Service Facts

OIL FIRED CENTRAL FURNACE with Variable Speed blower

THV1M087A9V3 - 9V5SA, TLF1M087A9V3 - 9V5SA TLR1M087A9V3 - 9V5SA, TDF1M087A9V3 - 9V5SA

IMPORTANT — This document contains a wiring diagram and service information. This is customer property and is to remain with this furnace. Please return to service information pack upon completion of work.

⚠ WARNING DISCONNECT POWER BEFORE SERVICING

Oil Fired Furnace Specifications												
Model	**THV1M087A9V3 & 9V5SA**				**TLF1M087A9V3 & 9V5SA TLR1M087A9V3 & 9V5SA**				**TDF1M087A9V3 & 9V5SA**			
Type	**Upflow - Highboy**				**Upflow - Lowboy**				**Downflow - Horizontal**			
Heat input Rate (BTUH):	140,000	119,000	105,000	84,000	140,000	119,000	105,000	84,000	140,000	119,000	105,000	84,000
Heating Capacity (BTUH): [1]	114,000	98,000	88,000	70,000	114,000	98,000	87,000	70,000	114,000	98,000	87,000	70,000
Nominal Temperature Rise (deg. F):	**70**				**70**				**70**			
Minimum AFUE (I.C.S.) Rating (%):	**THV1M087A9V3SA - 84.3% THV1M087A9V5SA - 84.3%**				**TLF1M087A9V3SA - 83.4.0% TLF1M087A9V5SA - 83.4% TLR1M087A9V3SA - 84.2% TLR1M087A9V5SA - 84.2%**				**TDF1M087A9V3SA - 83.3% TDF1M087A9V5SA - 83.3%**			
Burner Specifications:	**R.W. Beckett Pressure Atomizing Type, Model AF**				**R.W. Beckett Pressure Atomizing Type, Model AF**				**R.W. Beckett Pressure Atomizing Type, Model AF**			
Air Tube Length (in.):	**5.875, Effective**				**5.875, Effective**				**5.875, Effective**			
Burner Head Type:	**Fixed, Flame Retention**				**Fixed, Flame Retention**				**Fixed, Flame Retention**			
Fuel Type:	**# 2 Distillate (Domestic Heating Oil)**				**# 2 Distillate (Domestic Heating Oil)**				**# 2 Distillate (Domestic Heating Oil)**			
Nozzle Rating For Beckett AF (GPH):	1.00	0.85	0.75	0.60	1.00	0.85	0.75	0.60	1.00	0.85	0.75	0.60
Spray Angle (deg.):	**80**				**80**				**80**			
Spray Pattern:	**Hollow**				**Hollow**				**Hollow**			
Oil Pump Pressure (PSIG):	**130**				**130**				**130**			
Ignition Control Type:	**Interrupted, Direct Spark**				**Interrupted, Direct Spark**				**Interrupted, Direct Spark**			
Delay valve on / Post Purge Feature:	**Yes / no**				**Yes / no**				**Yes / no**			
Automatic Oil Solenoid Valve:	**Yes**				**Yes**				**Yes**			
Blower Drive:	**Direct**				**Direct**				**Direct**			
	THV1M087A9V3SA		**THV1M087A9V5SA**		**TLF1M087A9V3SA TLR1M087A9V3SA**		**TLF1M087A9V5SA TLR1M087A9V5SA**		**TDF1M087A9V3SA**		**TDF1M087A9V5SA**	
Diameter x Width (in.):	**10 x 9**		**12 x 9**		**10 x 9**		**11 x 9**		**10 x 9**		**12 x 9**	
No. Used:	**1**		**1**		**1**		**1**		**1**		**1**	
Speeds (no.):	**Variable**		**Variable**		**Variable**		**Variable**		**Variable**		**Variable**	
CFM vs in. w.c.:	**See Fan Performance Table**				**See Fan Performance Table**				**See Fan Performance Table**			
Motor HP:	**1/2**		**1**		**1/2**		**1**		**1/2**		**1**	
Volts / Ph. / Hz.:	**120 / 60 / 1**				**120 / 60 / 1**				**120 / 60 / 1**			
Filter Furnished?:	**Yes**				**Yes**				**No**			
Type Recommended:	**Hi Velocity**				**Hi Velocity**				**Hi Velocity**			
No. - Size x Thick:	**1 - 16 x 25 x 1**				**2 - 10 x 20 x 1**				**Not Supplied**			
Vent - Size (in.):	**6**				**6**				**6**			
Gross Heat Exchanger Area (sq. ft.):	**27.8**				**27.8 (Front Flue) / 30.0 (Rear Flue)**				**27.8**			
Suply / Return Size (in. x in.):	**See Outline Drawing**				**See Outline Drawing**				**See Outline Drawing**			
Combustion Chamber Type:	**Preformed, Refactory (Ceramic Fiber Matrix Material)**				**Preformed, Refactory (Ceramic Fiber Matrix Material)**				**Preformed, Refactory (Ceramic Fiber Matrix Material)**			
Total Current (amps.):	**13.5**		**18.8**		**13.5**		**18.8**		**13.5**		**18.8**	
Max. Fuse Size (amps.):	**15**		**30**		**15**		**30**		**15**		**30**	
Dimensions uncrated (in.):	**H X W X D 58 X 22.25 X 31**				**H X W X D 41.5 X 22.25 X 47**				**H X W X D 22.25 X 61.25 X 22.25**			
Weight Shipping (lbs.) / Net (lbs.)	**260 / 250**				**300 / 290**				**280 / 270**			
[1] Lowest heating capacity represented, refer to AHRI directory for actual heating capacity.												

TLR/F1M087A9V3SA OIL FURNACE COOLING AND HEATING AIRFLOW AND POWER VS. EXTERNAL STATIC PRESSURE WITH FILTER

	OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE				
			SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9
COOLING	3.5	Low (350 CFM/TON)	OFF	OFF	OFF	ON	CFM	1093	1120	1120	1113	1091
							WATTS	183	267	340	413	471
		Normal (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM	1254	1296	1296	1284	1244
							WATTS	262	382	467	552	608
		High (450 CFM/TON)	OFF	OFF	ON	OFF	CFM	1259	1300	1306	1298	1250
							WATTS	271	375	472	557	609
	3**	Low (350 CFM/TON)	ON	OFF	OFF	ON	CFM	940	919	900	881	862
							WATTS	154	207	254	310	371
		Normal** (400 CFM/TON)	ON	OFF	OFF	OFF	CFM	1057	1060	1049	1037	1015
							WATTS	213	291	352	409	468
		High (450 CFM/TON)	ON	OFF	ON	OFF	CFM	1217	1211	1196	1179	1151
							WATTS	300	387	461	525	582
	2.5	Low (350 CFM/TON)	OFF	ON	OFF	ON	CFM	788	775	761	714	674
							WATTS	104	152	197	239	284
		Normal (400 CFM/TON)	OFF	ON	OFF	OFF	CFM	904	880	868	840	818
							WATTS	145	194	240	290	348
		High (450 CFM/TON)	OFF	ON	ON	OFF	CFM	1007	1001	987	978	962
							WATTS	181	248	302	357	417
	2	Low (350 CFM/TON)	ON	ON	OFF	ON	CFM	634	607	585	542	493
							WATTS	67	99	142	181	218
		Normal (400 CFM/TON)	ON	ON	OFF	OFF	CFM	541	682	808	929	1030
							WATTS	85	127	173	218	260
		High (450 CFM/TON)	ON	ON	ON	OFF	CFM	817	805	792	748	710
							WATTS	113	162	206	249	300

	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE				
		SW 7	SW 8		0.1	0.3	0.5	0.7	0.9
HEATING	LOW (920 CFM)	ON	ON	CFM	804	791	792	780	761
				WATTS	100	146	198	256	307
	MEDIUM LOW (1145 CFM)	OFF	ON	CFM	985	991	988	987	964
				WATTS	146	221	283	346	393
	MEDIUM HIGH** (1290 CFM)	ON	OFF	CFM	1107	1111	1127	1129	1122
				WATTS	192	272	355	428	498
	HIGH (1500 CFM)	OFF	OFF	CFM	1293	1330	1332	1324	1319
				WATTS	291	407	495	582	661

NOTES:
1. **FACTORY SETTING.
2. CONTINUOUS FAN SETTING: HEATING OR COOLING AIRFLOW IS APPROXIMATELY 50% OF SELECTED COOLING VALUE.
3. FOR VARIABLE SPEED: LOW SPEED AIRFLOWS ARE APPROXIMATELY 30% OF LISTED VALUES.
4. LOW 350 CFM/TON IS RECOMMENDED FOR VARIABLE SPEED APPLICATION FOR COMFORT & HUMID CLIMATE SETTING: NORMAL IS 400 CFM/TON: HIGH 450 CFM/TON IS FOR DRY CLIMATE SETTING.

TLR/F1M087A9V5SA OIL FURNACE COOLING AND HEATING AIRFLOW AND POWER VS. EXTERNAL STATIC PRESSURE WITH FILTER

	OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE				
			SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9
COOLING	5**	Low (350 CFM/TON)	OFF	OFF	OFF	ON	CFM	1539	1548	1533	1527	1525
							WATTS	438	573	674	761	866
		Normal ** (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM	1756	1759	1766	1740	1722
							WATTS	635	790	970	1055	1180
		High (450 CFM/TON)	OFF	OFF	ON	OFF	CFM	1948	1958	1927	1852	1780
							WATTS	870	1063	1215	1240	1255
	4	Low (350 CFM/TON)	ON	OFF	OFF	ON	CFM	1198	1216	1223	1223	1221
							WATTS	237	322	403	493	565
		Normal (400 CFM/TON)	ON	OFF	OFF	OFF	CFM	1396	1434	1425	1401	1406
							WATTS	339	464	565	631	741
		High (450 CFM/TON)	ON	OFF	ON	OFF	CFM	1572	1577	1570	1574	1575
							WATTS	467	588	708	816	922
	3.5	Low (350 CFM/TON)	OFF	ON	OFF	ON	CFM	1056	1053	1047	1048	1046
							WATTS	172	251	304	375	445
		Normal (400 CFM/TON)	OFF	ON	OFF	OFF	CFM	1200	1216	1237	1231	1226
							WATTS	232	326	425	494	575
		High (450 CFM/TON)	OFF	ON	ON	OFF	CFM	1363	1407	1405	1388	1381
							WATTS	317	449	552	625	712
	2.5	Low (350 CFM/TON)	ON	ON	OFF	ON	CFM	774	754	741	728	705
							WATTS	95	138	183	233	289
		Normal (400 CFM/TON)	ON	ON	OFF	OFF	CFM	863	875	861	859	826
							WATTS	111	177	228	284	334
		High (450 CFM/TON)	ON	ON	ON	OFF	CFM	962	971	969	951	935
							WATTS	140	208	270	320	383

	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE				
		SW 7	SW 8		0.1	0.3	0.5	0.7	0.9
HEATING	LOW (920 CFM)	ON	ON	CFM	804	791	792	780	761
				WATTS	100	146	198	256	307
	MEDIUM LOW (1145 CFM)	OFF	ON	CFM	985	991	988	987	964
				WATTS	146	221	283	346	393
	MEDIUM HIGH ** (1290 CFM)	ON	OFF	CFM	1107	1111	1127	1129	1122
				WATTS	192	272	355	428	498
	HIGH (1500 CFM)	OFF	OFF	CFM	1293	1330	1332	1324	1319
				WATTS	291	407	495	582	661

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THV1M087A9V3SA OIL FURNACE COOLING AND HEATING AIRFLOW AND POWER VS. EXTERNAL STATIC PRESSURE WITH FILTER

	OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE				
			SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9
COOLING	3.5	Low (350 CFM/TON)	OFF	OFF	OFF	ON	CFM	1127	1147	1148	1138	1117
							WATTS	229	295	356	413	470
		Normal (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM	1278	1293	1297	1293	1272
							WATTS	321	398	469	536	597
		High (450 CFM/TON)	OFF	OFF	ON	OFF	CFM	1301	1320	1323	1315	1287
							WATTS	336	419	493	558	611
	3**	Low (350 CFM/TON)	ON	OFF	OFF	ON	CFM	969	993	1004	997	968
							WATTS	152	213	272	329	377
		Normal ** (400 CFM/TON)	ON	OFF	OFF	OFF	CFM	1132	1145	1147	1136	1106
							WATTS	225	289	350	405	460
		High (450 CFM/TON)	ON	OFF	ON	OFF	CFM	1264	1253	1270	1260	1241
							WATTS	308	369	441	502	562
	2.5	Low (350 CFM/TON)	OFF	ON	OFF	ON	CFM	802	836	829	802	789
							WATTS	98	150	199	238	280
		Normal (400 CFM/TON)	OFF	ON	OFF	OFF	CFM	910	942	949	941	918
							WATTS	132	189	244	300	346
		High (450 CFM/TON)	OFF	ON	ON	OFF	CFM	1048	1077	1083	1072	1041
							WATTS	185	251	311	368	419
	2	Low (350 CFM/TON)	ON	ON	OFF	ON	CFM	669	677	669	663	642
							WATTS	67	107	146	184	220
		Normal (400 CFM/TON)	ON	ON	OFF	OFF	CFM	749	781	772	751	731
							WATTS	85	134	179	217	254
		High (450 CFM/TON)	ON	ON	ON	OFF	CFM	837	868	862	841	829
							WATTS	111	162	211	255	300

	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE				
		SW 7	SW 8		0.1	0.3	0.5	0.7	0.9
HEATING	LOW	ON	ON	CFM	857	882	883	858	843
				WATTS	115	167	219	263	307
	MEDIUM LOW	OFF	ON	CFM	1061	1086	1092	1080	1051
				WATTS	196	261	321	378	430
	MEDIUM HIGH **	ON	OFF	CFM	1198	1205	1197	1193	1172
				WATTS	272	337	395	458	517
	HIGH	OFF	OFF	CFM	1280	1295	1297	1287	1265
				WATTS	330	407	476	538	596

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4. LOW 350 CFM/TON IS RECOMMENDED FOR VARIABLE SPEED APPLICATION FOR COMFORT & HUMID CLIMATE SETTING: NORMAL IS 400 CFM/TON: HIGH 450 CFM/TON IS FOR DRY CLIMATE SETTING.

THV1M087A9V5SA OIL FURNACE COOLING AND HEATING AIRFLOW AND POWER VS. EXTERNAL STATIC PRESSURE WITH FILTER

	OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE				
			SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9
COOLING	5**	Low (350 CFM/TON)	OFF	OFF	OFF	ON	CFM	1609	1616	1620	1623	1632
							WATTS	543	642	737	836	936
		Normal ** (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM	1841	1835	1820	1807	1779
							WATTS	818	925	1020	1110	1181
		High (450 CFM/TON)	OFF	OFF	ON	OFF	CFM	2040	1978	1915	1864	1810
							WATTS	1142	1161	1178	1204.08	1215.44
	4	Low (350 CFM/TON)	ON	OFF	OFF	ON	CFM	1277	1296	1301	1314	1311
							WATTS	287	370	446	531	604
		Normal (400 CFM/TON)	ON	OFF	OFF	OFF	CFM	1494	1501	1504	1492	1493
							WATTS	440	530	615	690	776
		High (450 CFM/TON)	ON	OFF	ON	OFF	CFM	1661	1659	1657	1665	1657
							WATTS	595	689	782	890	979
	3.5	Low (350 CFM/TON)	OFF	ON	OFF	ON	CFM	1094	1103	1122	1125	1124
							WATTS	195	258	332	402	473
		Normal (400 CFM/TON)	OFF	ON	OFF	OFF	CFM	1277	1304	1305	1317	1312
							WATTS	288	374	449	532	606
		High (450 CFM/TON)	OFF	ON	ON	OFF	CFM	1477	1470	1470	1472	1461
							WATTS	428	504	586	673	745
	3	Low (350 CFM/TON)	ON	ON	OFF	ON	CFM	866	893	893	886	879
							WATTS	115	172	228	287	346
		Normal (400 CFM/TON)	ON	ON	OFF	OFF	CFM	1081	1096	1106	1104	1101
							WATTS	189	255	322	387	458
		High (450 CFM/TON)	ON	ON	ON	OFF	CFM	1213	1244	1269	1275	1266
							WATTS	253	340	425	500	573

	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE				
		SW 7	SW 8		0.1	0.3	0.5	0.7	0.9
HEATING	LOW	ON	ON	CFM	864	895	899	899	879
				WATTS	111	169	224	239	334
	MEDIUM LOW	OFF	ON	CFM	1052	1064	1059	1057	1061
				WATTS	174	238	296	359	431
	MEDIUM HIGH **	ON	OFF	CFM	1162	1185	1202	1205	1211
				WATTS	226	302	378	450	526
	HIGH	OFF	OFF	CFM	1377	1397	1396	1399	1401
				WATTS	353	445	520	604	688

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TDF1M087A9V3SA OIL FURNACE COOLING AND HEATING AIRFLOW AND POWER VS. EXTERNAL STATIC PRESSURE WITH FILTER

	OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE				
			SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9
COOLING	3.5	Low (350 CFM/TON)	OFF	OFF	OFF	ON	CFM	1215	1243	1235	1227	1211
							WATTS	232	303	371	442	507
		Normal (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM	1375	1389	1414	1417	1364
							WATTS	290	378	492	571	600
		High (450 CFM/TON)	OFF	OFF	ON	OFF	CFM	1375	1389	1414	1417	1364
							WATTS	290	378	492	571	600
	3**	Low (350 CFM/TON)	ON	OFF	OFF	ON	CFM	992	1048	1065	1068	1044
							WATTS	141	218	277	348	406
		Normal ** (400 CFM/TON)	ON	OFF	OFF	OFF	CFM	1173	1229	1235	1226	1206
							WATTS	189	288	358	438	498
		High (450 CFM/TON)	ON	OFF	ON	OFF	CFM	1358	1361	1375	1374	1340
							WATTS	295	353	452	548	607
	2.5	Low (350 CFM/TON)	OFF	ON	OFF	ON	CFM	836	879	872	863	839
							WATTS	81	148	197	254	313
		Normal (400 CFM/TON)	OFF	ON	OFF	OFF	CFM	938	1000	1006	1014	992
							WATTS	114	187	250	321	384
		High (450 CFM/TON)	OFF	ON	ON	OFF	CFM	1085	1135	1145	1148	1115
							WATTS	156	234	312	386	433
	2	Low (350 CFM/TON)	ON	ON	OFF	ON	CFM	690	705	699	677	649
							WATTS	65	107	155	198	235
		Normal (400 CFM/TON)	ON	ON	OFF	OFF	CFM	782	813	818	801	760
							WATTS	79	134	184	231	279
		High (450 CFM/TON)	ON	ON	ON	OFF	CFM	853	920	911	901	885
							WATTS	88	163	216	278	327

	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE				
		SW 7	SW 8		0.1	0.3	0.5	0.7	0.9
HEATING	LOW	ON	ON	CFM	864	913	919	910	892
				WATTS	94	161	220	281	337
	MEDIUM LOW	OFF	ON	CFM	1103	1148	1159	1151	1117
				WATTS	175	253	324	404	462
	MEDIUM HIGH **	ON	OFF	CFM	1267	1292	1298	1301	1289
				WATTS	245	329	417	489	553
	HIGH	OFF	OFF	CFM	1375	1389	1414	1417	1364
				WATTS	290	378	492	571	600

NOTES:
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TDF1M087A9V5SA OIL FURNACE COOLING AND HEATING AIRFLOW AND POWER VS. EXTERNAL STATIC PRESSURE WITH FILTER

	OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE				
			SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9
COOLING	5**	Low (350 CFM/TON)	OFF	OFF	OFF	ON	CFM	1665	1665	1684	1665	1675
							WATTS	522	621	747	830	939
		Normal ** (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM	1884	1895	1905	1895	1863
							WATTS	751	884	1040	1120	1230
		High (450 CFM/TON)	OFF	OFF	ON	OFF	CFM	2147	2087	2025	1960	1880
							WATTS	1170	1190	1220	1230	1250
	4	Low (350 CFM/TON)	ON	OFF	OFF	ON	CFM	1274	1289	1334	1348	1348
							WATTS	271	334	429	545	637
		Normal (400 CFM/TON)	ON	OFF	OFF	OFF	CFM	1490	1516	1533	1541	1549
							WATTS	377	495	600	672	796
		High (450 CFM/TON)	ON	OFF	ON	OFF	CFM	1715	1715	1715	1724	1715
							WATTS	575	671	769	879	1020
	3.5	Low (350 CFM/TON)	OFF	ON	OFF	ON	CFM	1132	1168	1186	1186	1186
							WATTS	192	266	350	424	495
		Normal (400 CFM/TON)	OFF	ON	OFF	OFF	CFM	1291	1302	1332	1372	1372
							WATTS	263	357	449	547	646
		High (450 CFM/TON)	OFF	ON	ON	OFF	CFM	1486	1518	1542	1565	1565
							WATTS	388	503	609	711	809
	3	Low (350 CFM/TON)	ON	ON	OFF	ON	CFM	972	1005	1021	1015	999
							WATTS	119	201	265	331	405
		Normal (400 CFM/TON)	ON	ON	OFF	OFF	CFM	1110	1142	1148	1154	1154
							WATTS	180	260	329	404	488
		High (450 CFM/TON)	ON	ON	ON	OFF	CFM	1254	1268	1290	1318	1318
							WATTS	238	318	405	528	607

	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE				
		SW 7	SW 8		0.1	0.3	0.5	0.7	0.9
HEATING	LOW	ON	ON	CFM	871	876	894	890	871
				WATTS	104	155	221	282	336
	MEDIUM LOW	OFF	ON	CFM	1051	1081	1104	1104	1087
				WATTS	160	229	306	380	445
	MEDIUM HIGH **	ON	OFF	CFM	1178	1213	1247	1247	1260
				WATTS	219	285	389	466	550
	HIGH	OFF	OFF	CFM	1389	1421	1442	1473	1483
				WATTS	311	415	519	627	715

NOTES:
1. **FACTORY SETTING.
2. CONTINUOUS FAN SETTING: HEATING OR COOLING AIRFLOW IS APPROXIMATELY 50% OF SELECTED COOLING VALUE.
3. FOR VARIABLE SPEED: LOW SPEED AIRFLOWS ARE APPROXIMATELY 30% OF LISTED VALUES.
4. LOW 350 CFM/TON IS RECOMMENDED FOR VARIABLE SPEED APPLICATION FOR COMFORT & HUMID CLIMATE SETTING: NORMAL IS 400 CFM/TON: HIGH 450 CFM/TON IS FOR DRY CLIMATE SETTING.

Service Facts

CFM vs. Temperature Rise														
Model	**Heating Capacity**													
		800	**900**	**1000**	**1100**	**1200**	**1300**	**1400**	**1500**	**1600**	**1700**	**1800**	**1900**	**2000**
Highboy THV1M087A9V3SA	70,000		72	65	59	54	50	46	43					
	87,000		90	81	73	67	62	58	54					
	98,000		101	91	82	76	70	65	60					
	114,000		117	106	96	88	81	75	70					
Highboy THV1M087A9V5SA	70,000			65	59	54	50	46	43	41	38	36	34	32
	87,000			81	73	67	62	58	54	50	47	45	42	40
	98,000			91	82	76	70	65	60	57	53	50	48	45
	114,000			106	96	88	81	75	70	66	62	59	56	53
Lowboy Front Flue TLF1M087A9V3SA	70,000		72	65	59	54	50	46	43	41				
	87,000		90	81	73	67	62	58	54	50				
	98,000		101	91	82	76	70	65	60	57				
	114,000		117	106	96	88	81	75	70	66				
Lowboy Front Flue TLF1M087A9V5SA	70,000		72	65	59	54	50	46	43	41	38	36	34	
	87,000		90	81	73	67	62	58	54	50	47	45	42	
	98,000		101	91	82	76	70	65	60	57	53	50	48	
	114,000		117	106	96	88	81	75	70	66	62	59	56	
Lowboy Rear Flue TLR1M087A9V3SA	70,000	81	72	65	59	54	50	46	43	41	38			
	87,000	101	90	81	73	67	62	58	54	50	47			
	98,000	113	101	91	82	76	70	65	60	57	53			
	114,000	Not allowed	117	106	96	88	81	75	70	66	62			
Lowboy Rear Flue TLR1M087A9V5SA	70,000		72	65	59	54	50	46	43	41	38	36		
	87,000		90	81	73	67	62	58	54	50	47	45		
	98,000		101	91	82	76	70	65	60	57	53	50		
	114,000		117	106	96	88	81	75	70	66	62	59		
Downflow/Horizontal TDF1M087A9V3SA	70,000		72	65	59	54	50	46	43	41				
	87,000		90	81	73	67	62	58	54	50				
	98,000		101	91	82	76	70	65	60	57				
	114,000		117	106	96	88	81	75	70	66				
Downflow/Horizontal TDF1M087A9V5SA	70,000			65	59	54	50	46	43	41	38	36	34	
	87,000			81	73	67	62	58	54	50	47	45	42	
	98,000			91	82	76	70	65	60	57	53	50	48	
	114,000			106	96	88	81	75	70	66	62	59	56	

The shaded area is the recommended operating range for HEATING comfort

To Shut Off
For complete shutdown: Turn the oil fuel supply line valve to the off position. The valve is typically located close to the oil tank. Disconnect the electrical supply to the furnace.

⚠ CAUTION

If this is done during cold winter months, provisions must be taken to prevent freeze-ups of all water pipes and water receptacles.
Whenever your house is to be vacant, arrange to have someone inspect your house for proper temperature. This is very important during freezing weather. If for any reason your furnace should fail to operate damage could result, such as frozen water pipes.

SEQUENCE OF OPERATION
Turn on the main electrical supply and set the Comfort Control above the indicated temperature.

Step 1: The Thermostat's contacts close between W1 and RH completing the oil burner's primary control T-circuit.
Step 2: The primary control initiates a self-check for 2 to 6 seconds.
Step 3: Primary control supplies line voltage to both the igniter and burner motor. The oil pump solenoid valve is delayed from opening for 15 second (valve on delay) start.
Step 4: The oil pump solenoid valve is opened and a 15 second ignition trial is started. If flame is not sensed at the end of the 15-second ignition trial, the control shuts down on safety and must be manually reset (push RED button 1 – 2 sec). If the control shuts down after 3 consecutive manual resets, the control enters a restricted lockout and will require reset (push RED button for 30+ sec.).
Step 5: Once flame is established, the ignition remains on for 10 seconds to insure flame stability.
Step 6: The burner continues to operate until the call for heat is removed by opening the primary controls "T – T" circuit. If flame is lost after the primary control has sensed flame, the primary control will enter an automatic 60-second recycle delay and then will return to the ignition sequence. If the flame is lost two more consecutive times (total of 3 times during a continuous call for heat), the primary control will enter a restricted lockout and require reset (push RED button for 30+ sec.).
Step 7: As the temperature rises in the furnace to the point of the fan control Thermostat's preset fan on temperature, the fan control Thermostat closes and supplies line voltage to the fan center relay. The fan center relays normally opened contacts #4 and #6 close and control voltage is supplied to W1 on the variable speed interface control board. This starts or changes the variable speed motor operation to the programmed heat fan speed.
Step 8: Once the burner shuts down operation, the fan continues to run and cools down the furnace. The fan control Thermostat opens once it reaches the fan off temperature setting. This removes line voltage from the fan center relay and the fan center relay contacts #4 and #6 open. Control voltage is removed from W1 on the variable speed interface control and the variable speed fan start the preprogrammed fan off delay or continues the continue the constant fan operation if selected.

Fan Sequence of Operation in Cooling
Step 1: The Thermostat's contacts close between RC and Y, and RC and G supplying control voltage to the oil furnace's Y and G terminals. This supplies control voltage to the variable speed fan interface control that starts the indoor fan in the preprogrammed fan operation (refer to dip switch setting metric for fan programmed options in the Installers Guide and Service Facts).
Step 2: Once the Thermostat has satisfied the demand for cooling, control voltage is removed from Y and G on the Oil Furnace's variable speed interface control and the variable speed fan starts the preprogrammed fan off program if applicable or continues the constant fan operation if selected (refer to dip switch setting metric for fan programmed options in the Installers Guide).

Fan Sequence of Operation (Fan switch "ON")
Step 1: When the Thermostat's fan mode has been set to constant fan operation, the contacts between RC and G are closed supplying control voltage to the Oil Furnace's variable speed fan interface control which runs the indoor fan continuously at 50 percent of the Cooling fan speed program. Determine the Oil Furnace interface board's dip switch settings 1,2,3,4 (see airflow table for settings) for cooling speed CFM. Divide by 2 for continuous fan CFM.

SERVICE

⚠ WARNING

EXPLOSION HAZARD
DO NOT use this furnace if any component has been underwater. Immediately call a qualified heating contractor to inspect the furnace and replace any part of the soft ceramic fiber refractory chamber or furnace control system that has been exposed to water.
Failure to follow this warning may cause property damage, personal injury or death.

TROUBLESHOOTING

⚠ WARNING

SHOCK HAZARD
When testing electrical equipment, always follow standard electrical safety procedures.

Before beginning these troubleshooting procedures, always review these basic points:

1) Check for 120 VAC power to the furnace. If there is no voltage, check the disconnecting switch for circuit breaker trip or blown fuses.
2) Make sure the room Thermostat is set on the heating mode and is "calling for heat".
3) Check for sufficient oil supply and that all oil shutoff valves are open.

4) To successfully service this oil furnace, the following recently (within the last year) calibrated instruments must be available.
   -Smoke spot test kit with Bacharach-type oil burner smoke scale
   -Carbon dioxide (CO_2) and carbon monoxide (CO) test kit or analyzer
   -Flue gas temperature measuring instrument
   -Draft gauge, capable of measuring 0.01 to 0.25 in. W.G. draft (Draft is the pressure differential between the static pressure measured in the vent pipe, or just above the combustion chamber, and the indoor atmospheric pressure. Under normal operating conditions, it will have a **negative** value, i.e. the pressure in the combustion chamber and the vent system are less than room air pres sure.)
   -Multimeter (analog or digital type)
   -Oil pressure gauge, capable of measuring at least 0 to 200 PSIG
   -Burner electrode and nozzle setting gauge

5) Be familiar with the correct operation of these instruments as well as how to adjust the oil burner settings (refer to burner manufacturer's literature).

⚠ WARNING

EXPLOSION HAZARD

Repeated operation of the oil primary safety control reset button can cause a build-up of unburned oil in the combustion chamber. An accumulation of oil in the combustion chamber is a hazardous situation and may cause a fire or explosion.

A. **Symptom: Furnace does not operate.**

Items to check:

1) Make sure the disconnecting switch is "ON" and the circuit breaker has not tripped, or fuses have not blown.
2) Confirm there is 120 VAC at the fan center junction box.
3) Confirm the room Thermostat is wired correctly, set on the "HEAT" mode, and "calling for heat".
4) On the oil primary control, lockout has occurred if the indicator light (an LED) is rapidly flashing; depress the oil primary reset button.

   If the burner does not operate properly after depressing the reset button three (3) times, turn off the electrical power to the furnace and close the manual oil shutoff valve. Reference the literature insert shipped with the furnace for detailed diagnostic information.

B. **Symptom: Burner short cycles or "locks out" on oil primary safety control.**

Items to check:

1) Fuel oil tank nearly empty or oil flow restriction. Refill oil tank, replace oil filter, open all shutoff valve(s), and purge oil line(s) of air.
2) If the oil primary control has not "locked out" (e.g., on the primary control, the indicator light is not flashing), measure the electrical current to the room Thermostat. Set the heat anticipator on the room Thermostat to the current value measured. Also, check the wiring between the Thermostat and primary control to be sure it is correct and no loose connections exist.
3) Inspect the burner flame sensor, "cad cell", to be sure the lens is clean and the cell is correctly aimed at the flame.
4) Inspect the burner oil nozzle for blockages and signs of deterioration. Replace the nozzle, if required. Also, measure and reset the electrode gap and alignment. If badly worn or deformed, replace the electrodes. (Refer to the burner manufacturer's instructions.)
5) Confirm there is a strong spark across electrodes. Generally, viewing a spark jump across the electrodes is sufficient indication the ignition transformer is operating correctly. **Testing an electronic ignition transformer with a transformer tester is generally not recommended.**
6) Inspect the heat exchanger through the cleanout ports for signs of excessive soot, scale buildup, or blockage. If a heavy deposits are present, clean the heat exchanger.

C. **Symptom: Burner short cycles on high limit Thermostat, but does not "lock out" on oil primary safety control.**

Items to check:

1) Open dampers or registers in the air distribution system. Clear any duct system restrictions.
2) Inspect and clean all air filters in the air distribution system.
3) Inspect blower for interference with rotation or locked rotor condition. Also, confirm the blower wheel is secured to the fan motor shaft.
4) The fan motor or run capacitor may be damaged. Test and replace the motor or capacitor, as required.
5) Increase fan speed.

D. **Symptom: Unable to achieve clean combustion by making burner air adjustments.**

Items to check:

1) Measure the burner air tube insertion depth and alignment. The end of the tube should not **protrude inside the combustion chamber. The end of the tube should be approximately ¼ inch away from the inner wall surface of the combustion chamber.**

2) Inspect the oil nozzle for excessive wear, blockage, or deterioration. Measure and, if necessary, reset the nozzle depth or turbulator location with respect to end of the burner head. Replace the nozzle, if necessary (refer to the oil burner manufacturer's instructions).
3) Measure the oil pump pressure. If required, adjust the pressure to burner nameplate value. (This is the typical minimum pressure required to obtain the full input rate from the furnace).
4) Verify the burner is configured as specified in Table 1 and adjusted according to the Initial Burner Operation **section of this manual (page 8) and the burner manufacturer's instructions.**
5) Measure the overfire draft. If required, adjust the barometric damper to increase the stack draft to obtain an overfire draft of 0.02 in. W.G. with the burner operating. (This is the typical minimum draft required to obtain the specified flue gas combustion analysis values given in Table 1.) If the specified overfire draft cannot be obtained with a stack draft of 0.02 in. W.G., the heat exchanger may be partially blocked and could require cleaning.
6) Measure the draft at the point where the vent connector attaches to the heat exchanger flue pipe. With the

burner operating, the stack draft should not exceed 0.05 in. W.G. If the stack draft has been adjusted above this value to give the proper overfire draft, the heat exchanger will require cleaning.

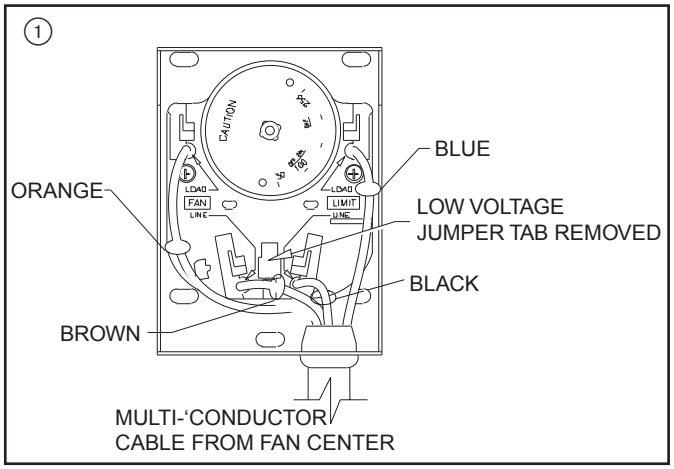
If there is little or no stack draft, the chimney flue way may require cleaning, the chimney is too restrictive, or a downdraft condition exists.

E. **Symptom: Furnace blower will not start.**

Items to check:

1) See pages 16, 17, 18, 19.

F. **Symptom: Blower cycles on and off after the burner has shutdown.**



Item to check:

1) Increase the fan limit control differential. Typically, the fan "off" setting should be 30 degrees F. below the fan "on" setting. Adjust the setting as required.

⚠ WARNING

FIRE HAZARD
If the fan and high limit control is faulty, it should be replaced. However, it must only be replaced by the same make and model as the original. All the original temperature settings should be duplicated on the replacement model as well. REMOVE THE LOW VOLTAGE JUMPER IN THE CONTROL, IF EQUIPPED. See Figure 1. Refer to the electrical diagram for proper electrical connections. (page 10 & 11)

FLAME SENSOR ("CAD CELL") CHECKOUT PROCEDURE

On the oil primary control, to check the electrical resistance of the flame sensor (referred to as a cadmium sulfide photocell, or "cad cell"), depress the reset button on the oil primary safety control while the burner is firing. The oil primary control will report the measured resistance range of the cad cell by flashing the LED (light emitting diode) one (1) to four (4) times. Refer to the oil burner manufacturer's instructions for further details.

For all primary controls, an alternate procedure to check the flame sensor operation is as follows:

1) Remove the flame sensor lead wires from the terminals (labeled "CAD CELL" on the underside of the control) of the oil primary safety control module. Start the burner. Shortly after combustion is established, place a temporary jumper wire across the cad cell terminals, or leads, of the control. Connect an ohmmeter across the flame sensor lead wires. The measured resistance should be less than,
   - 1600 Ohms for the cad cell.
2) Stop the burner and remove the jumper wire.
3) With the burner off, measure the resistance of the flame sensor with the ohmmeter. The resistance of the sensor without "seeing" a light source (so-called "dark" cell resistance) should be greater than,
   - 20,000 Ohms for the cad cell.
4) If the sensor resistances are outside the acceptable ranges given above, confirm the lens of the cell is clean and the cell is located correctly in the burner housing. If the cell is clean and correctly located, replace the flame sensor.

NOTICE: All resistances are approximate values only and will vary depending upon the intensity of the light source (flame or sunlight) and the condition or age of the cad cell.

MAINTENANCE

Air Filter(s)

⚠ CAUTION

BURN HAZARD - ROTATING FAN BLADES
To avoid injury from moving parts, hot surfaces, or electrical shock, shut off the power to the furnace and allow the furnace to cool BEFORE removing any furnace access doors to service air filters.

Highboy and lowboy furnace models are factory-supplied with a permanent-type, air filter. Downflow/Horizontal models are not shipped with a filter. However, external filters are required. At least twice a year, remove the air filter(s) for cleaning. To clean a washable filter, soak it in water with a mild detergent and then rinsing it with clean water. Allow the filter to air dry before reinstalling it in the furnace filter rack.
If the furnace, or duct system, is equipped with disposable-type (paper element), air filters, inspect them every month for an excessive accumulation of dust and dirt. Replace disposable air filters at least twice a year. Make certain the replacement filter is the same size as the one being replaced.
The filter size is marked on the outer edge of the air filter. Install the filter with the arrow marked on the filter pointing toward the furnace.

Oil Burner

⚠ WARNING

ANNUAL SERVICE REQUIRED
A qualified heating contractor MUST service the oil burner in this furnace at least once a year.

Generally, service to the burner will involve a thorough inspection and cleaning of the burner, replacement of the oil nozzle and oil filter, and readjustment of the burner to achieve proper ignition and clean combustion.

Blower and Motor

NOTICE: The fan motor has sealed bearings that do NOT require lubrication.

The blower and fan motor will **not** normally require any service. This furnace is equipped with a directly-driven blower. Therefore, it will **not** require any retensioning or replacement of a drive belt.

Heat Exchanger

⚠ WARNING

BURN HAZARD
DO NOT attempt to clean the heat exchanger unless electrical power and fuel flow to the furnace are turned off and the furnace is at room temperature.

⚠ CAUTION

FRAGILE
The combustion chamber refractory material is fragile and can be easily damaged. If the inner radiator of the heat exchanger is cleaned, avoid scraping or hitting the walls of the combustion chamber.

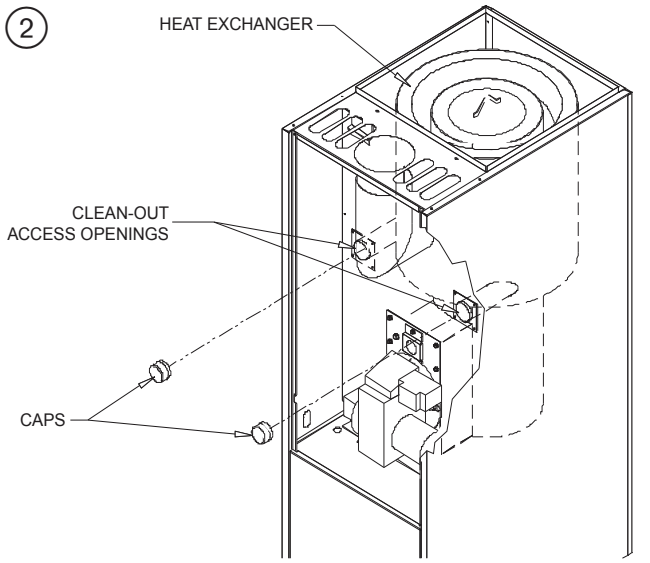
⚠ CAUTION

FRAGILE
Do not brush or scrape the surface of the combustion chamber. It can be easily damaged.

⚠ CAUTION

ANNUAL SERVICE REQUIRED
A qualified heating contractor MUST inspect the heat exchanger in this furnace at least once a year. If heavy deposits are found, immediate cleaning is required.

All heat exchanger surfaces should be as clean as possible for the most efficient operation of the furnace. The heat exchanger may require cleaning after every heating season, as combustion of fuel oil tends to produce soot, particulate matter, and scale, due to corrosion. These materials coat the inner walls of the heat exchanger. This coating reduces the heat transfer effectiveness of the heat exchanger and can hinder the flow of flue gases from the furnace.



Location and Design of the Highboy Heat Exchanger Cleanout Port

NOTICE: Accumulation of heavy soot deposits over one heating season may indicate the oil burner is out of adjustment.

The heat exchanger may be inspected and cleaned through two (2) access, or cleanout, ports located in the burner compartment, on highboy and lowboy models, or protruding through the front casing panel, on the horizontal/downflow model. Each cleanout port consists of a 2-inch O.D. tube closed by a pressed-in cap, refer to Figure 2.

Using a screwdriver, or a large pair of adjustable jaw pliers, remove each cleanout port cap. With the aid of a portable light source, peer into the heat exchanger. As much as possible, loosen all material and deposits clinging to the heat exchanger walls using wire brushes, or any suitable tool. Collect and remove this material by hand or with the assistance of a vacuum cleaner and a nozzle-type attachment.

The heat exchanger may also be cleaned through the flue pipe connection. With the furnace turned off and at room temperature, carefully remove the vent connector and the heat exchanger flue pipe, if equipped, to inspect and clean the heat exchanger.

The inner radiator of the heat exchanger may be cleaned from the inside of the combustion chamber. This involves removal of the burner and the burner mounting plate from the heat exchanger.

Using a portable light source with a mirror inserted through and into the heat exchanger, check for an accumulation of soot, scale, and particulate matter on the walls and in the base of the drum, or on the floor of the combustion chamber. If a significant accumulation is present, it should be removed. Use a flexible wire brush to loosen the deposits on the heat exchanger walls. Remove any loose foreign material using a vacuum cleaner. Replace all gaskets, if removed, with new (unused) gaskets. Reassemble the burner mounting plate, burner flange, and new gaskets in the reverse order they were removed. A rubber mallet, or equivalent tool, may be useful for reinstalling the caps in the cleanout tubes.

⚠ WARNING

RE-INSTALL ALL PARTS
Should the unit be disassembled, all components, panels, block offs, collars, gaskets and fasteners must be reassembled as originally factory produced.
Failure to do so may result in property damage, injury, or loss of life!

Flue and Chimney

At least once a year, thoroughly inspect the heat exchanger flue pipe, the vent connector, the chimney, or vent, and the barometric damper for signs of sagging, loose connections, excessive corrosion, and deterioration. Clean, repair, or replace any components for continued safe and proper operation of the furnace.

INITIAL OPERATION OF THE FURNACE

INITIAL BURNER OPERATION

⚠ WARNING

EXPLOSION HAZARD

To avoid possible explosion, DO NOT attempt to light the burner if:

- Oil has accumulated in the base of the combustion chamber.

- The furnace is full of fuel vapors.

- The combustion chamber is very hot.

⚠ CAUTION

SERVICE INSTRUCTIONS

The oil burner must be installed and adjusted using recently (within the last year) calibrated combustion instruments by a qualified heating dealer prior to placing the furnace in operation. Refer to this manual and the oil burner instruction manual for details.

⚠ CAUTION

MINIMIZE OIL ODOR

To minimize initial fuel oil and combustion odors, ventilate the building well while operating the furnace for the first time.

Do NOT run the oil pump dry (without oil) for more than two (2) minutes. Damage to the oil pump may result.

To initially operate the furnace:

1) Turn the electrical disconnecting switch to the "OFF" position.
2) Set the room Thermostat above room temperature.
3) Be sure the oil tank is full of clean # 2 fuel oil.
4) Open all shutoff valves in the oil line.
5) Turn on the electrical disconnecting switch and prime the burner oil pump according to the pump manufacturer's instructions.
6) When ignition is established, make a temporary air adjustment for a clean, smoke-free flame. At this point, the final burner adjustment should be made using test instruments to measure oil pump pressure, smoke number, carbon dioxide (CO_2), carbon monoxide (CO), draft, and flue gas temperature.
   - Refer to item (4) under the Troubleshooting section of this manual for a list of required test instru ments.

   In order to achieve the best combustion efficiency, the following procedure is recommended.
7) Measure the oil pump pressure. If required, adjust it to deliver the appropriate pressure for the burner. The oil pump should be set to produce 130 PSIG, for the R.W. Beckett model AF burner.
8) Carbon Dioxide (CO_2) and Carbon Monoxide (CO) – In order to assure that proper and safe combustion is taking place, carbon dioxide and carbon monoxide measurements must be taken. A CO_2 reading within the limits of Table 1 with no measurable CO is desirable. The maximum acceptable CO reading is about 50 PPM. If the CO reading is too high, open the burner air shutter, or air band, slightly to permit more combustion air to the flame. Recheck the CO level and adjust as required.
9) Draft – Draft measurements should be taken through the overfire port and in the vent connector, not more than 12 inches away from the furnace outlet. A 5/16 in. hex washer head bolt plugs the overfire port in the burner mounting plate. Remove the bolt and insert a suitable draft measurement gage. After the chimney (or stack gas passageway) has warmed up to operating temperature, approximately 15 to 20 minutes of burner operation, adjust the barometric damper to obtain the correct overfire draft reading. The overfire draft should read 0.02 in. W.G. The draft measured at the flue (stack draft) should read no more than 0.05 in. W.G.

NOTICE: The overfire draft is the more important measurement and should be used to adjust the setting of the barometric draft control.

10) Flue Gas Temperature – The flue gas temperature will vary depending on heat input rate, air temperature rise across the heat exchanger, and airflow rate through the furnace. To prevent excessive water vapor condensation from the flue gases, the gross flue gas temperature should not fall below 330ºF. In addition, if the gross flue gas temperature exceeds 650ºF, the heating efficiency of the furnace will be reduced.

    To reduce high flue temperatures, after properly adjusting the burner, check for blocked supply/return airflow. Remove any blockages, increase fan speed, or consider reducing the furnace heat input rate. Also, verify there is no air leakage into the combustion chamber from around the burner mounting flange or heat exchanger mounting plate. If flue gas temperatures are too low, consider increasing the heat input rate or reducing the amount of supply/return airflow.
11) Cycle the furnace several times to verify the burner lights off and shutsdown smoothly without excessive noise or smoke production.

SUPPLY/RETURN AIRFLOW AND AIR TEMPERATURE

The supply/return airflow shall be set to obtain an air temperature rise, across the furnace, in the range of 55 to 85ºF. See CFM vs Temperature Rise table, Page 3. Since the flow resistance of each duct system is slightly different, the airflow (fan speed) may have to be changed in the field to achieve a satisfactory temperature rise.

One way to measure the temperature rise across the furnace is to insert temperature measuring devices (e.g. thermometers) into the return air duct and into the supply air duct about 12 inches from the furnace. After the furnace has been firing continually for over 20 minutes, read the temperature difference between the two (2) thermometers. The temperature difference should not exceed 85ºF, nor be less than 55ºF. A temperature rise of 70ºF is considered to be optimum for comfort.

The blower speed is adjusted by changing the dip switch settings on the variable speed interface board. See heating airflow tables.

Furnace Model:	**All**
Burner Model:	**R.W. Beckett, AF**
Standard Nozzle:	**Delavan, 0.75 GPH / 80 deg. angle / hollow cone**
Oil Pump Pressure (PSIG):	**130**
Burner Head Type:	**F3**
Head / Turbulator Setting:	**"Z" = 1.125 in.**
Air Band Setting:	**Fully-closed**
Air Shutter / Damper Setting:	**5**
Overfire Draft (in. W.G.):	**0.02**
Smoke Spot, Maximum (Bacharach Scale):	**# 1**
Carbon Dioxide, CO_2, Maximum (%):	**13**
Carbon Dioxide, CO_2, Minimum (%):	**12***
Carbon Monoxide, CO (PPM)	**0**
Oil Solenoid Valve Equipped:	**YES**
Prepurge Time (sec):	**15 sec.**
Postpurge Time (sec):	**None**
Ignition Type:	**Interrupted**

Table 1: Oil Burner Application and Specifications

*** When operating these furnaces at the lowest input rate (84,000 BTUH), the carbon dioxide (CO_2) value may not be able to be adjusted above 12%. This is normal and does not necessarily indicate a problem.**

To adjust the fan speed, follow this procedure:

a. Turn off all electrical power to the furnace at the disconnecting switch.
b. Remove the burner compartment access door.
c. Locate Variable Speed interface board on blower housing. Set dip switches for desired air flow. See air flow tables for settings.
d. Replace the blower compartment access door.
e. Restore electrical power to the furnace at the disconnecting switch.

With the furnace operating, measure the air temperature rise across the furnace again. If the value does not fall in the range of 70 to 100°F, repeat the above procedure.

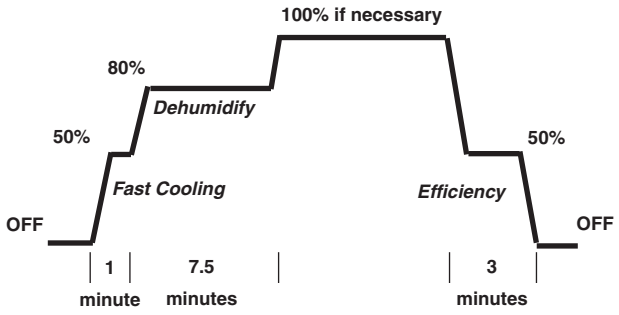
The following table and graph explain the delay-off settings:

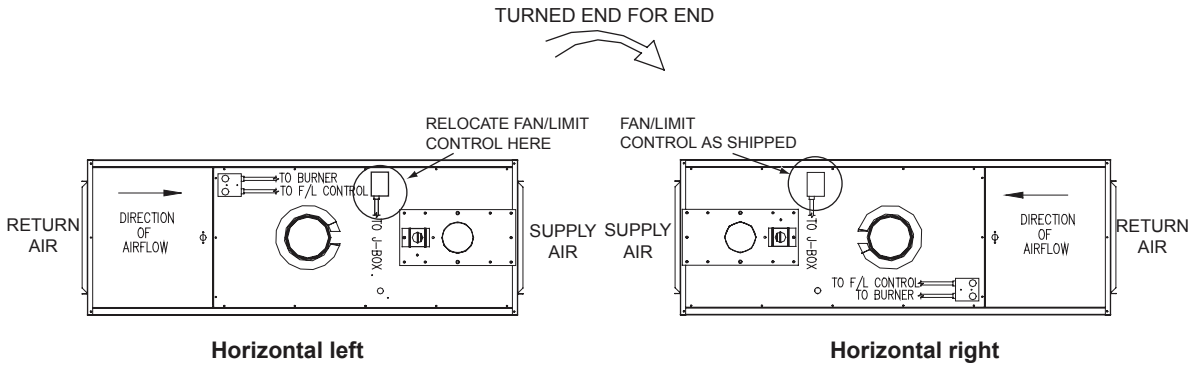
COOLING OFF - DELAY OPTIONS

SWITCH SETTINGS		SELECTION	NOMINAL AIRFLOW
5 - OFF	6 - OFF	NONE	SAME
5 - ON	6 - OFF	1.5 MINUTES	100% *
5 - OFF	6 - ON	3 MINUTES	50%
5 - ON	6 - ON	**	50 - 100%

** - This setting is equivalent to BAY24X045 relay benefit.*

*** - This selection provides ENHANCED MODE, which is a ramping up and ramping down of the blower speed to provide improved comfort, quietness, and potential energy savings. See Cooling Off-Delay table for setup. The graph which follows, shows the ramping process for the ENHANCED MODE.*





Correct locations for the horizontal furnace high limit and fan control

High Limit Thermostat Setting (deg. F.):	230 (highboy / lowboy models) 190 (horizontal / downflow model)
Fan "On" Setting (deg. F.):	130
Fan "Off" Setting (deg. F.):	100

Table 2: Standard Furnace Fan / Limit Control

FURNACE LIMIT AND BLOWER CONTROLS

All furnaces are equipped with a combined thermostatic high temperature limit and blower (fan) control. The high temperature limit is set such that it does not permit a supply (discharge) air temperature above its setting. See Table 2.

The thermostatic fan control should be set so the greatest fuel utilization efficiency of the furnace is obtained. Generally, a blower "ON" setting of 130°F should give the best result. After the burner shuts down, the circulating air blower will continue to operate until the air temperature inside the furnace falls below the lower setting on the fan control.

This delay on blower shutdown extracts residual heat from the furnace heat exchanger that would ordinarily be lost to the outdoor atmosphere. If a longer, or shorter, cooldown period is desired, the fan control differential setting may be reset to lengthen, or shorten, the cycle as desired. Refer to Table 2 for the standard fan and high limit control settings. In addition to the combined fan and limit control, the horizontal /downflow furnace is equipped with an **auxiliary high limit temperature control** located in the blower compartment, refer to the electrical diagram on page 10. The purpose of this control is to prevent overheating of the blower motor and air filter(s), if airflow is severely reduced.

If the duct system becomes partially, or totally, blocked or the furnace air filter(s) become excessively dirty causing the blower to fail to circulate enough air, the thermostatic high temperature limit (or, if equipped, the auxiliary high temperature limit) may activate to prevent very high discharge air temperatures from occurring.

Should airflow be restricted, the furnace might cycle on and off too frequently or become inoperative. To correct this condition, verify that all supply and return dampers and registers in the air distribution system are open. If this fails to resolve the problem, turn off the electrical power to the furnace. Remove the blower compartment access door to examine the air filter(s) and blower for blockages or a loose blower wheel. (On the highboy and horizontal / downflow furnaces, air filters should be mounted external to the furnace casing.) If possible, correct the condition by cleaning or replacing the air filter(s), freeing the blower wheel of any foreign materials, or securing the blower wheel to the fan motor shaft. **Always replace the blower compartment access door when service is finished.** Restore electrical power to the furnace.

ROOM THERMOSTAT

Most room Thermostats are equipped with user adjustable, or selectable, levels of heat anticipation. This feature helps to reduce the amount of room air temperature overshoot that occurs after a heating cycle.

To adjust the heat anticipator, measure the electrical current output of the oil burner primary safety control to the room Thermostat. (If measurement is not possible, the value of current output may be marked on the cover of the control). Set the Comfrot Control heat anticipator to match the electrical current output of the oil primary safety control.

Quick Check Motor Will Not Run

ICM-2 QUICK CHECK

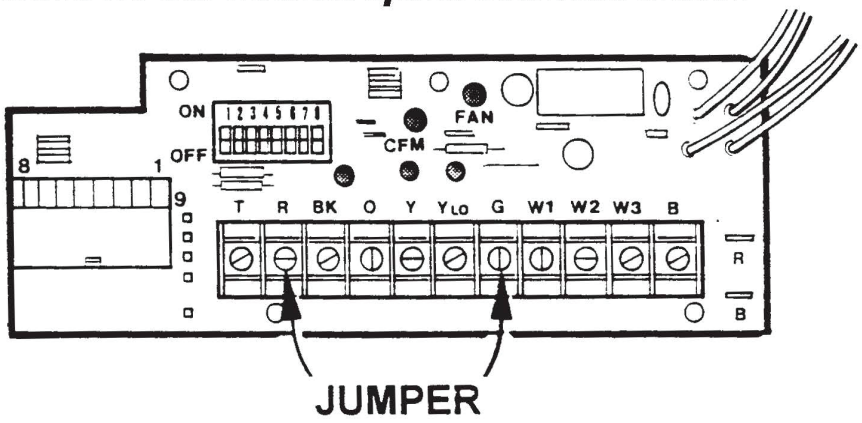
Blower Motor Will Not Run

1. Jumper 24 Volt A.C "R" T erminal to "G" terminal on the Low Voltage Terminal board on the variable speed interface board.

Does motor run?

NO: Go to step #2.

YES: Motor runs, check thermostat and thermostat wire.



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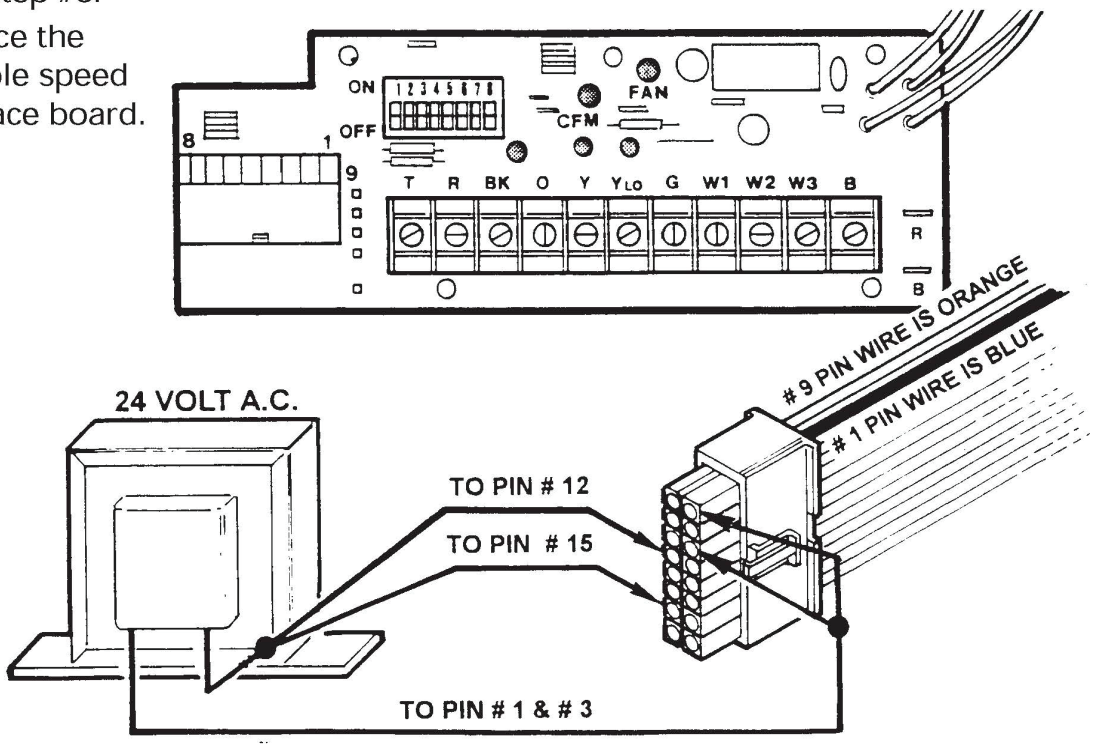
2. Unplug 16 wire low voltage harnass from the interface board. Jumper 24 Volts A. C, to pins #12, #15 and common pins #1 and #3.

Does the motor run?

NO: Go to step #3.

YES: Replace the variable speed interface board.



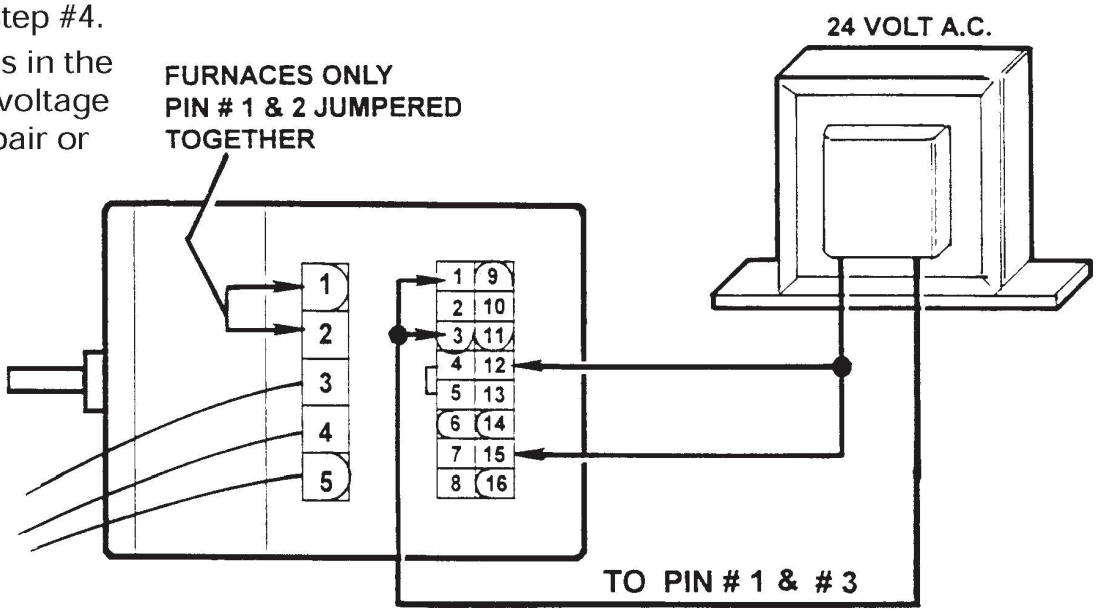
Quick Check Motor Will Not Run

3. Unplug 16 wire low voltage harness from the motor. Jumper 24 Volts A.C. to motor low voltage plug pins #12 and #15 and pins #1 and #3 which are common.

Does motor run?

NO: Go to step #4.

YES: Fault is in the 16 wire low voltage harness. Repair or replace it.

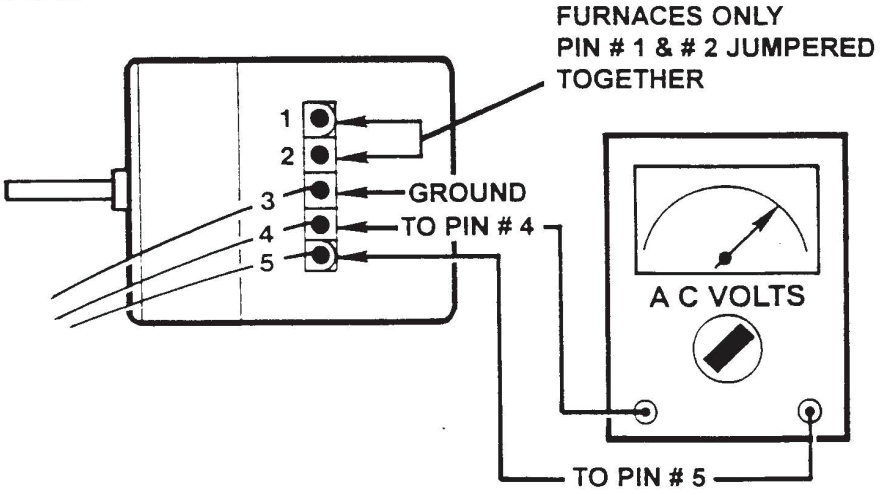


4. Is the line voltage to the motor high voltage power plug pin #4 and pin #5 correct?

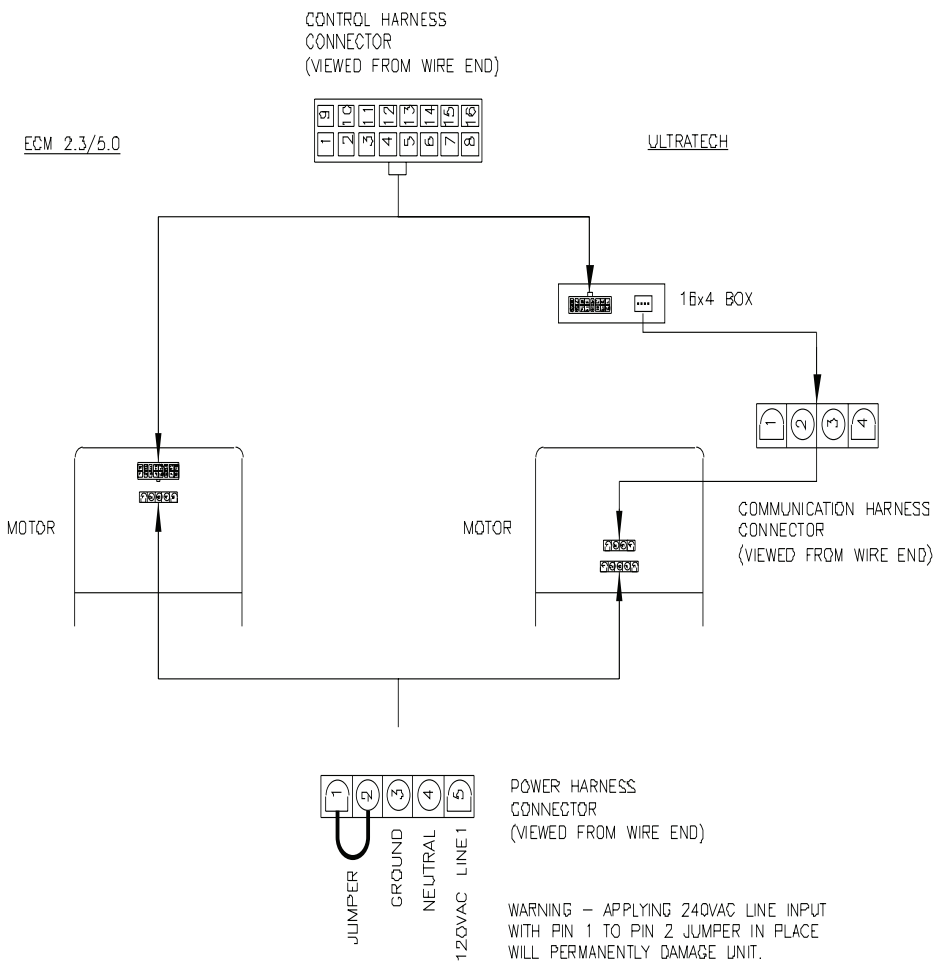
Furnace ICM-2 motor correct voltage is 120 Volts A.C. and there must be a jumper wire in this plug between pins #1 and #2.

NO: Correct line voltage fault.

YES: Live voltage correct and motor will not run. Replace motor.

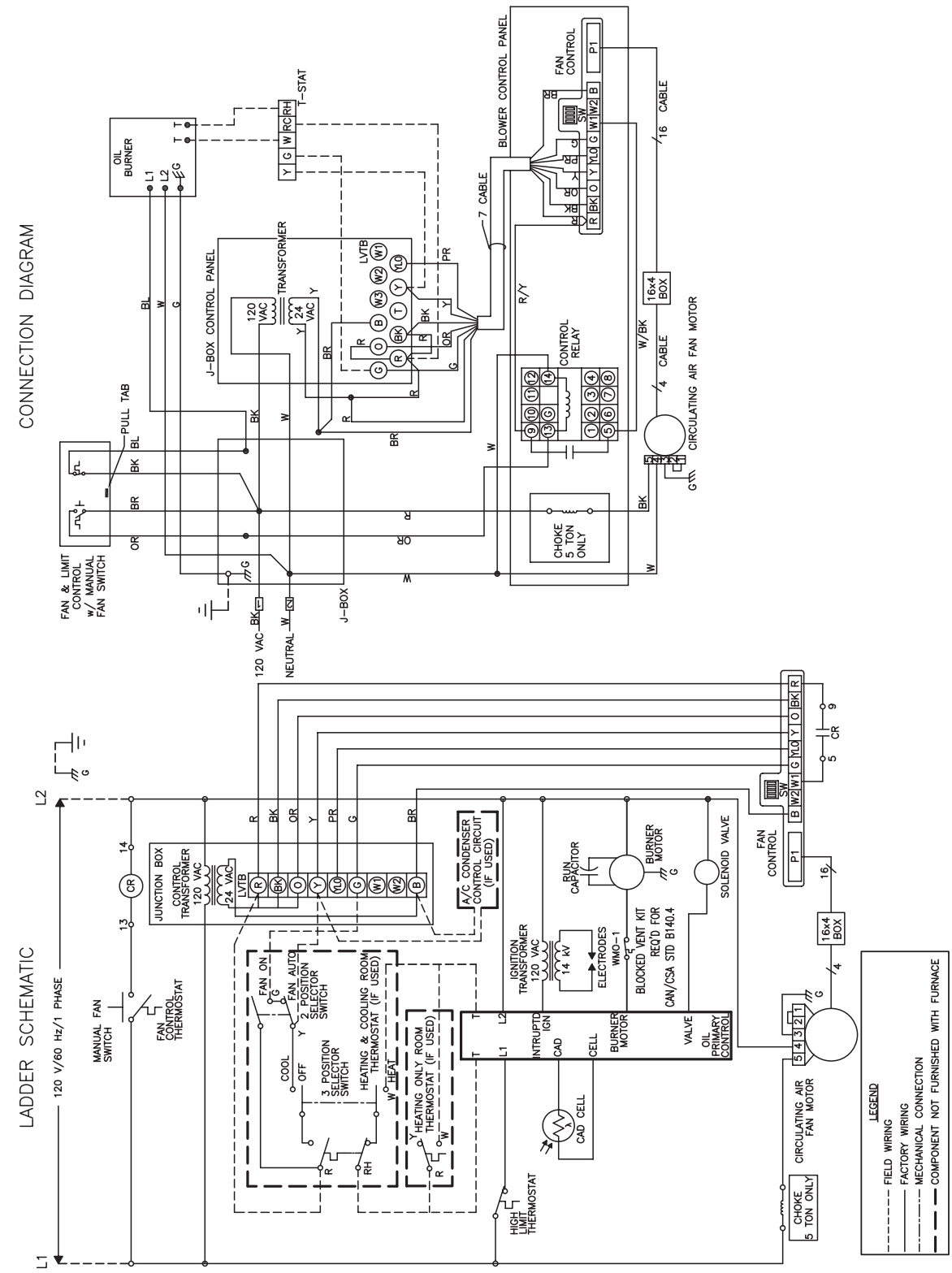


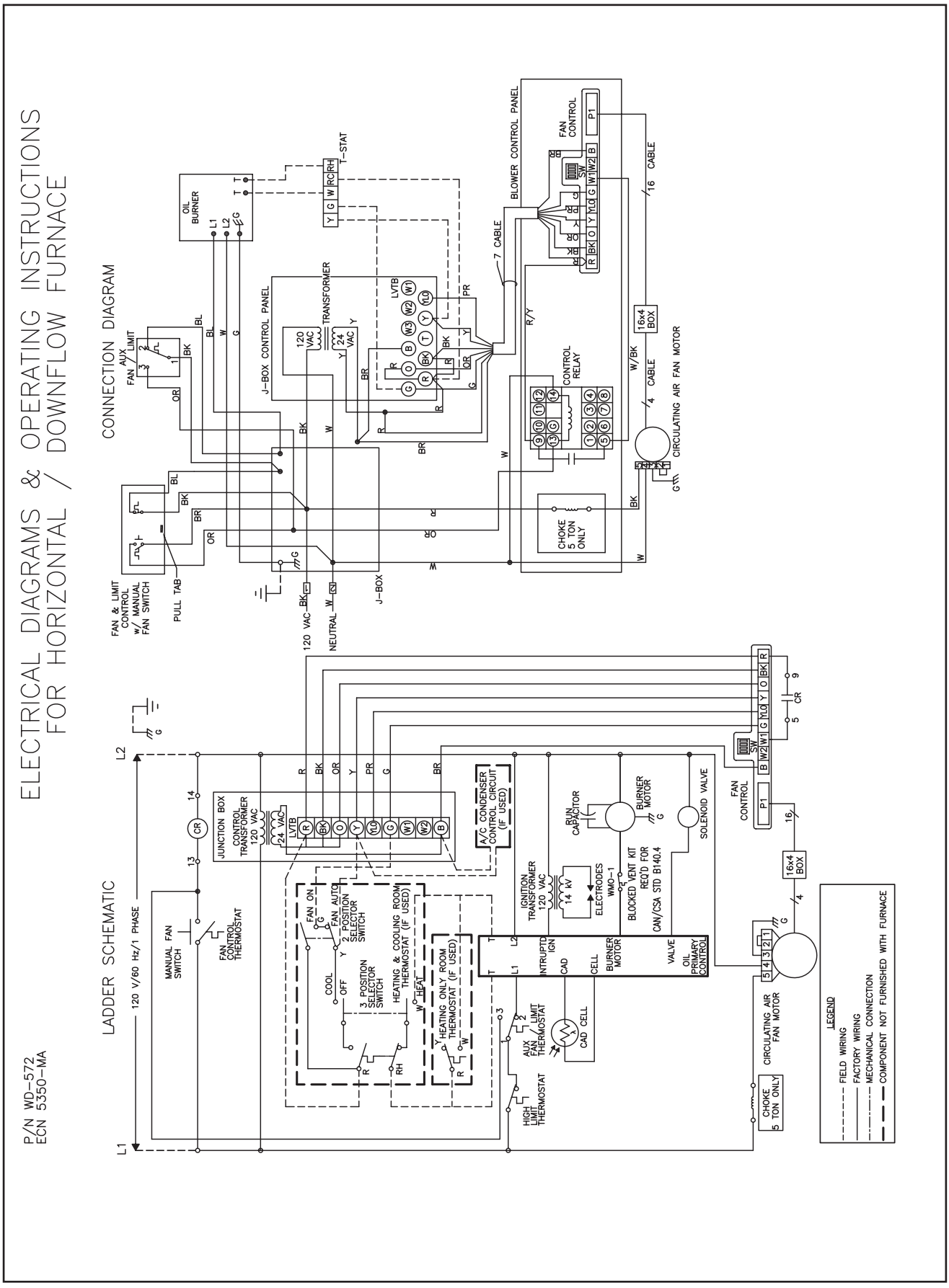
CONTROL HARNESS CONNECTOR	
PIN	DESCRIPTION
1	SPEED COMMON
2	COOL ENABLE
3	SPEED COMMON
4	
5	
6	
7	
8	
9	
10	SPEED OUTPUT
11	
12	R INPUT
13	
14	
15	BLOWER ENABLE
16	BLOWER ENABLE



ELECTRICAL DIAGRAMS & OPERATING INSTRUCTIONS FOR HIGHBOY & LOWBOY FURNACES

P/N WD-571
ECN 5350-MA




ELECTRICAL DIAGRAMS & OPERATING INSTRUCTIONS
FOR HORIZONTAL / DOWNFLOW FURNACE
P/N WD-572
ECN 5350-MA
CONNECTION DIAGRAM
LADDER SCHEMATIC
120 V/60 Hz/1 PHASE
L1
L2
OIL BURNER
T-STAT
BLOWER CONTROL PANEL
FAN CONTROL
7 CABLE
16 CABLE
4 CABLE
J-BOX CONTROL PANEL
120 VAC TRANSFORMER
LVTB
CONTROL RELAY
16x4 BOX
CIRCULATING AIR FAN MOTOR
FAN & LIMIT CONTROL w/ MANUAL FAN SWITCH
PULL TAB
J-BOX
120 VAC
NEUTRAL
CHOKE 5 TON ONLY
JUNCTION BOX
CONTROL TRANSFORMER 120 VAC
24 VAC
A/C CONDENSER CONTROL CIRCUIT (IF USED)
MANUAL FAN SWITCH
FAN CONTROL THERMOSTAT
FAN ON
FAN AUTO
2 POSITION SELECTOR SWITCH
3 POSITION SELECTOR SWITCH
COOL
OFF
HEAT
HEATING & COOLING ROOM THERMOSTAT (IF USED)
HEATING ONLY ROOM THERMOSTAT (IF USED)
IGNITION TRANSFORMER 120 VAC
14 kV
ELECTRODES
WMC-1
RUN CAPACITOR
BURNER MOTOR
BLOCKED VENT KIT REQ'D FOR CAN/CSA STD B140.4
SOLENOID VALVE
OIL PRIMARY CONTROL
INTRUPTD IGN
CAD CELL
AUX FAN LIMIT THERMOSTAT
HIGH LIMIT THERMOSTAT
LEGEND
FIELD WIRING
FACTORY WIRING
MECHANICAL CONNECTION
COMPONENT NOT FURNISHED WITH FURNACE