

G50DF(X) series units are mid-efficiency gas furnaces used for downflow applications only, manufactured with Lennox Duralok Plus heat exchangers formed of aluminumized steel. G50DF(X) units are available in heating capacities of 44,000 to 132,000 Btuh and cooling applications up to 5 tons. Refer to Engineering Handbook for proper sizing.

Units are factory equipped for use with natural gas. Kits are available for conversion to LPG operation. G50DF(X) model units are equipped with the Lennox SureLight silicon nitride ignition system. The G50DF(X) unit meets the California Nitrogen Oxides (NO_x) Standards and California Seasonal Efficiency requirements. 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.

TABLE OF CONTENTS

Introduction	1
Specifications	2
Blower Data	3
High Altitude	6
Parts Identification	7
I Unit Components	8
II Installation	16
III Start Up	16
IV Heating System Service Checks	16
V Typical Operating Characteristics	19
VI Maintenance	19
VII Wiring and Sequence of Operation	21
VIII SureLight Troubleshooting Guide	27



⚠ IMPORTANT

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer, service agency or the gas supplier.

⚠ WARNING



Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

⚠ WARNING

Sharp edges. Be careful when servicing unit to avoid sharp edges which may result in personal injury.

SPECIFICATIONS

Gas Heating Performance	Model No.	G50DF-24A-045	☐ G50DF-24A-070	G50DF-36A-070	G50DF-36B-090
	Low NO _x Model No.	G50DF-24A-045X	---	G50DF-36A-070X	---
	Input - Btuh (kW)	44,000 (12.9)	66,000 (19.3)	66,000 (19.3)	88,000 (25.8)
	Output - Btuh (kW)	36,000 (10.5)	53,000 (15.5)	53,000 (15.5)	71,000 (20.8)
	☆AFUE	80.0%	80.0%	80.0%	80.0%
	California Seasonal Efficiency	73.1%	74.2%	74.2%	76%
	High static (AGA/CGA) - in. w.g. (Pa)	.50 (124)	.50 (124)	.50 (124)	.50 (124)
	Temperature rise range - °F (°C)	20 - 50 (11 - 28)	35 - 65 (19 - 36)	35 - 65 (19 - 36)	45 - 75 (25 - 42)
	Gas pipe size IPS - in. (mm)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
	Flue connection - in. (mm) round	4 (102)	4 (102)	4 (102)	4 (102)
Indoor Blower	Wheel nominal diameter x width - in.	10 x 8	10 x 8	10 x 8	10 x 8
	mm	254 x 203	254 x 203	254 x 203	254 x 203
	Motor output - hp (W)	1/5 (149)	1/5 (149)	1/3 (249)	1/3 (249)
	Tons (kW) of add-on cooling	1.5 - 2 (5.3 - 7.0)	1.5 - 2 (5.3 - 7.0)	1.5 - 3 (5.3 - 10.6)	1 - 3 (3.5 - 10.6)
Shipping weight - 1 package		121 lbs. (55 kg)	132 lbs. (60 kg)	132 lbs. (60 kg)	146 lbs. (66 kg)
Matching Coils		CR26-18N-F, CR26-30N-F, CR26-36N-F	CR26-18N-F, CR26-30N-F, CR26-36N-F	CR26-18N-F, CR26-30N-F, CR26-36N-F	CR26-36W-F, CR26-48N-F
Electrical characteristics		120 volts - 60 hertz - 1 phase (less than 12 amps)			
OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA					
Down-Flow Additive Base - Shipping Weight - lbs. (kg)		11M59 - 9 (4)	11M59 - 9 (4)	11M59 - 9 (4)	11M60 - 10 (5)
LPG/Propane Kit		See Page 6			
Twinning Kit		15L38	15L38	15L38	15L38

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

NOTE - Filters and provisions for mounting are not furnished and must be field provided.

☐ Canada Only

Gas Heating Performance	Model No.	☐ G50DF-36C-110	G50DF-48C-090	G50DF-48C-110	G50DF-60C-110	G50DF-60D-135
	Low NO _x Model No.	----	G50DF-48C-090X	----	----	----
	Input - Btuh (kW)	110,000 (32.2)	88,000 (25.8)	110,000 (32.2)	110,000 (32.2)	132,000 (38.7)
	Output - Btuh (kW)	87,000 (25.5)	71,000 (20.8)	89,000 (26.1)	90,000 (26.4)	107,000 (31.3)
	☆AFUE	80.0%	80.0%	80.0%	80.0%	80.0%
	California Seasonal Efficiency	75.4%	76.5%	76.8%	74.6%	76.5%
	High static (AGA/CGA) - in. w.g. (Pa)	.50 (124)	.50 (124)	.50 (124)	.50 (124)	.50 (124)
	Temperature rise range - °F (°C)	50 - 80 (27 - 44)	45 - 75 (25 - 42)	45 - 75 (25 - 42)	35 - 65 (19 - 36)	40 - 70 (22 - 39)
	Gas pipe size IPS - in. (mm)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
	Flue connection - in. (mm) round	4 (102)	4 (102)	4 (102)	4 (102)	4 (102)
Indoor Blower	Wheel nominal diameter x width - in.	10 x 8	10 x 10	10 x 10	11-1/2 x 10	11-1/2 x 10
	mm	254 x 203	254 x 254	254 x 254	292 x 254	292 x 254
	Motor output - hp (W)	1/3 (249)	1/2 (373)	1/2 (373)	3/4 (560)	3/4 (560)
	Tons (kW) of add-on cooling	1 - 3 (3.5 - 10.6)	2 - 4 (7.0 - 14.1)	2 - 4 (7.0 - 14.1)	4 - 5 (14.1 - 17.6)	4 - 5 (14.1 - 17.6)
Shipping weight - 1 package		169 lbs. (77 kg)	153 lbs (69 kg)	169 lbs. (77 kg)	169 lbs. (77 kg)	192 lbs. (87 kg)
Matching Coils		CR26-36W-F, CR26-48N-F	CR26-36W-F, CR26-48N-F, CR26-60N-F	CR26-36W-F, CR26-48N-F, CR26-60N-F	CR26-48N-F, CR26-60N-F	CR26-48W-F, CR26-60W-F
Electrical characteristics		120 volts - 60 hertz - 1 phase (less than 12 amps)				
OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA						
Down-Flow Additive Base - Shipping Weight - lbs. (kg)		11M61 - 11 (5)	11M61 - 11 (5)	11M61 - 11 (5)	11M61 - 11 (5)	11M62 - 13 (6)
LPG/Propane Kit		See Page 6				
Twinning Kit		15L38	15L38	15L38	15L38	15L38

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

NOTE - Filters and provisions for mounting are not furnished and must be field provided.

☐ Canada Only

BLOWER DATA

G50DF-24A-045 PERFORMANCE										
External Static Pressure		Air Volume / Watts at Different Blower Speeds								
		High			Medium			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0.00	0	1202	565	417	1058	500	367	828	390	278
0.05	12	1185	560	410	1041	490	360	819	385	274
0.10	25	1167	550	402	1024	482	353	809	380	270
0.15	37	1147	540	396	1008	475	346	793	375	265
0.20	50	1127	530	390	991	470	338	776	365	260
0.25	62	1104	520	382	979	460	335	764	360	257
0.30	75	1081	510	374	966	455	331	752	355	254
0.40	100	1018	480	357	922	435	319	712	335	244
0.50	125	960	455	342	873	410	306	651	305	234
0.60	150	901	425	330	811	385	290	618	290	231
0.70	175	815	385	313	691	325	272	564	265	221
0.80	200	685	325	289	619	290	259	465	220	203
0.90	225	558	265	271	510	240	238	395	185	190

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

G50DF-24A-070 PERFORMANCE										
External Static Pressure		Air Volume / Watts at Different Blower Speeds								
		High			Medium			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
.00	0	1235	580	445	1035	490	375	820	390	300
.05	10	1220	575	440	1025	485	365	815	385	295
.10	25	1205	570	430	1020	480	365	810	385	290
.15	35	1190	560	425	1005	475	355	800	380	285
.20	50	1170	555	420	995	470	350	790	375	280
.25	60	1140	540	410	975	460	345	785	370	275
.30	75	1125	530	400	955	450	335	775	365	275
.40	100	1075	505	385	930	440	325	745	350	265
.50	125	1025	485	370	890	420	315	715	340	255
.60	150	975	460	355	850	400	305	685	325	245
.70	175	710	430	340	800	380	290	630	295	235
.80	200	780	365	315	725	340	275	550	260	220
.90	210	720	340	310	670	315	265	495	235	200

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

G50DF-36A-070 PERFORMANCE													
External Static Pressure		Air Volume / Watts at Different Blower Speeds											
		High			Medium-High			Medium-Low			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0.00	0	1475	695	616	1343	635	554	1151	545	495	989	465	415
0.05	12	1449	685	606	1321	625	543	1139	540	481	983	465	407
0.10	25	1423	670	595	1298	615	532	1127	530	466	976	460	398
0.15	37	1397	660	585	1276	600	521	1115	525	452	970	460	390
0.20	50	1371	645	574	1253	590	510	1103	520	437	963	455	381
0.25	62	1345	635	563	1228	580	494	1090	515	428	953	450	371
0.30	75	1318	620	552	1203	570	478	1077	510	418	943	445	360
0.40	100	1249	590	528	1151	545	455	1039	490	395	918	435	346
0.50	125	1200	565	508	1094	515	432	998	470	374	882	415	331
0.60	150	1112	525	475	1033	490	409	951	450	354	831	390	313
0.70	175	1032	485	455	968	455	390	856	405	338	722	340	280
0.80	200	959	455	434	876	415	359	737	350	299	666	315	266
0.90	225	770	365	389	715	335	321	667	315	278	591	280	244

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

BLOWER DATA

G50DF-36B-090 PERFORMANCE

External Static Pressure		Air Volume / Watts at Different Blower Speeds											
		High			Medium-High			Medium-Low			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0.00	0	1598	755	608	1408	665	526	1166	550	436	963	455	355
0.05	12	1579	745	599	1398	660	518	1164	550	428	966	455	351
0.10	25	1559	735	589	1388	655	509	1161	550	420	968	455	346
0.15	37	1528	720	573	1369	645	497	1156	545	413	966	455	341
0.20	50	1497	705	556	1350	635	485	1150	545	406	964	455	335
0.25	62	1465	690	544	1326	625	473	1137	535	398	955	450	329
0.30	75	1432	675	532	1301	615	460	1124	530	389	945	445	323
0.40	100	1370	645	509	1248	590	438	1093	515	373	933	440	313
0.50	125	1294	610	482	1198	565	420	1055	500	355	902	425	302
0.60	150	1213	575	456	1141	540	397	1012	480	343	862	405	285
0.70	175	1139	540	437	1054	495	371	917	435	313	802	380	272
0.80	200	1002	475	401	948	445	342	850	400	295	728	345	251
0.90	225	901	425	374	822	390	313	740	350	272	---	---	---

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

G50DF-36C-110 PERFORMANCE

External Static Pressure		Air Volume / Watts at Different Blower Speeds											
		High			Medium-High			Medium-Low			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0.00	0	1660	785	668	1425	675	589	1205	570	489	1015	480	409
0.05	12	1635	770	652	1415	670	575	1205	570	480	1010	475	405
0.10	25	1610	760	636	1405	665	560	1205	570	471	1010	475	402
0.15	37	1575	745	617	1395	660	544	1200	565	460	1005	475	395
0.20	50	1535	725	597	1380	650	524	1200	565	449	1005	475	387
0.25	62	1490	705	576	1350	635	506	1190	560	436	1000	470	380
0.30	75	1450	685	556	1320	625	488	1175	555	422	1000	470	372
0.40	100	1350	635	516	1250	590	456	1125	530	400	970	460	347
0.50	125	1230	580	472	1150	545	416	1045	495	365	910	430	319
0.60	150	1110	525	438	1025	485	374	950	450	329	820	385	284
0.70	175	950	450	396	870	410	329	800	380	286	695	330	251
0.80	200	800	380	362	715	390	294	675	320	245	---	---	---
0.90	225	685	325	300	625	295	237	560	265	208	---	---	---

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

G50DF-48C-090 PERFORMANCE

External Static Pressure		Air Volume / Watts at Different Blower Speeds											
		High			Medium-High			Medium-Low			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0.00	0	2039	960	749	1852	875	657	1595	755	562	1325	625	466
0.05	12	1998	945	727	1826	860	638	1576	745	547	1338	632	460
0.10	25	1956	925	704	1800	850	619	1556	735	532	1351	640	453
0.15	37	1921	905	692	1770	835	602	1541	725	518	1340	630	441
0.20	50	1885	890	679	1739	820	585	1526	720	503	1329	625	428
0.25	62	1844	870	662	1701	805	568	1502	710	488	1301	615	414
0.30	75	1802	850	645	1663	785	551	1477	695	473	1272	600	399
0.40	100	1693	800	606	1583	745	517	1415	670	448	1226	580	378
0.50	125	1600	755	570	1491	705	485	1334	630	414	1170	550	360
0.60	150	1494	705	540	1406	665	457	1248	590	389	1110	525	337
0.70	175	1378	650	509	1300	615	426	1166	550	367	1026	485	316
0.80	200	1248	590	478	1161	550	390	1027	485	331	---	---	---
0.90	225	1097	520	439	1028	485	360	925	435	307	---	---	---

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

BLOWER DATA Cont.

G50DF-48C-110 PERFORMANCE													
External Static Pressure		Air Volume / Watts at Different Blower Speeds											
		High			Medium-High			Medium-Low			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0.00	0	2034	960	846	1790	845	712	1508	710	595	1226	580	477
0.05	12	2001	945	825	1761	830	694	1493	705	581	1224	580	470
0.10	25	1968	930	803	1731	815	675	1477	695	567	1222	575	463
0.15	37	1924	910	781	1708	805	657	1470	695	555	1219	575	455
0.20	50	1879	885	758	1685	795	638	1463	690	542	1216	575	447
0.25	62	1837	865	736	1654	780	618	1442	680	528	1201	565	437
0.30	75	1794	845	714	1623	765	597	1420	670	514	1186	560	427
0.40	100	1681	795	669	1548	730	564	1361	640	483	1134	535	400
0.50	125	1622	765	630	1445	680	524	1280	605	447	1065	505	371
0.60	150	1447	685	592	1312	620	479	1165	550	404	1000	470	343
0.70	175	1289	610	545	1178	555	434	1056	500	369	907	430	319
0.80	200	1157	545	502	1067	505	406	956	450	348	816	385	296
0.90	225	1012	480	472	931	440	372	840	395	320	690	325	265

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

G50DF-60C-110 PERFORMANCE													
External Static Pressure		Air Volume / Watts at Different Blower Speeds											
		High			Medium-High			Medium-Low			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
.00	0	2450	1155	1170	2355	1110	1005	2145	1015	840	1845	870	705
.05	10	2430	1150	1165	2340	1105	995	2130	1005	835	1840	870	695
.10	25	2380	1120	1145	2315	1090	985	2105	995	825	1830	865	690
.15	35	2350	1110	1135	2260	1065	965	2085	985	815	1815	855	680
.20	50	2300	1085	1115	2235	1055	955	2060	975	805	1805	850	675
.25	60	2270	1070	1105	2205	1040	945	2015	950	785	1780	840	665
.30	75	2245	1060	1100	2150	1015	925	1995	940	775	1770	835	655
.40	100	2135	1010	1060	2070	975	895	1925	910	750	1730	815	640
.50	125	2055	970	1035	1990	940	870	1855	875	725	1695	800	625
.60	150	1975	930	1010	1910	900	845	1785	845	705	1650	775	605
.70	175	1870	880	980	1830	865	820	1695	800	680	1575	745	585
.80	200	1760	830	950	1720	815	795	1605	755	655	1505	710	570
.90	225	1625	765	915	1560	735	755	1515	715	640	1435	675	555

BLOWER DATA Cont.

G50DF-60D-135 PERFORMANCE													
External Static Pressure		Air Volume / Watts at Different Blower Speeds											
		High			Medium-High			Medium-Low			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0.00	0	2845	1345	1143	2692	1270	961	2451	1155	818	2054	970	686
0.05	12	2774	1310	1128	2628	1240	948	2354	1110	809	2022	955	680
0.10	25	2702	1275	1112	2564	1210	935	2256	1065	799	1989	940	674
0.15	37	2629	1240	1095	2494	1175	918	2203	1040	784	1933	910	666
0.20	50	2556	1205	1077	2424	1145	901	2150	1015	769	1877	885	657
0.25	62	2471	1165	1061	2309	1090	890	2089	985	759	1835	865	649
0.30	75	2385	1125	1045	2194	1035	878	2028	955	749	1792	845	640
0.40	100	2184	1030	1022	2066	975	851	1900	895	727	1697	800	626
0.50	125	2019	955	990	1917	905	830	1779	840	707	1584	750	602
0.60	150	1865	880	957	1760	830	796	1630	770	676	1491	705	583
0.70	175	1697	800	927	1592	750	768	1475	695	656	1364	645	557
0.80	200	1513	715	897	1485	700	740	1378	650	627	1266	600	538
0.90	225	1385	655	863	1305	615	712	1206	570	598	1120	530	516

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

FILTER AIR RESITANCE

cfm (L/s)	in. w.g. (Pa)	cfm (L/s)	in. w.g. (Pa)
0 (0)	0.00 (0)	1400 (660)	0.15 (35)
200 (95)	0.01 (0)	1600 (755)	0.19 (45)
400 (190)	0.03 (5)	1800 (850)	0.23 (55)
600 (285)	0.04 (10)	2000 (945)	0.27 (65)
800 (380)	0.06 (15)	2200 (1040)	0.33 (80)
1000 (470)	0.09 (20)	2400 (1130)	0.38 (95)
1200 (565)	0.12 (30)	2600 (1225)	0.44 (110)

HIGH ALTITUDE

Input -1 through -14	¹ High Altitude Orifice Kit Natural Gas Only	High Altitude Pressure Switch Kit		LPG/Propane Kit	
		4501-7500 ft.	7501-10,000 ft.	0-7500 ft.	7501-10,000 ft.
-044 -070	59M16	---	---	45L60	47M81
-090	59M16	15M22	56L32	45L60	47M81
-110	59M16	15M22	56L32	45L60	47M81
-135	59M16	49L90	15M22	45L60	47M81
Input -15 and later	¹ High Altitude Orifice Kit Natural Gas Only	High Altitude Pressure Switch Kit		LPG/Propane Kit	
		4501-7500 ft.	7501-10,000 ft.	0-7500 ft.	7501-10,000 ft.
-045 -070	59M17	---	---	25W20	25W21
-090	59M17	15M22	56L32	45L60	25W21
-110	59M17	15M22	56L32	25W20	25W21
-135	59M17	49L90	15M22	25W20	25W21

¹ Required for proper operation at altitudes from 7501 to 10,000 ft.

NOTE - G50DF(X) units do NOT require a manifold change due to elevation. Manifold pressure remains the same at all elevations.

G50DF(X) PARTS ARRANGEMENT

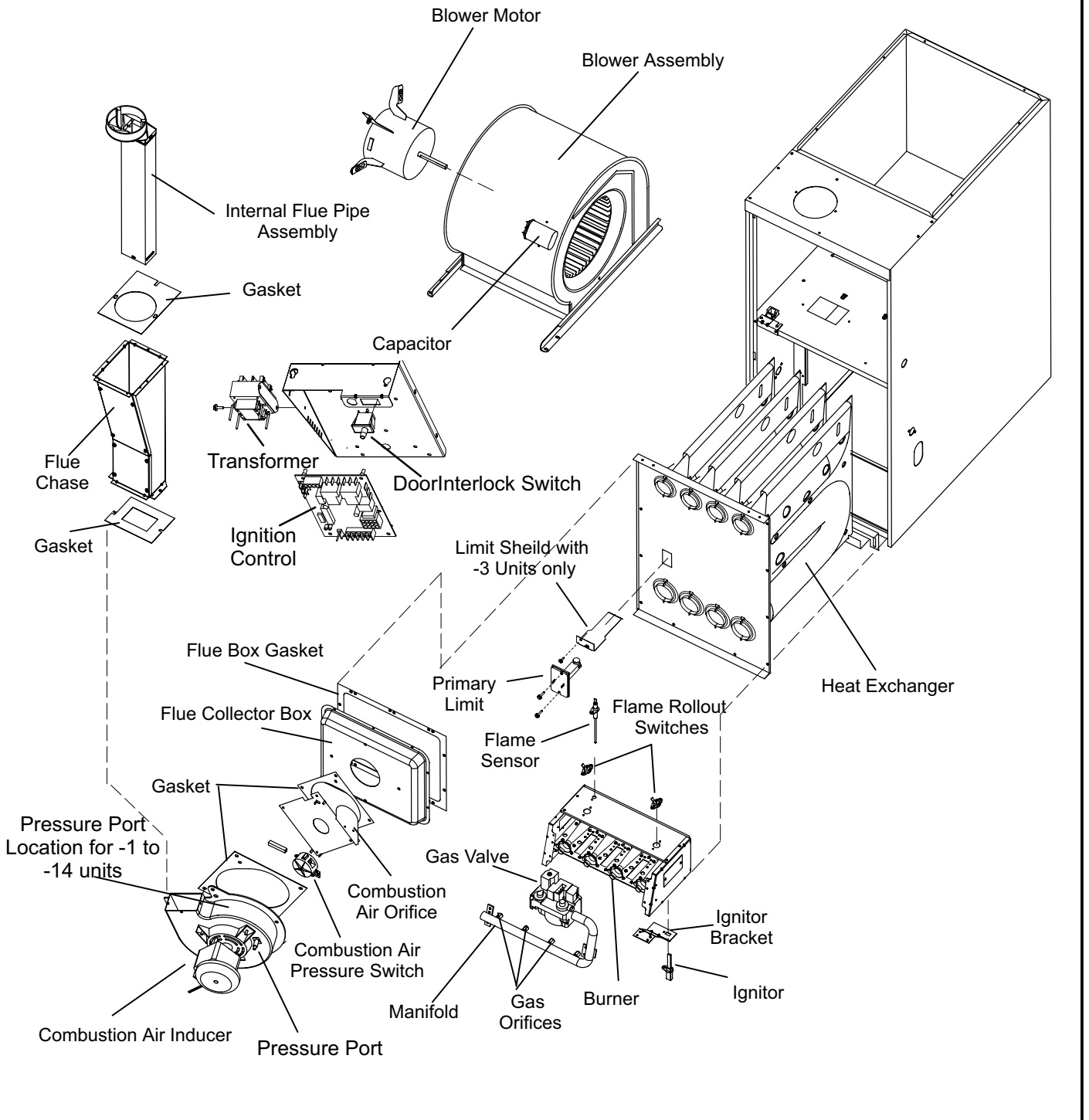


FIGURE 1

I-UNIT COMPONENTS

G50DF(X) unit components are shown in figure 1. The gas valve, combustion air inducer and burners can be accessed by removing the burner access panel. Electrical components are in the control box (figure 2) found in the blower section.

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.

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 rated 14A at 125VAC is wired in series with line voltage. When the blower door is removed the unit will shut down.

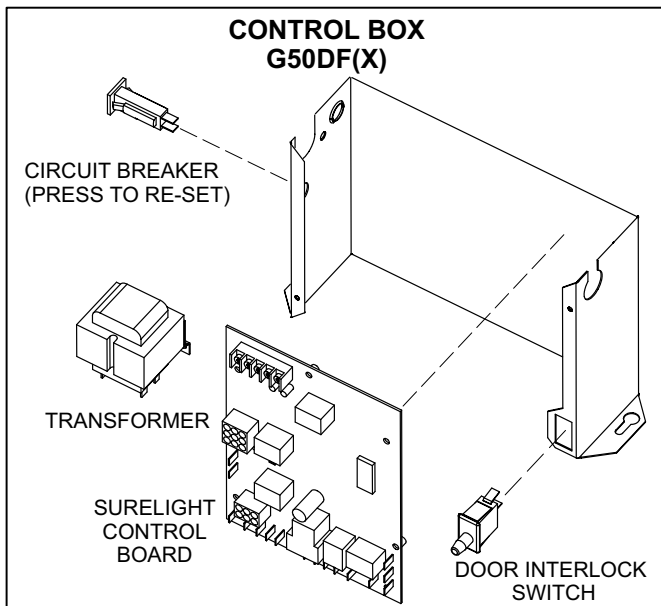


FIGURE 2

3- Circuit Breaker (CB8)

A 24V circuit breaker is also located in the control box. The switch provides overcurrent protection to the transformer (T1). The breaker is rated 3A at 32V. If the current exceeds this limit the breaker will trip and all unit operation will shutdown. The breaker can be manually reset by pressing the button on the face. See figure 2.

⚠ 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.

4- Furnace Control (A92) Figure 3 SureLight Control 97L48

All G50DF(X) units are equipped with the Lennox SureLight ignition system. The system consists of ignition control board, ignitor and sensor. 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 (1) one amp. Table 1 shows control terminal designations. Tables 2 and 3 show jack plug terminal designations. See table 4 for troubleshooting diagnostic codes. 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. Each time power is applied to the furnace, the SureLight board performs a selfcheck including energizing the combustion air inducer for a period of 1 second.

TABLE 1

SURELIGHT CONTROL TERMINAL DESIGNATIONS	
ACB COOL	Blower - Cooling Speed (Line Volt)
ACB HEAT	Blower - Heating Speed (Line Volt)
PARK	Alternate Blower Speeds (Dead)
ACB LOW	Continuous Low Speed Blower
ACC	Accessory Terminal (Line Volt)
TX	120VAC Hot to Transformer
HOT	120VAC Hot Input
HTG ACC	Heat Only Accessory (Line Volt)
NEUTRALS	120VAC Neutrals
24VAC HOT	24VAC Hot from Transformer
24VAC RTN	24VAC Return from Transformer
FLAME SENSE	Flame Sense Terminal

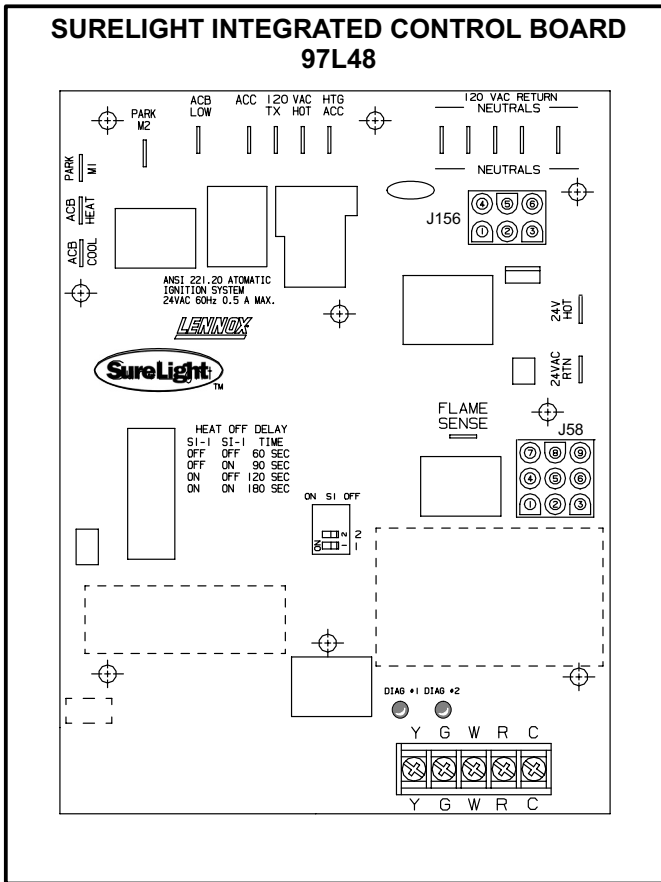


FIGURE 3

TABLE 2

SureLight BOARD J156 (J2) TERMINAL DESIGNATIONS	
PIN #	FUNCTION
1	Ignitor
2	Not Used
3	Ignitor Neutral
4	Combustion Air Inducer Line Voltage
5	Not Used
6	Combustion Air Inducer Neutral

TABLE 3

SureLight BOARD J58 (J1) TERMINAL DESIGNATIONS	
PIN #	FUNCTION
1	Primary Limit In
2	Gas Valve Common
3	Roll Out Switch Out
4	Gas Valve 24V
5	Pressure Switch In
6	Pressure Switch and Primary Limit Out
7	Not Used
8	Roll Out Switch In
9	Ground

a-Electronic Ignition (See Figure 5)

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 proving 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. After the 15-second pre-purge period, the SureLight ignitor warms up for 20 seconds during which the gas valve opens at 19 seconds for a 4-second trial for ignition. The ignitor stays energized during the trial until flame is sensed. If ignition is not proved during the 4-second period, the control will try four more times with an inter-purge and warm-up time between trials of 35 seconds. After a total of five trials for ignition (including the initial trial), the control goes into Watchguard-Flame Failure mode. After a 60-minute reset period, the control will begin the ignition sequence again. The SureLight control board has an added feature that prolongs the life of the ignitor. After a successful ignition, 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.

b-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. 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 4.

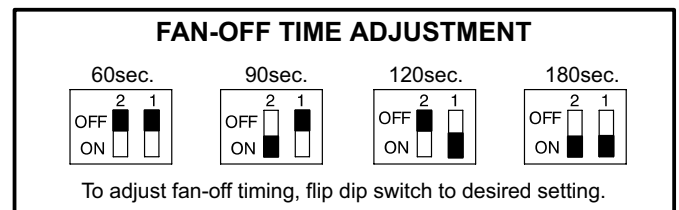


FIGURE 4

The SureLight board is equipped with two LED lights for troubleshooting. The diagnostic codes are listed below in table 4.

TABLE 4
DIAGNOSTIC CODES

Make sure to Identify LED'S Correctly. Refer to figure 3 or 6.

LED #1 97L48 - DIAG1 Green 69M15 - DS1 Red	LED #2 97L48 - DIAG2 Green 69M15 - DS2 Green	DESCRIPTION
SIMULTANEOUS SLOW FLASH	SIMULTANEOUS SLOW FLASH	Power on - Normal operation. Also signaled during cooling and continuous fan.
SIMULTANEOUS FAST FLASH	SIMULTANEOUS FAST FLASH	Normal operation - signaled when heating demand initiated at thermostat.
SLOW FLASH	ON	Primary or secondary limit switch open. Limit must close within 3 minutes or unit goes into 1 hour Watchguard.
OFF	SLOW FLASH	Prove Switch open OR: Blocked inlet/exhaust vent; OR: Prove switch closed prior to activation of combustion air blower. OR: Blocked condensate line
ALTERNATING SLOW FLASH	ALTERNATING SLOW FLASH	Watchguard -- burners failed to ignite. Limit open more than 3 minutes OR: Lost flame sense 5 times in one heating cycle.
SLOW FLASH	OFF	Flame sensed without gas valve energized.
ON	SLOW FLASH	Rollout switch open. OR: Low voltage pin connector improperly attached.
ON ON OFF	ON OFF ON	Circuit board failure or control wired incorrectly. Check 120 and 24 voltage to board.
FAST FLASH	SLOW FLASH	Main power polarity reversed. Switch line and neutral. Improper main ground.
SLOW FLASH	FAST FLASH	Low flame signal. Measures below: Control 97L48 0.61 microAmps Control 69M15 0.31 microAmps. Replace flame sense rod.
ALTERNATING FAST FLASH	ALTERNATING FAST FLASH	The following conditions are sensed during the ignitor warm-up period only: 1) Improper main ground; 2) Broken ignitor; OR: Open ignitor circuit; 3) Line voltage below 75 volts. (If voltage lower than 75 volts prior to ignitor warm-up, control will signal waiting on call from thermostat, and will not respond.)

NOTE - Slow flash rate equals 1 Hz (one flash per second). Fast flash rate equals 3 Hz (three flashes per second).

Low flame sense current - 97L48 control = 0.21-0.60 microAmps. 69M15 control = 0.25 - 0.30 microAmps.

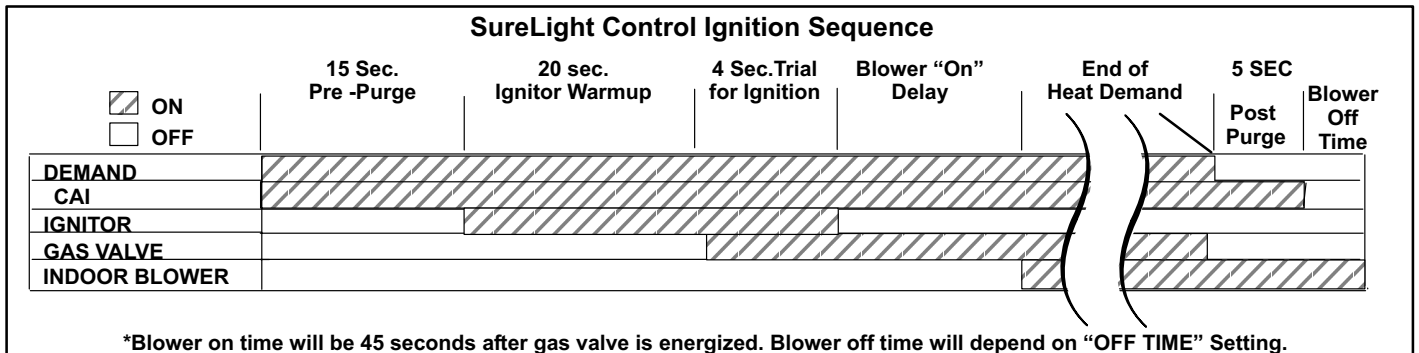


FIGURE 5

5- Furnace Control (A92) Figure 6 SuerLight Control 69M15

G50DF(X) units are also equipped with the Lennox SureLight ignition system. The system consists of ignition control board, ignitor and sensor. 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 (DS1 red and DS2 green) for troubleshooting and two 120 volt accessory terminals each rated at (1) one amp. A 24 volt accessory terminal rated at 0.5 amps is also provided. Table 5 shows 24 volt and 120 volt control terminal designations. Tables 6 and 7 show jack plug terminal designations. See table 4 for troubleshooting diagnostic codes. 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. Each time power is applied to the furnace, the SureLight board performs a selfcheck.

TABLE 5

SURELIGHT BOARD TERMINAL DESIGNATIONS	
COOL	Blower - Cooling Speed (120V)
HEAT	Blower - Heating (120V)
PARK	Unused blower lead not energized
FAN	Continuous Low Blower Speed
EAC	Accessory Terminal (120V)
XFMR	Transformer (120V)
LINE	Input (120V)
HUM	Heat Only Accessory (120V)
5 Terminals	120 Volt Neutral
FS	Flame Sensor
24V HUM	Heat Only Accessory (24V)

TABLE 6

SURELIGHT BOARD TERMINAL DESIGNATIONS	
PIN #	FUNCTION
1	Combustion Air Inducer Line Voltage
2	Ignitor Voltage
3	Combustion Air Inducer Neutral
4	Ignitor Neutral

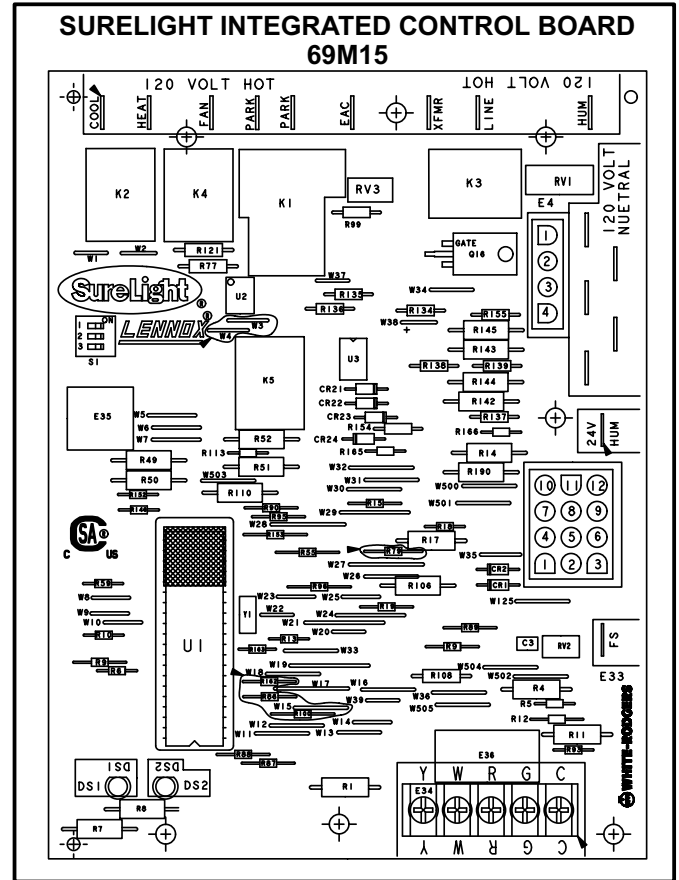


FIGURE 6

TABLE 7

SURELIGHT BOARD TERMINAL DESIGNATIONS	
PIN #	FUNCTION
1	Prove Switch and Limit Out
2	Not Used
3	24V Hot
4	Not Used
5	Roll Out Switch Out
6	24V Common
7	Limit In
8	Ground
9	Gas Valve Common
10	Prove Switch In
11	Roll Out Switch In
12	Gas Valve 24V Hot

c-Electronic Ignition (See Figure 5)

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 proving 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. After the 15-second pre-purge period, the SureLight ignitor warms up for 20 seconds during which the gas valve opens at 19 seconds for a 4-second trial for ignition. The ignitor stays energized during the trial until flame is sensed. If ignition is not proved during the 4-second period, the control will try four more times with an inter purge and warm-up time between trials of 35 seconds. After a total of five trials for ignition (including the initial trial), the control goes into Watchguard-Flame Failure mode. After a 60-minute reset period, the control will begin the ignition sequence again. The SureLight control board has an added feature that prolongs the life of the ignitor. After a successful ignition, 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.

d-Fan Time Control Heating

The heating 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 setting the S1 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. For customized comfort, monitor the supply air temperature once the heat demand is satisfied. Note the supply air temperature at the instant the blower is de-energized. Adjust the fan-off delay to achieve a supply air temperature between 90° - 110° at the instant the blower is de-energized. (Longer delay times allow for lower air temperature, shorter delay times allow for higher air temperature). See table 8 for switch settings and fan delay times..

e-Fan Time Control Cooling

The cooling fan on time is fixed at 2 seconds and cannot be adjusted. Fan off time (time that the blower operates after the cool demand has been satisfied) can be adjusted by setting the S1 dip switches (switch 3) located on the SureLight integrated control. See table 8 for switch settings and fan delay times.

TABLE 8

S1 DIP SWITCH SETTINGS		
Heat Off Delay		
Switch 1	Switch 2	SECONDS
OFF	OFF	60
OFF	ON	90
ON	OFF	120
ON	ON	180
Cool Off Delay		
Switch 3		SECONDS
OFF		2
ON		45

6-Flame Sensor (Figure 7)

A flame sensor is located on the left side of the burner support. See parts arrangement figure 1. The sensor is mounted on the flame rollout plate and the tip protrudes into the flame envelope of the left-most burner. The sensor can be removed for service without removing any part of the burners. During operation, flame is sensed by current passed through the flame and sensing electrode. The SureLight control allows the gas valve to remain open as long as flame signal is sensed. See table 14 for flame sense signal.

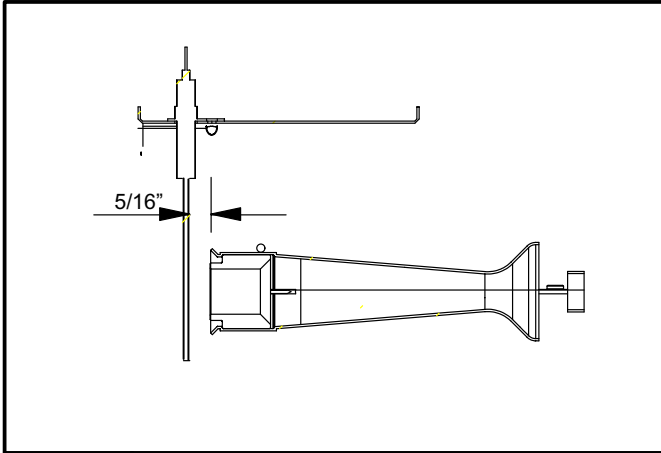


FIGURE 7

7-Ignitor

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

NOTE - The G50DF(X) furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

8-Flame Rollout Switch (S47)

Flame rollout switch S47 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. See parts arrangement figure 1. The limit is a N.C. SPST manual-reset limit connected in series with the ignition control A92. 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 heat exchanger, flue or lack of combustion air. The switch is factory set to open at 210°F and cannot be adjusted. The switch can be manually reset. To manually reset a tripped switch, push the reset button located on the control.

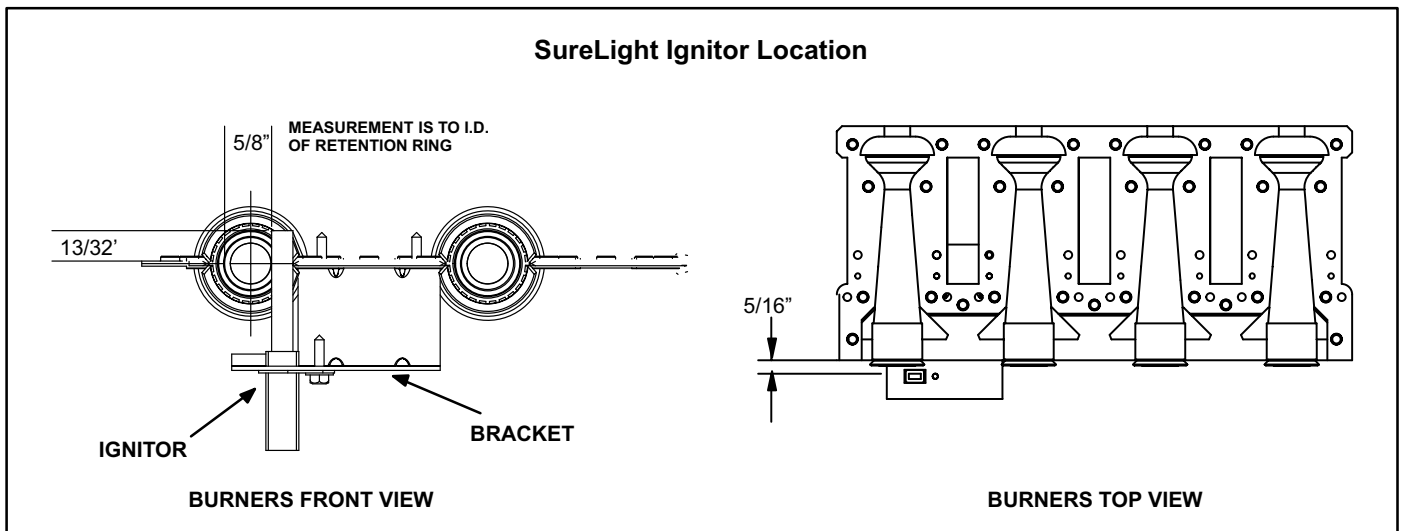


FIGURE 8

9-Blower Motors and Capacitors

All G50DF(X) units use direct drive blower motors. All motors are 120V permanent split capacitor motors to ensure maximum efficiency. Ratings for capacitors will be on motor nameplate.

NOTE - The shaft on 1 HP motors have 2 flat sides and are matched with blower wheels with 2 set screws.

10-Primary Limit Control (S10)

The primary limit (S10) is located in the heating vestibule panel. G50DF(X) -3 and later units have a limit shield and should not be removed. See figure 9 and make note of limit orientation to shield. When excess heat is sensed in the heat exchanger, the limit will open. If the limit is open, the furnace control energizes the supply air blower and closes the gas valve. The limit automatically resets when unit temperature returns to normal. The switch must reset within three minutes or SureLight board will go into Watch guard for one hour. The setpoint is factory set (printed on side of switch) and cannot be adjusted.

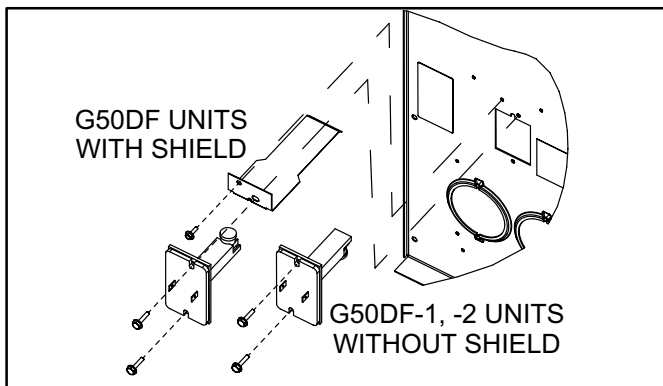


FIGURE 9

11-Secondary Limit Controls (S21)

The secondary limit (S21) on G50DF(X) units is located in the blower compartment in the back side of the blower housing. See figure 10. 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. G50DF -1 through -6 units use 3/4" air stream limits factory set to open at 150°F. G50DF-7 and later units use 1/2" air stream limits factory set to open at 135°.

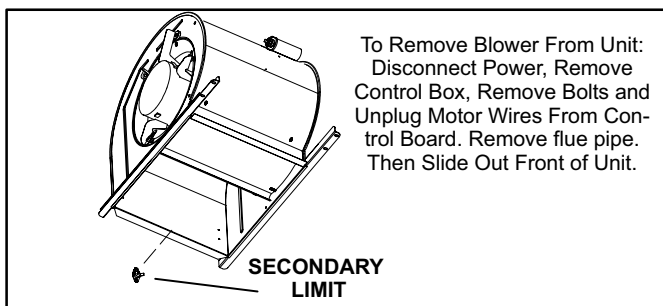


FIGURE 10

12-Gas Valve Figures 11, 12 & 13

The G50DF(X) uses a gas valve manufactured by Honeywell or White Rodgers. 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 or switch are located on 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.

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

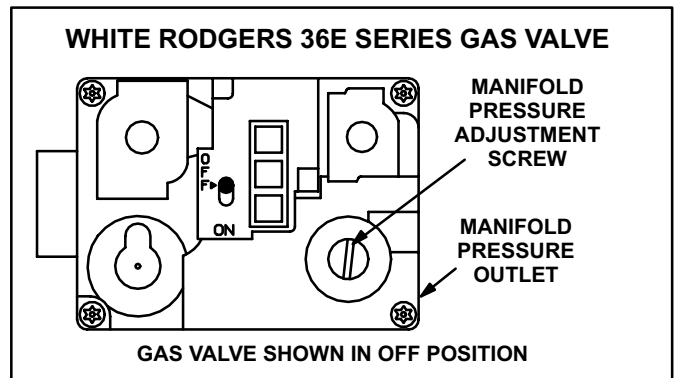


FIGURE 11

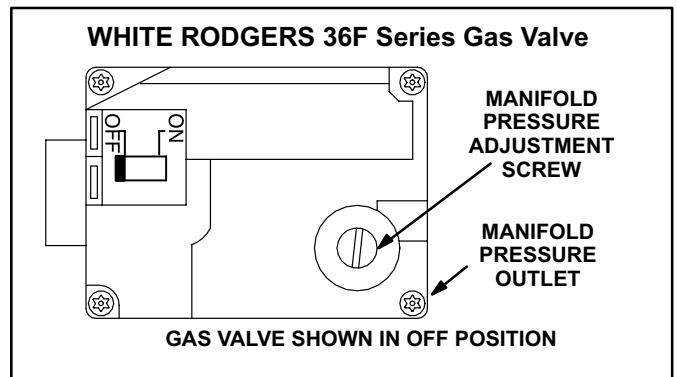


FIGURE 12

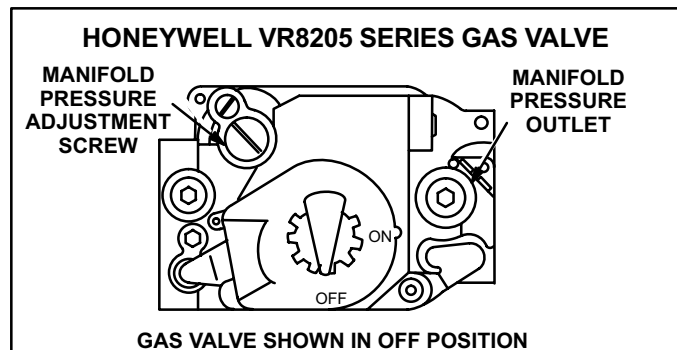


FIGURE 13

13-Combustion Air Inducer (B6)

All G50DF(X) 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 furnace 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 proving switch connected to the combustion air inducer orifice plate (figure 14) is used to prove inducer operation. The combustion air inducer orifice will be different for each model. See table 9 for orifice sizes. The switch monitors air pressure in the inducer housing. During normal operation, the pressure in the housing is negative. If pressure becomes less negative (signifying an obstruction) the proving switch opens. When the proving switch opens, the furnace control (A92) immediately closes the gas valve to prevent burner operation.

TABLE 9

G50DF(X) Unit	C.A.I. Orifice Size
-045	1.438"
-070	1.688"
-090	1.875"
-110	2.250"
-135	2.600"

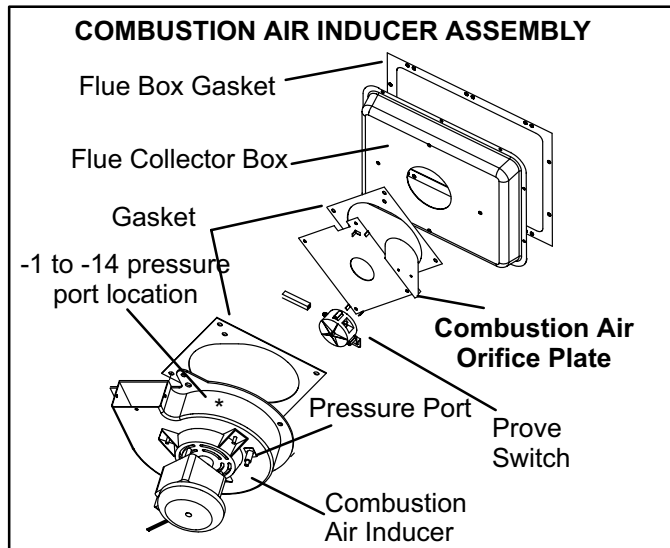


FIGURE 14

14-Combustion Air Inducer Proving Switch (S18)

G50DF(X) series units are equipped with a combustion air proving switch located on the combustion air inducer orifice plate. See figure 14. 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 furnace control when pressure inside the combustion air inducer decreases to a certain set point. Set points vary depending on unit size. See table 10. The pressure sensed by the switch is negative relative to atmospheric pressure. If the flue becomes obstructed during operation, the switch senses a loss of negative pressure (pressure becomes more equal with atmospheric pressure) and opens the circuit to the furnace control and gas valve. A bleed port on the switch allows relatively dry air in the vestibule to purge switch tubing, to prevent condensate build up.

The switch is factory set and is not field adjustable. It is a safety shut-down control in the furnace and must not be by-passed for any reason. If switch is closed or by-passed, the control will not initiate ignition at start up.

TABLE 10

PROVE SWITCH SET POINTS			
Unit	0 - 4500' (0 - 1372m)	4501' - 7500' (1373 - 2286m)	7501' - 10000' (2286 - 3098m)
-045-1 to -14	.36" (89Pa)	.36" (89Pa)	.36" (89Pa)
-070-1 to -14	.36" (89Pa)	.36" (89Pa)	.36" (89Pa)
-090-1 to -14	.47" (116Pa)	.43" (106Pa)	.36" (89Pa)
-110-1 to -14	.51" (126Pa)	.43" (106Pa)	.36" (89Pa)
-135-1 to -14	.51" (126Pa)	.47" (116Pa)	.43" (106Pa)
ALL -15 and later models	.031" (77Pa)		

NOTE-Some units require a high altitude pressure switch kit if installed above 4500 ft (1370 m).

II-PLACEMENT AND INSTALLATION

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

III-START-UP

A-Preliminary and Seasonal Checks



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

B-Heating Start-Up

WARNING


Shock and burn hazard.

G50DF(X) units are equipped with a hot surface ignition system. Do not attempt to light manually.

- 1 - **STOP!** Read the safety information at the beginning of this section.
- 2 - Set thermostat to lowest setting.
- 3 - Turn off all electrical power to appliance.
- 4 - This appliance is equipped with an ignition device which automatically lights the burners. Do **not** try to light the burners by hand.
- 5 - Remove bottom access panel.
- 6 - *White Rodgers Gas Valve* -- Switch lever to **OFF**. See figure 11.
Honeywell Gas Valve -- Turn knob on gas valve clockwise  to **OFF**. Do not force. See figure 13.
- 7 - Wait five (5) 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 - *White Rodgers Gas Valve* -- Switch gas valve lever to **ON**.
Honeywell Gas Valve -- Turn knob on gas valve counterclockwise  to **ON**. Do not force.
- 9 - Replace access panel.
- 10- Turn on all electrical power to unit.
- 11- Set thermostat to desired setting.
- 12- If the appliance will not operate, follow the instructions "To Turn Off Gas To Unit" and call your service techni-

cian or gas supplier.

Turning Off Gas To Unit

- 1 - Set thermostat to lowest setting.
- 2 - Turn off all electrical power to unit if service is to be performed.
- 3 - Remove access panel.
- 4 - Switch lever on White Rodgers gas valve to **OFF**; turn knob on Honeywell valve clockwise  to **OFF**. Do not force.
- 5 - Replace access panel.

C-Safety or Emergency Shutdown

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

D-Extended Period Shutdown

Turn off thermostat or set to "UNOCCUPIED" mode. Close all gas valves (both internal and external to unit) to guarantee no gas leak into combustion chamber. Turn off power to unit. All access panels and covers must be in place and secured.

IV-HEATING SYSTEM SERVICE CHECKS

A-C.S.A. Certification

All units are C.S.A. (formally A.G.A. and C.G.A. combined) design certified without modifications. Refer to the G50DF(X) Installation Instruction.

B-Gas Piping

CAUTION

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

WARNING

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

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

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

C-Testing Gas Piping

⚠ IMPORTANT

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

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5psig (14" W.C.). See figure 15. If the pressure is equal to or less than 0.5psig (14"W.C.), use the manual shut-off valve before pressure testing to isolate furnace from gas supply.

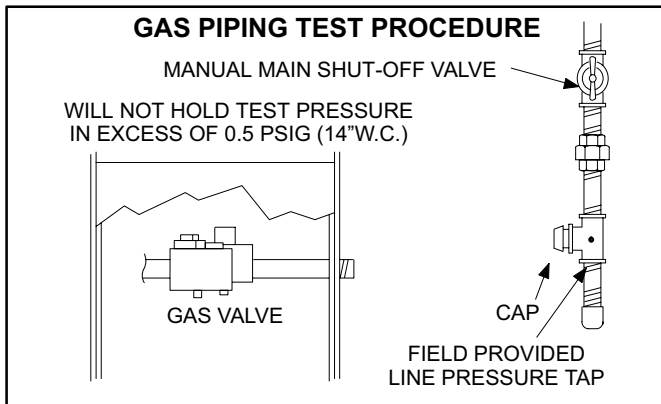


FIGURE 15

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 15. 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. See table 11 for operating pressure at unit gas connection (line).

On multiple unit installations, each unit should be checked separately, with and without 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 G50DF(X) can be measured at any time the gas valve is open and is supplying gas to the unit. See table 11 for normal operating manifold pressure.

TABLE 11

All G50DF Units	Natural	LP
Line Pressure WC"	4.5 - 10.5	11.0 - 13.0
Manifold Pressure WC"	3.5	10.0

⚠ IMPORTANT

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

The gas valve is factory set and should not require adjustment. All gas valves are factory regulated. See specifications section of this manual for High Altitude manifold pressure settings.

Manifold Adjustment Procedure:

- 1 - Connect a test gauge to outlet pressure tap on gas valve. See figures 11, 12 and 13. 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.

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

F- Proper Gas Flow (Approximate)

Furnace should operate at least 5 minutes before checking gas flow. Determine time in seconds for **two** revolutions of gas through the meter. (Two revolutions assures a more accurate time.) **Divide by two** and compare to time in table 12 below. If manifold pressure matches table 11 and rate is incorrect, check gas orifices for proper size and restriction.

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

TABLE 12

GAS METER CLOCKING CHART				
G50DF Unit	Seconds for One Revolution			
	Natural		LP	
	1 cu ft Dial	2 cu ft Dial	1 cu ft Dial	2 cu ft DIAL
-45	82	164	205	410
-70	55	110	136	272
-90	41	82	102	204
-110	33	66	82	164
-135	27	54	68	136
Natural-1000 btu/cu ft			LP-2500 btu/cu ft	

⚠ IMPORTANT

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

G- Proper Combustion

Furnace should operate minimum 15 minutes with correct manifold pressure and gas flow rate before checking combustion. See sections E- and F-. Take combustion sample beyond the flue outlet and compare to table 13. The maximum carbon monoxide reading should not exceed 100 ppm.

TABLE 13

Unit	CO ₂ % For Nat	CO ₂ % For L.P.
G50DF(X)-24A-45	4.5% - 6.5	5.8 - 7.8
G50DF(X)-36A-070	5.8 - 7.8	6.8 - 8.8
G50DF-36B-090	6.2 - 8.2	6.7 - 8.7
G50DF(X)-48C-090	7.2 - 8.2	7.7 - 8.7
G50DF-48C-110	5.9 - 7.9	7.5 - 9.5
G50DF-60D-135	6.5 - 8.5	7.5 - 9.5

H-Flame Signal

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

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

TABLE 14

Flame Signal in Microamps			
SureLight	Normal	Low	Drop Out
97L48	≥ 0.61	0.21 - 0.60	≤ 0.20
69M15	≥ 0.31	0.25 - 0.30	≤ 0.24

To Measure Flame Signal - Ignition Control:

A transducer (Part #78H5401 available from Lennox Repair Parts) is required to measure flame signal if meter used will not read a low micro amp signal. See figure 16. The transducer converts microamps to volts on a 1:1 conversion. See table 14 for the appropriate flame signal. A digital readout meter must be used. The transducer plugs into most meters. See figure 17 for proper use of transducer.

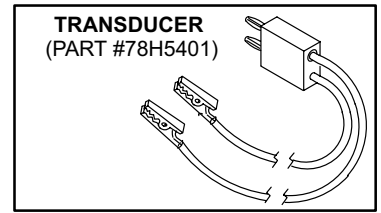


FIGURE 16

- 1 - Set the volt meter to the DC voltage scale. Insert transducer into the VDC and common inputs. Observe correct polarities. Failure to do so results in negative (-) values.
- 2 - Turn off supply voltage to control.
- 3 - Disconnect ignition control flame sensor wire from the flame sensor.
- 4 - Connect (-) lead of the transducer to flame sensor.
- 5 - Connect (+) lead of transducer to the ignition control sensor wire.
- 6 - Turn supply voltage on and close thermostat contacts to cycle system.
- 7 - When main burners are in operation for two minutes, take reading. Remember 1 DC volt = 1 DC microamp.

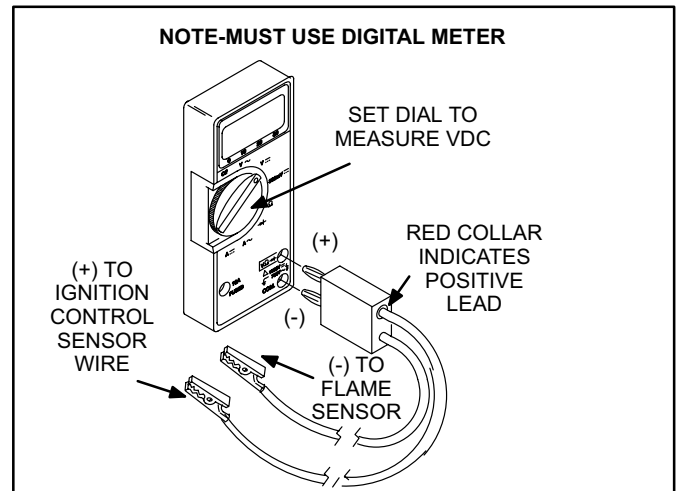


FIGURE 17

V-TYPICAL OPERATING CHARACTERISTICS

A-Blower Operation and Adjustment

- 1 - Blower operation is dependent on thermostat control system.
- 2 - Generally, blower operation is set at thermostat 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

Temperature rise for G50DF(X) 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.

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 - Tap locations shown in figure 18.
- 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 perma-gum. 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.

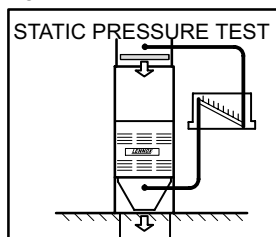


FIGURE 18

D-Blower Speed Taps

SureLight Control 69M15

Blower speed tap changes are made on the SureLight control board. See figure 6. Unused taps must be secured on dummy terminals "PARK" on the SureLight board. 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.

To change existing heat tap, turn off power then switch out speed tap on "HEAT" with tap connected to one of two "PARK" terminals. See unit wiring diagram for motor tap colors for each speed.

E-Blower Speed Taps

SuerLight Control 97L48

Blower speed tap changes are made on the SureLight control board. See figure 3. 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 unit wiring diagram for motor tap colors for each speed.

VI-MAINTENANCE

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

A-Filters

All G50DF(X) filters are installed external to the unit. 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.

B- Heat Exchanger and Burners

Cleaning the Heat Exchanger and Burners

NOTE-Use papers or protective covering in front of furnace while cleaning furnace.

Cleaning the heat exchanger requires a steel spring "snake," a reversible drill and a vacuum cleaner. The steel spring snake may be constructed by purchasing a 4 ft. long by 1/4" diameter steel wire cable and a 1/4" diameter wire brush. These items are available at a hardware store. Insert wire end of brush into the open end of the spring cable. Crimp the cable around the brush so that the brush is secured and will not come off during cleaning. Attach the other end of the cable to the reversible drill to complete the tool for cleaning the heat exchanger. See figure 19 for parts arrangement when disassembling furnace.

- 1 - Turn off both electrical and gas power supplies to furnace.
- 2 - Remove flue pipe and top cap from unit. Mark and disconnect wiring from prove switch and combustion air inducer.

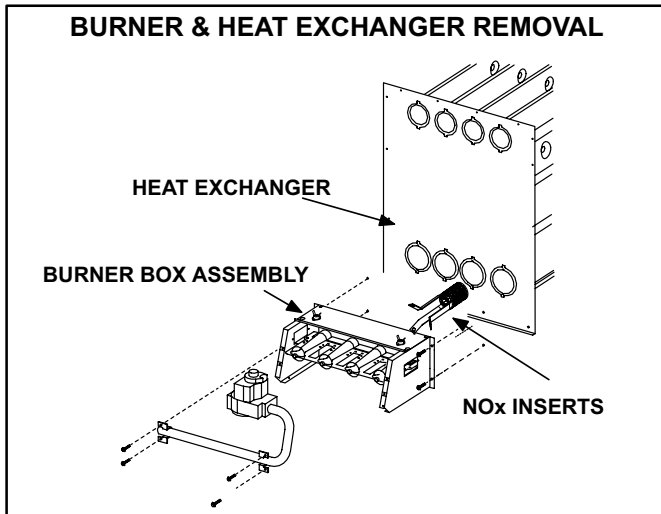


FIGURE 19

- 3 - Remove four screws securing the combustion air inducer. Carefully remove the combustion air inducer and prove switch together as a unit to avoid damaging blower gasket. If gasket is damaged, it must be replaced to prevent leakage.
- 4 - Remove collector box located behind combustion air inducer. Care must be taken to avoid damaging the collector box gasket. If the gasket is damaged it must be replaced to prevent leakage.
- 5 - Mark then disconnect wires from gas valve and rollout switch.
- 6 - Disconnect gas supply piping. Remove six screws securing the burner manifold assembly to the lower vestibule panel and remove the assembly from the unit. NO_x units only: remove screws holding NO_x inserts. Carefully remove inserts from each heat exchanger clam. See figure 19.
- 7 - Insert brush end of cable snake into top of one of the heat exchanger openings. **DO NOT FORCE CABLE INTO HEAT EXCHANGER.** Once the cable has been inserted, operate drill on slow speed. Move the cable in and out of the heat exchanger section three or four times or until sufficient cleaning is accomplished. Reverse drill and slowly work cable out of opening.
- 8- Repeat procedure for each heat exchanger section.
- 9- When the top heat exchanger sections are complete, place brush end of cable snake into the bottom openings of each of the heat exchanger sections. Clean the bottom opening as described in step 7.
- 10- Remove cable from heat exchanger. Use a vacuum to remove debris knocked loose during cleaning from each heat exchanger section.
- 11- Attach the exhaust end (positive pressure) of the vacuum to the top of the heat exchanger sections. Any loose debris will be forced to the bottom of the heat exchanger section. Vacuum debris from bottom openings.
- 12- Replace collector box and combustion air inducer/prove switch combination. Check gaskets for damage. Dam-

aged seals must be replaced to avoid heat exchanger leaks. Replace all screws to the collector box and combustion air inducer. Leaving off screws may cause leaks.

- 13- Clean burner by running a vacuum with a soft brush attachment over face of burners. Visually inspect inside of burners and crossovers for any blockage caused by foreign matter. Remove any blockage.
- 14- For NO_x units, replace inserts in each heat exchanger section. **DO NOT BEND.**
- 15- Replace burner / manifold assembly onto vestibule panel.
- 16- Reconnect wires to PROVE switch, roll-out switch, gas valve and combustion air inducer. Refer to unit wiring diagram.
- 17- Reconnect vent pipe to combustion blower outlet.
- 18- Reconnect gas supply piping.
- 19- Turn on power and gas supply to unit.
- 20- Set thermostat and check for proper operation.
- 21- Check all piping connections, factory and field, for gas leaks. Use a leak detecting solution or other preferred means. **Do not use matches, candles, flame or other sources of ignition to check for gas leak.**
- 22- If a leak is detected, shut gas and electricity off and repair leak.
- 23- Repeat steps 21 and 22 until no leaks are detected.
- 24- Replace front access panel.

⚠ 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 G50DF(X) series units are permanently lubricated and need no further lubrication.

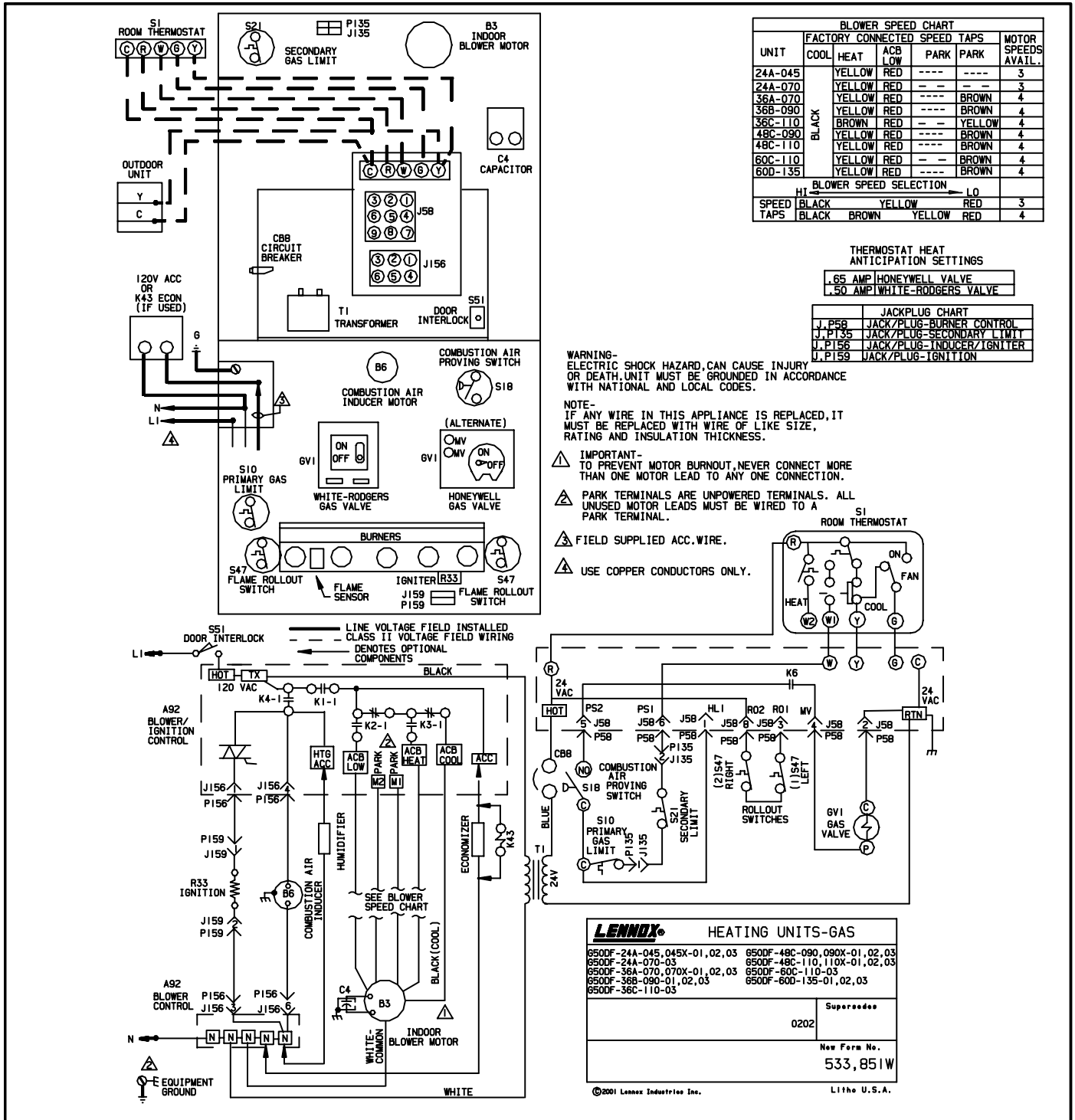
D-Flue and Chimney

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 correct voltage.
- 3 - Check amp-draw on blower motor.

VII- Wiring and Sequence of Operation



UNIT	FACTORY CONNECTED SPEED TAPS				MOTOR SPEEDS AVAIL.
	COOL	HEAT	ACB LOW	PARK	
24A-045	YELLOW	RED	----	----	3
24A-070	YELLOW	RED	----	----	3
36A-070	YELLOW	RED	----	BROWN	4
36B-090	YELLOW	RED	----	BROWN	4
36C-110	BROWN	RED	----	YELLOW	4
48C-090	YELLOW	RED	----	BROWN	4
48C-110	YELLOW	RED	----	BROWN	4
60C-110	YELLOW	RED	----	BROWN	4
60D-135	YELLOW	RED	----	BROWN	4

HT ← BLOWER SPEED SELECTION → LO

SPEED TAPS	BLACK	YELLOW	RED	3	
	BLACK	BROWN	YELLOW	RED	4

TERMOSTAT HEAT ANTICIPATION SETTINGS
 .65 AMP HONEYWELL VALVE
 .50 AMP WHITE-RODGERS VALVE

J. P58	JACK/PLUG-BURNER CONTROL
J. P135	JACK/PLUG-SECONDARY LIMIT
J. P156	JACK/PLUG-INDUCER/IGNITER
J. P159	JACK/PLUG-IGNITION

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

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

- ⚠ **IMPORTANT-** TO PREVENT MOTOR BURNOUT, NEVER CONNECT MORE THAN ONE MOTOR LEAD TO ANY ONE CONNECTION.
- ⚠ **PARK TERMINALS ARE UNPOWERED TERMINALS.** ALL UNUSED MOTOR LEADS MUST BE WIRED TO A PARK TERMINAL.
- ⚠ **FIELD SUPPLIED ACC. WIRE.**
- ⚠ **USE COPPER CONDUCTORS ONLY.**

- 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, S47 rollout switch and S21 secondary limit are closed. Call for heat can continue.
- 3 - SureLight control (A92) energizes combustion air inducer B6. Combustion air inducer runs until S18 combustion air prove switch closes (switch must close within 2-1/2 minutes or control goes into 5 minute Watchguard Pressure Switch delay). Once S18 closes, a 15-second pre-purge follows.
- 4 - SureLight control (A92) energizes ignitor. A 20-second warm-up period begins.

- 5 - Gas valve opens for a 4-second trial for ignition.
- 6 - Flame is sensed, gas valve remains open for the heat call.
- 7 - After 45-second delay, SureLight control (A92) energizes indoor blower B3.
- 8 - When heat demand is satisfied, W1 of the indoor thermostat de-energizes W of the SureLight control which de-energizes the gas valve. Combustion air inducer B6 continues a 5-second post-purge period, and indoor blower B3 completes a selected OFF time delay.

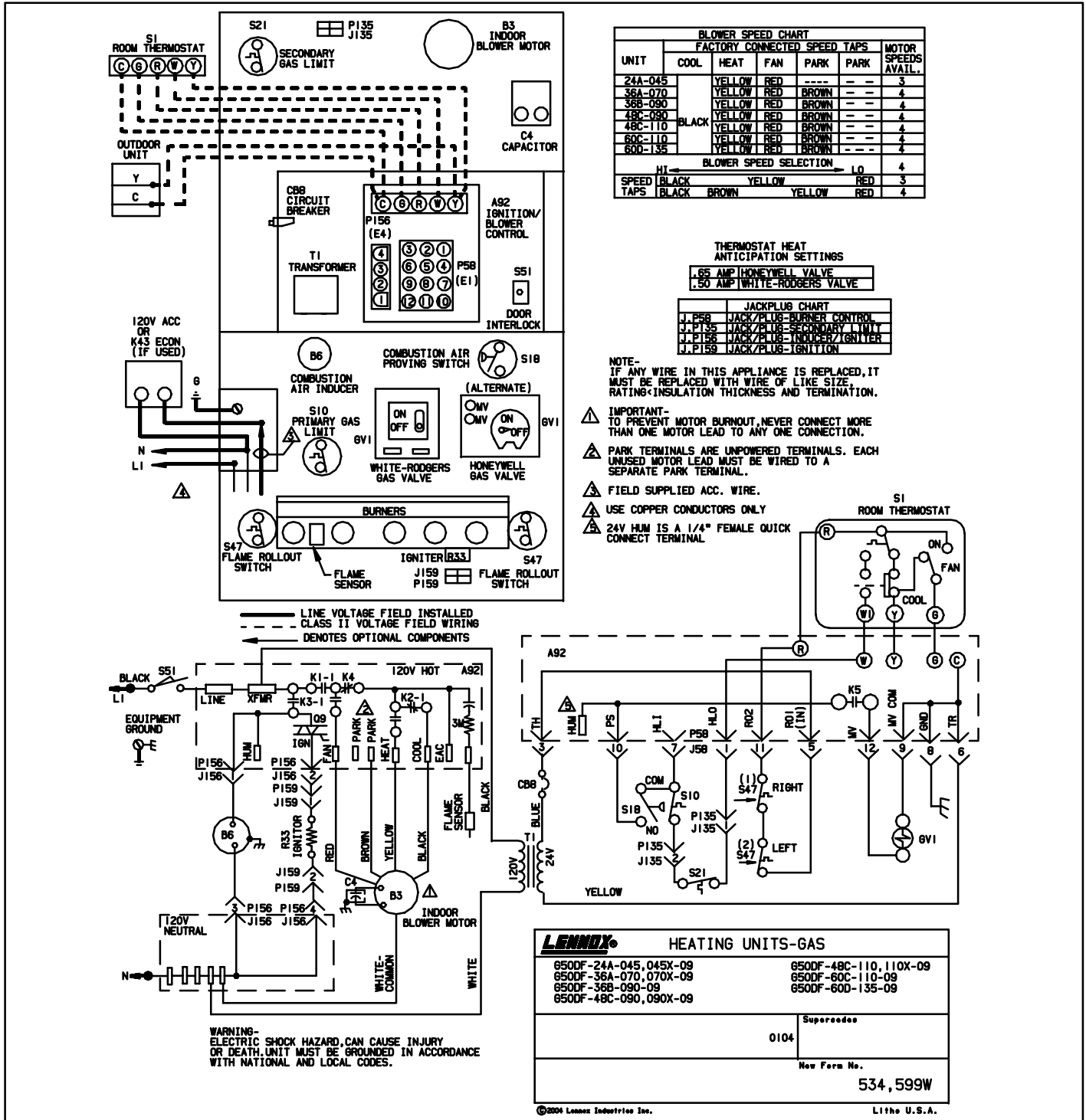
LENNOX HEATING UNITS-GAS

650DF-24A-045, 045X-01, 02, 03	650DF-48C-090, 090X-01, 02, 03
650DF-24A-070-03	650DF-48C-110, 110X-01, 02, 03
650DF-36A-070, 070X-01, 02, 03	650DF-60C-110-03
650DF-36B-090-01, 02, 03	650DF-60D-135-01, 02, 03
650DF-36C-110-03	

Supersedes 0202

New Form No. 533, 851W

©2001 Lennox Industries Inc. Litho U.S.A.



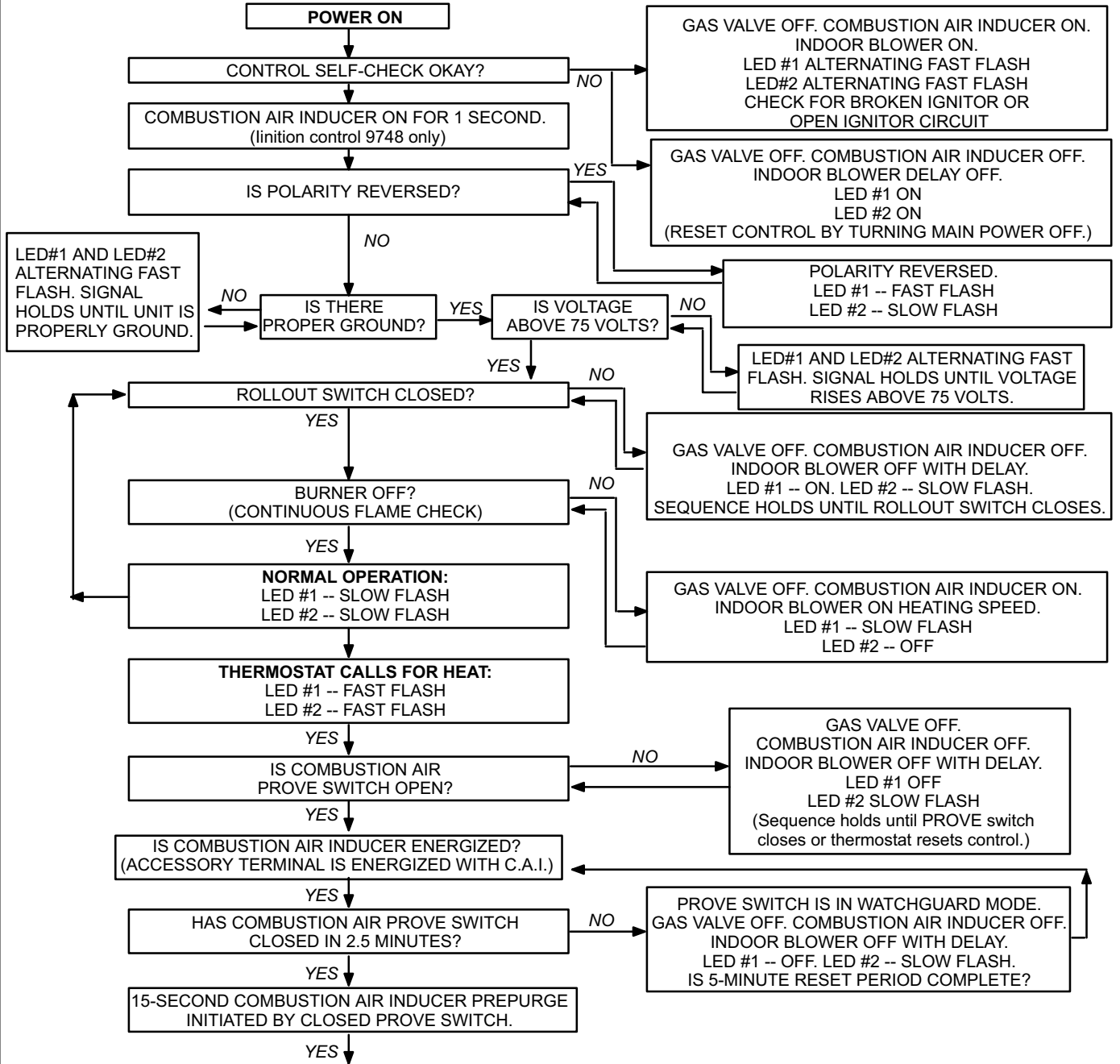
- When there is a call for heat, W1 of the thermostat energizes W of the furnace control with 24VAC.
- S10 primary limit switch, S47 rollout switch and S21 secondary limit are closed. Call for heat can continue.
- SureLight control (A92) energizes combustion air inducer B6. Combustion air inducer runs until S18 combustion air prove switch closes (switch must close within 2-1/2 minutes or control goes into 5 minute Watchguard Pressure Switch delay). Once S18 closes, a 15-second pre-purge follows.
- SureLight control (A92) energizes ignitor. A 20-second warm-up period begins.
- Gas valve opens for a 4-second trial for ignition.
- Flame is sensed, gas valve remains open for the heat call.
- After 45-second delay, SureLight control (A92) energizes indoor blower B3.
- When heat demand is satisfied, W1 of the indoor thermostat de-energizes W of the SureLight control which de-energizes the gas valve. Combustion air inducer B6 continues a 5-second post-purge period, and indoor blower B3 completes a selected OFF time delay.

SURELIGHT CONTROL HEATING SEQUENCE OF OPERATION

Control board 69M15 RED LED #1 = DS1 & GREEN LED #2 = DS2
Control board 97L48 GREEN LED #1 = DIAG1 & GREEN LED #2 = DIAG2

NORMAL HEATING MODE

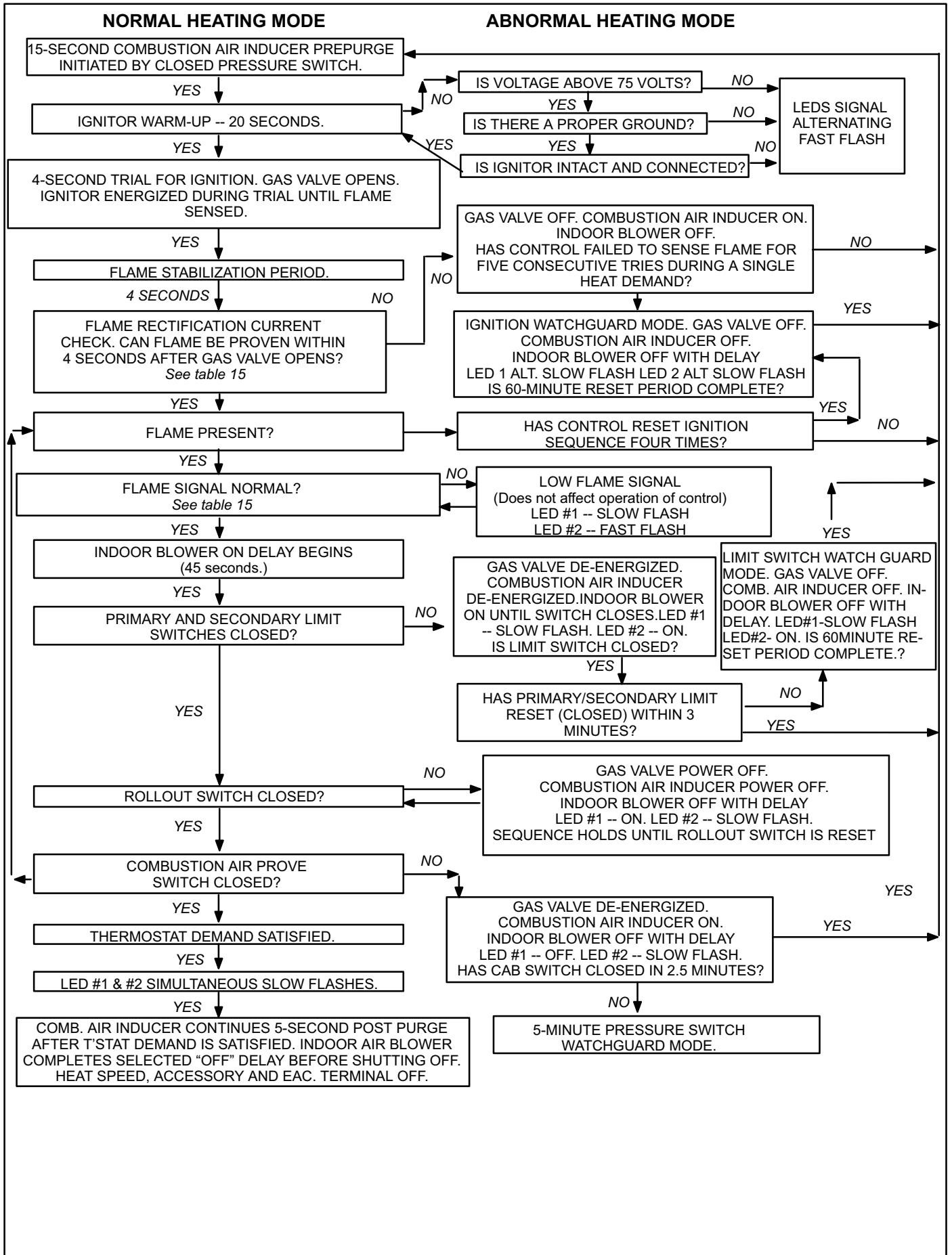
ABNORMAL HEATING MODE



CONTINUED NEXT PAGE

**TABLE 15
FLAME SENSE SIGNAL**

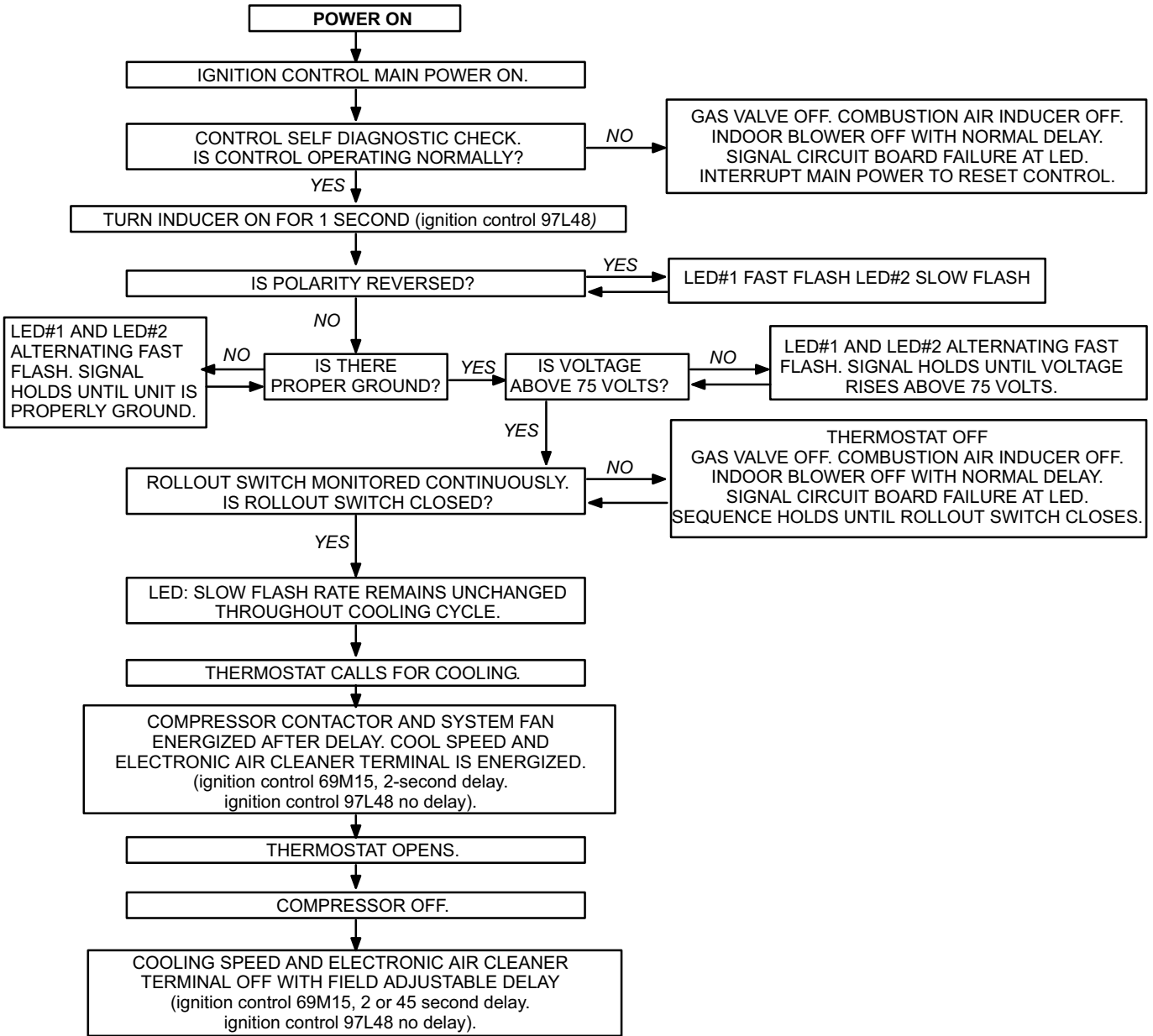
Ignition Control	Normal	Low	Drop Out
97L48	≥ 0.61	0.21 - 0.60	0.20
69M15	≥ 0.31	0.25 - 0.30	0.24



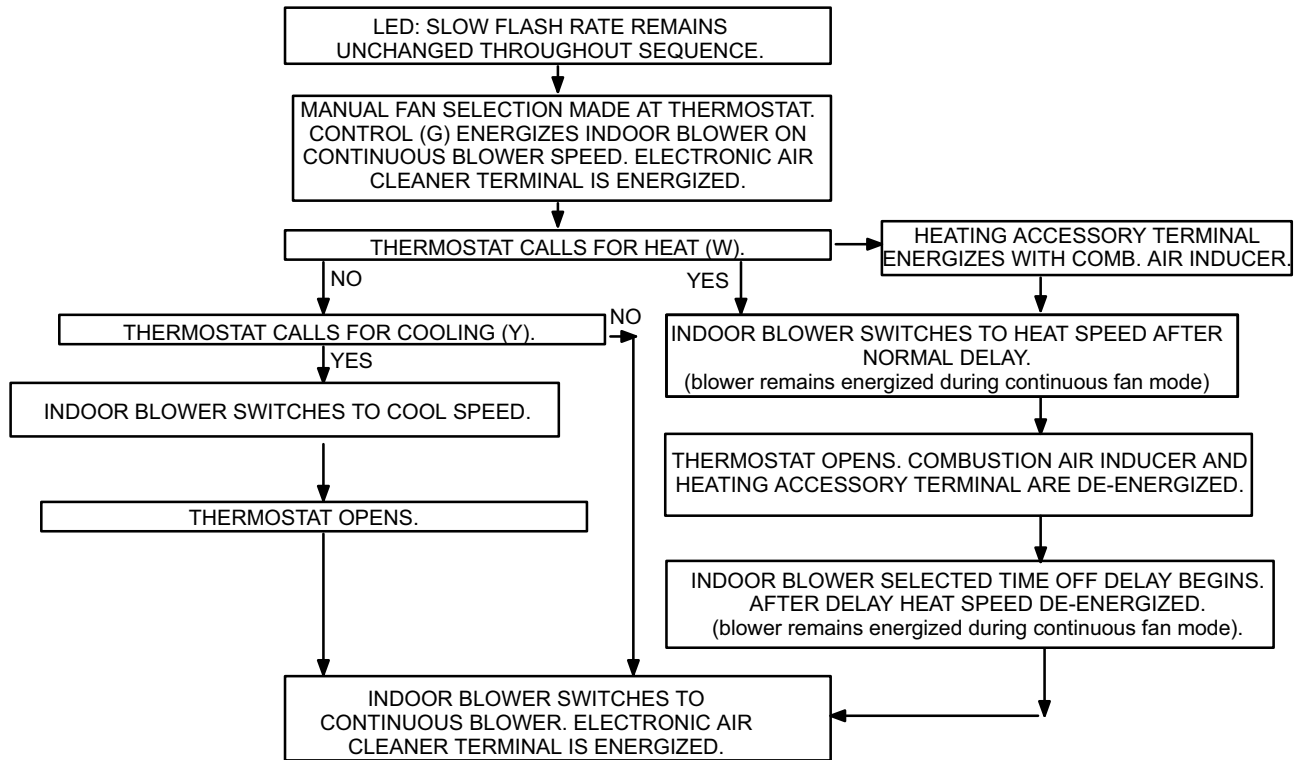
**SURELIGHT CONTROL
COOLING SEQUENCE OF OPERATION**

NORMAL COOLING MODE

ABNORMAL COOLING MODE



SURELIGHT CONTROL CONTINUOUS FAN SEQUENCE OF OPERATION



SURELIGHT - TROUBLE SHOOTING GUIDE

UPON INITIAL POWER UP, REMOVE ALL THERMOSTAT DEMANDS TO THE UNIT

PROBLEM: 1 UNIT FAILS TO OPERATE IN THE COOLING, HEATING, OR CONTINUOUS FAN MODE		
Condition	Possible Cause	Corrective Action / Comments
<p style="text-align: center;">1.1</p> <p>- Both diagnostic lights fail to light up.</p> <p>LED#1-Off LED#2-Off</p>	1.1.1 Main voltage 120V not supplied to unit.	ACTION 1 - Check 120V main voltage. Determine cause of main power failure.
	1.1.2 Miswiring of furnace or improper connections.	ACTION 1 - Check for correct wiring of 120V to power make up box and transformer. ACTION 2 - Check 24V wiring to control board.
	1.1.3 Circuit breaker tripped or fails to close.	ACTION 1 - Replace circuit breaker if it is reset but does not have continuity. ACTION 2 - If circuit breaker still trips, check for short.
	1.1.4 Door interlock switch failure.	ACTION 1 - Check that door switch is activated when door is closed. ACTION 2 - Check wire connections to switch, replace loose connectors. ACTION 3 - Check continuity of switch in closed position. Replace if defective.
	1.1.5 Transformer Failure.	ACTION 1 - Check that transformer output is 24V. Replace if defective.
	1.1.6 Failed control board.	ACTION 1 - If all the above items have been checked, replace board.
<p style="text-align: center;">1.2</p> <p>- Diagnostic lights flash the roll-out code.</p> <p>LED#1-On, LED#2-Slow Flash</p>	1.2.1 Roll-out switch open.	ACTION 1 - Manually reset the roll-out switch by pushing the top button. ACTION 2 - Determine the cause of the roll-out switch activation before leaving furnace.
	1.2.2 Roll-out switch failure.	ACTION 1 - Check continuity across roll-out switch. Replace roll-out switch if switch is reset but does not have continuity.
	1.2.3 Miswiring or improper connections at roll-out switch.	ACTION 1 - Check wiring connections to switch.
	1.2.4 24 volt pin connector failure	ACTION 1 - Check pin connector for proper connection to control board. ACTION 2 - Check continuity of the multi plug pin.
<p style="text-align: center;">1.3</p> <p>- On initial power-up the comb. air inducer does not energize. - Diagnostic lights flash the reverse polarity code.</p> <p>LED#1-Fast Flash, LED#2-Slow Flash.</p>	1.3.1 120V main power polarity reversed.	ACTION 1 - Check the 120V has line and neutral correctly input into control. ACTION 2 - Reverse the line and neutral at the 120V field connection.
<p style="text-align: center;">1.4</p> <p>- On initial power up the combustion air inducer does not energize. - Diagnostic lights flash normal power on operation.</p> <p>LED#1-Slow Flash LED#2-Slow Flash</p>	1.4.1 Open combustion air inducer motor circuit.	ACTION 1 - Check for 120V to combustion air inducer. If no power, check wire and connections.
	1.4.2 Failed combustion air inducer motor.	ACTION 1 - If power is present at blower, replace blower.

PROBLEM 1: UNIT FAILS TO OPERATE IN THE COOLING, HEATING, OR CONTINUOUS FAN MODE		
Condition	Possible Cause	Corrective Action / Comments
<p>1.5</p> <ul style="list-style-type: none"> - On initial power-up the combustion air blower remains energized. - Diagnostic lights flash the improper main ground. <p>LED#1-Alternating Fast Flash LED#2-Alternating Fast Flash</p>	<p>1.5.1</p> <p>Improper ground to the unit.</p>	<p>ACTION 1 - Check that the unit is properly ground. ACTION 2 - Install a proper main ground to the unit</p>
	<p>1.5.2</p> <p>120 volt pin connector is improperly attached to the circuit board.</p>	<p>ACTION 1 - Check pin connector for proper installation. Correctly insert connector into control.</p>
	<p>1.5.3</p> <p>Line voltage is below 75V.</p>	<p>ACTION 1 - Check that the line voltage is above 75V. Determine cause of voltage drop and supply correct voltage to the control.</p>
PROBLEM 2: UNIT WILL OPERATE IN COOLING BUT NOT IN THE HEATING MODE, WITH COMBUSTION AIR INDUCER CYCLING 5 SECONDS ON 55 SECONDS OFF.		
Condition	Possible Cause	Corrective Action / Comments
<p>2.1</p> <ul style="list-style-type: none"> - On initial power-up the combustion air inducer remains energized. - Diagnostic lights flash the improper main ground. - Units with control boards date coded after Nov.1 1997; combustion air inducer will cycle 5 seconds on 55 seconds off. <p>LED#1-Alternating Fast Flash LED#2-Alternating Fast Flash</p>	<p>2.1.1</p> <p>Open ignitor circuit.</p>	<p>ACTION 1 - Check for correct wiring and loose connections in the ignitor circuit. Check multi-plug connections for correct installation.</p>
	<p>2.1.2</p> <p>Broken or failed ignitor.</p>	<p>ACTION 1 - Unplug ignitor and read resistance across ignitor. If resistance does not read between 10.9 and 19.7 ohms, replace the ignitor.</p>
PROBLEM 3: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER DOES NOT ENERGIZE		
Condition	Possible Cause	Corrective Action / Comments
<p>3.1</p> <ul style="list-style-type: none"> - Unit operates with a cooling or continuous fan demand. - Combustion air inducer will not start with a Heating demand. - Diagnostic lights flash the limit failure mode. <p>LED#1-Slow Flash, LED#2-On</p>	<p>3.1.1</p> <p>Primary or secondary limit open.</p>	<p>ACTION 1 - Check continuity across switch(es). Switches reset automatically upon cool down. ACTION 2 - Check for restrictions on blower inlet air (including filter) and outlet air. Determine cause for limit activation before placing unit back in operation.</p>
	<p>3.1.2</p> <p>Miswiring of furnace or improper connections at limit switch(es).</p>	<p>ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
<p>3.2</p> <ul style="list-style-type: none"> - Unit operates with a cooling and continuous fan demand. - Combustion air inducer will not start with a Heating demand. - Diagnostic lights flash the pressure switch failure code. <p>LED#1-Off, LED#2-Slow Flash</p>	<p>3.2.1</p> <p>Miswiring of furnace or improper connections to combustion air inducer.</p>	<p>ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
	<p>3.2.2</p> <p>Prove switch stuck closed.</p>	<p>ACTION 1 - Check that the prove switch is open without the combustion air inducer operating. Replace if defective.</p>

PROBLEM 3: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR INDUCER DOES NOT ENERGIZE (CONT.).

Condition	Possible Cause	Corrective Action/Comments
<p align="center">3.3</p> <ul style="list-style-type: none"> - Unit operates with a cooling and continuous fan demand. - Combustion air inducer will not start with a Heating demand. - Diagnostic lights flash the pressure switch failure code 2.5 minutes after heating demand. <p>LED#1-Off, LED#2-Slow Flash</p>	<p>3.3.1</p> <p>Miswiring of furnace or improper connections to combustion air inducer.</p>	<p>ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
	<p>3.3.2</p> <p>Combustion air inducer failure.</p>	<p>ACTION 1 - If there is 120V to combustion air inducer and it does not operate, replace combustion air inducer.</p>

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

Condition	Possible Cause	Corrective Action/Comments
<p align="center">4.1</p> <ul style="list-style-type: none"> - Unit operates with a cooling and continuous fan demand. - Combustion air inducer energizes with a heating demand. - Diagnostic lights flash the pressure switch failure code 2.5 minutes after heating demand. <p>LED#1-Off LED#2-Slow Flash</p>	<p>4.1.1</p> <p>Prove switch does not close due to incorrect routing of the prove switch lines.</p>	<p>ACTION 1 - Check that the prove switch lines are correctly routed. Correctly route prove switch lines.</p>
	<p>4.1.2</p> <p>Prove switch does not close due to obstructions in the pressure lines.</p>	<p>ACTION 1 - Remove any obstructions from the the prove lines and/or taps.</p>
	<p>4.1.3</p> <p>Prove switch lines damaged</p>	<p>ACTION 1 - Check prove switch lines for leaks. Replace any broken lines.</p>
	<p>4.1.4</p> <p>Condensate in prove switch line.</p>	<p>ACTION 1 - Check prove switch lines for condensate. Remove condensate from lines.</p>
	<p>4.1.5</p> <p>Prove switch does not close due to a low differential pressure across the prove switch.</p>	<p>ACTION 1 - Check the differential pressure across the prove switch. This pressure should exceed the set point listed on the switch.</p> <p>ACTION 2 - Check for restricted inlet vent. Remove all blockage.</p> <p>ACTION 3 - Check for proper vent sizing and run length. See installation instructions.</p>
	<p>4.1.6</p> <p>Wrong prove switch installed in the unit, or pressure switch is out of calibration.</p>	<p>ACTION 1 - Check that the proper prove switch is installed in the unit. Replace prove switch if necessary.</p>
	<p>4.1.7</p> <p>Miswiring of furnace or improper connections at prove switch.</p>	<p>ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
	<p>4.1.8</p> <p>Prove switch failure.</p>	<p>ACTION 1 - If all the above modes of failure have been checked, the prove switch may have failed. Replace prove switch and determine if unit will operate.</p>

PROBLEM 5: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER ENERGIZES, IGNITOR IS ENERGIZED.

Condition	Possible Cause	Corrective Action/Comments
<p align="center">5.1</p> <ul style="list-style-type: none"> - Unit operates with a cooling and continuous fan demand. - Combustion air inducer energizes with Heating demand. - Ignitor is energized but unit fails to light. <p>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</p>	<p>5.1.1</p> <p>Check that gas is being supplied to the unit.</p>	<p>ACTION 1 - Check line pressure at the gas valve. Pressure should not exceed 13" WC for both natural and propane. Line pressure should read a minimum 4.5" WC for natural and 8.0"WC for propane.</p>
	<p>5.1.2</p> <p>Miswiring of gas valve or loose connections at multi-pin control amp plugs or valve.</p>	<p>ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.</p>
	<p>5.1.3</p> <p>Defective gas valve or ignition control.</p>	<p>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. ACTION 3 - Replace the control board if 24V is not supplied to valve.</p>

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

Condition	Possible Cause	Corrective Action/Comments
<p align="center">6.1</p> <ul style="list-style-type: none"> - Burners fire with a heating demand. - Burners light but unit shuts off prior to satisfying T-stat demand. - Diagnostic lights flash the pressure switch code. <p>LED#1-Off LED#2-Slow Flash</p>	<p>6.1.1</p> <p>Low pressure differential at the prove switch.</p>	<p>ACTION 1 - Check for restricted exhaust vent. Remove all blockage. ACTION 2: Check for proper vent sizing. See installation instructions.</p>
	<p>6.2.1</p> <p>Sensor or sense wire is improperly installed.</p>	<p>ACTION 1 - Check that sensor is properly located and that the sense wire is properly attached to both the sensor and the control.</p>
	<p>6.2.2</p> <p>Sensor or sense wire is broken.</p>	<p>ACTION 1 - Check for a broken sensor. ACTION 2 - Test continuity across the sense wire. If wire or sensor are damaged replace the component.</p>
	<p>6.2.3</p> <p>Sensor or sensor wire is grounded to the unit.</p>	<p>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.</p>
<p align="center">6.2</p> <ul style="list-style-type: none"> - Combustion air inducer energizes with a heating demand. - Burners light but fail to stay lit. - After 5 tries the control diagnostics flash the watchdog burners failed to ignite code. <p>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</p>	<p>6.2.4</p> <p>Control does not sense flame.</p>	<p>ACTION 1 - Check the microamp signal from the burner flame. If the microamp signal is low, 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. ACTION 3 - Check that there is proper ground to burner box. Repair as necessary.</p>

PROBLEM 6: BURNERS LIGHT WITH HEATING DEMAND BUT UNIT SHUTS DOWN PREMATURELY (CONT.)

Condition	Possible Cause	Corrective Action/Comments
<p align="center">6.3</p> <ul style="list-style-type: none"> - Combustion air inducer energizes with a heating demand. - Burners light. - Roll-out switch trips during the heating demand. - Diagnostic lights flash roll-out failure. <p>LED#1-On LED#2-Slow Flash</p>	<p align="center">6.3.1</p> <p align="center">Unit is firing above 100% of the nameplate input.</p>	<p>ACTION 1 - Check that the manifold pressure matches value listed on nameplate. See installation instructions for proper procedure.</p> <p>ACTION 2 - Verify that the installed orifice size match the size listed on the nameplate or installation instructions.</p> <p>ACTION 3 - Check the input rate to verify rate matches value listed on nameplate.</p>
	<p align="center">6.3.2</p> <p align="center">Gas orifices leak at the manifold connection.</p>	<p>ACTION 1 - Tighten orifice until leak is sealed. NOTE: Be careful not to strip orifice threads.</p> <p>ACTION 2 - Check for gas leakage at the threaded orifice connection. Use approved method for leak detection (see unit instructions).</p>
	<p align="center">6.3.3</p> <p align="center">Insufficient flow through the heat exchanger caused by a sooted or restricted heat exchanger.</p>	<p>ACTION 1 - Check for sooting deposits or other restrictions in the heat exchanger assembly. Clean assembly as outlined in instruction manual.</p> <p>ACTION 2 - Check for proper combustion. See IV-Heating System Service Checks section G-.</p>
	<p align="center">6.3.4</p> <p align="center">Burners are not properly located in the burner box.</p>	<p>ACTION 1 - Check that the burners are firing into the center of the heat exchanger openings. Correct the location of the burners if necessary.</p>
<p align="center">6.4</p> <ul style="list-style-type: none"> - Combustion air inducer energizes with a heating demand. - Burners light roughly and the unit fails to stay lit. - Diagnostic lights flash watchguard flame failure. <p>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</p>	<p align="center">6.4.1</p> <p align="center">Poor Venting</p>	<p>ACTION 1 - Check vent pipe and remove any obstructions</p> <p>ACTION 2 - Check for correct exhaust vent installation. See instructions</p>
	<p align="center">6.4.2</p> <p align="center">Improper burner cross-overs</p>	<p>ACTION 1 - Remove burner and inspect the cross-overs for burrs, or any restriction or if crossover is warped. Remove restriction or replace burners.</p>
	<p align="center">6.4.3</p> <p align="center">Burrs in gas orifices</p>	<p>ACTION 1 - Remove gas orifices and inspect. Remove any burrs that are present or replace orifice.</p>

PROBLEM 6: BURNERS LIGHT WITH HEATING DEMAND BUT UNIT SHUTS DOWN PREMATURELY (CONT.)		
<p>6.5</p> <ul style="list-style-type: none"> - Combustion air inducer 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. <p>LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash</p>	<p>6.5.1</p> <p>Loose sensor wire connection causes intermittent loss of flame signal.</p>	<p>ACTION 1 - Check that the sensor is properly located.</p> <p>ACTION 2 - Check that the sense wire is properly attached to both the sensor and the control. Pay extra attention to the pin connectors.</p>
	<p>6.5.2</p> <p>Poor ground to burner box</p>	<p>ACTION 1 - Check for proper ground and repair as necessary.</p>
	<p>6.5.3</p> <p>Prove Switch opens 5 times during a single demand</p>	<p>ACTION 1 - Inspect vent pipe installation and for any restriction. Remove restriction.</p> <p>ACTION 2 - Check prove switch reliability.</p>
PROBLEM 7: CONTROL SIGNALS LOW FLAME SENSE DURING HEATING MODE		
Condition	Possible Cause	Corrective Action/Comments
<p>7.0</p> <ul style="list-style-type: none"> - Unit operates correctly but the diagnostic lights flash low flame sense code. <p>LED#1-Slow Flash LED#2-Fast Flash</p>	<p>7.1.1</p> <p>Sense rod is improperly located on the burner.</p>	<p>ACTION 1 - Check the sense rod for proper location on the burner. Properly locate the sense rod or replace if rod cannot be located correctly.</p>
	<p>7.1.2</p> <p>Sense rod is contaminated.</p>	<p>ACTION 1 - Check sense rod for contamination or coated surface. Clean the sense rod with steel wool or replace sensor. DO NOT USE SAND PAPER TO CLEAN ROD. SAND PAPER WILL CONTRIBUTE TO THE CONTAMINATION PROBLEM.</p>
PROBLEM 8: INDOOR BLOWER FAILS TO OPERATE IN COOLING, HEATING, OR CONTINUOUS FAN MODE		
Condition	Possible Cause	Corrective Action/Comments
<p>8.0</p> <ul style="list-style-type: none"> - Indoor blower fails to operate in continuous fan, cooling, or heating mode. 	<p>8.1.1</p> <p>Miswiring of furnace or improper connections at control or indoor blower motor.</p>	<p>ACTION 1 - Correct wiring and/or replace any loose connections. Check for correct wiring and loose connections.</p>
	<p>8.1.2</p> <p>120V is not being supplied to the indoor air blower or blower motor failure.</p>	<p>ACTION 1 - Check for 120V at the various calls for indoor blower by energizing "Y", "G", and "W" individually on the low voltage terminal strip. Note that when "W" is energized, the blower is delayed 45 seconds. If there is 120V to each motor tap but the blower does not operate, replace the motor.</p>
	<p>8.1.3</p> <p>Defective control board</p>	<p>ACTION 1 - If there is not 120V when "Y", "G", or "W" is energized, replace the control.</p>
	<p>8.1.4</p> <p>Defective run capacitor</p>	<p>ACTION 1 - Replace capacitor</p>
PROBLEM 9: RF STATIC DURING TIME FOR IGNITION		
Condition	Possible Cause	Corrective Action/Comments
<p>9.0</p> <ul style="list-style-type: none"> - AM radio interference. 	<p>9.1.2</p> <p>Ignitor operation</p>	<p>ACTION 1 - Call Technical Support, Dallas.</p>