



INSTALLATION, OPERATING and SERVICE MANUAL

THE INSTALLATION OF THE UNIT SHALL BE IN ACCORDANCE WITH THE
REGULATIONS OF THE AUTHORITIES HAVING JURISDICTION.

**OIL-FIRED HI-BOY – HEAVY DUTY FURNACES
MODELS: NH3 and LFR**

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NOTICE TO HOMEOWNER:
READ AND SAVE THESE INSTRUCTIONS



2210272 March 2010

TABLE 1
NH3 GENERAL INSTRUCTIONS

UPFLOW CONFIGURATION																		
MODEL	RIELLO BURNER	B.T.U.H. OUTPUT	B.T.U.H. INPUT (USGPH)	AFUE %	NOZZLE	PUMP p.s.i.	INSERTION inches	BURNER AIR SETTING		CHIMNEY FLUE PRESSURE (in w.c.)	GROSS STACK °F	FILTER SIZE (QTY)	DIRECT DRIVE SPEED TAP			BELT DRIVE		EXTERNAL STATIC PRESSURE (in w.c.)
								TURB	SHUTTER				12" BLOWER	10" BLOWER	9" BLOWER	PULLEY COMBINATION	TURNS OPEN	
NH3 – 122	40 F3	122,000	144,976 (1.04)	81.1	Delavan 0.85 X 60° B Monarch 0.85 X 60° R	150	4 5/8"	3	4.0	-0.02	500	16" X 24" (2)	MED-HI MED-HI	MED-HI MED-HI	MED-HI MED-HI			
NH3 – 109	40 F3	109,000	128,248 (0.92)	81.5	Delavan 0.75 X 60° B Monarch 0.75 X 60° R	150	4 5/8"	3	3.1	-0.02	460	16" X 24" (2)	MED	MED-LO	MED-HI	3-1/4" X 6"	1 – 1/2	0.20
													MED	MED-LO	MED-HI	3-1/4" X 5"	1	0.50
NH3 – 95	40 F3	95,000	111,520 (0.80)	82.2	Delavan 0.65 X 60° B Monarch 0.65 X 60° R	150	4 5/8"	2	2.7	-0.02	425	16" X 24" (2)	MED-LO	MED-LO	MED-LO	3-1/4" X 6"	2-1/2	0.20
													MED	MED-LO	MED-HI	3-1/4" X 5"	2	0.50
NH3 – 90	40 F3	89,000	103,156 (0.74)	82.7	Delavan 0.60 X 60° B Monarch 0.60 X 60° R	150	4 5/8"	1.5	2.5	-0.02	400	16" X 24" (2)	MED-LO	LO	MED-LO	3-1/4" X 6"	3	0.20
													MED	LO	MED-LO	3-1/4" X 5"	2-1/2	0.50
MODEL	BECKETT BURNER	B.T.U.H. OUTPUT	B.T.U.H. INPUT (USGPH)	AFUE %	NOZZLE	PUMP p.s.i.	INSERTION inches	BURNER AIR SETTING		CHIMNEY FLUE PRESSURE (in w.c.)	GROSS STACK °F	FILTER SIZE (QTY)	DIRECT DRIVE SPEED TAP			BELT DRIVE		EXTERNAL STATIC PRESSURE (in w.c.)
								SHUTTER	AIR BAND				12" BLOWER	10" BLOWER	9" BLOWER	PULLEY COMBINATION	TURNS OPEN	
NH3 – 117	AFG60YHHS	117,000	139,400 (1.00)	81.0	Delavan 1.00 X 70° A Monarch 1.00 X 70° NS	100	5"	10	1	-0.02	515	16" X 24" (2)	MED-HI	MED-LO	MED-HI			
													MED-HI	MED-HI	MED-HI			
NH3 – 101	AFG60YHHS	101,000	118,490 (0.85)	81.7	Delavan 0.85 X 70° A Monarch 0.85 X 70° NS	100	5"	8	0	-0.02	475	16" X 24" (2)	MED	MED-LO	MED-LO	3-1/4" X 6"	3	0.20
													MED	MED-LO	MED-LO	3-1/4" X 5"	2-1/2	0.50
NH3 – 89	AFG60YHHS	89,000	104,550 (0.75)	82.7	Delavan 0.75 X 70° A Monarch 0.75 X 70° NS	100	5"	6	0	-0.02	450	16" X 24" (2)	MED	MED-LO	MED-LO	3-1/4" X 6"	3	0.20
													MED	MED-LO	MED-LO	3-1/4" X 5"	2-1/2	0.50
NH3 – 77	AFG60YHHS	77,000	90,610 (0.65)	82.5	Delavan 0.65 X 70° A Monarch 0.65 X 70° NS	100	5"	5	0	-0.02	425	16" X 24" (2)	MED-LO	LO	LO	3-1/4" X 6"	3	0.20
													MED-LO	LO	LO	3-1/4 X 5"	2-1/2	0.50
MODEL	AERO BURNER	B.T.U.H. OUTPUT	B.T.U.H. INPUT (USGPH)	AFUE %	NOZZLE	PUMP p.s.i.	INSERTION inches	BURNER AIR SETTING		CHIMNEY FLUE PRESSURE (in w.c.)	GROSS STACK °F	FILTER SIZE (QTY)	DIRECT DRIVE SPEED TAP			BELT DRIVE		EXTERNAL STATIC PRESSURE (in w.c.)
								AIR BAND					12" BLOWER	10" BLOWER	9" BLOWER	PULLEY COMBINATION	TURNS OPEN	
NH3 – 100	HF-US-2X	101,000	118,490 (0.85)	81.7	Delavan 0.85 X 70° A Monarch 0.85 X 70° NS	100	5"	7/16"		-0.02	450	16" X 24" (2)	MED	MED-LO	MED-LO	3-1/4" X 6"	3	0.20
													MED	MED-LO	MED-LO	3-1/4" X 5"	2-1/2	0.50
NH3 – 88	HF-US-2X	89,000	104,550 (0.75)	82.7	Delavan 0.75 X 70° A Monarch 0.75 X 70° NS	100	5"	5/8"		-0.02	425	16" X 24" (2)	MED	MED-LO	MED-LO	3-1/4" X 6"	3	0.20
													MED	MED-LO	MED-LO	3-1/4" X 5"	2-1/2	0.50
NH3 – 78	HF-US-2X	77,000	90,610 (0.65)	82.5	Delavan 0.65 X 70° A Monarch 0.65 X 70° NS	100	5"	7/8"		-0.02	400	16" X 24" (2)	MED-LO	LO	LO	3-1/4" X 6"	3	0.20
													MED-LO	LO	LO	3-1/4" X 5"	2-1/2	0.50
MODEL	CARLIN BURNER	B.T.U.H. OUTPUT	B.T.U.H. INPUT (USGPH)	AFUE %	NOZZLE	PUMP p.s.i.	INSERTION inches	BURNER AIR SETTING		CHIMNEY FLUE PRESSURE (in w.c.)	GROSS STACK °F	FILTER SIZE (QTY)	DIRECT DRIVE SPEED TAP			BELT DRIVE		EXTERNAL STATIC PRESSURE (in w.c.)
								POSITIONING BAR	AIR BAND				12" BLOWER	10" BLOWER	9" BLOWER	PULLEY COMBINATION	TURNS OPEN	
NH3 – 99	EZ-1	101,000	118,490 (0.85)	81.7	Delavan 0.85 X 70° A Monarch 0.85 X 70° NS	100	5"	0.85-1.00 GPH	0.65	-0.02	450	16" X 24" (2)	MED	MED-LO	MED-LO	3-1/4" X 6"	3	0.20
													MED	MED-LO	MED-LO	3-1/4" X 5"	2-1/2	0.50
NH3 – 87	EZ-1	89,000	104,550 (0.75)	82.7	Delavan 0.75 X 70° A Monarch 0.75 X 70° NS	100	5"	0.75 GPH	0.60	-0.02	415	16" X 24" (2)	MED	MED-LO	MED-LO	3-1/4" X 6"	3	0.20
													MED	MED-LO	MED-LO	3-1/4" X 5"	2-1/2	0.50
NH3 – 76	EZ-1	77,000	90,610 (0.65)	82.5	Delavan 0.65 X 70° A Monarch 0.65 X 70° NS	100	5"	0.60-0.65 GPH	0.50	-0.02	380	16" X 24" (2)	MED-LO	LO	LO	3-1/4" X 6"	3	0.20
													MED-LO	LO	LO	3-1/4" X 5"	2-1/2	0.50

Use burner air settings as a guide only. Set burner air to give a trace of smoke. Re-adjust burner air to reduce CO₂ by 1 to 1.5 percent. Take measurements with the burner cover & air ducts installed (if any).

The maximum allowable temperature rise is 85°F. Select speed to suit specific installation requirements. Air temperature can be lowered by increasing the blower speed; lowering the firing rate; or increasing supply & return outlets.

The minimum recommended temperature rise is 65°F.

TABLE 2 – NH3 BLOWER PERFORMANCE

DIRECT DRIVE BLOWER	BLOWER MOTOR	SPEED TAP	RPM	STATIC PRESSUR E (in w.c.)	CFM	A/C TONS	DIRECT DRIVE BLOWER	BLOWER MOTOR	SPEED TAP	RPM	STATIC PRESSUR E (in w.c.)	CFM	A/C TONS
DELHI GT 12-7 DD	3/4 HP 5 SPD	HIGH	1,045	0.50	1,610	4.00	LAU DD 12-8AT	3/4 HP 5 SPD	HIGH	1,010	0.50	1,775	4.25
		MED-HI	850		1,200	3.00			MED-HI	790		1,250	3.00
		MEDIUM	750		1,090	2.50			MEDIUM	720		980	2.25
		MED-LO	710		860	2.00			MED-LO	670		830	2.00
		LO	680		760	1.75			LO	510		740	1.75
DELHI GT 12-7 DD	3/4 HP 5 SPD	HIGH	1,040	0.20	1,735		LAU DD 12-8AT	3/4 HP 5 SPD	HIGH	980	0.20	1,975	
		MED-HI	760		1,260				MED-HI	700		1,340	
		MEDIUM	650		1,115				MEDIUM	610		1,040	
		MED-LO	585		915				MED-LO	540		910	
		LO	540		800				LO	500		810	
DIRECT DRIVE BLOWER	BLOWER MOTOR	SPEED TAP	RPM	STATIC PRESSUR E (in w.c.)	CFM	A/C TONS	DIRECT DRIVE BLOWER	BLOWER MOTOR	SPEED TAP	RPM	STATIC PRESSUR E (in w.c.)	CFM	A/C TONS
DELHI G10-8 DD	1/2 HP 4 SPD	HIGH	1,055	0.50	1,420	3.50	DELHI G9 DD	1/2 HP 4 SPD	HIGH	1,115	0.50	1,300	3.00
		MED-HI	1,010		1,280	3.00			MED-HI	1,090		1,230	3.00
		MED-LO	920		1,115	2.75			MED-LO	1,050		1,125	2.75
		LO	845		900	2.25			LO	1,000		1,065	2.50
DELHI G10-8 DD	1/2 HP 4 SPD	HIGH	1,015	0.20	1,540		DELHI G9 DD	1/2 HP 4 SPD	HIGH	1,095	0.20	1,495	
		MED-HI	925		1,390				MED-HI	1,050		1,380	
		MED-LO	795		1,180				MED-LO	985		1,230	
		LO	670		940				LO	890		1,140	
DIRECT DRIVE BLOWER	BLOWER MOTOR	SPEED TAP	RPM	STATIC PRESSUR E (in w.c.)	CFM	A/C TONS	BELT DRIVE BLOWER	BLOWER MOTOR	PULLEY TURNS OPEN	RPM	STATIC PRESSUR E (in w.c.)	CFM	A/C TONS
DELHI G9 DD or TORIN DC 916-916-5	1/3 HP 4 SPD	HIGH	1,095	0.50	1,250	3.00	DELHI G9 BD or TORIN BC 916-916-5 c/w 6" Pulley	1/2 HP c/w 3-1/4" VS Pulley	1	1,017	0.50	1,200	3.00
		MED-HI	1,045		1,165	2.75			1-1/2	970		1,050	2.50
		MED-LO	980		960	2.25			2	985		1,000	2.50
		LO	920		835	2.00			3	915		840	2.00
DELHI G9 DD or TORIN DC 916-916-5	1/3 HP 4 SPD	HIGH	1,065	0.20	1,415		DELHI G9 BD or TORIN BC 916-916-5 c/w 6" Pulley	1/2 HP c/w 3-1/4" VS Pulley	1-1/2	845	0.20	1,100	
		MED-HI	980		1,255				2	820		1,090	
		MED-LO	850		1,070				2-1/2	795		985	
		LO	750		875				3	770		970	

TABLE 3 - LFR GENERAL INSTRUCTIONS

MODEL	RIELLO BURNER	B.T.U.H. OUTPUT	B.T.U.H. INPUT (USGPH)	AFUE %	NOZZLE	PUMP p.s.i.	INSERTION inches	BURNER AIR BAND	SHUTTER	CHIMNEY FLUE PRESSURE (in. w.c.)	GROSS STACK °F	FILTER	DIRECT DRIVE TAP 10" BLOWER	9" BLOWER	EXTERNAL STATIC PRESSURE (in. w.c.)
LFR-88	40 F3	88,000	101,762(0.73)	81.7	Delavan 0.60 60A	150	2"	1.5	3.4	-0.02	380	20" x 25"	MED-LO	MED-HI	0.20
													MED-HI		0.50
LFR-75	40 F3	75,000	85,034(0.61)	81.2	Delavan 0.50 80B	150	2"	0.5	2.7	-0.02	350	20" x 25"	LO	MED-LO	0.20
													MED-LO	HI	0.50
													LO	MED-HI	0.50

MODEL	BECKETT BURNER	B.T.U.H. OUTPUT	B.T.U.H. INPUT (USGPH)	AFUE %	NOZZLE	PUMP p.s.i.	INSERTION inches	BURNER AIR SHUTTER	BAND	CHIMNEY FLUE PRESSURE (in. w.c.)	GROSS STACK °F	FILTER	DIRECT DRIVE TAP 10" BLOWER	9" BLOWER	EXTERNAL STATIC PRESSURE (in. w.c.)
LFR-89V	AFG70MM	89,000	101,762(0.73)	82.2	Hago 0.55 45B	180	2-3/8"	6	0	-0.02	400	20" x 25"	MED-LO	MED-HI	0.20
													MED-HI		0.50
LFR-80V	AFG70MM	81,000	93,398(0.61)	82.0	Hago 0.50 45B	180	2-3/8"	7.5*	0	-0.02	360	20" x 25"	MED-LO	MED-HI	0.20
													MED-LO	HI	0.50

* USE LOW FIRING RATE BAFFLE

MODEL	RIELLO BURNER	B.T.U.H. OUTPUT	B.T.U.H. INPUT (USGPH)	AFUE %	NOZZLE	PUMP p.s.i.	INSERTION inches	BURNER AIR TURB	SHUTTER	CHIMNEY FLUE PRESSURE (in. w.c.)	GROSS STACK °F	FILTER	DIRECT DRIVE TAP 10" BLOWER	9" BLOWER	EXTERNAL STATIC PRESSURE (in. w.c.)
LFR-86V	BF3	86,000	100,386(0.72)	82.3	Delavan 0.60 60A	145	2"	1.5	4.4	-0.02	380	20" x 25"	MED-LO	MED-HI	0.20
													MED-HI		0.50
LFR-73V	BF3	73,000	83,640(0.60)	81.9	Delavan 0.50 80B	145	2"	1	3.8	-0.02	350	20" x 25"	LO	MED-LO	0.20
													MED-LO	HI	0.50

MODEL	CARLIN BURNER	B.T.U.H. OUTPUT	B.T.U.H. INPUT (USGPH)	AFUE %	NOZZLE	PUMP p.s.i.	INSERTION inches	BURNER AIR POS BAR	BAND	CHIMNEY FLUE PRESSURE (in. w.c.)	GROSS STACK °F	FILTER	DIRECT DRIVE TAP 10" BLOWER	9" BLOWER	EXTERNAL STATIC PRESSURE (in. w.c.)
LFR-87	EZ PRO	87,000	101,762(0.73)	81.7	Delavan 0.60 60A	150	1-1/2"	0.60/0.65	0.75	-0.02	390	20" x 25"	MED-LO	MED-HI	0.20
													MED-HI		0.50
LFR-72	EZ PRO	73,000	85,034(0.61)	80.7	Delavan 0.50 60A	150	1-1/2"	0.5	0.60	-0.02	360	20" x 25"	LO	MED-LO	0.20

Models marked -V can be used with the Newmac SVS sealed vent system.

Use burner air settings as a guide only. Set burner air to give a trace of smoke. Re-adjust burner air to reduce CO₂ by 1 to 1.5 percent.

Take measurements with the burner cover & air ducts installed (if any). The minimum recommended temperature rise is 65°F.

The maximum allowable temperature rise is 85°F. Select speed to suit specific installation requirements.

Air temperature can be lowered by increasing the blower speed, lowering the firing rate, or increasing supply & return outlets.

TABLE 4 - LFR BLOWER PERFORMANCE

DIRECT DRIVE BLOWER	BLOWER MOTOR	SPEED TAP	RPM	STATIC PRESSURE (IN. W.C.)	CFM	A/C TONS
DELHI GT 10DD	1/3 HP 4 SPD	HIGH	1,080	0.50	1,200	3.00
		MED-HI	1,030		1,000	2.50
		MED-LO	960		875	2.00
		LO	910		750	1.75
DELHI GT 10DD	1/3 HP 4 SPD	HIGH	1,050	0.20	1,350	
		MED-HI	850		1,200	
		MED-LO	740		1,000	
		LO	670		800	

FURNACE LOCATION

IMPORTANT

Please read this entire manual and all labels before installing the furnace.

UNPACKING AND INSPECTION

It is the responsibility of the consignee of the unit to examine the packages for damage and, if found, to note the same on the Carrier's Bill of Lading.

The NH₃ furnace is shipped in one package complete with oil burner, draft regulator, filter racks, air filters, A/C Control Center (optional) and instruction manual. The LFR is shipped in two packages.

Caution: Remove shipping retaining bracket from blower before start-up.

HEAT LOSS

Before installation, verify the furnace output capacity meets the building heat loss requirements. A detailed heat loss analysis is recommended.

INSTALLATION REGULATIONS

This unit should be installed in accordance with the regulations of the authority having jurisdiction. In Canada the installation must conform to CSA Standard B139, "The Installation Code for Oil Burning Equipment." In the United States, the National Fire Protection Association Standard NFPA 31 should be followed. Check with provincial, state, or local codes concerning clearances, venting system requirements and other regulations governing installation. Some codes may vary from the requirements set forth in this manual.

FOUNDATION

To ensure the furnace is on a level foundation and above any possible dampness, a cement pad is recommended.

CLEARANCES

The minimum clearances to combustible materials are as follows:

	Side	Rear	Top	Front*	Flue Pipe	Floor
NH-3	6"	6"	1"	24"	9"	Combustible
LFR	1"	2"	1"	16"	9"	Combustible
* Measured from the panel on which the burner is installed. Allow sufficient room for servicing.						

FOR YOUR SAFETY: Do not store or use gasoline or flammable vapors and liquids in the vicinity of this or any other appliance.

VENTING PRODUCTS OF COMBUSTION

CHIMNEYS

A negative overfire pressure should be maintained. Locate the furnace as close to the chimney or flue as possible. The maximum draft is obtained by keeping elbows and pipe length to a minimum. Install the flue pipe with a gradual rise of at least 1/4" per foot from the furnace to the flue. Do not extend the flue pipe beyond the inside wall of the chimney. Refer to Table 11(a) and Table 11(b) for proper chimney flue sizing and Fig. 23 for optimizing chimney draft.

The owner shall provide a chimney constructed to comply with the following specifications:

(a) The chimney must be absolutely smoke tight throughout its entire length, and must extend at least three feet (3') above a flat roof or two feet above the ridges of peak roofs.

- (b) If built of a single thickness of brick or of cement blocks, it shall be lined throughout its entire length with fire clay lining, having not less than three-fourths inch (3/4") thickness. Flue lining is to be laid in mortar and made airtight. If the chimney is of the prefabricated type, it must be an approved class "A" chimney or type "L" Vent for interior.
- (c) The furnace flue must have no other openings for attaching any fireplace, stove, range, gas or ventilating connection unless the equipment is appropriately certified.
- (d) If it is necessary to offset the flue, it must be done in such a manner as not to reduce the gross cross-sectional area or create a ledge or obstruction, where loose material may lodge.
- (e) Flue pipe connections must be secured with metal screws.

CAUTION: Oil-fired appliances shall be connected to flues or vents having sufficient draft at all times to ensure safe and proper operation of the appliance.

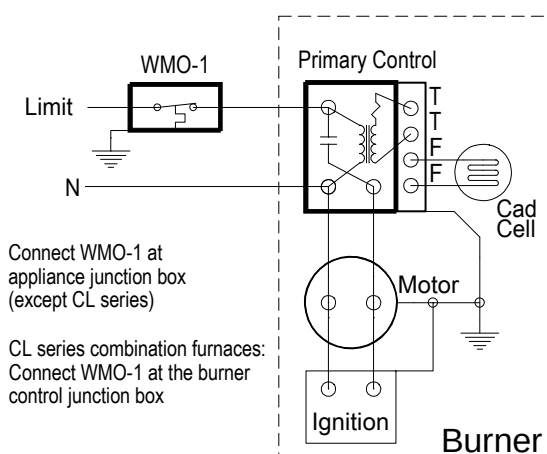
BAROMETRIC DRAFT REGULATOR

A Listed/Certified draft regulator must be installed between the appliance and the chimney, within easy reach for adjustment and free from obstruction. Use larger or multiple draft regulators for chimneys with strong draft. Follow the manufacturer's instructions located with the draft regulator for proper installation.

BLOCKED VENT SWITCH

The WMO-1 blocked vent control is required on Newmac oil-fired and combination furnaces or boilers installed in Canada. The WMO-1 switch must be installed on the chimney vent pipe for Newmac oil fired furnaces and boilers; and installed on the burner plate for Newmac combination wood/oil or coal/oil fired furnaces. Do not use the WMO-1 Blocked Vent Switch with the Newmac Sealed Vent System (SVS). Refer to the Newmac and Field Controls Instructions enclosed in the WMO-1 package.

Wiring WMO-1



POWER VENTING

The NH3 furnace is certified for use with Field Controls SWGII-5 Through the Wall Venter. This vent kit p/n 2040023 contains the NM-61 electronically activated post purge control. Secondary Safety Switch WMO-1 is optional. Consult installation codes for requirements and approvals governing power venters and draft inducers. Follow the instructions supplied with the vent system for proper installation.

LFR furnace models with the suffix -V are certified for use with the NEWMAC SVS sealed direct vent system.

PROPER DUCT SIZING

Locate the furnace as close as possible to the center of the heat distribution system and make sure the top is level. Refer to TABLES 6 and 7, DUCT SIZING FOR HEATING and COOLING in this manual.

AIR CONDITIONING

This appliance is designed to accommodate air conditioning equipment. A/C ready models incorporate a fan center transformer / relay. Live motor leads must be isolated on direct drive motors using a two speed fan & limit control or a suitable fan center control.

HUMIDIFIER

If a humidifier is installed, ensure water cannot drip on the heat exchanger. This will damage the furnace and void the warranty.

ELECTRICAL CONNECTIONS

The NH3-4 furnace is rated at 120V, 60Hz, 1-Phase, 20 Amp fuse.

The LFR and NH3 furnaces are rated at 120V, 60Hz, 1-Phase, 15 Amp fuse

See the furnace marking label. Follow the National Electrical Code as well as provincial, state, and local regulations. Figs. 13, 14 and 15 show standard wiring schematics.

FUEL SYSTEMS

Fuel not heavier than No. 2 fuel oil must be used. The oil supply tank must be of a listed or certified type acceptable to the regulatory authority having jurisdiction. Install the oil tank or tanks according to local codes and regulations. The tank should be kept at least 1/4 full. If a two-pipe system is used, suction and return lines should be of the same diameter and extend to the same depth in the tank. An emergency oil shut-off valve should be installed as required by local ordinance. This can be manual, electric solenoid, or vacuum operated. An oil safety valve that cuts the fuel supply unless a vacuum is created by the pump is recommended. Any leaks in the system will prevent oil from flowing. Suntec PRV or Webster OSV valves are recommended. Loop copper lines connected directly to the oil pump to reduce vibration. Use separate oil line for each individual appliance to prevent "loss of prime" problems.

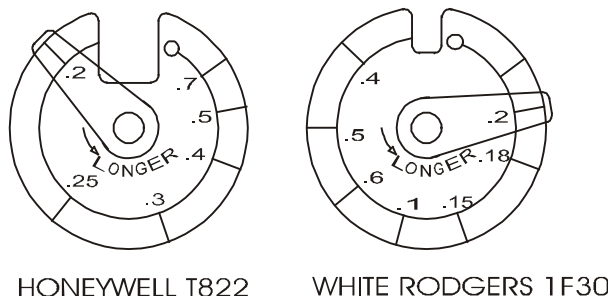
THERMOSTAT

Locate the thermostat on an interior wall free from drafts approximately 5 feet above floor level. The operation of the burner is normally controlled by the room thermostat, which may be set for the temperature desired, typically 70°F. if a higher or lower temperature is desired, the indicator should be set to the proper point on the scale.

THERMOSTAT HEAT ANTICIPATOR

To prevent short cycling, the heat anticipator should be set as recommended in the specifications for the burner primary control. This is typically set at 0.1 or 0.2 amps as indicated in Figure 1. This adjustment changes the thermostat's response time to prevent the room temperature from over-running the thermostat setting.

FIG. 1 - Heat Anticipator



WARNING: The heat anticipator will **BURN OUT** if 25 volts are applied directly to the thermostat by shorting out the primary control during testing or incorrect wiring. If this happens the thermostat warranty is void.

FAN & LIMIT CONTROL

This thermally operated control has a probe to sense air temperature inside the appliance adjacent to the heat exchanger. Fig. 3 shows the main parts of a Honeywell L4064 Fan & Limit Control. Refer to Fig. 4 for its settings. For controls equipped with the Manual-Auto switch button constant fan operation can be achieved by pushing it to the MAN position.

High Limit Setting: See Figs. 2, 3 and 4. **This setting is factory set – DO NOT CHANGE**

The high limit setting limits burner operation. When the air temperature inside the appliance reaches the set high limit value, overheating of the furnace is prevented by cutting power to the burner. When the temperature falls below the set high limit the burner power is restored.

Fan-On Setting: See Figs. 2, 3 and 4. This setting starts the air circulation blower when the burner has warmed the furnace to the fan-on temperature

Fan-Off Setting: See Figs. 2, 3 and 4. This setting keeps the air circulation blower running until the temperature of the heat exchanger drops to the fan-off temperature. This ensures the blower adequately cools the heat exchanger before shutting off and keeps cool air from being circulated through the ductwork.

Fan differential (difference between the Fan On & Fan Off settings) should be at least 15°F (8°C).

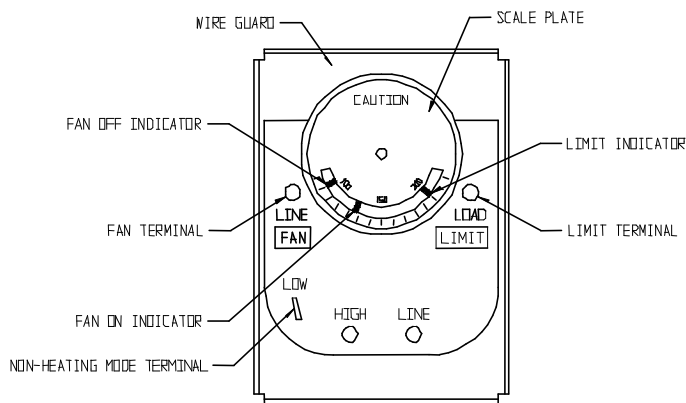


FIG. 2. TWO SPEED FAN & LIMIT CONTRL-L6064A

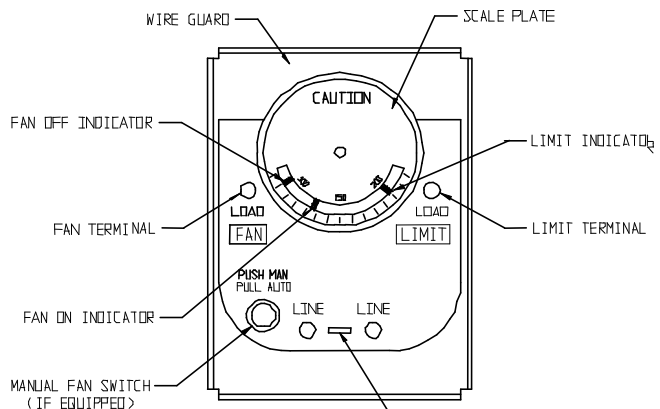


FIG. 3. SINGLE SPEED FAN & LIMIT - L4064B

FIG. 4. FAN AND LIMIT SETTINGS

	FAN ON	FAN OFF	LIMIT*
NH3	125	90	200
LFR	110	90	200
* Do not change high limit setting			

COMBUSTION AND VENTILATION AIR FOR CHIMNEYS & POWER VENTERS

Free air for combustion and ventilation must be permanently provided to the furnace room. Combustion air refers to the total air requirements of the fuel-burning appliance. This includes air for the combustion process and air to provide chimney draft (dilution air). Ventilation air provides free circulation of air in the room where the appliance is located to keep ambient temperatures within safe limits under normal conditions.

Furnaces installed in tight houses, in houses which have air-handling devices with unbalanced airflows, or in enclosed spaces are very likely to have homeowners complain of smoke, fumes, burner lockouts, and excessive fuel consumption. This is more prevalent in post 1985 construction due to the tighter building construction as prescribed by the latest building codes. Regulations are relatively specific on the minimum allowable quantities of ventilation and combustion air required once the space category is determined. However, every house is subject to different internal and external conditions and regulations vary among localities. With this in mind, Newmac recommends provision for combustion and ventilation air as specified in Table 5. Table 5 is based on relevant commonly available codes and regulations.

Values indicated in Table 5 are based on the maximum input rating for this single appliance. However, in making combustion and ventilation analysis the aggregate input rating of all appliances in the space must be considered. The installation of additional oil-fired appliances may require more combustion and ventilation air. When sizing combustion and ventilation air ducts, allowance must also be made for the blocking effect of louvers, grilles and screens. If the design and free area is unknown, wood louvers generally have 20-25% free area and metal louvers or grilles have 60-75% free area. Screens should not be less than 1/4 inch mesh.

TABLE 5. COMBUSTION & VENTILATION AIR SIZING

APPLIANCE	FLOOR AREA (Square feet)	SPACE CATEGORY	Vertical Ducts & Direct Opening Sizes			Horizontal Duct Sizes (in.)		
			Free Area	L X W (QTY)	Dia. (QTY)	Free Area	L X W (QTY)	Dia. (QTY)
			Total (in. ²)	(in. X in.)	(in.)	Total (in. ²)	(in. X in.)	(in.)
NH3	more than 725	Unconfined	30	4 x 8 (1)	6 (1)	30	4 x 8 (1)	6 (1)
	725 or less	Confined	72	4 x 9 (2)	7 (2)	145	4 x 18 (2)	10 (2)
LFR	more than 725	Unconfined	21	4 x 6 (1)	5 (1)	21	4 x 6 (1)	5 (1)
	725 or less	Confined	52	4 x 7 (2)	6 (2)	105	6 x 9 (2)	8 (2)

Free area of ducts assumes air is conveyed from outside

The following should be kept in mind when using Table 5:

- All applicable codes and regulations must be followed.
- Free duct area is for ducts and opening to outdoors.
- Unconfined free area values are based on 1 sq. in per 5,000 Btu/hr of the maximum input rating.
- Confined free area of vertical ducts is based on 1 sq. in per 4,000 Btu/hr of the maximum input rating.
- Confined free area of horizontal ducts is based on 1 sq. in per 2,000 Btu/hr of the maximum input rating.
- Two openings of equal size are required for confined spaces.
- Maximum length of run for ducts is 50 ft. Duct size allowances must be made for longer runs.
- Ducts should be designed or insulated to prevent condensation. If insulating, a minimum insulation value of R-3 is required.
- In the case where one opening or duct is specified and combustion and ventilation air is still inadequate, a second duct may be required. Locate one high and the other low for air circulation.

It is particularly important to duct the cold air as close to the appliance as possible. A means of closing the air openings when the appliance is not operating may be required. Except for an SVS sealed vent installation, outside air ducts should not be connected either to the burner or to the appliance.

Guidelines to determine the need for additional combustion and ventilation air may not be adequate for every situation. If in doubt, it is advisable to err on the safe side and provide additional air.

Fig. 5 shows a typical appliance installation. In this case there is a furnace and a water heater in an enclosed space--both require ventilation and combustion air which is delivered by the top and bottom air ducts.

As long as adequate combustion and ventilation air is supplied, the confined appliance room with ducted air offers several advantages:

- The incoming cold air is confined to the furnace room. Therefore, the residence occupants are less susceptible to drafts. Cool outdoor air will be tempered by the ambient temperature of the furnace room before it enters habitable spaces.
- Noise levels may be reduced.
- The furnace will be less susceptible to combustion spillage and back-drafting in low draft situations reducing odor and smoke. Moderate amounts of smoke and fumes will be contained and expelled safely outdoors.
- Incomplete combustion of any carbon-based fuel may produce deadly carbon monoxide. Ventilation may dilute any carbon monoxide produced under abnormal operating conditions.
- Adequate air for combustion will help maintain the proper air-fuel ratio. Appliances, which are burning fuel rich, will produce soot and burn excessive fuel. A 1/8 inch thick deposit of soot on the surface of the heat exchanger is equivalent to 1 inch of fiberglass insulation.
- Modern efficient oil burning appliances tend to be physically smaller than are their predecessors are. As a result, hot surfaces such as those on flue connectors are not as high off the ground or floor as they used to be. A separate furnace room with a "child proof" door is an important safety precaution.

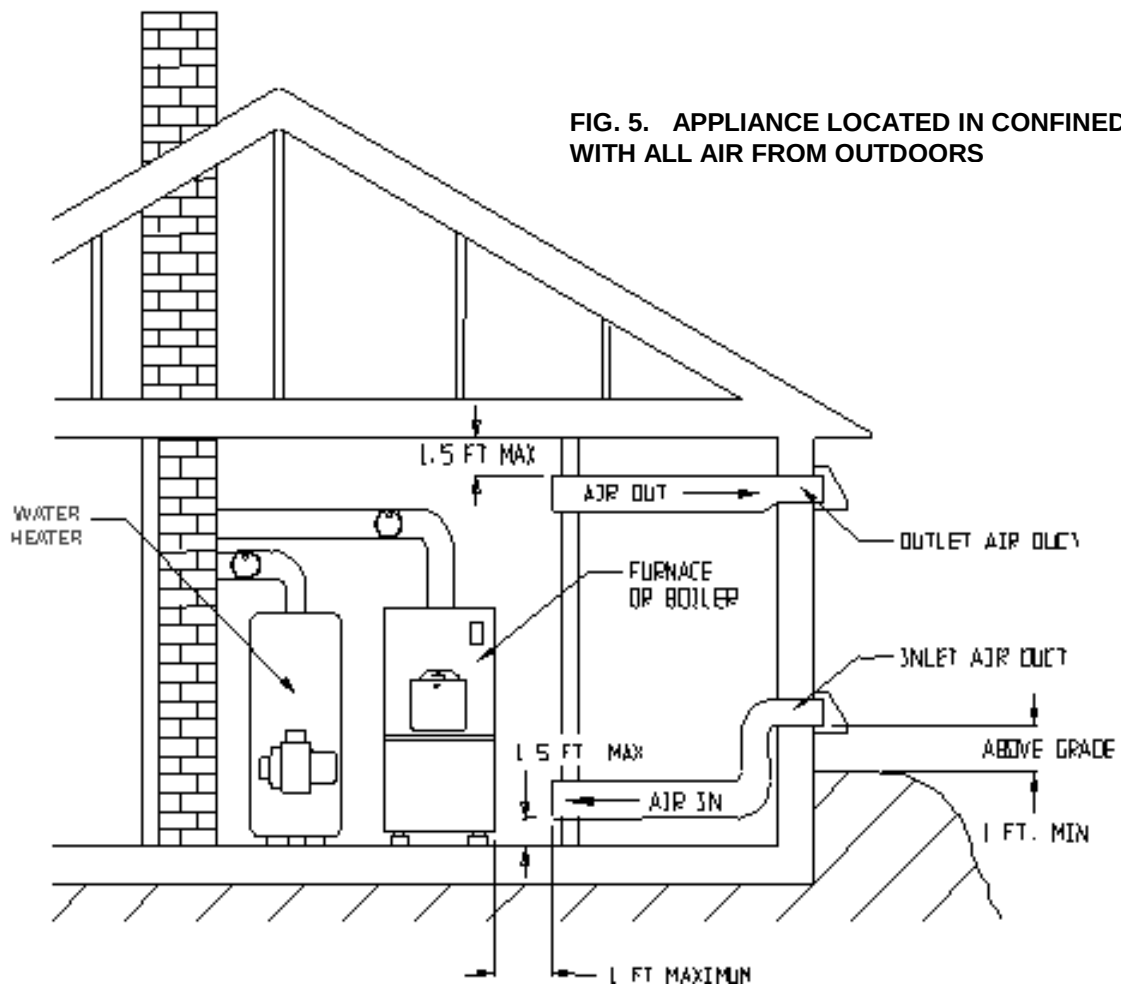


FIG. 5. APPLIANCE LOCATED IN CONFINED SPACE WITH ALL AIR FROM OUTDOORS

OIL BURNER INSTRUCTIONS

BURNER CARE

This burner is fully automatic in operation. All adjustments should be made by a qualified technician. Keep the burner free from excess dirt and moisture. Oil leaks should be tended to immediately. If the burner motor has oiler openings, the motor should be given a few drops of SAE 20 non-detergent oil at least two or three times a year. No other parts require lubrication.

CAUTION: *Do not use gasoline, crankcase or any oil containing gasoline. Do not tamper with the unit or controls--call the serviceman. Do not attempt to start the burner when excess oil has accumulated, when the unit is full of vapor, or when the combustion chamber is very hot. Do not start the burner unless the cleanout doors are secured in place. Do not burn garbage or paper in the heating system. Never leave combustible materials such as paper or rags near the unit.*

OIL BURNER INSTALLATION

Install the oil nozzle in the burner firing assembly, and check the adjustments. See Fig. 6 and Table 6 for the correct electrode settings. These settings are critical for proper burner operation. Some burner manufacturers have a gauge available for setting the electrodes. Most burners with adjustable heads have preset stops to ensure the distance from the nozzle face to the face of the retention head ("Z" dimension) is correct. Set or check the air tube insertion depth according to Fig. 7 and Table 6. This is the distance from the face of the burner-mounting flange to the face of the retention head. Mount the oil burner on the lugs of the burner plate carefully centering it in the combustion chamber port. Use TABLES 1 (NH3) or 3 (LFR), **GENERAL INSTRUCTIONS** for preliminary air settings for the burner.

BURNER SET-UP AND ADJUSTMENT

The installer must use a suitable draft gauge, smoke tester, carbon dioxide tester, 0-750°F stack thermometer, 0-200 psi oil pressure gauge, 0-30 in. Hg. vacuum gauge, and 0-220°F thermometer to properly set-up the burner.

1. Turn on supply power and set the thermostat above room temperature.
2. Open all oil lines and valves.
3. Make sure the oil pump by-pass plug is correctly installed for a one or two pipe system. Bleed any air from the oil pump (refer to pump manufacture's instructions).
4. Adjust the burner air until a #1 smoke or less is reached using a smoke tester. If a smoke tester is unavailable, slowly close the air band until the fire becomes smoky. Slowly increase the air until a small amount of smoke is observed at the flame tips.

If the burner fails to start, check (a) oil supply, (b) ignition electrodes and transformer, (c) cad cell. If the burner goes off on safety, do not push the reset button on the primary control for at least 10 minutes.

Do not push the reset button more than once before correcting the cause. If the burner still does not start, press the reset on the burner motor.

5. Using a suitable draft meter, adjust the barometric draft regulator to measure the specified flue pressure. This requires that a 5/16" diameter sampling hole be made between the flue collar and the draft regulator.

EXTENDED SHUT DOWN PERIODS

When the appliance is not to be used for an extended period of time, set the thermostat at its lowest value, turn off the main switch and close the oil burner supply valve. If the heating unit room is damp, protect the burner against dirt and moisture with a light cover. To resume operation, remove the cover and inspect the burner. Remove any dirt and debris gently to avoid the need to adjustment the air band. Open the supply valve and turn on the main switch. If the burner fails to operate, see the **MAINTENANCE & SERVICE** section of this manual.

ELECTRODE SETTINGS

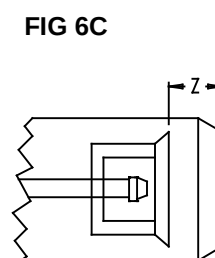
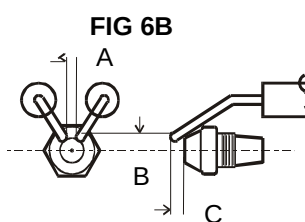
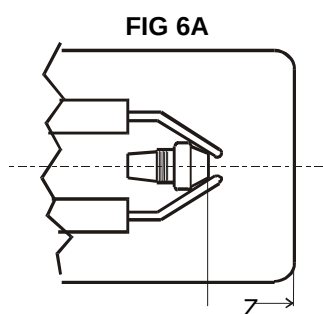


FIG 7 BURNER INSERTION

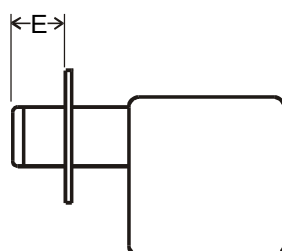


TABLE 6 DIMENSIONAL RELATIONSHIPS (Figs 6 & 7)

	Riello 40 or BF	Beckett Std. Head	Beckett Adj. Head	Aero	Carlin
A	5/32"	5/32"	5/32"	1/8"	1/8" to 5/32"
B	13/64"	7/16"	7/16"	7/32"	5/16"
C	5/64" to 7/64"	1/16"	1/16"	1/8"	1/16"
Z	Refer to Turbulator Setting	1-1/8" (Fig 6A)	1-3/4" (Fig 6C)	1-1/8" (Fig 6A)	Use Positioning Bar
E - NH3	4-5/8"	5"	5"	5"	5"
E - LFR	2"	2-3/8"	2-3/8"	2"	1-1/2"

Use burner manufacturer's gauge if supplied.

OIL FILTER

Use a 10 micron or better filter. We recommend an additional in-line filter. The oil filter should be cleaned or replaced at least once a year by the serviceman.

OIL PUMP AND FUEL SYSTEM

Make sure the by-pass plug is correctly located for a one or two pipe system. Failure to do so may damage the pump. Generally, for 3/8" copper tubing, the vertical lift should not exceed 8 feet and the horizontal run should be limited to 30 feet. Do not exceed 10 psi inlet line pressure.

Single pipe systems are recommended for gravity feed or when the tank outlet is at a higher elevation than the pump inlet. Refer to Fig. 10. The inlet vacuum should be no more than 6" Hg.

Two pipe systems are recommended for lift feed or when the pump inlet is at a higher elevation than the tank outlet. Install the return line termination higher than the supply intake as shown in Fig. 10. Generally, the inlet vacuum should be no more than 12" Hg.

Correct piping is critical to long-term operation of the fuel system. Never use compression fittings. Minimize the resistance to flow due to excessive line lengths; high lift; and unnecessary fittings, kinks and bends. This will decrease the running vacuum and the risk of air separation. A "Tigerloop" fuel oil de-aerator may improve the performance of poorly designed fuel oil delivery systems.

BURNER OIL PRESSURE CHECK

Install the pressure gauge directly on the gauge or nozzle port. Adjust to the pressure specified by Newmac for the nozzle input rating. Refer to TABLE 1 (NH3) or 3 (LFR), **GENERAL INSTRUCTIONS** in this manual or the certification label on the appliance.

Each oil burner should have its own suction line. A common return line can be used as long as the diameter is large enough. Check valves are not required on properly installed systems. Service on fuel units should not be attempted without a suitable vacuum and pressure gage.

FIG. 8. TYPICAL OIL PUMP

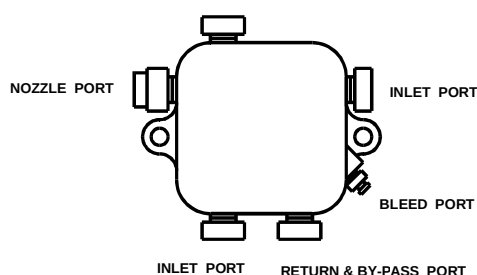
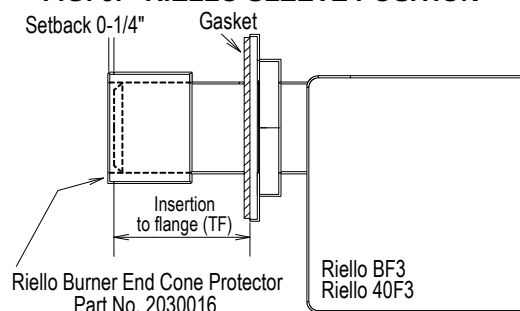


FIG. 9. RIELLO SLEEVE POSITION



The oil piping information presented here is intended as a guide only. For piping system design data, consult the installation instructions from the pump manufacturer.

FURNACE SET UP AND MAINTENANCE

BLOWER MOTORS

Motor manufacturers supply some motors that do not require oiling. Oil ports usually have plastic covers and are found on the motor end caps. If oil ports are not incorporated, oiling is not required. For motors with provision for re-oiling use SAE 20 non-detergent oil or oil specially formulated for electric motors. Use only a few small drops two or three times a year.

COMBUSTION CHAMBER

For the NH3, make sure the cerafelt combustion chamber was not damaged or mis-aligned during shipping. Inspect the combustion chamber periodically and replace if necessary. The LFR has no cerafelt combustion chamber.

SMOKE BAFFLES

Both the NH3 and the LFR furnaces have factory installed smoke baffles inside the radiator ducts.

NH3 - Check to ensure they have not become dislodged during shipping. They can be checked and repositioned, if necessary, by reaching in through the breech pipe and pushing them down the tubes so their stop tabs are flush against the welds.

LFR – The baffles are accessed through the front cleanout covers. No adjustment is normally necessary.

AIR FILTER RACK

NH3 - The air filter rack can be positioned on the left or right.

NH3-4 - The filter racks shipped with the furnace mount on both sides. Knockouts are provided at the corners to cut the opening. The opening in the rack for sliding in the filters should face the front of the furnace, unless there is enough clearance at the rear to change the filters without damage — at least 24 inches.

LFR – See FIG. 12. The air filter rack can be positioned on the left or right, rear or base of the blower compartment. The left and right openings are already cut; the one which is not in use is covered by a side panel. If a rear or base opening is required it should be cut (17-3/4" x 13-3/4"). An additional side cover can be obtained from Newmac to cover the unused side opening.

AIR FILTERS

Air filters should be inspected monthly and changed as required. At least two changes are usually required during the heating season—more may be necessary if dusty conditions exist. Remove the filter gently to prevent dust spillage. Install filters of the same size and type. Check filter markings for correct orientation.

BLOWER REMOVAL

Disconnect power before removing or servicing the blower. Remove the burner and blower access panels on the front of the furnace. Remove the nut and bolt that fastens the blower locking plate to the fan partition and slide the blower locking plate out. The blower is mounted on slide rails which allow it to be pulled forward for servicing. The wiring harness has sufficient length so that it can be removed without disconnecting the motor leads. If the capacitor leads need to be removed, short the terminals with an insulated screwdriver before handling.

BLOWER ADJUSTMENT

This unit is designed for a maximum temperature rise through the furnace of 85° F at a maximum external static pressure of 0.50 inches of water column. However, due to the wide range of static pressures in duct systems, it is the responsibility of the installer to verify that the temperature rise does not exceed 85° F. To measure the actual temperature rise let the unit operate for at least five minutes. Insert a thermometer and note the temperature of the warm air supply at a point at least 24 inches upstream from the heat exchanger surface. Next measure the temperature at the return air grill and take the difference. Air temperature rise can be lowered by increasing the blower speed; lowering the firing rate; or increasing undersized supply and return air free area. The furnace will not operate properly and its life will be decreased if insufficient air quantity passes over the heat exchanger. Similarly, too much air during heating mode resulting in a temperature rise of less than 65° F may cause heat exchanger degradation due to condensation.

DIRECT DRIVE BLOWER

The installer should select the best speed tap for the specific installation. Recommended speed taps for heating are given in TABLES 1 (NH3) AND 3 (LFR) GENERAL INSTRUCTIONS. The motor RPM will vary over a range of static pressures. The blower heating speed can be changed by moving the black wire harness lead to another speed tap on the terminal block located inside the blower compartment. Refer to TABLES 2 (NH3) and 4 (LFR), BLOWER PERFORMANCE for airflow data. A second speed for non-heating modes can be selected using the red wire harness lead. See FIG. 13 and 14 for WIRING SCHEMATICS.

BELT DRIVE BLOWER – NH3 only

The air delivery (CFM) and temperature can be varied by adjusting the motor pulley. Closing the pulley increases blower speed and decreases temperature rise. Opening the pulley decreases the blower speed and increases the temperature rise. A 6 inch diameter blower pulley is required for 0.20 inch w.c. static pressure. A 5 inch diameter pulley is used for 0.20 inch w.c. static pressure. Correct belt tension allows a 1 inch deflection midway between the pulleys. Too much tension will overload the motor—too little tension will cause slippage.

Pulley combinations vary according to the fuel input and duct static pressure. Recommended pulley combinations for heating mode are given in TABLE 1 (NH3), GENERAL INSTRUCTIONS. Refer to TABLE 2 (NH3), BLOWER PERFORMANCE for air flow data.

An optional two-speed motor is available. The low speed can be used in non-heating mode. If the unit is not factory wired for a two-speed motor, connect the red wire of the blower wire harness to the correct motor lead. See FIG. 15 for STANDARD WIRING SCHEMATIC - BELT DRIVE and follow the motor manufacturer's instructions. Make sure replacement and retrofit belt drive motors meet or exceed the OEM motor specifications. Two speed belt drive motors are available from Newmac.

MAINTENANCE & SERVICE

Maintenance and servicing must be done by a qualified burner technician or shortened furnace life and poor efficiency may result. Under Tests and Observations and Requirements in CSA B139, the installer is required to perform tests to ensure proper and safe operating conditions. Newmac requires the installer to fill out the **INSTALLER INFORMATION** sheet found in this manual.

CLEANING

The heat exchanger should be inspected on an annual basis. If cleaning is required, remove the cleanout cover. Use a wire brush or cleaning tool (available from Newmac) to loosen scale and soot and a vacuum cleaner to remove it from the furnace. Replace gaskets if necessary before replacing the cleanout cover. A layer of soot on the heat exchanger surfaces and firetube walls will reduce heat transfer and can increase fuel consumption significantly. A 1/32" layer of soot acts as an insulator and can result in a 3% increase in the amount of oil burned. A 1/16" layer may result in an average fuel loss of 8%.

When removing the burner, cleanout or cover panels take care not to damage gaskets.

NH3 FURNACE - take care not to break the combustion chamber. Removal of the combustion chamber plate assembly allows a more thorough inspection and cleaning.

Replace all parts properly before starting the appliance.

WARRANTY

The following information is required to process warranty claims: owner's name and address; furnace serial number, model number, installation date; and installer's name, address and phone number. A "Returned Goods Number" must be issued by Newmac prior to acceptance of returned goods. Refer to the LIMITED LIFETIME WARRANTY for terms and conditions.

IMPORTANT HOMEOWNER INSTRUCTIONS

1. AN EMERGENCY POWER SWITCH IS REQUIRED TO BE INSTALLED IN A CONVENIENT LOCATION AT A SAFE DISTANCE FROM THE BURNER. THIS SWITCH INTERRUPTS THE ELECTRICAL SUPPLY CIRCUIT TO THE APPLIANCE. MAKE SURE YOU ARE AWARE OF ITS LOCATION AND THE OFF POSITION IS CLEARLY MARKED.
2. KEEP THE SPACE CLEAR AROUND THE APPLIANCE WITHIN THE SPECIFIED CLEARANCES TO COMBUSTIBLES.
3. ENSURE THE SUPPLY OF COMBUSTION AIR TO THE APPLIANCE IS NOT OBSTRUCTED OR CUT-OFF.
4. MAINTAIN PROPER VENTILATION OF THE APPLIANCE AREA.
5. MAINTAIN FREE AIR FLOW THROUGH THE RETURN AIR REGISTERS. *
6. CONTACT SERVICE PERSONNEL BEFORE REMODELLING.
7. CONTACT SERVICE PERSONNEL FOR ANNUAL SERVICE AND MAINTENANCE.
8. CONTACT SERVICE PERSONNEL FOR AIR FILTER REPLACEMENT. *
9. CONTACT SERVICE PERSONNEL BEFORE AND AFTER EXTENDED PERIODS OF APPLIANCE INOPERATION.
10. THE BURNER IS FULLY AUTOMATIC IN OPERATION. ALL ADJUSTMENTS SHOULD BE MADE BY A QUALIFIED TECHNICIAN. DO NOT PUSH THE RESET BUTTON MORE THAN ONCE.

CAUTION : DO NOT ATTEMPT TO START THE BURNER WHEN EXCESS OIL HAS ACCUMULATED, WHEN THE APPLIANCE IS FULL OF VAPOUR, OR WHEN THE COMBUSTION CHAMBER IS VERY HOT.

11. **CAUTION : DO NOT TAMPER WITH THE APPLIANCE OR CONTROLS—CALL YOUR SERVICE PERSONNEL.**
12. **DO NOT USE GASOLINE, CRANKCASE OIL, OR ANY OIL CONTAINING GASOLINE**
13. ALWAYS KEEP THE OIL SUPPLY VALVE SHUT OFF IF THE BURNER IS SHUT DOWN FOR AN EXTENDED PERIOD OF TIME.
14. DO NOT START THE BURNER UNLESS THE BLOWER ACCESS DOOR IS SECURED IN PLACE.
15. NEVER BURN GARBAGE OR PAPER IN THE HEATING SYSTEM, AND NEVER LEAVE PAPER OR RAGS AROUND THE APPLIANCE.

* FURNACES ONLY

FIG. 10. TYPICAL OIL TANK PIPING INSTALLATIONS

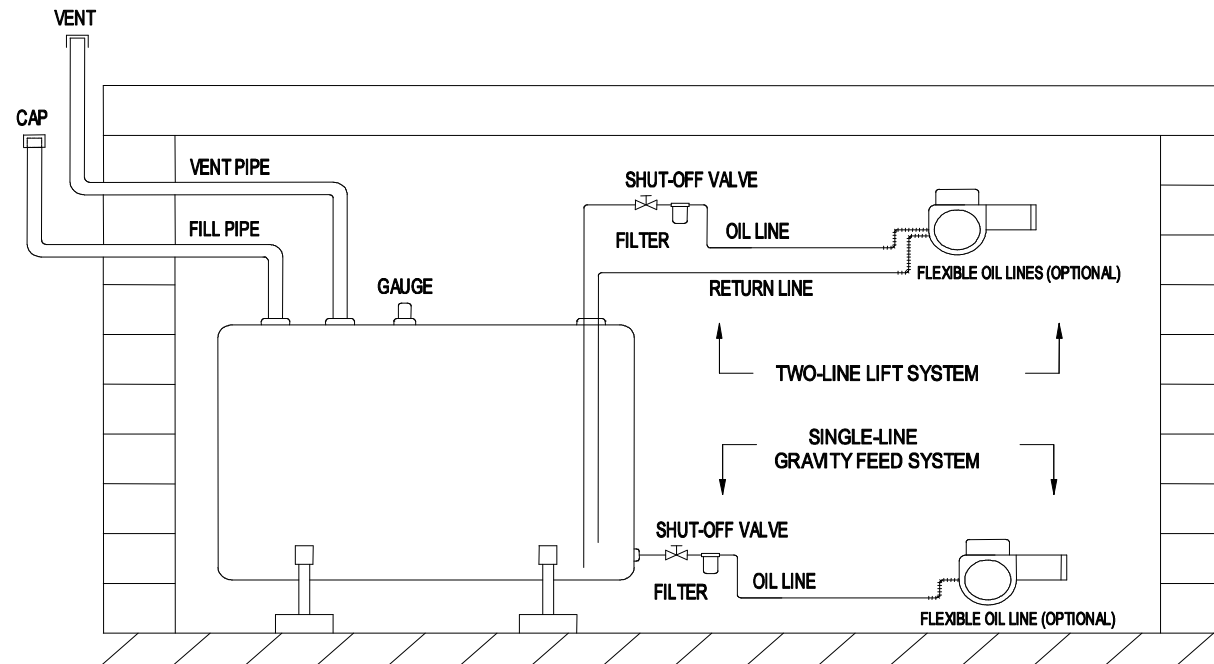
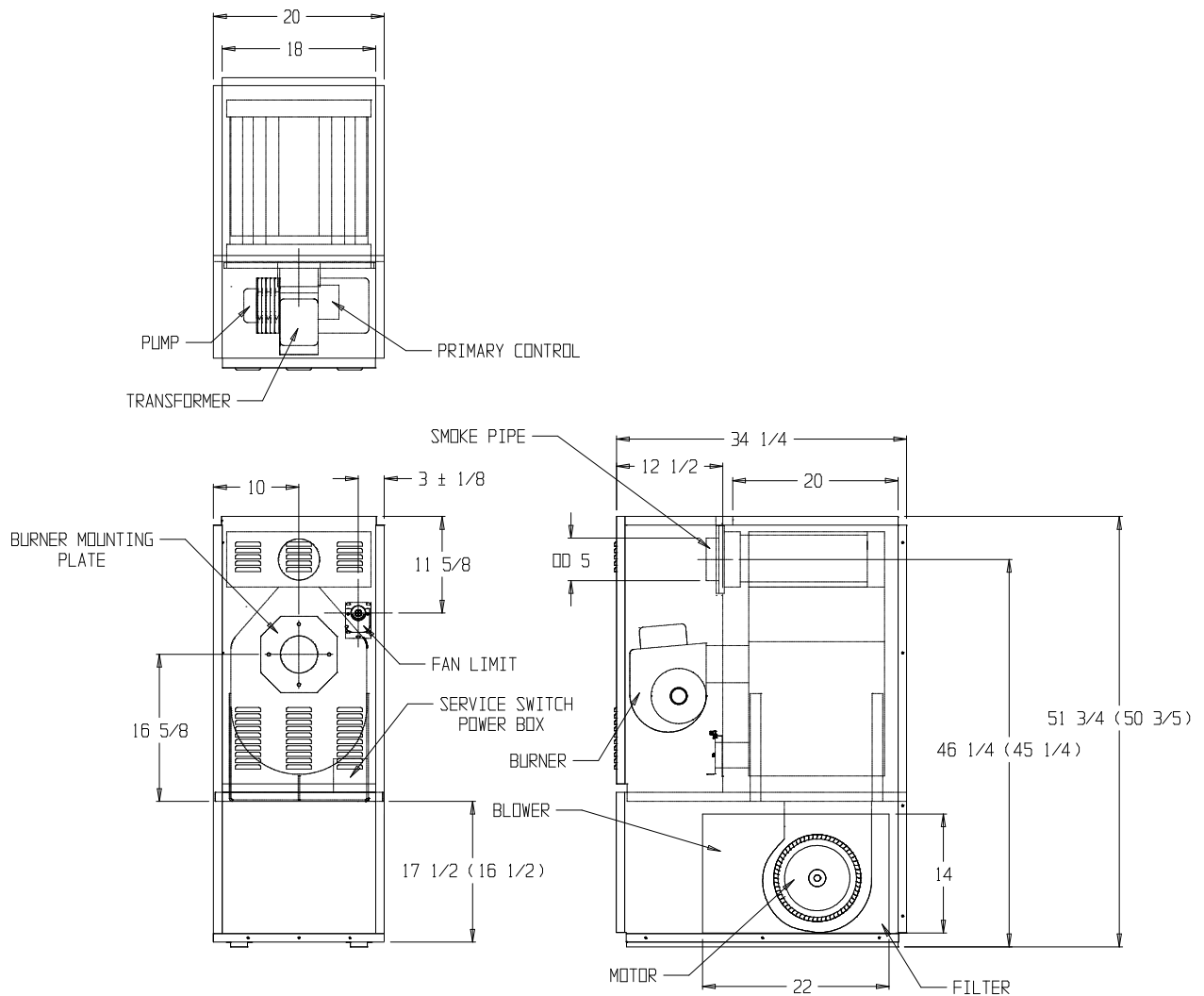


FIG. 11. DIMENSIONS & CONTROL LOCATION – NH3



DIMENSIONS IN BRACKETS ARE FOR MODEL BUILT BEFORE JUNE 1999

FIG. 12. LFR SET UP

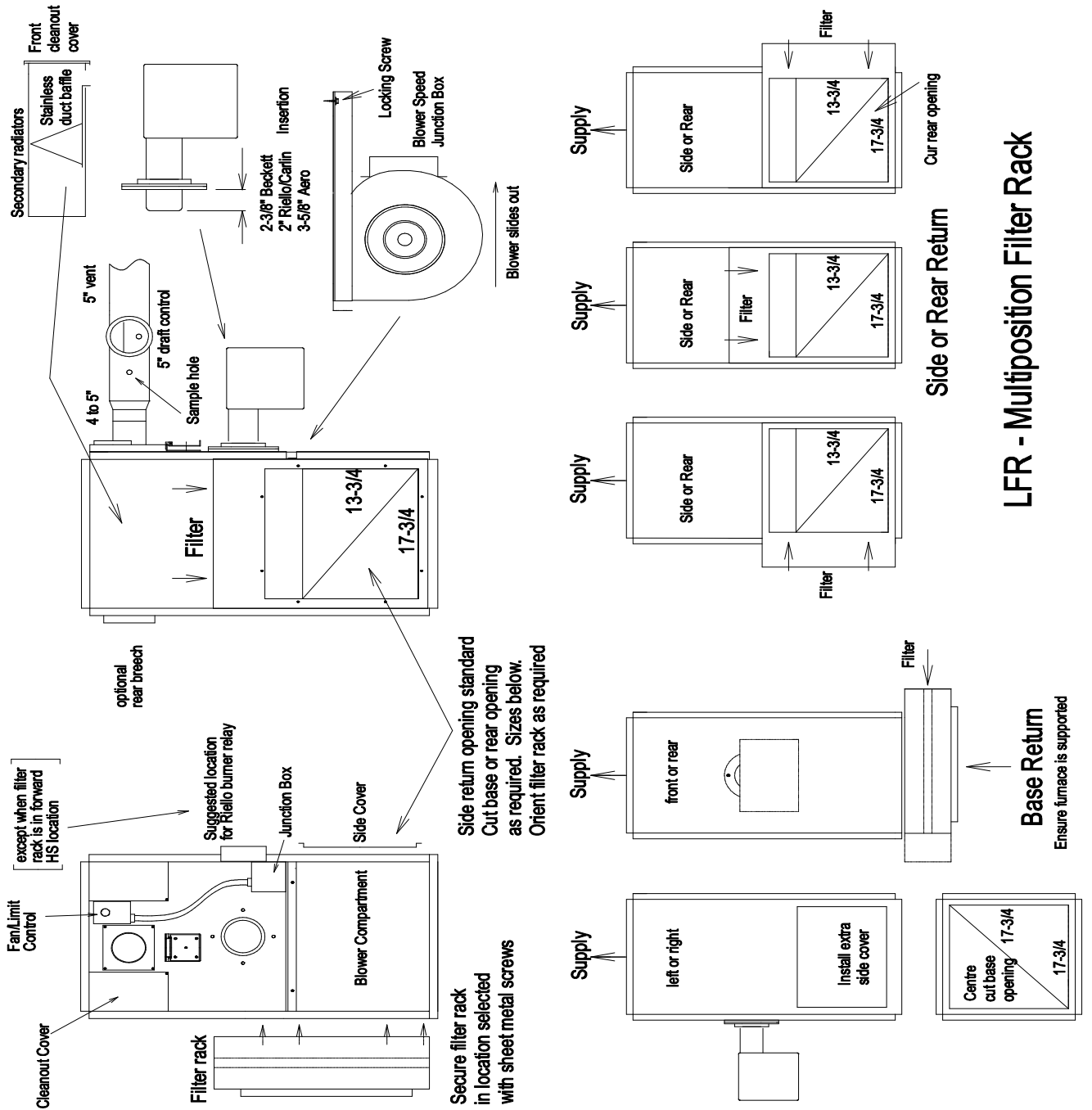
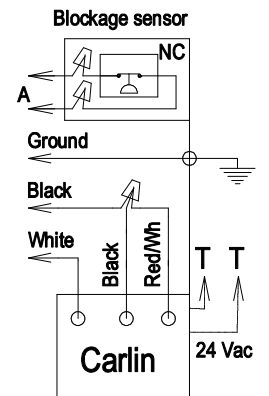
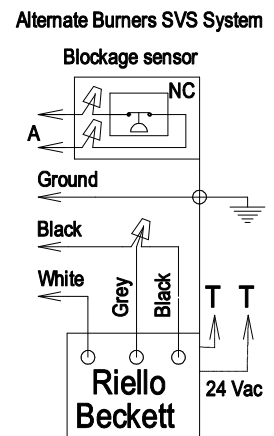
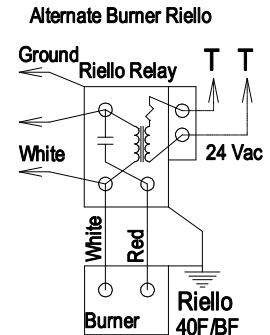
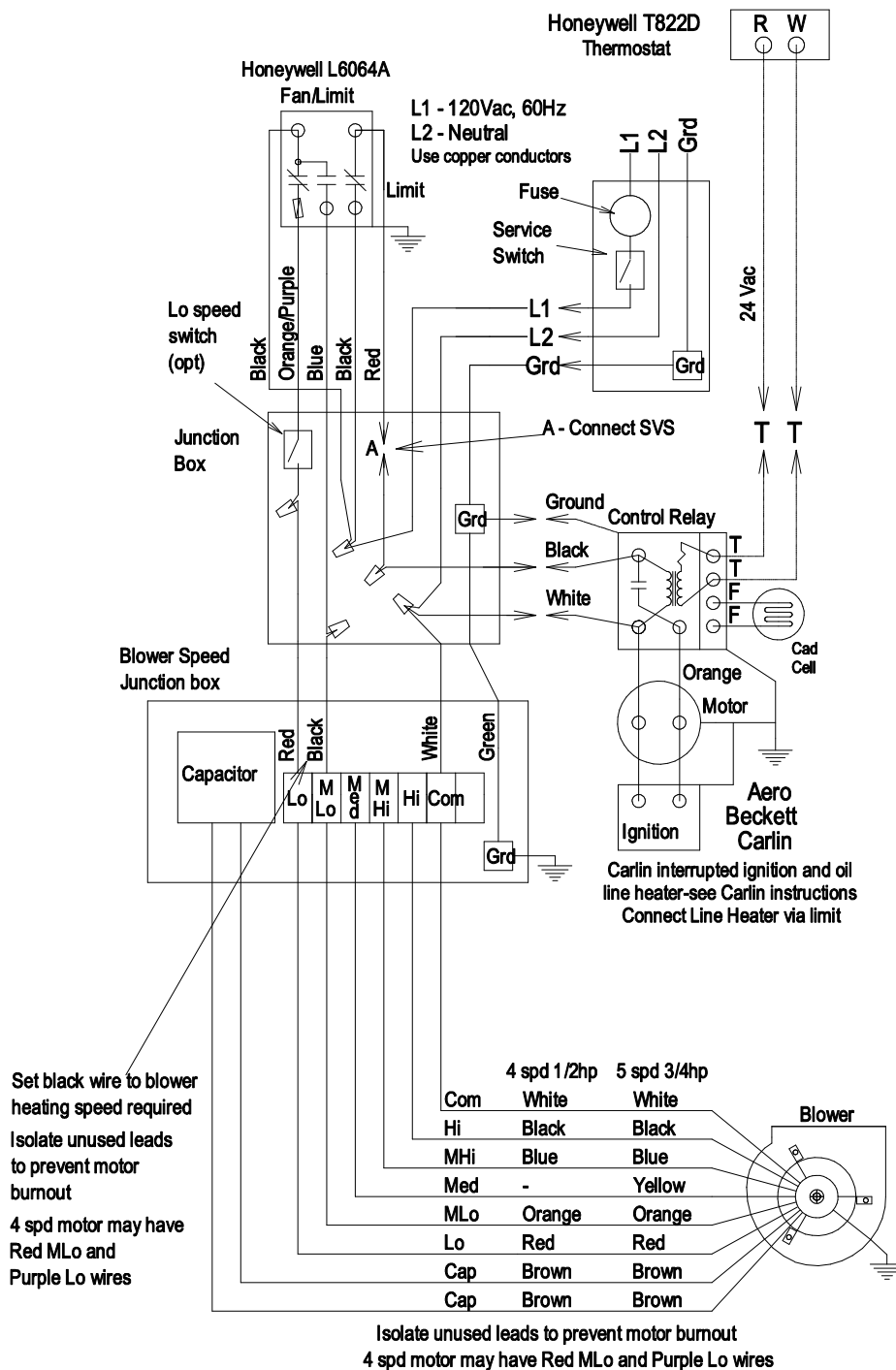


FIG. 13. STANDARD WIRING SCHEMATIC - DIRECT DRIVE



Carlin interrupted ignition and oil line heater-see Carlin instructions
 Connect Line Heater via limit

SVS Sealed Vent System
 Models with suffix -V
 See SVS Installation Instructions

FIG. 14. STANDARD WIRING SCHEMATIC - A/C READY DIRECT DRIVE

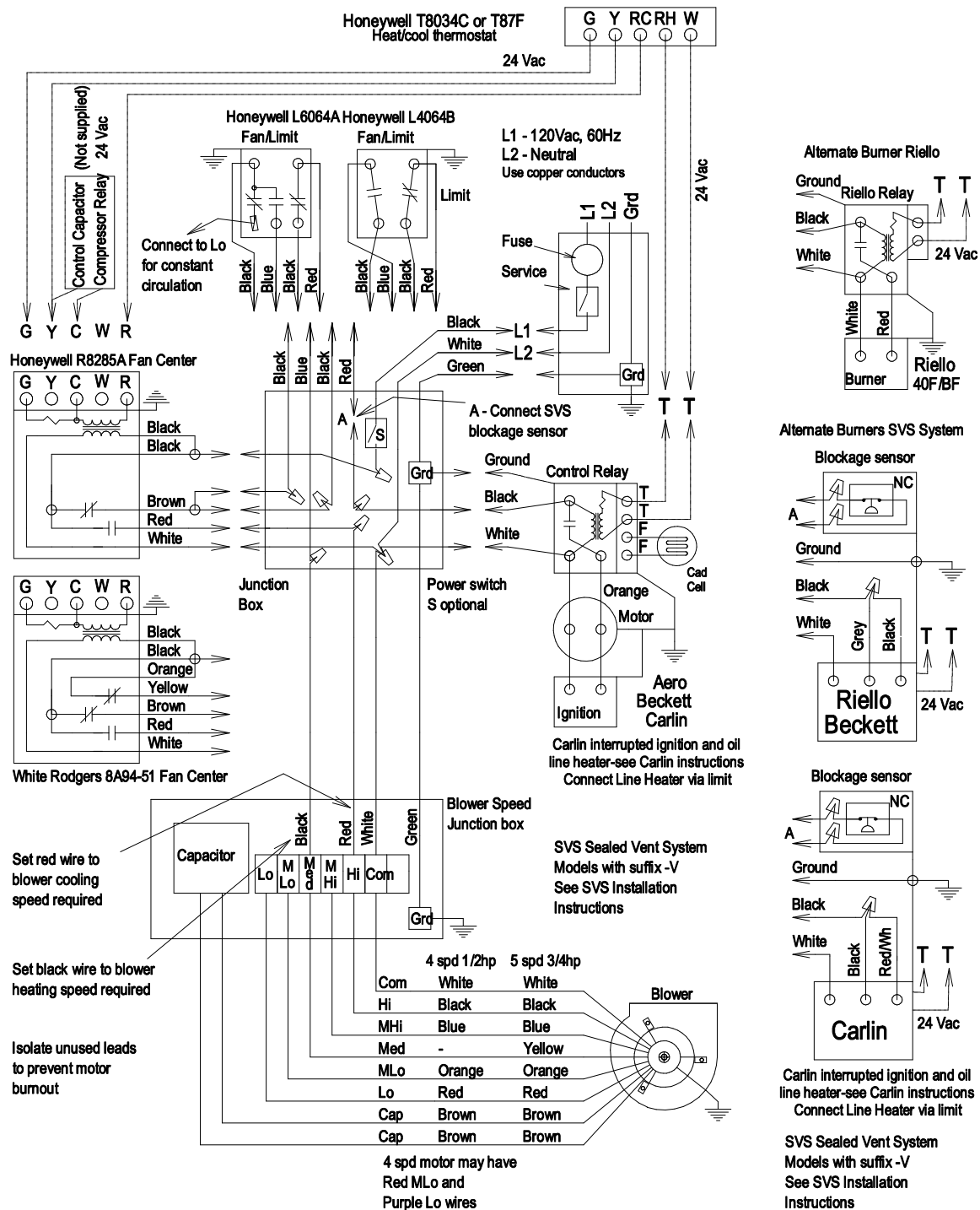


FIG. 15. STANDARD WIRING SCHEMATIC - BELT DRIVE

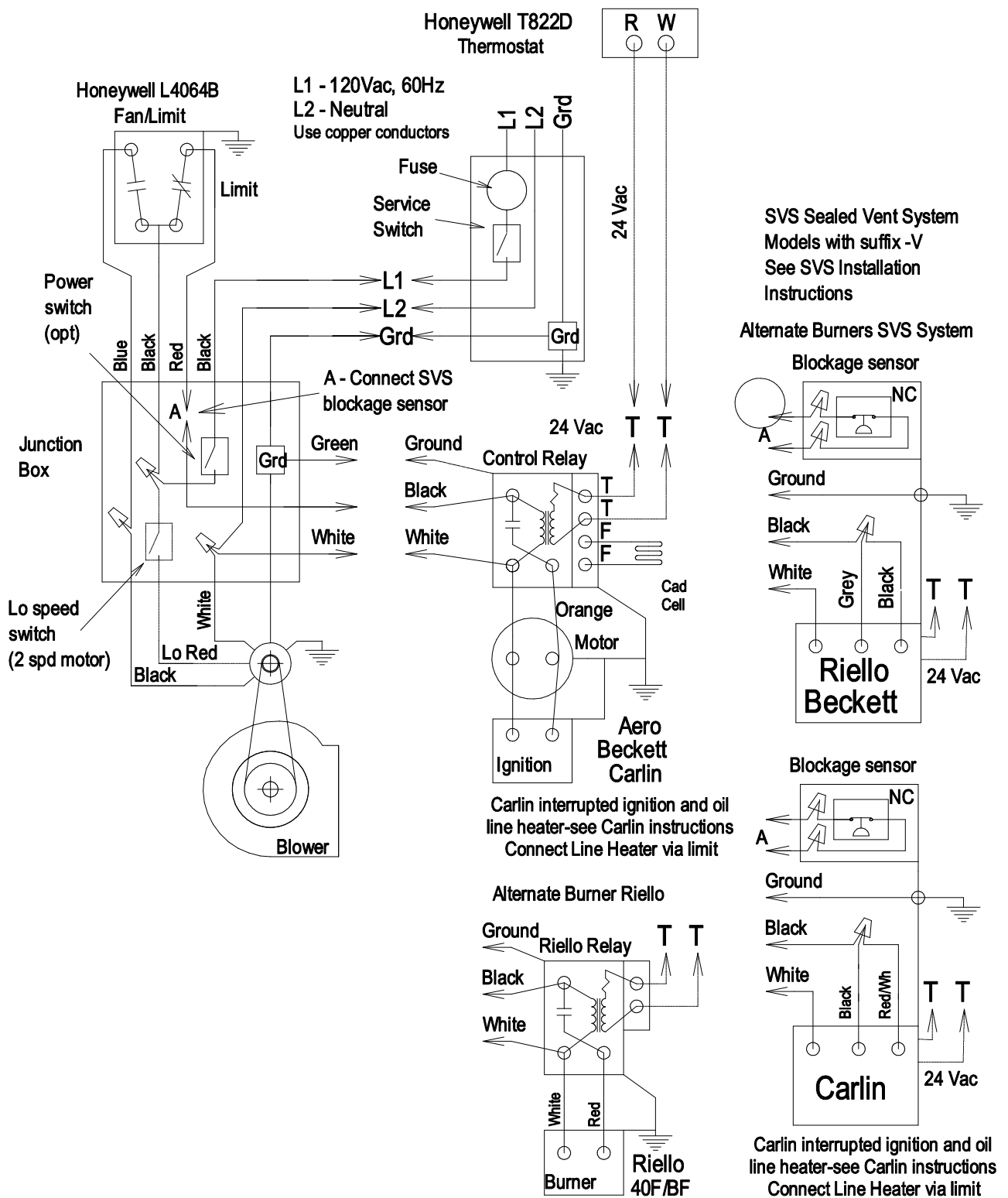


TABLE 6. DUCT SIZING FOR HEATING WITHOUT A/C COIL

OUTPUT CAPACITY (See Notes)	Min. Air Flow Req'd.	Supply Duct or Extended Plenum @ 800 FPM	Min. Sq. Inch Needed for Spec. CFM (Total Area of All Supply Duct)	Min. Number Supply Runs @ 600 FPM				MINIMUM SIZE	
				5" RUNS 80 CFM	6" RUNS 115 CFM	7" RUNS 155 CFM	3 1/2" X 14" 170 CFM	Return Duct Furnace or Air Handler @ 800 FPM	Return Air Grille (or equivalent) @ Face Velocity of 500 FPM
45,000 to 55,000	500 CFM	14" X 8" or 12" round	100	7	5	4	3	14" X 8" or 12" round	12" X 12"
60,000 to 70,000	700 CFM	18" X 8" or 14" round	140	10	6	5	4	18" X 8" or 14" round	24" X 10"
75,000 to 85,000	800 CFM	22" X 8" or 14" round	170	10	7	5	5	22" X 8" or 14" round	24" X 12"
95,000 to 105,000	900 CFM	24" X 8" or 15" round	190	12	8	6	6	24" X 8" or 15" round	24" X 12"
105,000 to 115,000	1100 CFM	22" X 10" or 16" round	220	-	10	7	7	22" X 10" or 16" round	30" X 12"
125,000 to 150,000	1400 CFM	24" X 12" or 18" round	280	-	12	9	8	24" X 12" or 18" round	30" X 14"
155,000 to 160,000	1600 CFM	1 - 35" X 10" or 20" round or 2 - 22" X 8"	360	-	14	10	10	32" X 10" or 20" round	30" X 18"
165,000 to 170,000	1800 CFM	1 - 35" X 12" or 2 - 22" X 10"	420	-	16	12	11	32" X 12"	30" X 20"
175,000 to 190,000	2000 CFM	1 - 35" X 14" or 2 - 22" X 12"	480	-	18	13	12	32" X 14"	30" X 22"

Notes: 1. BTUH with maximum temperature rise.
2. Gas furnaces are rated in input capacity. Rated output capacity is 80 % of input.
3. Oil and electric furnaces are rated in output capacity.

TABLE 7. DUCT SIZING FOR HEATING & COOLING WITH A/C COIL IN DUCT

Air conditioning systems should never be sized on the basis of floor area alone. Knowledge of the approximate floor area (sq. ft.) that can be cooled with a ton of air conditioning will be of invaluable assistance to you in avoiding serious mathematical errors.

Size of O.D. Unit	Normal Air Flow Req'd @ 400 CFM per Ton	Furnace		Supply Duct or Extended Plenum @ 800 FPM	Min. Number Supply Runs @ 600 FPM				Min. Return Duct Size at Furnace or Air Handler @ 800 FPM	Min. Return Air Grille Size (or equivalent) @ Face Velocity of 500 FPM
		Blower Motor H.P.	Blower Wheel Dia. X Width		5" RUNS 80 CFM	6" RUNS 115 CFM	7" RUNS 155 CFM	3 1/2" X 14" 170 CFM		
1 1/2 ton 18,000 BTUH	600 CFM	1/4 H.P.	9" X 8" 10" X 8"	16" X 8" or 12" round	8	5	4	4	16" X 8" or 12" round	24" X 8"
2 ton 24,000 BTUH	800 CFM	1/4 H.P.	9" X 9" 10" X 8"	22" X 8" or 14" round	10	7	5	5	22" X 8" or 14" round	22" X 12"
2 1/2 ton 30,000 BTUH	1000 CFM	1/3 H.P.	10" X 8" 10" X 10" 12" X 9"	20" X 10" or 16" round	13	9	7	6	20" X 10" or 18" round	30" X 12"
3 ton 36,000 BTUH	1200 CFM	1/3 H.P.	10" X 8" 10" X 10" 12" X 9"	24" X 10" or 18" round	-	11	8	7	24" X 10" or 18" round	30" X 12"
3 1/2 ton 42,000 BTUH	1400 CFM	1/2 H.P. 3/4 H.P.	10" X 8" 10" X 10" 12" X 9" 12" X 10"	24" X 12" or 18" round	-	12	9	8	24" X 12" or 18" round	30" X 14"
4 ton 48,000 BTUH	1600 CFM	1/2 H.P. 3/4 H.P.	12" X 7" 12" X 9" 12" X 10" 12" X 12"	32" X 10" or 20" round	-	14	11	10	32" X 10" or 20" round	30" X 18"
4 1/2 ton 54,000 BTUH	1800 CFM	3/4 H.P. 1 H.P.	12" X 8" 12" X 9" 12" X 10" 12" X 12"	32" X 10" or 20" round	-	16	12	11	32" X 12" or 22" round	30" X 20"
5 ton	2000 CFM	3/4 H.P. 1 H.P.	12" X 10" 12" X 12"	32" X 10" or 20" round	-	18	13	12	32" X 14"	30" X 22"

FIG. 16. NH3 EXPLODED ASSEMBLY

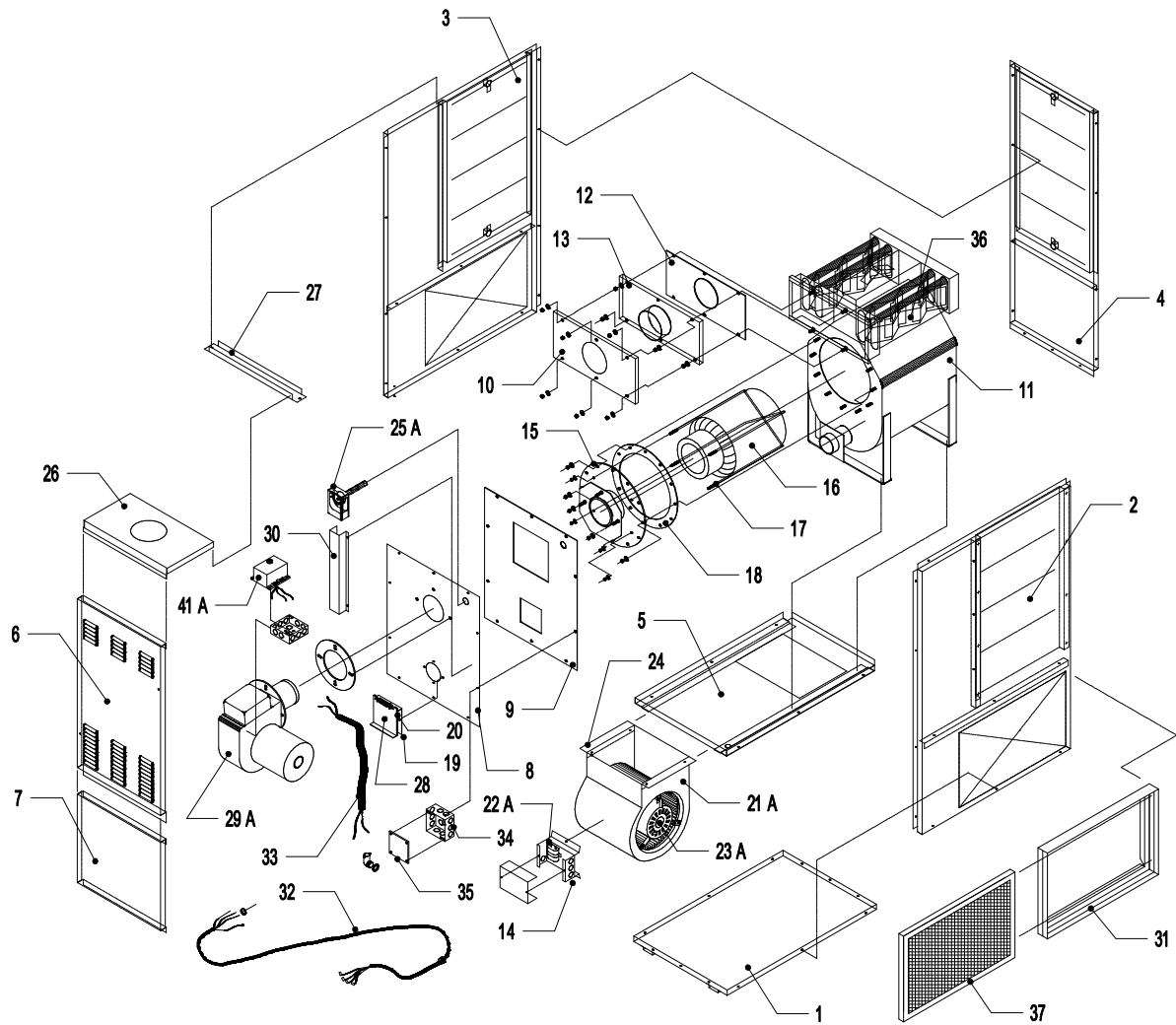
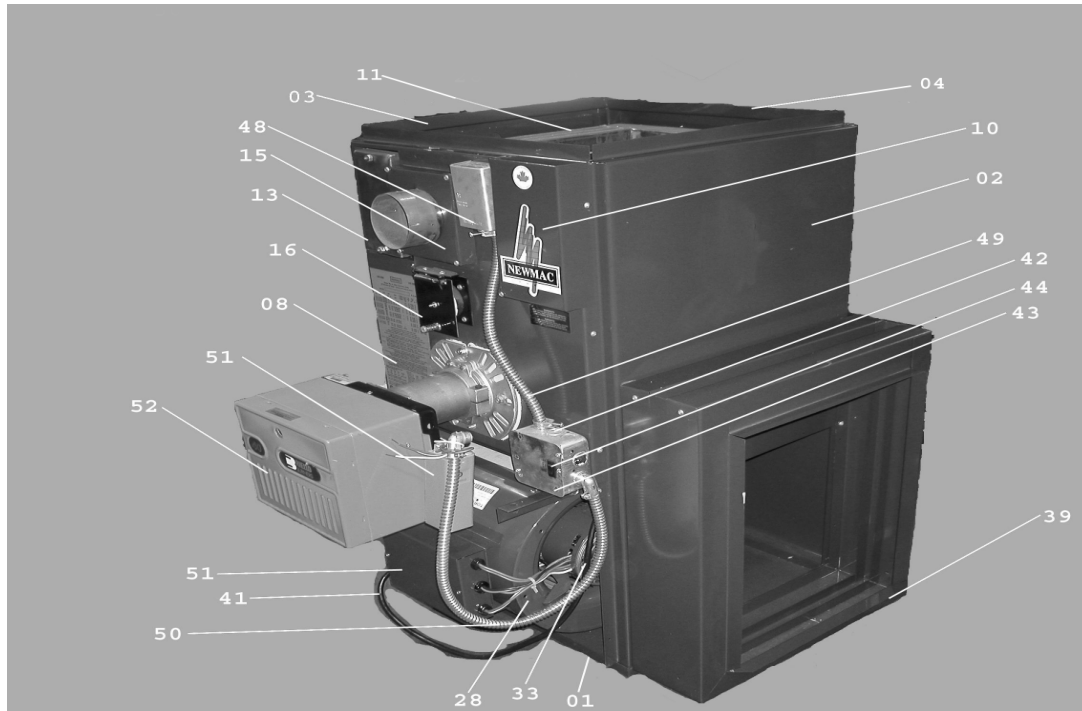


TABLE 8, NH3 PARTS LIST

ITEM	PART NO.	DESCRIPTION
1	4110400	BASE PANEL
2	4110401	SIDE PANEL R.H.
3	4110402	SIDE PANEL L.H.
4	4110403	REAR PANEL
5	4110404	FAN PARTITION
6	4110407	BURNER ACCESS PANEL
7	4110406	BLOWER ACCESS PANEL
8	4110405	FRONT PANEL
9	2080054	FRONT PANEL GASKET
10	4110408	CLEAN OUT PANEL
11	4160201	HEAT EXCHANGER ASSEMBLY
12	2080055	CLEANOUT COVER GASKET
13	4060401	CLEANOUT COVER
14	4050115	BLOWER ELECTRICAL BOX ASSEMBLY
15	4060402	COMBUSTION CHAMBER PLATE
16	2030008	COMBUSTION CHAMBER
17	4060403	COMBUSTION CHAMBER SUPPORT
18	2080056	CHAMBER PLATE GASKET
19	4110413	INSPECTION DOOR HOUSING
20	2080007	INSPECTION DOOR GASKET
21 A	2040114	DIRECT DRIVE BLOWER - DELHI G9-DD
21 B		DIRECT DRIVE BLOWER - TORIN - DC 916 916 5
21 C	2040115	DIRECT DRIVE BLOWER - DELHI - G10-8 DD
21 D	2040145	DIRECT DRIVE BLOWER - DELHI - GT12-7 DD
21 E		DIRECT DRIVE BLOWER - LAU - DD12-8AT
	4050117	1/2 hp, G9 DIRECT DRIVE BLOWER ASSEMBLY
	2040113	BELT DRIVE BLOWER - DELHI G9
		BELT DRIVE BLOWER - TORIN - BC 916 916
	4050105	1/2 hp, G9 BELT DRIVE BLOWER ASSEMBLY
22 A	2010040	5 uF 370 V CAPACITOR (used with 23 A & 23 B)
22 B		10 uF 370 V CAPACITOR (used with 23 C)
22 C	2010052	20 uF 370 V CAPACITOR (used with 23 D)
23 A	2020007	1/3 hp DIRECT DRIVE BLOWER MOTOR (Emerson)
23 B	2020008	1/2 hp DIRECT DRIVE BLOWER MOTOR (Emerson)
23 C		1/2 hp DIRECT DRIVE BLOWER MOTOR (A.O. Smith)
23 D	2020022	3/4 hp DIRECT DRIVE BLOWER MOTOR (A.O. Smith)
		BELLY BAND ASSEMBLY (includes band & arms)
	2020003	1/2 hp BELT DRIVE BLOWER MOTOR
	2240001	3-1/4" X 1/2" VARIABLE SPEED PULLEY
24	4110414	FAN SLIDE

ITEM	PART NO.	DESCRIPTION
25 A		TWO SPEED FAN & LIMIT
	2010024	HONEYWELL L6064A 1086B (8")
25 B		SINGLE SPEED FAN & LIMIT
	2010025	HONEYWELL L4064B 2608 (8")
		WHITE ROGERS E12(t)5D51-90 (8")
26	4110409	TOP PANEL
27	4110180	TOP RAIL
28	4120477	INSPECTION DOOR ASSEMBLY
29 A	2110040	OIL BURNER - AERO HF-US-2X
29 B	2110129	OIL BURNER - BECKETT AFG-AF60YHHS
29 C	2110033	OIL BURNER- CARLIN EZ-PRO
29 D	2110031	OIL BURNER - RIELLO 40 F3
29 E	2110032	OIL BURNER - RIELLO R35.3.05
30	4110410	WIRE PANEL
31	4110412	FILTER RACK ASSEMBLY
32	2200010-2	48" BLOWER WIRE HARNESS (4 Wire)
	2240034	FAN BELT - 1/2" X 34"
	2240035	FAN BELT - 1/2" X 35"
	2240006	BLOWER PULLEY - 6" X 3/4"
	2240005	BLOWER PULLEY - 5" X 3/4"
33	41100140	BURNER CABLE (30" wire/18" conduit)
34	2200101	4" X 4" JUNCTION BOX
35	2200103	4" X 4" JUNCTION BOX COVER
36	3100341	SMOKE BAFFLE
37	2180004	16" X 24" FILTER
	2040019	5" DRAFT REGULATOR
		CLEAN OUT BRUSH
		THERMOSTAT
	2010001	HONEYWELL - T822D
	2010057	WHITE ROGERS - 1F30
		THERMOSTAT - HEATING/COOLING (optional)
	2010027	HONEYWELL - T87F
	2010042	HONEYWELL SUBBASE - Q539A
		HONEYWELL T8034 C
	2200258	LOW SPEED ROCKER SWITCH (SPST, 15 AMP)
		FAN CENTER (optional)
	2010059	WHITE RODGERS - 8A94-51 (DPDT for up to 3/4 hp)
	2010041	HONEYWELL - R8285A (SPDT for up to 1/2 hp)
	2010015	HONEYWELL - R8405A (SPST for up to 1/2 hp)
		HONEYWELL - R8405B (SPDT for up to 1/2 hp)

TABLE 9 LFR PARTS LIST



Item No.	Part No.	Description
01	4110507	Base Panel
02	4110503	Side Panel RH
03	4110504	Side Panel LH
04	4110506	Rear Panel
05	4110505	Fan Partition
06	4110517	Side Cover, Blower
07	4110512	Front Blower Access Panel
08	4110500	Front Panel
09	4110515	Cleanout Cover Left Casing
010	4110514	Cleanout Cover Right Casing
011	4160301	Heat Exchanger Assembly
012	2080063	Cleanout Cover Gasket
013	3100411	Cleanout Cover
014	4110515	Breech Collar
015	4110514	Breech Cover
016	4120479	Inspection Door Assembly Complete
017	4110509	Inspection Door Plate
018	4110510	Inspection Door Support
019	4110511	Inspection Port Cover
020	2080065	Inspection Door Gasket
021	2070018	Inspection Door Hinge Pin
022	2220002	Torsion Spring
023	3140122	Inspection Door Gasket Retainer Disk
024	4060250	Smoke Pipe Assembly
025	2080064	Smoke Pipe/Breech Gasket
026	3100443	Breech Cover Plate
027	4010310	Stainless Steel Baffle
028	4050200	10" Direct Drive (DD) Blower Assembly
027	4010310	Stainless Steel Baffle
030	4050115	Blower Speed Junction Box Assembly

Item No.	Part No.	Description
031	2010040	5uF 370v Capacitor
032	2040116T	GT10DD or DCT-1020-1020-5 Blower
033	2020007	1/3HP 4 speed Direct Drive Motor
034	4110502	Fan Slide, 10"
035	2040114T	G9DD, DC- or DCT-916-916-5 Blower
039	4110501	Filter Rack Assembly
040	2180007	20" x 25" Furnace Air Filter
041	2200010-2	48" Blower Wire Harness
042	2200101	4" x 4" Junction Box
043	2200103	4" x 4" Junction Box Cover, switch type
044	2200258	Low Speed Switch
045	2010041	Honeywell R8258A Fan Center (optional)
046	2080067	Front Casing Lower White Gasket
047	2080116	Front Limit Control Yellow Insulation
048	2010024	8" Fan/Limit Control, Honeywell L4064A1086B
049	4050194	Fan and Limit Cable Set, 16"
050	4050195	Burner Cable Set, 30"
051	2010034	Riello Switching Relay, AL1008
052	5400010	Oil Burner, Riello 40F3-6
052A	5400011PP	Oil Burner, Riello BF3-6
054		Cleaning tool
052B	2110147	Oil Burner, Beckett AFG70MM (NM701)
052C	5400032	Oil Burner, Beckett Pre & Post AFG70MM (NM702)
052D	2110162	Oil Burner, Carlin EZ Pro
052E	5400056	Oil Burner, Carlin Pre & Post EZ Pro

FIG 18 RIELLO BURNER MODEL 40 F3 & F5 EXPLODED ASSEMBLY

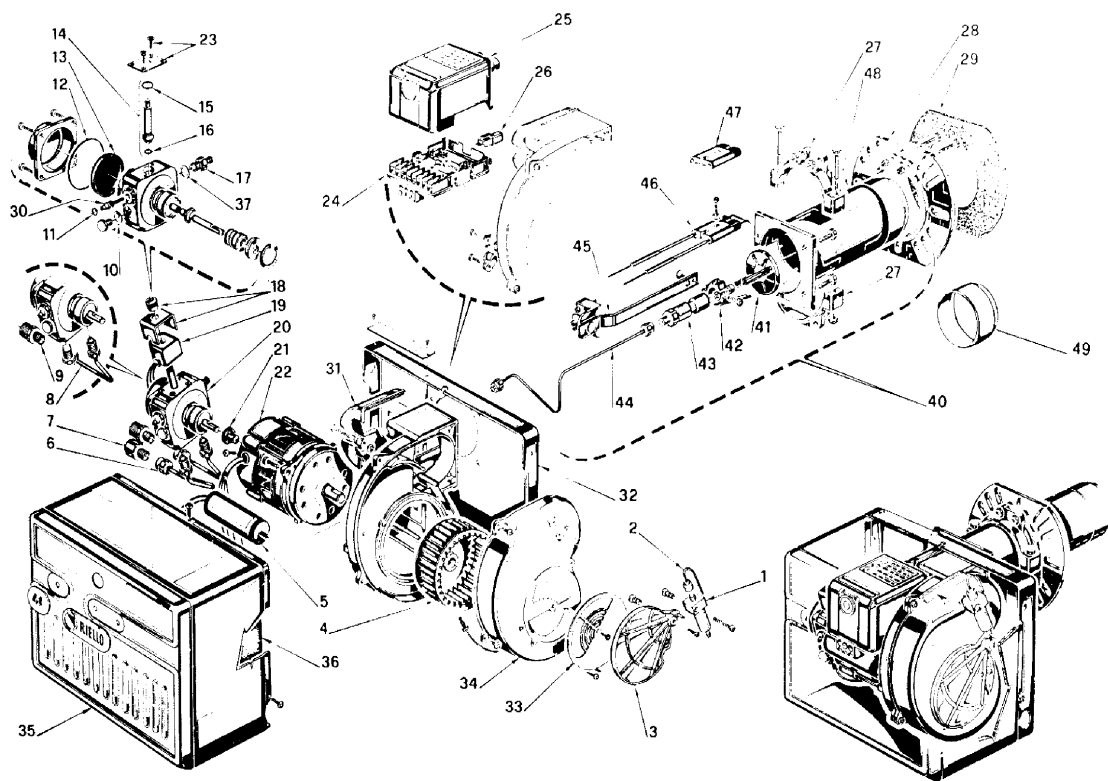
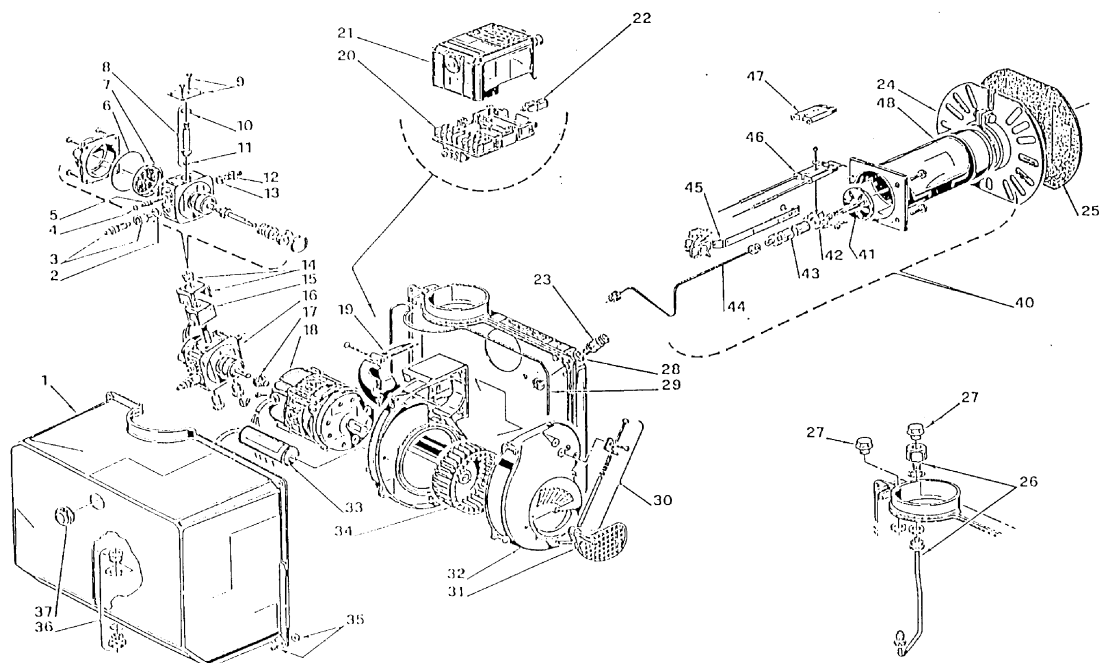


FIG 19 RIELLO BURNER MODEL 40 BF3 & BF5 EXPLODED ASSEMBLY



Item 2030016 Riello Burner End Cone Protector not shown. See Fig. 9 for its location.

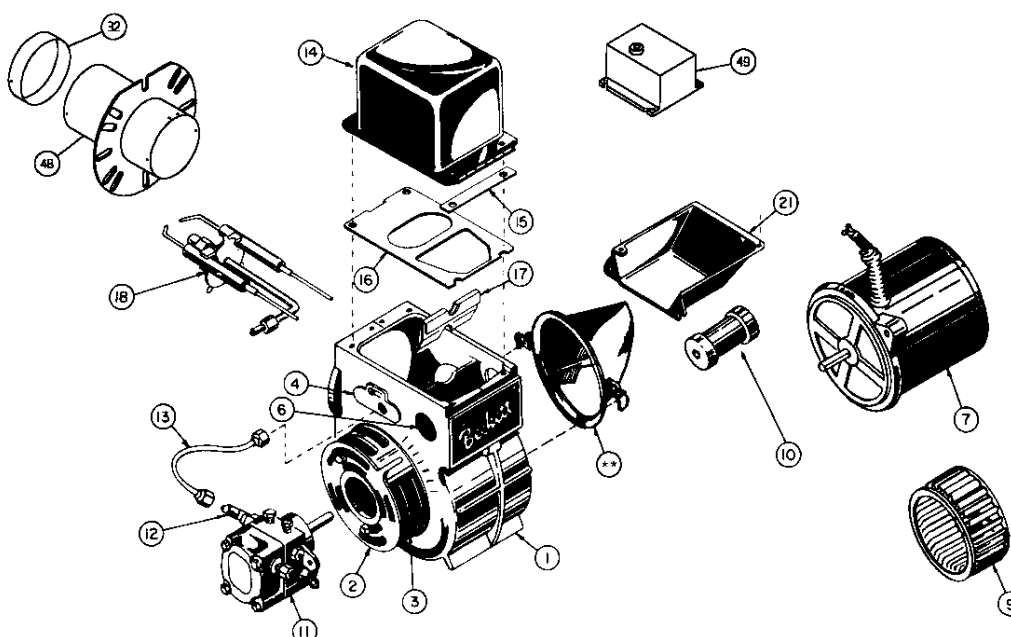
TABLE 10 RIELLO BURNER PARTS LIST

ITEM		PART NUMBER		BURNER MODEL				DESCRIPTION
F3 & F5	BF3 & BF5	RIELLO	NEWMAC	F3	F5	BF3	BF5	
1		3006911	2090055	X	X			Hydraulic jack
2		3006912		X	X			Capillary tube
3		3000878		X	X			Hydraulic air shutter
4	34	3005708		X	X	X	X	Fan
5	33	3005844	2090041	X	X	X	X	Capacitor 12.5 uF
6		3006993		X	X			Pipe connector-return
7		3005847		X	X			1/4" NPT/metric adapter-female
8		3006992		X	X			Pipe connector-supply
9		3006571		X	X			3/8" NPT/metric adapter-male
10	2	3007077		X	X	X	X	Crushable metal washer 3/8" ID
11	4	3007028		X	X	X	X	O-ring - pump pressure regulator
12	6	C7010002	2090043	X	X	X	X	O-ring - pump cover
13	7	3005719		X	X	X	X	Pump screen
14	8	3006036		X	X	X	X	Valve stem
15	10	3007029		X	X	X	X	O-ring valve stem,upper
16	11	3007156		X	X	X	X	O-ring valve stem,lower
17	12	3007268		X	X	X	X	Nozzle outlet fitting
18	14	3006553		X	X	X	X	Coil U-bracket retainer nut
19	15	3002279		X	X	X	X	Coil
20	16	3007802	2060007	X	X	X	X	Pump
21	17	3000443		X	X	X	X	Pump drive key
22	18	3005843		X	X	X	X	Motor
23	9	3007203		X	X	X	X	Plate - valve stem retainer
24	20	3002278		X	X	X	X	Primary control sub-base
25	21	3001157	2010048	X	X	X	X	Primary control 530 SE/C
26	22	3002280	2010045	X	X	X	X	Photo cell
27		3005854		X	X			Semiflange (2 Req'd)
28	24	3005855		X	X	X	X	Universal mounting flange
29	25	3005856	2080058	X	X	X	X	Mounting gasket
30	5	N/A		X	X			Regulator
31	19	3007315		X				Air tube cover plate
		3007316			X			Air tube cover plate
32		3007221		X				Chassis front plate
		3007222			X			Air intake housing
33		3007204		X	X			Manual Air Shutter
34	32	3007207		X		X		Air intake housing
		3007208			X			Air intake housing
	32	3007824					X	Air intake housing
35		3007232		X				Burner back cover
		3007233			X			Burner back cover
	1	3008019				X		Burner cover

TABLE 10 RIELLO BURNER PARTS LIST – continued

ITEM		PART NUMBER		BURNER MODEL				DESCRIPTION
F3 & F5	BF3 & BF5	RIELLO	NEWMAC	F3	F5	BF3	BF5	
	1	3008023					X	Burner Cover
36		3007319		X				Acoustic liner
		3007320			X			Acoustic liner
37	13	3007087		X	X	X	X	Crushable metal washer 5/8" ID
40	40	3948873	2210141	X		X		Short combustion head - 6"
	40	3948973	2210143		X		X	Short combustion head - 6"
41	41	3006968		X		X		Turbulator disc
	41	3006977			X		X	Turbulator disc
42	42	3006966		X	X	X	X	Electrode support
43	43	3006965		X	X	X	X	Nozzle adapter
44	44	3006969		X		X		Nozzle oil tube - short
	44	3006973			X		X	Nozzle oil tube - short
45	45	3006324		X		X		Regulator assembly - short
	45	3006323			X		X	Regulator assembly - short
46	46	3006330		X		X		Electrode assembly - short
	46	3006329			X		X	Electrode assembly - short
47	47	3005869		X	X	X	X	Electrode porcelain
48	48	3007592		X		X		End cone assembly - short
	48	3007594			X		X	End cone assembly - short
	3	3007568				X	X	Bleeder
	23	C5283000				X	X	Electrical fitting
	26	3008020				X		Oil supply tube & adapter fitting
	26	3008024					X	Oil supply tube & adapter fitting
	27	3007901				X	X	Plug
	29	3007630				X	X	Gasket burner cover
	30	3000681				X	X	Manual air damper regulator
	31	3008021				X	X	Air damper
	35	3007707				X	X	Cover screw and washer
	36	3007628				X	X	Filter assembly
	37	3007627				X	X	Plug-cover opening-burner reset
		C7001025	2110172			X		Two line conversion kit
		C7001026	2110173				X	Two line conversion kit
		3007627	2010044	X	X			Relay, Honeywell R8038A 1048

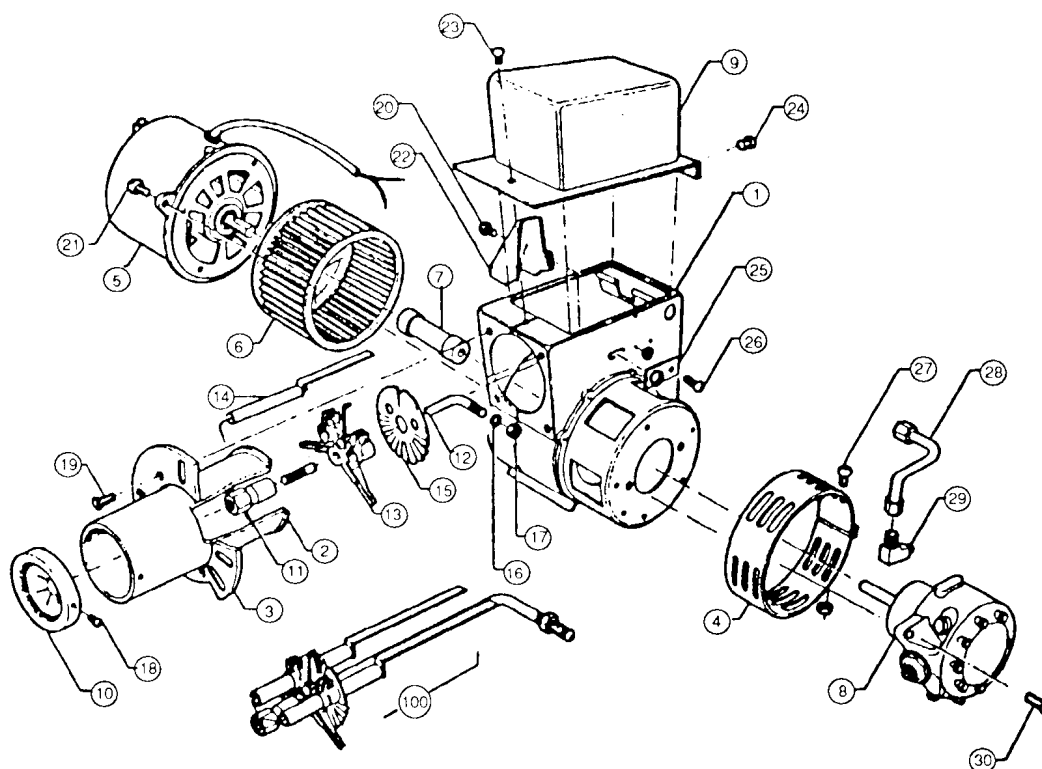
FIG. 20. BECKETT BURNER MODEL AFG60YHHS EXPLODED ASSEMBLY



BECKETT BURNER MODEL AFG60HYYS PARTS LIST

ITEM NO.	PART NUMBER		BURNER MODEL AFG60YHYS NM504	DESCRIPTION
	BECKETT	NEWMAC		
1	5877	2090024	X	Burner Housing Assembly
2	3709		X	Air Shutter
3	3492		X	Air Band
4	3493		X	Escutcheon Plate
	5941		X	Adjusting Plate Assy
7	2456	2020012	X	PSC Drive Motor, 3450 RPM
9	2999	2090056	X	Blower Wheel
10	2454	2090011	X	Flexible Coupling
11	21844U	2060012	X	Pump Clean Cut A2EA - 6520
	51573	2090058		Suntec Pump c/w Solenoid Valve
12	2256			Pump Nozzle Port Fitting
13	5636			Connector Tube Assembly
14	2442	2090025	X	Ignition Transformer (10,000 Volt)
	51771U	2090064	X	Electronic Ignitor (14,000 Volt)
17	3708	2090044	X	Low Firing Rate Baffle
18		2090047	X	6" Electrode assembly
21	5770		X	Junction Box Kit
26	3-666		X	Knurled Locknut
27	2-13		X	Nozzle Adapter - Single
28	1-49		X	Electrode Clamp
36	3384		X	3-3/8U Static Plate
47		2110006	X	Endcone , F3
	31517	2110015	X	Ceramic Heat Shield
		2110016	X	Ceramic Heat Shield Holder
48		2090040		6" SS Air Tube c/w Welded Flange
49	7456U	2010069	X	Primary Relay, Honeywell R7184B
		2090067		Primary Relay, Honeywell R7184P
	3416	2080051	X	Flange Gasket
	51770	2090061		Field Controls AirBoot
	7006	2010006	X	Cad Cell C554A1455B Honeywell
		2100130		Nozzle, Delavan 0.65 X 70°A
		2100131		Nozzle, Delavan 0.75 X 70°A
		2100128	X	Nozzle, Delavan 0.85 X 70°A
		2100132		Nozzle, Delavan 1.00 X 70°A
		2100140		Delavan Stop Drop (Pro Tek)

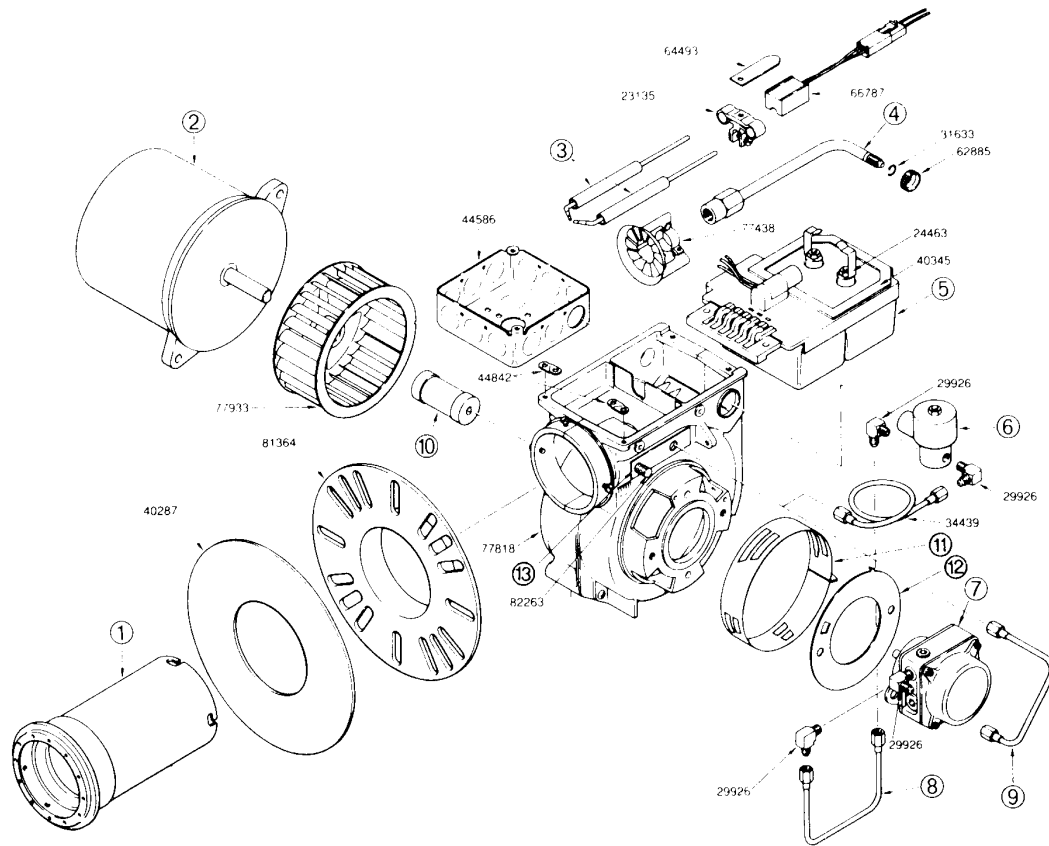
FIG. 21. AERO BURNER MODEL HF-US-2X EXPLODED ASSEMBLY



AERO BURNER MODEL HF-US-2X PARTS LIST

ITEM NO.	PART NUMBER		QTY REQ'D	DESCRIPTION
	AERO	NEWMAC		
1	35222100	2090016	1	HF-US Housing
2	35040000		1	Blast Tube, 6"
3	35161000	2090017	1	Mounting Flange - Fixed
	26200005		1	Flange Spacer (Specify 5" Insertion & 6" Air Tube)
4		2090013	1	Air Band, 3 Hole
5		2020011	1	Motor 1/7 hp, 3450 rpm
6	35152329	2090021	1	Fan, 508-229-HF-US-(S) SV
7	35171223	2090011	1	Coupling
8	2060004	2060004	1	Pump
9	35382740	2090002	1	Transformer, 2721-456
				Electronic Ignitor
10	35141900	2110005	1	End Cone, AFC-2X
		2090020	2	End Cone Screws, Stainless Steel
12		2090030	1	Tube, Oil Delivery 5"
19	35202202		4	Blast Tube Screw (specify length)
25	35330000		1	Slide Plate
26	35203901		1	Slide Plate Locking Screw
27	35193201		1	Air Band Locking Nut
28			1	Oil Line Assembly
33	35182400	2080050	1	Oil Burner Mounting Gasket 1/8"
100			1	Electrode Assembly
		2010002	1	Primary Control, Honeywell R8184G
		2010006	1	CAD Cell, Honeywell C554A1455B

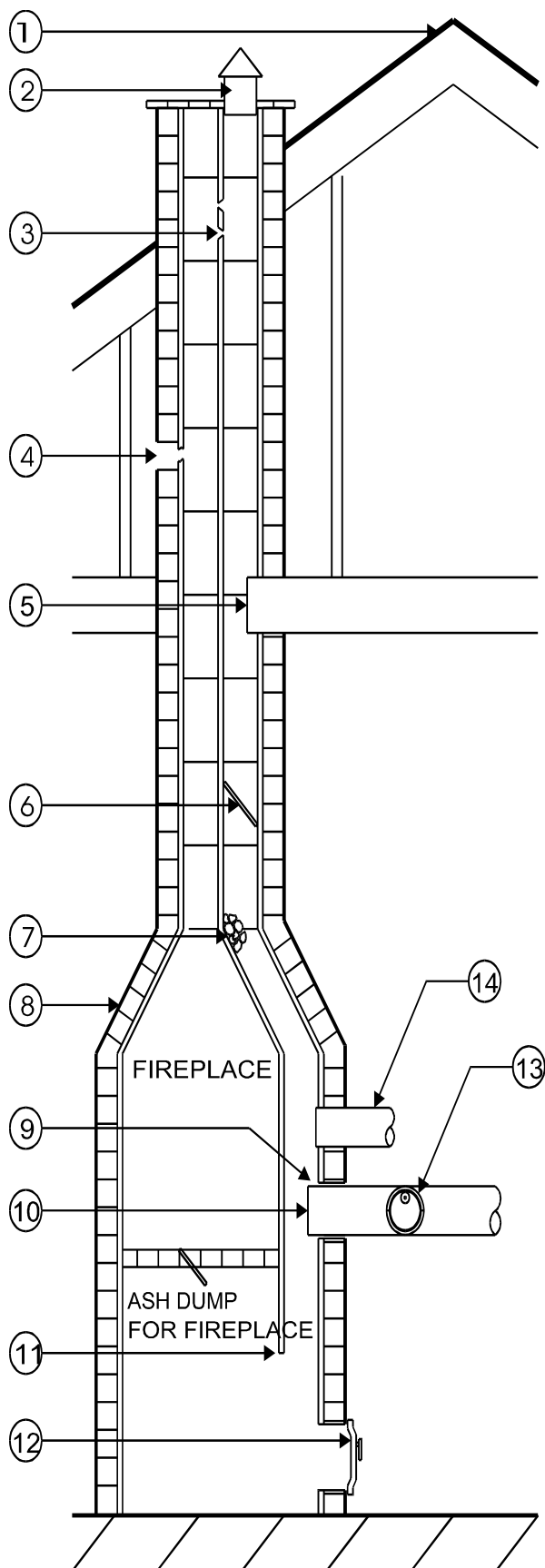
FIG. 22. CARLIN EZ-PRO EXPLODED ASSEMBLY



CARLIN EZ-PRO PARTS LIST

ITEM NO.	PART NUMBER		QTY REQ'D		DESCRIPTION
	CARLIN	NEWMAC	EZ-PRO	EZ-PRO PP	
1	77735		X	X	7" Air Tube c/w Welded Flange
2	98022		X	X	Motor, 1/6 hp, 3450 rpm
3			X	X	Electrode Wire, Set of 2
4			X	X	Nozzle Line / Adapter Assembly
5	41000SOCAS		X	X	14 kV Transformer / Ignitor
	40200-02		X		Primary Control, Interrupted Duty
	60200-02			X	Primary Control, Interrupted Duty, pre & post purge
6				X	Oil Valve (in pump)
7	22996	2060004	X		Fuel Unit, Std. Single Stage, Suntec A2VA-7116
8	34397			X	Oil Line, 3/16 OD, Std. Fuel Unit to Oil Valve
9	34470		X		Oil Line, 3/16 OD, Std. Fuel Unit to Nozzle Line
10	75564		X	X	Coupling, For Std. Fuel Unit, Approx. 2-3/8" OAL
11	77594		X		Air Band
12	77586		X		Air Shutter
13	81570		X	X	Head Positioning Bar Kit
	4015300K		X	X	Flame Detector
	81695		X	X	CAD Cell Assembly c/w Harness
	77933		X	X	Blower Wheel
	40212		X	X	Flange Gasket
		2090063		X	Field Controls AirBoot (Field Controls p/n 4626802)

FIGURE 23. COMMON CHIMNEY DRAFT PROBLEMS



CAUSE	CORRECTION
① ROOF PEAK, BUILDINGS OR TREES HIGHER THAN CHIMNEY	EXTEND CHIMNEY HEIGHT
② COPING RESTRICTS OPENING	ENLARGE TO CHIMNEY INSIDE DIMENSIONS
③ BREAK IN CHIMNEY LINING	REPAIR MAKING SURE CONNECTIONS ARE TIGHT
④ OUTSIDE AIR LEAK	REPAIR AND SEAL ALL JOINTS
⑤ JOIST PROTRUDES INTO CHIMNEY	REMOVE TO GIVE FULL CLEARANCE
⑥ OBSTRUCTION IN CHIMNEY	DISLodge AND REMOVE
⑦ SOOT ACCUMULATION IN OFFSET	REMOVE
⑧ OFFSET TOO SHORT	STRAIGHTEN OR LENGTHEN
⑨ LOOSE SEATED PIPE IN FLUE OPENING	SEAL AIR GAPS
⑩ SMOKE PIPE EXTENDS INTO CHIMNEY	MAKE END FLUSH WITH INSIDE OF CHIMNEY
⑪ OPENING BETWEEN FLUES	EXTEND FLUE PARTITION TO FLOOR LEVEL
⑫ LOOSE FITTING CLEANOUT DOOR	CLOSE TIGHTLY AND SEAL ALL LEAKS
⑬ TOO MUCH OR TOO LITTLE DRAFT	ADJUST DRAFT REGULATOR
⑭ TOO MANY APPLIANCES ON SAME FLUE	REMOVE OR RELOCATE APPLIANCES IN EXCESS OF MAXIMUM INPUT RATING
⑮ TOO MUCH DRAFT WITH DRAFT REGULATOR FULLY OPEN	INSTALL LARGER OR SECOND DRAFT REGULATOR
⑯ OPEN FIREPLACE	SEAL OPENING
⑰ SMOKE PIPE TOO CLOSE TO CHIMNEY BASE	RAISE SMOKE PIPE OR EXTEND INSIDE
	CUT ON ANGLE WITH OPENING FACING UP AND CLEAN REGULARLY
⑱ SMOKE PIPE EXTENDS TOO FAR INTO ELBOW	PULL SMOKE PIPE BACK
⑲ WIDELY FLUCTUATING DRAFT AND DOWNDRAFTING	TRY A DIFFERENT TYPE OF CHIMNEY CAP
⑳ UNUSED FLUE OR VENT CONNECTION	REMOVE
㉑ HOUSE DEPRESSURIZATION	PROVIDE ADDITIONAL COMBUSTION AIR
㉒ FLUE PIPE TOO LONG OR TOO MANY ELBOWS	MOVE APPLIANCE CLOSER TO CHIMNEY

FIGURE 24 TROUBLESHOOTING CHART

PROBLEM	CAUSE	CORRECTION
Burner Motor Fails to Start	Thermostat	Check for Broken Wires
		Tighten Connections
		Clean Contacts
		Replace Thermostat
	Burner Motor Overload Tripped	Press Rest Button
	Ceased Pump	Repair or Replace
Burner Start--No Flame	Faulty Primary Relay	Repair or Replace
	Oil Supply	Check Oil Supply
	Air Leak in Oil Supply Line	Tighten Fittings or Replace Line
	Oil Line Plugged or Kinked	Clean or Repair
	Oil Filter Clogged	Replace or Clean
	Loss of Prime	Eliminate Teed Oil Lines
	Electrode Setting	Adjust Electrodes
	Loose or Dirty Nozzle	Replace Nozzle
	Ignition Transformer	Replace Transformer
	Burner Motor Overload Trips	Press Rest Button
	Ceased Pump	Repair or Replace
Burner Locks out on Safety	Faulty Primary Relay	Repair or Replace
	Cad Cell	Clean or Replace
	Oil Line Restricted	Clear Restriction
	Plugged Fuel Pump	Clean Strainer
	Loss of Prime	Eliminate Teed Oil Lines
	Cold Oil	Change to #1 Oil
	Poor Combustion	Convert to One Line System
		Adjust Air Settings
Burner Ignition Delayed	Poor Combustion	Ensure Draft is Adequate
	Air Leak in Oil Supply Line	Tighten Fittings or Replace Line
	Loose or Dirty Nozzle	Replace Nozzle
	Faulty Oil Pump	Repair or Replace Pump
	Oil Supply Line	Ensure Properly Designed
	Loss of Prime	Eliminate Teed Oil Lines
	Electrode Setting	Adjust Electrodes
	Cracked Electrodes	Replace Electrodes
	Wrong Nozzle	Use Specified Nozzle
	Low Oil Pressure	Adjust to Correct Setting
Fumes & Odors From Burner	Excess Air	Adjust Air Setting
	Faulty Transformer	Replace Transformer
	Insufficient Combustion Air	Provide Combustion Air
	Inadequate Flue Draft	Provide Specified Draft
	Pump Seal Leaking	Repair Pump
	Loss of Prime	Eliminate Teed Oil Lines
	Nozzle Assembly Adjustment	Ensure Setting is Correct
	Burner Adjustment	Check Using Instruments
	Blast Tube Burned Off	Check Blast Tube
	End Cone Wrong or Burned Off	Check End Cone
	Incorrect Insertion	Measure Insertion Depth
	Dirty Burner Fan	Clean Blades
	Damaged Chamber	Check Chamber
	Clogged Flue Passages	Clean Flue Passages
	Nozzle After Drip	Check Fuel Delivery System
	Unspecified Nozzle	Replace Nozzle

FIG 24 TROUBLESHOOTING CHART – continued

PROBLEM	CAUSE	CORRECTION
Not Enough Heat	Firing Rate Too Low	Use Higher Input Nozzle
	Dirty Heat Exchanger	Clean Heat Exchanger
	Poor Combustion	Adjust Using Instruments
	Undersized Capacity	Size Based on Heat Loss
	Distribution System	Ensure Proper Design
	Faulty Thermostat or Location	Repair, Replace, or Relocate
Too Much Heat	Defective Primary Control	Repair or Replace
	Faulty Thermostat or Location	Repair, Replace, or Relocate
	Faulty Oil Pump	Check for Proper Pressure
	Firing Rate Too High	Reduce Nozzle Size
	Oversized Capacity	Size Based on Heat Loss
	Distribution System	Proper Duct Design
Excessive Oil Consumption	Poor Combustion	Adjust Using Instruments
	Excess Air	Adjust Air Setting
	Inadequate Flue Draft	Provide Specified Draft
	Insufficient Combustion Air	Provide Combustion Air
	Oil Supply	Check Oil Supply
	Electrode Setting	Adjust Electrodes
	Wrong Nozzle	Use Specified Nozzle
	Fuel System Leaking	Check Fuel System
	Faulty Oil Pump	Repair or Replace Pump
Short Cycle	Over-Firing	Use Specified Nozzle Size
	Tripping High Limit	Replace Dirty Filters
		Increase Blower Speed
		Increase Undersized R/A Ducts
		Clear Blocked Return Registers
		Increase Undersized S/A Ducts
		Clear Blocked Supply Grills
		Replace Faulty Blower Motor
		Clean Clogged Blower Wheel
		Replace Broken Blower Belt
	Faulty Thermostat or Location	Repair, Replace, or Relocate
Noise	Heat Anticipator Set Too Low	Adjust Heat Anticipator
	Defective Primary Relay	Repair or Replace Relay
Burner Air Tube Burn-Off	Burner Pump Whine	Eliminate Suction Line Air Leak
	Duct Expansion	Stiffen Plenum & Ducts
	Plenum Amplifies Noise	Install Plenum Apron
	Blocked Flue Passages	Clean Boiler
	Unspecified Burner	Replace Burner
	Unspecified Nozzle	Install Correct Nozzle
	Incorrect Head	Install Correct Head
	Wrong/Misaligned Static Plate	Install Correct Plate or Align
	Chimney Down Drafting	Install Chimney Cap
	Poor Over-Fire Draft	Increase Draft at Breech
		Correct Chimney Problems
	Over-Firing	Use Specified Nozzle
		Use Specified Pressure
	Incorrect Insertion	Use Correct Air Tube Assembly
		Adjust Flange
Frequent Sooting	Reduced Draft	Add Combustion Air
	Delayed Ignition	Adjust Burner Settings
	Loss of Prime	Eliminate Teed Oil Lines
	Unspecified Burner	Replace Burner
	Unspecified Nozzle	Install Correct Nozzle
Premature Corrosion	Incorrect Head	Install Correct Head
	Temperature Rise Too Low	Reduce Motor Speed
		Use Higher Specified Nozzle

INSTALLER INFORMATION

NAME: _____

COMPANY: _____

INSTALLATION DATE: _____

THE HOMEOWNER SHOULD TELEPHONE () FOR SERVICE OR
ADDITIONAL INFORMATION.

MODEL: _____

APPLIANCE INITIAL TEST AND SERVICE INFORMATION

1	FUEL INPUT (USGPH)
2	FUEL PRESSURE (PSIG)
3	FLUE PRESSURE (INCHES W.C.)
4	OVERFIRE PRESSURE (INCHES W.C.)
5	NOZZLE ANGLE / PATTERN
6	CO ² PERCENT
7	BURNER MODEL
8	FLUE GAS TEMPERATURE (F°)
9	ROOM TEMPERATURE (F°)
10	SMOKE NUMBER (BACHARACH)
11	FUEL GRADE NUMBER
12	SUPPLY PLENUM STATIC PRESSURE (INCHES W.C.)
13	SUPPLY AIR TEMPERATURE (F°)
14	RETURN AIR TEMPERATURE (F°)
15	AIR TEMPERATURE RISE (F°)
16	LIMIT CONTROL FUNCTIONING PROPERLY
17	PRIMARY CONTROL SHUT OFF TIME (IGNITION FAILURE)
18	PRIMARY CONTROL SHUT OFF TIME (FLAME FAILURE)

OIL FIRED FURNACE - LIMITED LIFETIME WARRANTY

Effective July 1, 1995 and subject to the following conditions Newmac Manufacturing Inc. warrants the Oil Fired Furnace, to the original owner purchaser, under normal use and repair against defects in workmanship and materials for a period of one calendar year from the date of original installation. This warranty does not cover nozzles, filters, belts etc.

The burner, blower, motors, controls or any other electrical or mechanical components not manufactured by Newmac are warranted for a period of one year from date of original installation by their respective manufacturers; burners 3 years.

Effective July 1, 1995 and on the date of original installation Newmac warrants to the original purchaser during his or her lifetime that the primary heat exchanger of all Oil Fired Furnaces will be free from defects in material and workmanship provided however, this warranty shall apply only to the original installation of the furnace in a single dwelling unit used without interruption by the purchaser as his or her principal residence. This warranty does not apply to solid fuel or combination furnaces and is subject to the conditions and exceptions of warranty listed below.

Under the above warranty Newmac Mfg. at its option will repair or replace the heat exchanger under the above terms or offer the then current applicable retail price of a heat exchanger towards a new equivalent furnace. Proof of original purchase will be required.

The warranty must be registered within 30 days of installation or the following pro-rated warranty "Twenty Year Warranty" applies.

Where the owner of the dwelling is not the original purchaser and in multi-family dwellings Newmac warrants the primary heat exchanger against defects in materials and workmanship under a 20 year Limited Warranty subject to the conditions and exceptions listed below and on a prorated basis as follows of the then current retail price

0-10	<u>Years</u>	100%	<u>Warranty</u>	0	<u>of Retail Price</u>
11-12	"	50%	"	50%	"
12-14	"	40%	"	60%	"
14-16	"	30%	"	70%	"
16-18	"	20%	"	80%	"
18-20	"	10%	"	90%	"
20 years and over		0%	"	100%	"

The purchaser must pay all other costs of warranty service including labour costs involving diagnostic calls and or removing, servicing and or replacing warranty parts and or warehousing charges and or freight costs. All parts are supplied F.O.B. Debert, Nova Scotia and the defective parts must be returned freight prepaid for repair and or warranty consideration when requested by Newmac Mfg.

CONDITIONS

This warranty refers to the primary combustion heat exchanger.

In order for this warranty to be effective:

1. The furnace must be installed by a qualified licensed installer and in accordance with Newmac's installation instructions. The furnace must also be installed in accordance with all applicable, local states, or provincial codes and the National Warm Air Heating and Air Conditioning Association Standards or generally accepted equivalent standards.
2. The Furnace must operate in an environment not contaminated by halogens (such as but not limited to fluorine or chlorine) or chlorinated hydro carbons. These corrosive chemicals entering the combustion area cause rapid deterioration of inner surfaces leading to heat exchanger failures. The furnace must be maintained and cleaned on an annual basis by qualified personnel; air filters should be changed monthly. Oil filters and nozzles must be changed annually.
3. The furnace must be sized and fired correctly as stated on the label for the residence. The label must not have been defaced or removed.
4. The furnace must not be modified from its published design or purpose and or an air conditioning coil shall not be installed on the return air side of the furnace.
5. Furnace must not have been removed from the original installation site.
6. There must be adequate return air and or ductwork.
7. There must be adequate combustion air installed to the furnace room; and in the case of sidewall venting there must be adequate ventilation air in addition to combustion air to prevent depressurization of the home.
8. Warranty components may be replaced with reconditioned parts at the discretion of Newmac Mfg.
9. Proof of original purchase will be requested under this warranty.

EXCEPTIONS

1. All labour, freight or diagnostic calls, removal and replacement costs and warehousing charges are the responsibility of the purchaser including the return to Debert, Nova Scotia of defective parts.
2. Defects or damages caused by failure of the refractory chamber, improper installation, wiring, electrical current characteristics, accident, misuse or abuse, fire, flood, alteration and or misapplication of the product, default or delay in performance; caused by war, government restrictions, restraints, strikes, material or freezing.
3. Refractory chamber, nozzles, air filters, belts etc...
4. Defects or damages caused by nozzle failure and/or plugging and/or oil flow restrictions due to cold oil from outside tanks or misalignment of burner at installation.
5. This warranty in no way can be considered as a guarantee of workmanship of an installer connected with the installation of the Newmac Oil Fired Furnace or as imposing on Newmac any liability of any nature for unsatisfactory performance as a result of faulty workmanship in the installation which liability is expressly disclaimed.
6. This warranty will not be applicable if the furnace is damaged or a result of being improperly serviced or operated.

LIMITATIONS ON WARRANTY

Newmac will make no express warranties other than the warranty set forth above. All implied warranties including the implied warranties of a merchantability and fitness for a particular purpose are limited to the duration of the express warranty, set forth above. Liabilities for incidental and consequential damages are excluded regardless of the cause. Some provinces in Canada and some states in the U.S.A. do not allow limitations on how long an implied warranty lasts so the above may not apply to you. The expressed warranties made in this warranty are exclusive and may not be altered, enlarged or changed by any distributor, dealer or any other person whatsoever. All replacement parts whether new or remanufactured, assume as their warranty period on the remaining period of this warranty.

For routine service requirements contact the dealer who installed the equipment originally, or an alternate qualified and registered heating dealer or electrical.

To register your warranty, please complete form below, detach and mail to Newmac Mfg. Inc. P.O. Box 9, Lancaster Cr; Debert, N.S. B0M 1G0

LIMITED LIFETIME WARRANTY REGISTRATION

Owner's Name _____ Date of Installation _____

Address of Installation _____

Dealer's Name _____ Dealer's Address _____

Furnace Serial Number _____ Furnace Model Number _____