

G40UH(X) series units are mid-efficiency gas furnaces used for upflow or horizontal applications only, manufactured with Lennox Duralok Plus heat exchangers formed of aluminized steel. G40UH(X) units are available in heating capacities of 44,000 to 154,000 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. G40UH(X) model units are equipped with a hot surface ignition system. The G40UH(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.

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⚠ 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

		Model No.	G40UH -24A-045	G40UH -36A-045	¹ G40UH -24A-070	G40UH -36A-070	G40UH -48B-070	G40UH -36B-090	G40UH -48B-090
		Low NO _x Model No.	-24A-045X	---	---	-36A-070X	---	---	-48B-090X
Gas Heating Performance	Input - Btuh		44,000	44,000	66,000	66,000	66,000	88,000	88,000
	Output - Btuh		36,000	35,900	54,100	54,100	54,000	72,100	72,100
	² AFUE		80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
	High static (CSA) - in. w.g.		.50	.50	.50	.50	.50	.50	.50
	Temperature rise range - °F		35 - 65	25 - 55	40 - 70	40 - 70	25 - 55	40 - 70	40 - 70
Connections	Flue - in. (round)		4	4	4	4	4	4	4
	Gas pipe size IPS - in.		1/2	1/2	1/2	1/2	1/2	1/2	1/2
Indoor Blower	Wheel nom. dia. x width - in.		10 x 7	10 x 8	10 x 7	10 x 8	10 x 10	10 x 8	10 x 10
	Motor output - hp		1/5	1/3	1/5	1/3	1/2	1/3	1/2
	Tons of add-on cooling		1.5 - 2	2 - 3	1.5 - 2	2 - 3	2 - 4	2 - 3	3 - 4
Shipping Data	lbs. - 1 package		121	126	127	132	139	146	153
Electrical characteristics		120 volts - 60 hertz - 1 phase (less than 12 amps)							

Gas Heating Performance	Model No.	¹ G40UH -36C-110	G40UH -48C-110	G40UH -60C-110	G40UH -48C-135	G40UH -60D-135	G40UH -60D-155
	Low NO _x Model No.	- - -	- - -	-60C-110X	- - -	- - -	- - -
	Input - Btuh	110,000	110,000	110,000	132,000	132,000	154,000
	Output - Btuh	90,200	88,500	89,400	106,900	106,900	124,700
	² AFUE	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
	High static (CSA) - in. w.g.	.50	.50	.50	.50	.50	.50
	Temperature rise range - °F	50 - 80	40 - 70	30 - 60	50 - 80	45 - 75	50 - 80
Connections	Flue - in. (round)	4	4	4	³ 4	³ 4	³ 4
	Gas pipe size IPS - in.	1/2	1/2	1/2	1/2	1/2	1/2
Indoor Blower	Wheel nom. dia. x width - in.	10 x 8	10 x 10	11-1/2 x 10	10 x 10	11-1/2 x 10	11-1/2 x 10
	Motor output - hp	1/3	1/2	1	1/2	1	1
	Tons of add-on cooling	2 - 3	3 - 4	4 - 5	2.5 - 4	4 - 5	4 - 5
Shipping Data	lbs. - 1 package	166	169	175	178	195	204
Electrical characteristics		120 volts - 60 hertz - 1 phase (less than 12 amps)					

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

¹ Canada Only

² Annual Fuel Utilization Efficiency based on DOE test procedures and according to FTC labeling regulations. Isolated combustion system rating for non-weatherized furnaces.

³ Flue connection on the unit is 4 in. diameter. Most applications will require 5 in. venting and field supplied 4 x 5 in. adaptor. See Venting Tables in the Installation Instructions for detailed information.

SPECIFICATIONS

Model No.		G40UH-60C-110 -1, -2, -3 units	G40UH-60D-135 -1, -2, -3 units	G40UH-60D-155 -1, -2, -3 units
Gas Heating Performance	Input - Btuh (kW)	110,000 (32.2)	132,000 (38.7)	154,000 (45.1)
	Output - Btuh (kW)	90,200 (26.4)	106,900 (31.3)	124,700 (36.5)
	☆AFUE	80.0%	80.0%	80.0%
	California Seasonal Efficiency	75.7%	75.0%	75.6%
	High static (AGA/CGA) - in. w.g. (Pa)	.50 (124)	.50 (124)	.50 (124)
	Flue connection - in. (mm) round	4 (102)	4 (102)	4 (102)
	Gas pipe size IPS - in. (mm)	1/2 (12.7)	1/2 (12.7)	1/2 (12.7)
	Temperature rise range - °F (°C)	35 - 65 (19 - 36)	45 - 75 (25 - 42)	50 - 80 (28 - 44)
Indoor Blower	Wheel nominal diameter x width - in. (mm)	11-1/2 x 10 (292 x 254)	11-1/2 x 10 (292 x 254)	11-1/2 x 10 (292 x 254)
	Motor output - hp (W)	3/4 (560)	3/4 (560)	3/4 (560)
	Tons (kW) of add-on cooling	5 (17.6)	5 (17.6)	5 (17.6)
Shipping weight - 1 package		172 lbs. (78 kg)	192 lbs. (87 kg)	201 lbs. (91 kg)
Matching Coils		Up-flow cased	C33-36C-2F, C33-48C-2F, C33-50/60C-2F,	C33-60D-2F, C33-62D-2F
		Horizontal	CH33-36C-2F, CH33-48C-2F, CH33-50/60C-2F	CH33-60D-2F, CH33-62D-2F
Electrical characteristics		120 volts - 60 hertz - 1 phase (less than 12 amps)		

OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA

			"A" Width Models	"B" Width Models	"C" Width Models	"D" Width Models
FILTER KITS						
¹ Air Filter and Rack Kit	Horizontal (end)	Catalog No.	87L95	87L96	87L97	87L98
		Size of filter - in.	14 x 25 x 1	18 x 25 x 1	20 x 25 x 1	25x25 x 1
	Side Return	Single	44J22	44J22	44J22	44J22
		Ten Pack	66K63	66K63	66K63	66K63
		Size of filter - in.	16 x 25 x 1	16 x 25 x 1	16 x 25 x 1	16 x 25 x 1
EZ Filter Base Up-Flow Only	Catalog No. - Ship. Wt. - lbs.		73P55 - 7	73P56 - 7	73P57 - 8	73P58 - 10
	Size of field provided filter - in.		14 x 25 x 1	16 x 25 x 1	20 x 25 x 1	24 x 24 x 1
CABINET ACCESSORIES						
Horizontal Support Frame Kit - Horizontal Only			56J18	56J18	56J18	56J18
Return Air Base - Up-Flow Only			- - -	98M60	98M58	98M59
CONTROLS						
Twinning Kit			15L38	15L38	15L38	15L38
VENTING						
Vent Adaptor - 6 in. connection size up-flow applications only			18M79	18M79	18M79	18M79
LPG/Propane Kits			See Page 13			

¹ Cleanable polyurethane frame type filter.

BLOWER DATA

G40UH-24A-045 PERFORMANCE										
External Static Pressure		Air Volume / Watts at Various Blower Speeds								
		High			Medium			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0.00	0	1090	515	460	905	425	390	725	340	300
0.05	12	1080	510	450	900	425	390	720	340	300
0.10	25	1065	505	445	895	420	385	710	335	295
0.15	37	1050	495	435	895	420	380	700	330	290
0.20	50	1030	485	425	890	420	375	690	325	290
0.25	62	1015	480	415	875	415	370	680	320	285
0.30	75	995	470	410	860	405	365	665	315	280
0.40	100	960	455	395	840	395	350	650	305	270
0.50	125	910	430	380	795	375	335	610	290	260
0.60	150	840	395	355	750	355	315	540	255	245
0.70	175	770	365	340	665	315	295	490	230	235
0.80	200	660	310	315	555	260	275	420	200	225
0.90	225	560	265	295	480	225	260	355	170	210

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.

G40UH-24A-070 PERFORMANCE										
External Static Pressure		Air Volume / Watts at Various Blower Speeds								
		High			Medium			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0.00	0	1075	505	445	905	425	375	730	345	290
0.05	12	1070	505	445	900	425	375	725	340	290
0.10	25	1065	505	440	895	420	370	720	340	285
0.15	37	1060	500	435	890	420	365	715	335	285
0.20	50	1055	500	430	885	420	360	710	335	280
0.25	62	1045	495	425	880	415	360	700	330	280
0.30	75	1030	485	415	875	415	355	690	325	270
0.40	100	1010	475	400	860	405	350	675	320	270
0.50	125	975	460	390	840	395	340	660	310	265
0.60	150	940	445	375	805	380	325	640	300	255
0.70	175	890	420	360	755	355	305	605	285	240
0.80	200	830	390	340	700	330	285	565	265	225
0.90	225	765	360	305	640	300	265	515	245	205

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

G40UH-36A-045 PERFORMANCE								
External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1480	615	1300	545	1100	460	930	385
0.05	1465	605	1290	530	1100	450	930	380
0.10	1445	585	1280	520	1100	445	930	370
0.15	1440	585	1275	505	1095	435	935	365
0.20	1415	570	1260	495	1090	425	935	360
0.25	1400	560	1250	485	1090	420	930	355
0.30	1375	545	1235	470	1075	410	930	350
0.40	1320	520	1195	450	1060	390	915	330
0.50	1265	495	1160	430	1020	375	890	320
0.60	1210	475	1105	410	975	350	840	295
0.70	1135	450	1045	380	910	325	775	280
0.80	1025	415	915	345	810	300	720	265
0.90	885	380	815	320	725	270	640	240

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

G40UH-36A-070 PERFORMANCE												
External Static Pressure in. w.g. Pa	Air Volume / Watts at Various Blower Speeds											
	High			Medium-High			Medium-Low			Low		
	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0.00 0	1500	710	705	1290	610	565	985	465	455	830	390	375
0.05 12	1475	695	695	1275	600	555	980	465	445	820	385	365
0.10 25	1450	685	680	1255	590	545	970	460	440	810	380	360
0.15 37	1425	675	670	1240	585	535	965	455	430	805	380	355
0.20 50	1400	660	655	1225	580	525	955	450	425	795	375	350
0.25 62	1370	645	645	1205	570	510	945	445	415	790	375	345
0.30 75	1340	630	630	1180	555	500	930	440	405	780	370	335
0.40 100	1285	605	610	1140	540	475	900	425	390	745	350	325
0.50 125	1215	575	580	1080	510	450	865	410	375	705	335	310
0.60 150	1150	545	560	1015	480	430	810	380	355	655	310	290
0.70 175	1060	500	535	940	445	405	730	345	330	585	275	270
0.80 200	955	450	515	800	375	370	655	310	305	480	225	260
0.90 225	785	370	475	605	285	325	585	275	270	410	195	255

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.

G40UH-36B-090 PERFORMANCE												
External Static Pressure in. w.g. Pa	Air Volume / Watts at Various Blower Speeds											
	High			Medium-High			Medium-Low			Low		
	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0.00 0	1500	710	720	1255	590	595	1040	490	460	900	425	370
0.05 12	1485	700	705	1250	590	580	1040	490	450	895	420	365
0.10 25	1465	690	685	1240	585	570	1035	490	445	890	420	360
0.15 37	1450	685	675	1235	585	555	1035	490	440	885	420	355
0.20 50	1435	675	660	1225	580	545	1030	485	435	880	415	350
0.25 62	1420	670	645	1215	575	530	1025	485	425	875	415	345
0.30 75	1400	660	630	1200	565	520	1020	480	415	870	410	340
0.40 100	1345	635	595	1170	550	495	1000	470	400	855	405	330
0.50 125	1300	615	575	1135	535	475	965	455	380	830	390	300
0.60 150	1235	585	545	1080	510	445	930	440	360	780	370	290
0.70 175	1165	550	510	1020	480	415	870	410	340	740	350	280
0.80 200	1080	510	480	940	445	385	800	380	315	670	315	260
0.90 225	985	465	445	840	395	355	710	335	290	600	285	245

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

G40UH-36C-110 PERFORMANCE

External Static Pressure		Air Volume / Watts at Various 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	1555	735	715	1335	630	575	1085	510	460	925	435	365
0.05	12	1540	725	705	1330	630	555	1080	510	450	920	435	360
0.10	25	1525	720	690	1320	625	545	1075	505	440	915	430	355
0.15	37	1510	715	680	1310	620	535	1070	505	430	910	430	350
0.20	50	1490	705	670	1295	610	525	1065	505	420	900	425	340
0.25	62	1465	690	655	1280	605	510	1060	500	415	890	420	335
0.30	75	1440	680	645	1260	595	495	1050	495	405	880	415	330
0.40	100	1385	655	615	1230	580	485	1030	485	390	865	410	320
0.50	125	1320	625	590	1190	560	460	995	470	375	835	395	300
0.60	150	1260	595	570	1135	535	430	960	455	355	815	385	295
0.70	175	1190	560	545	1075	505	410	915	430	345	775	365	285
0.80	200	1090	515	515	970	460	385	860	405	325	760	360	280
0.90	225	975	460	485	880	415	360	790	375	305	705	335	275

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.

G40UH-48B-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
.00	0	2080	980	846	1810	855	764	1535	725	634	1295	610	519
.10	25	2030	955	810	1790	845	714	1520	715	600	1285	605	492
.20	50	1955	920	767	1760	830	675	1515	715	566	1275	600	477
.30	75	1885	890	732	1710	805	640	1505	710	555	1265	595	459
.40	100	1820	860	699	1670	790	611	1470	695	525	1255	590	443
.50	125	1740	820	664	1600	755	575	1420	670	496	1215	575	414
.60	150	1635	770	624	1530	720	544	1350	635	464	1175	555	400
.70	175	1545	730	597	1420	670	501	1270	600	432	1080	510	368
.80	200	1400	660	554	1295	610	462	1135	535	392	990	465	343
.90	225	1250	590	512	1125	530	419	1050	495	372	875	410	310

NOTES - 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.
Air volume based on bottom air return air. Actual air volume may vary on side return air applications.

G40UH-48B-090 PERFORMANCE

External Static Pressure		Air Volume / Watts at Various 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	1970	930	790	1810	855	735	1585	750	670	1340	630	565
0.05	12	1940	915	780	1785	840	715	1580	745	650	1335	630	555
0.10	25	1915	905	765	1760	830	695	1570	740	630	1325	625	540
0.15	37	1880	885	745	1730	815	660	1560	735	615	1325	625	530
0.20	50	1840	870	730	1700	800	620	1545	730	600	1320	625	520
0.25	62	1805	850	715	1670	790	625	1520	715	585	1310	620	510
0.30	75	1765	835	695	1640	775	625	1490	705	565	1295	610	500
0.40	100	1695	800	670	1570	740	595	1440	680	540	1260	595	480
0.50	125	1600	755	635	1490	705	560	1360	640	505	1195	565	450
0.60	150	1505	710	600	1400	660	530	1285	605	480	1140	540	425
0.70	175	1395	660	565	1265	595	485	1170	550	440	990	465	380
0.80	200	1250	590	520	1100	520	445	975	460	390	905	425	355
0.90	225	1005	475	460	870	410	385	900	425	365	810	380	325

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

G40UH-48C-110 PERFORMANCE													
External Static Pressure in. w.g. Pa		Air Volume / Watts at Various Blower Speeds											
		High			Medium-High			Medium-Low			Low		
		cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
0.00	0	2015	950	895	1620	765	780	1340	630	640	1150	545	525
0.05	12	1990	940	870	1615	760	760	1340	630	640	1150	545	525
0.10	25	1965	925	850	1610	760	745	1340	630	640	1150	545	525
0.15	37	1930	910	825	1605	755	725	1335	630	630	1150	545	525
0.20	50	1895	895	805	1600	755	710	1335	630	615	1150	545	525
0.25	62	1860	880	785	1590	750	695	1330	630	605	1150	545	520
0.30	75	1820	860	765	1580	745	675	1330	630	590	1145	540	515
0.40	100	1740	820	725	1530	720	635	1320	625	560	1140	540	490
0.50	125	1665	785	695	1475	695	600	1285	605	525	1120	530	470
0.60	150	1575	745	650	1405	665	555	1230	580	490	1075	505	445
0.70	175	1475	695	610	1310	620	515	1165	550	470	1015	480	415
0.80	200	1350	635	560	1210	570	485	1080	510	430	930	440	380
0.90	225	1210	570	520	1070	505	430	870	410	365	740	350	325

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.

G40UH-48C-135 PERFORMANCE													
External Static Pressure		Air Volume / Watts at Various 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	2075	980	820	1800	850	710	1425	675	570	1115	525	435
0.05	12	2035	960	805	1785	840	695	1425	670	560	1120	530	435
0.10	25	1990	940	790	1765	835	675	1420	670	545	1125	530	430
0.15	37	1950	920	765	1740	820	660	1410	665	535	1125	530	425
0.20	50	1905	900	745	1715	810	645	1405	665	525	1120	530	420
0.25	62	1865	880	730	1680	795	625	1390	655	515	1115	525	410
0.30	75	1825	860	715	1650	780	610	1375	650	505	1105	520	405
0.40	100	1740	820	680	1585	745	580	1355	640	485	1090	515	390
0.50	125	1640	775	645	1495	705	545	1300	615	455	1050	495	370
0.60	150	1540	730	615	1420	670	515	1225	580	430	1000	470	355
0.70	175	1420	670	575	1310	615	475	1140	535	400	935	440	330
0.80	200	1260	595	520	1155	545	425	1025	485	365	865	410	315
0.90	225	1125	530	495	1010	475	385	880	415	330	750	355	285

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

G40UH-60C-110-1, -2, -3 with 3/4 hp motor PERFORMANCE - Bottom Return Air, Side Return Air with Optional RAB Return Air Base, Return Air from Both Sides or Return Air from Bottom and One Side.

External Static Pressure		Air Volume / Watts at Various 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	2450	1155	1220	2300	1085	1060	2056	970	905	1725	815	735
0.05	12	2410	1135	1205	2265	1070	1045	2040	965	895	1715	810	725
0.10	25	2370	1120	1195	2230	1050	1030	2020	955	890	1710	810	720
0.15	37	2325	1095	1175	2200	1040	1015	1995	940	875	1700	800	715
0.20	50	2280	1075	1165	2170	1025	1005	1975	935	870	1695	800	710
0.25	62	2245	1060	1150	2130	1005	990	1950	920	855	1680	795	705
0.30	75	2205	1040	1135	2095	990	975	1925	910	845	1665	785	700
0.40	100	2115	995	1105	2010	950	940	1860	875	820	1625	770	685
0.50	125	2025	955	1060	1945	920	920	1810	855	805	1605	755	675
0.60	150	1910	900	1015	1850	875	885	1715	810	780	1540	730	670
0.70	175	1835	865	1005	1775	840	865	1655	780	765	1495	705	655
0.80	200	1745	825	975	1655	780	835	1540	725	730	1400	660	635
0.90	225	1610	760	945	1540	725	805	1475	695	715	1310	620	615

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.

G40UH-60C-110-1, -2, -3 with 3/4 hp motor PERFORMANCE - Single Side Return Air - Air volumes in bold require field fabricated transition to accommodate 20 x 25 x 1 in. (508 x 635 x 25 mm) cleanable air filter in order to maintain proper air velocity.

External Static Pressure		Air Volume / Watts at Various 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	2395	1130	1230	2260	1065	1085	2015	950	920	1730	815	750
0.05	12	2365	1115	1220	2230	1050	1070	1985	935	905	1720	810	745
0.10	25	2330	1100	1205	2200	1040	1060	1960	925	890	1705	805	750
0.15	37	2285	1080	1190	2170	1025	1045	1030	485	880	1695	800	740
0.20	50	2245	1060	1170	2135	1010	1030	1905	900	870	1675	790	735
0.25	62	2200	1040	1160	2100	990	1020	1890	890	860	1665	785	730
0.30	75	2170	1025	1145	2070	980	1005	1870	880	850	1655	780	720
0.40	100	2085	985	1110	1990	940	975	1825	860	835	1610	760	705
0.50	125	1980	935	1075	1910	900	945	1755	830	810	1555	735	690
0.60	150	1890	890	1045	1835	865	915	1670	790	780	1515	715	680
0.70	175	1800	850	1020	1725	815	885	1615	760	770	1445	685	655
0.80	200	1700	805	995	1645	775	855	1525	720	745	1380	650	645
0.90	225	1590	750	980	1520	720	820	1410	665	710	1300	615	625

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

G40UH-60C-110 with 1 hp motor PERFORMANCE - Bottom Return Air, Side Return Air with Optional RAB Return Air Base, Return Air from Both Sides or Return Air from Bottom and One Side.

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	2655	1250	1407	2370	1120	1063	2085	985	894	1665	785	679
.10	25	2580	1215	1376	2350	1110	1043	2065	975	875	1650	780	667
.20	50	2500	1180	1346	2305	1085	1012	2045	965	849	1645	775	662
.30	75	2410	1135	1305	2230	1050	978	2010	950	820	1640	775	649
.40	100	2320	1095	1270	2165	1020	947	1940	915	786	1625	765	634
.50	125	2225	1050	1235	2090	985	914	1895	895	763	1610	760	622
.60	150	2130	1005	1205	2000	945	880	1840	870	740	1570	740	603
.70	175	2030	955	1155	1915	905	851	1760	830	709	1535	725	590
.80	200	1925	910	1123	1820	860	823	1670	790	681	1475	695	566
.90	225	1795	845	1078	1690	795	788	1560	735	655	1395	660	537

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.

G40UH-60C-110 with 1 hp motor PERFORMANCE - Single Side Return Air - Air volumes in bold require field fabricated transition to accommodate 20 x 25 x 1 in. (508 x 635 x 25 mm) cleanable air filter in order to maintain proper air velocity.

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	2430	1145	1309	2245	1060	1006	1910	900	843	1635	770	686
.10	25	2355	1110	1277	2190	1035	978	1905	900	817	1620	765	677
.20	50	2280	1075	1242	2140	1010	950	1885	890	797	1610	760	667
.30	75	2205	1040	1218	2075	980	924	1860	875	782	1605	755	655
.40	100	2130	1005	1189	2005	945	905	1815	855	752	1595	750	636
.50	125	2045	965	1159	1920	905	864	1750	825	726	1565	740	619
.60	150	1955	920	1132	1850	875	840	1700	800	705	1525	720	605
.70	175	1860	875	1105	1760	830	817	1610	760	674	1475	700	582
.80	200	1755	830	1067	1670	790	789	1540	725	654	1395	660	560
.90	225	1645	775	1033	1575	745	763	1445	680	627	1325	625	540

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

G40UH-60D-135-1, -2, -3 with 3/4 hp motor PERFORMANCE - Bottom Return Air, Side Return Air with Optional RAB Return Air Base, Return Air from Both Sides or Return Air from Bottom and One Side.

External Static Pressure		Air Volume / Watts at Various 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	2465	1165	1205	2325	1100	1060	2155	1015	930	1895	895	780
0.05	12	2430	1145	1195	2295	1085	1050	2125	1000	920	1875	885	770
0.10	25	2395	1130	1180	2265	1070	1040	2095	990	910	1855	875	765
0.15	37	2350	1110	1165	2230	1050	1025	2070	975	900	1830	865	755
0.20	50	2310	1090	1150	2195	1035	1010	2045	965	890	1805	850	745
0.25	62	2265	1070	1135	2155	1015	995	2010	950	875	1785	840	735
0.30	75	2220	1050	1120	2115	1000	980	1975	930	865	1765	830	730
0.40	100	2120	1000	1080	2035	960	950	1915	905	845	1715	810	720
0.50	125	2050	970	1055	1955	925	925	1830	865	815	1645	775	700
0.60	150	1930	910	1015	1860	880	895	1745	825	795	1585	745	680
0.70	175	1835	865	985	1775	840	870	1655	780	770	1530	720	670
0.80	200	1720	810	955	1645	775	830	1560	735	745	1445	685	650
0.90	225	1595	755	925	1535	725	800	1455	685	720	1310	620	620

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.

G40UH-60D-135-1, -2, -3 with 3/4 hp motor PERFORMANCE - Single Side Return Air - Air volumes in bold require field fabricated transition to accommodate 20 x 25 x 1 in. (508 x 635 x 25 mm) cleanable air filter in order to maintain proper air velocity.

External Static Pressure		Air Volume / Watts at Various 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	2350	1110	1180	2225	1050	1035	2055	970	905	1855	875	775
0.05	12	2310	1090	1170	2195	1035	1025	2035	960	895	1835	865	765
0.10	25	2275	1075	1155	2165	1020	1010	2010	950	885	1815	855	760
0.15	37	2235	1055	1140	2130	1005	1000	1980	935	875	1795	845	755
0.20	50	2195	1035	1130	2100	990	985	1945	920	865	1775	835	750
0.25	62	2155	1020	1115	2055	970	970	1915	905	855	1750	825	740
0.30	75	2115	1000	1100	2010	950	950	1885	890	845	1725	815	735
0.40	100	2010	950	1055	1940	915	930	1830	865	830	1665	785	720
0.50	125	1930	910	1035	1860	880	905	1745	825	805	1600	755	705
0.60	150	1830	865	1005	1770	835	880	1655	780	775	1530	720	685
0.70	175	1735	820	985	1655	780	845	1595	755	765	1480	700	675
0.80	200	1645	775	955	1545	730	815	1480	700	735	1375	650	650
0.90	225	1515	715	925	1435	675	785	1385	655	710	1290	610	630

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

G40UH-60D-135 with 1 hp motor PERFORMANCE - Bottom Return Air, Side Return Air with Optional RAB Return Air Base, Return Air from Both Sides or Return Air from Bottom and One Side.

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	2715	1280	1407	2255	1065	1070	1910	900	850	1660	785	674
.10	25	2640	1245	1403	2250	1060	1030	1900	895	834	1645	775	668
.20	50	2540	1200	1355	2245	1060	1006	1890	890	821	1630	770	665
.30	75	2480	1170	1319	2200	1040	975	1890	890	781	1625	765	656
.40	100	2390	1125	1282	2155	1015	940	1885	890	775	1615	760	642
.50	125	2320	1095	1251	2085	985	904	1860	875	758	1605	755	631
.60	150	2205	1040	1210	2020	955	876	1815	855	731	1595	750	611
.70	175	2080	980	1161	1935	915	839	1760	830	707	1545	730	588
.80	200	2010	950	1122	1855	875	810	1690	795	679	1495	705	568
.90	225	1880	885	1071	1755	830	781	1585	745	646	1430	675	545

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.

G40UH-60D-135 with 1 hp motor PERFORMANCE - Single Side Return Air - Air volumes in bold require field fabricated transition to accommodate 20 x 25 x 1 in. (508 x 635 x 25 mm) cleanable air filter in order to maintain proper air velocity.

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	2455	1160	1336	2170	1025	1019	1850	875	829	1555	735	673
.10	25	2380	1125	1299	2140	1010	974	1840	870	812	1550	730	664
.20	50	2305	1085	1266	2105	995	947	1830	865	791	1545	730	656
.30	75	2235	1055	1234	2045	965	914	1820	860	774	1540	725	642
.40	100	2160	1020	1240	1985	935	886	1800	850	755	1540	725	628
.50	125	2065	975	1170	1925	910	863	1745	825	726	1535	725	614
.60	150	1990	940	1146	1870	880	844	1700	800	706	1505	710	599
.70	175	1895	895	1111	1775	835	808	1655	780	689	1465	690	573
.80	200	1805	850	1074	1680	790	779	1565	740	656	1425	670	562
.90	225	1695	800	1042	1590	750	752	1480	700	630	1335	630	533

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.

G40UH-60D-155-1, -2, -3 with 3/4 hp motor PERFORMANCE - Bottom Return Air, Side Return Air with Optional RAB Return Air Base, Return Air from Both Sides or Return Air from Bottom and One Side.

External Static Pressure		Air Volume / Watts at Various 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	2380	1120	1135	2235	1055	1000	2060	970	875	1875	885	750
0.05	12	2340	1105	1130	2205	1040	990	2035	960	865	1840	870	745
0.10	25	2305	1090	1125	2180	1030	975	2015	950	855	1810	855	735
0.15	37	2265	1070	1105	2145	1010	960	1990	940	845	1790	845	725
0.20	50	2220	1045	1090	2105	995	945	1960	925	835	1765	835	720
0.25	62	2180	1030	1075	2080	980	935	1935	910	825	1740	820	710
0.30	75	2145	1010	1065	2050	965	925	1905	900	815	1715	810	700
0.40	100	2060	970	1040	1975	930	900	1845	870	795	1655	780	685
0.50	125	1955	925	1005	1890	890	870	1765	835	770	1610	760	670
0.60	150	1885	890	975	1795	850	840	1695	800	750	1560	735	655
0.70	175	1800	850	955	1730	815	815	1605	760	720	1480	700	635
0.80	200	1700	805	930	1630	770	785	1520	715	695	1405	660	615
0.90	225	1575	745	895	1525	720	760	1395	660	660	1285	605	585

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

G40UH-60D-155-1, -2, -3 with 3/4 hp motor PERFORMANCE - Single Side Return Air - Air volumes in bold require field fabricated transition to accommodate 20 x 25 x 1 in. (508 x 635 x25 mm) cleanable air filter in order to maintain proper air velocity.

External Static Pressure		Air Volume / Watts at Various 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	2230	1050	1080	2130	1005	945	1995	940	840	1830	865	745
0.05	12	2200	1035	1070	2105	990	935	1970	930	830	1810	855	735
0.10	25	2165	1025	1060	2075	980	930	1950	920	820	1795	845	725
0.15	37	2135	1005	1050	2040	965	915	1920	905	815	1765	835	720
0.20	50	2100	990	1035	2005	945	905	1890	895	805	1735	820	710
0.25	62	2050	965	1015	1975	930	895	1855	875	795	1705	805	700
0.30	75	2000	945	995	1940	915	880	1820	860	780	1675	790	690
0.40	100	1905	900	965	1860	875	850	1755	825	770	1630	770	680
0.50	125	1825	860	945	1780	840	830	1700	800	750	1555	735	660
0.60	150	1745	825	920	1690	795	805	1595	750	715	1495	705	645
0.70	175	1650	780	905	1610	760	785	1515	715	705	1430	675	625
0.80	200	1565	740	880	1520	715	755	1445	680	680	1330	630	605
0.90	225	1445	685	845	1385	655	720	1300	610	640	1225	580	575

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.

G40UH-60D-155 with 1 hp motor PERFORMANCE - Bottom Return Air, Side Return Air with Optional RAB Return Air Base, Return Air from Both Sides or Return Air from Bottom and One Side.

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	2670	1260	1386	2325	1095	1048	1970	930	857	1700	800	706
.10	25	2580	1215	1342	2320	1095	1045	1965	925	842	1690	795	696
.20	50	2510	1185	1311	2255	1065	985	1960	925	817	1640	775	662
.30	75	2425	1145	1277	2210	1040	953	1955	920	803	1635	770	649
.40	100	2345	1105	1246	2150	1015	922	1925	910	778	1630	770	633
.50	125	2255	1065	1217	2095	990	897	1890	890	752	1615	760	618
.60	150	2170	1025	1182	2010	950	863	1840	870	733	1590	750	605
.70	175	2090	985	1139	1925	910	833	1785	840	708	1550	730	588
.80	200	1895	895	1106	1840	870	806	1710	805	683	1500	705	571
.90	225	1855	875	1064	1740	820	776	1620	765	655	1430	675	551

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.

G40UH-60D-155 with 1 hp motor PERFORMANCE - Single Side Return Air - Air volumes in bold require field fabricated transition to accommodate 20 x 25 x 1 in. (508 x 635 x 25 mm) cleanable air filter in order to maintain proper air velocity.

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	2410	1135	1282	2175	1025	987	1870	880	833	1620	765	675
.10	25	2335	1100	1257	2140	1010	956	1860	875	810	1610	760	667
.20	50	2255	1065	1225	2085	985	918	1855	875	788	1605	755	658
.30	75	2205	1040	1200	2025	955	896	1830	865	764	1600	755	647
.40	100	2120	1000	1164	1975	930	874	1795	845	742	1595	750	628
.50	125	2040	960	1131	1905	900	847	1745	825	731	1575	745	618
.60	150	1955	920	1103	1835	865	820	1695	800	698	1540	725	601
.70	175	1870	880	1069	1760	830	792	1635	770	673	1465	690	568
.80	200	1770	835	1041	1670	790	763	1560	735	646	1415	665	548
.90	225	1660	785	1006	1585	745	740	1480	700	629	1345	635	527

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

HIGH ALTITUDE

All -1 to -14 models - Pressure regulator adjustment may be required depending on altitude. See below for proper pressure regulator setting.

Manifold Pressure (Outlet) in. w.g. (kPa)				
FUEL	ALTITUDE ft. (m)			
	0-4500 (0-1372)	4501-5500 (1373-1676)	5501-6500 (1677-1981)	6501-7500 (1982-2286)
Natural Gas	3.5 (.87)	3.3 (.82)	3.2 (.80)	3.1 (.77)
LPG/Propane	10.0 (2.49)			

All -15 and later models - Pressure regulator adjustment is not required. See below for proper pressure regulator setting.

Manifold Pressure (Outlet) in. w.g. (kPa)	
FUEL	ALTITUDE ft. (m)
	0 - 10,000 (0 - 3048)
Natural Gas	3.5 (.87)
LPG/Propane	10.0 (2.49)

HIGH ALTITUDE

G40UH-1 to -14	¹ High Altitude Orifice Kit Natural Gas Only	High Altitude Prove Switch Kit		LPG/Propane Kit	
		4501-7500 ft. (1373- 2236m)	7501-10,000 ft. (2287 - 3048m)	0-7500 ft. (0 - 2286m)	7501-10,000 ft. (2286 - 3048m)
-045- -070	47M82	56L32	56L32	45L60	47M81
-090	47M82	49L90	15M22	45L60	47M81
-110	47M82	49L90	15M22	45L60	47M81
-135	47M82	49L90	15M22	45L60	47M81
-155	47M82	49L90	15M22	45L60	47M81

G40UH-15 and later	¹ High Altitude Orifice Kit Natural Gas Only	High Altitude Pressure Switch Kit		LPG/Propane Kit	
		4501-7500 ft. (1373 - 2286m)	7501-10,000 ft. (2287 - 3048m)	0-7500 ft. (0 - 2286m)	7501-10,000 ft. (2286 - 3048m)
all models	59M17	NO CHANGE	56L32	25W20	25W21

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

G40UH(X) PARTS ARRANGEMENT

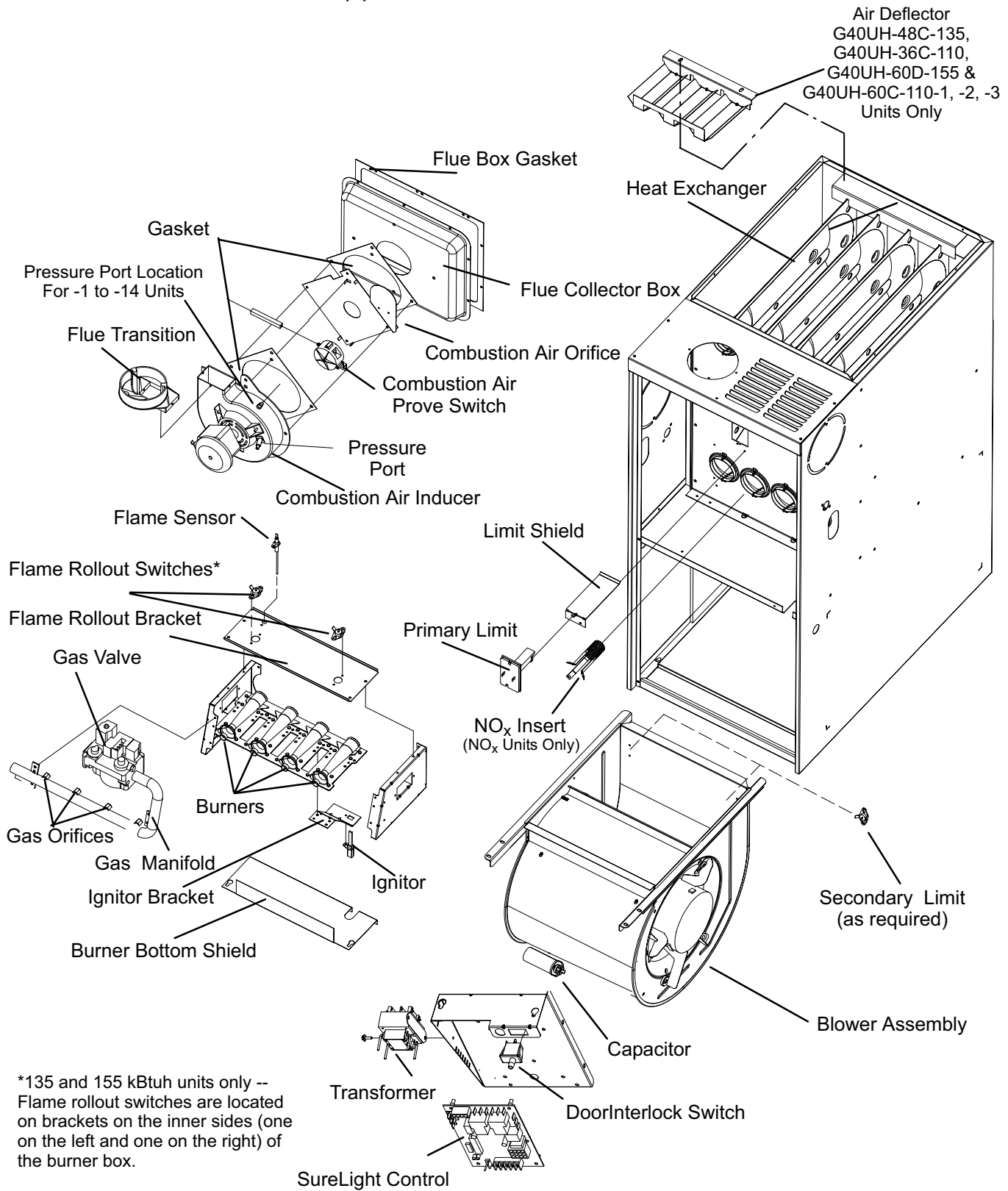


FIGURE 1

G40UH(X) PARTS IDENTIFICATION (HORIZONTAL POSITION)

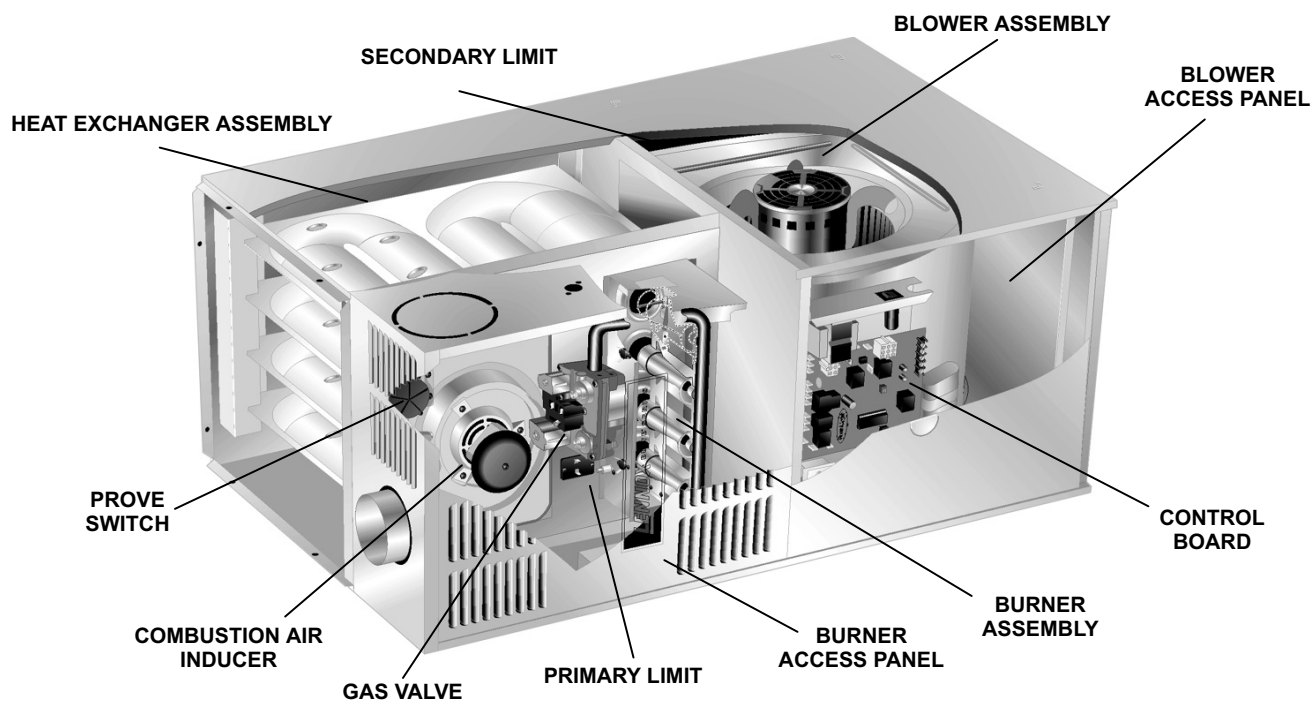


FIGURE 2

G40UH(X) HEATING COMPONENTS

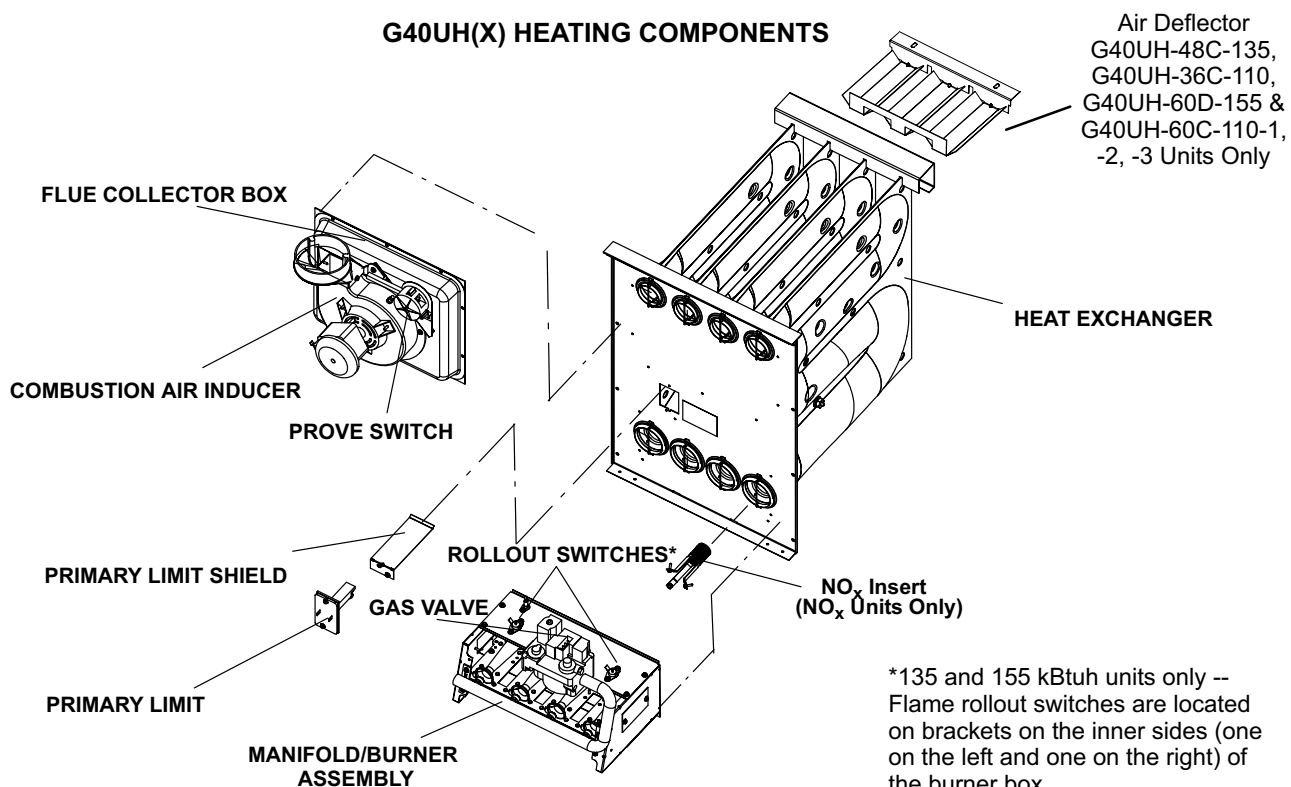


FIGURE 3

I-UNIT COMPONENTS

G40UH(X) unit components are shown in figures 1, 2, 3 and 4. 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 4) found in the blower section.

G40UH(X) units are factory equipped with a bottom return air panel in place. The panel is designed to be field removed as required for bottom air return. Markings are provided for side return air and may be cut out in the field.

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.

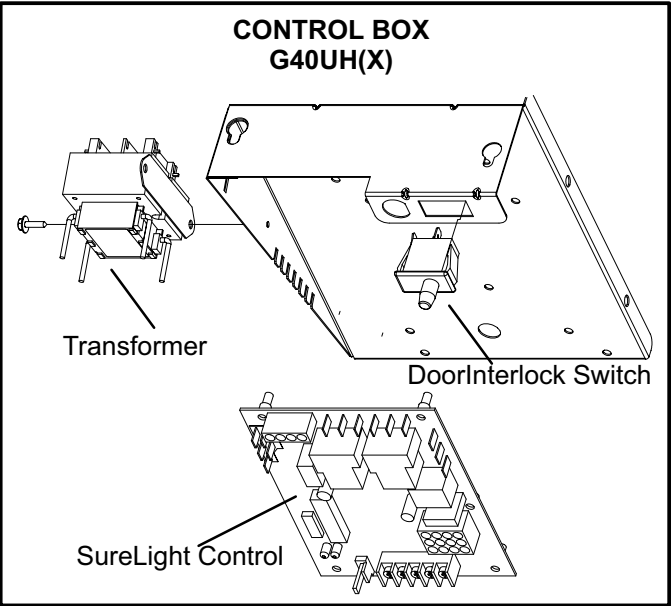


FIGURE 4

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.

3. SureLight Integrated Ignition Control (A92) 10M93 & 56L84

The Lennox SureLight ignition system consists of ignition control (figure 5 with control terminal designations in table 1), sensor (figure 10) and ignitor (figure 11). The ignition control and ignitor work in combination to ensure furnace ignition and ignitor durability. The ignition control, controls all major furnace operations. The ignition control also features two LED lights for troubleshooting and two accessory terminals rated at (1) one amp. Tables 2 and 3 show jack plug terminal designations. See table 4 for troubleshooting diagnostic codes. Units equipped with the SureLight system 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 ignition control. The ignition control finds the lowest ignitor temperature which will successfully light the burner, thus increasing the life of the ignitor.

TABLE 1

SURELIGHT CONTROL TERMINAL DESIGNATIONS	
COOL	Blower - Cooling Speed (120V)
HEAT	Blower - Heating Speed (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	120V Neutral
FS	Flamer Sensor

TABLE 2

SURELIGHT CONTROL J156 (J2) TERMINAL DESIGNATIONS	
PIN #	FUNCTION
1	Combustion Air Inducer Line
2	Ignitor Line
3	Combustion Air Inducer Neutral
4	Ignitor Neutral

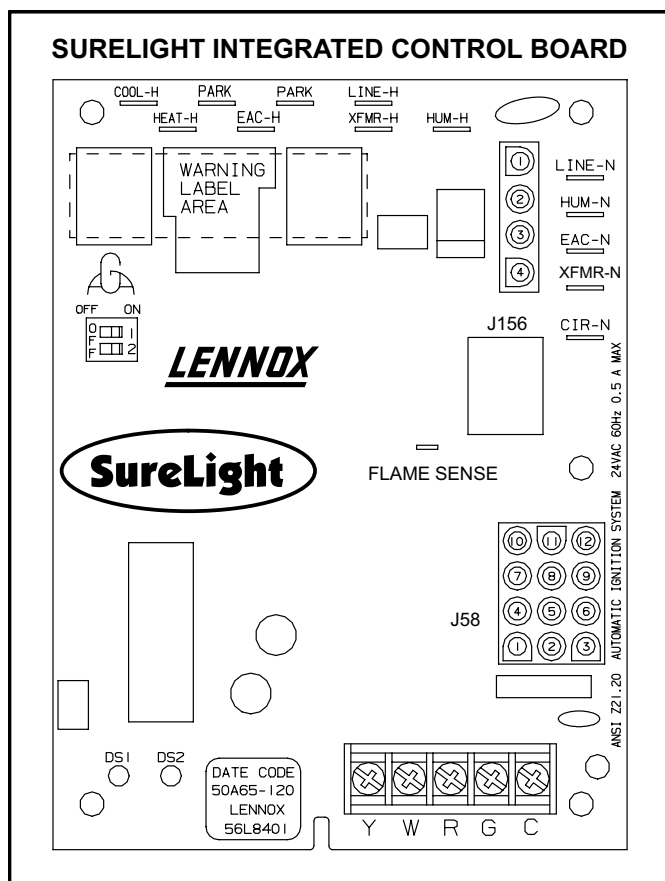


FIGURE 5
TABLE 3

SUERLIGHT CONTROL J58 (J1) TERMINAL DESIGNATIONS	
PIN #	FUNCTION
1	Secondary Limit
2	Not Used
3	24V
4	Not Used
5	Rollout Switch In
6	24V
7	Primary Limit
8	Ground
9	Gas Valve In
10	Pressure Switch Out
11	Rollout Switch Out
12	Gas Valve Out

a-Electronic Ignition (See Figure 7)

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 com-

bustion 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. Units with control 56L84: the ignitor stays energized for the first second of the 4-second trial. Units with control 10M93: ignitor stays energized the full 4 second trial. If ignition is not proved during the 4-second period, the control (56L84 or 10M93) 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. 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 6.

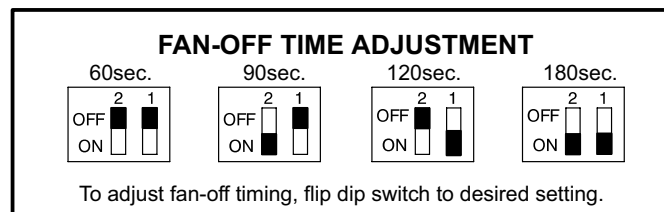


FIGURE 6

The ignition control 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 figures 5 and 8 for control board layout.		
LED #1 DS #1 AN #1	LED #2 DS #2 AN #2	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 inducer.
ALTERNATING SLOW FLASH	ALTERNATING SLOW FLASH	Watchguard -- burners failed to ignite.
SLOW FLASH	OFF	Flame sensed without gas valve energized.
ON	SLOW FLASH	Rollout switch open. OR: 24V pin connector improperly attached.
ON ON OFF	ON OFF ON	Circuit board failure or control wired incorrectly.
FAST FLASH	SLOW FLASH	Main power polarity reversed. Switch line and neutral.
SLOW FLASH	FAST FLASH	Low flame signal. See Table 15 for flame sense.
ALTERNATING FAST FLASH	ALTERNATING FAST FLASH	The following conditions are sensed Improper main ground (Control 10M93, 57L84) during ignitor warm up period ONLY, improper main ground continuously (Control 78M47 & 100973-01) OR: Broken ignitor (Control 10M93, 57L84) OR: Open ignitor circuit (Control 78M47 & 100973-01) OR: Line voltage below 75V (Control 10M93, 57L84) 90V (Control 78M47 & 100973-01)

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

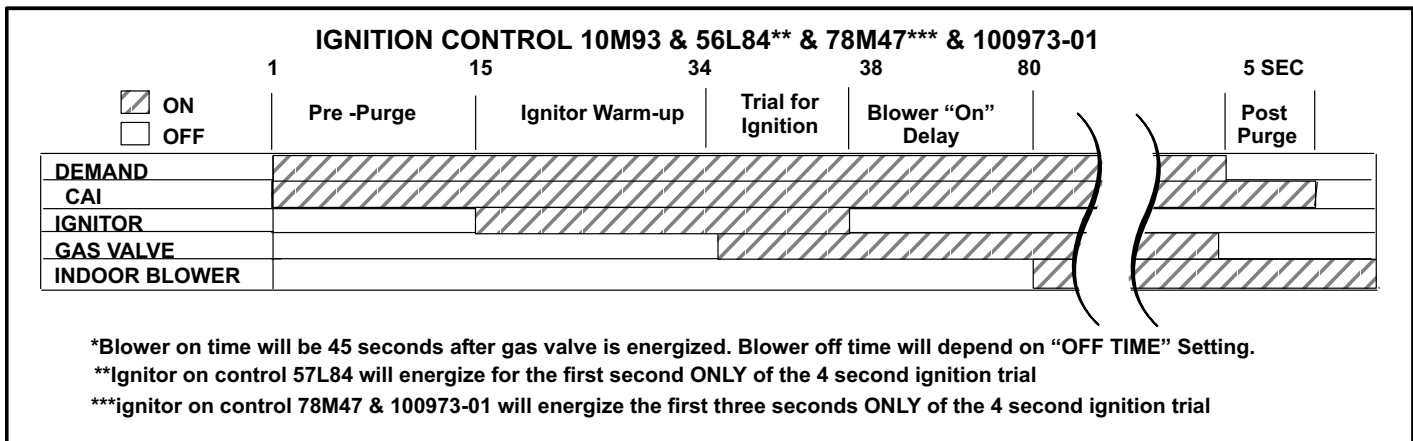


FIGURE 7

4. Integrated Ignition Control (A92) 78M47 & 100973-01

! 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 board (figure 8 with control terminal designations in table 7), sensor (figure 10) and ignitor (figure 11). The ignition control board and ignitor work in combination to ensure furnace ignition and ignitor durability. The ignition control, controls all major furnace operations. The ignition control also features two LED lights (AN1 red and AN2 green) for troubleshooting and two accessory terminals rated at (1) one amp. The ignition control also features a (3) amp fuse for overcurrent protection. Tables 5 and 6 show jack plug terminal designations. See table 4 for troubleshooting diagnostic codes. The mini-nitride ignitor is made from a non-porous, high strength proprietary ceramic material that provides long life and trouble free maintenance. The ignition control continuously monitors line voltage and maintains the ignitor power at a consistent level to provide proper lighting and maximum ignitor life.

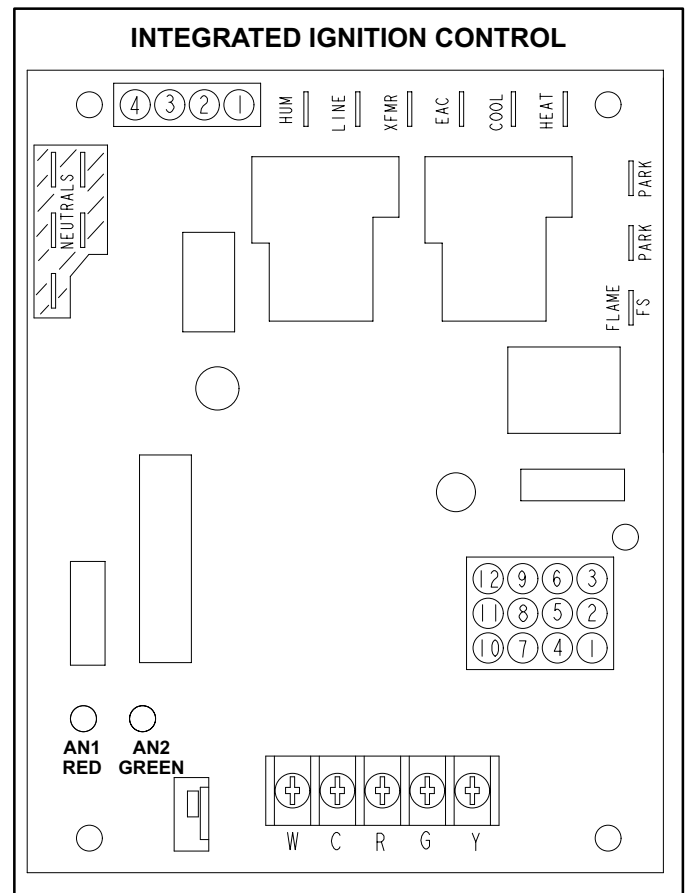


FIGURE 8

TABLE 5

4-Pin Terminal Designation	
PIN #	FUNCTION
1	Combustion Air Inducer Line
2	Ignitor Line
3	Combustion Air Inducer Neutral
4	Ignitor Neutral

TABLE 6

12-Pin Terminal Designations	
PIN #	FUNCTION
1	High Limit Output
2	Not Used
3	24V Line
4	Not Used
5	Rollout Switch Out
6	24V Neutral
7	High Limit Input
8	Ground
9	Gas Valve Common
10	Prove Switch In
11	Rollout Switch In
12	Gas Valve Out

TABLE 7

TERMINAL DESIGNATIONS	
120 Volt Hot	
COOL	Cool Speed
HEAT	Heat Speed
PARK	Park
PARK	Park
EAC	Electronic Air Cleaner
XFMR	Transformer
LINE	Line
HUM	Humidifier
120 Volt Neutral	
CIRC	Blower
XMFR	Transformer
HUM	Humidifier
LINE	Line
Flame FS	Flame Signal

Electronic Ignition (See Figure 7)

On a call for heat the ignition board monitors the combustion air inducer prove switch. The control board will not begin the heating cycle if the prove switch is closed (bypassed). Once the prove switch is determined to be open, the combustion air inducer is energized. When the differential in the prove switch is great enough, the prove switch closes and a 15-second pre-purge begins. If the prove switch is not proven within 2-1/2 minutes, the control board 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 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 control board has an added feature of ignitor power regulation to maintain consistent lighting and longer ignitor life under all line voltage conditions.

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 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 9.

Board 100973-01 only has a 45 second fan off delay after cooling demand has been met. This delay is factory set and not adjustable.

FAN-OFF TIME ADJUSTMENT

JUMPER POSITION		HEAT OFF DELAY
OFF	OFF	180
PIN1	PIN2	60
PIN2	PIN3	90
PIN3	PIN4	120
PIN4	PIN5	180

To adjust fan-off timing, reposition jumper across pins to achieve desired setting.

FIGURE 9

5.Flame Sensor (Figure 10)

A flame sensor is located on the left side of the burner support. See figure 10. 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 ignition control allows the gas valve to remain open as long as flame signal is sensed.

6. Ignitor (Figure 11)

The SureLight ignitor used on G40UH units, is made of durable silicon nitride. 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. The check ignitor, measure its resistance. A value of 10.9 to 19.7 ohms indicates a good ignitor.

The mini-nitride ignitor used on G40UH units (equipped with control 78M47 or 100973-01) is made from a proprietary ceramic material. Ignitor longevity is enhanced by controlling the voltage to the ignitor. The check ignitor, measure its resistance. A value of 50 to 450 ohms indicates a good ignitor.

NOTE - The G40UH(X) furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

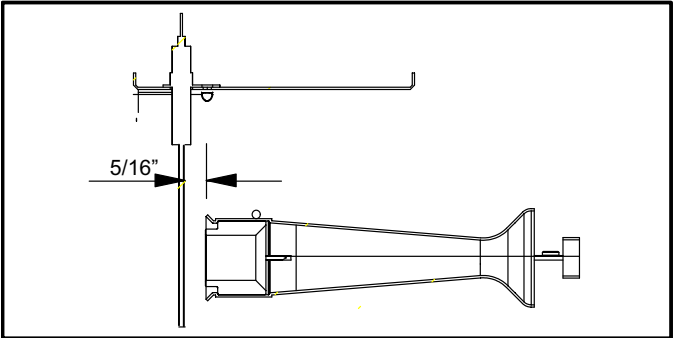


FIGURE 10

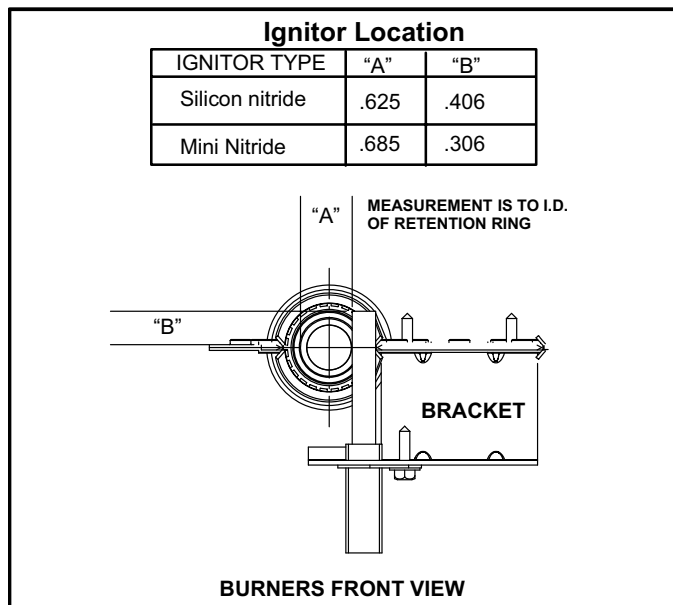


FIGURE 11

7. Combustion Air Inducer (B6)

All G40UH(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 is used to prove inducer operation. The combustion air inducer orifice will be different for each model. See table 8 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.

Horizontal Applications

The G40UH(X) furnace can be installed in horizontal applications.

The combustion air inducer may be rotated clockwise or counterclockwise by 90° to allow for vertical vent discharge in a horizontal application. Remove the four mounting screws, rotate the assembly (assembly consists of orifice plate, proving switch, gasket and combustion air inducer), then reinstall the mounting screws. See figure 12. Use the provided wire tie to bundle the pressure switch wires with the inducer motor power leads. **Route the wires away from moving parts and the heat of the inducer motor to prevent damage to the wires.** Use sheet metal shears to remove the cut out from the side of the cabinet. See figure 13. Use the two provided sheet metal screws to install the cut out on the top cap to cover the original flue outlet opening.

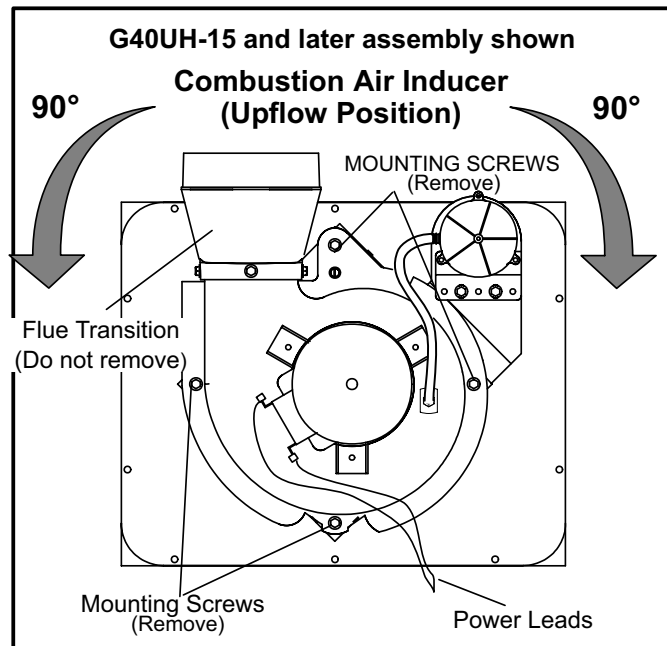


FIGURE 12

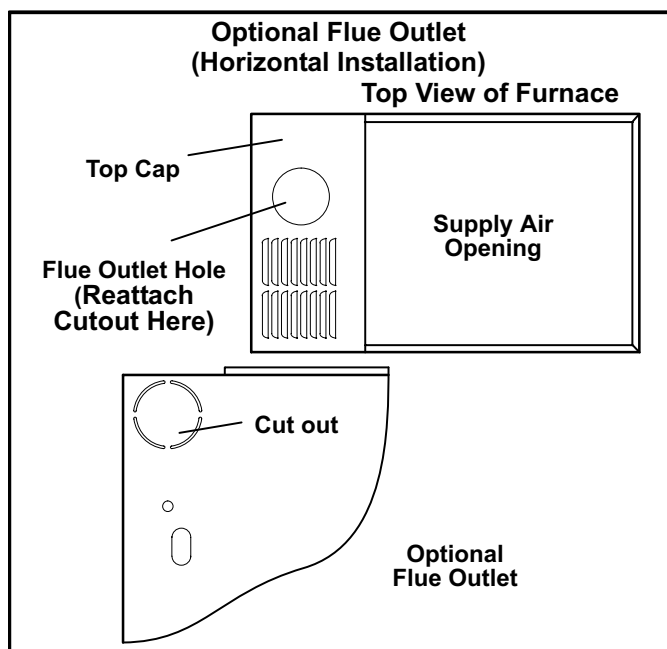


FIGURE 13

TABLE 8

G40UH(X) Unit	C.A.I. Orifice Size
-045	1.250
24A/36A-070	1.438
48B-070-1 to -10	1.5
48B-070-14 and later	1.438
-090	1.688
36C-110 (-1, -2, -3 units)	2.156
36C-110 (-6 and later)	2.0
-48C, 60C-110 (-1, -2, -3 units)	1.875
48C, 60C-110 (-4, -5 units)	2.156
48C, 60C-110 (-6 and later)	2.0
-135 (-1, -2, -3, -4, -5 units)	2.156
-135 (-6 and later units)	2.375
-155	2.60

8.Flame Rollout Switches (S47)

Flame rollout switch is a high temperature limit located on top of the burner box (135 and 155 Btuh units- rollout switches are located on inner sides of burner box). See heating components figure 3. Each furnace is equipped with two identical switches. One switch is located over the leftmost burner and the other switch is located over the rightmost burner. The limit is a N.C. SPST manual-reset limit connected in series with the ignition control 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 and cannot be adjusted. See table 9. The switch can be manually reset. To manually reset a tripped switch, push the reset button located on the control.

TABLE 9

BTUH INPUT	Rollout Switch Setpoint
-045	250° F
-070	
-090	
-110	
-135	200° F
-155	

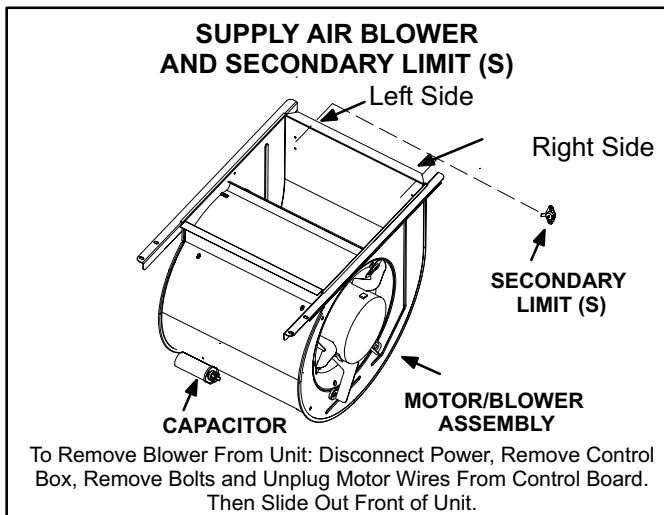


FIGURE 14

9.Blower Motors and Capacitors

All G40UH(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) on G40UH(X) units is located in the heating vestibule panel. 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 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 Repair Parts handbook.

11.Secondary Limit Controls (S21)

The secondary limit (S21) on G40UH(X) (-24A-045 will not have a secondary limit) units is located in the blower compartment in the back side of the blower housing. See figure 14. Table 10 and the blower speed chart on the wiring diagram show secondary limit quantities per unit. 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. G40UH-1 through -6 units use a surface type limit factory set to open at 125°F. G40UH-7 units and later, use an airstream type limit factory set to open at 135°. The secondary limit cannot be adjusted.

TABLE 10

G40UH UNIT	Quantity	LeftSide	Right Side
24A-045	0	No	No
24A-070	2	Yes	Yes
36A-045	2	Yes	Yes
36A-070	2	Yes	Yes
36B-090	1	No	Yes
36C-110	1	No	Yes
48B-070	2	Yes	Yes
48B-090	2	Yes	Yes
48C-110	1	No	Yes
48C-135	2	Yes	Yes
60C-110	1	No	Yes
60D-135	2	Yes	Yes
60D-155	2	Yes	Yes

12. Gas Valve Figures 16, 15, 17 & 18

The G40UH(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.

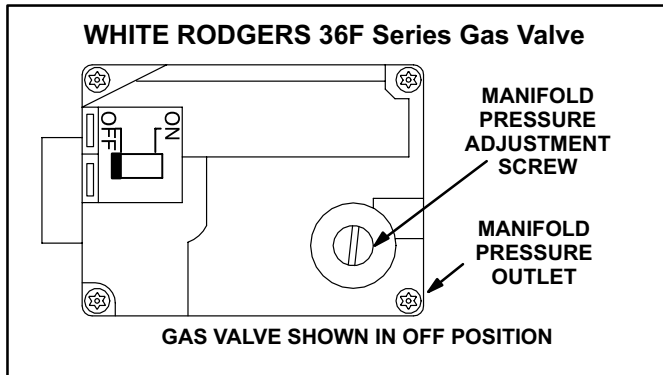


FIGURE 15

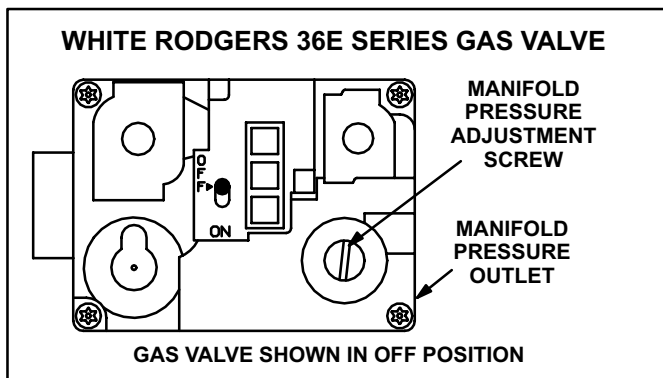


FIGURE 16

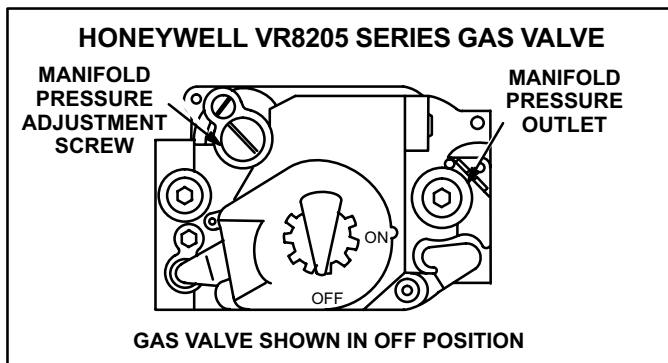


FIGURE 17

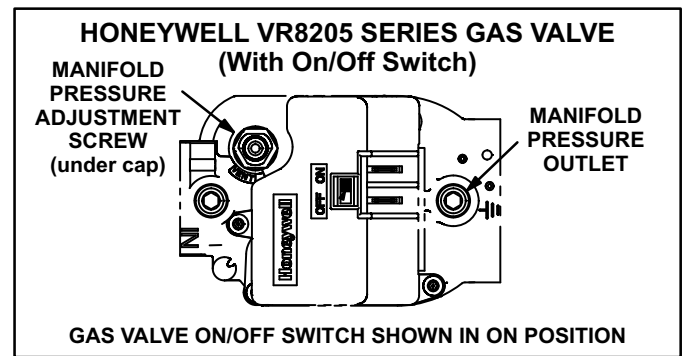


FIGURE 18

13. Combustion Air Inducer Proving Switch (S18)

G40UH(X) series units are equipped with a combustion air proving 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 furnace control when pressure inside the combustion air inducer decreases to a certain set point. Set points vary depending on unit size. See table 11. 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 bypassed for any reason. If switch is closed or by-passed, the control will not initiate ignition at start up.

TABLE 11

PROVE SWITCH SET POINTS			
-1 to -14 Units	0 - 4500ft (0 - 1372m)	4501' - 7500' 1373m - 7500m	7501' - 10,000' (2287 - 3048m)
-045	0.47" (116Pa)	0.36" (89Pa)	0.36" (89Pa)
-070	0.47" (116Pa)	0.36" (89Pa)	0.36" (89Pa)
-090	0.51" (126Pa)	0.47" (116Pa)	0.43" (106Pa)
-110	0.58" (.14Pa)	0.47" (116Pa)	0.43" (106Pa)
-135	0.51" (126Pa)	0.47" (116Pa)	0.43" (106Pa)
-155	0.51" (126Pa)	0.47 (116a)	0.43" (106Pa)
All -15 and later models	0.40" (99pa)	no change	0.36" (89Pa)

NOTE-- -1 to -14 units require a high altitude prove switch kit if installed above 4500 ft (1370 m).

NOTE-- -15 and later units require a high altitude prove switch kit if installed above 7500 ft (2286 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.


G40UH(X) units are equipped with a hot surface ignition system. Do not attempt to light manually.

Gas Valve Operation (Figures 16, 15, 17 and 18)

- 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 upper access panel.
- 6 - *Honeywell VR8205 Gas Valve with On/Off Switch* - Move gas valve switch to **OFF position**. Do not force. See figure 17.
Honeywell VR8205 Gas Valve with Control Knob -

Turn knob on gas valve clockwise  to **OFF**. Do not force. See figure 18.

White Rodgers 36E/36F Gas Valve - Move gas valve switch to **OFF position**.

- 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 - *Honeywell VR8205 Gas Valve with On/Off Switch* - Move gas valve switch to **ON position**. Do not force. See figure 17.
Honeywell VR8205 Gas Valve with Control Knob - Turn knob on gas valve counterclockwise  to **ON**. Do not force.
White Rodgers 36E/36F Gas Valve - Move gas valve switch to **ON position**.

- 9 - Replace the upper access panel.


- 10- Turn on all electrical power 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.

- 12- If the appliance will not operate, follow the instructions "Turning Off Gas to Unit" and call your service technician or gas supplier.

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 upper access panel.
- 4 - *Honeywell VR8205 Gas Valve with On/Off Switch* - Move gas valve switch to **OFF position**. Do not force. See figure 17.
Honeywell VR8205 Gas Valve with Control Knob - Turn knob on gas valve clockwise  to **OFF**. Do not force. See figure 18.
White Rodgers 36E/36F Gas Valve - Switch gas valve lever to **OFF**.

- 5 - Replace the upper access panel.

C-Safety or Emergency Shutdown

Disconnect main power to unit. 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 G40UH(X) 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 0.5psig (14" W.C.). See figure 19. 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.

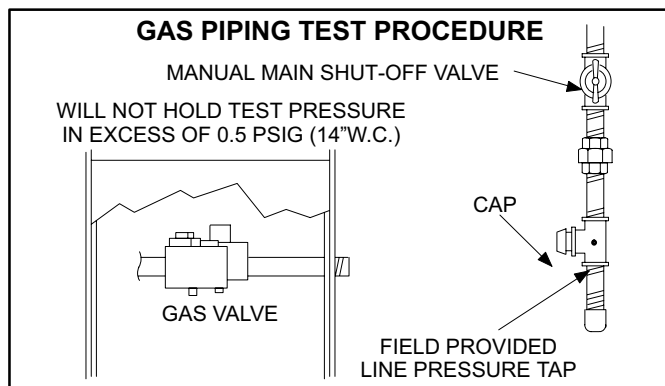


FIGURE 19

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 19. 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 12 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 G40UH(X) can be measured at any time the gas valve is open and is supplying gas to the unit. See table 12 for normal operating manifold pressure.

TABLE 12

All G40UH 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 16, 15 and 17. Start unit and allow 5 minutes for unit to reach steady state.
- 2 - While waiting for the unit to stabilize, notice the flame. 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) & Combustion

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 13 below. Adjust manifold pressure on gas valve to match time needed. Manifold pressure should not exceed values listed in table 12. If manifold pressure matches table 12 and rate is incorrect, check gas orifices for proper size and restriction. After furnace has operated for 15 minutes take a combustion sample beyond the flue outlet and compare to table 14. The maximum carbon monoxide reading should not exceed 100ppm.

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

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 14

G40UH Unit	CO ₂ Range Nat	CO ₂ Range LP
24A-045(X)	5.50 - 6.50	6.80 - 7.80
36A-045	5.80 - 6.80	6.60 - 7.60
24A-070	7.00 - 8.00	8.00 - 9.00
36A-070(X)	6.80 - 7.80	7.80 - 8.80
48B-070	6.80 - 7.80	7.80 - 8.80
36B-090	7.20 - 8.20	7.70 - 8.70
48B-090(X)	7.20 - 8.20	7.70 - 8.70
36C-110	6.50 - 7.50	7.50 - 8.50
48C-110	6.90 - 7.90	8.50 - 9.50
60C-110(X)	6.50 - 7.50	7.50 - 8.50
48C-135	6.70 - 7.70	7.60 - 8.60
60D-135	6.70 - 7.70	7.60 - 8.60
60D-155	6.80 - 7.80	7.80 - 8.80

TABLE 13

GAS METER CLOCKING CHART

G40UH 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
-155	23	46	58	116
Natural-1000 btu/cu ft		LP-2500 btu/cu ft		

G-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.

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 20. The transducer converts microamps to volts on a 1:1 conversion. See table 15 for flame signal. A digital readout meter must be used. The transducer plugs into most meters. See figure 21 for proper use of transducer.

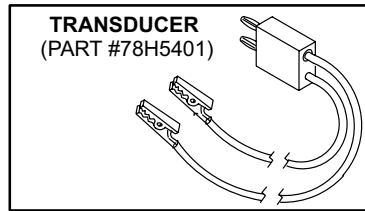


FIGURE 20

- 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.

TABLE 15

Flame Signal in Microamps			
Control	Normal	Low	Drop Out
56L84, 10M93	≥ 0.18	0.16 - 0.17	≤ 0.15
78M47 100973-01	≥ 1.5	0.5 - 1.4	≤ 0.4

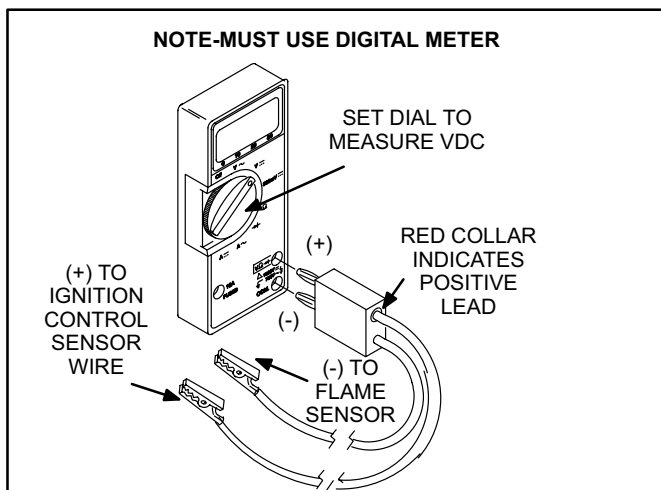


FIGURE 21

! WARNING

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

V-TYPICAL OPERATING CHARACTERISTICS

A-Blower Operation and Adjustment

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

- 1 - Blower operation is dependent on thermostat control system.
- 2 - Generally, blower operation is set at thermostat sub-base fan switch. With fan switch in ON position, blower operates continuously. 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 G40UH(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 22.

- 2 - Punch a 1/4" diameter hole in supply and return air plenums. Insert manometer hose flush with inside edge of hole or insulation. Seal around the hose with 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.

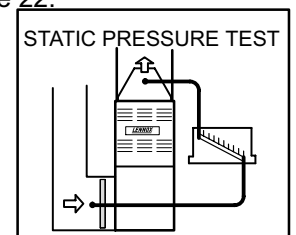


FIGURE 22

- 3 - With only the blower motor running and the evaporator coil dry, observe the manometer reading. Adjust blower motor speed to deliver the air desired according to the job requirements.
- 4 - External static pressure drop must not be more than 0.5" W.C.
- 5 - Seal around the hole when the check is complete.

D-Blower Speed Taps

Blower speed tap changes are made on the ignition control board. See figures 5 and 8. On G40DF-1 through -8 units, the heating tap is connected to the "HEAT-H" terminal and the cooling tap is connected to the "COOL-H" terminal. On G40UHF-8 and later units, the heating tap is connected to the "HEAT" terminal and the cooling tap is connected to the "COOL" terminal. On all units the continuous blower tap is the same as the heating tap and unused taps must be secured on two 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

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

A-Filters

All G40UH(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 1 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.

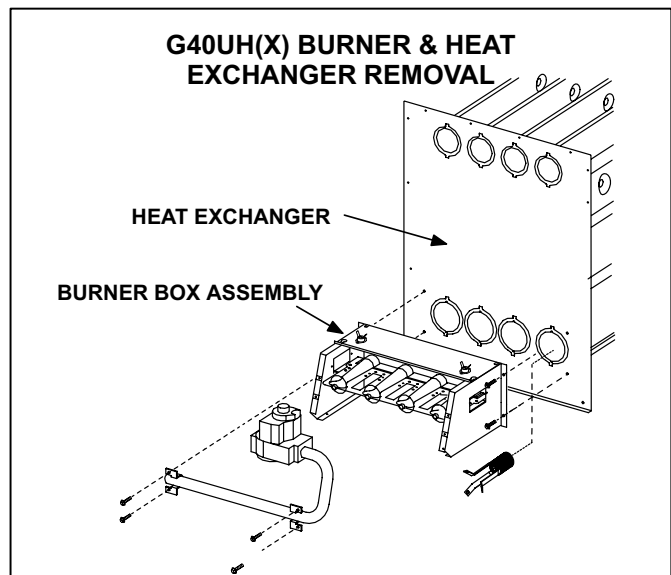


FIGURE 23

- 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 24.

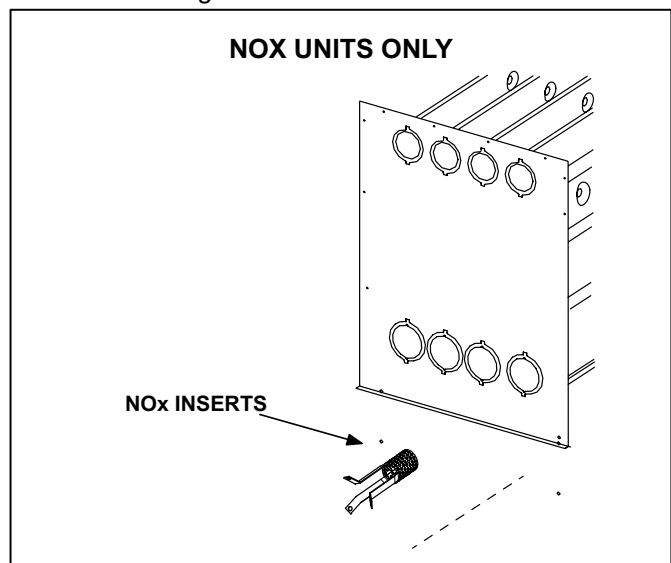


FIGURE 24

- 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. Damaged 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 NOX units, replace inserts in each heat exchanger section. **DO NOT BEND.**
- 15- Replace burner / manifold assembly onto vestibule panel.
- 16- Reconnect wires to pressure 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. Rinse piping after leak test has been completed. **Do not use matches, candles, flame or other sources of ignition to check for gas leaks.**
- 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 G40UH(X) series units are permanently lubricated and need no further lubrication.

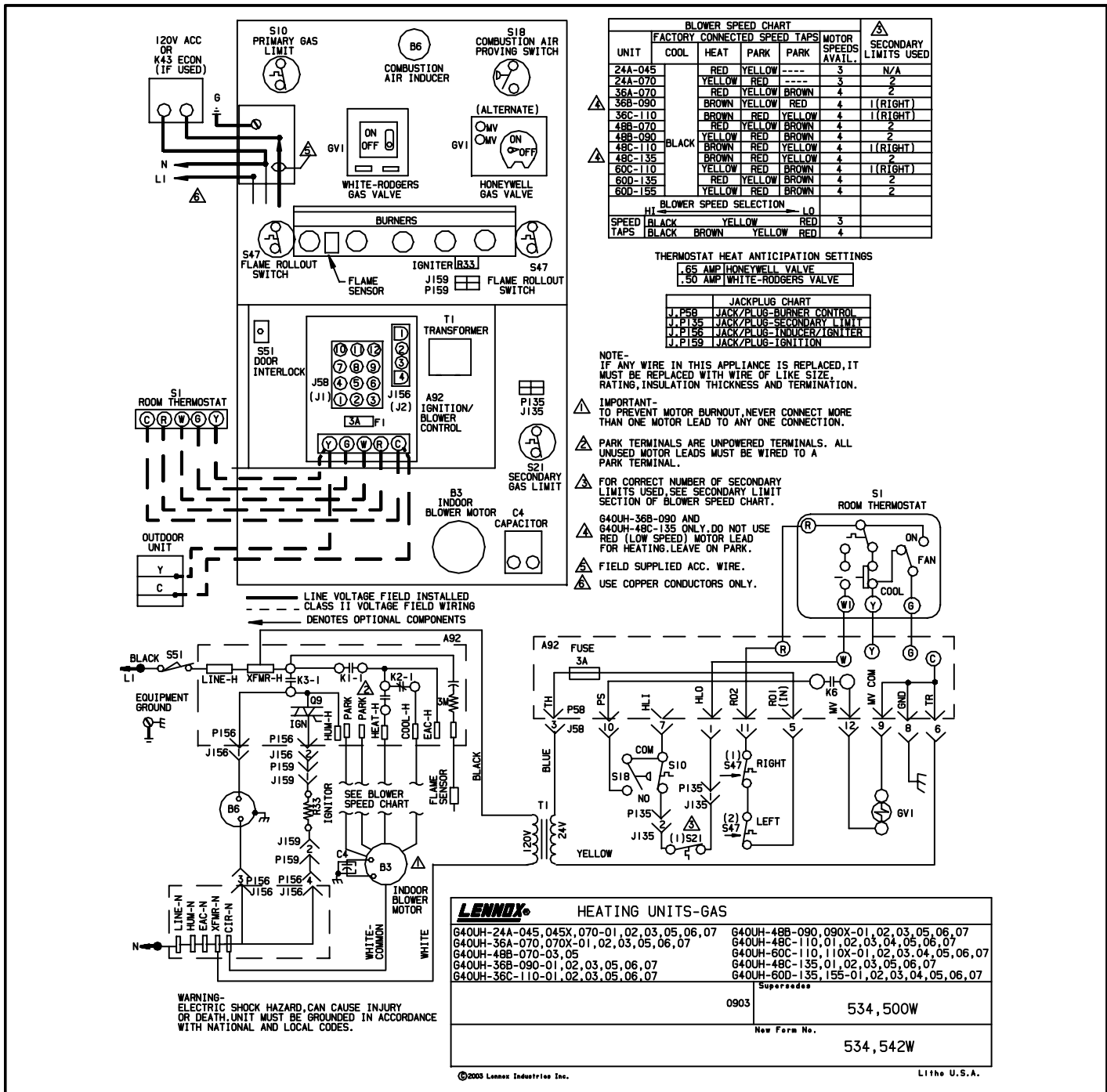
D-Flue and Chimney

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

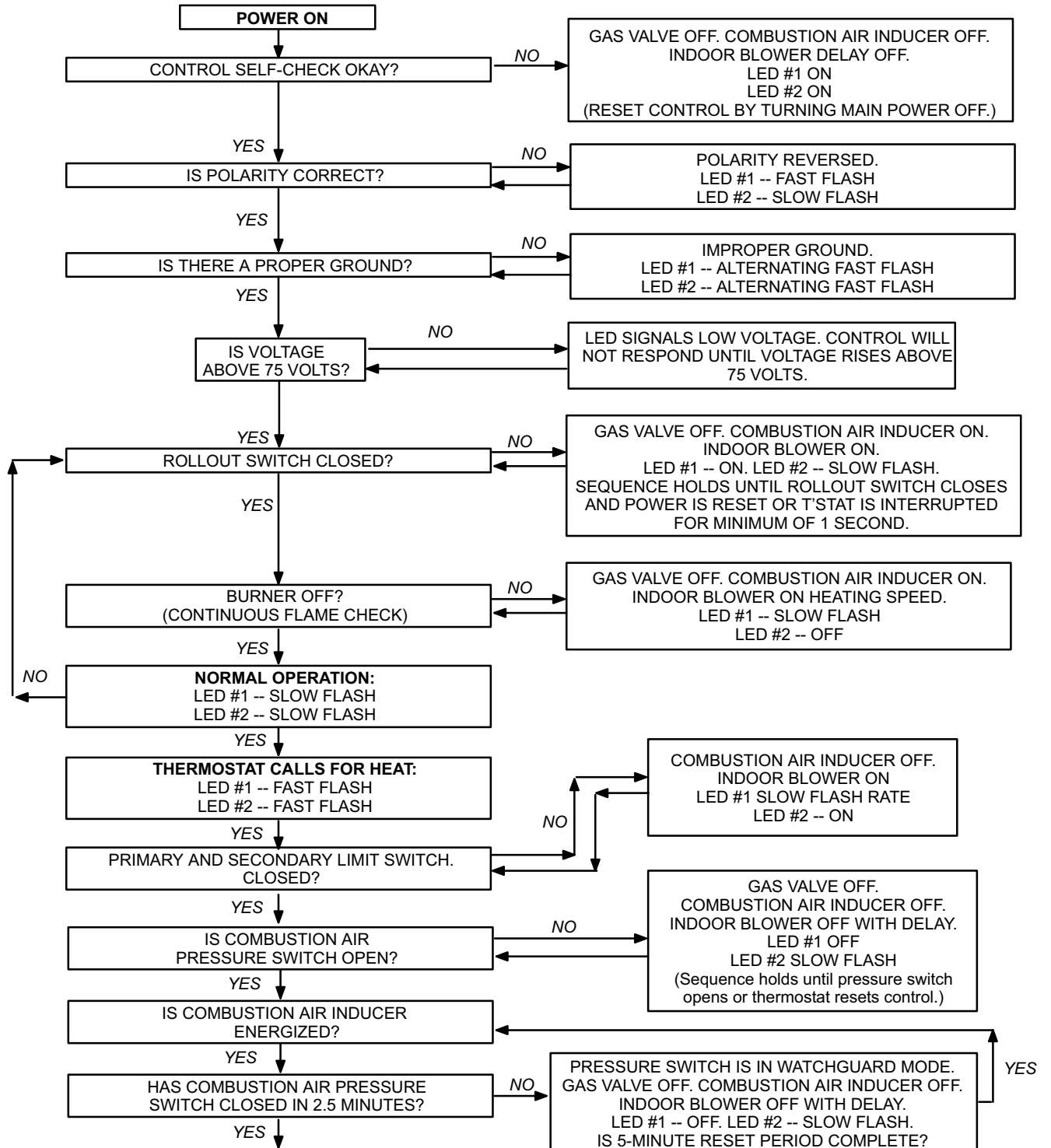


- When there is a call for heat, W1 of the thermostat energizes W of the furnace control with 24VAC.
- S10 primary limit switch, S47 rollout switch and S21 secondary limit are closed. Call for heat can continue.
- SureLight control (A92) energizes combustion air inducer B6. Combustion air inducer runs 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.

HEATING SEQUENCE OF OPERATION

NORMAL HEATING MODE

ABNORMAL HEATING MODE

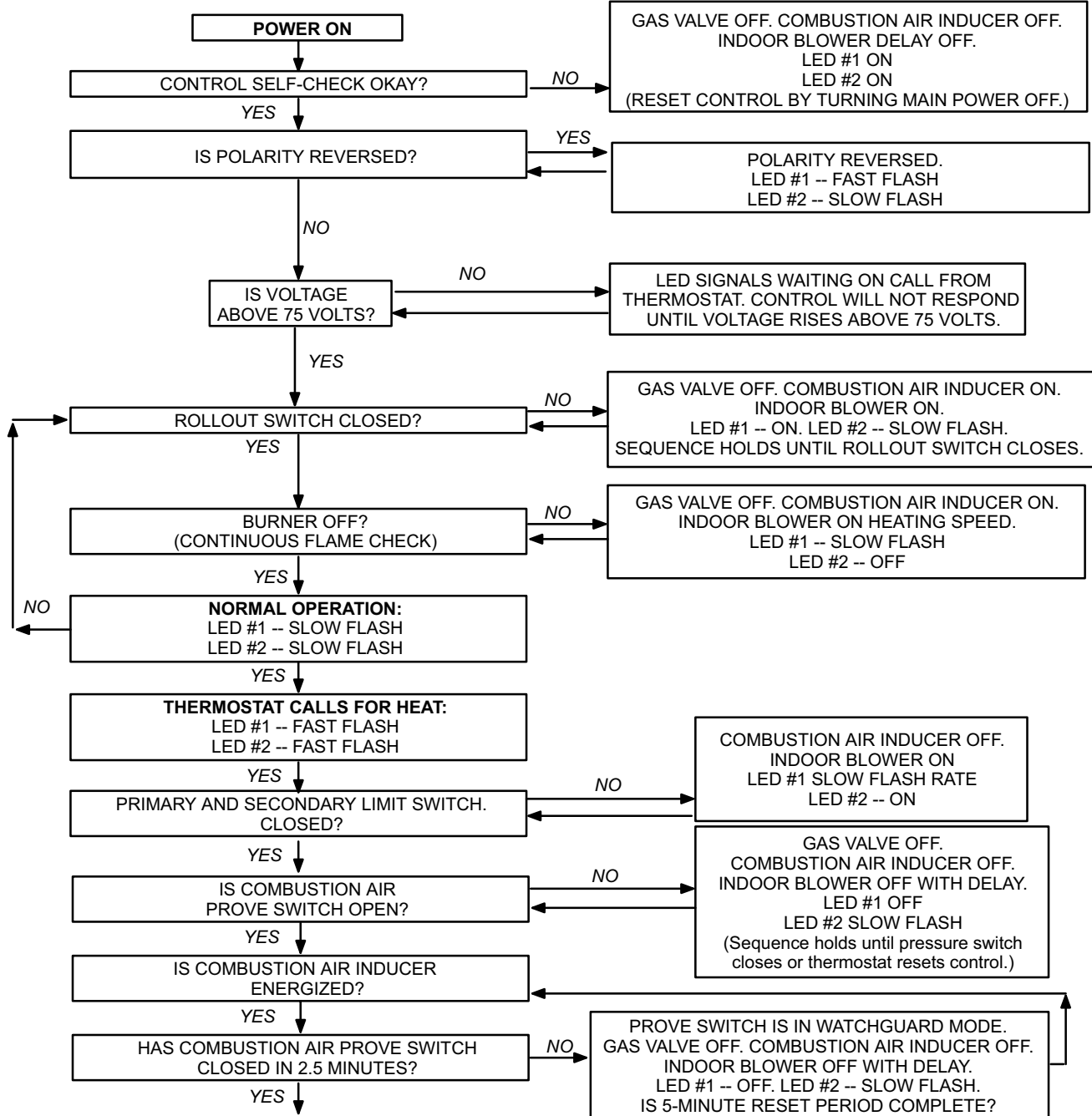


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HEATING SEQUENCE OF OPERATION

NORMAL HEATING MODE

ABNORMAL HEATING MODE

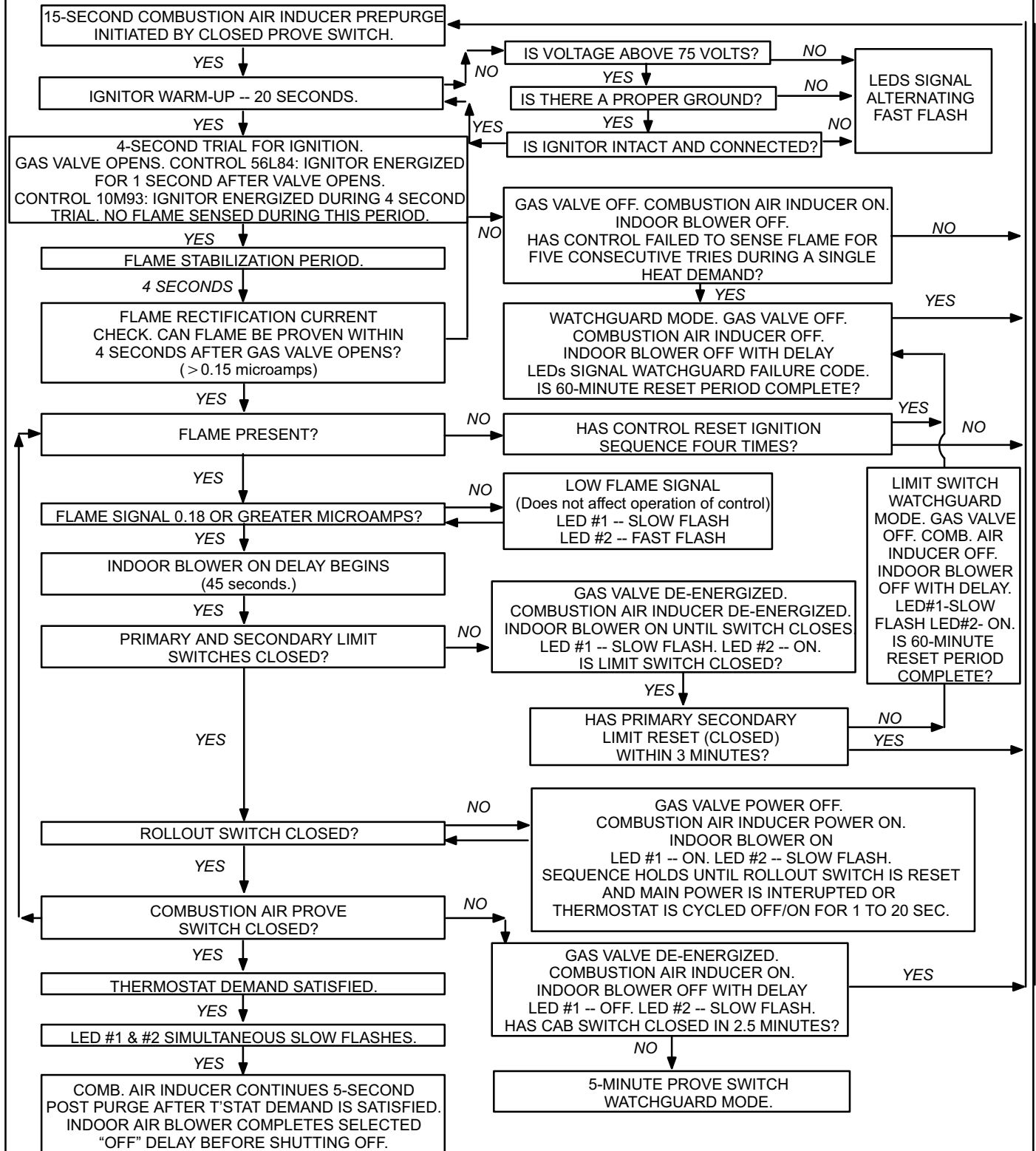


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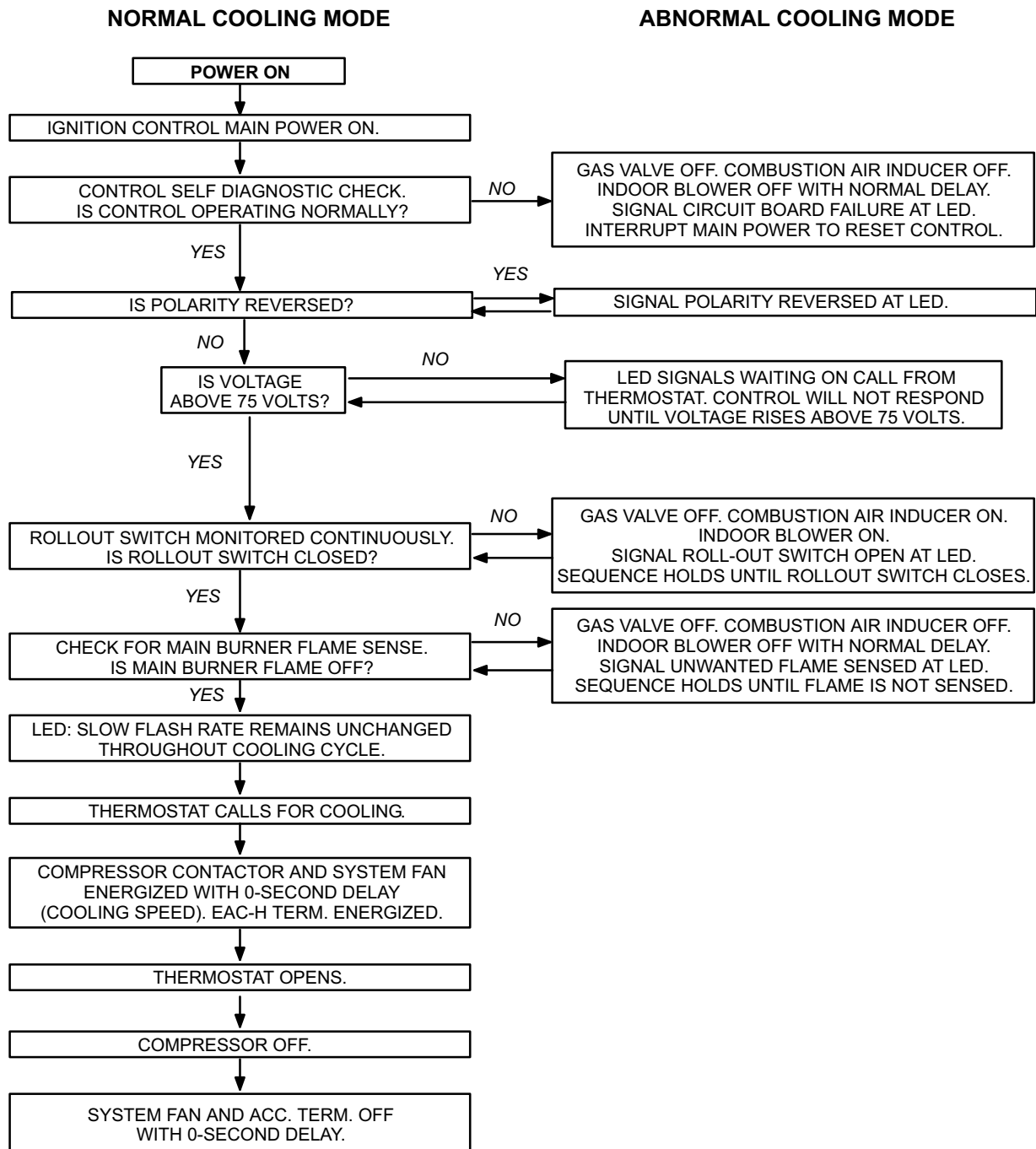
HEATING SEQUENCE CONTINUED

NORMAL HEATING MODE

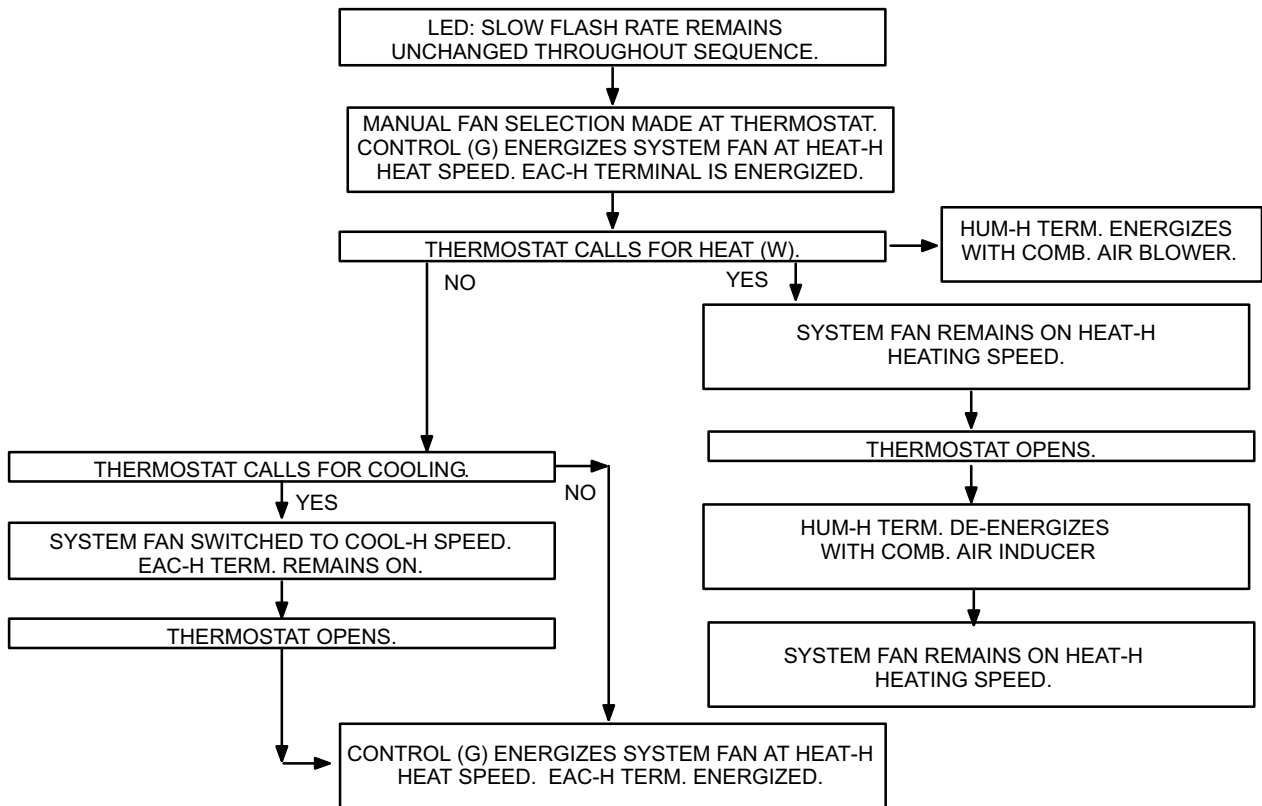
ABNORMAL HEATING MODE

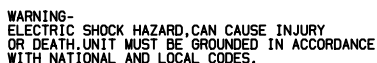


COOLING SEQUENCE OF OPERATION



CONTINUOUS HEAT SPEED FAN SEQUENCE OF OPERATION





5 FIELD SUPPLIED ACC. WIRE.
6 USE COPPER CONDUCTORS ONLY



640UH-24A-045, 045X-070	640UH-48B-090, 090X
640UH-36A-045, 070, 070X	640UH-48C-110
640UH-48B-070	640UH-60C-110, 110X
640UH-36B-090	640UH-48C-135
640UH-36C-110	640UH-60D-135, 155
0206	Supersedes 535, 136W
	New Form No. 535, 321W

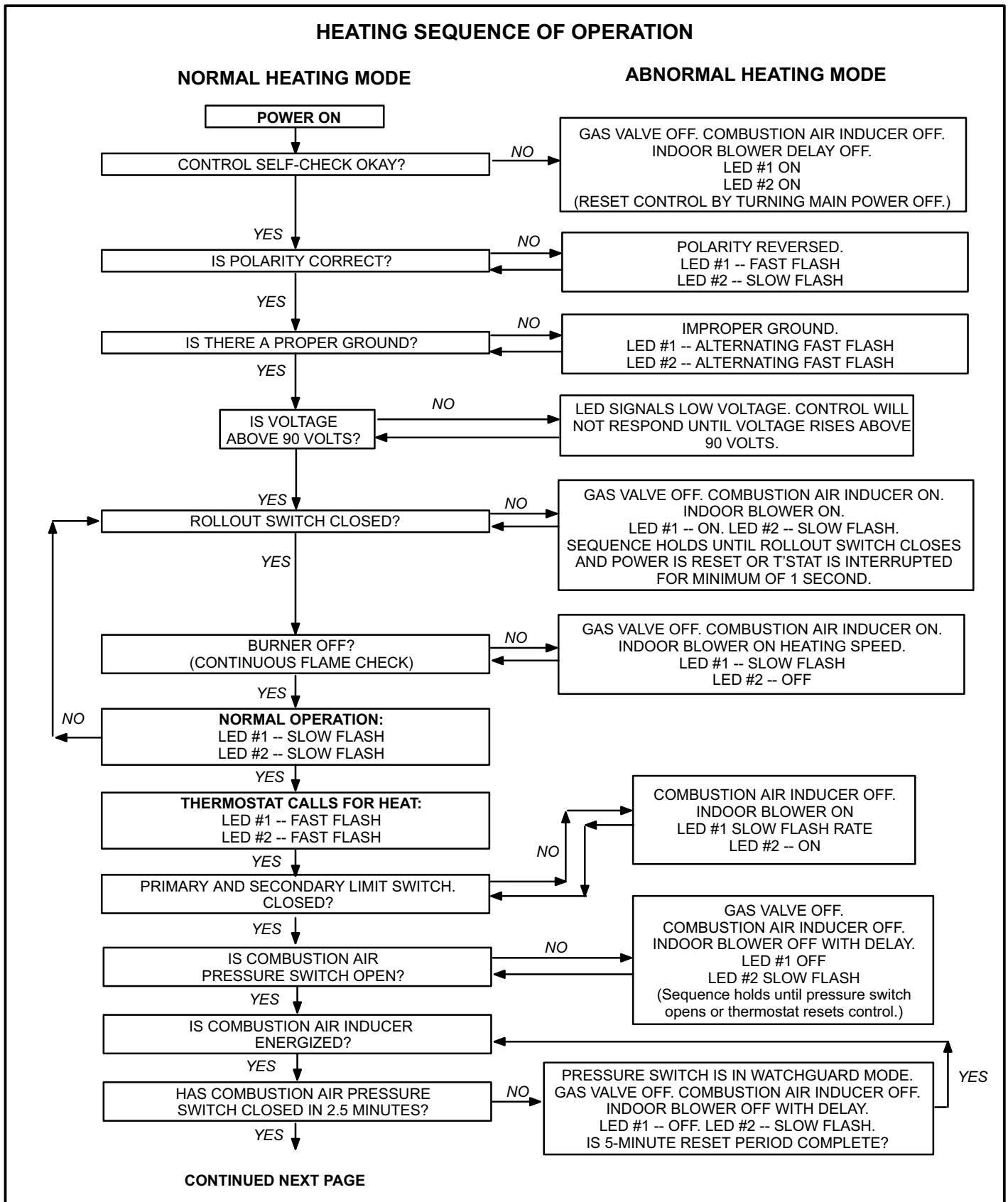
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Litho U.S.A.

- 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 - Ignition 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 - Ignition 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, ignition control (A92) energizes indoor blower B3.
- 8 - When heat demand is satisfied, W1 of the indoor thermostat de-energizes W of the ignition 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.

G40UH with Ignition Control 78M47 & 100973-01

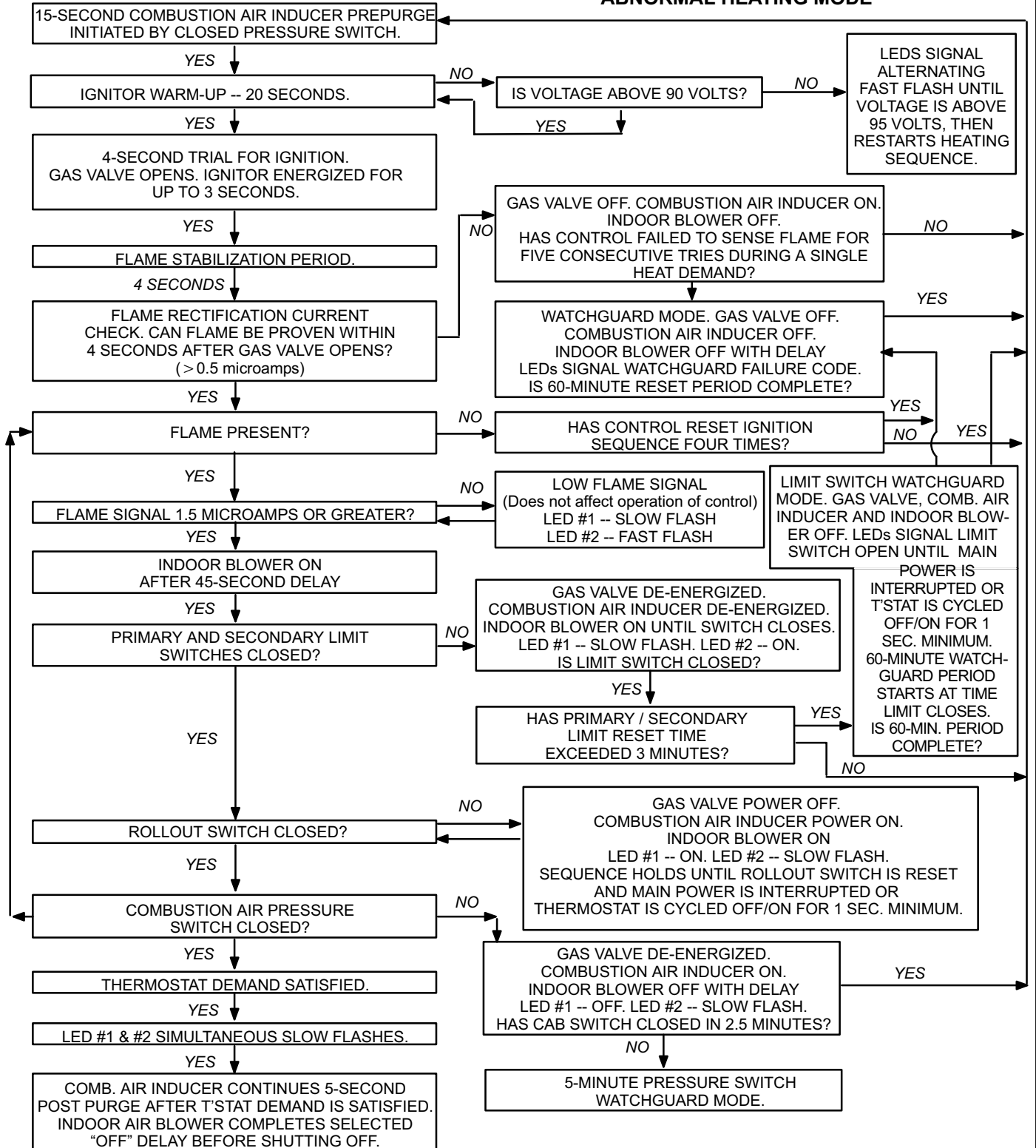
LED#1 = AN1 LED#2 = AN2



HEATING SEQUENCE CONTINUED

NORMAL HEATING MODE

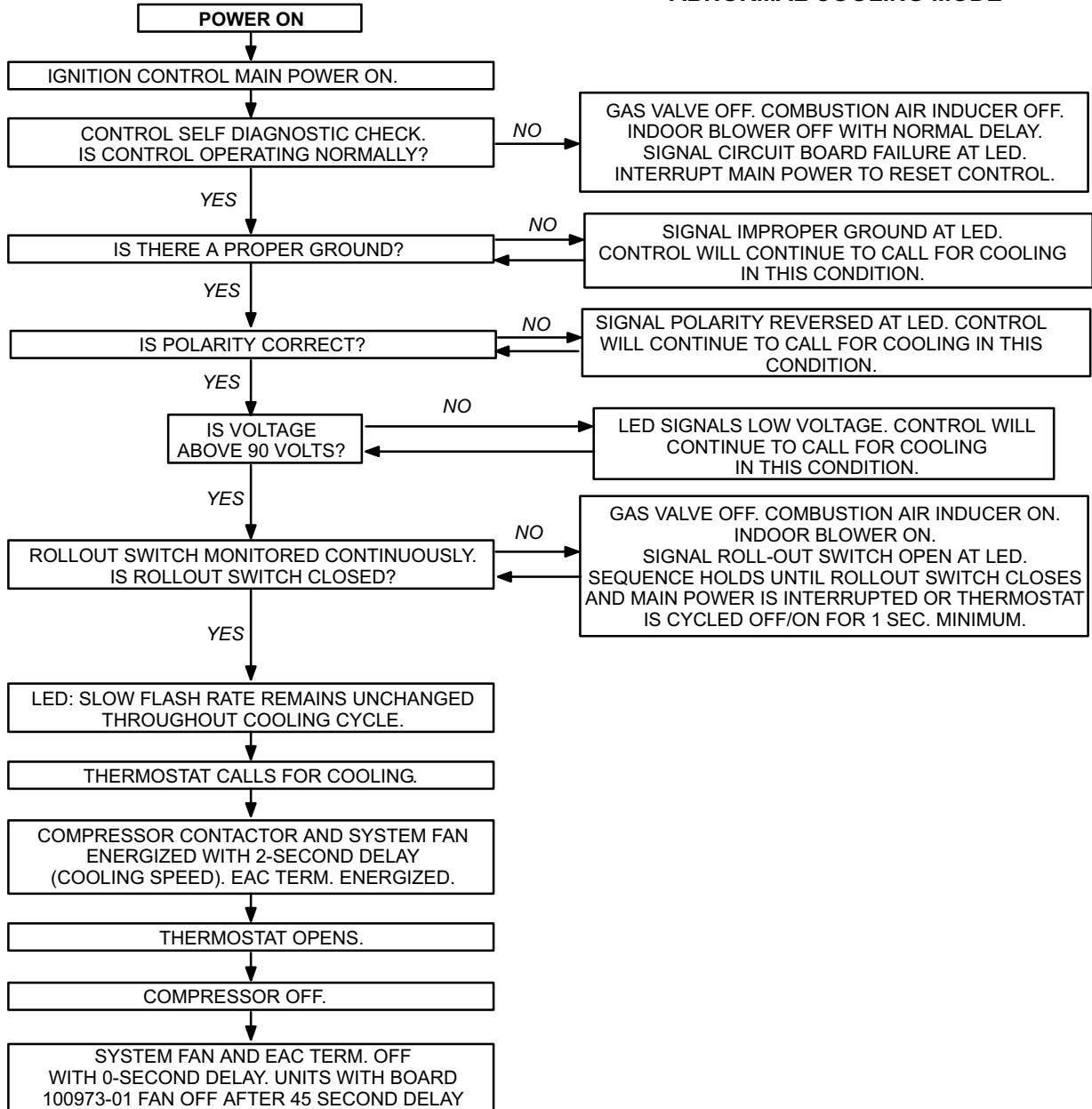
ABNORMAL HEATING MODE



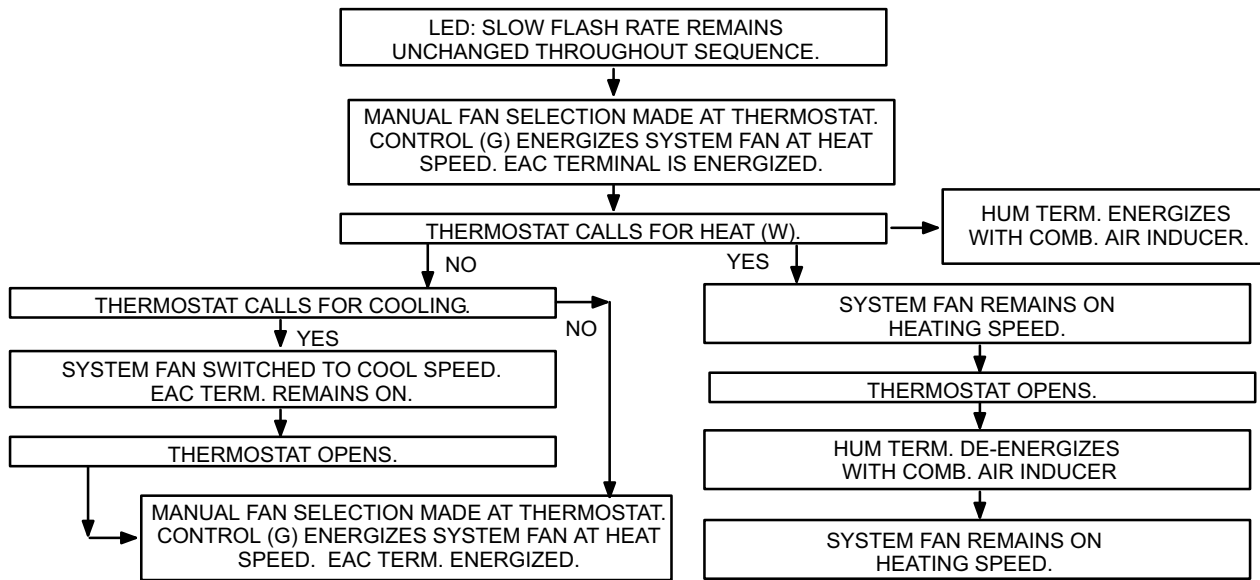
COOLING SEQUENCE OF OPERATION

NORMAL COOLING MODE

ABNORMAL COOLING MODE



CONTINUOUS HEAT SPEED FAN SEQUENCE OF OPERATION



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
1.1 - Both diagnostic lights fail to light up. LED#1-Off LED#2-Off	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 Blown fuse	ACTION 1 - Replace fuse. ACTION 2 - If fuse still blows, 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.
1.2 - Diagnostic lights flash the roll-out code. LED#1-On, LED#2-Slow Flash	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.
1.3 - On initial power-up the comb. air inducer does not energize. - Diagnostic lights flash the reverse polarity code. LED#1-Fast Flash, LED#2-Slow Flash.	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.
1.4 - On initial power up the combustion air inducer does not energize. - Diagnostic lights flash normal power on operation. LED#1-Slow Flash LED#2-Slow Flash	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
1.5 - Diagnostic lights flash the improper main ground. LED#1-Alternating Fast Flash LED#2-Alternating Fast Flash	1.5.1 Improper ground to the unit.	ACTION 1 - Check that the unit is properly ground. ACTION 2 - Install a proper main ground to the unit
	1.5.2 120 volt Pin connector is improperly attached to the circuit board.	ACTION 1 - Check 4-pin connector for proper installation. Correctly insert connector into control.
	1.5.3 Line voltage is below 75V. (-1 through -8 units) Line voltage is below 90V. (-9 and later units)	ACTION 1 - Check that the line voltage is above 75V. Determine cause of voltage drop and supply correct voltage to the control.
	1.5.4 Open ignitor circuit. (-1 through -8 units)	ACTION 1 - Check for correct wiring and loose connections in the ignitor circuit. Check multi-plug connections for correct installation.
	1.5.5 Broken or failed ignitor. (-1 through -8 units)	ACTION 1 - Unplug ignitor and read resistance across ignitor. If resistance does not read between 10.9 and 19.7 ohms, replace the ignitor.
PROBLEM 2: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER DOES NOT ENERGIZE		
Condition	Possible Cause	Corrective Action / Comments
2.1 - 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. LED#1-Slow Flash, LED#2-On	2.1.1 Primary or secondary (if equipped) limit open.	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.
	2.1.2 Miswiring of furnace or improper connections at limit switch(es).	ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.
2.2 - 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. LED#1-Off, LED#2-Slow Flash	2.2.1 Miswiring of furnace or improper connections to combustion air inducer.	ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.
	2.2.2 Prove switch stuck closed.	ACTION 1 - Check that the prove switch is open without the combustion air inducer operating. Replace if defective.

PROBLEM 2: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR INDUCER DOES NOT ENERGIZE (CONT.).

Condition	Possible Cause	Corrective Action/Comments
2.3 - 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. LED#1-Off, LED#2-Slow Flash	2.3.1 Miswiring of furnace or improper connections to combustion air inducer.	ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.
	2.3.2 Combustion air inducer failure.	ACTION 1 - If there is 120V to combustion air inducer and it does not operate, replace combustion air inducer.

PROBLEM 3: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER ENERGIZES, IGNITOR IS NOT ENERGIZED.

Condition	Possible Cause	Corrective Action/Comments
3.1 - 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. LED#1-Off LED#2-Slow Flash	3.1.1 Prove switch does not close due to incorrect routing of the prove switch lines.	ACTION 1 - Check that the prove switch lines are correctly routed. Correctly route prove switch lines.
	3.1.2 Prove switch does not close due to obstructions in the pressure lines.	ACTION 1 - Remove any obstructions from the the pressure lines and/or taps.
	3.1.3 Prove switch lines damaged	ACTION 1 - Check prove switch lines for leaks. Replace any broken lines.
	3.1.4 Condensate in prove switch line.	ACTION 1 - Check prove switch lines for condensate. Remove condensate from lines.
	3.1.5 Prove switch does not close due to a low differential pressure across the prove switch.	ACTION 1 - Check the differential pressure across the prove switch. This pressure should exceed the set point listed on the switch. ACTION 2 - Check for restricted inlet vent. Remove all blockage. ACTION 3 - Check for proper vent sizing and run length. See installation instructions.
	3.1.6 Wrong prove switch installed in the unit, or prove switch is out of calibration.	ACTION 1 - Check that the proper prove switch is installed in the unit. Replace prove switch if necessary.
	3.1.7 Miswiring of furnace or improper connections at prove switch.	ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.
	3.1.8 Prove switch failure.	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.

PROBLEM 4: UNIT FAILS TO FIRE IN THE HEATING MODE, COMBUSTION AIR BLOWER ENERGIZES, IGNITOR IS ENERGIZED.		
Condition	Possible Cause	Corrective Action/Comments
4.1 - Unit operates with a cooling and continuous fan demand. - Combustion air inducer energizes with Heating demand. - Ignitor is energized but unit fails to light. LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash	4.1.1 Check that gas is being supplied to the unit.	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.
	4.1.2 Miswiring of gas valve or loose connections at multi-pin control amp plugs or valve.	ACTION 1 - Check for correct wiring and loose connections. Correct wiring and/or replace any loose connections.
	4.1.3 Defective gas valve or ignition control.	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.
PROBLEM 5: BURNERS LIGHT WITH A HEATING DEMAND BUT UNIT SHUTS DOWN PREMATURELY		
Condition	Possible Cause	Corrective Action/Comments
5.1 - 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. LED#1-Off LED#2-Slow Flash	5.1.1 Low pressure differential at the prove switch.	ACTION 1 - Check for restricted exhaust vent. Remove all blockage. ACTION 2: Check for proper vent sizing. See installation instructions.
5.2 - 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. LED#1-Alternating Slow Flash LED#2-Alternating Slow Flash	5.2.1 Sensor or sensor wire is improperly installed.	ACTION 1 - Check that sensor is properly located and that the sense wire is properly attached to both the sensor and the control.
	5.2.2 Sensor or sensor wire is broken.	ACTION 1 - Check for a broken sensor. ACTION 2 - Test continuity across the sense wire. If wire or sensor are damaged replace the component.
	5.2.3 Sensor or sensor wire is grounded to the unit.	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.
	5.2.4 Control does not sense flame.	ACTION 1 - Check the microamp signal from the burner flame. If the microamp signal is below normal microamps, check the sensor rod for proper location or contamination. ACTION 2 - Replace, clean, or relocate flame sensor 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 sensor rod. ACTION 3 - Check that there is proper ground to burner box. Repair as necessary.

**PROBLEM 5: BURNERS LIGHT WITH HEATING DEMAND BUT UNIT SHUTS DOWN
PREMATURELY (CONT.)**

Condition	Possible Cause	Corrective Action/Comments
<p align="center">5.3</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">5.3.1</p> <p>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">5.3.2</p> <p>Gas orifices leak at the manifold connection.</p>	<p>ACTION 1 - Tighten orifice until leak is sealed.</p> <p>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">5.3.3</p> <p>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.</p>
	<p align="center">5.3.4</p> <p>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">5.4</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">5.4.1</p> <p>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">5.4.2</p> <p>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">5.4.3</p> <p>Burrs in gas orifices</p>	<p>ACTION 1 - Remove gas orifices and inspect. Remove any burrs that are present or replace orifice.</p>
	<p align="center">5.4.4</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>
<p align="center">5.5</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 align="center">5.5.1</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 align="center">5.5.2</p> <p>Poor ground to burner box</p>	<p>ACTION 1 - Check for proper ground and repair as necessary.</p>

PROBLEM 6: CONTROL SIGNALS LOW FLAME SENSE DURING HEATING MODE		
Condition	Possible Cause	Corrective Action/Comments
6.0 - Unit operates correctly but the diagnostic lights flash low flame sense code. LED#1-Slow Flash LED#2-Fast Flash	6.1.1 Sensor rod is improperly located on the burner.	ACTION 1 - Check the sensor rod for proper location on the burner. Properly locate the sensor rod or replace if rod cannot be located correctly.
	6.1.2 Sensor rod is contaminated.	ACTION 1 - Check sensor rod for contamination or coated surface. Clean the sensor rod with steel wool or replace sensor. DO NOT USE SAND PAPER TO CLEAN ROD. SAND PAPER WILL CONTRIBUTE TO THE CONTAMINATION PROBLEM.
PROBLEM 7: INDOOR BLOWER FAILS TO OPERATE IN COOLING, HEATING, OR CONTINUOUS FAN MODE		
Condition	Possible Cause	Corrective Action/Comments
7.0 - Indoor blower fails to operate in continuous fan, cooling, or heating mode.	7.1.1 Miswiring of furnace or improper connections at control or indoor blower motor.	ACTION 1 - Correct wiring and/or replace any loose connections. Check for correct wiring and loose connections.
	7.1.2 120V is not being supplied to the indoor air blower or blower motor failure.	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.
	7.1.3 Defective control board	ACTION 1 - If there is not 120V when "Y", "G", or "W" is energized, replace the control.
	7.1.4 Defective run capacitor	ACTION 1 - Replace capacitor
PROBLEM 8: RF STATIC DURING TIME FOR IGNITION		
Condition	Possible Cause	Corrective Action/Comments
8.0 - AM radio interference.	8.1.2 Ignitor operation	ACTION 1 - Call Technical Support, Dallas.