EL180DFE series units are mid-efficiency gas furnaces used for downflow applications only, manufactured with Lennox Duralok™ heat exchangers formed of aluminized steel. EL180DFE units are available in heating capacities of 44,000 to 110,000 Btuh and cooling applications 1.5 to 5 tons. Refer to Engineering Handbook for proper sizing.

Units are factory equipped for use with natural gas. Kits are available for conversion to LP/Propane operation. EL180DFE model units are equipped with a hot surface ignition system and a constant torque ECM motor. The motor is programmed to provide constant torque at each of the five selectable speed taps. All units use a redundant gas valve to assure safety shut-off as required by C.S.A.

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

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### SPECIFICATIONS

**Gas Heating Performance**

<table>
<thead>
<tr>
<th>Model No.</th>
<th>AFUE</th>
<th>Input - Btuh</th>
<th>Output - Btuh</th>
<th>Temperature rise range °F</th>
<th>Gas Manifold Pressure (in. w.g.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL180DF045E36A</td>
<td>80%</td>
<td>44,000</td>
<td>35,200</td>
<td>15 - 45</td>
<td>3.5 / 10.0</td>
</tr>
<tr>
<td>EL180DF070E36B</td>
<td>80%</td>
<td>66,000</td>
<td>52,800</td>
<td>30 - 60</td>
<td>3.5 / 10.0</td>
</tr>
<tr>
<td>EL180DF090E48B</td>
<td>80%</td>
<td>88,000</td>
<td>70,400</td>
<td>30 - 60</td>
<td>3.5 / 10.0</td>
</tr>
<tr>
<td>EL180DF110E60C</td>
<td>80%</td>
<td>110,000</td>
<td>88,000</td>
<td>30 - 60</td>
<td>3.5 / 10.0</td>
</tr>
</tbody>
</table>

Input - Btuh: 44,000, 66,000, 88,000, 110,000
Output - Btuh: 35,200, 52,800, 70,400, 88,000
Temperature rise range °F: 15 - 45, 30 - 60, 30 - 60, 30 - 60

**Gas Manifold Pressure (in. w.g.)**

- Nat. Gas / LPG/Propane: 3.5 / 10.0, 3.5 / 10.0, 3.5 / 10.0, 3.5 / 10.0

**High Static - in. w.g.**
- 0.50, 0.50, 0.50, 0.50

**Connections**
- Flue connection - in. round: 4, 4, 4, 4
- Gas pipe size IPS: 1/2, 1/2, 1/2, 1/2

**Indoor Blower**
- Wheel nom. dia. x width - in.: 10 x 8, 10 x 10, 10 x 10, 11-1/2 x 10
- Motor output - hp: 1/2, 1/2, 3/4, 1
- Tons of add-on cooling: 1.5 - 3, 1.5 - 3, 2.5 - 4, 3 - 5

**Electrical Data**
- Voltage: 120 volts - 60 hertz - 1 phase
- Blower motor full load amps: 6.8, 6.8, 8.4, 10.9
- Maximum overcurrent protection: 12, 12, 12, 12

**Shipping Data**
- lbs. - 1 package: 113, 128, 140, 160

**NOTE**
- Filters and provisions for mounting are not furnished and must be field provided.
- Annual Fuel Utilization Efficiency based on DOE test procedures and according to FTC labeling regulations. Isolated combustion system rating for non-weatherized furnaces.

### OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA

#### CABINET ACCESSORIES

**Downflow Combustible Flooring Base**
- 11M59, 11M60, 11M61

#### FILTERS

- Downflow Filter Cabinet: 51W06, 51W07, 51W08
- No. and Size of filter - in.: (1) 20 x 16 x 1, (2) 20 x 20 x 1, (2) 20 x 20 x 1

#### NIGHT SERVICE KITS

**Night Service Kit**
- 84W47, 84W47, 84W47

**Safety Service Kit**
- 89W19, 89W19, 89W19

1. Cleanable polyurethane, frame-type filter.

### GAS HEAT ACCESSORIES

<table>
<thead>
<tr>
<th>Input</th>
<th>High Altitude Pressure Switch Kit</th>
<th>Natural Gas to LPG/Propane Kit</th>
<th>LPG/Propane to Natural Gas Kit</th>
<th>Natural Gas High Altitude Orifice Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>045</td>
<td>No Change</td>
<td>80W51</td>
<td>70W89</td>
<td>73W81</td>
</tr>
<tr>
<td>070</td>
<td>No Change</td>
<td>80W52</td>
<td>70W89</td>
<td>73W81</td>
</tr>
<tr>
<td>090</td>
<td>No Change</td>
<td>80W52</td>
<td>70W89</td>
<td>73W81</td>
</tr>
<tr>
<td>110</td>
<td>No Change</td>
<td>80W57</td>
<td>70W89</td>
<td>73W81</td>
</tr>
</tbody>
</table>
### BLOWER DATA

#### EL180DF045E36A PERFORMANCE (Less Filter)

<table>
<thead>
<tr>
<th>External Static Pressure in. w.g.</th>
<th>Air Volume / Watts at Various Blower Speeds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>cfm</td>
</tr>
<tr>
<td>0.00</td>
<td>1430</td>
</tr>
<tr>
<td>0.10</td>
<td>1400</td>
</tr>
<tr>
<td>0.20</td>
<td>1375</td>
</tr>
<tr>
<td>0.30</td>
<td>1335</td>
</tr>
<tr>
<td>0.40</td>
<td>1320</td>
</tr>
<tr>
<td>0.50</td>
<td>1275</td>
</tr>
<tr>
<td>0.60</td>
<td>1245</td>
</tr>
<tr>
<td>0.70</td>
<td>1215</td>
</tr>
<tr>
<td>0.80</td>
<td>1175</td>
</tr>
</tbody>
</table>

#### EL180DF070E36B PERFORMANCE (Less Filter)

<table>
<thead>
<tr>
<th>External Static Pressure in. w.g.</th>
<th>Air Volume / Watts at Various Blower Speeds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>cfm</td>
</tr>
<tr>
<td>0.00</td>
<td>1475</td>
</tr>
<tr>
<td>0.10</td>
<td>1430</td>
</tr>
<tr>
<td>0.20</td>
<td>1400</td>
</tr>
<tr>
<td>0.30</td>
<td>1360</td>
</tr>
<tr>
<td>0.40</td>
<td>1310</td>
</tr>
<tr>
<td>0.50</td>
<td>1280</td>
</tr>
<tr>
<td>0.60</td>
<td>1250</td>
</tr>
<tr>
<td>0.70</td>
<td>1220</td>
</tr>
<tr>
<td>0.80</td>
<td>1165</td>
</tr>
</tbody>
</table>

#### EL180DF090E48B PERFORMANCE (Less Filter)

<table>
<thead>
<tr>
<th>External Static Pressure in. w.g.</th>
<th>Air Volume / Watts at Various Blower Speeds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>cfm</td>
</tr>
<tr>
<td>0.00</td>
<td>1750</td>
</tr>
<tr>
<td>0.10</td>
<td>1725</td>
</tr>
<tr>
<td>0.20</td>
<td>1695</td>
</tr>
<tr>
<td>0.30</td>
<td>1660</td>
</tr>
<tr>
<td>0.40</td>
<td>1615</td>
</tr>
<tr>
<td>0.50</td>
<td>1570</td>
</tr>
<tr>
<td>0.60</td>
<td>1545</td>
</tr>
<tr>
<td>0.70</td>
<td>N/A</td>
</tr>
<tr>
<td>0.80</td>
<td>N/A</td>
</tr>
</tbody>
</table>
## BLOWER DATA

**EL180DF110E60C PERFORMANCE (Less Filter)**

<table>
<thead>
<tr>
<th>External Static Pressure in. w.g.</th>
<th>High</th>
<th>Medium-High</th>
<th>Medium</th>
<th>Medium-Low</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cfm</td>
<td>Watts</td>
<td>cfm</td>
<td>Watts</td>
<td>cfm</td>
</tr>
<tr>
<td>0.00</td>
<td>2410</td>
<td>625</td>
<td>2095</td>
<td>405</td>
<td>1875</td>
</tr>
<tr>
<td>0.10</td>
<td>2385</td>
<td>630</td>
<td>2100</td>
<td>415</td>
<td>1830</td>
</tr>
<tr>
<td>0.20</td>
<td>2325</td>
<td>650</td>
<td>2010</td>
<td>440</td>
<td>1760</td>
</tr>
<tr>
<td>0.30</td>
<td>2280</td>
<td>675</td>
<td>1940</td>
<td>460</td>
<td>1705</td>
</tr>
<tr>
<td>0.40</td>
<td>2235</td>
<td>690</td>
<td>1895</td>
<td>475</td>
<td>1635</td>
</tr>
<tr>
<td>0.50</td>
<td>2165</td>
<td>710</td>
<td>1845</td>
<td>490</td>
<td>1595</td>
</tr>
<tr>
<td>0.60</td>
<td>2125</td>
<td>735</td>
<td>1800</td>
<td>510</td>
<td>1545</td>
</tr>
<tr>
<td>0.70</td>
<td>2090</td>
<td>740</td>
<td>1755</td>
<td>530</td>
<td>1510</td>
</tr>
<tr>
<td>0.80</td>
<td>2035</td>
<td>760</td>
<td>1700</td>
<td>540</td>
<td>1460</td>
</tr>
</tbody>
</table>
FIGURE 1

- Blower Assembly
- Flue Chase
- Control Box (includes integrated control, transformer, inter lock switch and circuit breaker)
- primary Limit (under combustion air inducer)
- Combustion Air Inducer
- Heat Exchanger
- Gas Valve
- Burner Box (includes sensor, ignitor and rollout switches)
- Access Panel
- Secondary Limit
- Primary Limit (under combustion air inducer)
I-UNIT COMPONENTS

EL180DFE unit components are shown in figure 1. The gas valve, combustion air inducer and burners can be accessed by removing the heating compartment access panel. Electrical components are in the control box (figure 2) found in the blower section.

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

1. Control Transformer (T1)
A transformer located in the control box provides power to the low voltage section of the unit. Transformers on all models are rated 40VA with a 120V primary and a 24V secondary.

2. Door Interlock Switch (S51)
A door interlock switch is wired in series with line voltage. When the blower door is removed the unit will shut down.

3. Circuit Breaker (CB8)
A 24V circuit breaker is also located in the control box. The switch provides overcurrent protection to the transformer (T1). The breaker is rated at 3A at 32V. If the current exceeds this limit the breaker will trip and all unit operation will shutdown. The breaker can be manually reset by pressing the button on the face.

4. Integrated Control (A92)

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

The hot surface ignition control system consisting of an integrated control (figure 3 with control terminal designations in tables 1, 2 and 3), flame sensor and ignitor (figure 6). The integrated control and ignitor work in combination to ensure furnace ignition and ignitor durability. The integrated control, controls all major furnace operations. The integrated control also features a RED LED for troubleshooting and two accessory terminals rated at (1) one amp. See table 4 for troubleshooting diagnostic codes. The nitride ignitor is made from a non-porous, high strength proprietary ceramic material that provides long life and trouble free maintenance.

Electronic Ignition (Figure 4)
On a call for heat the integrated control monitors the combustion air inducer pressure switch. The control will not begin the heating cycle if the pressure switch is closed (bypassed). Once the pressure switch is determined to be open, the combustion air inducer is energized. When the differential in the pressure switch is great enough, the pressure switch closes and a 15-second pre-purge begins. If the pressure switch is not proven within 2-1/2 minutes, the integrated control goes into Watchguard-Pressure Switch mode for a 5-minute re-set 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. The ignitor remains energized for the first 3 seconds during the 4 second trial. If ignition is not proved during the 4-second period, the integrated control will try four more times with an inter purge and warm-up time between trials of 35 seconds. After a total of five trials for ignition (including the initial trial), the integrated control goes into Watchguard-Flame Failure mode. After a 60-minute reset period, the integrated control will begin the ignition sequence again.
### TABLE 1

<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 2

<table>
<thead>
<tr>
<th>PIN #</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>High Limit Output</td>
</tr>
<tr>
<td>2</td>
<td>Not Used</td>
</tr>
<tr>
<td>3</td>
<td>24V Line</td>
</tr>
<tr>
<td>4</td>
<td>Not Used</td>
</tr>
<tr>
<td>5</td>
<td>Rollout Switch Out</td>
</tr>
<tr>
<td>6</td>
<td>24V Neutral</td>
</tr>
<tr>
<td>7</td>
<td>High Limit Input</td>
</tr>
<tr>
<td>8</td>
<td>Ground</td>
</tr>
<tr>
<td>9</td>
<td>Gas Valve Common</td>
</tr>
<tr>
<td>10</td>
<td>Pressure Switch In</td>
</tr>
<tr>
<td>11</td>
<td>Rollout Switch In</td>
</tr>
<tr>
<td>12</td>
<td>Gas Valve Out</td>
</tr>
</tbody>
</table>

### TABLE 3

<table>
<thead>
<tr>
<th>1/4&quot; QUICK CONNECT TERMINALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>120HUM Humidifier 120VAC</td>
</tr>
<tr>
<td>LINE 120VAC</td>
</tr>
<tr>
<td>XFMR Transformer 120VAC</td>
</tr>
<tr>
<td>CIRC Indoor blower 120VAC</td>
</tr>
<tr>
<td>EAC Indoor air quality accessory 120VAC</td>
</tr>
<tr>
<td>NEUTRALS Common 120VAC</td>
</tr>
<tr>
<td>HUM24 Humidifier 24VAC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3/16&quot; QUICK CONNECT TERMINALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOL Cooling tap 24VAC</td>
</tr>
<tr>
<td>HEAT Heating tap 24VAC</td>
</tr>
<tr>
<td>FAN Continuous blower 24 VAC</td>
</tr>
<tr>
<td>PARK (no power) Park terminal for speed taps</td>
</tr>
<tr>
<td>FS Flame sense</td>
</tr>
<tr>
<td>24 COM Common 24VAC</td>
</tr>
</tbody>
</table>

### FIGURE 3

**INTEGRATED CONTROL**  
(Automatic Hot Surface Ignition System)

- **RED LED**
- **RECALL BUTTON**
- **BLOWER OFF DELAY**
The integrated control is equipped with an LED light for troubleshooting. The diagnostic codes are listed below in Table 4.

<table>
<thead>
<tr>
<th>RED LED Flash Code</th>
<th>Diagnostic Codes / Status of Furnace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>No power to control or board fault detected</td>
</tr>
<tr>
<td>On</td>
<td>Board fault detected,</td>
</tr>
<tr>
<td>Heartbeat&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Control powered - displayed during all modes of operation if no errors are detected</td>
</tr>
<tr>
<td>1</td>
<td>Reverse Line Voltage Polarity</td>
</tr>
<tr>
<td>2</td>
<td>Improper Earth Ground</td>
</tr>
<tr>
<td>3</td>
<td>Burner failed to light, or lost flame during heat demand</td>
</tr>
<tr>
<td>4</td>
<td>Low Flame Signal - check flame sensor</td>
</tr>
<tr>
<td>5</td>
<td>Watchguard - burner failed to light, exceeded maximum number of retries or recyclers</td>
</tr>
<tr>
<td>6</td>
<td>Not Used</td>
</tr>
<tr>
<td>7</td>
<td>Primary or Secondary Limit Open or Watchguard Mode - Limit Switch Open longer than 3 minutes</td>
</tr>
<tr>
<td>8</td>
<td>Rollout Switch Open</td>
</tr>
<tr>
<td>9</td>
<td>Pressure Switch failed to close or opened during heat demand</td>
</tr>
<tr>
<td>10</td>
<td>Watchguard - Pressure Switch opened 5 times during one heat demand</td>
</tr>
<tr>
<td>11</td>
<td>Pressure Switch stuck closed prior to activation of combustion air inducer</td>
</tr>
<tr>
<td>12</td>
<td>Flame Sensed without gas valve energized</td>
</tr>
<tr>
<td>13</td>
<td>Low Line Voltage</td>
</tr>
</tbody>
</table>

**Notes**

- **Note 1**: A "Heartbeat" is indicated by a "Slow Flash" - 1 sec on 1 sec off, repeating
- **Note**: Error codes are indicated by a "Rapid Flash" - the LED flashes X times at 1/2 sec on 1/2 sec off, remains off for 3 sec, then repeats
- **Note**: Last 10 error codes are stored in memory including when power is shut off to the unit. - To recall, press and release button, most recent will be displayed first, LED off for 3 sec, then next error code is displayed, etc. To clear error codes, depress and hold button longer than 5 seconds.

**FIGURE 4**

*Blower on time will be 30 seconds after flame is sensed. Blower off time will depend on “OFF TIME” Setting.*
Fan Time Control

**Heating Fan On Time**
The fan on time of 30 seconds is not adjustable.

**Heating Fan Off Time**
Fan off time (time that the blower operates after the heat demand has been satisfied) can be adjusted by moving the jumper to a different setting. The unit is shipped with a factory fan off setting of 90 seconds. For customized comfort, monitor the supply air temperature once the heat demand is satisfied. Note the supply air temperature at the instant the blower is de-energized. Adjust the fan-off delay to achieve a supply air temperature between 90° - 110° at the instant the blower is de-energized. (Longer delay times allow for lower air temperature, shorter delay times allow for higher air temperature). See figure 5.

**Cooling Fan On Time**
The fan on time is 2 seconds and is not adjustable.

**Cooling Fan Off Time**
The control has a 45 second fan off delay after cooling demand has been met. This delay is factory set and not adjustable.

---

<table>
<thead>
<tr>
<th>HEAT FAN-OFF TIME IN SECONDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUMPER POSITION</td>
</tr>
<tr>
<td>PIN1 PIN2</td>
</tr>
<tr>
<td>PIN2 PIN3</td>
</tr>
<tr>
<td>PIN4 PIN5</td>
</tr>
<tr>
<td>NO JUMPER</td>
</tr>
</tbody>
</table>

To adjust fan-off timing, reposition jumper across pins to achieve desired setting.
5. Flame Rollout Switches (Figure 6)
Flame rollout switch (S47) is a high temperature limit. Each furnace is equipped with two identical switches. The limit is a N.C. SPST manual-reset limit connected in series with the integrated control A92. When S47 senses rollout, the integrated control immediately stops ignition and closes the gas valve. If unit is running and flame rollout is detected, the gas valve will close and integrated control will be disabled. Rollout can be caused by a blocked heat exchanger, blocked flue or lack of combustion air. The switch has a factory setpoint of 210°F and cannot be adjusted. To manually reset a tripped switch, push the reset button located on the control.

6. Primary Limit Control
The primary limit on EL180DFE units is located in the heating vestibule panel under the combustion air inducer. See figure 1. When excess heat is sensed in the heat exchanger, the limit will open. If the limit is open, the integrated control energizes the supply air blower and closes the gas valve. The limit automatically resets when unit temperature returns to normal. The switch must reset within three minutes or SureLight® control will go into Watchguard for one hour. The switch is factory set and cannot be adjusted. The switch may have a different setpoint for each unit model number. If limit switch must be replaced, refer to Lennox ProductZone repair parts list on Lennox DaveNet®.

7. Flame Sensor (Figure 6)
A flame sensor is located on the left side of the burner support. The sensor is mounted on the flame rollout plate and the tip protrudes into the flame envelope of the left-most burner. The sensor can be removed for service (clean using steel wool) without removing any part of the burners. During operation, flame is sensed by current passed through the flame and sensing electrode. The integrated control allows the gas valve to remain open as long as flame signal is sensed.

A microamp DC meter is needed to check the flame signal on the integrated control.
Flame (microamp) signal is an electrical current which passes from the integrated control to the sensor during unit operation. Current passes from the sensor through the flame to ground to complete a safety circuit.
To Measure Flame Signal - Integrated Control:

Use a digital readout meter capable of reading DC microamps. See figure 7 and table 5 for flame signal check.

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

**TABLE 5**

<table>
<thead>
<tr>
<th>Flame Signal in Microamps</th>
<th>Normal</th>
<th>Low</th>
<th>Drop Out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.5</td>
<td>0.5 - 1.4</td>
<td>≤ 0.4</td>
</tr>
</tbody>
</table>

**FIGURE 7**

Measuring Flame Signal (upflow furnace shown)
8. Ignitor (Figure 6)
The nitride ignitor used on EL180DFE units is made from a proprietary ceramic material. To check ignitor, measure its resistance and voltage. A value of 39 to 70 ohms indicates a good ignitor. Voltage to the ignitor should be 120VAC. See figure 8 for resistance, and voltage check.

NOTE - The EL180DFE furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

---

**FIGURE 8**

**Test 1**
Check ignitor circuit for correct resistance.
Remove 4-pin plug from control.
Check ohms reading across terminals 2 and 4.
If value is correct (39 to 70 ohms), this is the only test needed.
If the reading on the meter is not correct, (0 or infinity) then a second test is needed.

**Test 2**
Check ignitor for correct resistance.
Separate the 2-pin jack-plug near the manifold and check resistance of ignitor at the plug. Reading should be between 39 and 70 ohms.
If the reading is correct, then the problem is with the wiring between the jack-plug and the control.
If reading is not correct, the issue is the ignitor.

**Test 3**
Check ignitor for correct voltage
Insert meter probes into terminals 2 and 4 (use small diameter probes in order not to damage plug).
Check voltage during 20 second ignitor warm up period.
Voltage should read 120 volts ± 10%. If voltage reads below these values, check for correct supply voltage to furnace.
9. Gas Valve (Figure 6)

The EL180DFE uses internally redundant gas valve to assure safety shut-off. If the gas valve must be replaced, the same type valve must be used.

24VAC terminals and valve switch are located on the valve. All terminals on the gas valve are connected to wires from the integrated control. 24V applied to the terminals energizes the valve.

Inlet and outlet pressure taps are located on the valve. A regulator adjustment screw is located on the valve.

LPG changeover kits are available from Lennox. Kits include burner orifices and a gas valve regulator spring.

10. Combustion Air Inducer (B6)

All EL180DFE units use a combustion air inducer to move air through the burners and heat exchanger during heating operation. The blower uses a 120VAC motor. The motor operates during all heating operation and is controlled by integrated control A92. The inducer also operates for 15 seconds before burner ignition (pre-purge) and for 5 seconds after the gas valve closes (post-purge).

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

<table>
<thead>
<tr>
<th>EL180DFE Unit</th>
<th>C.A.I. Orifice Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>045E36A</td>
<td>1.045”</td>
</tr>
<tr>
<td>070E36B</td>
<td>1.316”</td>
</tr>
<tr>
<td>090E48B</td>
<td>1.531”</td>
</tr>
<tr>
<td>110E60C</td>
<td>1.690”</td>
</tr>
</tbody>
</table>

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. If switch is closed or by-passed, the integrated control will not initiate ignition at start up.

11. Combustion Air Inducer Pressure Switch (S18)

EL180DFE series units are equipped with a combustion air pressure switch located on the combustion air inducer orifice bracket. The switch is connected to the combustion air inducer housing by means of a flexible silicone hose. It monitors negative air pressure in the combustion air inducer housing.

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

On start-up, the switch senses that the combustion air inducer is operating. It closes a circuit to the integrated control when pressure inside the combustion air inducer decreases to a certain set point. Set points vary depending on unit size. See table 7. The pressure sensed by the switch is negative relative to atmospheric pressure. If the flue becomes obstructed during operation, the switch senses a loss of negative pressure (pressure becomes more equal with atmospheric pressure) and opens the circuit to the integrated control and gas valve. A bleed port on the switch allows relatively dry air in the vestibule to purge switch tubing, to prevent condensate build up.

Table 7

<table>
<thead>
<tr>
<th>EL180DFE Unit</th>
<th>Make</th>
<th>Break ± 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>045E36A</td>
<td>-0.75</td>
<td>-0.60</td>
</tr>
<tr>
<td>070E36B</td>
<td>-0.80</td>
<td>-0.65</td>
</tr>
<tr>
<td>090E48B</td>
<td>-0.75</td>
<td>-0.60</td>
</tr>
<tr>
<td>110E60C</td>
<td>-0.80</td>
<td>-0.65</td>
</tr>
</tbody>
</table>

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. If switch is closed or by-passed, the integrated control will not initiate ignition at start up.

Troubleshooting

See figure 9 for measuring operating pressure and checking resistance in the pressure switch.
12. Blower Motor

**IMPORTANT**

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

EL180DFE units are equipped with a constant torque ECM motor. It has a DC motor coupled to an electronic control module both contained in the same motor housing. The motor is programmed to provide constant torque at each of the five selectable speed taps. Each tap requires 24 volts to energize.

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

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

1- Shut off power to unit.
2- Remove input plugs P48 and P49 from motor. See figure 13 for troubleshooting procedure.

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

If replacing the indoor blower motor or blower wheel is necessary, placement is critical. The blower wheel must be centered in the blower housing as shown in figure 10. When replacing the indoor blower motor the set screw must be aligned and tightened with the motor shaft as shown in figure 11.

13. Secondary Limit Controls
The secondary limit is located in the blower compartment on the back side of the blower housing. See figure 12. When excess heat is sensed in the blower compartment, the limit will open. If the limit is open, the furnace control energizes the supply air blower and closes the gas valve. The limit automatically resets when unit temperature returns to normal. The secondary limit cannot be adjusted.

---

**FIGURE 10**
Center Blower Wheel in Blower Housing

**FIGURE 11**
Align and tighten set screw with flat side of motor shaft

**FIGURE 12**
Secondary Limit Control
Turn on power to unit. Check for 120 volts across terminals “L” and “N” on input plug P48. If voltage is present continue to test 2. If voltage is not present problem may be upstream of plug P48 and proceed to test 3.

Switch thermostat to CONTINUOUS FAN MODE. Check for 24 volts across terminal “C” on input plug P48 and speed tap used for continuous fan. (1, 2, 3, 4 or 5) on input plug P49. If 24 volts is not present problem may be upstream of plug P49. Proceed to test 4.

Check for 120 volts across terminals “CIRC” and “Neutrals” on the integrated control. If voltage is present, problem is with the harness. If voltage is not present problem may be with the integrated control.

Check for 120 volts across terminals “CIRC” and “Neutrals” on the integrated control. If voltage is present, problem is with the integrated control. If voltage is not present problem may be with the integrated control.

Check for 24 volts across terminals “24 COM” and “FAN” terminals on the integrated control. If voltage is present, problem is with the harness. If voltage is not present problem may be with the integrated control.

Test 1
Test 2
Test 3 (if necessary)
Test 4 (if necessary)
Replacing the Motor Module
1. Disconnect electrical power to unit.
2. Remove unit access panel.
3. Unplug the two harnesses from the motor control module. See figure 14.

Unplug the Two Harness Connection

4. Remove the two hex head bolts securing the motor control module to the motor (see figure 15).

Remove the Hex Head Bolts

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

Testing the Motor (Figure16)
If any motor fails the below tests, do not install the new control module. The motor is defective and it also must be replaced. The new control can fail if placed on a defective motor.

1. Using an ohmmeter check the resistance from any one of the motor connector pins to the aluminum end plate of the motor. This resistance should be greater than 100k ohms.
2. Check the resistances between each of the three motor connector pins. These should all read approximately the same resistance within an ohm.
3. Check to see if the blower wheel spins freely.

<table>
<thead>
<tr>
<th>Scale</th>
<th>Measurement range in words</th>
<th>ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 M</td>
<td>two megohm-two million ohms</td>
<td>0 - 2,000,000</td>
</tr>
<tr>
<td>200 K</td>
<td>two hundred kilo-ohm-two hundred thousand ohms</td>
<td>0 - 200,000</td>
</tr>
<tr>
<td>20 K</td>
<td>twenty kilo-ohm-twenty thousand ohms</td>
<td>0 - 20,000</td>
</tr>
<tr>
<td>2 K</td>
<td>two kilo-ohm-two-thousand ohms</td>
<td>0 - 2,000</td>
</tr>
<tr>
<td>200</td>
<td>two hundred ohms</td>
<td>0 - 200</td>
</tr>
</tbody>
</table>

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

1. Verify electrical power to unit is disconnected.
2. Connect three-wire harness from motor to control module.
3. Mount new motor control module to motor using two hex head bolts removed in figure 15. Torque bolts to 22 inch pounds or 1/16th clock turn as exampled to the right.
4. Reconnect the two harnesses to the motor control module.
5. The electrical connectors of the motor should be facing down to form a drip loop (figure17). This will directs moisture away from the motor and its electric connections on the motor.

Drip Loop
II- PLACEMENT AND INSTALLATION
Make sure unit is installed in accordance with installation instructions and applicable codes.

III- START-UP
A- Heating Start-Up

⚠️ WARNING
Shock and burn hazard.
EL180DFE units are equipped with a hot surface ignition system. Do not attempt to light manually.

Gas Valve Operation

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

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

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

B- Safety or Emergency Shutdown
Disconnect main power to unit. Close manual and main gas valves.

C- Extended Period Shutdown
Turn off thermostat or set to “UNOCCUPIED” mode. Close all gas valves (both internal and external to unit) to guarantee no gas leaks into combustion chamber. Turn off power to unit. All access panels and covers must be in place and secured.

IV-HEATING SYSTEM SERVICE CHECKS
A- C.S.A. Certification
All units are C.S.A. design certified without modifications. Refer to the EL180DFE Installation Instruction.

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

C- Testing Gas Piping

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

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

⚠️ WARNING
Do not exceed 600 in-lbs (50 ft-lbs) torque when attaching the gas piping to the gas valve.

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig (14" W.C.). See figure 19. If the pressure is equal to or greater than 0.5 psig (14"W.C.), close 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- Gas Pressure Adjustment**

**Gas Flow (Approximate)**

**TABLE 9**

<table>
<thead>
<tr>
<th>EL180DFE Unit</th>
<th>Seconds for One Revolution</th>
<th>Natural</th>
<th>LP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 cu ft</td>
<td>2 cu ft</td>
</tr>
<tr>
<td></td>
<td>Dial</td>
<td>Dial</td>
<td>Dial</td>
</tr>
<tr>
<td>-045</td>
<td>80</td>
<td>160</td>
<td>200</td>
</tr>
<tr>
<td>-070</td>
<td>55</td>
<td>110</td>
<td>136</td>
</tr>
<tr>
<td>-090</td>
<td>41</td>
<td>82</td>
<td>102</td>
</tr>
<tr>
<td>-110</td>
<td>33</td>
<td>66</td>
<td>82</td>
</tr>
<tr>
<td>-135</td>
<td>27</td>
<td>54</td>
<td>68</td>
</tr>
</tbody>
</table>

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for two revolutions of gas through the meter. (Two revolutions assures a more accurate time.) **Divide by two** and compare to time in table 9. If manifold pressure matches table 11 and rate is incorrect, check gas orifices for proper size and restriction. Remove temporary gas meter if installed.

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

**E- Supply and Manifold Pressure**

**Supply Pressure Measurement**

1 - Remove the threaded plug from the inlet side of the gas valve and install a field-provided barbed fitting. Connect to a test gauge to measure supply pressure.

2 - Start unit and allow 5 minutes for unit to reach steady state.

3 - After allowing unit to stabilize for 5 minutes, record supply pressure and compare to value given in table 11.

**Manifold Pressure Measurement**

1 - Remove the threaded plug from the outlet side of the gas valve and install a field-provided barbed fitting. Connect to a test gauge to measure manifold pressure.

2 - Start unit and allow 5 minutes for unit to reach steady state.

3 - While waiting for the unit to stabilize, observe the flame. Flame should be stable and should not lift from burner. Natural gas should burn blue.

4 - After allowing unit to stabilize for 5 minutes, record manifold pressure and compare to value given in table 11.

**NOTE** - Shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to remove barbed fitting and replace threaded plug.

**F- Proper Combustion**

Furnace should operate a minimum 15 minutes with correct manifold pressure and gas flow rate before checking combustion. Take combustion sample beyond the flue outlet and compare to the tables below. The maximum carbon monoxide reading should not exceed 50 ppm.

**TABLE 10**

<table>
<thead>
<tr>
<th>EL180DFE Unit</th>
<th>CO₂% For Nat</th>
<th>CO₂% For LP</th>
</tr>
</thead>
<tbody>
<tr>
<td>045</td>
<td>6.8 - 7.4</td>
<td>7.5 - 9.0</td>
</tr>
<tr>
<td>070</td>
<td></td>
<td></td>
</tr>
<tr>
<td>090</td>
<td></td>
<td></td>
</tr>
<tr>
<td>110</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

G- High Altitude

The manifold pressure may require adjustment and combustion air pressure switch may need replacing to ensure proper combustion at higher altitudes. Refer to table 11 for manifold pressure and table 12 for pressure switch change and gas conversion kits.

**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.
### TABLE 11
Supply and Manifold Pressure Settings at all Altitudes

<table>
<thead>
<tr>
<th>Model Input Size</th>
<th>Gas</th>
<th>0-4500 ft</th>
<th>4501-7500 ft</th>
<th>7501 - 10,000 ft</th>
<th>Supply Pressure in wg.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Min</td>
<td>Max</td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>045</td>
<td>Nat</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>LP/propane</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>11.0</td>
</tr>
<tr>
<td>070</td>
<td>Nat</td>
<td>3.5</td>
<td>3.3</td>
<td>3.5</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>LP/propane</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>11.0</td>
</tr>
<tr>
<td>090</td>
<td>Nat</td>
<td>3.5</td>
<td>3.3</td>
<td>3.5</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>LP/propane</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>11.0</td>
</tr>
<tr>
<td>110</td>
<td>Nat</td>
<td>3.5</td>
<td>3.3</td>
<td>3.5</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>LP/propane</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>11.0</td>
</tr>
</tbody>
</table>

### TABLE 12
Pressure Switch and Gas Conversion Kits at all Altitudes

<table>
<thead>
<tr>
<th>Model Input Size</th>
<th>High Altitude Pressure Switch Kit</th>
<th>High Altitude Natural Gas Burner Orifice Kit</th>
<th>Natural Gas to LP/Propane Burner Orifice Kit</th>
<th>LP/Propane to Natural Gas Burner Orifice Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-4500 ft</td>
<td>4501-7500 ft</td>
<td>7501 - 10,000 ft</td>
<td>7501 - 10,000 ft</td>
</tr>
<tr>
<td>045</td>
<td>No Change</td>
<td>80W51</td>
<td>73W37</td>
<td>70W69</td>
</tr>
<tr>
<td>070</td>
<td>80W52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>090</td>
<td>No Change</td>
<td>80W52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>110</td>
<td>80W52</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE** - A natural to LP/Propane gas changeover kit is necessary to convert this unit. Refer to the changeover kit installation instruction for the conversion procedure.
H- Proper Ground and Voltage

A poorly grounded furnace can contribute to premature ignitor failure. Use the following procedure to check for ground and voltage to the integrated control.

1 - Measure the AC voltage between Line Neutral (spade terminals) and “C” terminal (low voltage terminal block) on the integrated control. See figure 20. A wide variation in the voltage between Line Neutral and “C” as a function of load indicates a poor or partial ground. Compare the readings to the table below. If the readings exceed the maximum shown in table 1, make repairs before operating the furnace.

2 - In addition, measure the AC voltage from Line Hot to Line Neutral (spade terminals) on the integrated control. See figure 21. This voltage should be in the range of 97 to 132 Vac

<table>
<thead>
<tr>
<th>Furnace Status</th>
<th>Measurement VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expected</td>
</tr>
<tr>
<td>Power On Furnace Idle</td>
<td>0.3</td>
</tr>
<tr>
<td>CAI / Ignitor Energized</td>
<td>0.75</td>
</tr>
<tr>
<td>Indoor Blower Energized</td>
<td>Less than 2</td>
</tr>
</tbody>
</table>

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. With fan switch in AUTO position, blower cycles with demand or runs continuously while heating or cooling circuit cycles.

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

B-Temperature Rise (Figure 22)

Temperature rise for EL180DFE units depends on unit input, blower speed, blower horsepower and static pressure as marked on the unit rating plate. The blower speed must be set for unit operation within the range of “TEMP. RISE °F” listed on the unit rating plate.
C-External Static Pressure

1 - Tap locations shown in figure 23.

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

3 - With only the blower motor running and the evaporator coil dry, observe the manometer reading. Adjust blower motor speed to deliver the air desired according to the job requirements. For heating speed external static pressure drop must not be more than 0.5" W.C. For cooling speed external static pressure drop must not be more than 0.8" W.C.

4 - Seal the hole when the check is complete.

D-Blower Speed Taps

Blower speed tap changes are made on the integrated control. See figure 3. The heating tap is connected to the “HEAT” terminal and the cooling tap is connected to the “COOL” terminal. The continuous blower tap is connected to the “FAN” terminal. Unused taps must be secured on dummy terminals labeled “PARK. To change out existing speed tap, turn off power and switch out speed tap with tap connected to “PARK”. See blower speed tap table on unit diagram for motor tap colors for each speed.

VI-MAINTENANCE

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.

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

B-Filters

Filters should be inspected monthly. Clean or replace the filters when necessary to ensure that the furnace operates properly. Replacement filters must be rated for high velocity airflow. See table 14.

TABLE 14

<table>
<thead>
<tr>
<th>Cabinet Width</th>
<th>Return Air Filter Size (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (14-1/2&quot;)</td>
<td>14 x 25 x 1 (1)</td>
</tr>
<tr>
<td>B (17-1/2&quot;)</td>
<td>16 x 25 x 1 (1)</td>
</tr>
<tr>
<td>C (21&quot;)</td>
<td>20 x 25 x 1 (1)</td>
</tr>
</tbody>
</table>
**IMPORTANT**

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

Before using any filter with this system, check the specifications provided by the filter manufacturer against the data given in the appropriate Lennox Product Specifications bulletin. Additional information is provided in Service and Application Note ACC-00-2 (August 2000).

Cleaning the Heat Exchanger and Burners

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

1. Turn off both electrical and gas power supplies to furnace.
2. Remove flue pipe, top cap, flue chase and internal flue pipe assembly from the unit.
3. Label the wires from gas valve, rollout switches, primary limit switch and make-up box then disconnect them.
4. Remove the screws that secure the combustion air inducer/pressure switch assembly to the collector box. Carefully remove the combustion air inducer to avoid damaging blower gasket. If gasket is damaged, it must be replaced to prevent leakage.
5. Remove the collector box located behind the combustion air inducer. Be careful with the collector box gasket. If the gasket is damaged, it must be replaced to prevent leakage.
6. Disconnect gas supply piping. Remove the four screws securing the burner manifold assembly to the vestibule panel and remove the assembly from the unit.
7. Remove screws from both sides, top and bottom of vestibule panel.
8. Remove the collector box located behind the combustion air inducer. Be careful with the collector box gasket. If the gasket is damaged, it must be replaced to prevent leakage.
9. Back wash using steam. Begin from the burner opening on each clam. Steam must not exceed 275°F.
10. To clean burners, run a vacuum cleaner with a soft brush attachment over the face of burners. Visually inspect inside the burners and crossovers for any blockage caused by foreign matter. Remove any blockage. Figure 24 shows burner detail.

**FIGURE 24**
11- To clean the combustion air inducer visually inspect and using a wire brush clean where necessary. Use compressed air to clean off debris and any rust.

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

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

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

15- Reconnect all wires.

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

17- Reconnect gas supply piping.

18- Turn on power and gas supply to unit.

19- Set thermostat and check for proper operation.

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

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

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

23- Replace access panel.

**C-Supply Air Blower**

1 - Check and clean blower wheel.

2 - Motors used on the Lennox EL180DFE series units are permanently lubricated and need no further lubrication.

**D-Flue and Chimney**

Flue must conform to local codes. In the absence of local codes, flue must meet the National Fuel Gas Code ANSI-Z223.1 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 the correct voltage at the furnace (furnace operating). Correct voltage is 120VAC ± 10%

3 - Check amp-draw using a true RMS meter on the blower motor with blower access panel in place. See figure 26.
VII- Wiring and Sequence of Operation

EL180DFE Schematic Wiring Diagram and Sequence of Operation

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

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

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

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

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

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

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

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

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

10 - When heat demand is satisfied, W1 of the indoor thermostat de-energizes W of A92 integrated control which de-energizes GV1 gas valve. B6 combustion air inducer continues a 5-second post-purge period, and B3 indoor blower completes a selected OFF time delay.
Troubleshooting: Heating Sequence of Operation

**HEATING SEQUENCE OF OPERATION**

**NORMAL HEATING MODE**

- **POWER ON**

  - **CONTROL SELF-CHECK OKAY?**
    - NO
    - **IS POLARITY CORRECT?**
      - NO
      - **IS THERE A PROPER GROUND?**
        - NO
        - **IS VOLTAGE ABOVE 70 VOLTS?**
          - NO
          - **ROLLOUT SWITCH CLOSED?**
            - NO
            - **BURNER OFF?**
              - NO
              - **NORMAL OPERATION:**
                - LED SLOW FLASH
          - YES
          - **THERMOSTAT CALLS FOR HEAT:**
            - LED SLOW FLASH
        - YES
        - **PRIMARY LIMIT SWITCH CLOSED?**
          - NO
          - **IS COMBUSTION AIR PRESSURE SWITCH OPEN?**
            - NO
            - **IS COMBUSTION AIR INDUCER ENERGIZED?**
              - NO
              - **HAS COMBUSTION AIR PRESSURE SWITCH CLOSED IN 2.5 MINUTES?**
                - NO
                - CONTINUED NEXT PAGE
          - YES
          - **CONTINUED NEXT PAGE**
    - YES
      - **LED FLASHES CODE 1 - POLARITY REVERSED.**

- **ABNORMAL HEATING MODE**

  - **GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.**
  - **INDOOR BLOWER DELAY OFF.**
  - **LED SLOW FLASH**
    - **RESET CONTROL BY TURNING MAIN POWER OFF.**

  - **LED FLASHES CODE 2 - IMPROPER GROUND.**

  - **LED FLASHES CODE 13 - LOW LINE VOLTAGE.**
    - CONTROL WILL NOT RESPOND TO A CALL FOR HEATING UNTIL VOLTAGE RISES ABOVE 75 VOLTS.

  - **LED FLASHES CODE 8 - ROLLOUT SWITCH OPEN.**
    - GAS VALVE OFF. COMBUSTION AIR INDUCER ON.
    - SEQUENCE HOLDS UNTIL ROLLOUT SWITCH CLOSES AND POWER IS RESET OR T'STAT IS INTERRUPTED FOR MINIMUM OF 1 SECOND.

  - **LED FLASHES CODE 12 - FLAME SENSED WITHOUT GAS VALVE ENERGIZED.**
    - GAS VALVE OFF. COMBUSTION AIR INDUCER ON.
    - INDOOR BLOWER ON HEATING SPEED.

  - **LED FLASHES CODE 7 - PRIMARY LIMIT OPEN.**
    - COMBUSTION AIR INDUCER OFF.
    - INDOOR BLOWER ON

  - **LED FLASHES CODE 11 - PRESSURE SWITCH CLOSED.**
    - GAS VALVE OFF COMBUSTION AIR INDUCER OFF. INDOOR BLOWER OFF WITH DELAY.
    - (Sequence holds until pressure switch opens or thermostat resets control.)

  - **LED FLASHES CODE 9 - PRESSURE SWITCH FAILED TO CLOSE OR OPENED DURING HEAT DEMAND.**
    - PRESSURE SWITCH IS IN WATCHGUARD MODE. GAS VALVE OFF. COMBUSTION AIR INDUCER OFF.
    - INDOOR BLOWER OFF WITH DELAY. IS 5-MINUTE RESET PERIOD COMPLETE?
Troubleshooting: Cooling Sequence of Operation

COOLING SEQUENCE OF OPERATION

NORMAL COOLING MODE

POWER ON

IGNITION CONTROL MAIN POWER ON.

CONTROL SELF DIAGNOSTIC CHECK. IS CONTROL OPERATING NORMALLY?

YES

IS THERE A PROPER GROUND?

YES

IS POLARITY CORRECT?

YES

IS VOLTAGE ABOVE 70 VOLTS?

YES

ROLLOUT SWITCH MONITORED CONTINUOUSLY. IS ROLLOUT SWITCH CLOSED?

YES

LED: SLOW FLASH RATE REMAINS UNCHANGED THROUGHOUT COOLING CYCLE.

THERMOSTAT CALLS FOR COOLING.

COMPRESSOR CONTACCTOR AND SYSTEM FAN ENERGIZED WITH 2-SECOND DELAY (COOLING SPEED). EAC TERM. ENERGIZED.

THERMOSTAT OPENS.

COMPRESSOR OFF.

SYSTEM FAN AND EAC TERM. OFF WITH 45-SECOND DELAY.

ABNORMAL COOLING MODE

POWER ON

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.

LED FLASHES CODE 2 IMPROPER GROUND. CONTROL WILL CONTINUE TO CALL FOR COOLING IN THIS CONDITION.

LED FLASHES CODE 1 POLARITY REVERSED. CONTROL WILL CONTINUE TO CALL FOR COOLING IN THIS CONDITION.

LED FLASHES CODE 8 ROLLOUT SWITCH OPEN. GAS VALVE OFF. COMBUSTION AIR INDUCER ON. INDOOR BLOWER ON. SEQUENCE HOLDS UNTIL ROLLOUT SWITCH CLOSES AND MAIN POWER IS INTERRUPTED OR THERMOSTAT IS CYCLED OFF/ON FOR 1 SEC. MINIMUM.

LED FLASHES CODE 13 LOW VOLTAGE. CONTROL WILL CONTINUE TO CALL FOR COOLING IN THIS CONDITION.
CONTINUOUS FAN SEQUENCE OF OPERATION

LED: SLOW FLASH RATE REMAINS UNCHANGED THROUGHOUT SEQUENCE.

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

THERMOSTAT CALLS FOR HEAT (W).

THERMOSTAT CALLS FOR COOLING.

THERMOSTAT OPENS.

SYSTEM FAN CONTINUES FAN SPEED WITHOUT INTERRUPTION. EAC TERMINAL REMAIN ON. HUM TERMINAL IS ENERGIZED WITH COMBUSTION AIR BLOWER.

SYSTEM FAN SWITCHES TO HEAT SPEED AFTER 30 SECOND DELAY. EAC AND HUM TERMINAL REMAIN ON.

HUM TERMINAL OFF AFTER POST PURGE BY COMBUSTION AIR BLOWER. SYSTEM FAN SWITCHES TO FAN SPEED AFTER BLOWER OFF DELAY. EAC CONTINUES WITHOUT INTERRUPTION.

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