G24M SERIES UNITS

G24M series units are mid-efficiency gas furnaces manufactured with tubular steel heat exchangers formed of aluminized steel. G24M units are available in heating capacities of 45,000 to 140,000 Btuh and cooling applications up to 5 tons. Refer to Engineering Handbook for proper sizing.

Units are factory equipped for use with natural gas. A kit is available for conversion to LPG operation. Early model G24M units use electronic (direct spark) ignition. Late model G24M model units feature the Lennox SureLight® silicon-nitride ignition system. The G24MX unit meets the California Nitrogen Oxides (NOx) Standards and California Seasonal Efficiency requirements. All units use a redundant gas valve to assure safety shut-off as required by A.G.A. or C.G.A.

Units may be installed in upflow, downflow or horizontal position. The heat exchanger is designed for upright or horizontal use only. When the unit is installed in the downflow position, the heat exchanger is field removed and reinstalled so it is upright when the cabinet is inverted. No field conversion is required when the unit is installed in the horizontal position.

The heat exchanger, burners and manifold assembly can easily be removed for inspection and service by simply disconnecting gas, unplugging wiring harness and spark wires and removing four screws holding the heat exchanger in place. Then the heat exchanger slides out of the cabinet.

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

### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model No.</th>
<th>G24M2(X)-45</th>
<th>G24M2-60</th>
<th>G24M3(X)-60</th>
<th>G24M2-75</th>
<th>G24M3(X)-75</th>
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</thead>
<tbody>
<tr>
<td>Input Btuh (kW)</td>
<td>45,000 (13.2)</td>
<td>60,000 (17.6)</td>
<td>75,000 (22.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Btuh (kW)</td>
<td>36,900 (10.8)</td>
<td>49,200 (14.4)</td>
<td>61,700 (18.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>✧A.F.U.E.</td>
<td>80.1%</td>
<td>80.5%</td>
<td>80.5%</td>
<td>80.1%</td>
<td>80.0%</td>
</tr>
<tr>
<td>California Seasonal Efficiency</td>
<td>75.4%</td>
<td>76.4%</td>
<td>75.9%</td>
<td>76.8%</td>
<td>76.8%</td>
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<tr>
<td>Flue size connection diameter — in. (mm) round</td>
<td>3 (76)</td>
<td></td>
<td>4 (102)</td>
<td></td>
<td></td>
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<tr>
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<td>30 - 60 (17 - 33)</td>
<td>45 - 75 (25 - 42)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>High static certified by A.G.A./C.G.A. — in wg. (Pa)</td>
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<td></td>
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<tr>
<td>Gas Piping Size I.P.S. Natural or LPG/propane</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blower wheel nominal diameter x width</td>
<td>9 x 7</td>
<td>10 x 7</td>
<td>9 x 7</td>
<td>10 x 7</td>
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<tr>
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<td>1/3 (224)</td>
<td>1/4 (187)</td>
<td>1/3 (224)</td>
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</tr>
<tr>
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<td>1, 1-1/2 or 2</td>
<td>2, 2-1/2 or 3</td>
<td>1, 1-1/2 or 2</td>
<td>2, 2-1/2 or 3</td>
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<tr>
<td>kW</td>
<td>3.5, 5.3 or 7.0</td>
<td>7.0, 8.8 or 10.6</td>
<td>3.5, 5.3 or 7.0</td>
<td>7.0, 8.8 or 10.6</td>
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<tr>
<td>Shipping weight — lbs. (kg)</td>
<td>130 (59)</td>
<td>135 (61)</td>
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<tr>
<td>Electrical characteristics</td>
<td>120 volts — 60 hertz — 1 phase (less than 12 amps) All models</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Optional Accessories (Must Be Ordered Extra)

- LPG/propane kit
  - LB-69845L (38K84)
- Twinning Kit
  - 96J69 — 5 lbs. (2 kg)
- Up-Flow/Horizontal Filter and Filter Rack Kits
  - Single (32J02) Ten Pack (66K64)
  - (1) 16 x 20 x 1 (406 x 508 x 25)
- Down-flow Filter Kit
  - Catalog No. LB-69843A (32J01) — 3 lbs. (1 kg)
  - (2) 16 x 20 x 1 (406 x 508 x 25)
- Down-flow Combustible Floor Base
  - LB-79239A (67J91) — 10 lbs. (4 kg)
- Sidewall Power Venting Kit
  - 79J15 — 25 lbs. (11 kg)
- Hanging Bracket Kit
  - LB-69957 (46J66) — 15 lbs. (8 kg)

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

*Polyurethane frame type filter is furnished with kit.

*Filters are not furnished with kit and must be ordered extra.
<table>
<thead>
<tr>
<th>SPECIFICATIONS</th>
<th>Model No.</th>
<th>G24M4(X)-75</th>
<th>G24M3/4(X)-100</th>
<th>G24M4/5(X)-100</th>
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<tr>
<td>Input Btuh (kW)</td>
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<td>100,000 (29.3)</td>
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</tr>
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<td>Output Btuh (kW)</td>
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<td>82,000 (24.0)</td>
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<td>A.F.U.E.</td>
<td></td>
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<td>80.1%</td>
<td>80.0%</td>
</tr>
<tr>
<td>California Seasonal Efficiency</td>
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<td>76.3%</td>
<td>76.5%</td>
<td>77.0%</td>
</tr>
<tr>
<td>Flue size connection diameter — in. (mm) round</td>
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<td>4 (102)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature rise range — °F (°C)</td>
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<td>45 - 75 (25 - 42)</td>
<td>35 - 65 (19 - 36)</td>
<td></td>
</tr>
<tr>
<td>High static certified by A.G.A./C.G.A. — in wg. (Pa)</td>
<td></td>
<td>50 (125)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas Piping Size I.P.S. Natural or LPG/propane</td>
<td></td>
<td>1/2 (13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blower wheel nominal diameter x width</td>
<td>in.</td>
<td>12 x 8</td>
<td>12 x 9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>mm</td>
<td>305 x 203</td>
<td>305 x 229</td>
<td></td>
</tr>
<tr>
<td>Blower motor output — hp (W)</td>
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<td>1/2 (373)</td>
<td>3/4 (560)</td>
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</tr>
<tr>
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<td>Tons</td>
<td>2, 2-1/2, 3, 3-1/2 or 4</td>
<td>3-1/2, 4, 5 or 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>kW</td>
<td>7.0, 8.8, 10.6, 12.3 or 14.1</td>
<td>12.3, 14.1, 17.6 or 21.1</td>
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</tr>
<tr>
<td>Shipping weight — lbs. (kg) 1 package</td>
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<td>140 (64)</td>
<td>175 (79)</td>
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<td>Electrical characteristics</td>
<td></td>
<td>120 volts — 60 hertz — 1 phase (less than 12 amps) All models</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Optional Accessories (Must Be Ordered Extra)**

| LPG/propane kit | LB-69845L (38K84) | LB-69845K (81J14) |
| Twinning Kit | 96J69 — 5 lbs. (2 kg) |
| Up-Flow/Horizontal Filter and Filter Rack Kits | Single (32J02) Ten Pack (66K64) (1) 16 x 20 x 1 (406 x 508 x 25) | Single (46J14) Ten Pack (66K65) (1) 20 x 20 x 1 (508 x 508 x 25) |
| Catalog No. | LB-69843A (32J01) — 3 lbs. (1 kg) |
| No. & Size of Filters — in. (mm) | (2) 16 x 20 x 1 (406 x 508 x 25) |
| Down-flow Combustible floor Base | LB-79239A (67J91) — 10 lbs. (4 kg) | LB-79239B (67J92) — 10 lbs. (4 kg) |
| Sidewall Power Venting Kit | 79J15 — 25 lbs. (11 kg) |
| Hanging Bracket Kit | LB-69957 (46J66) — 15 lbs. (8 kg) |

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

*Polyurethane frame type filter is furnished with kit.*

*Filters are not furnished with kit and must be ordered extra.*
## SPECIFICATIONS

<table>
<thead>
<tr>
<th>Model No.</th>
<th>G24M3/4-120</th>
<th>G24M4/5(X)-120</th>
<th>G24M4/5-140</th>
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<tbody>
<tr>
<td>Input Btuh (kW)</td>
<td>120,000 (35.2)</td>
<td>140,000 (41.0)</td>
<td>114,800 (33.6)</td>
</tr>
<tr>
<td>Output Btuh (kW)</td>
<td>98,400 (28.8)</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>A.F.U.E.</td>
<td>80.0%</td>
<td>80.1%</td>
<td>80.0%</td>
</tr>
<tr>
<td>California Seasonal Efficiency</td>
<td>Not Available</td>
<td>75.5%</td>
<td>Not Available</td>
</tr>
<tr>
<td>Flue size connection diameter — in. (mm) round</td>
<td>4 (102)</td>
<td>5 (127)</td>
<td></td>
</tr>
<tr>
<td>Temperature rise range — °F (°C)</td>
<td>45 - 75 (25 - 42)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.F.U.E.</td>
<td>80.0%</td>
<td>80.1%</td>
<td>80.0%</td>
</tr>
<tr>
<td>California Seasonal Efficiency</td>
<td>Not Available</td>
<td>75.5%</td>
<td>Not Available</td>
</tr>
<tr>
<td>Gas Piping Size</td>
<td>1/2 (13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blower wheel nominal diameter x width</td>
<td>in. 12 x 8</td>
<td>in. 12 x 9</td>
<td></td>
</tr>
<tr>
<td>Blower motor output — hp (W)</td>
<td>1/2 (373)</td>
<td>3/4 (560)</td>
<td></td>
</tr>
<tr>
<td>Nominal cooling that can be added</td>
<td>Tons 2, 2-1/2, 3, 3-1/2 or 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>kW 7.0, 8.8, 10.6, 12.3 or 14.1</td>
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<td></td>
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<tr>
<td>Shipping weight — lbs. (kg)</td>
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</tr>
<tr>
<td>Electrical characteristics</td>
<td>120 volts — 60 hertz — 1 phase (less than 12 amps)</td>
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<tr>
<td>LPG/propane kit</td>
<td>LB-69845K (81J14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twining Kit</td>
<td>96J69 — 5 lbs. (2 kg)</td>
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<td></td>
</tr>
<tr>
<td>Up-Flow/Horizontal Filter and Filter Rack Kits</td>
<td>Single (46J14) Ten Pack (66K65)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(1) 20 x 20 x 1 (508 x 508 x 25)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DDow-flow Filter Rack</td>
<td>Catalog No. LB-69843A (32J01) — 3 lbs. (1 kg)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>No. &amp; Size of Filters (2) 16 x 20 x 1</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(2) 406 x 508 x 25</td>
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</tr>
<tr>
<td>Down-flow Combustible Floor Base</td>
<td>LB-79239B (67J92) — 10 lbs. (4 kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sidewall Power Venting Kit</td>
<td>79J15 — 25 lbs. (11 kg)</td>
<td></td>
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<tr>
<td>Hanging Bracket Kit</td>
<td>LB-69957 (46J66) — 15 lbs. (8 kg)</td>
<td></td>
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</tbody>
</table>

— Optional Accessories (Must Be Ordered Extra) —

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

† Polyurethane frame type filter is furnished with kit.

‡ 2 in. x 5 in. (51 mm x 127 mm) flue adaptor furnished with -140 input furnaces for connection to furnace induced draft blower.

## BLOWER DATA

### External Static Pressure

<table>
<thead>
<tr>
<th>in. w.g.</th>
<th>Pa</th>
<th>cfm</th>
<th>L/s</th>
<th>cfm</th>
<th>L/s</th>
<th>cfm</th>
<th>L/s</th>
<th>cfm</th>
<th>L/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1270</td>
<td>600</td>
<td>980</td>
<td>460</td>
<td>770</td>
<td>365</td>
<td>570</td>
<td>270</td>
</tr>
<tr>
<td>.05</td>
<td>12</td>
<td>1245</td>
<td>590</td>
<td>975</td>
<td>460</td>
<td>770</td>
<td>365</td>
<td>565</td>
<td>265</td>
</tr>
<tr>
<td>.10</td>
<td>25</td>
<td>1220</td>
<td>575</td>
<td>975</td>
<td>460</td>
<td>770</td>
<td>365</td>
<td>565</td>
<td>265</td>
</tr>
<tr>
<td>.15</td>
<td>37</td>
<td>1195</td>
<td>565</td>
<td>965</td>
<td>455</td>
<td>765</td>
<td>360</td>
<td>560</td>
<td>265</td>
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<tr>
<td>.20</td>
<td>50</td>
<td>1170</td>
<td>550</td>
<td>960</td>
<td>455</td>
<td>760</td>
<td>360</td>
<td>560</td>
<td>265</td>
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<td>1140</td>
<td>540</td>
<td>950</td>
<td>450</td>
<td>760</td>
<td>360</td>
<td>555</td>
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<td>940</td>
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<td>880</td>
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<td>900</td>
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<td>740</td>
<td>350</td>
<td>630</td>
<td>295</td>
<td>520</td>
<td>245</td>
</tr>
</tbody>
</table>

**NOTE** — All air data is measured external to unit with 1 in. (25 mm) cleanable filter (not furnished) in place. Also see Filter Air Resistance table.
### BLOWER DATA
#### G24M3-60 AND G24M3-75 BLOWER PERFORMANCE

<table>
<thead>
<tr>
<th>External Static Pressure</th>
<th>High</th>
<th>Medium-High</th>
<th>Medium-Low</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>in. w.g.</td>
<td>Pa</td>
<td>cfm</td>
<td>L/s</td>
<td>cfm</td>
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<td>670</td>
<td>1230</td>
</tr>
<tr>
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<td>1400</td>
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<td>985</td>
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<td>175</td>
<td>1070</td>
<td>505</td>
<td>920</td>
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</table>

**NOTE** — All air data is measured external to unit with 1 in. (25 mm) cleanable filter (not furnished) in place. Also see Filter Air Resistance table.

### G24M4-75, G24M3/4-100 AND G24M3/4-120 BLOWER PERFORMANCE

<table>
<thead>
<tr>
<th>External Static Pressure</th>
<th>High</th>
<th>Medium-High</th>
<th>Medium</th>
<th>Medium-Low</th>
<th>Low</th>
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</thead>
<tbody>
<tr>
<td>in. w.g.</td>
<td>Pa</td>
<td>cfm</td>
<td>L/s</td>
<td>cfm</td>
<td>L/s</td>
</tr>
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<td>0</td>
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<td>865</td>
<td>1600</td>
<td>755</td>
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<tr>
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<td>12</td>
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<tr>
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<td>25</td>
<td>1800</td>
<td>850</td>
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<td>125</td>
<td>1600</td>
<td>755</td>
<td>1420</td>
<td>670</td>
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<tr>
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<td>1550</td>
<td>730</td>
<td>1380</td>
<td>650</td>
</tr>
<tr>
<td>.70</td>
<td>175</td>
<td>1480</td>
<td>700</td>
<td>1330</td>
<td>630</td>
</tr>
</tbody>
</table>

**NOTE** — All air data is measured external to unit with 1 in. (25 mm) cleanable filter (not furnished) in place. Also see Filter Air Resistance table.
## BLOWER DATA

**G24M4/5-100, G24M4/5-120 AND G24M4/5-140 BLOWER PERFORMANCE**

### External Static Pressure

<table>
<thead>
<tr>
<th>in. w.g.</th>
<th>Pa</th>
<th>Air Volume at Various Blower Speeds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cfm        L/s</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>2450       1155</td>
</tr>
<tr>
<td>.05</td>
<td>12</td>
<td>2440       1150</td>
</tr>
<tr>
<td>.10</td>
<td>25</td>
<td>2430       1145</td>
</tr>
<tr>
<td>.15</td>
<td>37</td>
<td>2415       1140</td>
</tr>
<tr>
<td>.20</td>
<td>50</td>
<td>2400       1135</td>
</tr>
<tr>
<td>.25</td>
<td>62</td>
<td>2380       1125</td>
</tr>
<tr>
<td>.30</td>
<td>75</td>
<td>2360       1115</td>
</tr>
<tr>
<td>.40</td>
<td>100</td>
<td>2310       1090</td>
</tr>
<tr>
<td>.50</td>
<td>125</td>
<td>2260       1065</td>
</tr>
<tr>
<td>.60</td>
<td>150</td>
<td>2180       1030</td>
</tr>
<tr>
<td>.70</td>
<td>175</td>
<td>2100       990</td>
</tr>
</tbody>
</table>

**NOTE** — All air data is measured external to unit with 1 in. (25 mm) cleanable filter (not furnished) in place. Also see Filter Air Resistance table

### FILTER AIR RESISTANCE

<table>
<thead>
<tr>
<th>cfm (L/s)</th>
<th>in. w.g. (Pa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (0)</td>
<td>0.00 (0)</td>
</tr>
<tr>
<td>200 (95)</td>
<td>0.01 (2)</td>
</tr>
<tr>
<td>400 (185)</td>
<td>0.03 (7)</td>
</tr>
<tr>
<td>600 (280)</td>
<td>0.04 (10)</td>
</tr>
<tr>
<td>800 (375)</td>
<td>0.06 (15)</td>
</tr>
<tr>
<td>1000 (470)</td>
<td>0.09 (22)</td>
</tr>
<tr>
<td>1200 (560)</td>
<td>0.12 (30)</td>
</tr>
<tr>
<td>1400 (655)</td>
<td>0.15 (37)</td>
</tr>
<tr>
<td>1600 (750)</td>
<td>0.19 (47)</td>
</tr>
<tr>
<td>1800 (845)</td>
<td>0.23 (57)</td>
</tr>
<tr>
<td>2000 (935)</td>
<td>0.27 (67)</td>
</tr>
<tr>
<td>2200 (1030)</td>
<td>0.33 (82)</td>
</tr>
<tr>
<td>2400 (1125)</td>
<td>0.38 (95)</td>
</tr>
<tr>
<td>2600 (1220)</td>
<td>0.44 (110)</td>
</tr>
</tbody>
</table>
To Access Blower:
1- Turn off power to unit and disconnect L1 and L2 line voltage power.
2- Disconnect thermostat wiring connections from furnace control board.
3- Remove screws (2) from blower panel.
4- Disconnect J135 from P135 from limit control.
5- Disconnect J43 from blower motor.
6- Remove blower panel and lift from unit.
I-UNIT COMPONENTS (Figures 1, 2, 3)

G24M unit components are shown in figure 1. The blower controls, gas valve and burners can be accessed by removing the front access panel. A separate blower access door is located behind the front access panel. Electrical control components are mounted to the blower access door.

G24M units are factory equipped with bottom return air panels in place. The panels are designed to be field removed as required for bottom air return. Indentations on side of units, show where side return opening should be cut during installation.

A-Blower Door Components (Figure 4)

Electrical burner control and blower control components are located on the outside surface of the blower access door. Jackplugs allow the blower door to be easily removed for blower service.

Located on the blower door are the unit transformer (T1), the furnace control (A3) and door interlock switch (S51). Furnace control (A3) combines the function of a burner ignition control and blower control.

1- Control Transformer (T1)

A transformer located on the blower door provides power to the low voltage section of the unit. Transformers on all models are rated 30VA with a 120V primary and a 24V secondary.

2-Door Interlock Switch (S51)

A door interlock switch rated 16A at 125VAC is located on the blower access door. The switch is wired in series with line voltage. When the blower door is removed the unit will shut down.

DANGER

Shock hazard.
Disconnect power before servicing. Control is not field repairable. If control is inoperable, simply replace entire control.
Can cause injury or death. Unsafe operation will result if repair is attempted.

3- SureLight Ignition System (A3) Late Model G24M Units

Late model G24M units are equipped with the Lennox SureLight ignition system. The system consists of ignitor (figure 5) and ignition control board (figure 6 with control terminal designations in table 1). The board and ignitor work in combination to ensure furnace ignition and ignitor durability. The SureLight integrated board controls all major furnace operations. The board also features two LED lights for troubleshooting and two accessory terminals rated at (4) four amps. See table 2 for troubleshooting diagnostic codes. Table 3 and 4 show jack plug terminal designations. Units equipped with the SureLight board can be used with either electronic or electro-mechanical thermostats without modification. The SureLight ignitor is made of durable silicon-nitride. Ignitor longevity is also enhanced by voltage ramping by the control board. The board finds the lowest ignitor temperature which will successfully light the burner, thus increasing the life of the ignitor.

a-flame sensor

The flame sensor uses flame rectification to sense combustion. During operation, flame is sensed by current passed through the flame and sensing electrode. Figure 7 shows the gap between tip of the electrode and the burner surface.
SURELIGHT CONTROL BOARD
LATE MODEL G24M UNITS

FIGURE 6

SURELIGHT CONTROL TERMINAL DESIGNATIONS

<table>
<thead>
<tr>
<th>designation</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACB COOL</td>
<td>Blower - Cooling Speed (Line Volt)</td>
</tr>
<tr>
<td>ACB HEAT</td>
<td>Blower - Heating Speed (Line Volt)</td>
</tr>
<tr>
<td>PARK</td>
<td>Alternate Blower Speeds (Dead)</td>
</tr>
<tr>
<td>ACB LOW</td>
<td>Continuous Low Speed Blower</td>
</tr>
<tr>
<td>ACC</td>
<td>Accessory Terminal (Line Volt)</td>
</tr>
<tr>
<td>TX</td>
<td>120VAC Hot to Transformer</td>
</tr>
<tr>
<td>HOT</td>
<td>120VAC Hot Input</td>
</tr>
<tr>
<td>HTG ACC</td>
<td>Heat Only Accessory (Line Volt)</td>
</tr>
<tr>
<td>NEUTRALS</td>
<td>120VAC Neutrals</td>
</tr>
<tr>
<td>24VAC HOT</td>
<td>24VAC Hot from Transformer</td>
</tr>
<tr>
<td>24VAC RTN</td>
<td>24VAC Return from Transformer</td>
</tr>
<tr>
<td>FLAME SENSE</td>
<td>Flame Sense Terminal</td>
</tr>
</tbody>
</table>

FIGURE 7

NORMAL FLAME SIGNAL > 0.7 MICROAMPS
LOW FLAME SIGNAL < 0.7 MICROAMPS
MINIMUM FLAME SIGNAL < 0.15 MICROAMPS

FLAME SENSOR TO BURNER GAP
1/4 in. 7 mm
1/32 in. 0.79 mm
3/16 in. 4.7 mm
11/16 in. 18 mm

TABLE 1

<table>
<thead>
<tr>
<th>table 1</th>
</tr>
</thead>
</table>

TABLE 2

DIAGNOSTIC CODES

MAKE SURE TO ID LED'S CORRECTLY: REFER TO INSTALLATION INSTRUCTIONS FOR CONTROL BOARD LAYOUT.

<table>
<thead>
<tr>
<th>LED #1</th>
<th>LED #2</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simultaneous Slow Flash</td>
<td>Simultaneous Slow Flash</td>
<td>Power - Normal operation Also signaled during cooling and continues fan.</td>
</tr>
<tr>
<td>Simultaneous Fast Flash</td>
<td>Simultaneous Fast Flash</td>
<td>Normal operation - signaled when heating demand initiated at thermostat.</td>
</tr>
<tr>
<td>Slow Flash</td>
<td>ON</td>
<td>Primary or Secondary limit open. Units with board 63K8901 or 24L85: Limit must close within 5 trials for ignition or board goes into one hour limit Watchguard. Units with board 56L83 or 97L48: Limit must close within 3 minutes or board goes into one hour limit Watchguard.</td>
</tr>
<tr>
<td>OFF</td>
<td>SLOW FLASH</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>Alternating Slow Flash</td>
<td>Alternating Slow Flash</td>
<td>Watchguard - burners fail to ignite.</td>
</tr>
<tr>
<td>SLOW FLASH</td>
<td>OFF</td>
<td>Flame sensed without gas valve energized.</td>
</tr>
<tr>
<td>ON</td>
<td>SLOW FLASH</td>
<td>Rollout switch open. OR: 9 pin connector improperly attached.</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>FAST FLASH</td>
<td>SLOW FLASH</td>
<td>Main power polarity reversed. Switch line and neutral.</td>
</tr>
<tr>
<td>SLOW FLASH</td>
<td>FAST FLASH</td>
<td>Low flame signal. Measures below .7 microAmps. Replace flame sense rod.</td>
</tr>
<tr>
<td>Alternating Fast Flash</td>
<td>Alternating Fast 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). Drop out flame sense current < 0.15 microAmps
TABLE 3
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 Blower Line Voltage</td>
</tr>
<tr>
<td>5</td>
<td>Not Used</td>
</tr>
<tr>
<td>6</td>
<td>Combustion Air Blower Neutral</td>
</tr>
</tbody>
</table>

TABLE 4
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>

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.

**b−Electronic Ignition**
On a call for heat the SureLight control monitors the combustion air inducer prove switch. The control will not begin the heating cycle if the prove switch is closed (by-passed). Once the prove switch is determined to be open, the combustion air inducer is energized. When the differential in the prove switch is great enough, the prove switch closes and a 15-second pre-purge begins. If the prove switch is not proven within 2-1/2 minutes, the control goes into Watchguard-Pressure Switch mode for a 5-minute re-set period.

**NOTE** - The G24M furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

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 stays energized for the first second of the 4-second trial. G24M units with 63K89, 24L85 or 56L83: the ignitor stays energized the first second of the 4 second trial. G24M units with board 97L48: ignitor stays energized during the 4-second trial until flame is sensed. If ignition is not proved during the 4-second period, the control will try four more times with an inter purge and warm-up time between trials of 35 seconds. After a total of five trials for ignition (including the initial trial), the control goes into Watchguard-Flame Failure mode. After a 60-minute reset period, the control will begin the ignition sequence again.

The SureLight control board has an added feature that prolongs the life of the ignitor. After a successful ignition, the SureLight control utilizes less power to energize the ignitor on successive calls for heat. The control continues to ramp down the voltage to the ignitor until it finds the lowest amount of power that will provide a successful ignition. This amount of power is used for 255 cycles. On the 256th call for heat, the control will again ramp down until the lowest power is determined and the cycle begins again.

**c−Fan Time Control**
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 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. See figure 8.

**NOTE**—If fan “off” time is set too low, residual heat in heat exchanger may cause primary limit S10 to trip resulting in frequent cycling of blower. If this occurs, adjust blower to longer time setting.

**FAN-OFF TIME ADJUSTMENT**

<table>
<thead>
<tr>
<th>60sec.</th>
<th>90sec.</th>
<th>120sec.</th>
<th>180sec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>ON 2</td>
<td>ON 1</td>
<td>ON 2</td>
<td>ON 2</td>
</tr>
</tbody>
</table>

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

**FIGURE 8**
4- Ram Control (A3)
Early Model G24M Units
The furnace control combines burner ignition functions with blower control functions.
Early model G24M units utilize a furnace control manufactured by RAM Electronics Corporation. The “RAM” board is a printed circuit board which controls the blower, gas valve, combustion air blower and ignition spark. It also monitors the flame, limit and gas valve operation. The control has a non-adjustable, factory preset “on” fan timing (45 seconds). Fan “off” timings are adjustable. The board utilizes both 120 and 24VAC. See figure 9. The board is also equipped with a diagnostic LED for use when troubleshooting the unit.
When the furnace is idle (blower off and no heating or cooling demand), the diagnostic LED flashes at a slow steady rate. On a call for heat, the diagnostic LED begins flashing at a fast rate and the combustion air blower is energized. The LED flashes different codes to indicate problem conditions. The diagnostic LED lights red (not flashing) to indicate control board failure. Table 7 shows how to interpret the other LED modes.

Pre-Purge
On a call for heat, the combustion air blower begins operating. If the combustion air prove switch closes, the combustion air blower continues to operate for 45 seconds (pre-purge) before allowing ignition. Pre-purge allows the heat exchanger to be cleared of combustion products and to introduce fresh air for combustion. If the combustion air prove switch does not close, the combustion air blower continues to run indefinitely (until the prove switch closes).

Post-Purge
After a demand, the combustion air blower continues to operate for 5 seconds (post-purge) before stopping. Post-purge allows the heat exchanger to be cleared of combustion products.

Ignition Control
The ignition control is a direct spark ignition control module integral to the furnace control. See figure 9. When there is a call for heat, the control delays ignition until combustion air blower operation has been proved and pre-purge period has elapsed. It then opens the gas valve and generates a spark to ignite the burners. Trial for ignition lasts for 7 seconds. At the same time, the control begins monitoring the flame sensor. If the flame current is too weak (less than 1 microamp) or if the burners do not ignite (within the 7 second ignition trial), the control will shut off the spark ignitor and the combustion air blower and de-energize the gas valve. Flame current should be between 1 and 5 microamps to keep the gas valve open. See figure 21.
The control will attempt to ignite the burners up to two more times. Each time the control restarts the ignition sequence, it begins with a 45 second pre-purge. If flame is not sensed after the third trial, the control locks out. Lockout means that the control shuts off the gas valve, spark and combustion air blower for 60 minutes. At the end of 60 minutes the control completely resets and will attempt ignition up to three times. The control can be manually reset before the end of 60 minutes by momentarily turning off power to the unit.

⚠️ DANGER
Shock hazard.
Spark related components contain high voltage. Disconnect power before servicing. Control is not field repairable. If control is inoperable, simply replace entire control.
Can cause injury or death. Unsafe operation will result if repair is attempted.
TABLE 5

<table>
<thead>
<tr>
<th>Condition</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustion Air Blower</td>
<td>Gas Valve</td>
</tr>
<tr>
<td>Loss of Flame Sensed Before End of 45 second Blower On Delay (3 or Fewer Trials for Ignition)</td>
<td>On</td>
</tr>
<tr>
<td>Loss of Flame Sensed After 45 second Blower On Delay (3 or Fewer Trials for Ignition)</td>
<td>On</td>
</tr>
<tr>
<td>Loss of Flame Sensed (More Than 3 Trials for Ignition)</td>
<td>Off</td>
</tr>
<tr>
<td>Flame Sensed Without Demand</td>
<td>On</td>
</tr>
<tr>
<td>Primary or Secondary Limit Open</td>
<td>On</td>
</tr>
<tr>
<td>Rollout Switch Open</td>
<td>On</td>
</tr>
<tr>
<td>Combustion Air Prove Switch Open</td>
<td>On</td>
</tr>
</tbody>
</table>

When flame is sensed, the indoor blower starts after a 45 second delay. Gas valve remains open and blower continues to run until demand stops, flame sensor senses loss of flame, a limit opens or the prove switch opens. If any of these events occur during a thermostat demand, the gas valve closes and the diagnostic LED registers the error condition (table 5).

Blower Control and Timings

DANGER

Electrical Shock Hazard.
This control contains field adjustable switches and also contains line voltage. Make sure power is disconnected before making any field adjustments or performing any service procedure.

NOTE—If fan “off” time is set too low, residual heat in heat exchanger may cause primary limit S10 to trip resulting in frequent cycling of blower. If this occurs, adjust blower to longer time setting.

Fan “ON” timing (time that the burners operate before the supply air blower starts) is fixed at 45 seconds and cannot be adjusted.

Fan “OFF” timings (time that the blower operates after a heating or cooling demand has been satisfied) are determined by the arrangement of switches on the furnace control board. See figure 9. To adjust fan “off” timings, gently reposition the switches to a new timing position. Figure 10.
shows the various fan "off" timings and how switches should be positioned. Unit is shipped with a factory fan "off" setting of 180 seconds. Fan "off" time will affect comfort and efficiency and is adjustable to satisfy individual applications. The fan "off" timing is initiated after a heating or cooling demand but not after a blower demand (that is, when indoor thermostat switch is changed from ON to AUTO and heating/cooling demand is not present, the blower stops immediately).

**TABLE 6**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Type</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VAC HOT</td>
<td>1/4&quot; Spade</td>
<td>24VAC In From Transformer</td>
</tr>
<tr>
<td>GND</td>
<td>1/4&quot; Spade</td>
<td>To Cabinet Ground</td>
</tr>
<tr>
<td>Y</td>
<td>Screw Strip</td>
<td>Cooling Demand</td>
</tr>
<tr>
<td>G</td>
<td>Screw Strip</td>
<td>Blower Demand</td>
</tr>
<tr>
<td>R</td>
<td>Screw Strip</td>
<td>24VAC to Thermostat</td>
</tr>
<tr>
<td>W</td>
<td>Screw Strip</td>
<td>Heating Demand</td>
</tr>
<tr>
<td>C</td>
<td>Screw Strip</td>
<td>24VAC Common</td>
</tr>
<tr>
<td>120VAC HOT</td>
<td>1/4&quot; Spade</td>
<td>Line Voltage In</td>
</tr>
<tr>
<td>120VAC RTN</td>
<td>1/4&quot; Spade</td>
<td>Line Voltage Neutral</td>
</tr>
<tr>
<td>120VAC TX</td>
<td>1/4&quot; Spade</td>
<td>Line Voltage Out To Transformer</td>
</tr>
<tr>
<td>CMB</td>
<td>J20/P20 Pin 1</td>
<td>Switched 120VAC to Combustion Air Blower</td>
</tr>
<tr>
<td>CMB RTN</td>
<td>J20/P20 Pin 2</td>
<td>120VAC Common Combustion Air Blower</td>
</tr>
<tr>
<td>ACB HEAT</td>
<td>1/4&quot; Spade</td>
<td>Switched 120VAC to Blower Heating Tap</td>
</tr>
<tr>
<td>ACB LOW</td>
<td>1/4&quot; Spade</td>
<td>120VAC Output to Supply Air Blower for Continuous Operation During No Demand</td>
</tr>
<tr>
<td>ACB COOL</td>
<td>1/4&quot; Spade</td>
<td>Switched 120VAC to Blower Cooling Tap</td>
</tr>
<tr>
<td>VLV HOT</td>
<td>J20/P20 Pin 13</td>
<td>24VAC to Gas Valve</td>
</tr>
<tr>
<td>VLV RTN</td>
<td>J20/P20 Pin 9</td>
<td>24VAC Common From Gas Valve</td>
</tr>
<tr>
<td>PSW IN</td>
<td>J20/P20 Pin 10</td>
<td>24VAC In From Pressure Switch Switch Open: Prohibits Ignition Switch Closed: Allows Ignition</td>
</tr>
<tr>
<td>HIL IN</td>
<td>J20/P20 Pin 11</td>
<td>24VAC In From Limits Limit Open: Closes Gas Valve Limits Closed: Allows Ignition</td>
</tr>
<tr>
<td>HIL OUT</td>
<td>J20/P20 Pin 14</td>
<td>24VAC to Limit Train and Pressure Switch</td>
</tr>
<tr>
<td>RO OUT</td>
<td>J20/P20 Pin 7</td>
<td>24VAC Out To Rollout Switches</td>
</tr>
<tr>
<td>RO IN</td>
<td>J20/P20 Pin 15</td>
<td>24VAC In From Rollout Switches</td>
</tr>
<tr>
<td>SPARK ELECTRODE</td>
<td>Male Spark Plug Type</td>
<td>High Voltage Out To Spark Electrode</td>
</tr>
<tr>
<td>FS</td>
<td>J20/P20 Pin 12</td>
<td>Flame Microamp Sensing</td>
</tr>
</tbody>
</table>

**Diagnostic LED**
The furnace control is equipped with a diagnostic LED used for troubleshooting the unit and the control. LED functions are shown in table 7.

**TABLE 7**

<table>
<thead>
<tr>
<th>LED State</th>
<th>Meaning</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steady On</td>
<td>Control Failure</td>
<td>Replace Control</td>
</tr>
<tr>
<td>Slow Flash</td>
<td>Normal Operation and No Call For Heat</td>
<td>- - -</td>
</tr>
<tr>
<td>Fast Flash</td>
<td>Normal Operation with Call For Heat</td>
<td>- - -</td>
</tr>
<tr>
<td>Two Flashes</td>
<td>Control Lockout</td>
<td>Failed to Sense or Sustain Flame. Check Gas Valve, Burners, Spark Electrode and Wire, Flame Sensor. Replace Control If All OK.</td>
</tr>
<tr>
<td>Three Flashes</td>
<td>Pressure Switch Open</td>
<td>Failed to Prove Combustion Blower Operation or Blocked Vent. Repair or Replace as Necessary.</td>
</tr>
<tr>
<td>Four Flashes</td>
<td>Open Limit</td>
<td>Check Primary Limit, Rollout Switches and Secondary Limits. Find source of Overtemperature. If all OK, Reset or Replace Limits as Necessary.</td>
</tr>
<tr>
<td>Five Flashes</td>
<td>Flame Sensed and Gas Valve Not Energized.</td>
<td>Check Gas Valve. If OK, Check Flame Sensor.</td>
</tr>
</tbody>
</table>

**B-Blower Motors and Capacitors**
All G24M units use direct drive blower motors. All motors used are 120V permanent split capacitor motors to ensure maximum efficiency. See table 8 for ratings.

**TABLE 8**

<table>
<thead>
<tr>
<th>BLOWER MOTOR</th>
<th>HP</th>
<th>CAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>G24MQ2</td>
<td>1/4</td>
<td>5MFD 370V</td>
</tr>
<tr>
<td>G24MQ3</td>
<td>1/3</td>
<td>5MFD 370V</td>
</tr>
<tr>
<td>G24MQ3/4</td>
<td>1/2</td>
<td>7.5MFD 370V</td>
</tr>
<tr>
<td>G24MQ4</td>
<td>1/2</td>
<td>7.5MFD 370V</td>
</tr>
<tr>
<td>G24MQ4/5</td>
<td>3/4</td>
<td>40MFD 370V</td>
</tr>
<tr>
<td>G24MQ5/6</td>
<td>3/4</td>
<td>40MFD 370V</td>
</tr>
</tbody>
</table>

**SUPPLY AIR BLOWER AND SECONDARY LIMITS**

**FIGURE 10**

**FIGURE 11**
C-Combustion Air Inducer (B6)

All G24M units use a combustion air inducer to move air through the burners and heat exchanger during heating operation. Some early model G24M units are equipped with a blower that uses a PSC (Permanent Split Capacitor) 120VAC motor. PSC motors use run capacitors. Other early and late model G24M units are equipped with a blower that uses a shaded pole 120V motor. The motor operates during all heating operation and is controlled by furnace control A3. For G24M units equipped with the Ram ignition system, the blower will operate for 45 seconds before burner ignition (pre-purge) and for 5 seconds after the gas valve closes (post-purge). For G24M units equipped with the SureLight ignition system, the blower will operate for 15 seconds before burner ignition (pre purge) and for 5 seconds after the the gas valve closes (post purge).

A pressure switch connected to the combustion air blower housing is used to prove combustion air blower operation. The switch monitors air pressure in the blower housing. During normal operation, the pressure in the housing is negative. If pressure becomes less negative (signifying an obstruction) the pressure switch opens. When the pressure switch opens, the furnace control (A3) immediately closes the gas valve to prevent burner operation.

D-Flame Rollout Switches (S47)

Flame rollout switch is a high temperature limit located on top of the burner box. Each furnace is equipped with two identical switches. One switch is located over the leftmost burner and the other switch is located over the rightmost burner. The limit is a N.C. SPST manual-reset limit connected in series with the ignition control A3. When S47 senses rollout, the ignition control immediately stops ignition and closes the gas valve. If unit is running and flame rollout is detected, the gas valve will close and ignition control will be disabled. Rollout can be caused by a blocked flue or lack of combustion air. The switch is factory set and cannot be adjusted. The setpoint will be printed on the side of the limit. To manually reset a tripped switch, push the reset button located on the control.

E-Primary Limit Control (S10)

The primary limit (S10) on G24M units is located in the middle of the heating vestibule panel. When excess heat is sensed in the heat exchanger, the limit will open. If the limit is tripped, the furnace control energizes the supply air blower and closes the gas valve. The limit automatically resets when unit temperature returns to normal. The switch is factory set and cannot be adjusted. The switch may have different setpoints for each unit model number. However, the setpoint will be printed on the side of the limit.

F-Secondary Limit Controls (S21)

The secondary limit (S21) on G24M units is located in the blower compartment in the back side of the blower housing. When excess heat is sensed in the blower compartment, the limit will open. If the limit is tripped, the furnace control energizes the supply air blower and closes the gas valve. The limit automatically resets when unit temperature returns to normal. The switch is factory set and cannot be adjusted. Two limits are supplied in each furnace and each limit is a different style (figures 13 and 14). The setpoint will be printed on the side of the limit. If stick limit (figure 14) suffers from nuisance trips and the furnace is in the horizontal position, replace with limit kit no. 50L98.

G-Spark Electrode and Flame Sensor

Early Model G24M Units

Figure 15 shows the arrangement of flame sensor, spark electrode and burners. The ignition control uses direct spark to ignite the rightmost burner and the burners cross-light to the left. The flame sensor uses flame rectification to sense combustion. A flame retention ring in the end of each burner is used to maintain correct flame length and shape and to keep the flame from lifting off the burner head.

Figure 16 shows the gap between tip of the electrodes and the burner surface.
H-Gas Valve
The G24M uses a gas valve manufactured by Honeywell (figure 17) or White Rodgers (figure 18). The valve is internally redundant to assure safety shut-off. If the gas valve must be replaced, the same type valve must be used. 24VAC terminals and gas control knob are located on top of the valve. All terminals on the gas valve are connected to wires from the electronic ignition control. 24V applied to the terminals energizes the valve.

Inlet and outlet pressure taps are located on the valve. A regulator adjustment screw is located on the valve. Refer to figure 17 or 18 for location of valve features.

An LPG changeover kit is available from Lennox. The kit includes burner orifices and a regulator conversion kit.

I-Combustion Air Blower Prove (Pressure) Switch (S64)
G24M series units are equipped with a combustion air prove switch located on the vestibule panel. The switch is connected to the combustion air blower housing by means of a flexible silicone hose. It monitors air pressure in the combustion air blower housing.
The switch is a single-pole single-throw pressure switch electrically connected to the furnace control. The purpose of the switch is to prevent burner operation if the combustion air blower is not operating.

![Diagram of PROVE SWITCH and COMBUSTION AIR BLOWER](image)

**FIGURE 19**

On start-up, the switch senses that the combustion air blower is operating. It closes a circuit to the furnace control when pressure inside the combustion air blower increases above switch setting (negative) w.c. The pressure sensed by the switch is relative to atmospheric pressure. If the flue becomes obstructed during operation, the switch senses a loss of negative pressure (pressure becomes more equal with atmospheric pressure) and opens the circuit to the furnace control and gas valve. The switch trip pressure is different depending on unit model number. The trip pressure is printed on the side of the limit.

The switch is factory set and is not field adjustable. It is a safety shut-down control in the furnace and must not be bypassed for any reason.

**II-PLACEMENT AND INSTALLATION**

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

**III-START-UP**

**A-Preliminary and Seasonal Checks**

1. Inspect electrical wiring, both field and factory installed for loose connections. Tighten as required.
2. Check voltage at disconnect switch. Voltage must be within range listed on the nameplate. If not, consult the power company and have voltage condition corrected before starting unit.

**B-Heating Start-Up**

2. Wait 5 minutes.
3. Open manual knob on gas valve, replace burner access door and turn on unit electrical supply.

**WARNING**

Shock and burn hazard.

G24M units are equipped with either a direct spark or hot surface ignition system. Do not attempt to light manually.

4. Set fan switch to AUTO or ON and move system selection switch to HEAT. Adjust thermostat to a setting above room temperature.
5. If unit does not light the first time, the SureLight control will attempt four more ignitions, the Ram control will attempt two more ignitions before locking out.
6. If lockout occurs, repeat steps 1, 2, 3 and 4.

**C-Safety or Emergency Shutdown**

Turn off unit power. Close manual and main gas valves.

**IMPORTANT**

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

**D-Extended Period Shutdown**

Turn off thermostat or set to “UNOCCUPIED” mode. Close all gas valves (both internal and external to unit) to guarantee no gas leak into combustion chamber. Turn off power to unit. All access panels, covers and vent caps must be in place and secured.
IV-HEATING SYSTEM SERVICE CHECKS


All units are A.G.A. design certified without modifications. Refer to the G24M Operation and Installation Instruction Manual for Information.

B-Gas Piping

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

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

C-Testing Gas Piping

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5psig (14" W.C.). See figure 20. If the pressure is equal to or less than 0.5psig (14"W.C.), use the manual shut-off valve before pressure testing to isolate furnace from gas supply.

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

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

D-Testing Gas Supply Pressure

When testing supply gas pressure, connect test gauge to inlet pressure tap (field provided). See figure 20. Check gas line pressure with unit firing at maximum rate. Low pressure may result in erratic operation or underfire. High pressure can result in permanent damage to gas valve or overfire. For natural gas units, operating pressure at unit gas connection must be between 5.0" W.C. and 13.0" W.C. For L.P. gas units, operating pressure at unit gas connection must be between 10.0" W.C. and 13.0" W.C.

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

E-Check Manifold Pressure

After line pressure has been checked and adjusted, check manifold pressure. Move pressure gauge to outlet pressure tap located on unit gas valve (GV1). Checks of manifold pressure are made as verification of proper regulator adjustment. Manifold pressure for the G24M can be measured at any time the gas valve is open and is supplying gas to the unit. Normal manifold pressure for natural gas units is 3.5 in. w.c. For LP/propane gas the correct manifold pressure is 9.5 in. w.c.

The gas valve is factory set and should not require adjustment. All gas valves are factory regulated. See table 9.

Manifold Adjustment Procedure:

1 - Connect a test gauge to outlet pressure tap on gas valve. Start unit and allow 5 minutes for unit to reach steady state.

2 - While waiting for the unit to stabilize, notice the flame. Flame should be stable and should not lift from burner. Natural gas should burn blue. L.P. gas should burn mostly blue with some orange streaks.

3 - After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to values given in table 9.

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

TABLE 9

<table>
<thead>
<tr>
<th>Unit (Fuel)</th>
<th>Operating Pressure (outlet) in. W.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural</td>
<td>3.5 $\pm$ 0.3</td>
</tr>
<tr>
<td>L.P.</td>
<td>9.5 $\pm$ 0.5</td>
</tr>
</tbody>
</table>

For safety, connect a shut-off valve between the manometer and the gas tap to permit shut off of gas pressure to the manometer.
F- Proper Gas Flow

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for two revolutions of gas through the meter. (Two revolutions assures a more accurate time.) Divide by two and compare to time in table 10 below. Adjust manifold pressure on gas valve to match time needed.

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

TABLE 10

<table>
<thead>
<tr>
<th>G24M Unit</th>
<th>Seconds for One Revolution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Natural</td>
</tr>
<tr>
<td></td>
<td>1 cu ft Dial</td>
</tr>
<tr>
<td>-45</td>
<td>80</td>
</tr>
<tr>
<td>-60</td>
<td>60</td>
</tr>
<tr>
<td>-75</td>
<td>48</td>
</tr>
<tr>
<td>-100</td>
<td>36</td>
</tr>
<tr>
<td>-120</td>
<td>30</td>
</tr>
<tr>
<td>-140</td>
<td>26</td>
</tr>
</tbody>
</table>

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

G-High Altitude Derate

NOTE-In Canada, certification for installation at altitudes over 4500 ft. (1372m) above sea level is the jurisdiction of the local authorities.

G24M-1 through -9 Models

This unit does not require gas pressure adjustment, or pressure switch change when operating at elevations of 0 to 7500 ft. (0 to 2248m). Check gas line pressure with unit firing. The minimum pressure as shown on the nameplate for natural and propane gases must be maintained. No orifice change is required.

NOTE-This is the only permissible field derate for this appliance.

G24M-10 and -11 Models

Table 11 shows manifold pressure settings for installations at different altitudes. Refer to table 12 for pressure switch replacement for models at elevations of 4500 feet (1372m) and greater.

Important

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

H-Flame Signal

A microamp DC meter is needed to check the flame signal on the primary ignition control.

Flame (microamp) signal is an electrical current which passes from the furnace control through the sensor electrode during unit operation. Current passes from the sensor through the flame to ground to complete a safety circuit.

To Measure Flame Signal:

1 - Place meter in series between furnace control and sensor wire. Connect the positive (+) lead of meter to the ignition control sensor connection and the negative (-) lead of the meter to the sensor wire. See figure 21.

2 - Set thermostat for a heating demand and check flame signal with unit operating. For G24M series with a RAM control, a reading of 1 to 5 microamps DC should occur. The furnace control must see at least 1.0 microamps in order to keep the gas valve energized. G24M units with the SureLight control should read 0.7 microamps or more.
Flame signal from the Ram control may rise above 5 microamps for the first few seconds after ignition then level off within the range.

**WARNING**

Fire and explosion hazard. These instructions MUST be followed exactly. Can cause a fire or explosion resulting in property damage, personal injury or loss of life.

V−TYPICAL OPERATING CHARACTERISTICS

A−Blower Operation and Adjustment

NOTE− The following is a generalized procedure and does not apply to all thermostat controls.

1 - Blower operation is dependent on thermostat control system.

2 - Generally, blower operation is set at thermostat sub-base fan switch. With fan switch in ON position, blower operates continuously on low speed. With fan switch in AUTO position, blower cycles with demand or runs continuously while heating or cooling circuit cycles.

3 - In all cases, blower and entire unit will be off when the system switch is in OFF position.

B−Temperature Rise

Temperature rise for G24M units depends on unit input, blower speed, blower horsepower and static pressure as marked on the unit rating plate. The blower speed must be set for unit operation within the range of “AIR TEMP. RISE °F” listed in the unit rating plate.

To Measure Temperature Rise:

1 - Place plenum thermometers in the supply and return air plenums. Locate supply air thermometer in the first horizontal run of the plenum where it will not pick up radiant heat from the heat exchanger.

2 - Set thermostat to highest setting.

3 - After plenum thermometers have reached their highest and steadiest readings, subtract the two readings. The difference should be in the range listed on the unit rating plate. If the temperature is too low, decrease blower speed. If temperature is too high, first check the firing rate. Provided the firing rate is acceptable, increase blower speed to reduce temperature. To change blower speed taps see the Blower Speed Taps section in this manual.

C−External Static Pressure

1 - Measure tap locations as shown in figure 22.

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

3 - With only the blower motor running and the evaporator coil dry, observe the manometer reading. Adjust blower motor speed to deliver the air desired according to the job requirements.

4 - External static pressure drop must not be more than 0.5” W.C.

5 - Seal around the hole when the check is complete.
D-Blower Speed Taps Leadless Motors

Blower speed tap selection is accomplished by changing the taps at the blower motor harness connector. Disconnect harness connector from motor to expose speed selectors. Blower speed selections are listed in table 13.

To Change Blower Speed:
1. Turn off electric power to furnace.
2. Remove front panel and blower access door. See figure 4.
3. Disconnect blower motor harness from motor.
4. Select desired speeds for heating and cooling (refer to unit wiring diagram).
5. Depress harness connector tab to release wire terminal. Select connector location for new speed (refer to unit wiring diagram). Insert wire terminal until it is securely in place. See figure 23.
6. Replace harness connector to motor.

E-Blower Speed Taps Leaded Motors

Blower speed tap changes are made on the SureLight control board. See figure 6. Unused taps must be secured on dummy terminals "PARK M1" and or "PARK M2" on the SureLight board. The heating tap is connected to the "ACB HEAT" terminal and the cooling tap is connected to the "ACB COOL" terminal. The continuous blower tap is connected to the "ACB LOW" terminal.

To change existing heat tap, turn off power then switch out speed tap on "ACB HEAT" with tap connected to "PARK M1" or "PARK M2". See table 14 for blower motor tap colors for each speed.

VI-MAINTENANCE

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

A- Filters
A filter must be used in order to ensure long life and proper operation. The filter is located in the return air duct or return air register. Filters must be cleaned or replaced when dirty to assure proper unit operation.

B- Heat Exchanger and Burners

NOTE—Use papers or protective covering in front of furnace while cleaning furnace. Due to dimples designed in the heat exchanger, cleaning is not recommended. Removal is for inspection only.
To clean burners:
1 - Turn off both electrical and gas power supplies to furnace.
2 - Disconnect gas supply piping and remove gas manifold.
3 - Disconnect ignitor and flame sensor leads.
4 - Remove burner tray and burners.
5 - Clean burner retention ring with wire brush.
6 - Use test tube brush to clean inside of each burner.
7 - Replace burners and burner tray, making sure burners are properly seated in slots on tray and orifice in manifold.
8 - Reinstall burner box and gas supply piping. Reconnect ignitor and flame sense leads.
9 - Carefully check all piping connections (factory and field) for gas leaks. Use a leak detecting solution or other preferred means.
10 - Restore electrical power and gas supply. Follow lighting instructions on front of unit.

**CAUTION**
Potential for gas leaks, fire or explosion. Some soaps used for leak detection are corrosive to certain metals. Carefully clean piping thoroughly after leak detection has been completed. Can cause damage to piping resulting in gas leaks, fire or explosion.

C-Supply Air Blower
1 - Check and clean blower wheel.
2 - Motors used on the Lennox G24M series units are permanently lubricated and need no further lubrication.

D-Flue and Chimney
Flue must conform to all AGA/GAMA venting requirements. Flue pipe deteriorates from the inside out and must be disconnected in order to check thoroughly. Check flue pipe, chimney and all connections for tightness and to make sure there is no blockage or leaks.

E-Electrical
1 - Check all wiring for loose connections.
2 - Check for correct voltage.
3 - Check amp-draw on blower motor.

---

**HEAT EXCHANGER REMOVAL**
(unit shown in horizontal position)

REMOVE SCREWS (4)

SLIDE ENTIRE ASSEMBLY OUT OF CABINET

FIGURE 24
VII - WIRING, OPERATION SEQUENCE & TROUBLESHOOTING
A - Field Wiring, Thermostat Connections

**FIGURE 25**

**TYPICAL G24M FIELD WIRING DIAGRAM**

- BLACK TO COMPRESSOR CONTACTOR
- TRANSFORMER
- DOOR INTERLOCK SWITCH
- GAS VALVE
- PRESSURE SWITCH
- PRIMARY LIMIT
- SECONDARY LIMITS
- COMBUSTION AIR BLOWER
- PRESSURE SWITCH
- FLAME ROLLOUT SWITCHES
- THERMOSTAT
- G24M FIELD WIRING

**FIGURE 26**

**G24M and CONDENSING UNIT THERMOSTAT DESIGNATIONS**
(Refer to specific thermostat and outdoor unit.)

- COOLING
- INDOOR BLOWER
- HEAT
- POWER
- COMMON
- COMPRESSION
- HS UNIT COMPRRESSOR
- HS UNIT COMMON
1 - When disconnect is closed, 120V is routed through door interlock switch (S51) to feed the line voltage side of the furnace control (A3) and transformer T1 primary. Door interlock switch must be closed for A3 and T1 to receive voltage.

2 - T1 supplies 24VAC to terminal "24VAC" on A3. In turn, terminal "R" of A3 supplies 24VAC to terminal "RC" of the indoor thermostat (not shown).

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

4 - CMB BLWR of the blower control energizes the combustion air blower (B6). When the combustion air blower nears full speed, combustion air prove switch (S18) closes.

5 - When S18 closes, assuming the flame rollout switch (S47), primary limit (S10) and secondary limits (S21) are closed, the furnace control begins a 45 second time-delay (pre-purge).

6 - At the end of the pre-purge cycle, the furnace control simultaneously opens the gas valve and sends high voltage to the spark electrode.

7 - When flame is sensed, the furnace control begins a 45 second delay before energizing the indoor blower.

8 - When heat demand is satisfied, W1 of the thermostat de-energizes W of the furnace control and the furnace control immediately de-energizes the gas valve. The combustion air blower runs for 5 seconds (post-purge) before being de-energized. Also, the indoor blower runs for a designated period (90-240 seconds) as set by switches on furnace control.
C-Ram Ignition Control Troubleshooting Guide

RAM CONTROL
HEATING TROUBLE SHOOTING SEQUENCE

NORMAL HEATING MODE

LED: SLOW FLASH RATE

THERMOSTAT CALLS FOR HEAT

LED: FAST FLASH RATE

FLAME OFF?

YES

CONTROL SELF-CHECK OKAY?

YES

HI LIMIT SWITCH CLOSED?

YES

PRESSURE SWITCH OPEN?

YES

COMBUSTION AIR BLOWER ON?

YES

PRESSURE SWITCH CLOSED?

NO

PREPURGE (45 seconds)

IGNITION TRIAL (7 seconds) – START IGNITION SPARK, OPEN MAIN GAS VALVE. INCREMENT TRIAL REGISTER, HAS FLAME BEEN REGISTERED WITHIN 7 SECONDS?

YES

SYSTEM FAN ON. (Fixed 45-second delay)

FLAME SENSE OKAY?

YES

FLAME CONTINUOUSLY CHECKED?

NO

ROLLOUT SWITCHES CLOSED

YES

HI LIMIT SWITCH CLOSED?

YES

PRESSURE SWITCH CLOSED?

YES

THERMOSTAT OPENS

LED: SLOW FLASH RATE

COMB. AIR BLOWER OFF (5 sec. delay)

FAN OFF (After selected 90, 120, 180, or 240 delay)?

NO

YES

NO

NO

NO

NO

NO

NO

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NO
RAM CONTROL
COOLING TROUBLE SHOOTING SEQUENCE

LED: Slow flash rate.
REMAINS UNCHANGED THROUGHOUT COOLING CYCLE.

THERMOSTAT CALLS FOR COOLING.

COMPRESSOR CONTACTOR AND SYSTEM FAN ENERGIZED AT COOLING SPEED AFTER 1 SECOND DELAY. ACC TERMINAL ENERGIZED.

THERMOSTAT OPENS.

COMPRESSOR OFF.

SYSTEM FAN AND ACC TERMINAL OFF AFTER COMPLETING SELECTED DELAY INTERVAL (At dip switches).

MANUAL FAN TROUBLESHOOTING SEQUENCE

LED: Slow flash rate.
REMAINS UNCHANGED THROUGHOUT SEQUENCE.

MANUAL FAN SELECTION MADE AT THERMOSTAT. CONTROL ENERGIZES SYSTEM FAN AT CONTINUOUS SPEED. ACC TERMINAL ENERGIZED.

THERMOSTAT CALLS FOR HEAT.

NO

SYSTEM FAN SWITCHES TO HEATING SPEED AFTER SELECTED DELAY. ACC TERM. REMAINS ENERGIZED.

YES

THERMOSTAT CALLS FOR COOLING.

SYSTEM FAN SWITCHED TO COOLING SPEED. ACC TERMINAL REMAINS ENERGIZED.

Yes

THERMOSTAT OPENS.

SYSTEM FAN SWITCHES TO CONTINUOUS SPEED AND ENERGIZES ACC TERMINAL. BOTH REMAIN ON UNTIL MANUAL FAN IS SWITCHED OFF AT THERMOSTAT.

No

THERMOSTAT OPENS.

SYSTEM FAN SWITCHED OFF AFTER DELAY. ACC TERMINAL DE-ENERGIZED.

LED CODES

<table>
<thead>
<tr>
<th>LED CODE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLOW FLASH</td>
<td>NORMAL OPERATION, NO CALL FOR HEAT.</td>
</tr>
<tr>
<td>FAST FLASH</td>
<td>NORMAL OPERATION, CALL FOR HEAT.</td>
</tr>
<tr>
<td>2 FLASH</td>
<td>SYSTEM LOCKOUT, FAILURE TO DETECT OR SUSTAIN FLAME.</td>
</tr>
<tr>
<td>3 FLASH</td>
<td>PRESSURE SWITCH OPEN OR CLOSED.</td>
</tr>
<tr>
<td>4 FLASH</td>
<td>HIGH LIMIT OR ROLLOUT SWITCH OPEN.</td>
</tr>
<tr>
<td>5 FLASH</td>
<td>FLAME SENSED AND GAS VALVE NOT ENERGIZED.</td>
</tr>
<tr>
<td>STEADY ON</td>
<td>CONTROL BOARD FAILURE.</td>
</tr>
</tbody>
</table>
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 continue.
3 - SureLight control energizes combustion air blower B6. Combustion air blower 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. Ignitor stays energized the first second of trial. (Board 97L48 only: ignitor energized during trial or until flame is sensed.
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 blower B6 continues a 5-second post-purge period, and indoor blower B3 completes a selected OFF time delay.
SURELIGHT CONTROL COOLING SEQUENCE

NORMAL COOLING MODE

POWER ON

IGNITION CONTROL MAIN POWER ON.

CONTROLLER SELF DIAGNOSTIC CHECK.
IS CONTROL OPERATING NORMALLY?

NO

TURN INDUCER ON FOR 1 SECOND.

YES

IS POLARITY REVERSED?

NO

SIGNAL IMPROPER GROUND AT LED.

YES

SIGNAL POLARITY REVERSED AT LED.

IS THERE PROPER GROUND?

NO

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

YES

GAS VALVE OFF. COMBUSTION AIR BLOWER OFF.
INDOOR BLOWER OFF WITH NORMAL DELAY.

GAS VALVE OFF. COMBUSTION AIR BLOWER OFF.
SEQUENCE HOLDS UNTIL ROLLOUT SWITCH CLOSES.

GAS VALVE OFF. COMBUSTION AIR BLOWER OFF.
SEQUENCE HOLDS UNTIL FLAME IS NOT SENSED.

ROLLOUT SWITCH MONITORED CONTINUOUSLY.
IS ROLLOUT SWITCH CLOSED?

NO

CHECK FOR MAIN BURNER FLAME SENSE.
IS MAIN BURNER FLAME OFF?

YES

LED: SLOW FLASH RATE REMAINS UNCHANGED THROUGHOUT COOLING CYCLE.

THERMOSTAT CALLS FOR COOLING.

COMPRESSOR CONTACTOR AND SYSTEM FAN ENERGIZED WITH 0-SECOND DELAY
ACB COOL SPEED AND ACC. TERM. ENERGIZED.

THERMOSTAT OPENS.

COMPRESSOR OFF.

ACB COOL SPEED AND ACC. TERM. OFF WITH 0-SECOND DELAY.

ABNORMAL COOLING MODE

GAS VALVE OFF. COMBUSTION AIR BLOWER OFF.
INDOOR BLOWER OFF WITH NORMAL DELAY.

SIGNAL CIRCUIT BOARD FAILURE AT LED.

INTERRUPT MAIN POWER TO RESET CONTROL.

NO
CONTINUOUS LOW 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 ACB LOW SPEED. ACC. TERMINAL IS ENERGIZED.

THERMOSTAT CALLS FOR HEAT (W).

NO

HTG ACC. TERM. ENERGIZES WITH COMB. AIR BLOWER.

YES

BOARD NO. 63K8901
SYSTEM FAN DE-ENERGIZED. SYSTEM FAN ENERGIZES ON ACB HEAT SPEED AFTER NORMAL DELAY.

THERMOSTAT CALLS FOR COOLING.

NO

SYSTEM FAN SWITCHED TO ACB COOL SPEED. ACC. TERM. REMAINS ON.

YES

THERMOSTAT OPENS.

BOARD 63K89: SYSTEM FAN OFF. ACC. TERM. OFF. (AFTER OFF DELAY COMPLETED).

THERMOSTAT OPENS. COMBUSTION AIR AND HTG ACC TERMINAL DE-ENERGIZE.

BOARD NO. 24L85, 56L83, 97L48
SYSTEM FAN SWITCHES TO ACB HEAT SPEED AFTER NORMAL DELAY (fan remains energized)

BOARDS 24L85, 56L83 AND 97L48:
SYSTEM FAN SWITCHES TO LOW SPEED AFTER NORMAL DELAY.
(fan remains energized)

MANUAL FAN SELECTION MADE AT THERMOSTAT. CONTROL (G) ENERGIZES SYSTEM FAN AT ACB LOW SPEED. ACC. TERM. ENERGIZED.
### E-SureLight Ignition Control Troubleshooting 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>LED#1-Off LED#2-Off</td>
<td>1.1.2 Miswiring of furnace or improper connections.</td>
<td><strong>ACTION 1</strong> - Check for correct wiring of 120V to power make up box and transformer. <strong>ACTION 2</strong> - Check 24V wiring to control board.</td>
</tr>
<tr>
<td>1.1.3 Circuit breaker tripped or fails to close.</td>
<td><strong>ACTION 1</strong> - Replace circuit breaker if it is reset but does not have continuity. <strong>ACTION 2</strong> - If circuit breaker still trips, check for short.</td>
<td></td>
</tr>
<tr>
<td>1.1.4 Door interlock switch failure.</td>
<td><strong>ACTION 1</strong> - Check that door switch is activated when door is closed. <strong>ACTION 2</strong> - Check wire connections to switch, replace loose connectors. <strong>ACTION 3</strong> - Check continuity of switch in closed position. Replace if malfunctioning</td>
<td></td>
</tr>
<tr>
<td>1.1.5 Transformer Failure.</td>
<td><strong>ACTION 1</strong> - Check that transformer output is 24V. Replace if malfunctioning</td>
<td></td>
</tr>
<tr>
<td>1.1.6</td>
<td>Failed control board.</td>
<td><strong>ACTION 1</strong> - If all the above items have been checked, replace board.</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>LED#1-On, LED#2-Slow Flash</td>
<td>1.2.2 Roll-out switch failure.</td>
<td><strong>ACTION 1</strong> - Check continuity across roll-out switch. Replace roll-out switch if switch is reset but does not have continuity.</td>
</tr>
<tr>
<td>1.2.3 Miswiring or improper connections at roll-out switch.</td>
<td><strong>ACTION 1</strong> - Check wiring connections to switch.</td>
<td></td>
</tr>
<tr>
<td>1.2.4</td>
<td>Nine pin connector failure</td>
<td><strong>ACTION 1</strong> - Check 9-pin connector for proper connection to control board. <strong>ACTION 2</strong> - Check continuity of the multi plug pin.</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>LED#1-Fast Flash, LED#2-Slow Flash.</td>
<td>1.4</td>
<td>- On initial power up the combustion air blower does not energize. - Diagnostic lights flash normal power on operation.</td>
</tr>
<tr>
<td>LED#1-Slow Flash LED#2-Slow Flash</td>
<td>1.4.2 Failed combustion air blower motor.</td>
<td><strong>ACTION 1</strong> - 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>- On initial power-up the combustion air blower remains energized. - Diagnostic lights flash the improper main ground.</td>
<td><strong>1.5.1</strong> Improper ground to the unit. <strong>ACTION 1</strong> - Check that the unit is properly ground. <strong>ACTION 2</strong> - Install a proper main ground to the unit.</td>
</tr>
<tr>
<td></td>
<td>- Diagnostic lights flash the improper main ground.</td>
<td><strong>1.5.2</strong> 6-Pin connector is improperly attached to the circuit board. <strong>ACTION 1</strong> - Check 6-pin connector for proper installation. Correctly insert connector into control.</td>
</tr>
<tr>
<td></td>
<td>- Line voltage is below 75V.</td>
<td><strong>1.5.3</strong> Line voltage is below 75V. <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>
<tr>
<td>LED#1-Alternating Fast Flash LED#2-Alternating Fast Flash</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### PROBLEM 2: UNIT OPERATES IN COOLING MODE 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>- On initial power-up the combustion air blower remains energized. - Diagnostic lights flash the improper main ground. - Combustion air blower cycles 5 seconds on 55 seconds off.</td>
<td><strong>2.1.1</strong> Open ignitor circuit. <strong>ACTION 1</strong> - Check for correct wiring and loose connections in the ignitor circuit. Check mult-plug connections for correct installation.</td>
</tr>
<tr>
<td></td>
<td>- Diagnostic lights flash the improper main ground. - Combustion air blower cycles 5 seconds on 55 seconds off.</td>
<td><strong>2.1.2</strong> Broken or failed ignitor. <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>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>- Unit operates with a cooling or continuous fan demand. - Combustion air blower will not start with a Heating demand. - Diagnostic lights flash the limit failure mode.</td>
<td><strong>3.1.1</strong> Primary or secondary (if equipped) limit open. <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></td>
<td>- Diagnostic lights flash the limit failure mode.</td>
<td><strong>3.1.2</strong> Miswiring of furnace or improper connections at limit switch(es). <strong>ACTION 1</strong> - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</td>
</tr>
<tr>
<td>LED#1-Slow Flash, LED#2-On</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2</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.</td>
<td><strong>3.2.1</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>- Pressure switch stuck closed.</td>
<td><strong>3.2.2</strong> Pressure switch stuck closed. <strong>ACTION 1</strong> - Check that the pressure switch is open without the combustion air blower operating. Replace if malfunctioning.</td>
</tr>
<tr>
<td>LED#1-Off, LED#2-Slow 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 (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></td>
<td></td>
</tr>
</tbody>
</table>
| - 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. | 3.3.1  
Miswiring of furnace or improper connections to combustion air blower. | ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections. |
|           | 3.3.2          |                           |
|           | Combustion air blower failure. | ACTION 1 - If there is 120V to combustion air blower and it does not operate, replace combustion air blower. |

**LED#1-Off, LED#2-Slow Flash**

### 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></td>
<td></td>
</tr>
</tbody>
</table>
| - 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. | 4.1.1  
Pressure switch does not close due to incorrect routing of the pressure switch lines. | ACTION 1 - Check that the pressure switch lines are correctly routed. Correctly route pressure switch lines. |
|           | 4.1.2          |                           |
|           | Pressure switch does not close due to obstructions in the pressure lines. | ACTION 1 - Remove any obstructions from the pressure lines and/or taps. |
|           | 4.1.3          |                           |
|           | Pressure switch lines damaged | ACTION 1 - Check pressure switch lines for leaks. Replace any broken lines. |
|           | 4.1.4          |                           |
|           | Pressure switch does not close due to a low differential pressure across the pressure switch. | ACTION 1 - Check the differential pressure across the pressure switch. This pressure should exceed the set point listed on the switch.  
ACTION 2 - Check for restricted inlet and exhaust vent. Remove all blockage.  
ACTION 3 - Check for proper vent sizing and run length. See installation instructions.  
ACTION 4 - Check voltage to thre combustion air blower. |
|           | 4.1.5          |                           |
|           | Wrong pressure switch installed in the unit, or pressure switch is out of calibration. | ACTION 1 - Check that the proper pressure switch is installed in the unit. Replace pressure switch if necessary. |
|           | 4.1.6          |                           |
|           | Miswiring of furnace or improper connections at pressure switch. | ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections. |
|           | 4.1.7          |                           |
|           | Pressure switch failure. | ACTION 1 - If all the above modes of failure have been checked, the pressure switch may have failed. Replace pressure switch and determine if unit will operate. |
**PROBLEM 5: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER ENERGIZES, IGNITOR IS ENERGIZED. (CONT.)**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 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&quot; WC for both natural and propane. Line pressure should read a minimum 4.5&quot; WC for natural and 8.0&quot; WC for propane.</td>
</tr>
<tr>
<td>- Combustion air blower energizes with Heating demand.</td>
<td>5.1.2 Miswiring of gas valve or loose connections at multi-pin control amp plugs or valve.</td>
<td>ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</td>
</tr>
<tr>
<td>- Ignitor is energized but unit fails to light.</td>
<td>5.1.3 Malfunctioning gas valve or ignition control.</td>
<td>ACTION 1 - Check that 24V is supplied to the gas valve approximately 35 seconds after heat demand is initiated. ACTION 2 - Replace the valve if 24V is supplied but valve does not open (check for excessive gas line pressure before replacing gas valve). ACTION 3 - Replace the control board if 24V is not supplied to valve.</td>
</tr>
</tbody>
</table>

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

**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</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Burners fire with a heating demand.</td>
<td>6.1.1 Low pressure differential at the pressure switch.</td>
<td>ACTION 1 - Check for restricted vent inlet or exhaust. Remove all blockage. ACTION 2 - Check for proper vent sizing. See installation instructions.</td>
</tr>
<tr>
<td>- Burners light but unit shuts off prior to satisfying T-stat demand.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Diagnostic lights flash the pressure switch code.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LED#1-Off  
LED#2-Slow Flash

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 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 (page 10) and that the sense wire is properly attached to both the sensor and the control.</td>
</tr>
<tr>
<td>- Burners light but fail to stay lit.</td>
<td>6.2.2 Sensor or sense wire is broken.</td>
<td>ACTION 1 - Check for a broken sensor. ACTION 2 - Test continuity across the sense wire. If wire or sensor are damaged replace the component.</td>
</tr>
<tr>
<td>- After 5 tries the control diagnostics flash the watchguard burners failed to ignite code.</td>
<td>6.2.3 Sensor or sensor wire is grounded to the unit.</td>
<td>ACTION 1 - Check for resistance between the sensor rod and the unit ground. ACTION 2 - Check for resistance between the sensor wire and the unit ground. ACTION 3 - Correct any shorts found in circuit.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Condition</th>
<th>Possible Cause</th>
<th>Corrective Action/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2.4</td>
<td>Control does not sense flame.</td>
<td>ACTION 1 - Check the microamp signal from the burner flame. If the microamp signal is below 0.70 microamps, check the sense rod for proper location or contamination. ACTION 2 - Replace, clean, or relocate flame sense rod. If rod is to be cleaned, use steel wool or replace sensor. DO NOT CLEAN ROD WITH SAND PAPER. SAND PAPER WILL CONTRIBUTE TO THE CONTAMINATION PROBLEM. NOTE: Do not attempt to bend sense rod.</td>
</tr>
<tr>
<td>Condition</td>
<td>Possible Cause</td>
<td>Corrective Action/Comments</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td><strong>6.3</strong></td>
<td>- Combustion air blower energizes with a heating demand. - Roll-out switch trips during the heating demand. - Diagnostic lights flash roll-out failure.</td>
<td><strong>6.3.1</strong> Unit is firing above 100% of the nameplate input.</td>
</tr>
<tr>
<td></td>
<td><strong>6.3.2</strong> Gas orifices leak at the manifold connection.</td>
<td><strong>ACTION 1</strong> - Tighten orifice until leak is sealed. <strong>NOTE:</strong> Be careful not to strip orifice threads. <strong>ACTION 2</strong> - Check for gas leakage at the threaded orifice connection. Use approved method for leak detection (see unit instructions).</td>
</tr>
<tr>
<td></td>
<td><strong>6.3.3</strong> Insufficient flow through the heat exchanger caused by a sooted or restricted heat exchanger.</td>
<td><strong>ACTION 1</strong> - Check for sooting deposits or other restrictions in the heat exchanger assembly. Clean assembly as outlined in instruction manual. <strong>ACTION 2</strong> - For G24M gas furnaces, check for proper combustion and flow. CO2 should measure between 6.0% and 8.0% for NG and between 6.5% and 8.5% for LP. CO should measure below .04% (400PPM) in an air-free sample of flue gases for either NG or LP.</td>
</tr>
<tr>
<td></td>
<td><strong>6.3.4</strong> Burners are not properly located in the burner box.</td>
<td><strong>ACTION 1</strong> - Check that the burners are firing into the center of the heat exchanger openings. Correct the location of the burners if necessary.</td>
</tr>
<tr>
<td><strong>6.4</strong></td>
<td>- Combustion air blower energizes with a heating demand. - Burners light roughly and the unit fails to stay lit. - Diagnostic lights flash watchguard flame failure.</td>
<td><strong>6.4.1</strong> Recirculation of flue gases. This condition causes rough ignitions and operation. Problem is characterized by nuisance flame failures.</td>
</tr>
<tr>
<td></td>
<td><strong>6.4.2</strong> Improper burner cross-overs</td>
<td><strong>ACTION 1</strong> - Remove burner and inspect the cross-overs for burrs, or any restriction or if crossover is warped. Remove restriction or replace burners.</td>
</tr>
</tbody>
</table>
### 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><strong>Action 1</strong> - 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></td>
<td>Sense rod is contaminated.</td>
<td><strong>Action 1</strong> - 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><strong>Action 1</strong> - Correct wiring and/or replace any loose connections. Check for correct wiring and loose connections.</td>
</tr>
<tr>
<td></td>
<td>120V is not being supplied to the indoor air blower or blower motor failure.</td>
<td><strong>Action 1</strong> - Check for 120V at the various calls for indoor blower by energizing &quot;Y&quot;, &quot;G&quot;, and &quot;W&quot; individually on the low voltage terminal strip. Note that when &quot;W&quot; 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>8.1.3</td>
<td>Defective control board</td>
<td><strong>Action 1</strong> - If there is not 120V when &quot;Y&quot;, &quot;G&quot;, or &quot;W&quot; 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><strong>Action 1</strong> - Call Technical Support, Dallas.</td>
</tr>
</tbody>
</table>