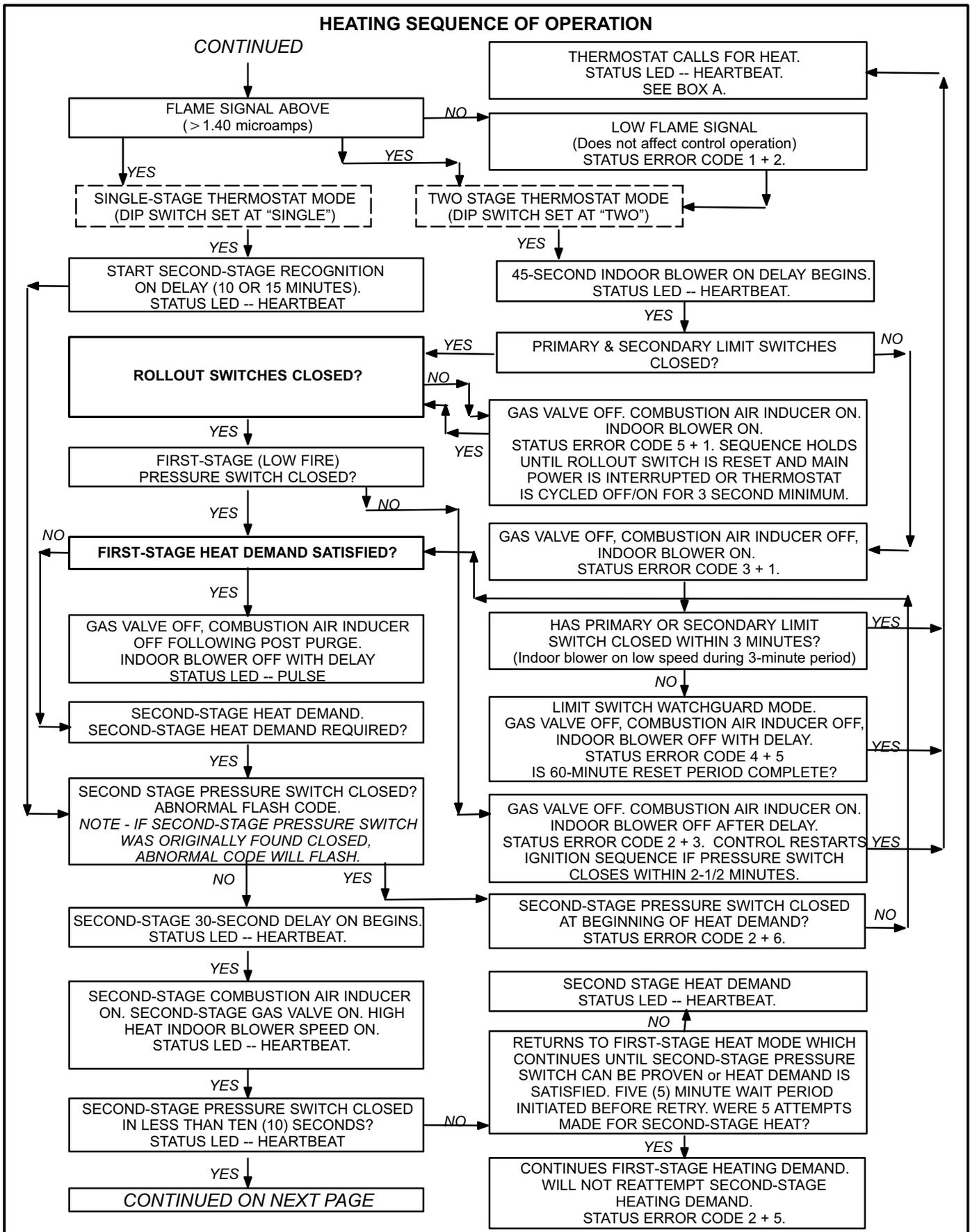
**HEATING SEQUENCE OF OPERATION
NORMAL AND ABNORMAL HEATING MODE**



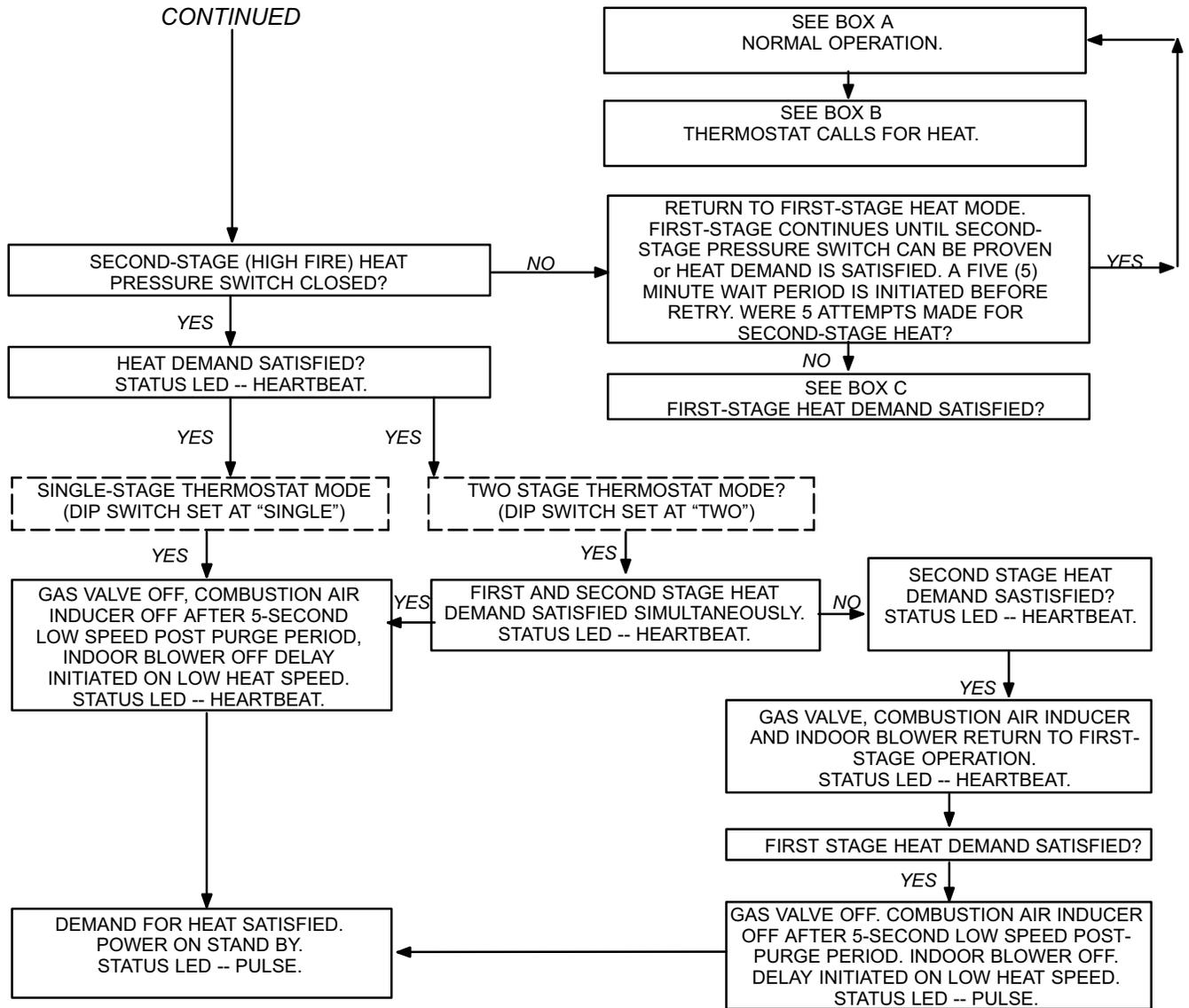
HEATING SEQUENCE OF OPERATION



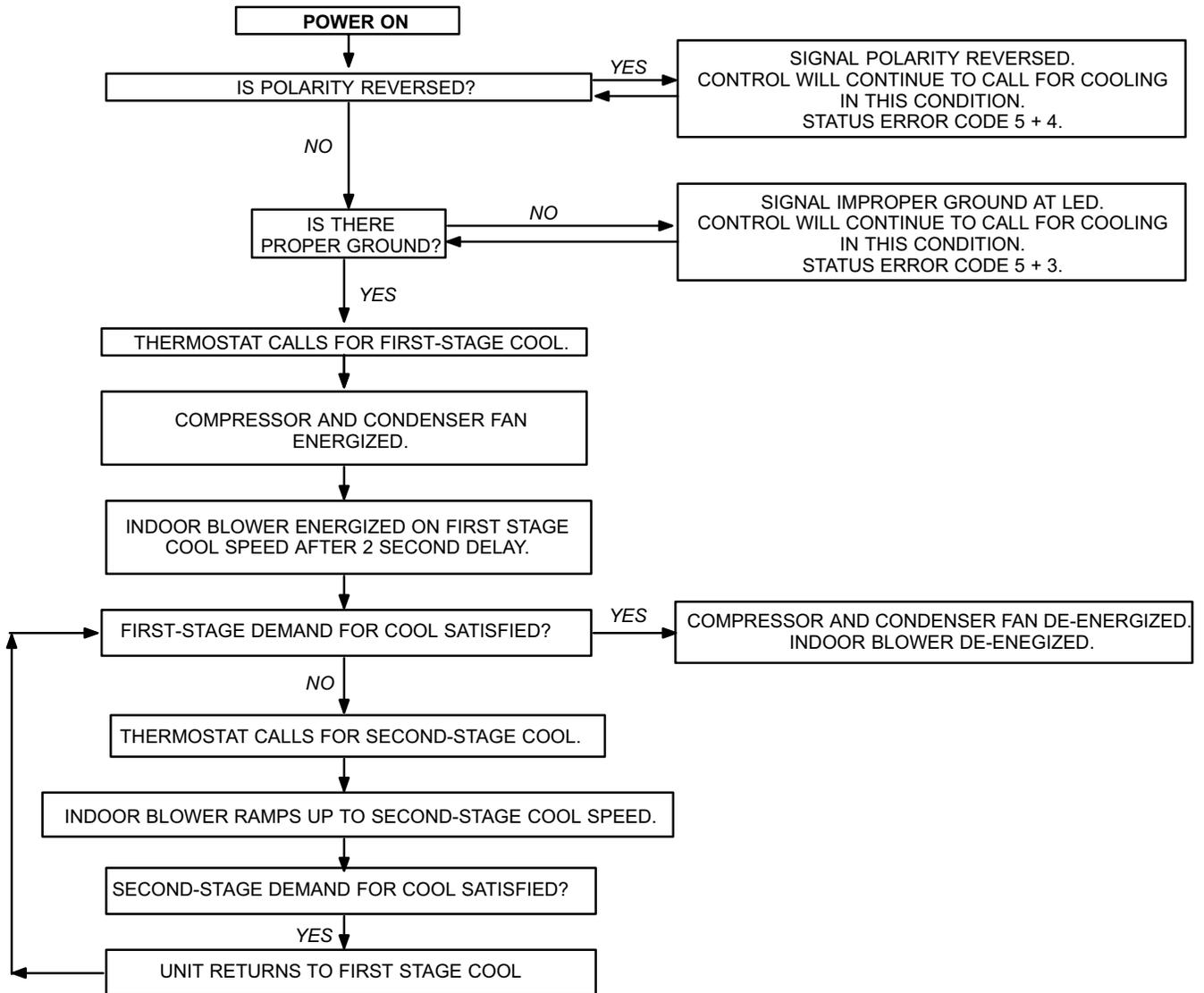
HEATING SEQUENCE OF OPERATION



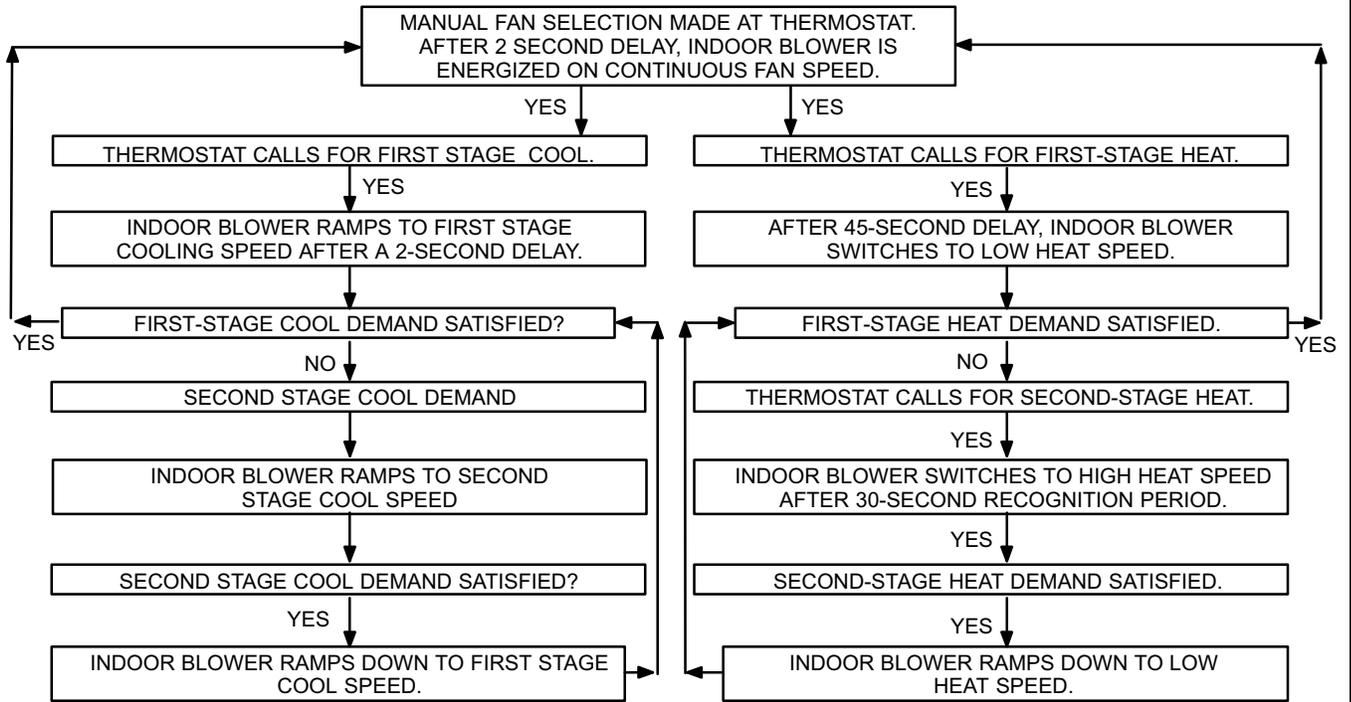
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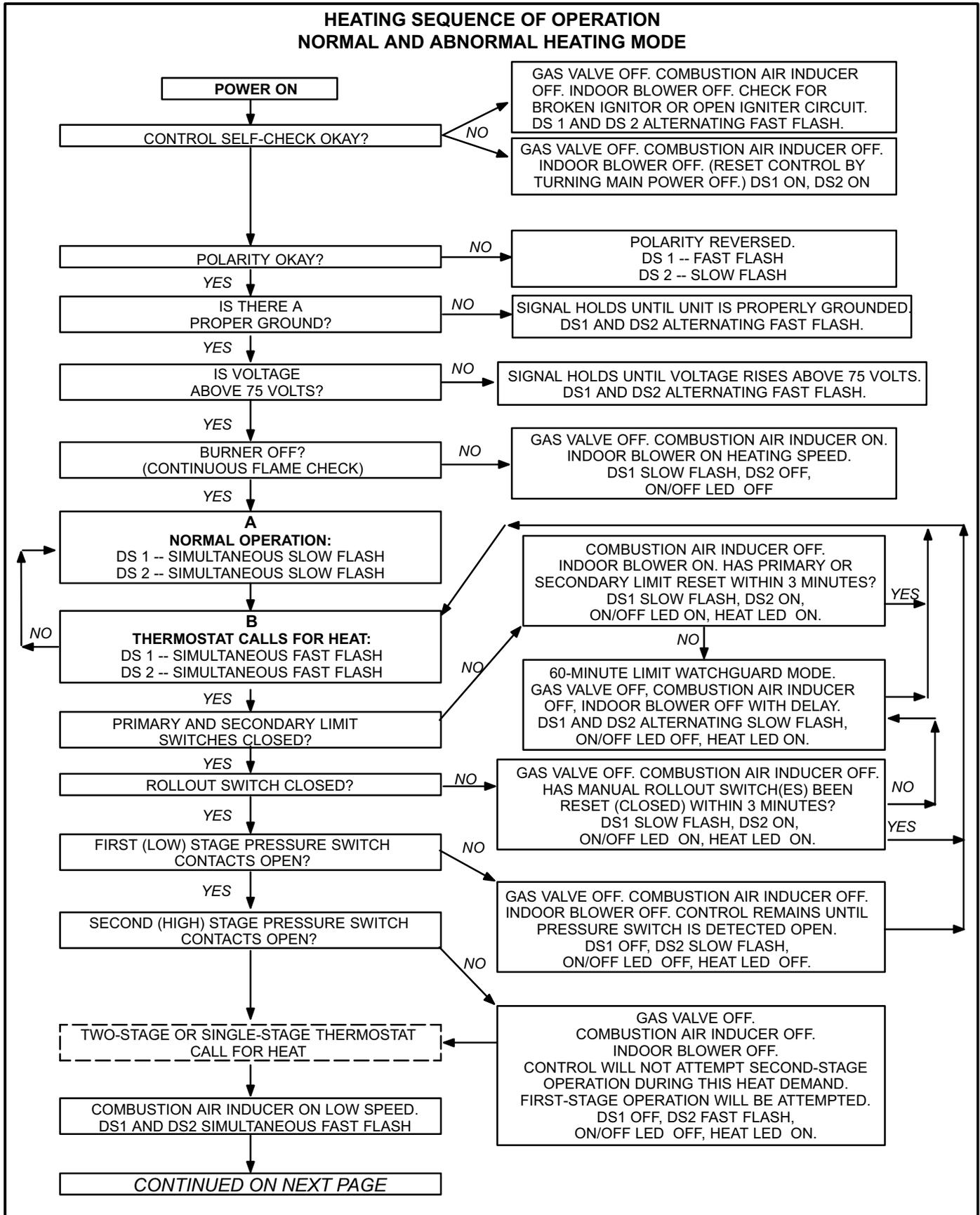
COOLING SEQUENCE OF OPERATION



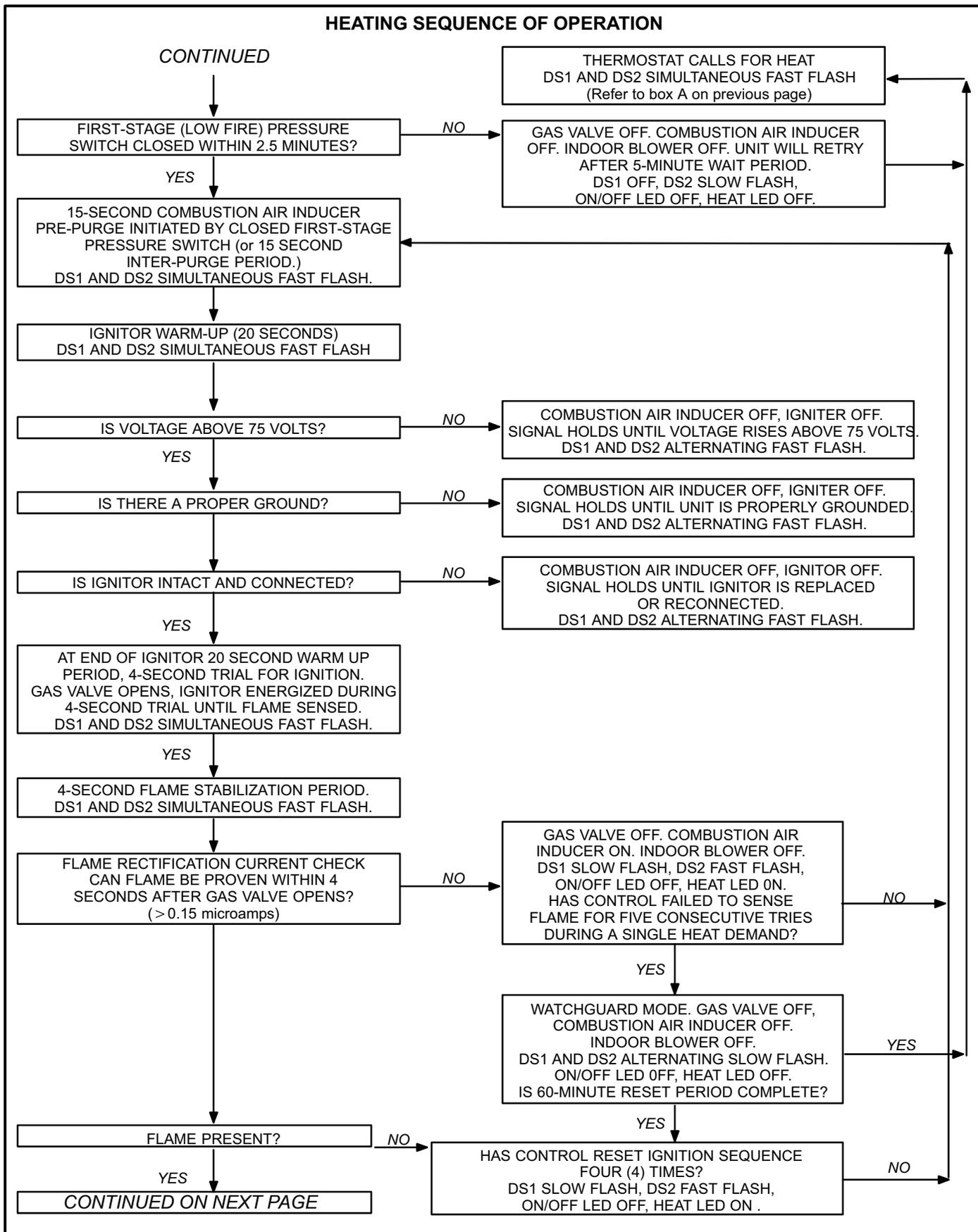
CONTINUOUS LOW SPEED FAN SEQUENCE OF OPERATION



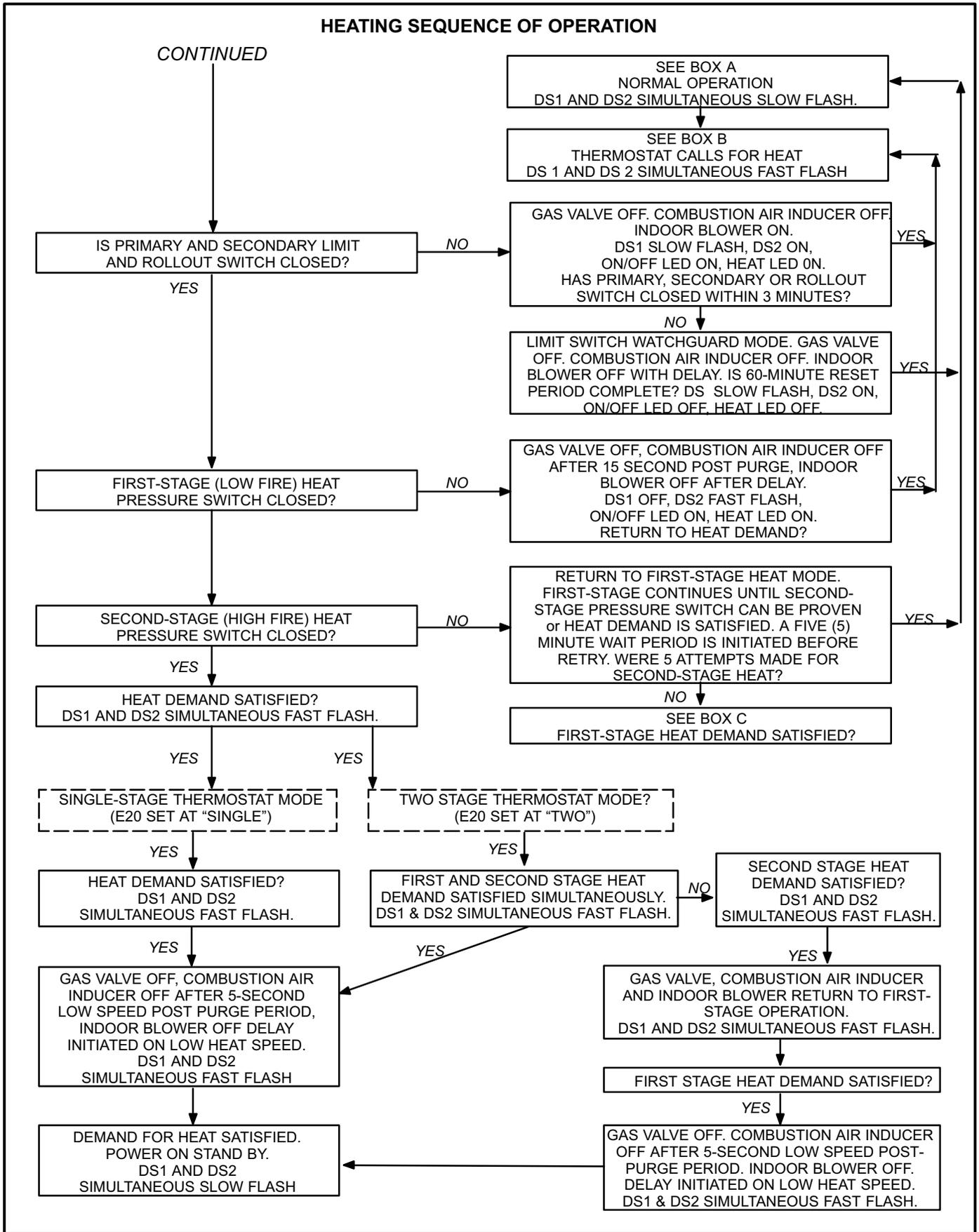
G- SureLight® Variable SpeedBoard 18M9901 & 49M5901



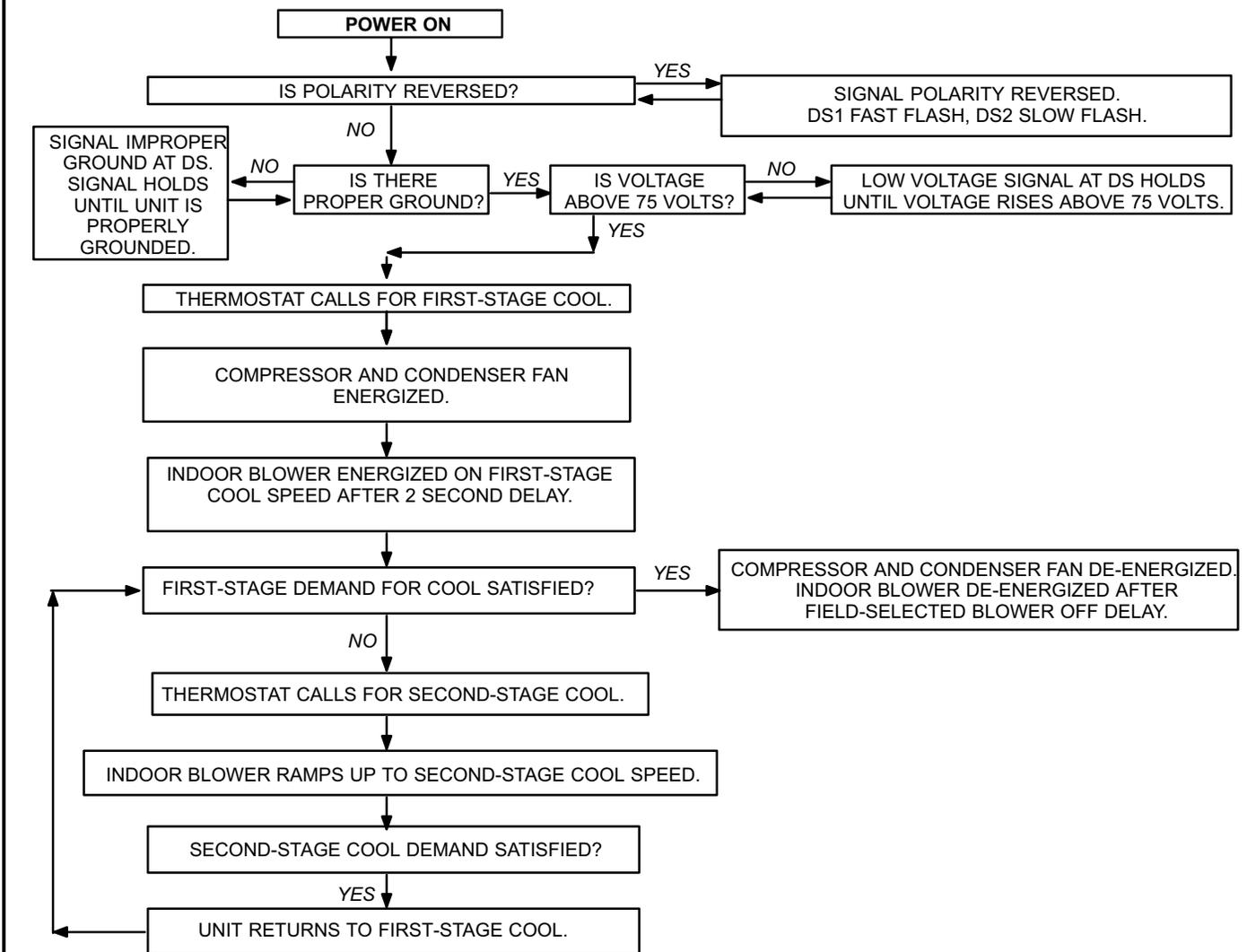
HEATING SEQUENCE OF OPERATION



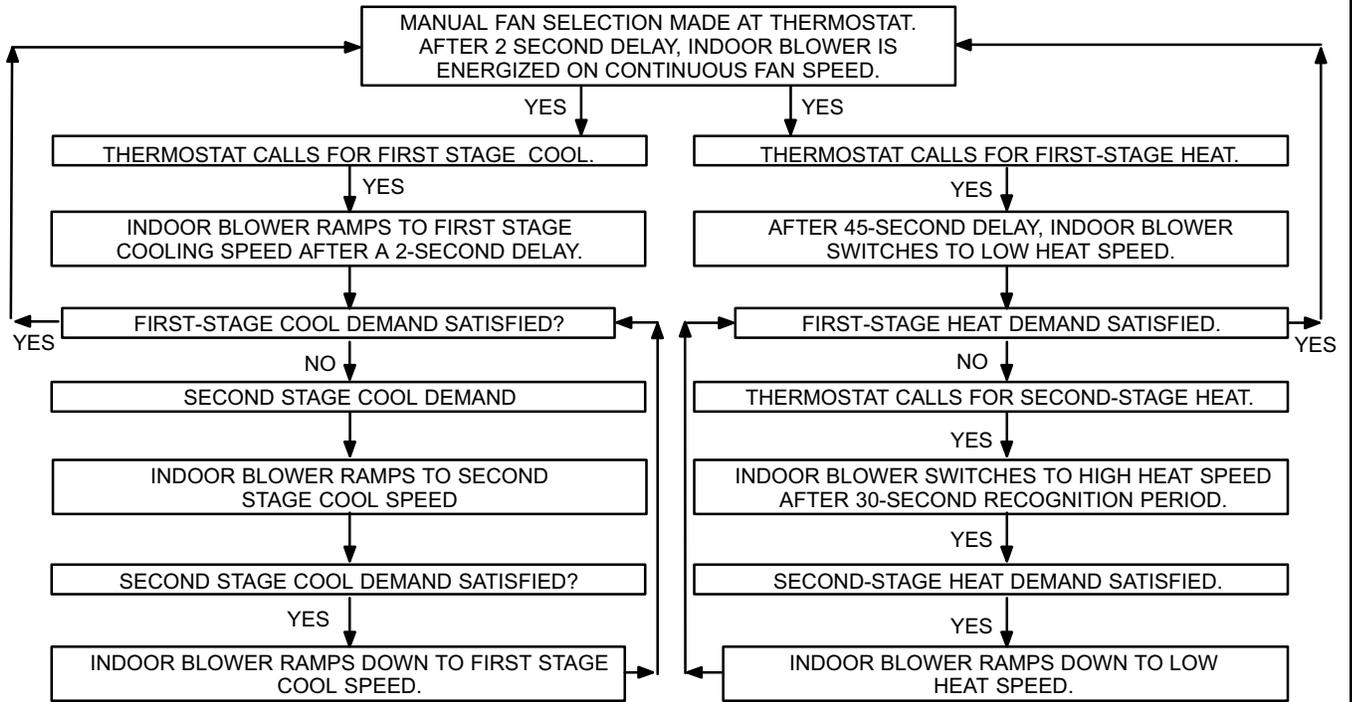
HEATING SEQUENCE OF OPERATION



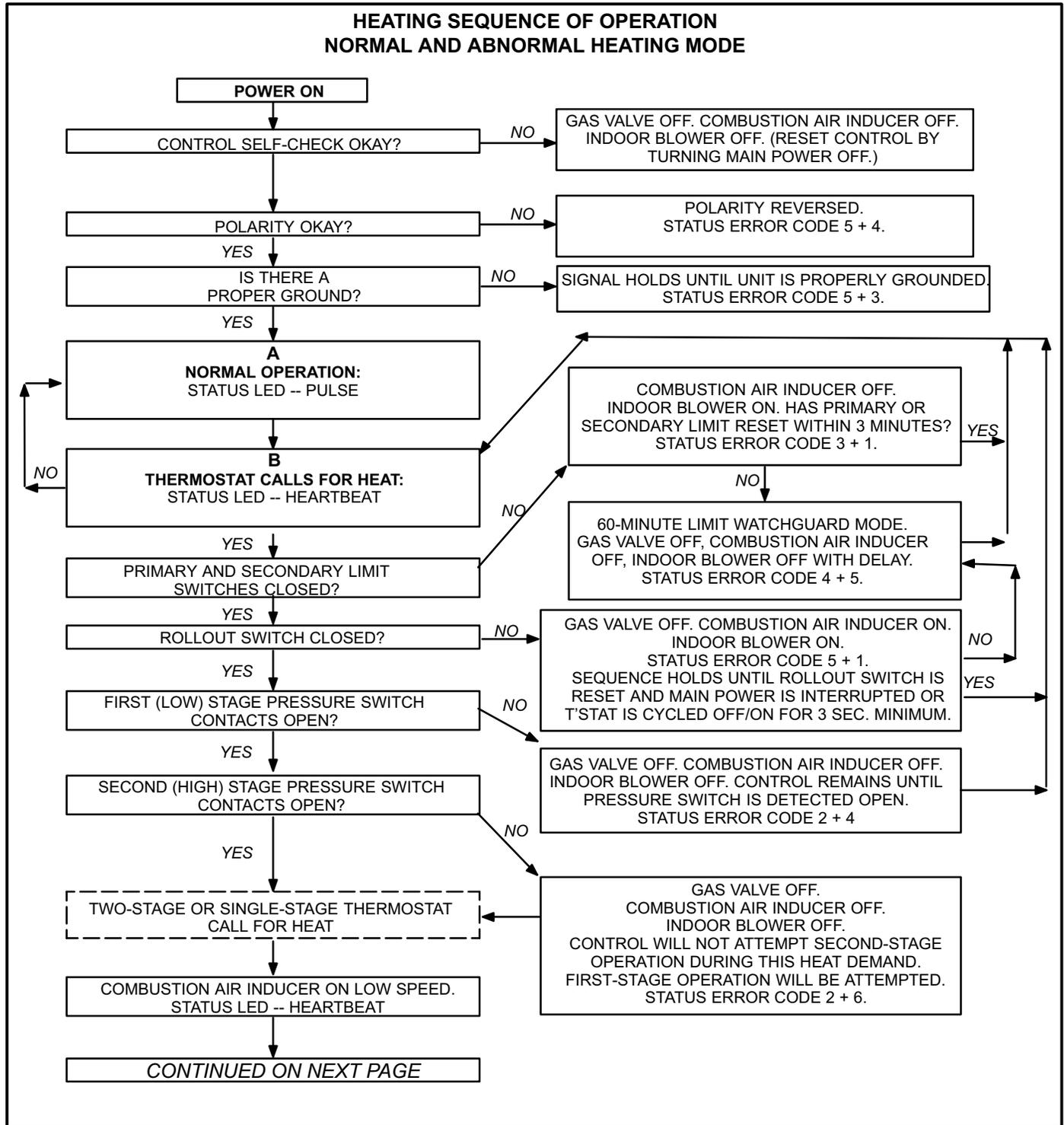
COOLING SEQUENCE OF OPERATION



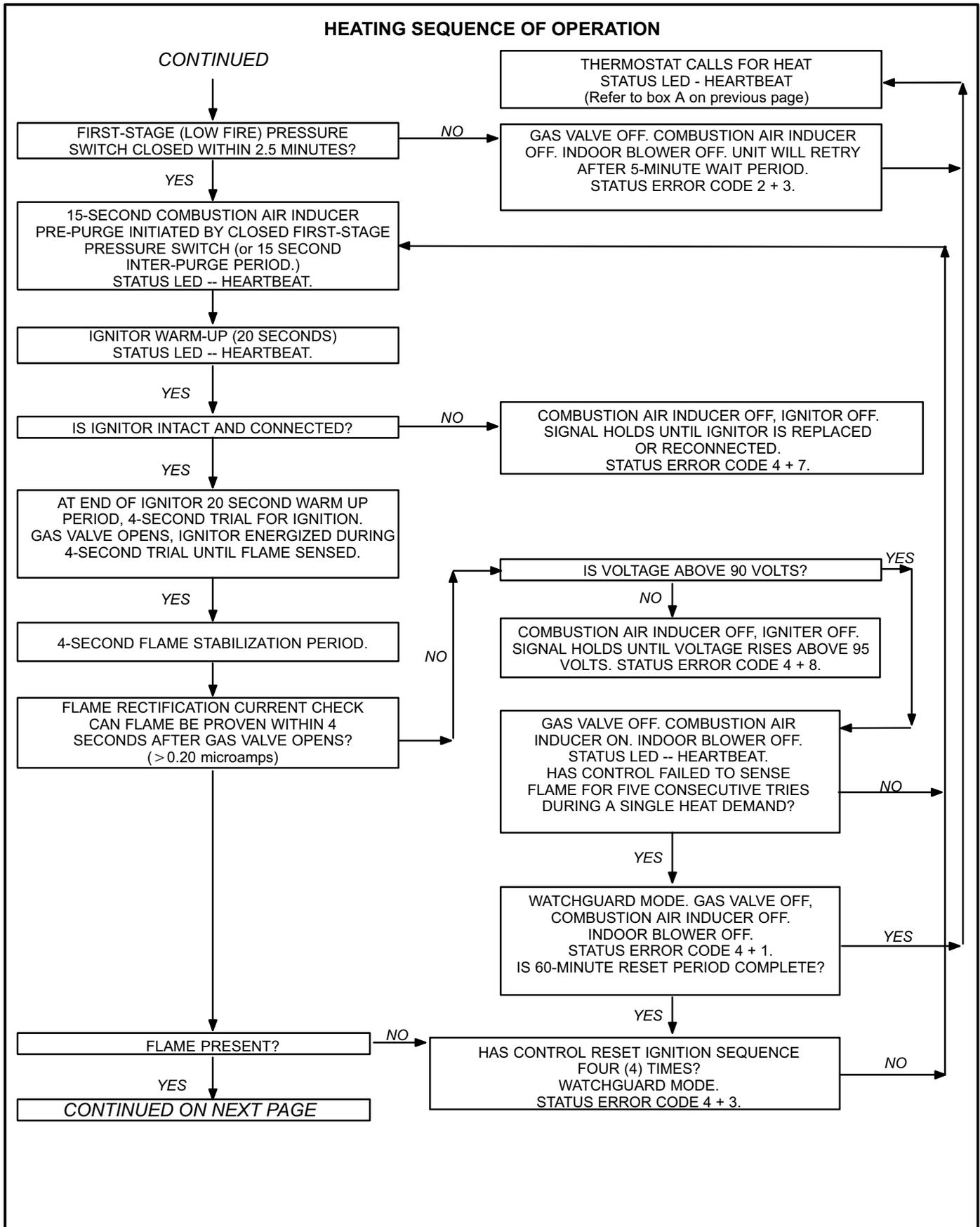
CONTINUOUS LOW SPEED FAN SEQUENCE OF OPERATION



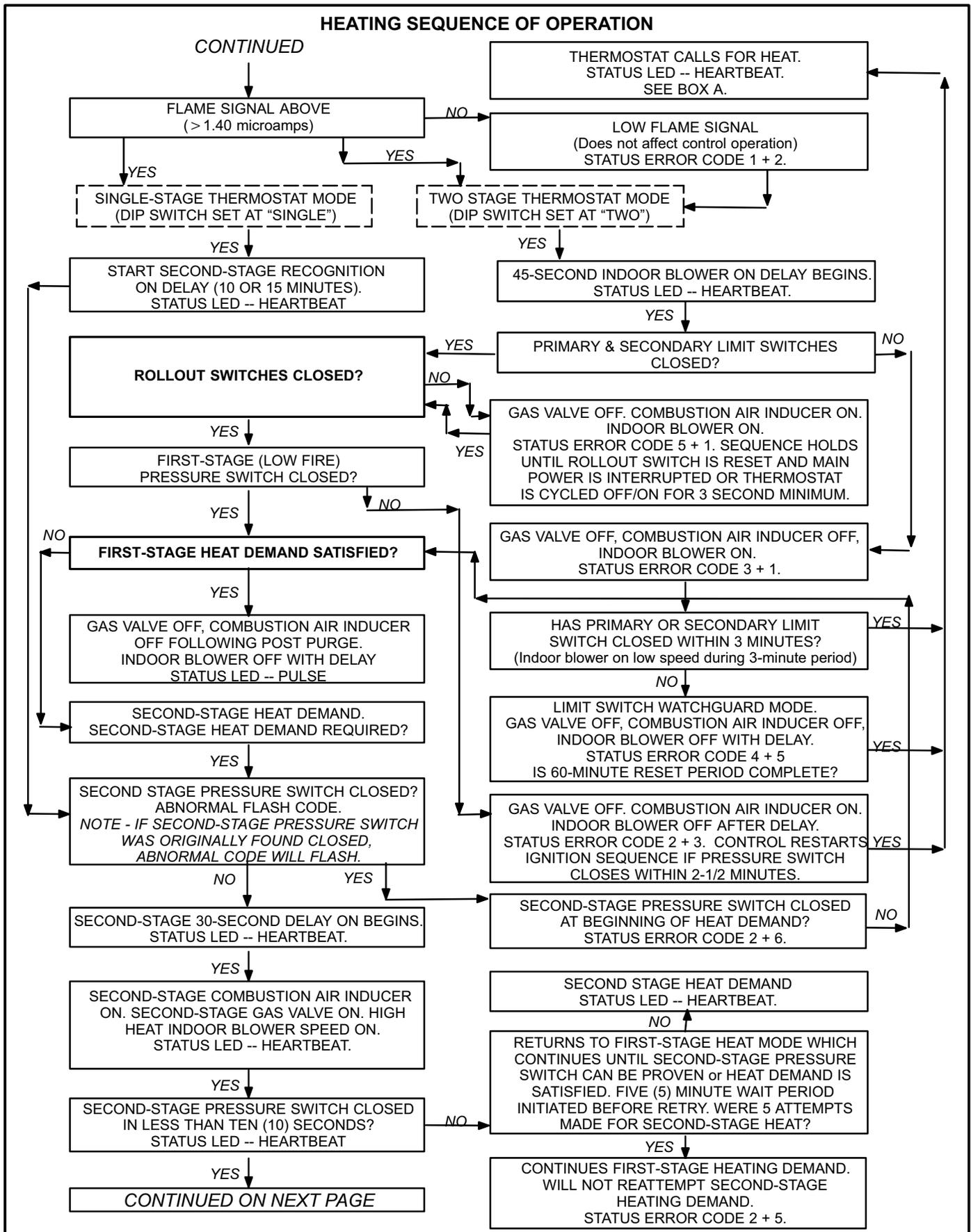
H- SureLight® Variable Speed Board 100870



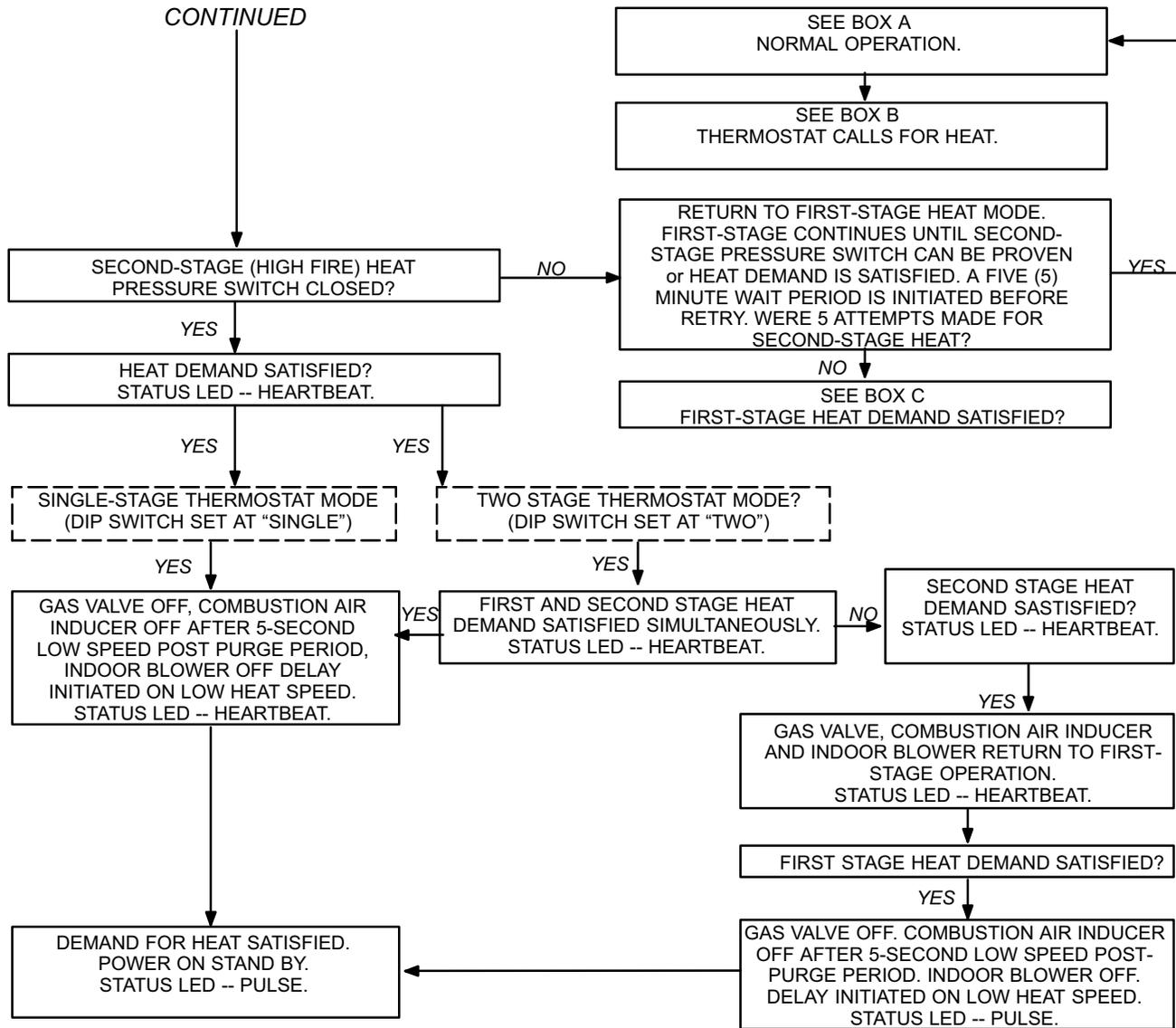
HEATING SEQUENCE OF OPERATION



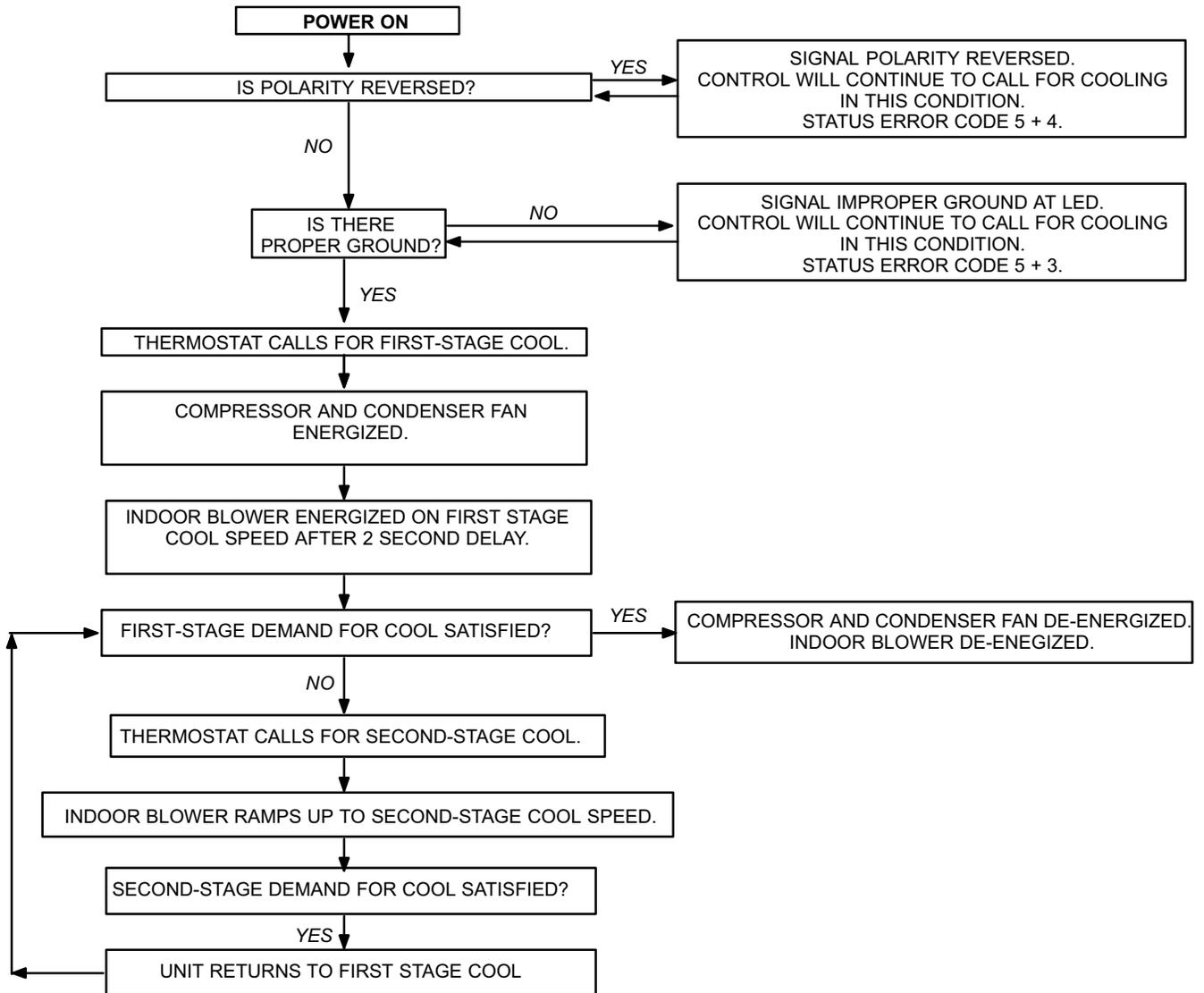
HEATING SEQUENCE OF OPERATION



HEATING SEQUENCE OF OPERATION



COOLING SEQUENCE OF OPERATION



CONTINUOUS LOW SPEED FAN SEQUENCE OF OPERATION

