SURELIGHT and BASIC SURELIGHT IGNITION SYSTEM

I-GENERAL
The SureLight® and Basic SureLight ignition system consists of a Lennox control board (figure 1) and hot surface ignitor. Figures 2 and 3 show the general location of the control board in multi and downflow position units. See table 2 for furnace model/ignition system matchup. Both models are similar except the SureLight board has a designated continuous blower speed and is protected by a circuit breaker located on the control box. Terminal designations are shown in table 3. The Basic SureLight board will energize HEAT−H heating speed for continuous blower and the control circuit is protected by an on board fuse. On both models the board and ignitor work in combination to ensure furnace ignition and ignitor durability. Both models control all major furnace operations. Tables 4 and 5 (Surelight) and tables 6 and 7 (Basic Surelight) show jack plug terminal designations. Both boards also feature two LED lights for trouble shooting (see table 1 for diagnostic codes) and two accessory terminals. Terminal ACC energizes with the indoor blower on the SureLight board and terminal EAC−H energizes with the indoor blower on the Basic Surelight. Terminal HTG ACC energizes when CAI is energized on the SureLight board and terminal HUM−N energizes with CAI on the Basic SureLight board. The SureLight board has a built in heating isolation relay. See wiring diagram for heat anticipator settings.

The ignitor used for both models is made of durable silicon-nitride. Ignitor longevity is also enhanced by controlling the temperature of the ignitor. The board finds the lowest ignitor temperature which will successfully light the burner, thus increasing the life of the ignitor.

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

**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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Table of Contents

I General Information .............................. 1
Board Diagnostic Codes ............................. 2
Board Terminal Designations ........................ 3
II Operation ...................................... 6
III Furnace Wiring and Operation Sequence ........ 8
   G23 ........................................... 8
   80MGF ......................................... 9
   G26 ........................................... 10
   GHR26 ........................................ 11
   G24M ........................................... 12
   G40UH ......................................... 13
   G50UH ......................................... 14
   80UHG .......................................... 15
   90UGF .......................................... 16
   G27M .......................................... 17
   G32 ........................................... 18
   G32V .......................................... 19
   GHR32 ......................................... 20
   GHR32V ......................................... 21
   Operation Sequence Flow Chart ................. 23
   SureLight Board ................................ 23
   Basic SureLight Board ......................... 28
   Troubleshooting Guide (both models) .......... 32
Both model boards are equipped with two LED lights for troubleshooting. The diagnostic codes are listed below in table 1.

## Table 1

<table>
<thead>
<tr>
<th>LED #1</th>
<th>LED #2</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMULTANEOUS</td>
<td>SIMULTANEOUS</td>
<td>Power - Normal operation&lt;br&gt;Also signaled during cooling and continuous fan.</td>
</tr>
<tr>
<td>SLOW FLASH</td>
<td>SLOW FLASH</td>
<td>Normal operation - signaled when heating demand initiated at thermostat.</td>
</tr>
<tr>
<td>SIMULTANEOUS</td>
<td>SIMULTANEOUS</td>
<td>Primary or Secondary limit open. Units with board 63K8901 or 24L8501 (Sure-</td>
</tr>
<tr>
<td>FAST FLASH</td>
<td>FAST FLASH</td>
<td>Light) and units with board 12L6901 (Basic SureLight): Limit must close within 5 trials for ignition or board goes into one hour limit Watchguard. Units with board 56L8301, 97L48 (SureLight) and 56L8401 and 10M9301 (Basic SureLight): Limit must close within 3 minutes or board goes into one hour limit Watchguard.</td>
</tr>
<tr>
<td>SLOW FLASH</td>
<td>ON</td>
<td>Pressure switch open or has opened 5 times during a single call for heat; OR: Blocked inlet/exhaust vent; OR: Condensate line blocked; OR: Pressure switch closed prior to activation of combustion air blower.</td>
</tr>
<tr>
<td>OFF</td>
<td>SLOW FLASH</td>
<td>Watchguard - burners fail to ignite.</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>Flame sensed without gas valve energized.</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>Rollout switch open. OR: 9 pin (SureLight) or 12 pin (Basic SureLight) connector improperly attached.</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>Circuit board failure or control wired incorrectly.</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>Main power polarity reversed. Switch line and neutral.</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>Low flame signal (see note below). Replace flame sense rod.</td>
</tr>
<tr>
<td>FAST FLASH</td>
<td>SLOW FLASH</td>
<td>Improper main ground or line voltage below 75 volts; OR: Broken ignitor; OR: Open ignitor circuit.</td>
</tr>
</tbody>
</table>

**NOTE** - Slow flash equals 1 Hz (one flash per second). Fast flash equals 3 Hz (three flashes per second). Normal flame signal for SureLight control is 0.61 or greater microamps with a drop out signal of 0.20 or less microamps. Normal flame signal for Basic SureLight is 0.18 or greater microamps with a drop out signal of 0.15 or less microamps.
### TABLE 2

<table>
<thead>
<tr>
<th>Model</th>
<th>SureLight Ignition System Model - 63K8901, 24L8501, 56L8301, 97L4801</th>
<th>Basic SureLight Ignition System Model - 12L6901, 56L8401, 10M9301</th>
</tr>
</thead>
<tbody>
<tr>
<td>G23(X)</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>80MGF</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>G24M</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>G27M</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>G26 / GHR26</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>90UGF</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>G32Q/V</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>GHR32Q/V</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>G50UH</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>80UHG</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>G40UH</td>
<td>✔</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 3

**IGNITION CONTROL BOARD TERMINAL DESIGNATIONS**

<table>
<thead>
<tr>
<th>SureLight Terminals</th>
<th>Basic SureLight Terminals</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACB COOL</td>
<td>COOL-H</td>
<td>Blower -Cooling Speed 120V</td>
</tr>
<tr>
<td>ACB HEAT</td>
<td>HEAT-H</td>
<td>Blower-Heating Speed 120V</td>
</tr>
<tr>
<td>ACC</td>
<td>EAC-H</td>
<td>Accessory / Electronic Air Cleaner 120V</td>
</tr>
<tr>
<td>HTG ACC</td>
<td>HUM-H</td>
<td>Heat Accessory / Humidifier 120V</td>
</tr>
<tr>
<td>24VAC HOT</td>
<td>XFMR-H</td>
<td>Transformer 24V Hot</td>
</tr>
<tr>
<td>24VAC RTN</td>
<td>XFMR-N</td>
<td>Transformer Neutral</td>
</tr>
<tr>
<td>HOT</td>
<td>LINE-H</td>
<td>120V Hot Input</td>
</tr>
<tr>
<td>NEUTRAL</td>
<td>LINE-N</td>
<td>120V Neutral</td>
</tr>
<tr>
<td>PARK (dead)</td>
<td>PARK (dead)</td>
<td>Alternate Speed Taps</td>
</tr>
<tr>
<td>TX</td>
<td></td>
<td>120V To Transformer</td>
</tr>
<tr>
<td>FLAME SENSE</td>
<td>FLAME SENSE</td>
<td>Flame Sense</td>
</tr>
<tr>
<td>HUM-N</td>
<td></td>
<td>Humidifier Neutral</td>
</tr>
<tr>
<td>EAC-N</td>
<td></td>
<td>Electronic Air Cleaner Neutral</td>
</tr>
<tr>
<td>CIR-N</td>
<td></td>
<td>Blower Neutral</td>
</tr>
</tbody>
</table>
### TABLE 4
**SURELIGHT BOARD J156 (J2) TERMINAL DESIGNATIONS**

<table>
<thead>
<tr>
<th>PIN #</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ignitor</td>
</tr>
<tr>
<td>2</td>
<td>Not Used</td>
</tr>
<tr>
<td>3</td>
<td>Ignitor Neutral</td>
</tr>
<tr>
<td>4</td>
<td>Combustion Air Inducer Line Voltage</td>
</tr>
<tr>
<td>5</td>
<td>Not Used</td>
</tr>
<tr>
<td>6</td>
<td>Combustion Air Inducer Neutral</td>
</tr>
</tbody>
</table>

### TABLE 5
**SURELIGHT BOARD J58 (J1) TERMINAL DESIGNATIONS**

<table>
<thead>
<tr>
<th>PIN #</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Primary Limit In</td>
</tr>
<tr>
<td>2</td>
<td>Gas Valve Common</td>
</tr>
<tr>
<td>3</td>
<td>Roll Out Switch Out</td>
</tr>
<tr>
<td>4</td>
<td>Gas Valve 24V</td>
</tr>
<tr>
<td>5</td>
<td>Pressure Switch In</td>
</tr>
<tr>
<td>6</td>
<td>Pressure Switch and Primary Limit Out</td>
</tr>
<tr>
<td>7</td>
<td>Not Used</td>
</tr>
<tr>
<td>8</td>
<td>Roll Out Switch In</td>
</tr>
<tr>
<td>9</td>
<td>Ground</td>
</tr>
</tbody>
</table>

### TABLE 6
**BASIC SURELIGHT BOARD J156 (J2) TERMINAL DESIGNATIONS**

<table>
<thead>
<tr>
<th>PIN #</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Combustion Air Inducer Line</td>
</tr>
<tr>
<td>2</td>
<td>Ignitor Line</td>
</tr>
<tr>
<td>3</td>
<td>Combustion Air Inducer Neutral</td>
</tr>
<tr>
<td>4</td>
<td>Ignitor Neutral</td>
</tr>
</tbody>
</table>

### TABLE 7
**BASIC SURELIGHT BOARD J58 (J1) TERMINAL DESIGNATIONS**

<table>
<thead>
<tr>
<th>PIN #</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Secondary Limit</td>
</tr>
<tr>
<td>2</td>
<td>Not Used</td>
</tr>
<tr>
<td>3</td>
<td>24V</td>
</tr>
<tr>
<td>4</td>
<td>Not Used</td>
</tr>
<tr>
<td>5</td>
<td>Rollout Switch In</td>
</tr>
<tr>
<td>6</td>
<td>24V</td>
</tr>
<tr>
<td>7</td>
<td>Primary Limit</td>
</tr>
<tr>
<td>8</td>
<td>Ground</td>
</tr>
<tr>
<td>9</td>
<td>Gas Valve In</td>
</tr>
<tr>
<td>10</td>
<td>Pressure Switch Out</td>
</tr>
<tr>
<td>11</td>
<td>Rollout Switch Out</td>
</tr>
<tr>
<td>12</td>
<td>Gas Valve Out</td>
</tr>
</tbody>
</table>
G40UH(X) HORIZONTAL POSITION

FIGURE 2

BASIC SURELIGHT CONTROL BOARD

G32V

SURELIGHT CONTROL BOARD

FIGURE 3
II-OPERATION (Both Models)

FAN TIMER CONTROL
The fan on time (during heat mode) of 45 seconds is not adjustable. Fan off time (time that the blower operates after the heat demand has been satisfied) can be adjusted by flipping the dip switches located on the SureLight integrated control. The unit is shipped with a factory fan off setting of 90 seconds. Fan off time will affect comfort and is adjustable to satisfy individual applications. There is no fan-on or fan-off time during cool mode. Fan energizes upon demand for cool and de-energizes when demand is satisfied. See figure 4 for fan-off time adjustment.

![FAN-OFF TIME ADJUSTMENT](image)

FIGURE 4

ELECTRONIC IGNITION
On a call for heat the control monitors the combustion air blower pressure switch. The control will not begin the heating cycle if the pressure switch is closed (jumpered). Once the pressure switch is determined to be open, the combustion air blower is energized. When the differential in the pressure switch is great enough the pressure switch closes and a 15-second pre-purge begins. If the pressure switch is not proven within 2-1/2 minutes, the control goes into Watchguard-Pressure Switch mode for a 5-minute reset period.

After the 15-second pre-purge period, the ignitor warms up for 20 seconds, during which the gas valve opens at 19 seconds for a 4-second trial for ignition. See figure 5. The ignitor energizes for the first second of the 4-second trial.

Board 97L4801 and 10M9301 ONLY: ignitor energizes the entire 4 second trial, or until flame is sensed (which ever is first). If ignition is not proved during the 4-second period, the control will try four more times. 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 control board has an added feature that prolongs the life of the ignitor. After the first successful ignition, the control lowers the ignitor temperature on successive calls for heat. The control continues to lower the ignitor temperature until it finds the lowest temperature that will provide a successful ignition. It finds this by ramping down until the ignitor will not light, then steps up by 3 times. Lower temperature means a cooler ignitor which prolongs ignitor life. This amount is used for 255 cycles. On the 256th call for heat, the control will again ramp down until the lowest ignitor temperature is determined and the cycle begins again.

GAS VALVE
Gas valves used will be manufactured by White Rodgers or Honeywell. The valves are internally redundant to assure safety shut off. The valve on the G27M, G32(V) and GHR32(V) provides two-stage heat. 24VAC terminals on top of the valves are connected to wires from the SureLight ignition control Jackplug J58 (some boards will have J1).

FLAME SENSING AND RECTIFICATION
The SureLight ignition system uses a sensing probe to verify flame conditions through flame rectification. The sensing probe functions quite differently from a thermocouple in a standard furnace.

Flame rectification is the property of a gas flame which permits it to act as a DC current path between two metal objects, when an AC voltage is applied between the two objects that are enveloped in a gas flame. An AC voltage is applied to the flame sensor and burner/burner crossover by the SureLight circuitry. Electrons are discharged alternately from the burner/crossover to the sensor and back. More electrons will hit the burner and crossover than sensor since the grounding area is so much larger. The end result is a pulsating DC current flowing through the flame in one direction (flame sensor to burner crossover) which is of a larger magnitude than the current flowing in the opposite direction (burner crossover to flame sensor). This pulsating DC current is the only type of signal which the SureLight board will accept as proof of flame. See figures 6, 7 and 8.

IGNITOR
The SureLight ignitor is made of durable silicon nitride. Ignitor longevity is enhanced by controlling voltage to the ignitor. The board finds the lowest ignitor temperature which will successfully light the burner, thus increasing the life of the ignitor. Due to this feature of the board, voltage cannot be measured so ignitor must be ohmmed. Ohm value should be between 10.9 and 19.7. See figures 6, 7 and 8 for ignitor location.
SureLight Control Ignition Sequence

<table>
<thead>
<tr>
<th>DEMAND</th>
<th>CAI</th>
<th>IGNITOR</th>
<th>GAS VALVE</th>
<th>INDOOR BLOWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Purge</td>
<td>Ignitor Warmup</td>
<td>Trial for Ignition</td>
<td>Blower “On” Delay</td>
<td>Post Purge</td>
</tr>
</tbody>
</table>

*Blower on time will be 45 seconds after gas valve is energized. Blower off time will depend on “OFF TIME” Setting.

**FIGURE 5**

SureLight Ignitor and Sensor
G27M, G24M, 80MGF and 80UHG

**FIGURE 6**

SureLight Ignitor and Sensor
G23(X), G26, 90UGF, GHR26, G32/V and GHR32/V

**FIGURE 7**

SureLight Ignitor and Sensor
G40UHG and G50UHG

**FIGURE 8**
Sequence of Operation G23X / 80MGE / G26 / GHR26 / 90UGF / 80UGH / G24M

G40UH/G50UH

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

2 - S10 primary limit switch and S47 rollout switch are closed. Call for heat can continued.

3 - SureLight control energizes combustion air inducer B6. Combustion air inducer runs until S18 combustion air prove switch closes (switch must close within 2-1/2 minutes or control goes into 5 minute Watchguard Pressure Switch delay). Once S18 closes, a 15-second pre-purge follows.

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

5 - Gas valve opens for a 4-second trial for ignition.

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

7 - After 45-second delay, SureLight control energizes indoor blower B3.

8 - When heat demand is satisfied, W1 of the indoor thermostat de-energizes W of the SureLight control which de-energizes the gas valve. Combustion air inducer B6 continues a 5-second post-purge period, and indoor blower B3 completes a selected OFF time delay.
Sequence of Operation G27M / G32 / G32V - GHR32 / GHR32V

Ignitor operation will vary between SureLight boards. Boards 56L83, 24L85 and 63K89 will energize the ignitor for the first second of the 4-second ignition trial. Board 97L48 will energize the ignitor for the full 4-second ignition trial.

1 - When there is a call for heat, W1 of the thermostat energizes W of the furnace control with 24VAC.
2 - SureLight control runs self-check for S10 primary limit switch and S21 secondary limit switch normally closed contacts. The control also checks S18 combustion air prove switch and S102 high fire pressure switch normally open contacts.

3A Single-stage Mode, Single-Stage Thermostat SureLight control energizes combustion air inducer B6 on high speed. Combustion air inducer runs until S102 high fire pressure switch closes (switch must close within 2-1/2 minutes or control goes into 5 minute Watchguard-Pressure Switch delay). A 15-second pre-purge follows after S102 closes.

3B Two-stage Mode, Single-Stage Thermostat SureLight control energizes combustion air inducer B6 on low speed. Combustion air inducer runs until combustion air inducer switch S18 closes (switch must close within 2-1/2 minutes or control goes into 5 minute Watchguard-Pressure Switch delay). A 15-second pre-purge follows once S18 closes.

3C Two-stage Mode, Two Stage Thermostat SureLight control energizes combustion air inducer B6 on low speed. Combustion air inducer runs until combustion air inducer switch S18 closes (switch will close within 2-1/2 minutes or control goes into 5 minute Watchguard-Pressure Switch delay). A 15-second pre-purge follows once S18 is closes.

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

5A Single-stage Mode, Single-Stage Thermostat Gas valve is energized on first stage heat (low). Gas valve opens for a 4 second trial for ignition. Flame is sensed. After 8 seconds from when gas valve opens, valve energizes on second stage (high heat).

5B Two-stage Mode, Single-Stage Thermostat Gas valve is energized on first stage. Gas valve opens for a 4-second trial for ignition. Signal is sent from control module to two-stage control board to begin W2 (second-stage) ON delay.

5C Two-stage Mode, Two Stage Thermostat - Gas valve is energized on first stage only. Gas valve opens for a 4-second trial for ignition.

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

7A Single-stage Mode, Single-Stage Thermostat After 45-second delay, indoor blower B3 is energized on high heating speed.

7B Two-stage Mode, Single-Stage Thermostat After 45-second delay, indoor blower B3 is energized on low speed.

7C Two-stage Mode, Two Stage Thermostat After 45-second delay, indoor blower B3 is energized on low speed.

8A Two-stage Mode, Single-Stage Thermostat Second stage time on delay complete (8, 12, or 15 minutes). Gas valve opens, indoor blower B3 remains energized on heating speed.

8B Two-stage Mode, Two Stage Thermostat Call for second stage heat comes from indoor thermostat.
HEATING SEQUENCE OF OPERATION

NORMAL HEATING MODE

POWER ON

CONTROL SELF-CHECK OKAY?

COMBUSTION AIR INDUCER ON FOR 1 SECOND.

POLARITY OKAY?

NO

IS THERE PROPER GROUND?

IS VOLTAGE ABOVE 75 VOLTS?

YES

ROLLOUT SWITCH CLOSED?

BURNER OFF? (CONTINUOUS FLAME CHECK)

NORMAL OPERATION:
LED #1 −− SLOW FLASH
LED #2 −− SLOW FLASH

THERMOSTAT CALLS FOR HEAT:
LED #1 −− FAST FLASH
LED #2 −− FAST FLASH

IS PRIMARY & SECONDARY LIMIT SWITCHES CLOSED?

PROVE SWITCH CONTACTS OPEN? (HIGH AND LOW FIRE)

YES

IS COMBUSTION AIR INDUCER ENERGIZED? (HTG ACC ENERGES WITH C.A.I.)

YES

TWO-STAGE MODE CALL FOR 1ST STAGE HEAT

COMBUSTION AIR INDUCER ON LOW SPEED (< 2.5 MINUTES)

LOW-FIRE PROVE SWITCH CLOSED?

PREPURGE 15 SECONDS

CONTINUED NEXT PAGE

ABNORMAL HEATING MODE

GAS VALVE OFF. COMBUSTION AIR INDUCER ON.
INDOOR BLOWER ON.
LED #1 ALTERNATING FAST FLASH
LED #2 ALTERNATING FAST FLASH
CHECK FOR BROKEN IGNITOR OR OPEN IGNITOR CIRCUIT

POLARITY REVERSED.
LED #1 −− FAST FLASH
LED #2 −− SLOW FLASH

LOW VOLTAGE SIGNAL AT LED HOLDS UNTIL VOLTAGE RISES ABOVE 75 VOLTS.

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.
INDOOR BLOWER OFF WITH DELAY.
LED #1 ON
LED #2 ON
(RESET CONTROL BY TURNING MAIN POWER OFF.)

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.
INDOOR BLOWER ON HEATING SPEED.
LED #1 −− SLOW FLASH
LED #2 −− OFF

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.
INDOOR BLOWER OFF WITH DELAY.
LED #1 −− ON
LED #2 −− SLOW FLASH
(SEQUENCE HOLDS UNTIL ROLLOUT SWITCH CLOSES)

GAS VALVE OFF. COMBUSTION AIR INDUCER ON.
INDOOR BLOWER ON.
LED #1 −− SLOW FLASH
LED #2 −− OFF

PROVE SWITCH WATCHGUARD (5 MINUTES)
COMBUSTION AIR INDUCER OFF.
INDOOR BLOWER OFF.
LED #1 OFF
LED #2 SLOW FLASH
HEATING SEQUENCE CONTINUED

* IS COMBUSTION AIR PROVE SWITCH OPEN?

YES

* IS COMBUSTION AIR INDUCER ENERGIZED?
(HTG ACC TERMINAL IS ENERGIZED WITH C.A.B)

YES

* HAS COMBUSTION AIR PROVE SWITCH CLOSED IN 2.5 MINUTES?

NO

* 15-SECOND COMBUSTION AIR INDUCER PREPURGE INITIATED BY CLOSED PROVE SWITCH.

YES

IGNITOR WARM-UP −− 20 SECONDS.

YES

4-SECOND TRIAL FOR IGNITION. GAS VALVE OPENS. BOARDS 63K89, 24L85 AND 56L83: IGNITOR ENERGIZED FOR 1 SECOND AFTER VALVE OPENS. BOARD 97L48: IGNITOR ENERGIZED THE FULL 4-SECOND TRIAL FOR IGNITION. NO FLAME SENSED DURING THIS PERIOD.

FLAME STABILIZATION PERIOD.

4 SECONDS

TWO-STAGE MODE CALL FOR 1st STAGE HEAT

MAIN GAS VALVE OPEN LOW FIRE ONLY

GAS VALVE OPEN HIGH AND LOW FIRE

TWO-STAGE MODE SINGLE STAGE T'STAT

SINGLE-STAGE MODE HIGH HEAT ONLY

4 SECONDS

FLAME RECTIFICATION CURRENT CHECK CAN FLAME BE PROVEN WITHIN 4 SECONDS AFTER GAS VALVE OPENS? (> 0.15 microamps)

NO

FLAME PRESENT?

YES

FLAME SIGNAL ABOVE 0.7 MICROAMPS?

NO

INDOOR BLOWER ON DELAY BEGINS. AFTER 45 SECOND DELAY, ACB HEAT SPEED TERMINAL IS ENERGIZED. ACC TERMINAL IS ENERGIZED.

TWO-STAGE MODE CALL FOR 1st STAGE HEAT

INDOOR BLOWER ON LOW SPEED

TWO-STAGE MODE SINGLE STAGE T'STAT

INDOOR BLOWER ON HIGH HEATING SPEED

SINGLE-STAGE MODE HIGH HEAT ONLY

CONTINUED NEXT PAGE
### HEATING SEQUENCE CONTINUED

1. **Primary and Secondary Limit Switches Closed?**
   - **NO**
   - **YES**
     - **Rollout Switch Closed?**
       - **NO**
       - **YES**
         - **Thermostat Demand Satisfied?**
           - **YES**
           - **NO**
             - **LED #1 & #2 Simultaneous Slow Flashes.**
             - **Comb. Air Inducer Continues 5-Second, Post-Purge After T'Stat Demand Is Satisfied. Indoor Air Blower Completes Selected “OFF” Delay Before Shutting OFF. ACB Heat Speed, HTG ACC and ACC TERM. De-Energize.**
         - **Prove Switch Closed?**
           - **YES**
           - **NO**
             - **Two-Stage Mode Call for 1st Stage Heat**
             - **Two-Stage Mode Single Stage T'Stat**
               - **Call for 2nd Stage Heat (High Fire) From Thermostat**
               - **2nd Stage on Delay On Control Board Complete (8, 15 OR 15 Min.)**
               - **Indoor Blower on Heat Speed?**
                 - **Combustion Air Inducer on High Speed?**
                   - **YES**
                   - **Yes**
                     - **High Fire Gas Valve Open? (8 Sec. Delay)**
                     - **YES**
                     - **NO**
                   - **NO**
                 - **NO**
               - **NO**
             - **SINGLE-STAGE MODE HIGH HEAT ONLY**
               - **Control Checks: Flame Presence, Closed Primary & Secondary Limits, Closed Prove Switches, Continuously Closed Rollout Switches (during heating cycle).**
               - **See previous sequences for failure modes.**
               - **Demand for Heat Satisfied. Thermostat Opens.**
               - **Gas Valve De-Energized.**
               - **Combustion Air Inducer Post-Purge – 5 Seconds.**
               - **Indoor Blower Selected Time OFF Delay.**
COOLING SEQUENCE OF OPERATION

NORMAL COOLING MODE

1. POWER ON
2. IGNITION CONTROL MAIN POWER ON.
3. CONTROL SELF DIAGNOSTIC CHECK. IS CONTROL OPERATING NORMALLY?
   - YES
5. TURN INDUCER ON FOR 1 SECOND.
6. IS POLARITY REVERSED?
   - YES
8. SIGNAL POLARITY REVERSED AT LED.
   - NO
9. IS THERE PROPER GROUND?
   - YES
   - NO
10. LED: SLOW FLASH RATE REMAINS UNCHANGED THROUGHOUT COOLING CYCLE.
11. THERMOSTAT CALLS FOR COOLING.
12. COMPRESSOR CONTACTOR AND SYSTEM FAN ENERGIZED WITH 0-SECOND DELAY. ACB COOL SPEED IS ENERGIZED. ACC TERMINAL IS ENERGIZED.
13. THERMOSTAT OPENS.
14. COMPRESSOR OFF.
15. SYSTEM FAN AND ACC. TERM. OFF WITH 0-SECOND DELAY.

ABNORMAL COOLING MODE

1. POWER ON
2. IGNITION CONTROL MAIN POWER ON.
3. CONTROL SELF DIAGNOSTIC CHECK. IS CONTROL OPERATING NORMALLY?
   - NO
5. GAS VALVE OFF. COMBUSTION AIR INDUCER OFF. INDOOR BLOWER OFF WITH NORMAL DELAY. SIGNAL CIRCUIT BOARD FAILURE AT LED. INTERRUPT MAIN POWER TO RESET CONTROL.
6. IS CONTROL OPERATING NORMALLY?
   - YES
7. SIGNAL POLARITY REVERSED AT LED.
   - NO
8. ROLLOUT SWITCH MONITORED CONTINUOUSLY.
9. IS ROLLOUT SWITCH CLOSED?
   - YES
   - NO
10. CHECK FOR MAIN BURNER FLAME SENSE. IS MAIN BURNER FLAME OFF?
   - YES
   - NO
11. LED: SLOW FLASH RATE REMAINS UNCHANGED THROUGHOUT COOLING CYCLE.
12. THERMOSTAT CALLS FOR COOLING.
13. COMPRESSOR CONTACTOR AND SYSTEM FAN ENERGIZED WITH 0-SECOND DELAY. ACB COOL SPEED IS ENERGIZED. ACC TERMINAL IS ENERGIZED.
14. THERMOSTAT OPENS.
15. COMPRESSOR OFF.
16. SYSTEM FAN AND ACC. TERM. OFF WITH 0-SECOND DELAY.
HEATING SEQUENCE CONTINUED

NORMAL HEATING MODE

15-SECOND COMBUSTION AIR INDUCER PREPURGE
INITIATED BY CLOSED PROVE SWITCH.

YES

IGNITOR WARM-UP — 20 SECONDS.

YES

4-SECOND TRIAL FOR IGNITION.
GAS VALVE OPENS. IGNITOR ENERGIZED FOR 1 SECOND
AFTER VALVE OPENS. BOARD 10M9301: IGNITOR
ENERGIZED FULL 4 SECOND TRIAL.
NO FLAME SENSED DURING THIS PERIOD.

YES

FLAME STABILIZATION PERIOD.

4 SECONDS

FLAME RECTIFICATION CURRENT
CHECK: CAN FLAME BE PROVEN WITHIN
4 SECONDS AFTER GAS VALVE OPENS? 
(> 0.15 microamps)

YES

FLAME PRESENT?

YES

FLAME SIGNAL ABOVE 0.2 MICROAMPS?

YES

INDOOR BLOWER ON DELAY BEGINS
(45 seconds.)

YES

PRIMARY AND SECONDARY LIMIT
SWITCHES CLOSED?

YES

ROLLOUT SWITCH CLOSED?

YES

COMBUSTION AIR PROVE
SWITCH CLOSED?

YES

THERMOSTAT DEMAND SATISFIED.

YES

LED #1 & #2 SIMULTANEOUS SLOW FLASHES.

YES

COMB. AIR INDUCER CONTINUES 5-SECOND
POST PURGE AFTER T'STAT DEMAND IS SATISFIED.
INDOOR AIR BLOWER COMPLETES SELECTED
“OFF” DELAY BEFORE SHUTTING OFF.

ABNORMAL HEATING MODE

IS VOLTAGE ABOVE 75 VOLTS?

NO

IS THERE A PROPER GROUND?

NO

IS IGNITOR INTACT AND CONNECTED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.
INDOOR BLOWER OFF.
HAS CONTROL FAILED TO SENSE FLAME FOR
FIVE CONSECUTIVE TRIES DURING A SINGLE
HEAT DEMAND?

YES

WATCHGUARD MODE. GAS VALVE OFF.
COMBUSTION AIR INDUCER OFF.
INDOOR BLOWER OFF WITH DELAY.
LEDS SIGNAL WATCHGUARD FAILURE CODE.
IS 60-MINUTE RESET PERIOD COMPLETE?

YES

HAS CONTROL RESET IGNITION
SEQUENCE FOUR TIMES?

NO

IS LIMIT SWITCH CLOSED?

NO

GAS VALVE DE-ENERGIZED.
COMBUSTION AIR INDUCER DE-ENERGIZED.
INDOOR BLOWER ON UNTIL SWITCH CLOSES.
LED #1 -- SLOW FLASH. LED #2 -- ON.
IS LIMIT SWITCH CLOSED?

YES

HAS PRIMARY SECONDARY
LIMIT RESET (CLOSED)
WITHIN 3 MINUTES?

NO

GAS VALVE POWER OFF.
COMBUSTION AIR INDUCER POWER ON.
INDOOR BLOWER ON
LED #1 -- ON. LED #2 -- SLOW FLASH.
SEQUENCE HOLDS UNTIL ROLLOUT SWITCH IS RESET
AND MAIN POWER IS INTERRUPTED OR
THERMOSTAT IS CYCLED OFF/ON FOR 1 TO 20 SEC.

YES

ROLLOUT SWITCH CLOSED?

YES

COMBUSTION AIR PROVE
SWITCH CLOSED?

YES

THERMOSTAT DEMAND SATISFIED.

YES

LED #1 & #2 SIMULTANEOUS SLOW FLASHES.

YES

COMB. AIR INDUCER CONTINUES 5-SECOND
POST PURGE AFTER T'STAT DEMAND IS SATISFIED.
INDOOR AIR BLOWER COMPLETES SELECTED
“OFF” DELAY BEFORE SHUTTING OFF.
COOLING SEQUENCE OF OPERATION

NORMAL COOLING MODE

POWER ON

IGNITION CONTROL MAIN POWER ON.

CONTROL SELF DIAGNOSTIC CHECK.

IS CONTROL OPERATING NORMALLY?

YES

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL CIRCUIT BOARD FAILURE AT LED.

INTERRUPT MAIN POWER TO RESET CONTROL.

NO

IS POLARITY REVERSED?

YES

SIGNAL POLARITY REVERSED AT LED.

NO

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER ON.

INDOOR BLOWER ON.

SIGNAL ROLL-OUT SWITCH OPEN AT LED.

SEQUENCE HOLDS UNTIL ROLLOUT SWITCH CLOSES.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

IS POLARITY REVERSED?

NO

GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.

INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL UNWANTED FLAME SENSED AT LED.

SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.
SURELIGHT CONTROL
CONTINUOUS HEAT SPEED FAN SEQUENCE OF OPERATION

LED: SLOW FLASH RATE REMAINS UNCHANGED THROUGHOUT SEQUENCE.

MANUAL FAN SELECTION MADE AT THERMOSTAT. CONTROL (G) ENERGIZES SYSTEM FAN AT HEAT-H HEAT SPEED. EAC-H TERMINAL IS ENERGIZED.

THERMOSTAT CALLS FOR HEAT (W).

SYSTEM FAN REMAINS ON HEAT-H HEATING SPEED.

HUM-H TERM. ENERGIZES WITH COMB. AIR INDUCER.

THERMOSTAT OPEN.

YES

SYSTEM FAN REMAINS ON HEAT-H HEATING SPEED.

HUM-H TERM. DE-ENERGIZES WITH COMB. AIR INDUCER

NO

THERMOSTAT OPENS.

YES

THERMOSTAT CALLS FOR COOLING.

SYSTEM FAN SWITCHED TO COOL-H SPEED. EAC-H TERM. REMAINS ON.

THERMOSTAT OPEN.

NO

THERMOSTAT CALLS FOR COOLING.

SYSTEM FAN REMAINS ON HEAT-H HEATING SPEED.
SURELIGHT - TROUBLE SHOOTING GUIDE
UPON INITIAL POWER UP, REMOVE ALL THERMOSTAT DEMANDS TO THE UNIT

PROBLEM: 1 UNIT FAILS TO OPERATE IN THE COOLING, HEATING, OR CONTINUOUS FAN MODE

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action / Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>- Both diagnostic lights fail to light up.</td>
<td>1.1.1 Main voltage 120V not supplied to unit.</td>
</tr>
<tr>
<td></td>
<td>LED#1-Off, LED#2-Off</td>
<td>ACTION 1 - Check 120V main voltage.  Determine cause of main power failure.</td>
</tr>
<tr>
<td>1.2</td>
<td>- Diagnostic lights flash the roll-out code.</td>
<td>1.2.1 Roll-out switch open.</td>
</tr>
<tr>
<td></td>
<td>LED#1-On, LED#2-Slow Flash</td>
<td>ACTION 1 - Manually reset the roll-out switch by pushing the top button. ACTION 2 - Determine the cause of the roll-out switch activation before leaving furnace.</td>
</tr>
<tr>
<td>1.3</td>
<td>- On initial power-up the comb. air blower does not energize. - Diagnostic lights flash the reverse polarity code.</td>
<td>1.3.1 120V main power polarity reversed.</td>
</tr>
<tr>
<td></td>
<td>LED#1-Fast Flash, LED#2-Slow Flash.</td>
<td>ACTION 1 - Check the 120V has line and neutral correctly input into control. ACTION 2 - Reverse the line and neutral at the 120V field connection.</td>
</tr>
<tr>
<td>1.4</td>
<td>- On initial power up the combustion air blower does not energize. - Diagnostic lights flash normal power on operation.</td>
<td>1.4.1 Open combustion air blower motor circuit.</td>
</tr>
<tr>
<td></td>
<td>LED#1-Slow Flash LED#2-Slow Flash</td>
<td>ACTION 1 - Check for 120V to combustion air blower. If no power, check wire and connections.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.4.2 Failed combustion air blower motor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACTION 1 - If power is present at blower, replace blower.</td>
</tr>
</tbody>
</table>
### Problem 1: Unit Fails to Operate in the Cooling, Heating, or Continuous Fan Mode

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action / Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- On initial power-up the combustion air blower remains energized.</td>
<td>1.5.1 Improper ground to the unit.</td>
<td><strong>Action 1</strong> - Check that the unit is properly grounded. <strong>Action 2</strong> - Install a proper main ground to the unit.</td>
</tr>
<tr>
<td>- Diagnostic lights flash the improper main ground.</td>
<td>1.5.2 6-Pin connector is improperly attached to the circuit board.</td>
<td><strong>Action 1</strong> - Check 6-pin connector for proper installation. Correctly insert connector into control.</td>
</tr>
<tr>
<td>LED#1-Alternating Fast Flash, LED#2-Alternating Fast Flash</td>
<td>1.5.3 Line voltage is below 75V.</td>
<td><strong>Action 1</strong> - Check that the line voltage is above 75V. Determine cause of voltage drop and supply correct voltage to the control.</td>
</tr>
</tbody>
</table>

### Problem 2: Unit Fails to Operate in the Cooling or Heating Mode, But Combustion Air Blower Operates Continuous. Units with Control Boards Date Coded After Nov. 1 1997, Will Operate in Cooling But Not in the Heating Mode, With Combustion Air Blower Cycling 5 Seconds On 55 Seconds Off.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action / Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- On initial power-up the combustion air blower remains energized.</td>
<td>2.1.1 Open ignitor circuit.</td>
<td><strong>Action 1</strong> - Check for correct wiring and loose connections in the ignitor circuit. Check multi-plug connections for correct installation.</td>
</tr>
<tr>
<td>- Diagnostic lights flash the improper main ground.</td>
<td>2.1.2 Broken or failed ignitor.</td>
<td><strong>Action 1</strong> - Unplug ignitor and read resistance across ignitor. If resistance does not read between 10.9 and 19.7 ohms, replace the ignitor.</td>
</tr>
<tr>
<td>- Units with control boards date coded after Nov. 1 1997; combustion air blower will cycle 5 seconds on 55 seconds off.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED#1-Alternating Fast Flash, LED#2-Alternating Fast Flash</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Problem 3: Unit Fails to Fire in the Heating Mode, Combustion Air Blower Does Not Energize

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action / Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Unit operates with a cooling or continuous fan demand.</td>
<td>3.1.1 Primary or secondary (if equipped) limit open.</td>
<td><strong>Action 1</strong> - Check continuity across switch(es). Switches reset automatically upon cool down. <strong>Action 2</strong> - Check for restrictions on blower inlet air (including filter) and outlet air. Determine cause for limit activation before placing unit back in operation.</td>
</tr>
<tr>
<td>- Combustion air blower will not start with a Heating demand.</td>
<td>3.1.2 Miswiring of furnace or improper connections at limit switch(es).</td>
<td><strong>Action 1</strong> - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</td>
</tr>
<tr>
<td>- Diagnostic lights flash the limit failure mode.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LED#1-Slow Flash, LED#2-On</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 3.2       |                |                             |
| - Unit operates with a cooling and continuous fan demand. | 3.2.1 Miswiring of furnace or improper connections to combustion air blower. | **Action 1** - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections. |
| - Combustion air blower will not start with a Heating demand. | 3.2.2 Pressure switch stuck closed. | **Action 1** - Check that the pressure switch is open without the combustion air blower operating. Replace if defective. |
| - Diagnostic lights flash the pressure switch failure code. | | |
| LED#1-Off, LED#2-Slow Flash | | |
### PROBLEM 3: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER DOES NOT ENERGIZE (CONT.)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3</td>
<td>- Unit operates with a cooling and continuous fan demand. - Combustion air blower will not start with a Heating demand. - Diagnostic lights flash the pressure switch failure code 2.5 minutes after heating demand.</td>
<td><strong>3.3.1</strong> Miswiring of furnace or improper connections to combustion air blower. <strong>ACTION 1</strong> - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</td>
</tr>
<tr>
<td></td>
<td>LED#1-Off, LED#2-Slow Flash</td>
<td><strong>3.3.2</strong> Combustion air blower failure. <strong>ACTION 1</strong> - If there is 120V to combustion air blower and it does not operate, replace combustion air blower.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>- Unit operates with a cooling and continuous fan demand. - Combustion air blower energizes with a heating demand. - Diagnostic lights flash the pressure switch failure code 2.5 minutes after heating demand.</td>
<td><strong>4.1.1</strong> Pressure switch does not close due to incorrect routing of the pressure switch lines. <strong>ACTION 1</strong> - Check that the pressure switch lines are correctly routed. Correctly route pressure switch lines.</td>
</tr>
<tr>
<td></td>
<td>LED#1-Off LED#2-Slow Flash</td>
<td><strong>4.1.2</strong> Pressure switch does not close due to obstructions in the pressure lines. <strong>ACTION 1</strong> - Remove any obstructions from the the pressure lines and/or taps.</td>
</tr>
<tr>
<td></td>
<td><strong>4.1.3</strong> Pressure switch lines damaged</td>
<td><strong>ACTION 1</strong> - Check pressure switch lines for leaks. Replace any broken lines.</td>
</tr>
<tr>
<td></td>
<td><strong>4.1.4</strong> Condensate in pressure switch line.</td>
<td><strong>ACTION 1</strong> - Check pressure switch lines for condensate. Remove condensate from lines. Check that the condensate lines are located correctly.</td>
</tr>
<tr>
<td></td>
<td><strong>4.1.5</strong> Pressure switch does not close due to a low differential pressure across the pressure switch.</td>
<td><strong>ACTION 1</strong> - Check the differential pressure across the pressure switch. This pressure should exceed the set point listed on the switch. <strong>ACTION 2</strong> - Check for restricted inlet and exhaust vent. Remove all blockage. <strong>ACTION 3</strong> - Check for proper vent sizing and run length. See installation instructions.</td>
</tr>
<tr>
<td></td>
<td><strong>4.1.6</strong> Wrong pressure switch installed in the unit, or pressure switch is out of calibration.</td>
<td><strong>ACTION 1</strong> - Check that the proper pressure switch is installed in the unit. Replace pressure switch if necessary.</td>
</tr>
<tr>
<td></td>
<td><strong>4.1.7</strong> Miswiring of furnace or improper connections at pressure switch.</td>
<td><strong>ACTION 1</strong> - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</td>
</tr>
<tr>
<td></td>
<td><strong>4.1.8</strong> Pressure switch failure.</td>
<td><strong>ACTION 1</strong> - If all the above modes of failure have been checked, the pressure switch may have failed. Replace pressure switch and determine if unit will operate.</td>
</tr>
</tbody>
</table>
### PROBLEM 5: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER ENERGIZES, IGNITOR IS ENERGIZED.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 - Unit operates with a cooling and continuous fan demand.</td>
<td>5.1.1 Check that gas is being supplied to the unit.</td>
<td>ACTION 1 - Check line pressure at the gas valve. Pressure should not exceed 13” WC for both natural and propane.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACTION 2 - Test continuity across the sense wire. If wire or sensor are damaged replace the component.</td>
</tr>
<tr>
<td></td>
<td>5.1.2 Miswiring of gas valve or loose connections at multi-pin control amp plugs or valve.</td>
<td>ACTION 3 - Check for restricted vent inlet or exhaust. Remove all blockage.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACTION 4 - Check for resistance between the sensor rod and the unit ground.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACTION 5 - Correct any shorts found in circuit.</td>
</tr>
<tr>
<td>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</td>
<td>5.1.3 Defective gas valve or ignition control.</td>
<td>ACTION 6 - Check the microamp signal from the burner flame. If the microamp signal is below 0.70 microamps, check the sense rod for proper location or contamination.</td>
</tr>
</tbody>
</table>

### PROBLEM 6: BURNERS LIGHT WITH A HEATING DEMAND BUT UNIT SHUTS DOWN PREMATURELY

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1 - Burners fire with a heating demand.</td>
<td>6.1.1 Wrong concentric vent kit used for terminating the unit.</td>
<td>ACTION 1 - Check vent termination kit installed. 1-1/2” dia. concentric vent (kit 60G77) for 50 and 75 inputs and 2” dia. concentric vent (kit 33K97) for 100 &amp; 125 inputs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACTION 2 - Check that 24V is supplied to the gas valve approximately 35 seconds after heat demand is initiated.</td>
</tr>
<tr>
<td></td>
<td>6.1.2 Condensate drain line is not draining properly.</td>
<td>ACTION 3 - Replace the control board if 24V is not supplied to valve.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACTION 4 - Check for restricted vent inlet or exhaust. Remove all blockage.</td>
</tr>
<tr>
<td></td>
<td>6.1.3 Low pressure differential at the pressure switch.</td>
<td>ACTION 5 - Check the microamp signal from the burner flame. If the microamp signal is below 0.70 microamps, check the sense rod for proper location or contamination.</td>
</tr>
<tr>
<td>LED#1-Off LED#2-Slow Flash</td>
<td></td>
<td>ACTION 6 - Check the microamp signal from the burner flame. If the microamp signal is below 0.70 microamps, check the sense rod for proper location or contamination.</td>
</tr>
<tr>
<td>6.2 - Combustion air blower energizes with a heating demand.</td>
<td>6.2.1 Sensor or sense wire is improperly installed.</td>
<td>ACTION 1 - Check that sensor is properly located and that the sense wire is properly attached to both the sensor and the control.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACTION 2 - Check for a broken sensor.</td>
</tr>
<tr>
<td></td>
<td>6.2.2 Sensor or sense wire is broken.</td>
<td>ACTION 3 - Replace, clean, or relocate flame sense rod. If rod is to be cleaned, use steel wool or replace sensor. DO NOT CLEAN ROD WITH SAND PAPER. SAND PAPER WILL CONTRIBUT TO THE CONTAMINATION PROBLEM. NOTE: Do not attempt to bend sense rod.</td>
</tr>
<tr>
<td></td>
<td>6.2.3 Sensor or sensor wire is grounded to the unit.</td>
<td>ACTION 4 - Check for resistance between the sensor rod and the unit ground.</td>
</tr>
<tr>
<td>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</td>
<td>6.2.4 Control does not sense flame.</td>
<td>ACTION 5 - Correct any shorts found in circuit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACTION 6 - Check the microamp signal from the burner flame. If the microamp signal is below 0.70 microamps, check the sense rod for proper location or contamination.</td>
</tr>
</tbody>
</table>

Page 35
<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action/Comments</th>
</tr>
</thead>
</table>
| 6.3       | - Combustion air blower energizes with a heating demand. - Burners light. - Roll-out switch trips during the heating demand. - Diagnostic lights flash roll-out failure. | 6.3.1  
Unit is firing above 100% of the nameplate input. | ACTION 1 - Check that the manifold pressure matches value listed on nameplate. See installation instructions for proper procedure.  
ACTION 2 - Verify that the installed orifice size match the size listed on the nameplate or installation instructions.  
ACTION 3 - Check gas valve sensing hose to insure no leaks are present.  
ACTION 4 - Check the input rate to verify rate matches value listed on nameplate. |
|           | 6.3.2  
Gas orifices leak at the manifold connection. | 6.3.2.1  
Gas orifices leak at the manifold connection. | ACTION 1 - Tighten orifice until leak is sealed.  
NOTE: Be careful not to strip orifice threads. ACTION 2 - Check for gas leakage at the threaded orifice connection. Use approved method for leak detection (see unit instructions). |
|           | 6.3.3  
Air leakage at the connections between the primary heat exchanger, secondary heat exchanger, and combustion air blower. | 6.3.3.1  
Air leakage at the connections between the primary heat exchanger, secondary heat exchanger, and combustion air blower. | ACTION 1 - Check for air leakage at all joints in the heat exchanger assembly. Condition will cause high CO2 with high CO.  
ACTION 2 - Seal leakage if possible, replace heat exchanger if necessary, tag and return heat exchanger to proper Lennox personnel. |
|           | 6.3.4  
Insufficient flow through the heat exchanger caused by a sooted or restricted heat exchanger. | 6.3.4.1  
Insufficient flow through the heat exchanger caused by a sooted or restricted heat exchanger. | ACTION 1 - Check for sooting deposits or other restrictions in the heat exchanger assembly. Clean assembly as outlined in instruction manual.  
ACTION 2 - Check for proper combustion. See table 8 or 9 for proper CO2. CO should measure below .04% (400PPM) in an air-free sample of flue gases for either NG or LP. |
|           | 6.3.5  
Burners are not properly located in the burner box. | 6.3.5.1  
Burners are not properly located in the burner box. | ACTION 1 - Check that the burners are firing into the center of the heat exchanger openings. Correct the location of the burners if necessary. |
| 6.4       | - Combustion air blower energizes with a heating demand. - Burners light roughly and the unit fails to stay lit. - Diagnostic lights flash watchguard flame failure. | 6.4.1  
Recirculation of flue gases. This condition causes rough ignitions and operation. Problem is characterized by nuisance flame failures. | ACTION 1 - Check for proper flow of exhaust gases away from intake vent. Remove any obstacles in front of the intake and exhaust vent which would cause recirculation.  
ACTION 2 - Check for correct intake and exhaust vent installation. See instructions |
|           | 6.4.2  
Improper burner cross-overs | 6.4.2.1  
Improper burner cross-overs | ACTION 1 - Remove burner and inspect the cross-overs for burns, or any restriction or if crossover is warped. Remove restriction or replace burners. |
PROBLEM 6: BURNERS LIGHT WITH HEATING DEMAND BUT UNIT SHUTS DOWN PREMATURELY (CONT.)

6.5
- Combustion air blower energizes with a heating demand.
- Burners light.
- Diagnostic lights flash watch guard flame failure.
- NOTE: Unit might go into 60 minute Watchguard mode depending on intermittent nature of sensor signal.

6.5.1 Loose sensor wire connection causes intermittent loss of flame signal.

ACTION 1 - Check that the sensor is properly located.
ACTION 2 - Check that the sensor wire is properly attached to both the sensor and the control. Pay extra attention to the pin connectors.

LED#1-Alternating Slow Flash
LED#2-Alternating Slow Flash

PROBLEM 7: CONTROL SIGNALS LOW FLAME SENSE DURING HEATING MODE

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0</td>
<td>Sense rod is improperly located on the burner.</td>
<td>ACTION 1 - Check the sense rod for proper location on the burner. Properly locate the sense rod or replace if rod cannot be located correctly.</td>
</tr>
<tr>
<td>7.0</td>
<td>Sense rod is contaminated.</td>
<td>ACTION 1 - Check sense rod for contamination or coated surface. Clean the sense rod with steel wool or replace sensor. DO NOT USE SAND PAPER TO CLEAN ROD. SAND PAPER WILL CONTRIBUTE TO THE CONTAMINATION PROBLEM.</td>
</tr>
</tbody>
</table>

LED#1-Slow Flash
LED#2-Fast Flash

PROBLEM 8: INDOOR BLOWER FAILS TO OPERATE IN COOLING, HEATING, OR CONTINUOUS FAN MODE

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.0</td>
<td>Miswiring of furnace or improper connections at control or indoor blower motor.</td>
<td>ACTION 1 - Correct wiring and/or replace any loose connections. Check for correct wiring and loose connections.</td>
</tr>
<tr>
<td>8.0</td>
<td>120V is not being supplied to the indoor air blower or blower motor failure.</td>
<td>ACTION 1 - Check for 120V at the various calls for indoor blower by energizing “Y”, “G”, and “W” individually on the low voltage terminal strip. Note that when “W” is energized, the blower is delayed 45 seconds. If there is 120V to each motor tap but the blower does not operate, replace the motor.</td>
</tr>
<tr>
<td>8.0</td>
<td>Defective control board</td>
<td>ACTION 1 - If there is not 120V when “Y”, “G”, or “W” is energized, replace the control.</td>
</tr>
</tbody>
</table>

PROBLEM 9: RF STATIC DURING TIME FOR IGNITION

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0</td>
<td>Ignitor operation</td>
<td>ACTION 1 - Call Technical Support, Dallas.</td>
</tr>
</tbody>
</table>
# TABLE 8
## 80% EFFICIENCY MODELS

<table>
<thead>
<tr>
<th>UNIT</th>
<th>NATURAL</th>
<th>PROPANE</th>
</tr>
</thead>
<tbody>
<tr>
<td>G23(X)</td>
<td>6.5% - 8.5%</td>
<td>8.0% - 9.5%</td>
</tr>
<tr>
<td>G24M</td>
<td>6.0% - 8.0%</td>
<td>6.5% - 8.5%</td>
</tr>
<tr>
<td>80MGF</td>
<td>6.0% - 8.0%</td>
<td>6.5% - 8.5%</td>
</tr>
<tr>
<td>80UHG</td>
<td>6.0% - 8.0%</td>
<td>6.5% - 8.5%</td>
</tr>
<tr>
<td><strong>G27M</strong></td>
<td>6.0% - 8.5%</td>
<td>N/A</td>
</tr>
<tr>
<td>G40/50UH (X)-24A-45</td>
<td>4.5% - 6.5%</td>
<td>5.8% - 7.8%</td>
</tr>
<tr>
<td>G40/50UH(X)-36A-070</td>
<td>5.8% - 7.8%</td>
<td>6.8% - 7.8%</td>
</tr>
<tr>
<td>G40/50UH(X)-36B090</td>
<td>6.2% - 8.2%</td>
<td>6.7% - 8.6%</td>
</tr>
<tr>
<td>G40/50UH(X)-48B-090</td>
<td><strong>62 %−82 %</strong></td>
<td><strong>67 %−86 %</strong></td>
</tr>
<tr>
<td>G40/50UH(X)-48C-110</td>
<td>5.9% - 7.9%</td>
<td>7.5% - 9.5%</td>
</tr>
</tbody>
</table>

* Furnace firing at least 15 minutes.
** Furnace firing on high fire.

# TABLE 9
## 90% EFFICIENCY MODELS

<table>
<thead>
<tr>
<th>UNIT</th>
<th>MIN VENT</th>
<th>MAX VENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NATURAL</td>
<td>PROPANE</td>
</tr>
<tr>
<td>G26</td>
<td>6.0% - 8.0%</td>
<td>7.0% - 9.0%</td>
</tr>
<tr>
<td>GHR26</td>
<td>6.0% - 8.0%</td>
<td>7.0% - 9.0%</td>
</tr>
<tr>
<td>90UGF</td>
<td>6.0% - 8.0%</td>
<td>7.0% - 9.0%</td>
</tr>
<tr>
<td><strong>G32Q/V</strong></td>
<td>6.9% - 8.4%</td>
<td>7.5%-9.0%</td>
</tr>
<tr>
<td><strong>GHR32Q/V</strong></td>
<td>6.0% - 8.0%</td>
<td>7.0% - 9.0%</td>
</tr>
</tbody>
</table>

* Furnace firing at least 15 minutes.
** Furnace firing on high fire.