Carrier®
HEATING & COOLING

58VLR Low-Boy Oil Furnace

Visit www.carrier.com

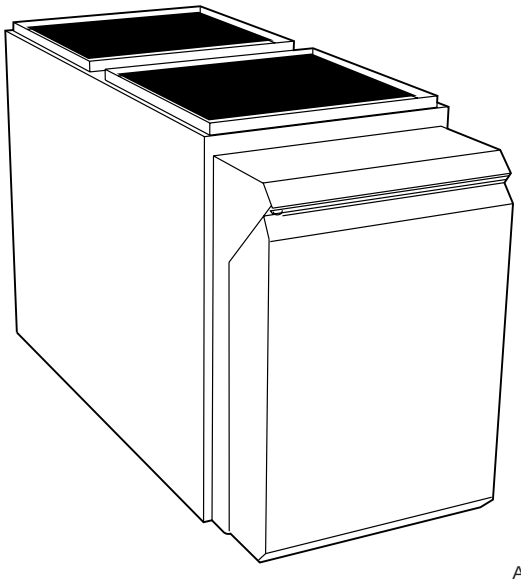
Installation, Start-Up, and Operating Instructions

For Input Capacities of 70,000—154,000; Series 100

NOTE: Read the entire instruction manual before starting the installation.

This symbol → indicates a change since the last issue.

TABLE OF CONTENTS



A05024

→ **Fig. 1—58VLR Low-Boy Oil Furnace**

SAFETY CONSIDERATIONS

FOR YOUR SAFETY

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

DO NOT ATTEMPT TO START THE BURNER WHEN EXCESS OIL HAS ACCUMULATED, WHEN THE FURNACE IS FULL OF VAPOR, OR WHEN THE COMBUSTION CHAMBER IS VERY HOT.

⚠ WARNING

CARBON MONOXIDE POISONING FIRE EXPLOSION HAZARD

Failure to follow this warning could lead to sooting, fire, explosion, and/or severe bodily harm.

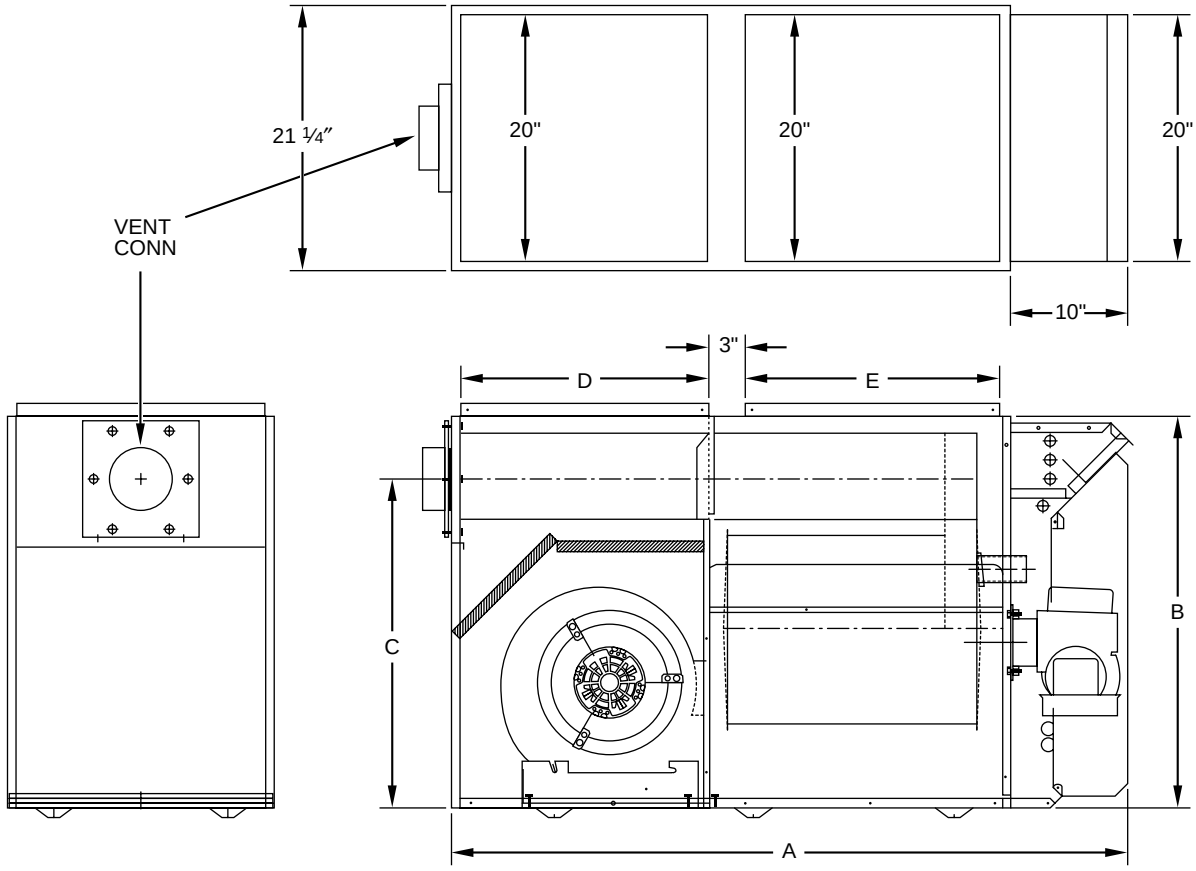
For use with grade 1 or 2 Fuel Oil. Do not use Gasoline, Crankcase Oil, or any Oil containing gasoline!

⚠ CAUTION

FIRE HAZARD

Failure to follow this caution may result in fire and property damage.

Never burn garbage or paper in the heating system and never leave rags, paper, or any flammable items around the unit.



Dimensions (In.)

UNIT SIZE	UNIT DIMENSIONS			FLUE HEIGHT	RETURN OPENING	SUPPLY OPENING	VENT CONNECTION
	Width	Depth	Height				
		A	B	C	D	E	
105–12	21-1/4	53-3/4	31-1/2	26-1/2	20	20	5
120–20	21-1/4	60-5/32	34-3/4	28-11/32	22	24	6

Fig. 2—Dimensional Drawing

⚠ WARNING

→ **UNIT RELIABILITY HAZARD**

These instructions are intended to be used by qualified personnel who have been trained in installing this type of furnace. Installation of this furnace by an unqualified person may lead to equipment damage and/or a hazardous condition which may lead to bodily harm.

All local and national code requirements governing installation of oil burning equipment, wiring, and flue connections must be followed. Some of the codes (issued by the Canadian Standards Association, the National Fire Protection Agency, and/or the American National Standards Institute) that may be applicable are:

ANSI/NFPA 31: INSTALLATION OF OIL BURNING EQUIPMENT

ANSI/NFPA 211: CHIMNEYS, FIREPLACES, VENTS, AND SOLID FUEL BURNING APPLIANCES

ANSI/NFPA 90B: WARM AIR HEATING AND AIR CONDITIONING SYSTEMS

ANSI/NFPA 70: NATIONAL ELECTRIC CODE

CSA B139: INSTALLATION CODE FOR OIL BURNING EQUIPMENT

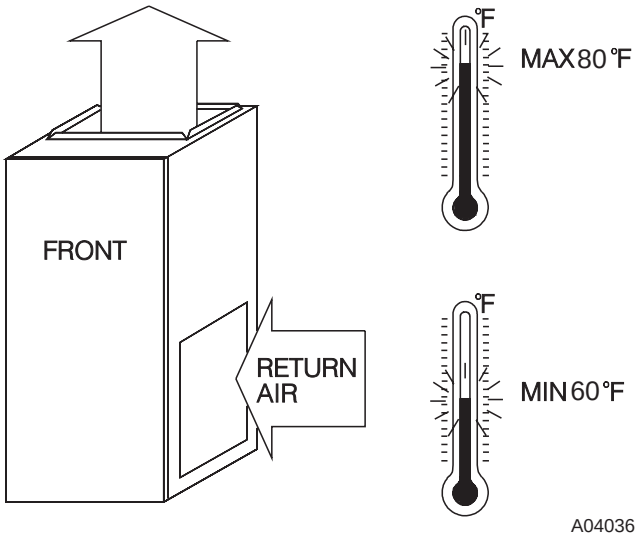
CAS C22.1: CANADIAN ELECTRICAL CODE

Only the latest issues of these codes should be used, and are available from either The National Fire Protection Agency, Batterymarch Park, Quincy, MA 02269 or The Canadian Standards Association, 178 Rexdale Blvd., Rexdale, Ontario M9W 1R3

Recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the furnace and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies a hazard which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

→ This furnace is designed for continuous return-air minimum temperature of 60°F db or intermittent operation down to 55°F db such as when used with a night setback thermostat. Return-air temperature must not exceed 80°F db. Failure to follow these return air limits may affect reliability of heat exchangers, motors and controls. (See Fig. 3.)



→ **Fig. 3—Return-Air Temperature**

INTRODUCTION

The model 58VLR Furnaces are available in 2 sizes. Each size can be fired at 3 different rates by a simple nozzle change. Unit 58VLR105 covers input ranges from 70,000 to 105,000 Btuh. Unit 58VLR120 covers input ranges from 119,000 to 154,000 Btuh.

This furnace is a Low-Boy unit. It may be operated only in the upflow configuration.

The furnace is shipped as a packaged unit, complete with burner and controls. It requires a line voltage (115 vac) connection to control box, a thermostat hook-up as shown on wiring diagram, oil line connection(s), adequate duct work, and connection to a properly sized vent.

The air handling capacity of this furnace is designed for cooling airflow. Refer to Table 13 or 14 for expected airflows at various external duct static pressures.

LOCATION

Step 1—General

⚠ WARNING

ELECTRICAL SHOCK, FIRE OR UNIT DAMAGE HAZARD

Failure to follow this warning could result in property damage or personal injury or death.

This furnace is not water tight and is not designed for outdoor installation. This furnace shall be installed in such a manner as to protect electrical components from water. Outdoor installation would lead to a hazardous electrical condition and to premature furnace failure.

⚠ CAUTION

UNIT DAMAGE HAZARD

This oil furnace may be used for construction heat provided that:

-The furnace operating conditions, including ignition, input rate, temperature rise and venting, are verified per instructions in this manual.

-The furnace is permanently installed with all electrical wiring, piping, venting and ducting installed according to these installation instructions. A return air duct is provided, sealed to the furnace casing, and terminated outside the space containing the furnace. This prevents a negative pressure condition as created by the circulating air blower, causing a flame rollout and/or drawing combustion products into the structure.

-The furnace is controlled by a thermostat. It may not be ″hot wired″ to provide heat continuously to the structure without thermostatic control.

-Clean outside air is provided for combustion. This is to minimize the corrosive effects of adhesives, sealers and other construction materials. It also prevents the entrainment of drywall dust into combustion air, which can cause fouling and plugging of furnace components.

-The temperature of the return air to the furnace is no less than 55°F, with no evening setback or shutdown. The use of the furnace while the structure is under construction is deemed to be intermittent operation per our installation instructions.

-The air temperature rise is within the rated rise range on the furnace rating plate, and the firing rate has been set to the nameplate value.

-The filters used to clean the circulating air during the construction process must be either changed or thoroughly cleaned prior to occupancy.

-The furnace, ductwork and filters are cleaned as necessary to remove drywall dust and construction debris from all HVAC system components after construction is completed.

This furnace is approved for reduced clearances to combustible construction, therefore, it may be installed in a closet or similar enclosure. It may be located in a basement or on the same level as area to be heated. In any case, unit should always be installed level.

The required minimum clearances for this furnace are specified in Table 1.

Table 1—Minimum Clearances to Combustible Materials (In.)

UNIT APPLICATION		LOW-BOY
Sides	Furnace	1
	Supply Plenum and Warm-Air Duct within 6 ft of Furnace	1
Back	Service Clearance	19
Top	Furnace Casing or Plenum	2
	Horizontal Warm-Air Duct Within 6 ft of Furnace	2
Bottom*		0
Flue Pipe	Horizontally or Below Pipe	4
	Vertically Above Pipe	9
Front		8

*Floor may be combustible

NOTE: Adequate service clearance should be provided over and above these dimensions as required.

The furnace should be located as close as possible to chimney or vent in order to keep vent connections short and direct. The furnace should also be located as near as possible to center of air distribution system.

Step 2—Location Relative to Cooling Equipment

When installing furnace with cooling equipment for year-round operation, the following recommendations must be followed for series or parallel airflow:

1. In series airflow applications, coil is mounted after furnace in an enclosure in supply-air stream. The furnace blower is used for both heating and cooling airflow.

⚠ CAUTION

→ **UNIT DAMAGE HAZARD**

Failure to follow this caution may reduce the life of this unit. The coil MUST be installed on air discharge side of furnace. Under no circumstances should airflow be such that cooled, conditioned air can pass over furnace heat exchanger. This will cause condensation in heat exchanger and possible failure of heat exchanger which could lead to a fire hazard and/or a hazardous condition which may lead to bodily harm. Heat exchanger failure due to improper installation may not be covered by warranty.

2. In parallel airflow applications, dampers must be provided to direct air over furnace heat exchanger when heat is desired and over cooling coil when cooling is desired.

IMPORTANT: The dampers should be adequate to prevent cooled air from entering furnace. If manually operated, dampers must be equipped with a means to prevent operation of either cooling unit or furnace unless damper is in full cool or heat position.

INSTALLATION

Step 1—Air for Combustion and Ventilation

⚠ WARNING

CARBON MONOXIDE POISONING AND UNIT CORROSION HAZARD

Failure to follow this warning could lead to premature rusting of heat exchanger and possible premature furnace failure and/or vent failure which could result in fire hazard and/or personal injury or death.

Installation of this furnace in an area where it will receive contaminated combustion air must be avoided. Such contamination would include the following: ammonia, chlorine, hydrogen sulfide, halogenated hydrocarbons, carbon tetrachloride, cleaning solvents, hydrochloric acid, water softening chemicals, and similar chemicals.

⚠ WARNING

CARBON MONOXIDE POISONING AND FIRE HAZARD

Failure to follow this warning could result in property damage, personal injury or death.

Do not block combustion-air openings in the furnace. Any blockage could result in improper combustion.

Step 2—General

This furnace should be installed in a location in which facilities for ventilation permit satisfactory combustion of oil, proper venting, and maintenance of ambient temperature at safe limits under normal conditions of use. The location should not interfere with proper circulation of air within the confined space. (See NFPA-31, Section 1.5.)

In addition to air needed for combustion, process air shall be provided as required for: cooling of equipment or material, controlling dew point, heating, drying, oxidation or dilution, safety exhaust, and odor control.

In addition to air needed for combustion, air shall be supplied for ventilation, including all air required for comfort and proper working conditions for personnel.

The barometric draft regulator (included with furnace) shall be installed in same room or enclosure as furnace in such a manner as to prevent any difference in pressure between regulator and combustion-air supply.

Air requirements for operation of exhaust fans, kitchen ventilation systems, clothes dryers, and fireplaces shall be considered in determining the adequacy of a space to provide combustion-air requirements.

The lack of a proper amount of combustion air can lead to serious furnace operational problems. Some of these problems are:

1. Excessive oil burner after drip and oil fumes.
2. Sooting.
3. Melted igniter/relay control.
4. Air band or air turbulator settings more open than normal.
5. Lockouts on start-up.

The requirements for combustion and ventilation air depend upon whether the furnace is located in a CONFINED or UNCONFINED space.

UNCONFINED SPACE

An unconfined space must have at least 50 cu ft for each 1000 Btuh of total input for all the appliances (such as furnaces, clothes dryers, water heaters, etc.) in the space. (Refer to Table 2.)

Table 2—Minimum Floor Area for Unconfined Space

58VLR FURNACE INPUT BTUH	MINIMUM SQ FT WITH 7-1/2 FT CEILING
70,000	467
91,000	607
105,000	700
119,000	793
140,000	933
154,000	1028

In unconfined spaces in buildings of conventional frame, brick, or stone construction, infiltration MAY be adequate to provide air for combustion, ventilation, and dilution of flue gases. This determination must be made on an individual installation basis and must take into consideration the overall volume of unconfined space, the number of windows and ventilation openings, the number of doors to the outside, internal doors which can close off unconfined space, and overall tightness of building construction. Consideration must also be given to the amount of storage items (furniture, boxes, etc.) within the unconfined space which take away from the air volume.

Many new buildings and homes (and older ones that have been weatherized) MUST BE considered as being of tight construction, therefore, infiltration will not be sufficient to supply necessary air for combustion and ventilation.

A building can be considered as being of tight construction when:

1. Walls and ceilings exposed to outside atmosphere have a continuous water vapor retarder with a rating of 1 perm or less with openings gasketed or sealed, and/or

2. Weatherstripping has been added on operable windows and doors, and/or
3. Caulking or sealants are applied to areas such as joints around window and door frames; between sole plates and floors; between wall-ceiling joints; between wall panels; at penetrations for plumbing, electrical, and fuel lines; and at other openings.

If combustion and ventilation air must be supplied to an unconfined space from outside, an opening with a FREE AREA of not less than 1 sq in. per 1000 Btuh of total input of all appliances within unconfined space (but not less than 100 sq in.) must be provided. This opening must be located such that it can not be blocked at any time.

CONFINED SPACE

A confined space has a volume of less than 50 cu ft per 1000 Btuh of the total input rating for all appliances installed in that space.

When furnace is installed in a closet or enclosure, 2 ventilation openings, with OPEN AREA as dimensioned in example below are required for combustion air. The openings should be located about 6 in. from top and bottom of enclosure at front of furnace. (Refer to Table 3.)

Table 3—Combustion Air From Confined Space

58VLR FURNACE INPUT BTUH	LENGTH (IN.)	HEIGHT (IN.)
70,000-105,000	16	8
119,000-154,000	20	10

NOTE: In calculating free area, consideration shall be given to blocking effect of louvers, grilles, or screens protecting openings. Screens used shall not be smaller than 1/4-in. mesh and shall be readily accessible for cleaning. If free area through a design of louver or grille is known, it shall be used in calculating size design and free area specified. If design and free area are not known, it may be assumed that wood louvers have 20 percent free area and metal louvers and grilles have 60 percent free area. Louvers shall be fixed in open position or interlocked with furnace so they open automatically at furnace start-up and remain open during furnace operation.

The size of the openings depends upon whether the air comes from outside of the structure or an unconfined space inside the structure.

All Air From Inside the Structure

For a confined space, where air is taken from an interior space, 2 permanent openings of equal area are required. One opening must be within 12 in. of ceiling and the other within 12 in. of floor. Each opening must have a free area of at least 1 sq in. per 1000 Btuh of total input rating but not less than 100 sq in. (Refer to Table 4.)

Table 4—Combustion Air From Unconfined Space

58VLR FURNACE INPUT BTUH	FREE AREA PER OPENING (SQ IN.)
70,000	100
91,000	100
105,000	105
119,000	119
140,000	140
154,000	154

All Air From Outside the Structure

If outside air is supplied to a confined space, then the 2 openings must be equal and located as above.

1. If combustion air is taken through a permanent opening directly communicating with the outdoors, the opening shall have a minimum free area of 1 sq in. per 4000 Btuh of total input rating for all equipment in the enclosure.
2. If combustion air is taken from outdoors through vertical ducts, the openings and ducts MUST have at least 1 sq in. of free area per 4000 Btuh of the total input for all equipment within the confined space. (Refer to Table 5.)

Table 5—Combustion Air From Outdoors Through Vertical Ducts

58VLR FURNACE INPUT BTUH	FREE AREA PER OPENING (SQ IN.)	ROUND PIPE (IN. DIAM)
70,000	17.5	5
91,000	22.8	6
105,000	26.3	6
119,000	29.8	6
140,000	35.0	6
154,000	38.5	6

3. If combustion air is taken from outdoors through horizontal ducts, the openings and ducts MUST have at least 1 sq in. of free area per 2000 Btuh of the total input for all equipment within the confined space. (Refer to Table 6.)

Table 6—Combustion Air From Outdoors Through Vertical Ducts

58VLR FURNACE INPUT BTUH	FREE AREA PER OPENING (SQ IN.)	ROUND PIPE (IN. DIAM)
70,000	35.0	7
91,000	45.5	8
105,000	52.5	9
119,000	59.5	9
140,000	70.0	10
154,000	77.0	10

When ducts are used to supply air, they must be of the same cross sectional area as free area of openings to which they connect.

The minimum dimension of rectangular air ducts must not be less than 3 in.

Step 3—Duct Work Recommendations

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to follow this warning could result in personal injury or death.

When supply ducts carry air circulated by furnace to areas outside spaces containing furnace, return air MUST also be handled by a duct sealed to furnace casing and terminating outside space containing furnace.

→ **Table 7—Electrical Data**

UNIT SIZE	VOLTS — HERTZ— PHASE	OPERATING VOLTAGE RANGE		MAX UNIT AMPS	MIN WIRE GAGE	MAX WIRE LENGTH (FT)†	MAX FUSE OR CKT BKR AMPS‡
		Max.*	Min.*				
105–12	115–60–1	132	104	12.2	14	26	15
120–20	115–60–1	132	104	15.7	12	26	20

*Permissable limits of voltage range at which unit will operate satisfactorally.
†Length shown is as measured 1 way along wire path between unit and service panel for maximum 2 percent voltage drop.
‡Time-delay fuse is recommended.

⚠ WARNING

FIRE HAZARD or UNIT MAY NOT OPERATE
Failure to follow this caution may result in property damage or intermittent unit operation.
Return-air grilles and warm air registers MUST NOT be obstructed.

The proper sizing of warm air ducts is necessary to ensure satisfactory furnace operation. Duct work should be in accordance with the latest editions of NFPA-90A (Installation of Air Conditioning and Ventilating Systems) and NFPA-90B (Warm Air Heating and Air Conditioning Systems) or Canadian equivalent.

The supply duct work should be attached to flanged front opening provided at discharge end of furnace. The return-air duct work should be attached to flanged rear opening of furnace. See Fig. 2 for dimensions of these openings.

NOTE: The back (blower access opening) should not be used for return air.

The following recommendations should be followed when installing duct work:

1. Install locking-type dampers in all branches of individual ducts to balance out system. Dampers should be adjusted to impose proper static at outlet of furnace.
2. A flexible duct connector of noncombustible material should be installed at unit on both supply- and return-air systems. In applications where extremely quiet operation is necessary, the first 10 ft (if possible) of supply and return ducts should be internally lined with acoustical material.
3. In cases where return-air grille is located close to fan inlet, there should be at least one 90° air turn between fan inlet and grille. Further reduction in sound level can be accomplished by installing acoustical air turning vanes or lining duct as described in item 2 above.
4. When a single air grille is used, duct between grille and furnace must be the same size as return opening in furnace.

Step 4—Venting

Venting of furnace should be to the outside and in accordance with local codes or requirements of local utility.

OIL-FIRED APPLIANCES SHALL BE CONNECTED TO FLUES HAVING SUFFICIENT DRAFT AT ALL TIMES TO ENSURE SAFE AND PROPER OPERATION OF APPLIANCE.

For additional venting information, refer to ANSI/NFPA 211 Chimney, Fireplaces, Vents, and Solid Fuel Burning Appliances and/or CSA B139 Installation Code.

This furnace is certified for use with Type ″L″ vent (maximum flue gas temperature 575°F).

VENT SYSTEM INSPECTION

Before furnace is installed, it is highly recommended that any existing vent system be completely inspected.

For any chimney or vent, this should include the following:

1. Inspection for any deterioration in chimney or vent. If deterioration is discovered, chimney must be repaired or vent must be replaced.
2. Inspection to ascertain that vent system is clear and free of obstructions. Any blockage must be cleared before installing furnace.
3. Cleaning chimney or vent if previously used for venting a solid fuel burning appliance or fireplace.
4. Confirming that all unused chimney or vent connections are properly sealed.
5. Verification that chimney is properly lined and sized per the applicable codes. (Refer to list of codes in Safety Considerations section.)

MASONRY CHIMNEYS

This furnace can be vented into an existing masonry chimney. This furnace must not be vented into a chimney servicing a solid fuel burning appliance. Before venting furnace into a chimney, the chimney MUST be checked for deterioration and repaired if necessary. The chimney must be properly lined and sized per local or national codes.

If furnace is vented into a common chimney, the chimney must be of sufficient area to accommodate the total flue products of all appliances vented into chimney.

The following requirements are provided for a safe venting system:

1. Be sure that chimney flue is clear of any dirt or debris.
2. Be sure that chimney is not servicing an open fireplace.
3. Never reduce pipe size below the outlet size of furnace. (See Fig. 2.)
4. All pipe should be supported using proper clamps and/or straps. These supports should be at least every 4 ft.
5. All horizontal runs of pipe should have at least 1/4 in. per ft of upward slope.
6. All runs of pipe should be as short as possible with as few turns as possible.
7. Seams should be tightly joined and checked for leaks.
8. The flue pipe must not extend into chimney but be flush with inside wall.
9. The chimney must extend 3 ft above highest point where it passes through the roof of a building and at least 2 ft higher than any portion of a building within a horizontal distance of 10 ft. It shall also be extended at least 5 ft above highest connected equipment flue collar.
10. Check local codes for any variance.

FACTORY-BUILT CHIMNEYS

Listed factory-built chimneys may be used. Refer to chimney manufacturer’s instructions for proper installation.

Step 5—Oil Burner

This furnace is supplied with a high-pressure atomizing retention head-type burner (for use with grade 1 or 2 Fuel Oil). The Riello oil burner operates with a prepurge period of 10 sec and a safety timing of 5 sec. The burner flange is factory installed for an insertion length of 3-3/4-in. The oil pump is set to operate on a single line system. To operate on a two-line system the by-pass plug must be installed.

Step 6—Oil Connections

⚠ CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in unit component damage.

This burner is shipped with the oil pump set to operate on a **single** line system. To operate on a **two-line** system the by-pass plug must be installed. Do not operate a **single** line system with the by-pass plug installed. Operating a single line system with the by-pass plug installed will result in damage to the pump shaft seal. Pump pressure must be set at time of burner start-up. A pressure gauge is attached to the **PRESSURE PORT** for pressure readings. Two **PIPE CONNECTORS** are supplied with the burner for connection lines to burner pipe connectors. All pump port threads are **British Parallel Thread** design. Direct connection of NPT threads to the pump **will damage** the pump body. Riello manometers and vacuum gauges **do not** require any adapters, and can be safely connected to the pump ports. An NPT (metric) adapter must be used when connecting other gauge models.

Complete instructions for installing fuel oil piping can be found in oil burner Installation Instructions included with furnace.

Oil line entry holes are provided in side panels. Two holes are provided in each location so that a 2-pipe system may be used if desired.

An oil filter should be used with all oil burners and should be installed as close to burner as possible.

Step 7—Barometric Draft Control

The barometric draft control shipped with furnace MUST be used with furnace to ensure proper operation. Instructions for installing control are packed with control.

Step 8—Electrical Connections

⚠ WARNING

ELECTRICAL SHOCK AND FIRE HAZARD

Failure to follow this warning could result in serious injury, death, or property damage.

The unit cabinet must have an uninterrupted or unbroken electrical ground to minimize personal injury if an electrical fault should occur. A green ground screw is provided in control box for this connection.

115V WIRING

Before proceeding with electrical connections, make certain that voltage, frequency, and phase correspond to that specified on unit rating plate. Also, check to be sure that service provided by utility is sufficient to handle load imposed by this equipment. Refer to rating plate or Table 7 for equipment electrical specifications.

Make all electrical connections in accordance with National Electrical Code (NEC) ANSI/NFPA 70-2001 and any local codes or ordinances that might apply. For Canadian installations, all electrical connections must be made in accordance with Canadian Electrical Code CSA C22.1 or subauthorities having jurisdiction.

⚠ WARNING

FIRE HAZARD

Failure to follow this warning could result in serious injury, death, or property damage.

Do not connect aluminum wire between disconnect switch and furnace. Use only copper wire.

The control system depends on correct polarity of power supply. Connect HOT wire (H) and NEUTRAL wire (N) as shown in Fig. 4.

A separate line voltage supply MUST be used with a fused disconnect switch or circuit breaker between main power panel and unit. (See Fig. 4.)

Metallic conduit (where required/used) may terminate at side panel of unit. It is not necessary to extend conduit inside unit from side panel to control box.

When replacing any original furnace wiring, use only 105°C No. 14 AWG copper wire.

24–V WIRING

→ Instructions for wiring thermostat (field supplied) are packed in thermostat box. Make thermostat connections as shown in Fig. 5 to 8 at 24-v terminal board on electronic control board. Thermostat wire connections at R and W are the minimum required for oil heating operation.

ACCESSORY INSTALLATION

1. General

   When installing optional accessories to this appliance, follow manufacturer's Installation Instructions included with accessory. Other than wiring for thermostat, wire with a minimum of type ″T″ insulation (63°F rise) must be used for accessories.

→ 2. Auxiliary Terminals

   The HUM 120 VAC terminals on the electronic control board are tied directly to the #8 pin of the 9 pin connector and provide a 120 VAC signal whenever the burner is energized. (See Fig. 4.) Supplementary 120 VAC and neutral terminals can be used for accessory wiring. See Electronic Air Cleaner and Humidifier sections for further information.

→ 3. Electronic Air Cleaner Connections

   When using an electronic air cleaner with variable-speed oil-fired furnaces, use an Airflow Sensor kit. As the air cleaner is connected to constant 120 VAC power, the airflow sensor turns on the electronic air cleaner when the furnace blower is operating.

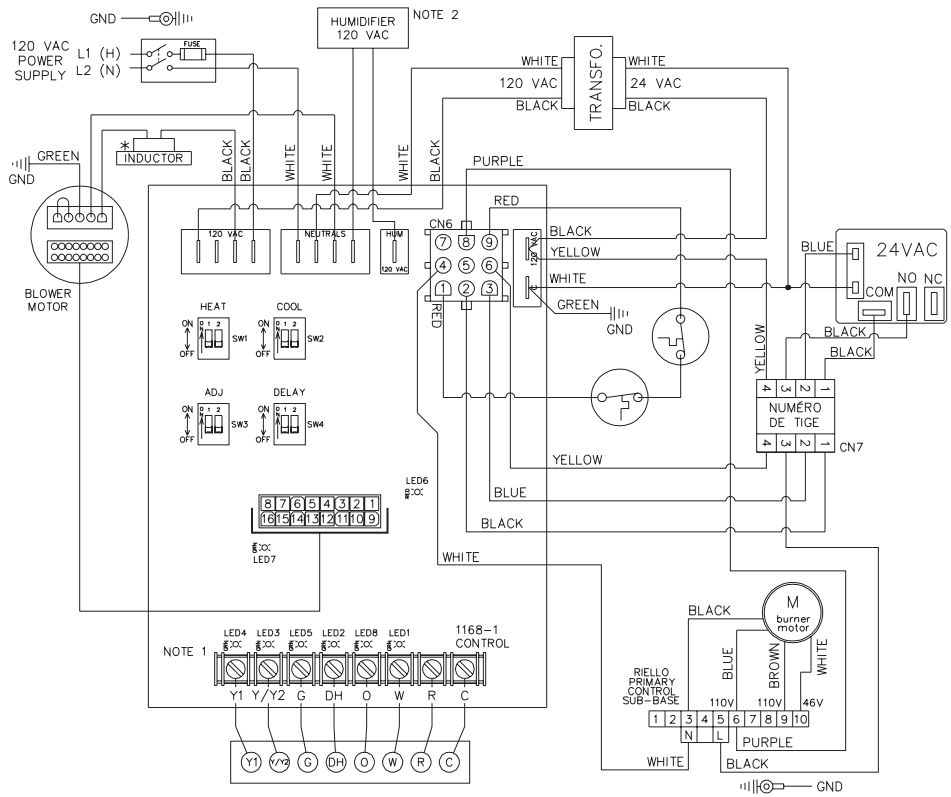
→ 4. Humidifier/Humidistat Connections

   To ensure humidifier will operate properly, use HUM output of Humidistat Control to control humidifier operation. A 24-VAC signal can be connected from the W and C on terminal block connections on the electronic board or a 120 VAC signal from the ″HUM 120 VAC″ terminal when primary heating source is used. (See Fig. 4-8.)

→ 5. Dehumidify Capability with Standard Humidistat Connection

   Latent capabilities for systems using the variable-speed oil-fired furnaces are better than average systems. If increased latent capacity is an application requirement, the field wiring terminal block provides connection terminals for use of a standard humidistat.

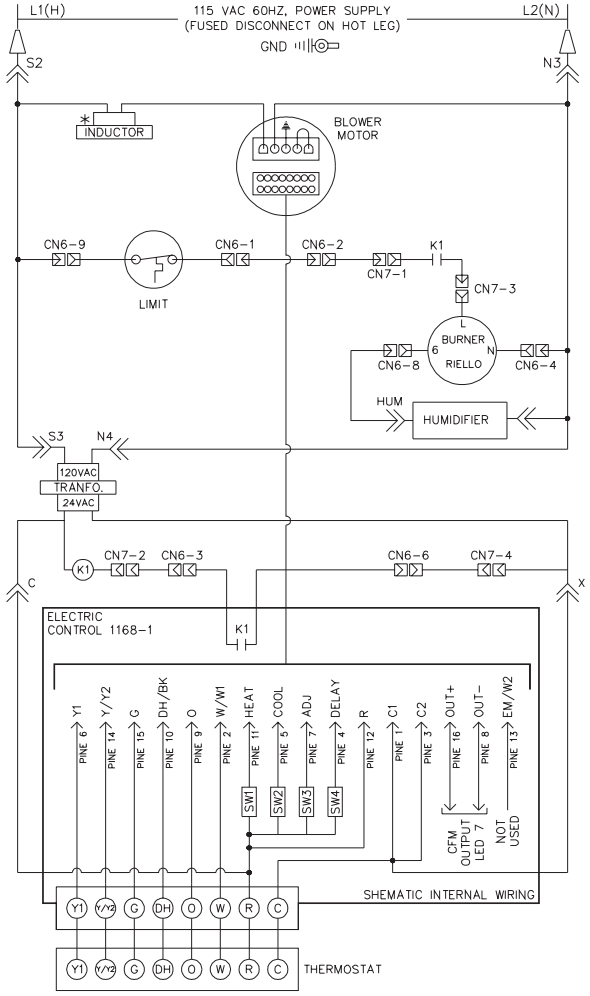
SCHEMATIC WIRING DIAGRAM



* USE ONLY WITH 1 HP MOTOR
NOTE 1: LED "ON" = 24 VAC INPUT APPLIED ON Y1, Y/Y2, G, O, W.
NOTE 2: 120 VAC OUTPUT FOR HUMIDIFIER WHEN BURNER RUN.
LED 6: ON IF HIGH LIMIT CONDITION IS DETECTED.
LED 7: CFM READOUT, ONE FLASH FOR EACH 100 CFM.

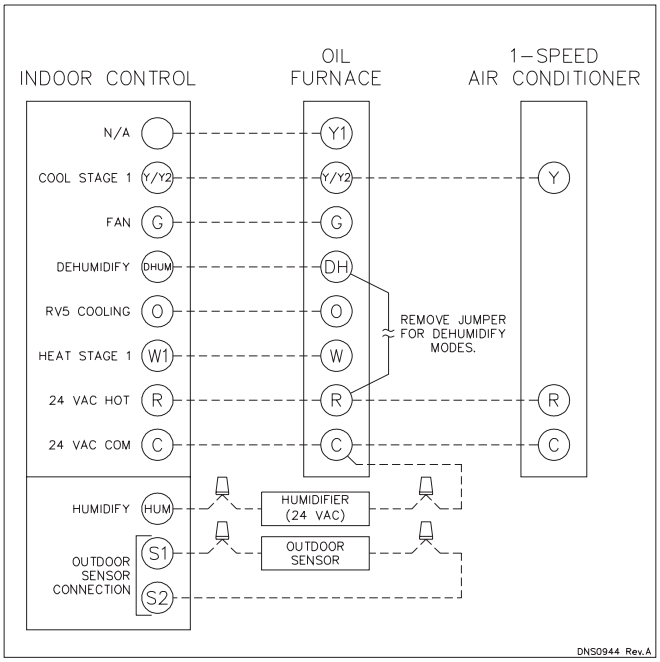
FOR HUMIDIFIER, REMOVE THE DUMMY TERMINAL MARKED HUM.

LADDER WIRING DIAGRAM



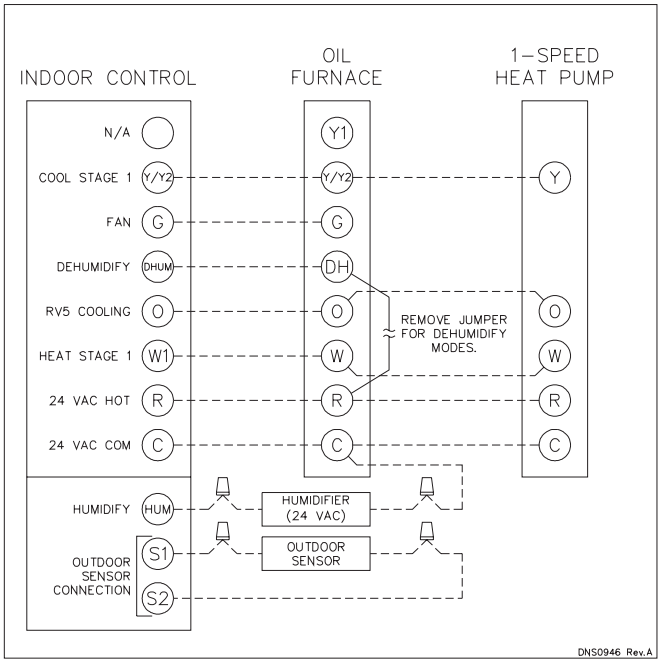
A04182

Fig. 4—Wiring Diagram



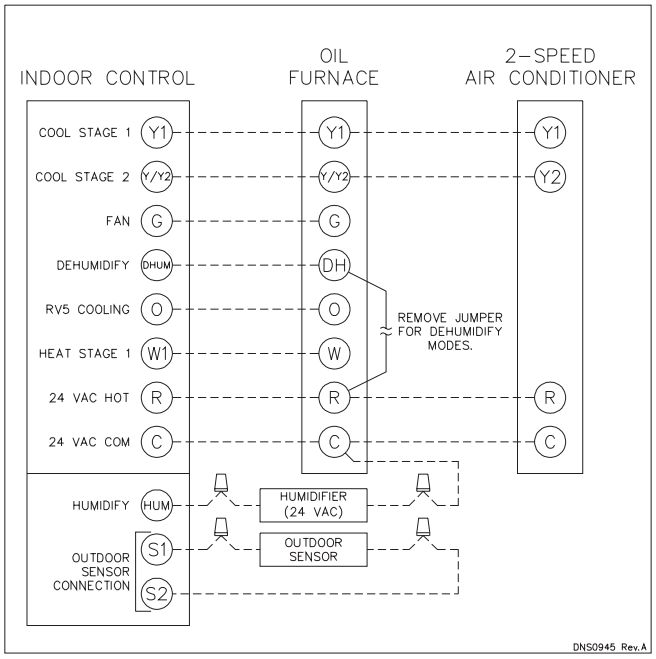
A04183

Fig. 5—24 VAC Oil Furnace Wiring with 1-Speed Air Conditioner



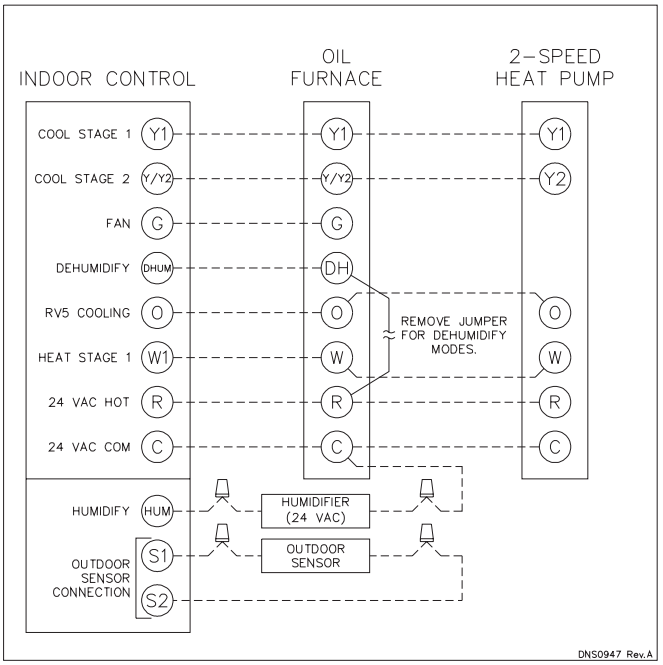
A04185

Fig. 7—24 VAC Oil Furnace Wiring with 1-Speed Heat Pump



A04184

Fig. 6—24 VAC Oil Furnace Wiring with 2-Speed Air Conditioner



A04186

Fig. 8—24 VAC Oil Furnace Wiring with 2-Speed Heat Pump

The variable-speed oil-fired unit will detect the humidistat contacts opening on increasing humidity and reduce its airflow to approximately 85 percent of nominal cooling mode airflow. This reduction will increase the system latent capacity until the humidity falls to a level which causes the humidistat contacts to close. When the contacts close, the airflow will return to 100 percent of the selected cooling airflow. To activate this mode, remove the Jumper between DH and R of the electronic board and wire in a standard humidistat.

Step 9—Filters

⚠ WARNING

FIRE, CARBON MONOXIDE AND POISONING HAZARD

Failure to follow this warning could result in fire, personal injury, or death.

Never operate unit without a filter or with filter access door removed.

An internal filter rack is provided as standard equipment with furnace and is located in blower compartment. A sufficient clearance should be provided for air filter access. Refer to Table 8 for filter rack flange dimensions for return air duct.

Table 8—Filter Size (In.) and Quantity

UNIT SIZE	AIR FILTER SIZE	RETURN OPENING SIZE	SUPPLY OPENING SIZE
105–12	(2) 12 X 20	20 X 20	20 X 20
120–20	(2) 16 X 20	22 X 20	24 X 20

STARTUP, ADJUSTMENT, AND SAFETY CHECKOUT

Step 1—Operational Checkout

Installation of furnace is now complete. Run through the following checkout and ensure each item has been performed.

1. Correct nozzle size has been selected for desired input rate.
2. Electrical wiring is completed according to Fig. 4.
3. Blower wheel support is removed.
4. Blower access door is secured in place.
5. Valve on oil supply line is open.
6. RESET BUTTON on primary control is pushed down.
7. Flame observation door is closed.
8. Thermostat is set for heating mode and set above room temperature.

If all of the above items have been performed, set main electrical switch to ON position and burner should start. When burner starts, proceed to Combustion Check section.

→ Step 2—Sequence of Operation

Using schematic diagram in Fig. 4 follow the sequence of operation through the different modes. Read and follow diagram very carefully.

NOTE: The GE ICM2 + blower motor speeds are infinitely variable control airflow rate (CFM). The ICM2+ motor ramps to speed at a controlled rate to reduce start-up noise perception. The ICM2+ motor ramps down slowly to a stop in the same time as ramp-up time. ICM2+ ramp-up and ramp-down times are additive to blower-on and -off delays, respectively. The ICM2+ is 115-v energized whenever power is available at furnace control, but operates only when 24-v motor control input(s) are on.

OIL-FIRED HEATING MODE

1. The thermostat closes R to W.
2. Burner motor starts. The burner motor fan pre-purges the combustion chamber and vent for 10 seconds, establishing the combustion air pattern. During this time the solenoid valve holding oil pressure will be approximately 100 psig. Solenoid valve opens, allowing oil to flow through nozzle. At the same time, the burner motor's ignition coil produces spark.
3. Spark ignites oil droplets.
4. Cad cell senses flame and burner continues to fire. Ignition transformer ceases sparking.
5. After the ″Pre-Run″ ON-delay time, the circulating air blower starts.
6. The circulating air blower and burner motor remain ON until the thermostat is satisfied. The solenoid valve remains open (R40-F)
7. Thermostat is satisfied.
8. The solenoid valve closes and the burner fan motor shuts down.
9. The furnace blower motor continues operating at 38 percent of the heating airflow for an additional 3 min.

COOLING MODE

a. Single-Speed Cooling Outdoor Unit (See Fig. 5 for thermostat connections.)

(1.) The thermostat closes R to G-and-Y circuits. The R-Y/Y2 circuit starts outdoor unit, and R to G-and-Y/Y2 circuits start the furnace BLWM on cooling speed.

(2.) When thermostat is satisfied, the R to G-and-Y/Y2 circuits are opened. The outdoor unit stops, and furnace BLWM continues operating at 50 percent of the cooling airflow for an additional 180 sec.

b. Two-Speed Cooling Outdoor Unit (see Fig. 17 for thermostat connections.)

(1.) The thermostat closes the R to G-and-Y1 circuits for low cooling or closes the R to G-and Y1-and-Y/Y2 circuits for high cooling. The R to Y1 circuit operates the outdoor unit on low-cooling speed. The R to G-and-Y1 circuit operates the furnace BLWM at low-cooling airflow 55 percent of single-speed cooling airflow. The R to Y1-and-Y2 circuits operate the outdoor unit on high-cooling speed, and the R to G-and-Y/Y2-and-Y1 circuits operate furnace BLWM at high-cooling airflow.

NOTE: Y1 is found in the furnace and in the outdoor unit. The furnace control CPU controls BLWM airflow by sensing only G-and-Y1 for low-cooling airflow and G-and-Y1-and-Y/Y2-for high-cooling airflow.

(2.) When the thermostat is satisfied, the R to G-and-Y1 or R to G-and-Y1-andY/Y2 circuits open. The outdoor unit stops, the furnace blower continues operating at 50 percent of the cooling airflow for an additional 3 min.

CONTINUOUS-BLOWER MODE

a. When R to G circuit is closed by the thermostat, BLWM operates at 64 percent, 75 percent, or 86 percent of single-speed cooling airflow; depend on dipswitch setting (See Tables 13 and 14.)

b. During a call for heat, the BLWM will keep continuous-blower speed until the end of ″Short run″ delay period.

After which the BLWM operates at the appropriate oil heating airflow. The BLWM reverts to continuous blower airflow after the heating cycle is completed.

c. When thermostat ″calls for low-cooling″, the BLWM keeps continuous-blower speed until the end of ″Short run″ delay period. After which the BLWM operates at the appropriate low cooling airflow. When the thermostat is satisfied, the BLWM switches to continuous-blower airflow.

d. When the thermostat calls for high cooling, the BLWM keep continuous-blower speed until the end of ″Short run″ delay period. After which the BLWM operates at the appropriate high cooling airflow.

e. When R-G circuit is opened, the BLWM stops immediately.

HEAT PUMP

NOTE: A dual-fuel thermostat is required when variable speed furnaces are used with heat pumps. See dual-fuel thermostat Installation Instructions for interface connections. The interface prevents simultaneous operation of both furnace and heat pump, and prevents direct transition from heat pump to furnace operation.

a. Single-Speed Heat Pump Cooling

(1.) The thermostats close the R to Y/Y2-and-G-and-O circuits to operate the Furnace BLWM at cooling airflow. The Y/Y2 input to the furnace control is necessary to provide adequate cooling airflow.

(2.) When thermostat is satisfied, furnace BLWM continues operating at 50 percent of the cooling airflow for an additional 3 min

b. Two-Speed Heat Pump Cooling

(1.) The thermostat closes the R to G-and-Y1-and-O circuits to operate the furnace BLWM at low-cool airflow. The thermostat R to G-and-Y/Y2-and-Y1-and-O circuits operates the furnace BLWM at high-cool airflow.

NOTE: The furnace control CPU controls blower airflow by sensing G, Y1, and O for low-cool airflow and G, Y1, Y/Y2, and O for 2-speed high-cool airflow.

(2.) When the thermostat is satisfied, the furnace BLWM continues operating at 50 percent of the additional 3 min.

c. Single-Speed Heat Pump Heating

(1.) The thermostats close R to G-and-Y/Y2 circuits to operate the furnace BLWM at heat pump heating airflow. Heating airflow is the same as cooling airflow.

(2.) When thermostat is satisfied, the furnace BLWM continues operating at 50 percent of the heat pump heating airflow for an additional 3 min.

d. Two-Speed Heat Pump Heating

(1.) The thermostat closes the R to Y1-and-G circuits for low heat and operates the furnace BLWM at heat pump low-heat airflow. Closing R-Y/Y2, Y1 and G circuit to furnace provides BLWM heat pump high-heat airflow.

NOTE: The furnace control CPU controls BLWM airflow by sensing G and Y1 for heat pump low-heat airflow, and G, Y1, and Y/Y2 for heat pump high-heat airflow.

(2.) When the thermostat is satisfied, the furnace BLWM continues operating at 50 percent heating airflow for an additional 3 min.

(3.) Opening only R-Y/Y2 circuit switches BLWM to heat pump low-heat airflow.

DEFROST

When furnace controls R to W/W1-and-Y/Y2 circuits are closed, furnace control CPU starts and burner and BLWM operation is at oil heating airflow during defrost.

Step 3—Combustion Check

In order to obtain optimum performance from oil burner, the following setup procedures must be followed:

1. A test kit to measure smoke, stack draft, over-fire draft, CO_2, oil pump pressure, and stack temperatures MUST be used in order to obtain proper air band setting. Although all of the above measurements are required for optimum setup and efficiency data, the most important readings that must be taken are smoke number, over-fire draft, stack draft, and pump pressure.
2. The proper smoke number has been established by engineering tests to be between 0 and 1. This degree of smoke emission is commonly referred to as a ″trace″ of smoke. It is recommended to use a Bacharach true spot smoke test set or equivalent.
3. In order to ensure proper draft through furnace, a barometric draft regulator (supplied with furnace) must be installed.
   In order for this device to function properly, barometric damper must be mounted with hinge pins horizontal and face of damper vertical. (See instructions included with damper.) The draft regulator should be adjusted after furnace has been firing for at least 5 minutes, and set between -0.025 and -0.035 in. wc. (See Table 9.)

Table 9—Furnace Draft Conditions (In. wc)

FURNACE INPUT (BTUH)	FLUE DRAFT MINIMUM	OVER-FIRE DRAFT MAXIMUM	TOTAL RESTRICTION THROUGH HEAT EXCHANGER
70,000	–0.025	0.010	0.020 to 0.035
91,000	–0.025	0.020	0.030 to 0.045
105,000	–0.025	0.025	0.035 to 0.050
119,000	–0.025	0.025	0.035 to 0.050
140,000	–0.025	0.025	0.035 to 0.050
154,000	–0.025	0.025	0.035 to 0.050

4. The over-fire draft, which is taken through observation door (located in center line above burner in front panel of furnace), is a measurement necessary to determine if there is a blockage between oil burner and flue outlet.
   There should be a total pressure drop of between 0.020 and 0.05 in. wc through furnace as shown in Table 9. The over-fire draft must be set within the range shown in Table 9. A reading outside the range shown in Table 9 (for example +0.1 in. wc) would indicate that furnace is in an extremely high-pressure condition in primary section. This condition may be caused by any of the following problems:
   a. Excessive combustion air due to air shutter being too wide open.
   b. A lack of flue draft (chimney effect) or some other blockage, such as soot, in secondary section of heat exchanger.
   c. Use of an oversized nozzle input.
   d. Pump pressure over the values listed in Table 10.

Table 10—Burner Input And Nozzle Size

FURNACE INPUT (BTUH)	FIRING RATE GAL/HR (US)*	RIELLO OIL BURNER		PUMP PRESSURE (PSIG)
		No. 40 Series Model	Delavan Nozzle	
70,000	0.50	F3	0.40 - 70A	160
91,000	0.65	F3	0.50 - 70W	170
105,000	0.75	F3	0.65 - 70W	135
119,000	0.85	F5	0.75 - 70B	130
140,000	1.00	F5	0.85 - 70W	140
154,000	1.10	F5	1.00 - 70W	125

* For rating puropses only.

5. The CO_2 and stack temperature instruments enable you to obtain data required to determine thermal efficiency of furnace.
6. An oil filter should be installed as close to burner as possible with ALL oil burners and is essential on lower firing rate burners. We recommend the use of a low pressure drop oil filter such as the General Filter, Inc. model #1A-25A or equivalent.
7. The oil pressure regulator is factory set to give oil pressure of 135 psig for the model having 105,000 BTUH input and 130 psig for the model having 119,000 BTUH input. The firing rate noted on nameplate may be obtained using the nozzles and pump pressures indicated in Table 10. The proper oil burner turbulator setting for all the firing rates is 0 (zero).
8. On a new installation, air entrapped in oil line leading from tank to nozzle must be thoroughly purged in order to prevent excessive after drip. The oil pump is provided with a special fitting which allows purging of any air between tank and oil pump. The proper procedure for performing this operation is as follows:
   a. Place a piece of clear plastic 1/4 in. diameter tubing over purge fitting on oil pump.
   b. Start oil burner, then open purge fitting and allow burner to run until purge tube is completely free of air bubbles.
   c. Tighten purge fitting. Allow oil to run to nozzle and fire burner.
   d. If purging takes longer than 15 sec and no flame has been established, burner stops. Push reset button on front of primary control to restart burner.
   e. For detailed information on operation of primary control, refer to instructions included with furnace.

After all the setup procedures mentioned above have been completed, the burner should be allowed to operate and an inspection mirror should be used to observe the flame pattern at tip of nozzle. Any irregularities such as burning to 1 side or pulsating flame patterns should be corrected by changing nozzle.

Step 4—Fan Adjustment Check

→ This furnace is equipped with a variable speed motor. The blower is factory set to deliver the required airflow for 0.75GAL/HR(US) INPUT and 3.0 tons air conditioning for the 58VLR105 (See Tables 11A, 11B, and 11C). The blower is factory set to deliver the required airflow for 0.85GAL/HR (US) INPUT and 5 tons air conditioning for the 58VLR120 (See Tables 12A, 12B, and 12C). The blower is field adjustable to deliver the required airflow for other capacities.

Table 11a—58VLR105 Size Dip Switch Adjustment for Oil Heating Mode

SW1-HEAT DIP SWITCH POSITION		INPUT USGPH	SW4-DELAY DIP SWITCH POSITION		INPUT USGPH
1	2		1	2	
OFF	OFF	0.75	OFF	OFF	0.75
ON	OFF	0.65	ON	OFF	0.65
OFF	ON	0.5	OFF	ON	0.5
ON	ON	N/A	ON	ON	N/A

Table 11b—58VLR105 Size Dip Switch Adjustments for Heat Pump and Cooling Mode

SW2-COOL DIP SWITCH POSITION		A/C SIZE (TONS)
1	2	
OFF	OFF	3.0
ON	OFF	2.5
OFF	ON	2.0
ON	ON	1.5

Table 11c—58VLR105 Size Dip Switch CFM Adjustments in All Modes

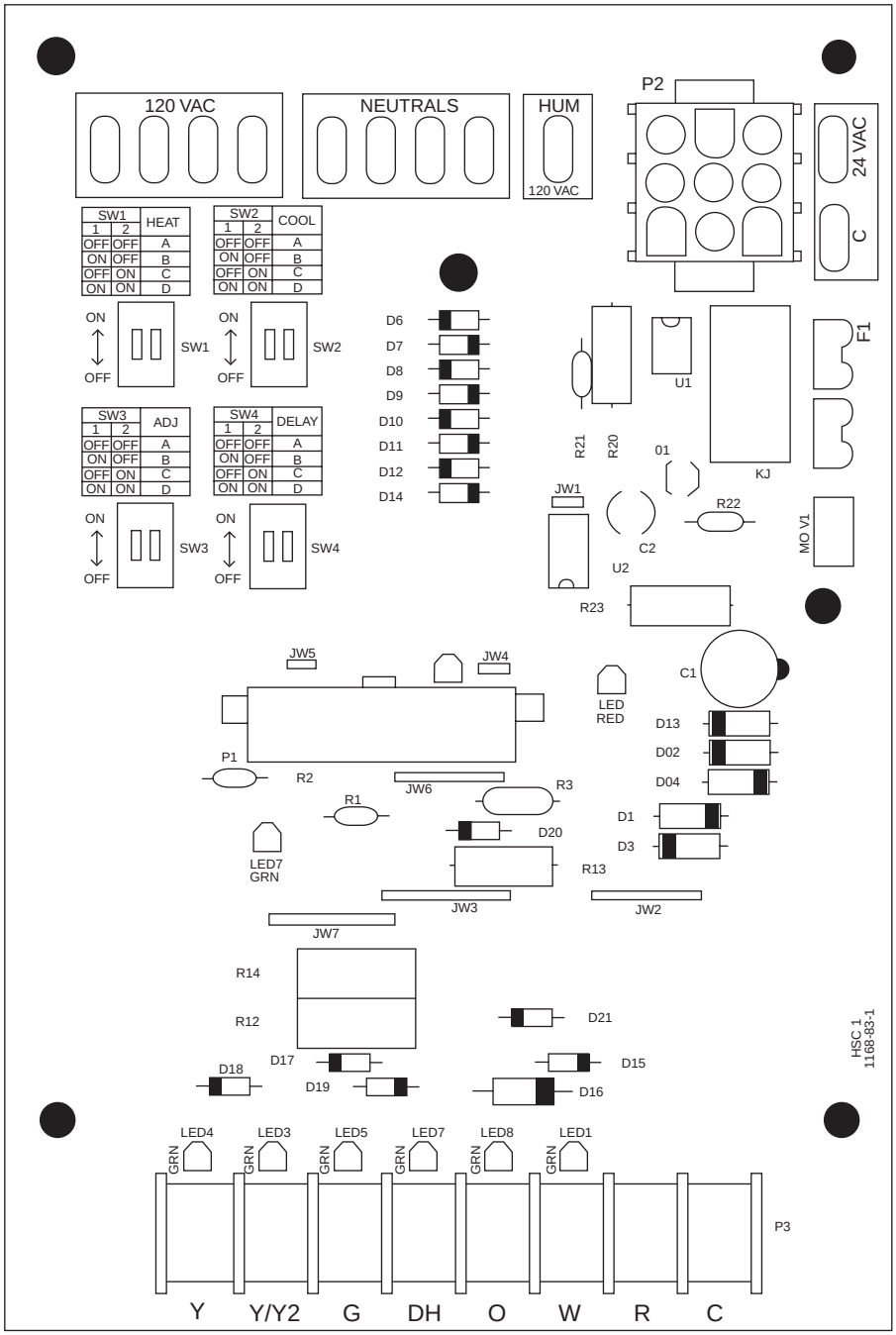
SW2-ADJUST DIP SWITCH POSITION		HEATING CFM % INCREASE OR DECREASE	COOLING CFM % INCREASE OR DECREASE
1	2		
OFF	OFF	0	0
ON	OFF	+ 13	+ 10
OFF	ON	- 15	- 10
ON	ON	N/A	0

Table 12a—58VLR120 Dip Switch Adjustment for Oil Heating Mode

SW1-HEAT DIP SWITCH POSITION		INPUT USGPH	SW4-DELAY DIP SWITCH POSITION		INPUT USGPH
1	2		1	2	
OFF	OFF	0.85	OFF	OFF	0.85
ON	OFF	1.00	ON	OFF	1.00
OFF	ON	1.10	OFF	ON	1.10
ON	ON	N/A	ON	ON	N/A

Table 12b—58VLR120 Size Dip Switch Adjustments for Heat Pump and Cooling Mode

SW2-COOL DIP SWITCH POSITION		A/C SIZE (TONS)
1	2	
OFF	OFF	5.0
ON	OFF	4.0
OFF	ON	3.5
ON	ON	3.0



NOTES

1. The Red LED to the right of P-1 will illuminate whenever the limit switch is open.
2. The Green LED below the left end of P-1 will flash when the blower motor is operating. The LED will flash one time for each 100 RPM.
3. The Green LEDs above Y1, Y/Y2, G, O, and W will illuminate whenever there is a 24V input from the thermostat.
4. The Green LED above DH will illuminate whenever there is not a 24VAC input applied.

A04194

Fig. 9—Control Board

Table 12c—58VLR120 Size Dip Switch CFM Adjustments in All Modes

SW2-ADJUST DIP SWITCH POSITION		HEATING CFM % INCREASE OR DECREASE	COOLING CFM % INCREASE OR DECREASE
1	2		
OFF	OFF	0	0
ON	OFF	+ 13	+ 10
OFF	ON	- 15	- 10
ON	ON	N/A	0

⚠ WARNING

FIRE HAZARD AND UNIT RELIABILITY

Failure to follow this warning could result in property damage, personal injury or death.

When operating furnace in heating mode, static pressure and temperature rise (supply-air temperature minus return-air temperature) must be within those limits specified on rating label.

Step 5—Limit Control Check

After furnace has been in operation for at least 15 minutes, restrict return-air supply by blocking filters or closing return registers and allow furnace to shut down on high limit. The burner should shut off, and main blower should continue to run.

Step 6—For Year-Round Air Conditioning

This furnace is designed for use in conjunction with cooling equipment to provide year-round air conditioning. The blower has been sized for both heating and cooling, however, fan motor setting may need to be changed to obtain necessary cooling airflow.

CARE AND MAINTENANCE

⚠ WARNING

ELECTRICAL SHOCK, FIRE OR EXPLOSION HAZARD

Failure to follow this warning could result in possible damage to this equipment, serious personal injury, or death.

The ability to properly perform maintenance on this equipment requires certain expertise, mechanical skills, tools, and equipment. If you do not possess these, do not attempt to perform any maintenance on this equipment other than those procedures recommended in the User's Manual.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to comply with this warning could cause electrical shock resulting in personal injury or death.

Before performing any service functions, unless operations specifically require power to be on, make sure all utilities are turned off upstream of appliance.

Step 1—General

In order to keep this furnace in good operating condition and to maintain its warranty, the furnace MUST be serviced on an annual basis. This servicing includes a nozzle change, a burner inspection, a visual check of tube passages through flue outlet and cleanout ports, and a visual inspection of combustion chamber when burner is removed.

Depending on above inspection, service could also include a cleaning and vacuuming of heat exchanger tubes and possibly the heat exchanger drum section.

Removal of any heat exchanger components which are sealed by gaskets requires replacement of gasket.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

Failure to replace any heat exchanger gaskets with new gaskets when any heat exchanger plates or covers are removed could lead to heat exchanger leakage, sooting, and/or a hazardous condition capable of causing personal injury or death.

This furnace should never be operated without an air filter. Disposable filters should be replaced at least once a year. If equipped to provide cooling, filters should be replaced a minimum of twice a year. Permanent filters should be cleaned at least twice a year.

ALWAYS KEEP MAIN OIL VALVE TURNED OFF IF BURNER IS SHUT DOWN FOR AN EXTENDED PERIOD OF TIME.

Step 2—Oil Burner

For optimum performance, oil burner nozzle should be replaced once a year. Contact your service technician if you are unsure of this procedure.

The procedure for nozzle installation and/or replacement is outlined in oil burner instruction manual which came with furnace.

After replacement of nozzle, burner should be adjusted in accordance with Combustion Check section of this instruction.

Step 3—Heat Exchanger and Flue Pipe

Ordinarily, it is not necessary to clean heat exchanger or flue pipe every year, but it is necessary to have your service technician check unit before each heating season to determine whether cleaning or replacement of parts is required.

If cleaning is necessary, the following steps should be performed:

1. Turn off all oil and electrical supplies upstream of furnace.

⚠ CAUTION

BURN HAZARD

Failure to follow this caution may result in minor personal injury.

If furnace has been in operation, some surfaces may be hot. Allow time for unit to cool down.

2. Disconnect flue pipe.
3. Remove flue collar panel located in rear part of furnace.
4. Remove flue silencer from secondary heat exchanger.
5. Disconnect oil line and remove oil burner from furnace.
6. Clean primary and secondary heat exchangers with a stiff brush and vacuum cleaner.
7. Before reassembly, heat exchanger/combustion chamber should be inspected to determine if replacement is required.
8. After cleaning, replace flue silencer, flue collar, and oil burner.
9. Readjust burner for proper operation.

Step 4—Blower Removal

To remove blower from furnace:

1. Turn off all oil and electrical supplies upstream of furnace.
2. Remove blower access door.
3. Remove air filters.
4. Remove blower retaining wing nuts.

→ Table 13—58VLR105 Size Airflow Data (CFM)

OIL HEATING MODE 24 VAC INPUT (R) ON W ONLY				
SW1-HEAT Dip Switch Position	HEAT INPUT (USGPH)	CFM with SW3-ADJ Dip Switch A Position	CFM with SW3-ADJ Dip Switch B Position	CFM with SW3-ADJ Dip Switch C Position
A (1=OFF, 2=OFF)	0.75	1260	1425	1070
B (1=ON, 2=OFF)	0.65	1050	1190	895
C (1=OFF, 2=ON)	0.5	850	960	725
D (1=ON, 2=ON)	Same Value then A Dip Switch Position			

CONTINUOUS FAN 24 VAC INPUT (R) ON G ONLY				
SW2-COOL Dip Switch Position	A/C Size (TON)	CFM with SW3-ADJ Dip Switch A Position	CFM with SW3-ADJ Dip Switch B Position	CFM with SW3-ADJ Dip Switch C Position
A (1=OFF, 2=OFF)	3.0	785	905	670
B (1=ON, 2=OFF)	2.5	655	755	560
C (1=OFF, 2=ON)	2.0	525	605	445
D (1=ON, 2=ON)	1.5	395	455	335

COOLING OR HEAT PUMP HEATING MODE - SINGLE SPEED OR 2-SPEED HIGH 24 VAC INPUT (R) TO G, Y/Y2 AND O (FOR COOLING)				
SW2-COOL Dip Switch Position	A/C Size (TON)	CFM with SW3-ADJ Dip Switch A Position	CFM with SW3-ADJ Dip Switch B Position	CFM with SW3-ADJ Dip Switch C Position
A (1=OFF, 2=OFF)	3.0	1050	1155	945
B (1=ON, 2=OFF)	2.5	875	965	790
C (1=OFF, 2=ON)	2.0	700	770	630
D (1=ON, 2=ON)	1.5	525	580	475

NOTE: In cooling-Dehumidification mode, with no 24 VAC input to DH, the CFM is reduced by 15%

COOLING MODE OR HEAT PUMP HEATING MODE - 2-SPEED LOW 24 VAC INPUT (R) TO G, Y1 AND O (FOR COOLING)				
SW2-COOL Dip Switch Position	A/C Size (TON)	CFM with SW3-ADJ Dip Switch A Position	CFM with SW3-ADJ Dip Switch B Position	CFM with SW3-ADJ Dip Switch C Position
A (1=OFF, 2=OFF)	3.0	580	635	520
B (1=ON, 2=OFF)	2.5	480	530	435
C (1=OFF, 2=ON)	2.0	385	425	345
D (1=ON, 2=ON)	1.5	290	320	260

NOTE: In Cooling-Dehumidification mode, with no 24 VAC input to DH, the CFM is reduced by 15%

DELAY PROFILE FOR OIL HEATING MODE				
SW4-DELAY Dip Switch Position	HEAT INPUT (USGPH)	Pre-Run On-Delay CFM Level - Time	Short Run On-Delay CFM Level - Time	Off-Delay CFM Level - Time
A (1=OFF, 2=OFF)	0.75	13% - 45 sec	19% - 30 sec	38% - 3 min.
B (1=ON, 2=OFF)	0.65	13% - 45 sec	19% - 60 sec	38% - 3 min.
C (1=OFF, 2=ON)	0.5	13% - 60 sec	13% - 60 sec	38% - 3 min.
D (1=ON, 2=ON)	All	13% - 30 sec	100% - 0 sec	100% - 2 min.

Short Run is the time before the blower start at normal speed, with very low CFM, to minimize cool draft in the air distribution system.
Off Delay is the time required to cool down the heat exchanger, with low CFM, to minimize cool draft in the air distribution system.

DELAY PROFILE FOR COOLING OR HEAT PUMP HEATING MODE				
No Adjustment Required	A/C Size	Pre-Run On-Delay Time	Short Run On-Delay CFM Level - Time	Off-Delay CFM Level - Time
-	All	13% - 30 sec	75% - 2.5 min.	50% - 3 min.

Short Run is the time before the blower start at normal speed, with lower CFM, to minimize cool draft in the air distribution system.
Off Delay is the time required to cool down the coil (heating mode), with low CFM, to minimize cool draft in the air distribution system.

5. Slide blower on rails toward rear of unit.
6. Reverse items 1 through 5 to reinstall blower. Refer to wiring diagram (See Fig. 4) of these instructions or diagram located on inside of blower door to properly rewire unit.

→ Table 14—58VLR120 Size Airflow Data (CFM)

OIL HEATING MODE
24 VAC INPUT (R) ON W ONLY

SW1-HEAT Dip Switch Position	HEAT INPUT (USGPH)	CFM with SW3-ADJ Dip Switch A Position	CFM with SW3-ADJ Dip Switch B Position	CFM with SW3-ADJ Dip Switch C Position
A (1=OFF, 2=OFF)	0.85	1450	1640	1235
B (1=ON, 2=OFF)	1.00	1700	1920	1445
C (1=OFF, 2=ON)	1.10	1850	2090	1575
D (1=ON, 2=ON)	Same Value then A Dip Switch Position			

CONTINUOUS FAN
24 VAC INPUT (R) ON G ONLY

SW2-COOL Dip Switch Position	A/C Size (TON)	CFM with SW3-ADJ Dip Switch A Position	CFM with SW3-ADJ Dip Switch B Position	CFM with SW3-ADJ Dip Switch C Position
A (1=OFF, 2=OFF)	5.0	1315	1510	1115
B (1=ON, 2=OFF)	4.0	1050	1210	895
C (1=OFF, 2=ON)	3.5	920	1055	780
D (1=ON, 2=ON)	3.0	790	905	670

COOLING OR HEAT PUMP HEATING MODE - SINGLE SPEED OR 2-SPEED HIGH
24 VAC INPUT (R) TO G, Y/Y2 AND O (FOR COOLING)

SW2-COOL Dip Switch Position	A/C Size (TON)	CFM with SW3-ADJ Dip Switch A Position	CFM with SW3-ADJ Dip Switch B Position	CFM with SW3-ADJ Dip Switch C Position
A (1=OFF, 2=OFF)	5.0	1750	1925	1575
B (1=ON, 2=OFF)	4.0	1400	1540	1260
C (1=OFF, 2=ON)	3.5	1225	1350	1105
D (1=ON, 2=ON)	3.0	1050	1155	945

NOTE: In cooling-Dehumidification mode, with no 24 VAC input to DH, the CFM is reduced by 15%

COOLING MODE OR HEAT PUMP HEATING MODE - 2-SPEED LOW
24 VAC INPUT (R) TO G, Y1 AND O (FOR COOLING)

SW2-COOL Dip Switch Position	A/C Size (TON)	CFM with SW3-ADJ Dip Switch A Position	CFM with SW3-ADJ Dip Switch B Position	CFM with SW3-ADJ Dip Switch C Position
A (1=OFF, 2=OFF)	5.0	965	1060	865
B (1=ON, 2=OFF)	4.0	770	845	695
C (1=OFF, 2=ON)	3.5	675	740	605
D (1=ON, 2=ON)	3.0	580	635	520

NOTE: In Cooling-Dehumidification mode, with no 24 VAC input to DH, the CFM is reduced by 15%

DELAY PROFILE FOR OIL HEATING MODE

SW4-DELAY Dip Switch Position	HEAT INPUT (USGPH)	Pre-Run On-Delay CFM Level - Time	Short Run On-Delay CFM Level - Time	Off-Delay CFM Level - Time
A (1=OFF, 2=OFF)	0.85	13% - 45 sec	44% - 30 sec	38% - 3 min.
B (1=ON, 2=OFF)	1.00	13% - 30 sec	44% - 30 sec	38% - 3 min.
C (1=OFF, 2=ON)	1.10	13% - 30 sec	50% - 30 sec	38% - 3 min.
D (1=ON, 2=ON)	All	13% - 30 sec	100% - 0 sec	100% - 2 min.

Short Run is the time before the blower start at normal speed, with very low CFM, to minimize cool draft in the air distribution system.
Off Delay is the time required to cool down the heat exchanger, with low CFM, to minimize cool draft in the air distribution system.

DELAY PROFILE FOR COOLING OR HEAT PUMP HEATING MODE

No Adjustment Required	A/C Size	Pre-Run On-Delay CFM Time	Short Run On-Delay CFM Level - Time	Off-Delay CFM Level - Time
-	All	13% - 30 sec	75% - 2.5 min.	50% - 3 min.

Short Run is the time before the blower start at normal speed, with lower CFM, to minimize cool draft in the air distribution system.
Off Delay is the time required to cool down the coil (heating mode), with low CFM, to minimize cool draft in the air distribution system.

SERVICE TRAINING

Packaged Service Training programs are an excellent way to increase your knowledge of the equipment discussed in this manual, including:

- Unit Familiarization • Maintenance
- Installation Overview • Operating Sequence

A large selection of product, theory, and skills programs is available, using popular video-based formats and materials. All include video and/or slides, plus companion book.

Classroom Service Training plus "hands-on" the products in our labs can mean increased confidence that really pays dividends in faster troubleshooting, fewer callbacks. Course descriptions and schedules are in our catalog.

CALL FOR FREE CATALOG 1-800-644-5544

[ ] Packaged Service Training [ ] Classroom Service Training

Book 1 4 Tab 6a 8a PC 101 Catalog No. 535-80171 Printed in U.S.A. Form 58VLR-2SI Pg 20 2-05 Replaces: 58VLR-1SI