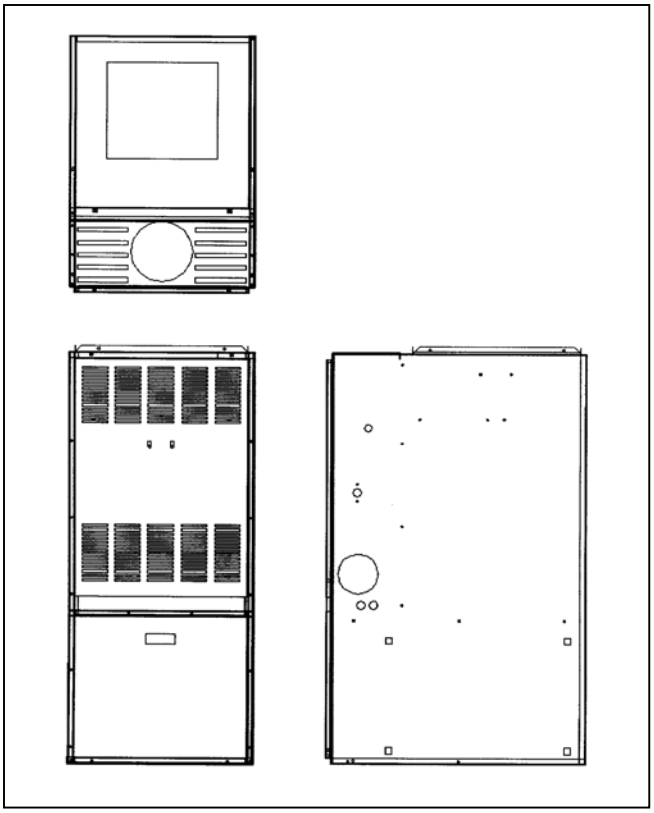
NORDYNE

INSTALLATION INSTRUCTIONS

OIL-FIRED WARM AIR FURNACE

O4HD-091A-12-FA AND O4HD-091A-V-F
O4HD-140A-16-FA AND O4HD-140A-V-F

(UPFLOW OR HORIZONTAL MODELS)



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Read this manual completely before beginning installation.
Important: These instructions must be kept with the furnace for future reference.

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⚠WARNING

IMPROPER INSTALLATION MAY CREATE A CONDITION WHERE THE OPERATION OF THE PRODUCT COULD CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.

IMPROPER INSTALLATION, ADJUSTMENT, ALTERATION, SERVICE OR MAINTENANCE CAN CAUSE INJURY OR PROPERTY DAMAGE. REFER TO THIS MANUAL FOR ASSISTANCE OR ADDITIONAL INFORMATION, CONSULT A QUALIFIED INSTALLER, SERVICE AGENCY OR THE FUEL SUPPLIER.

⚠CAUTION

THIS PRODUCT MUST BE INSTALLED IN STRICT COMPLIANCE WITH THESE INSTALLATION INSTRUCTIONS AND ANY APPLICABLE LOCAL, STATE, AND NATIONAL CODES INCLUDING BUT NOT LIMITED TO: BUILDING, ELECTRICAL AND MECHANICAL CODES.

⚠WARNING

The furnace area must not be used as a broom closet or for any other storage purposes, as a fire hazard may be created. Never store items such as the following on, near or in contact with the furnace:

1. **Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners or other cleaning tools.**
2. **Soap powders, bleaches, waxes or other cleaning compounds; plastic items or containers, gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids, or other volatile fluids.**
3. **Paint thinners or other painting materials and compounds.**
4. **Paper bags, boxes, or other paper or cardboard products.**

Never operate the furnace with the blower door removed. To do so could result in serious personal injury and/or equipment damage.

⚠WARNING

DO NOT USE GASOLINE, CRANKCASE OIL, OR ANY OTHER OIL CONTAINING GASOLINE AS A FUEL FOR THIS FURNACE.

INTRODUCTION

Please read these instructions completely and carefully before installing and operating the furnace.

The furnace must be installed and set up by a qualified contractor.

Model **O4HD-091A** is an oil fired forced air multi-positional furnace, with an output capacity range of 58,000 BTU/Hr. to 79,000 BTU/Hr. Model **O4HD-140A** is an oil fired forced air multi-positional furnaces, with output capacity ranges of 87,000 BTU/Hr. to 118,000 BTU/Hr. These models may be installed in the up-flow position, as well as both horizontal positions.

O4HD-091A-12-FA and **O4HD-140A-16-FA** are equipped with direct drive permanent split capacitor motors.

O4HD-091A-V-F and **O4HD-140A-V-F** are equipped with direct drive ECM motors.

All models are listed with the ***Canadian Standards Association*, (CSA)**, and comply with the standards of both the United States and Canada for use with No. 1 (Stove) and No. 2 (Furnace) Oil.

In the United States, the installation of the furnace and related equipment shall be installed in accordance with the regulations of **NFPA No. 31, *Installation of Oil Burning Equipment***, as well as in accordance with local codes.

In Canada, the installation of the furnace and related equipment shall be installed in accordance with the regulations of **CAN/CSA - B139, *Installation Code For Oil Burning Equipment***, as well as in accordance with local codes.

When installation or application questions arise, regulations prescribed in the National Codes and Local Regulations take precedence over the general instructions provided with this installation manual. When in doubt, please consult your local authorities.

All models are shipped assembled and pre-wired. The furnace should be carefully inspected for damage when being unpacked.

HEAT LOSS

To determine the correct furnace and firing rate for an application, it is necessary to calculate the maximum hourly heat loss of the building based on local design conditions. In new construction, the heat loss should be calculated on a room-by-room basis to enable proper sizing of the trunk and branch ductwork. In retrofit applications, a building shell (overall) heat loss calculation may be used.

In the United States, **Manual J**. titled, **"Load Calculation"** published by the **Air Conditioning Contractors of America, (ACCA)**, describes a suitable procedure for calculating the maximum hourly heat loss.

In Canada, the maximum hourly heat loss may be calculated in accordance with the procedures described in the manuals of the **Heating, Refrigeration and Air Conditioning Institute (HRAI)**, or by other method prescribed by authorities having jurisdiction that are suitable for local conditions.

LOCATION OF UNIT

The furnace should be located such that the flue connection to the chimney is short, direct and consists of as few elbows as possible. When possible, the unit should be centralized with respect to the supply and return air ductwork. A central location minimizes the trunk duct sizing. All models may be installed on combustible floors. Do not install the furnace on carpet or tiled floors.

Minimum installation clearances are listed in Table 1.

NOTE: The recommended installation clearances do not necessarily take into consideration the clearances necessary to replace the air filter or perform other routine maintenance.

UP-FLOW INSTALLATION

All **O4HD** furnace models have been assembled for installation in the up-flow position. Maintain all clearances to combustibles as outlined in Table 1. *Suggestion*; as a measure to prevent fuel oil from accumulating in locations other than the fire pot, as could be the case in the event of nozzle drip, install the furnace with an approximate 2 degree slope from the oil burner casing towards the fire pot. Use shims made of noncombustible material.

Table 1: Clearance to Combustibles

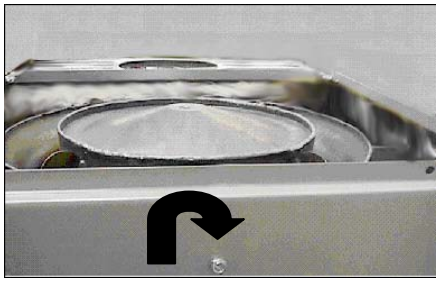
Furnace	O4HD	
Location	Upflow	Horizontal
Top	2 in.	2 in.
Bottom	0 in.	1 in.
S/A Plenum	1 in.	1 in.
Rear	1 in.	1 in.
Sides	1 in.	1 in.
Front	9 in.[1]	9 in.[1]
Flue Pipe	9 in.	9 in.
Enclosure	Closet	Alcove

[1] 24" clearance is required for servicing.

In the up flow position, the heat exchanger support screw shown in the picture may be removed. This may be preferable if the furnace rear panel will be inaccessible after installation. The screw must be removed if the heat exchanger must be removed from the cabinet. Do not remove this screw if installing furnace in a horizontal position.

HORIZONTAL INSTALLATION

O4HD furnaces models are assembled and shipped ready for installation in the up-flow position. The furnace may be installed in either of the horizontal positions; warm air discharging left or warm air-



Heat Exchanger Support Screw

discharging right by following these steps:

1. Rotate the furnace 90° to the desired position.
2. Remove the three nuts fastening the oil burner assembly to the furnace. Rotate the oil burner assembly to be in the normal upright position.
3. Re-align the oil burner assembly to the combustion chamber (fire-pot), and then secure into place with the three nuts.

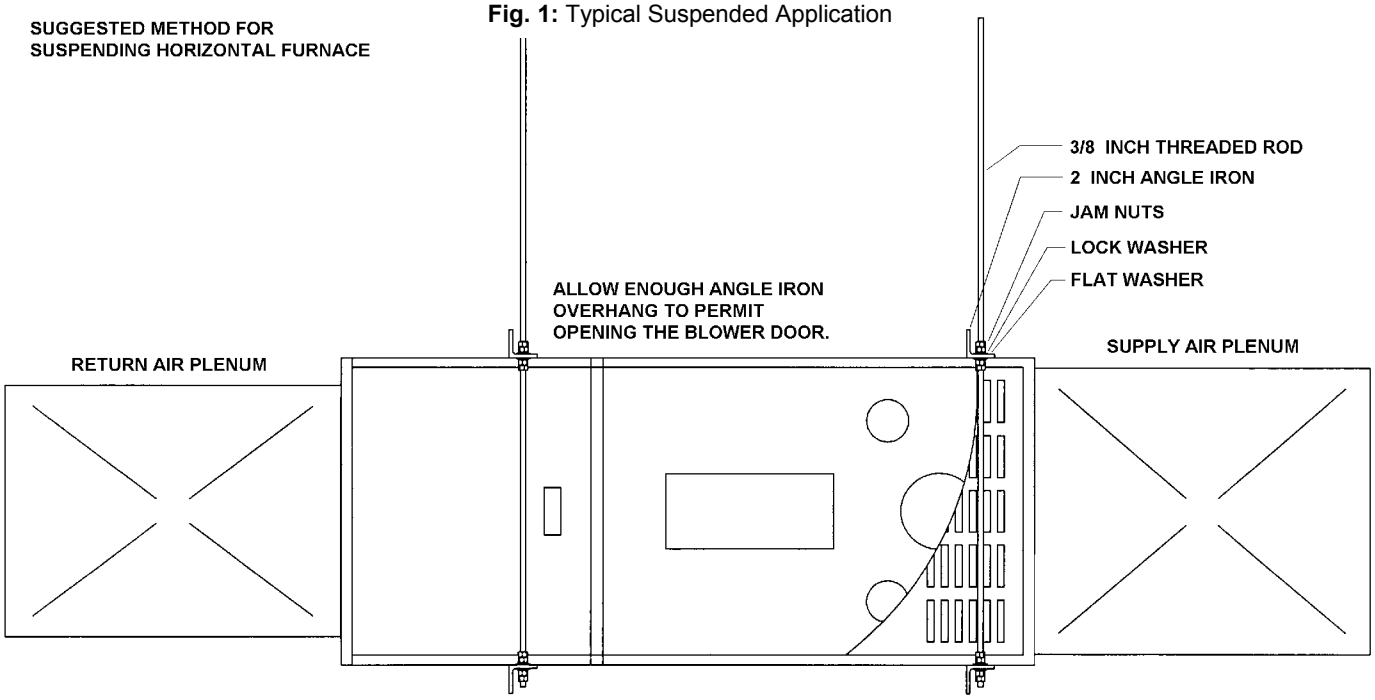
NON-SUSPENDED INSTALLATION

Maintain clearances to combustibles as outlined in Table 1. Installation on a combustible floor requires a clearance of 1 inch. Using a noncombustible material such as one-inch thick channel iron or similar material can do this. The furnace must be supported in such a way as to not allow twisting or sagging of the cabinet. Suggestion; as a measure to prevent fuel oil from accumulating in locations other than the fire pot, as could be the case in the event of nozzle drip, install the furnace with an approximate 2 degree slope from the oil burner casing towards the fire pot. Use shims made of noncombustible material.

SUSPENDED INSTALLATION

Refer to Figure 1. Maintain clearances to combustibles as outlined in Table 1. The furnace may be suspended by field fabricating a cradle of angle iron and threaded rod. Secure the furnace with 2 inch minimum slotted angle or equivalent, as shown in Figure 1. The furnace must be supported in such a way

Fig. 1: Typical Suspended Application



as to not allow twisting or sagging of the cabinet. Position the supports so as to not interfere with accessing the burner and blower compartments. Suggestion; as a measure to prevent fuel oil from accumulating in locations other than the fire pot, as could be the case in the event of nozzle drip, install the furnace with an approximate 2 degree slope from the oil burner casing towards the fire pot.

AIR CONDITIONING

If the furnace is used in conjunction with air conditioning, the furnace shall be installed in parallel with or upstream from the evaporator coil to avoid condensation in the heat exchanger. In a parallel installation, the dampers or air controlling means must prevent chilled air from entering the furnace. If the dampers are manually operated, there must be a means of control to prevent the operation of either system unless the dampers are in the full heat or full cool position. The air heated by the furnace shall not pass through a refrigeration unit unless the unit is specifically approved for such service.

Generally, a six-inch clearance between the air conditioning evaporator coil and the heat exchanger will provide adequate airflow through the evaporator coil.

The blower speed must be checked and adjusted to compensate for the pressure drop caused by the evaporator coil. Refer to Appendix B for recommended wiring and electrical connections of the air conditioning controls.

COMBUSTION AIR

When a furnace is installed in the full basement of a typical frame or brick house, infiltration is normally adequate to provide air for combustion and draft operation. If the furnace is installed in a closet or utility room, two (2) ventilation openings must be provided connecting to a well ventilated space (full basement, living room or other room opening thereto, but not a bedroom or bathroom). One opening shall be located 6" from the top and bottom of the enclosure at the front of the furnace. For furnaces located in buildings of unusually tight construction, such as those with high quality weather stripping, caulking, windows and doors, or storm sashed windows, or where basement windows are well sealed, a permanent opening communicating with a well ventilated attic or with the outdoors shall be provided, using a duct if necessary. Size all of the openings and associated ductwork by the standards provided in the latest Oil Installation Code editions; NFPA 31 in the United States, CAN/CSA B139 in Canada. Take all fuel burning appliances in the area into consideration when calculating combustion and ventilation air requirements.

The Model CAS-2B-90E Furnace Boot manufactured by Field Controls, Inc. may be used with the furnace to obtain combustion air directly from outdoors. Use of this device does not alter the need for ventilation air; however, it does provide a good direct source of combustion air and is connected directly to the oil burner.

NOTE: THE VACUUM RELIEF VALVE (VRV) INCLUDED IN THIS KIT MUST BE USED IN CONJUNCTION WITH THE FURNACE BOOT.

CHIMNEY VENTING

The chimney must be sized correctly and be in good repair. If the chimney is oversized, there is a high risk of the flue gases condensing resulting in damage to the chimney and other venting parts. This problem may be corrected by the use of an appropriately sized chimney liner.

If the chimney serves the **O4HD-091A** furnace only, the vent should be sized at 4-inch minimum, 5-inch maximum. If the chimney serves the **O4HD-140A** furnace only, the vent should be sized at 4-inch minimum, 6-inch maximum. The data provided in Table 3 is based on dedicated venting. If the furnace is to be co-vented with other appliances, refer to **NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*, NFPA 31, *Standard for the Installation of Oil Burning Equipment* or CAN/CSA B139**,

Installation Code For Oil Burning Equipment for correct sizing information.

NOTE: This furnace is approved for use with L-Vent.

NOTE: Maximum temperature for L-Vent is 575°F (300°C).

IMPORTANT: The chimney must be capable of providing sufficient draft at all times for the safe removal of the products of combustion.

The chimney should be tested under “winter” conditions; doors and windows closed, all other fossil fuel burning appliances on, clothes dryer on, bathroom fans on, etc. If the chimney cannot overcome the competition for air, it will be necessary to access the reason for it, and take corrective action. If the chimney is correctly and in good repair, it will probably be necessary to re-evaluate the availability of combustion and ventilation air, and take corrective action.

The flue pipe should be as short as possible with horizontal pipes sloping upward toward the chimney at a rate of one-quarter inch to the foot. The flue pipe should not be smaller in cross sectional area than the flue collar on the furnace. The flue pipe should connect to the chimney such that the flue pipe extends into, and terminates flush with the inside surface of the chimney liner. Seal the joint between the pipe and the lining. The chimney outlet should be at least two feet above the highest point of a peaked roof. All unused chimney openings should be closed. Chimneys must conform to local, provincial or state codes, or in the absence of local regulations, to the requirements of the National Building Code.

See Figure 2 and Table 2 for common chimney problems and their remedies.

⚠CAUTION

THE FURNACE MUST BE CONNECTED TO A FLUE HAVING SUFFICIENT DRAFT AT ALL TIMES TO ENSURE SAFE AND PROPER OPERATION OF THE APPLIANCE.

The flue pipe must not be routed through concealed space, because it must be visually checked for signs of deterioration during the annual inspection and servicing. The flue pipe must not pass through any floor or ceiling, but may pass through a wall where suitable fire protection provisions have been installed. In the United States, refer to the latest edition of NFPA 31 for regulations governing the installation of oil burning equipment. In Canada, refer to the latest edition of CAN/CSA B139 for rules governing the installation of oil burning equipment.

Fig. 2: Common Chimney Problems

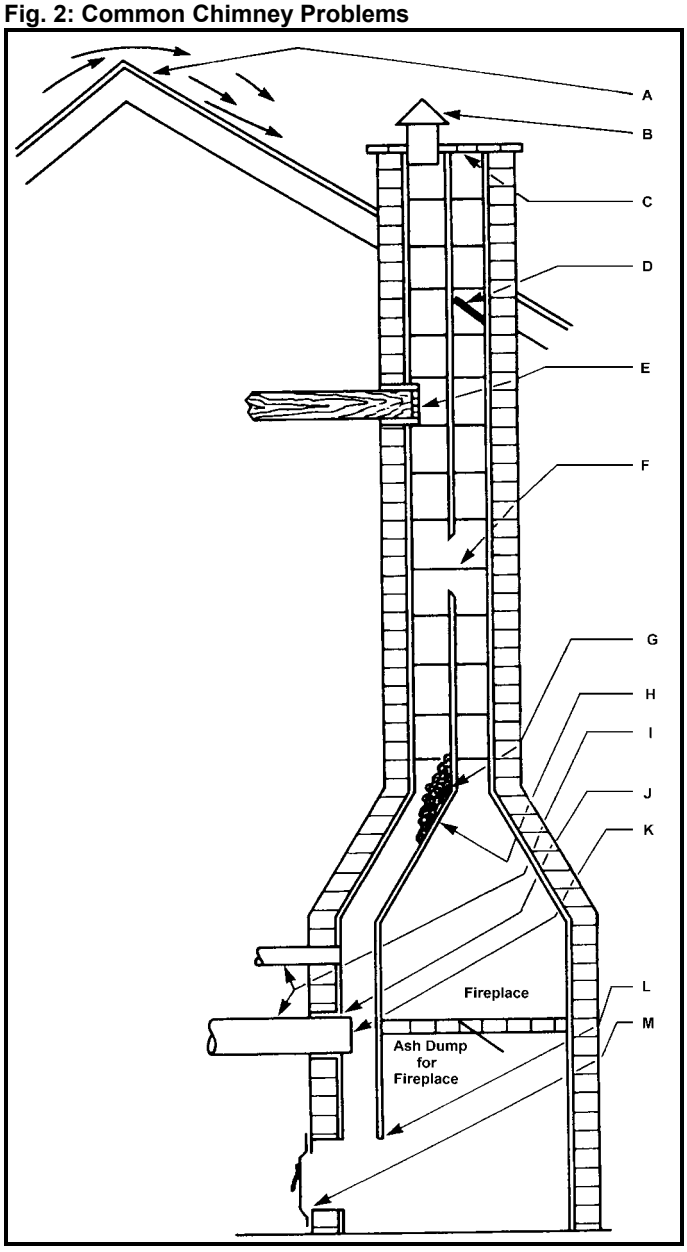


Table 2: Common Chimney Problems

Refer to Figure 2			
Key	Trouble	Diagnostic	Remedy
A	Top of chimney lower than surrounding objects	Observation	Extend chimney above all surrounding objects within 30 feet.
B	Chimney Cap or ventilator.	Observation	Remove
C	Coping restricts opening.	Observation	Make opening as large as inside of chimney.
D	Obstruction in chimney	Can be found by light and mirror reflecting conditions in chimney.	Use weight to break and dislodge.
E	Joist protruding into chimney.	Lowering a light on an extension cord.	Must be handled by competent masonry contractor.
F	Break in chimney lining.	Smoke test - build smudge fire blocking off other opening, watching for smoke to escape.	Must be handled by competent masonry contractor.
G	Collection of soot at narrow space in flue opening.	Lower light on extension cord.	Clean out with weighted brush or bag of loose gravel on end of line.
H	Offset	Lower light on extension cord.	Change to straight or to long offset.
I	Two or more openings to the same chimney.	Found by inspection from basement.	The least important opening must be closed, using some other chimney flue.
J	Loose-seated pipe in flue opening.	Smoke test.	Cementing all pipe openings should eliminate leaks.
K	Smoke pipe extends into chimney.	Measurement of pipe from within or observation of pipe by means of a lowered light.	Length of pipe must be reduced to allow end of pipe to be flush with inside of tile.
L	Failure to extend the length of flue partition to the floor.	By inspection or smoke test.	Extend partition to floor level.
M	Loose-fitted clean-out door.	Smoke test.	Close all leaks with cement.

DRAFT REGULATOR CONTROL

This device is used in conjunction with conventional chimney venting. This control (or draft regulator) automatically maintains a constant negative pressure in the furnace to obtain maximum efficiency. It ensures that proper pressures are not exceeded. If the chimney does not develop sufficient draft, the draft control cannot function properly. The draft regulator, must be installed within the same room or enclosure as the furnace, and should

not interfere with the combustion air supplied to the burner. The control should be located a minimum of 3 flue pipe diameters from the furnace breeching and installed in accordance to the instructions supplied with the regulator.

Table 3: Minimum Chimney Base Temperatures (°F)

Nozzle	Chimney Height (ft.)			
	11	20	28	36
Chimney Thermal Resistance < R6				
0.50	300	400	535	725
0.65	275	340	430	535
0.70	270	330	405	505
0.75	260	320	380	475
0.85	250	300	355	430
1.00	255	300	365	430
Nozzle	Chimney Height (ft.)			
	11	20	28	36
Chimney Thermal Resistance > R6				
0.50	185	200	220	250
0.65	175	185	205	220
0.70	175	185	195	215
0.75	175	185	195	210
0.85	165	185	195	205
1.00	165	185	195	205
< - Less than, > - greater than				

OIL TANK

Oil storage tanks must be selected and installed in compliance with applicable codes; in the United States, **NFPA 31, *Standard for the Installation of Oil Burning Equipment***, Chapter 2 and in Canada, **CAN/CSA-B139, *Installation Code for Oil Burning Equipment*, Section 6**. Observe all local codes and by-laws.

In general, the oil tank must be properly supported and remain stable in both empty and full condition. The oil tank must be fitted with vent and supply pipes to the outdoors. Refer to the above-mentioned codes for sizing. The vent pipe must be no less than 1¼ inches I.P.S., and terminate with an appropriate vent cap in a location where it will not be blocked. The fill pipe must be no less than 2 inches I.P.S., and terminate with an appropriate cap in a location where debris will not enter the fill pipe during oil delivery.

If located indoors, the tank should normally be in the lowest level, (cellar, basement, etc.). It must be equipped with a shut-off valve at the tank outlet used for the oil supply. The oil tank must be located as to not block the furnace / room exit pathway. Observe all clearances specified in the above-mentioned codes.

PIPING INSTALLATION

In the United States, **NFPA 31, Standard for the Installation of Oil Burning Equipment**, Chapter 2.

In Canada, the entire fuel system should be installed in accordance with the requirements of **CAN/CSA B139**, and local regulations. Use only approved fuel oil tanks piping, fittings and oil filters.

Ensure that all fittings used in a copper oil line system are high quality flare fittings. Do not use compression fittings.

Do not use Teflon tape on any fittings.

Pressurized or gravity feed installations must not exceed 3 PSIG. Pressures greater than 10 PSIG may cause damage to the shaft seal. If the height of the oil stored in a tank above the oil burner exceeds 11½ feet, it may be necessary to use a pressure-regulating device approved for this purpose.

The furnace may be installed with a one-pipe system with gravity feed or lift. The maximum allowable lift on a single line system is 8 feet. Lift should be measured from the bottom (outlet) of the tank, to the inlet of the burner. Sizing a single line system is complex because of the difficulty estimating the pressure drop through each fitting, bend and component in the line. In general, keep single line systems short as possible. 2-stage oil pumps are not available for the O4HD furnaces. The following chart shows the allowable line lengths (horizontal + vertical) for single and two-line oil piping systems. All distances are in feet.

In retrofit applications, where an existing oil line system is in place, a vacuum check will help determine the efficacy of the existing oil line system The vacuum in a system should not exceed 6" Hg. for a single pipe system, nor 12" Hg. for a two-pipe system.

NOTE: The oil burner requires the use of a bypass plug when converting from single-pipe to two-pipe oil piping systems. See burner manufacturer's instructions.

Table 4: Oil Lines

Copper Tubing Oil Line Length (Feet)				
Lift (Feet)	Single-Pipe		Two-Pipe	
	⅜" OD	½" OD	⅜" OD	½" OD
0	53	100	68	100
1	49	100	65	100
2	45	100	63	100
3	41	100	60	100
4	37	100	58	100
5	33	100	55	100
6	29	100	53	100
7	25	99	50	100
8	21	83	48	100
9	17	68	45	100
10	13	52	42	100
12	- - -	- - -	37	100
14	- - -	- - -	32	100
16	- - -	- - -	27	100
18	- - -	- - -	22	88

All fuel systems should include an oil filter between the fuel oil storage tank and the oil burner. For best results, install the oil filter as close to the burner as possible. When using an indoor oil tank, the oil filter may be installed at the tank downstream from the shut-off valve. If firing the furnace under the 0.65 gph rate, a 7 to 10 micron line filter should be installed as close to the oil burner as possible.

ELECTRICAL CONNECTIONS

The furnace is listed by the **Canadian Standards Association (CSA)**. It is factory wired and requires minimal field wiring. In the United States, the wiring must be in accordance with the **National Fire Protection Association NFPA-70**, **National Electrical Code**, and with local codes and regulations. In Canada, all field wiring should conform to **CAN/CSA C22.1 Canadian Electrical Code, Part 1**, and by local codes, where they prevail.

The furnace should be wired to a separate and dedicated circuit in the main electrical panel; however, accessory equipment such as electronic air cleaners and humidifiers may be included on the furnace circuit. Although a suitably located circuit breaker can be used as a service switch, a separate service switch is advisable. The service switch is necessary if reaching the circuit breaker involves becoming close to the furnace, or if the furnace is located between the circuit breaker and the means of entry to the furnace room. The furnace switch (service switch) should be clearly marked, installed in an easily

accessible area between the furnace and furnace room entry, and be located in such a manner to reduce the likelihood that it would be mistaken as a light switch or similar device.

The power requirements for all models: 120 VAC, 1 ∅, 60 Hz., 12A.

Accessories requiring 120 VAC power sources such as electronic air cleaners and humidifier transformers may be powered from the EFTB (Electronic Fan Timer Board). Do not use the direct drive motor connections as a power source, since there is a high risk of damaging the accessories by exposure to high voltage from the auto-generating windings of the direct drive motor.

Thermostat wiring connections and air conditioning contactor low voltage connections are shown in the wiring diagrams. Some micro-electronic thermostats require additional controls and wiring. Refer to the thermostat manufacturer's instructions.

The thermostat should be located approximately 5 feet above the floor, on an inside wall where there is good natural air circulation, and where the thermostat will be exposed to average room temperatures. Avoid locations where the thermostat will be exposed to cold drafts, heat from nearby lamps and appliances, exposure to sunlight, heat from inside wall stacks, etc.

Normal heat anticipator setting: 0.1 A. For more precise adjustment, the heat anticipator may be adjusted to the amperage draw of the heating control circuit as measured between the "R" and "W" terminals of the thermostat. To reduce the risk of damaging the heat anticipator, do not measure circuit without first removing one of the two wires first. To determine the heating circuit amperage draw:

1. With the power off to the appliance, disconnect one of the “R” or “W” wires from the thermostat terminal.
2. Connect an ammeter between the wire and the thermostat terminal to which it was attached.
3. Restore power to the appliance and initiate a call for heat. Note the amperage reading when the heating contacts are closed. (System switch must be on “HEAT” if so equipped.
4. Terminate the call for heat, turn power off and re-connect the thermostat wire. If the thermostat is serving a combination heating and air conditioning system, pay particular attention to polarity.
5. When the thermostat is reconnected and re-plumbed, adjust the heat anticipator setting to match the observed amperage reading.
6. Restore power to the appliance.

CIRCULATING AIR BLOWER (ECM)

All **O4HD-***A-V-F** furnace models are equipped with a variable speed direct drive blower system. The heart of the variable speed blower is the “ECM” motor. “ECM” stands for electronically commutated motor. The ECM consists of a brushless DC type motor with a microcomputer based variable speed drive located in the end bell. This drive continually monitors RPM and torque output of the motor. This information along with a set of blower constants developed in a laboratory is fed into pre-programmed algorithms in the microprocessor to determine the correct motor output required to maintain constant airflow regardless of external static pressure.

The microprocessor also stores delay profiles developed in a laboratory to optimize the efficiency and performance of split system air conditioners and heat pumps. More than just on and off delays, the variable speed blower “steps” through intermediate airflow levels during the preprogrammed on and off profiles. The result is smoother more efficient operation. The microprocessor also controls the rate of change of the motor’s output to create quiet, gradual starts and stops. This kind of control is not possible with conventional motor technology.

CONFIGURING THE BLOWER

Blower configuration should be pre-set at the factory for the selected heat output only however proper speed selection should be confirmed after installation. For cooling configuration, blower dipswitches must be adjusted to match cooling system nominal capacity. With the variable speed blower configured properly, the furnace will respond directly to thermostat inputs. During normal operation the motor will gradually change speed in response to changes in system variables such as the thermostat settings, duct static, filters etc. The variable speed blower is configured by setting the 7 dipswitches located on the control panel inside the control box mounted on the front of the blower.

⚠ IMPORTANT

THE VARIABLE SPEED BLOWER HAS BEEN DESIGNED TO GIVE THE INSTALLER MAXIMUM FLEXIBILITY TO OPTIMIZE SYSTEM PERFORMANCE, EFFICIENCY AND COMFORT. BECAUSE THERE ARE SO MANY WAYS TO CONFIGURE THE BLOWER IT IS IMPORTANT THESE INSTRUCTIONS CAREFULLY.

⚠ IMPORTANT

CHANGES TO BLOWER CONFIGURATION MUST BE MADE WITH THE POWER TO THE UNIT TURNED OFF. THE BLOWER MAY IGNORE CHANGES MADE WITH THE POWER ON.

ECM BLOWER OPERATION

COOLING OR HEAT PUMP MODE

When the thermostat calls for cooling or heat pump heating the circuit between R, G and Y (O is ignored by the blower) is completed and the blower begins a preprogrammed on-cycle “profile”. First the blower ramps up to approximately 1/3 of the selected airflow and stays there for 30 seconds. The blower then ramps up to the selected airflow until the thermostat is satisfied. A one-minute off-cycle delay at approximately ½ of the selected airflow is initiated when the call from the thermostat ends.

HEATING MODE

When the thermostat calls for heating the circuit between R and W is completed. The furnace control board initiates the ignition sequence. When the burner is energized and the fan timer has completed the selected on delay a relay is energized sending a signal to the blower. The blower will start and run at a very low speed. After 30 seconds, the blower ramps up to the selected heating airflow. The blower will operate two minutes after the off delay of the fan timer is satisfied.

NOTE: It is highly recommended that the minimum on and off delay timings on the fan timer be utilized with this blower as premature tripping of the limit may occur at the higher settings.

MANUAL FAN.

When the manual fan switch on the thermostat is on, energizing G only, the blower will ramp to 50% of the selected cooling/heat pump airflow.

SEE TABLE A.2 & A.3 FOR PROPER DIP SWITCH SETTINGS. (HEATING ONLY)

SEE CHART ON COVER OF BLOWER CONTROL BOX FOR PROPER DIP SWITCH SETTINGS FOR AIR CONDITIONING.

DIRECT DRIVE

The **O4HD-***A-**-FA** furnaces are equipped with a direct drive blower system. Direct drive blower speed adjustments are not normally required in properly sized extended plenum duct systems. The motor RPM and air CFM delivery will vary automatically to accommodate conditions within the usual range of external static pressures typical of residential duct systems. Under-sized duct systems may require a higher blower speed to obtain a reasonable system temperature rise. Some older duct systems were not designed to provide static pressure. They typically feature special reducing fittings at each branch run and lack block ends on the trunk ducts. These systems may require modification to provide some resistance to the airflow to prevent over- amping of the direct drive blower motor. Selecting a lower blower speed may correct this problem.

Direct drive blower speeds are adjusted by changing the "hot" wires to the motor winding connections. Please refer to wiring diagram in Appendix B or the wiring diagram label affixed to the furnace. **THE NEUTRAL WIRE (normally the white wire) IS NEVER MOVED TO ADJUST THE BLOWER SPEED**.

⚠CAUTION

DO NOT CONNECT POWER LEADS BETWEEN MOTOR SPEEDS. THE NEUTRAL WIRE MUST ALWAYS BE CONNECTED TO THE MOTOR'S DESIGNATED NEUTRAL TERMINAL.

It is possible and acceptable to use a single blower speed for both heating and cooling modes. The simplest method to connect the wiring from both modes is to use a "piggy-back connector" accommodating both wires on a single motor tap. It is also acceptable to connect the selected motor speed with a pigtail joined to both heating and cooling speed wires with a wire nut. As a safety precaution against accidental disconnection of the wires by vibration, it is advisable to secure the wire nut and wires with a few wraps of electricians tape.

If the joining of the blower speed wiring is done in the furnace junction box, tape off both ends of the unused wire.

FURNACE CONTROLS

The Electronic Fan Timer integrates control of all burner and circulator fan operations. This control is the central wiring point for most of the electrical components in the furnace. The **Honeywell EFT** has a fixed fan delay on time of 30 seconds after the burner ignites. The **United Technologies 1158-120** has an adjustable fan on time that is set by selecting the dipswitch combination displayed in Table 5. This fan on delay can be set at 30, 60, 90 or 120 seconds. This provides a delay between the burner ignition and blower start-up to eliminate excessive flow of cold air when the blower comes on. The **Honeywell ST9103** has an adjustable fan off time of 60, 90, 120 and 150 seconds that is set by selecting a dipswitch combination on the control board displayed in chart 1. Similarly the **United Technologies 1158-120** have an adjustable fan off time of 2, 3, 4,or 6 minutes displayed in Table 5. The fan off delay time starts when the burner is de-energized at the end of a call for heat. Blower shutdown is delayed to remove any residual heat from the heat exchanger and improve the annual efficiency of the furnace.

The electronic fan timer board works in conjunction with snap disc limit controls, which perform a safety function, and breaks power to the oil burner primary control, which shuts off the burner if the furnace over-heats. The limit control is thermally operated and automatically resets. The limit control is factory installed, pre-set and is not adjustable.

If a limit control opens, the **Honeywell ST9103** will energize the circulating fan. When the limit control closes the burner is re-energized and the heating cycle begins again.

If the limit control opens with the **United Technologies 1158-120** electronic fan control**,** the circulating fan will be energized as well. When the limit closes, the fan off timer will begin. At the end of the fan off time cycle the burner will be energized, initiating a normal burner cycle.

The circulating fan start-up and shutdown is immediate in the cooling mode.

The heating mode “fan off” delay may be field adjusted by manipulating the dipswitches. See Table 5.

Table 5: Heating “Blower Off/On” Timing

Honeywell ST9103

Dip Switch Position		Blower Off Delay Time
1	2	
On	On	60 seconds
On	Off	90 seconds
Off	On	120 seconds
Off	Off	150 seconds

United Technologies 1158-120

Dip Switch Position				Blower Delay Times	
1	2	3	4	On Sec.	Off Min.
Off	Off			30	
On	Off			60	
Off	On			90	
On	On			120	
		Off	Off		2
		On	Off		3
		Off	On		4
		On	On		6

⚠CAUTION

DISCONNECT THE POWER SUPPLY TO THE FURNACE BEFORE OPENING THE BLOWER ACCESS DOOR TO SERVICE THE AIR FILTER, FAN AND MOTOR. FAILURE TO SHUT OFF POWER COULD ALLOW THE BLOWER TO START UNEXPECTEDLY, CREATING A RISK OF DEATH OR PERSONAL INJURY.

⚠CAUTION

DO NOT START THE BURNER OR BLOWER FAN UNLESS THE BLOWER ACCESS DOOR IS SECURELY IN PLACE.

OIL BURNER

O4HD furnaces are equipped with Beckett AFG Series oil burners. The oil burner must align properly with the cerafelt fiber chamber (firepot). The cerafelt fiber chamber is initially quite soft, but hardens and becomes quite brittle after the first firing. The firepot is held in place by a retaining bracket; however, it is possible for the firepot to shift if subjected to rough handling during transit.

⚠CAUTION

BEFORE OPERATING THE FURNACE CHECK BURNER ALIGNMENT WITH COMBUSTION CHAMBER. THE END CONE OF THE AIR TUBE MUST BE CENTRED TO THE ACCOMODATING RING PROVIDED IN THE DESIGN OF THE COMBUSTION CHAMBER. ADJUST ALIGNMENT AS NECESSARY BEFORE THE FIRST FIRING.

OIL BURNER NOZZLES

O4HD-091A furnaces are certified for multiple firing rates, ranging from approximately 58,000 to 79,000 BTU/hr. The **O4HD-140A** furnaces are certified for multiple firing rates of approximately 87,000 115,000 BTU/hr. By changing the oil burner nozzle within the specific Model Range, and temperature rise, the furnace may be fired at an ideal rate for a wide range of structures.

BURNER ELECTRODES

Correct positioning of the electrode tips with respect to each other, to the fuel oil nozzle, and to the rest of the burners is essential for smooth light ups and proper operation. The electrode tips should be adjusted to a gap of 5/32", 1/16" ahead of the nozzle, 5/16" above the centerline of the nozzle. The "Z" dimension (front edge of the burner head to the front face of the nozzle is 1-1/8 inches.

Electrode positioning should be checked before the first firing of the furnace.

The electrode porcelains should be free of cracks, the electrode tips should be tapered and free of burrs, and the contact rods must be clean and be in firm contact with the ignition transformer contact springs. The electrodes must not come into contact with the burner head.

OIL BURNER SET-UP

The burner air supply is adjusted to maintain the *fuel to air ratio* to obtain ideal combustion conditions. A lack of air causes "soft" and "sooty" flames, resulting in soot build-up throughout the heat exchanger passages. Excess combustion air causes a bright roaring fire and high stack temperatures resulting in poor fuel efficiency.

PREPARATIONS:

Drill a ¼" test port in the venting, ideally at least 2 flue pipe diameters away from the furnace breeching, if venting horizontally from the furnace, or from the flue pipe elbow if venting vertically before reaching the furnace. (See Figures 4 and 5).

The test port will allow flue gas samples to be taken and stack temperatures to be measured.

Before starting the burner, check the burner alignment with the combustion chamber (fire pot), check that the correct nozzle is tightened into place, and that the burner electrodes are properly positioned.

The Beckett burner bulk air band is should be closed, and the air shutter initial setting should be approximately 7.00.

Note A: Locate hole at least 6 inches on the furnace side of the draft control.

Note B: Ideally, hole should be at least 12 inches from breeching or elbow.

PROCEDURE:

Start the burner and allow it to run at least ten minutes. Set the air shutter to give a good flame visually. Manipulating the air shutter on the left side of the burner controls the combustion air supply to the burner, and, if necessary, the bulk air band. To adjust, loosen the bolt on the movable shutter. Move the shutter gradually until a good flame (visually) has been achieved. Re-snug the bolt.

Check the initial draft setting as the furnace warms up. The draft may be measured at the test port. The breech draft should be approximately - 0.05" w.c. to obtain an over fire draft reading of - 0.02 inches w.c.

Check the oil pump pressure. Standard operating pressure is 100 PSIG.

After reaching steady state, take a smoke test. If not indicating a trace, set the combustion air controls to provide a trace.

Typically, the CO_2 reading will range from 11.5% to 13.5%.

After the air adjustments have been completed, and the air shutter or air adjustment plate has been secured, re-check the over fire draft and take another smoke test to ensure that the values have not changed.

Fig.3 Horizontal Smoke test Location

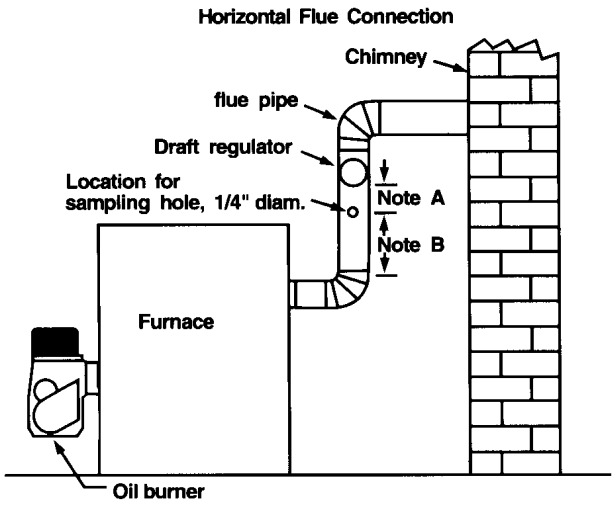


Fig.4 Vertical Smoke test Location

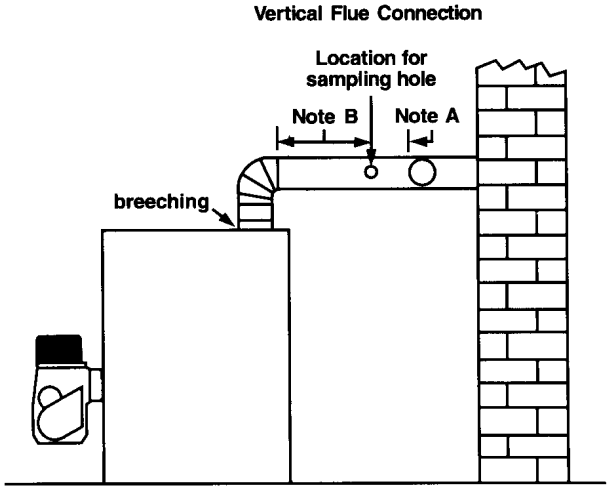


Fig. 5: Checking Over-Fire Draft.

SMOKE TEST NOTE:

If oily or yellow smoke spots are found on the smoke test filter paper, it is usually a sign of unburned fuel. This indicates poor combustion. This type of problem may be caused by excess draft, excess air, or contaminated fuel. Do not ignore this indicator.

STACK TEMPERATURE:

Stack temperature will vary depending on fuel input, circulating air blower speed, and burner set up, etc. In general, stack temperature should typically range between 380°F to 550°F, assuming that the combustion air is approximately room temperature (65°F - 70°F). In general, lower stack temperature indicates greater efficiency; however, excessively low stack temperature can lead to condensation forming in the chimney and / or venting. Sulphur and similar contaminants in the fuel oil will mix with condensation to form acids. Acids and resultant chemical salts will cause rapid deterioration of the chimney and venting components, and may attack the furnace.

If the flue gases are below the range, it may be necessary to slow down the blower fan. If the flue gases are above the range, the blower fan may require speeding up. Stack temperature varies directly with the system temperature rise. System temperature rise is the difference between the furnace outlet temperature and furnace inlet temperature as measured in the vicinity of the connection between the plenum take-offs and the trunk ducts. Refer to the appliance rating plate of model for temperature rise range.

If the venting from the furnace to the chimney is long, or exposed to cold ambient temperatures, it may be necessary to use L-Vent as the vent connector to reduce stack temperature loss to prevent condensation. The venting should be inspected annually to ensure that it is intact.

FURNACE INSTALLATION SET-UP

The furnace must be set up as the final step in the installation.

A) The oil burner must be set up following the procedures outlined above.

B) The appliance rating plate should be consulted for model temperature rise ranges. To determine the temperature rise, measure the supply air and return air temperatures when the furnace has reached steady state conditions. This is the point at which the supply air temperature stops increasing relative to the return air temperature. The furnace may have to run 10 to 15 minutes to reach steady state conditions. The measurements may be made with duct thermometers or thermocouples used in conjunction with multi-meters with temperature measurement capabilities.

The return air should be measured at a point where the thermometer will be well within the air stream near the furnace return air inlet. Actual location is not particularly critical; however, avoid locations where the temperature readings could be affected by humidifier bypass ducts, the inside radius of elbows, etc.

The supply air temperature should be measured at a point where the thermometer will be well within the air stream near the furnace supply air outlet. Usually, the side mid-point of the supply air plenum take-off is ideal, providing it is out of the line of sight to the heat exchanger. If the thermometer is within the line of sight of the heat exchanger, the supply air readings may be skewed by radiant heat from the heat exchanger. If the plenum take-off is unsuitable, the supply air temperature may be measured within the first 18 inches of the first segment of supply air trunk duct.

If the temperature rise is outside the recommended range, it may be adjusted on direct drive equipped units by selecting alternate circulation fan motor speeds. If the temperature rise is too high, speed the fan up. If the temperature rise is too low, slow the fan down.

C) Keep in mind that the stack temperature varies directly with the temperature rise. The higher the temperature rise, the higher the stack temperature will be, resulting in lower efficiency. The lower the temperature rise, the lower the stack temperature will be, which, in some cases, may allow condensation to form in the chimney and other vent parts.

D) Test the high limit control to ensure that it is operating correctly. This may be done by temporarily removing the circulator fan heating wire or neutral wire. Turn of electrical power to the furnace before working with the motor wires. Be sure to protect any removed wires from shorting out on metal furnace parts. If the high limit test is successful, shut off the electrical power to the furnace, restore the proper motor wiring. Finally, restore power to the furnace.

E) Operate the furnace through a minimum of three full heating cycles. During this time, check for fuel oil leaks, gross air leakage from the supply air ductwork, unusual noises originating anywhere within the heating system which may cause some concern or annoyance to the home owner, etc.

F) Be sure that the homeowner is familiar with the furnace. The homeowner should be aware of the location of electrical circuit breaker or fuse, the location of any electrical switches controlling the furnace, the location of the oil tank shut-off valve and how to operate the valve. The homeowner should be informed where the oil tank gauge is located and how to read it.

It would be beneficial to review safety issues with the home owner, such as the danger of storing combustibles too close to the furnace, hanging anything on the furnace vent pipe, and especially the dangers of indiscriminately pressing the burner reset button.

IMPORTANT: Be sure that the home owner knows where the burner reset switch is located, and is aware that the reset switch is not to be activated more than once without a thorough look for the cause of the problem, (lack of fuel, etc.). Be sure that the homeowner knows when to quit trying to start the furnace during these conditions and who to call for emergency service.

MAINTENANCE AND SERVICE

A: ROUTINE MAINTENANCE BY HOME OWNER

Other than remembering to arrange for the annual professional servicing of the furnace by the service or installation contractor, the most important routine service performed by the homeowner is to maintain the air filter or filters. A dirty filter can cause the furnace to over-heat, fail to maintain indoor temperature during cold weather, increase fuel consumption and cause component failure.

The furnace filter(s) should be inspected, cleaned or replaced monthly. The furnace is factory equipped with a semi-permanent type filter. If the filter is damaged, replace with filters of the same size and type.

During the routine service, inspect the general condition of the furnace watching for signs of oil leaks in the vicinity of the oil burner, soot forming on any external part of the furnace, soot forming around the joints in the vent pipe, etc. If any of these conditions are present, please advice your service or installation contractor.

B: ANNUAL SERVICE BY CONTRACTOR

⚠CAUTION

THE COMBUSTION CHAMBER (FIREPOT) IS FRAGILE. USE CARE WHEN INSPECTING AND CLEANING THIS AREA.

The heat exchanger should be inspected periodically and cleaned if necessary. If cleaning is necessary, **SHUT OFF POWER TO THE FURNACE** and remove the burner. Using a stiff brush with a wire handle, brush off scale and soot from inside the drum and flue pipe. To clean the radiator, remove the round cover or covers on the inner radiator access pipes located on the front panel between the oil burner and the flue pipe. A wire brush can be used to loosen dirt and debris on the inside surfaces of the radiator. Clean out all accumulated dirt, soot and debris with a wire handled brush and an industrial vacuum cleaner. Replace the clean-out covers.

Most circulating fan motors are permanently lubricated by the motor manufacturer. These motors will have no oil ports. If the blower motor does contain oil ports, under normal operating conditions it will not require oiling for the first two years. Oil sparingly; a few drops in each oil port with SAE 20 non-detergent oil. Oiling is most easily done with a "tele-spout" oiler. This oiler has a long flexible plastic spout. DO NOT OVER-LUBRICATE. Excess oil may result in premature electric motor failure.

Inspect the blower fan. Clean it if necessary.

Oil Burner Maintenance: Follow the instructions of the oil burner manufacturer. (See oil burner manufacturer's instructions supplied with furnace). The oil burner nozzle should be replaced annually. We recommend that the oil filter be changed on an annual basis.

The venting system should be cleaned and inspected for signs of deterioration. Replace pitted or perforated vent pipe and fittings. The barometric draft regulator should open and close freely.

All electrical connections should be checked to ensure tight connections. Safety controls such as the high limit controls should be tested for functionality. The fan control functions should be checked to ensure that all fan speeds are operating properly.

OPERATING INSTRUCTIONS

Before Lighting

Open all supply and return air registers and grilles.

Open all valves in oil pipes.

Turn on electric power supply.

To Light Unit

Set the thermostat above room temperature to call for heat. The burner will start. NOTE: If the furnace has been off for an extended period of time, it may be necessary to press the RESET button on the primary combustion control relay, (once only). If pressing the reset button does not start the furnace, refer to Appendix C, Troubleshooting.

15 seconds after the thermostat calls for heat, the electronic fan timer board on time delay starts. After the delay time is complete. the circulation fan will start.

The furnace will continue to run until the thermostat call for heat is satisfied.

Set the thermostat below room temperature. The oil burner will stop.

The air circulation blower will continue to run for the set time after the oil burner has stopped, depending on the dip switch settings.

To Shut Down Unit

Set the thermostat to the lowest possible setting. Set the manual switch (if installed) in the Electrical Power Supply Line to "OFF".

NOTE: If the furnace is to be shut down for an extended period of time, close the oil supply valve to the oil burner.

⚠WARNING

DO NOT ATTEMPT TO START THE BURNER WHEN EXCESS OIL HAS ACCUMULATED, WHEN THE FURNACE IS FULL OF VAPOUR, OR WHEN THE COMBUSTION CHAMBER IS VERY HOT. NEVER BURN GARBAGE OR PAPER IN THE FURNACE, AND NEVER LEAVE PAPER OR RAGS AROUND THE UNIT.

TABLE A-1: BECKETT OIL BURNER SET-UP

BECKETT AFG SERIES OIL BURNERS							
FURNACE MODEL	**OUTPUT BTU/Hr.**	**BURNER MODEL**	**NOZZLE (Delavan)**	**PUMP PRESSURE**	**FLOW RATE**	**HEAD**	**STATIC PLATE**
O4HD-091A	58,100 [1, 2]	AF76BO	0.50 / 70° W	100 PSIG	0.50 GPH	F0	3-3/8 in.
	73,700 [2]	AF76BN	0.65 / 70° W	100 PSIG	0.65 GPH	F3	3-3/8 in.
	78,900 [2]	AF76BN	0.70 / 70° W	100 PSIG	0.70 GPH	F3	3-3/8 in.
O4HD-140A	87,700 [2]	AF76BZHS	0.75 / 70° W	100 PSIG	0.75 GPH	F4	3-3/8 in.
	98,800	AF76BZHS	0.85 / 70° W	100 PSIG	0.85 GPH	F4	3-3/8 in.
	113,400	AF76BZHS	1.00 / 70° W	100 PSIG	1.00 GPH	F4	3-3/8 in.

[1] F0 Head required for proper combustion. [2] Low Firing Rate Baffle required, Beckett Part No. 3708

In the United States, the R. W. Beckett "AFG" Burner may be equipped with Beckett's "Inlet Air Shut-Off", Beckett Part No. AF/A 5861, to increase efficiency. It reduces the amount of air passing through the oil burner, combustion chamber, breeching, etc. up the chimney between burner cycles.
NOTE: THE USE OF THIS CONTROL CAN OCCASIONALLY CAUSE POST COMBUSTION NOZZLE DRIP.

TABLE A-2: DIRECT DRIVE BLOWER SET-UP

FURNACE	**OUTPUT BTU/Hr.**	**BLOWER**	**MOTOR HP**	**BLOWER SET-UP**			**COOLING CAPACITY**		
				0.20 in. w.c.	**0.50 in. w.c.**				
				Dip Switch/Speed Setting	**Dip Switch/Speed Setting**	**Htg. CFM Range [1]**	**Tons [2]**	**MOTOR HP**	**Clg. CFM Range**
O4HD-091A-12-FA	58,100	10-10DD	½	Low	Low	668-1069	3	½	1047-1267
	73,700			Medium-Low	Medium-Low	841-1346			
	78,900			Medium-High	Medium-High	910-1456			
O4HD-140A-16-FA	87,700	11-10DD	¾	Low	Low	943-1458	5	¾	1499-1879
	98,800			Low	Medium-Low	1084-1676			
	113,400			Low	Medium-Low	1279-1977			
O4HD-091A-V-F	58,100	11 10DD	¾	0-0-0	0-0-0	900	3	¾	312-1531
	73,700			1-0-1	1-0-1	1050			
	78,900			1-0-0	1-0-0	1200			
O4HD-140A-V-F	87,700	11 10DD	¾	1-0-0	1-0-0	1200	5	¾	312-1844
	98,800			0-1-1	0-1-1	1350			
	113,400			0-1-0	0-1-0	1500			

(1) Heating Range values based on temperature rise. Upper values may exceed measured airflow values in Table A-3. (2) Nominal values only.

TABLE A-3: DIRECT DRIVE BLOWER CHARACTERISTICS

FURNACE MODEL	BLOWER	MOTOR HP	MOTOR FLA	TEMP. RISE (ΔT)	DIP SWITCH/SPEED SETTING	CFM External Static Pressure – inches w.c.				
						0.20	0.30	0.40	0.50	0.60
O4HD-091A-12-FA	½	10-10 DD	7.7	50° - 80°F	High	1477	1411	1316	1267	1215
					Med-High	1388	1316	1267	1215	1133
					Med-Low	1292	1236	1176	1114	1024
					Low	1196	1156	1092	1047	977
O4HD-140A-16-FA	¾	11-10 DD	12.5	45° - 75°F	High	2074	1995	1930	1879	1792
					Med-High	1963	1896	1827	1774	1700
					Med-Low	1792	1755	1700	1642	1582
					Low	1622	1602	1541	1499	1433
O4HD-091A-V-F	¾	11-10 DD	9.6	50° - 80°F	0-1-1	1215	1214	1214	1207	1204
					1-0-0	1128	1108	1101	1095	1089
					1-0-1	988	987	981	978	938
					0-0-0	788	787	781	777	756
O4HD-140A-V-F	¾	11-10 DD	9.6	55° - 85°F	1-1-0	1800	1800	1800	1800	1770
					1-1-1	1650	1650	1650	1650	1620
					0-1-0	1500	1500	1500	1500	1470
					0-1-1	1350	1350	1350	1350	1330

NOTE: The cfm values listed in the tables above are the same from .20 - .50" static. The motor automatically compensates for changes in duct static pressure, (within the limits of the motor).

TIP:

These formulae will assist with the design of the ductwork and the determination of airflow delivery:

$$CFM = \frac{Bonnet\ Output}{\left(1.085\ x\ System\ Temperature\ Rise\right)}$$

$$System\ Temperature\ Rise = \frac{Bonnet\ Output}{\left(1.085\ x\ CFM\right)}$$

GENERAL DIMENSIONS – O4HD MODELS

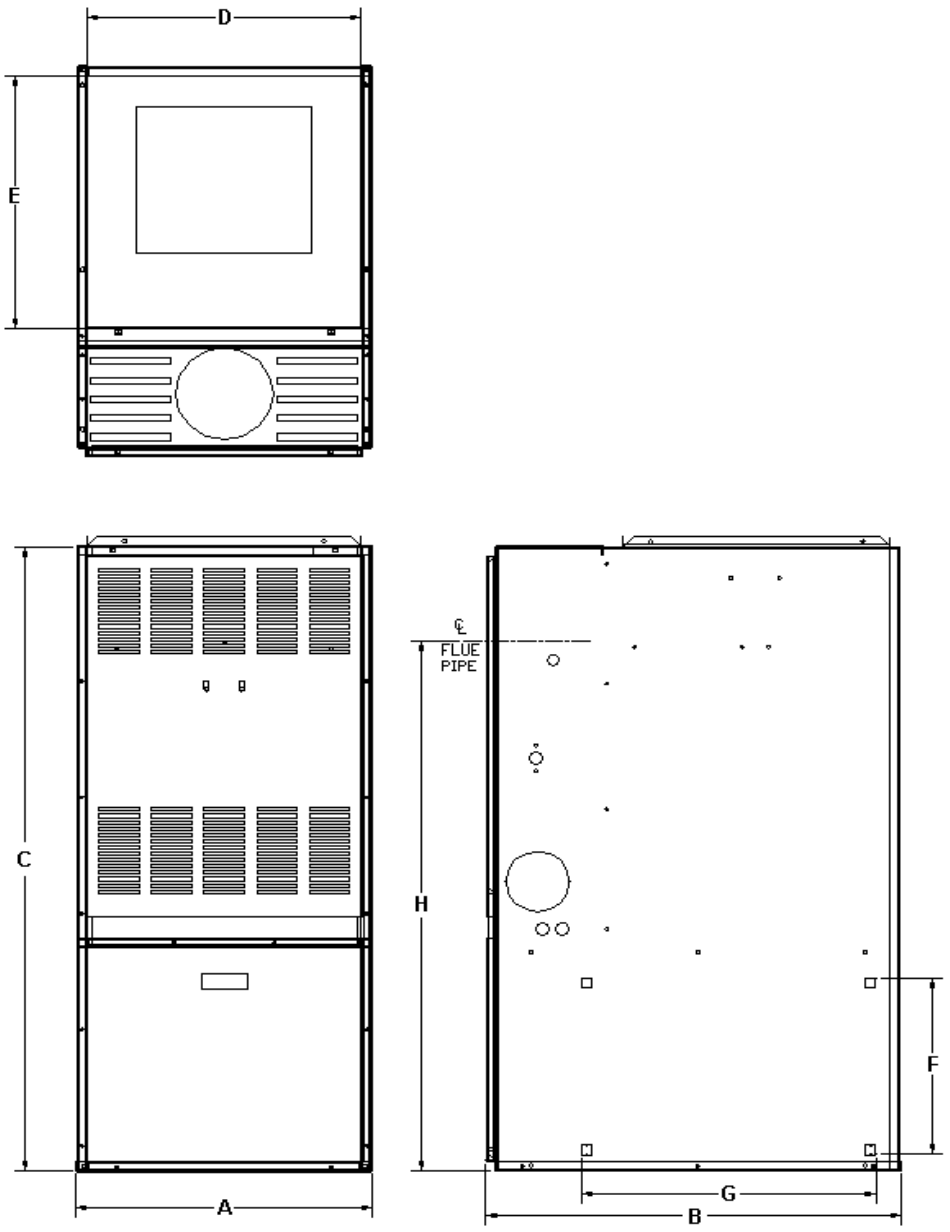
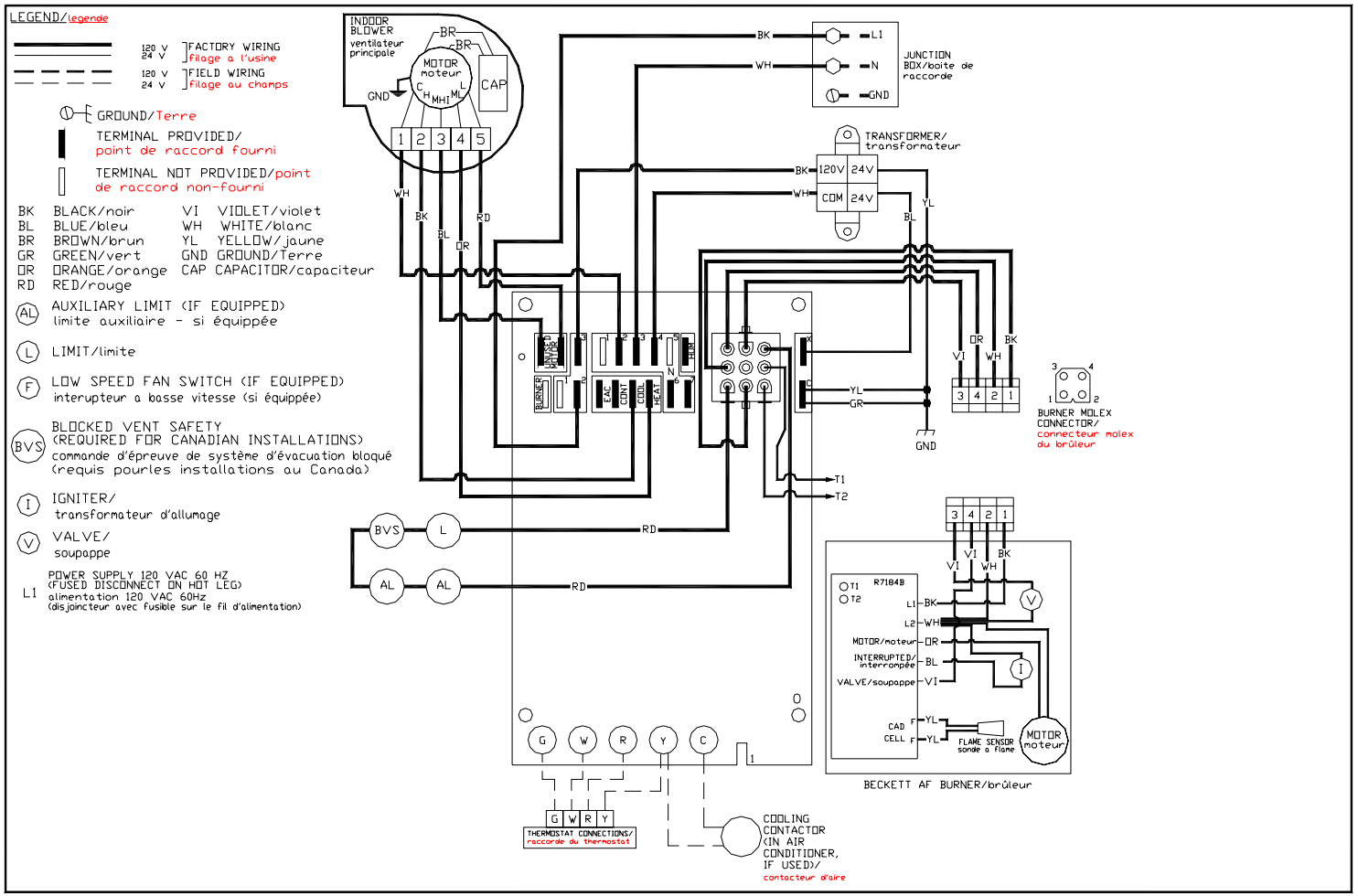


TABLE A-4: GENERAL DIMENSIONS (Inches) – O4HD MODELS

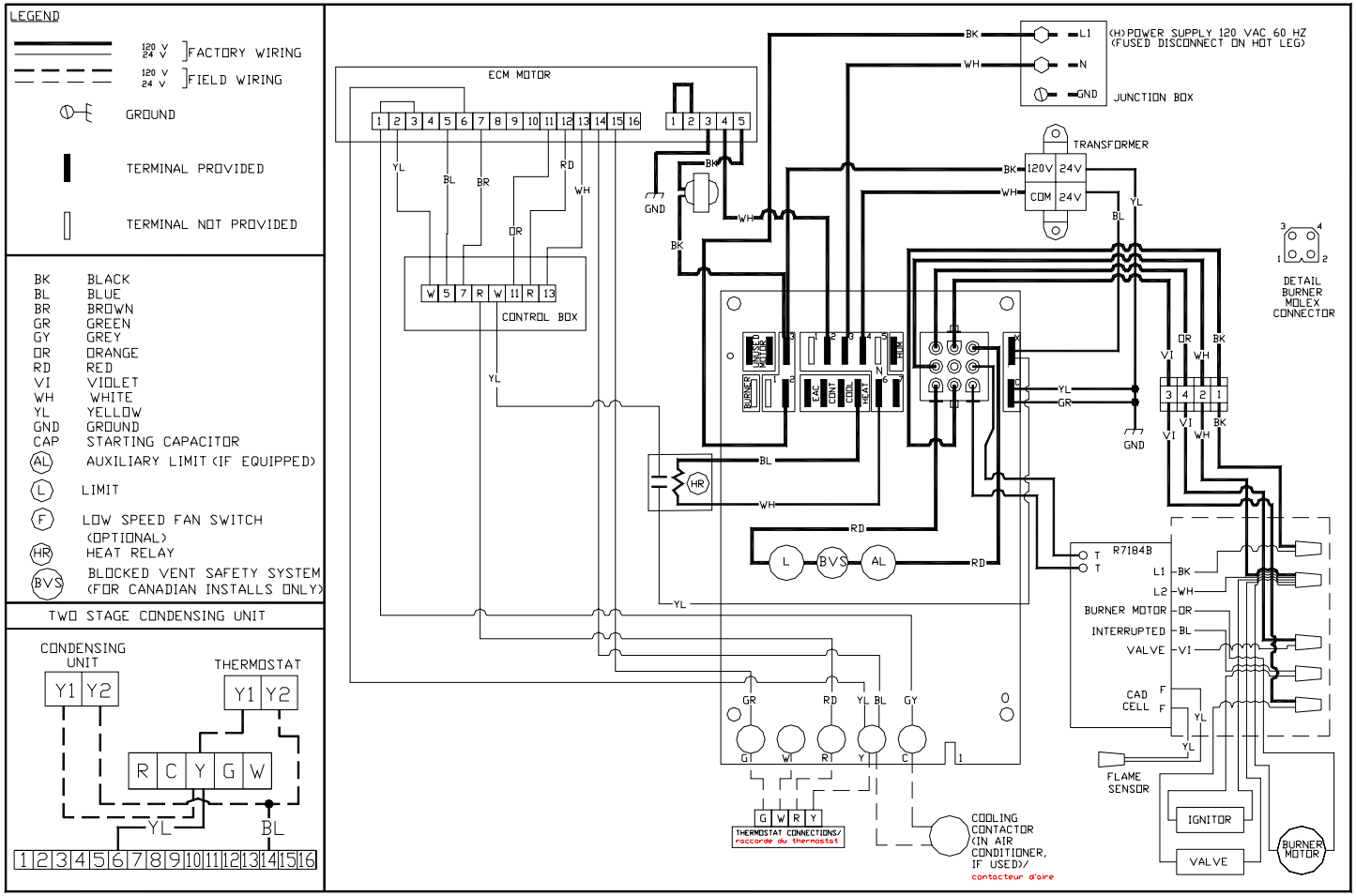
Cabinet			Plenum Openings			Flue		Filter (Perm.)	Ship Weight (lb.)
Width A	Depth B	Height C	Supply Air	Return Air		Dia.	Height H		
			D x E	Side F x G	Bottom				
O4HD-091A									
22	31	50 1/2	20 1/2 x 20	14 x 22	14 x 22	5	42	16 x 25 x 1	190
O4HD-140A									
22	31	58 1/8	20 1/2 x 20	14 x 22[1]	14 x 22[1]	6	46 1/2	16 x 25 x 1	270

[1]Denotes that two return air openings are required to achieve 5 tons airflow required for air conditioning.

APPENDIX A: WIRING DIAGRAM O4HD-091A-12-FA and O4HD-140A-16-FA



APPENDIX B: WIRING DIAGRAM O4HD-091A-V-F and O4HD-140A-V-F



WIRING NOTES

CONTINUOUS FAN OPERATION:

The EFTB (Electronic Fan Timer Board) has provisions to run the blower motor continuously on a speed lower than the cooling or heating speeds. On a call for cooling, the fan motor will switch to cooling speed, and on a call for heating, the fan will switch to heating speed, each over-riding the continuous low speed fan.

To obtain continuous low speed fan, route a 16 gauge stranded, type TEW, 105°C wire from the CONT Terminal on the EFTB to the low speed or medium low speed motor terminal. Both wire ends will require ¼ inch quick connects, (also known as "Faston" connectors or ¼" spade connectors). For additional control over the continuous low speed fan circuit, a SPST toggle switch may be wired in series between the motor terminal and the terminal. The continuous low speed fan operation operates at 115 vac. Use appropriate wiring methods to prevent electrical shock.

⚠WARNING

TURN OFF ELECTRICAL POWER TO THE FURNACE WHEN SERVICING OR ALTERING FURNACE WIRING.

FAILURE TO DO SO MAY RESULT IN SEVERE PERSONAL INJURY, PROPERTY DAMAGE OR DEATH.

ACCESSORIES:

The EFTB has provisions for supplying 115-volt power to an electronic air cleaner (EAC) as well as 115 volts to a line voltage humidifier or humidifier step down transformer. Both sets of terminals are ¼ inch quick connect type, rated at 1 A each.

The EAC terminals provide power to an electronic air cleaner whenever the heating or cooling speeds are activated. Power is not provided when the continuous speed is activated. If the electronic air cleaner must run during continuous low speed fan operation, wire the EAC into the furnace L1 terminal.

NOTE: It is seldom advisable to operate an electronic air cleaner at the continuous low speed because of the potential for excess ozone generation.

The HUM terminals provide power to a line voltage humidifier or humidifier step down transformer when the oil burner motor is operating.

THERMOSTAT HEATING CONNECTIONS:

The thermostat connections "R" and "W" connect to the "R" and "W" screw terminals on the EFTB located in the control box mounted on the blower.

NOTE: All thermostat wires for both heating and cooling connect to the furnace at the electronic fan timer board. A factory installed wiring harness connects the heating control functions to the R7184 oil primary control.

R7184 DETAILED SEQUENCE OF OPERATION

Power is applied to unit. The R7184 completes a self-diagnostic procedure. If no light or flame is present, and unit passes its self-diagnostic procedure, the control enters into the idle mode.

Thermostat calls for heat:

A) Safety check is made for flame (4 second delay).
   1) If flame is not present, the R7184 will apply power to the burner motor and igniter.
   2) If flame is present, the control remains in the idle state.

B) Unit enters a pre-purge period of 15 seconds.

C) After 10 seconds, control checks for flame presence.
   1) If flame is not present, the R7184 enters the trial for ignition state.
   2) When flame is present, the control enters lock out mode.

D) Control monitors the burner flame.
   1) When flame is present, the control enters ignition carryover state. (Continues to spark for 10 sec.).
      a) Provides continuous spark after flame is sensed to assure that burner remains lit.
      b) Turns on LED diagnostic light.
      c) Starts carryover timer.
         (i) Flame and call for heat are monitored.
            - If flame is lost and lockout timer has not expired, R7184 will return to trial for ignition state.
            - If flame is lost and lockout timer has expired, R7184 will enter the recycle state.
               - Recycle timer starts.
               - Burner motor and igniter and solenoid valve are turned off.
               - LED diagnostic light flashes slowly.

E) Carryover timer expires.
   1) Enters run state.
      a) Igniter turns off.

Combustion continues until thermostat is satisfied, or R7184 detects a loss of flame and enters into Recycle Mode.

F) Thermostat is satisfied - call for heat is terminated:
      a) R7184 shuts off burner motor and solenoid valve.
         (i) If control utilizes a blower motor off delay, after 30 seconds, flame presence is checked.
            - If flame is not present, the R7184 LED diagnostic light is off and returns to idle state.

If flame is presence is detected, the control enters lock out mode.

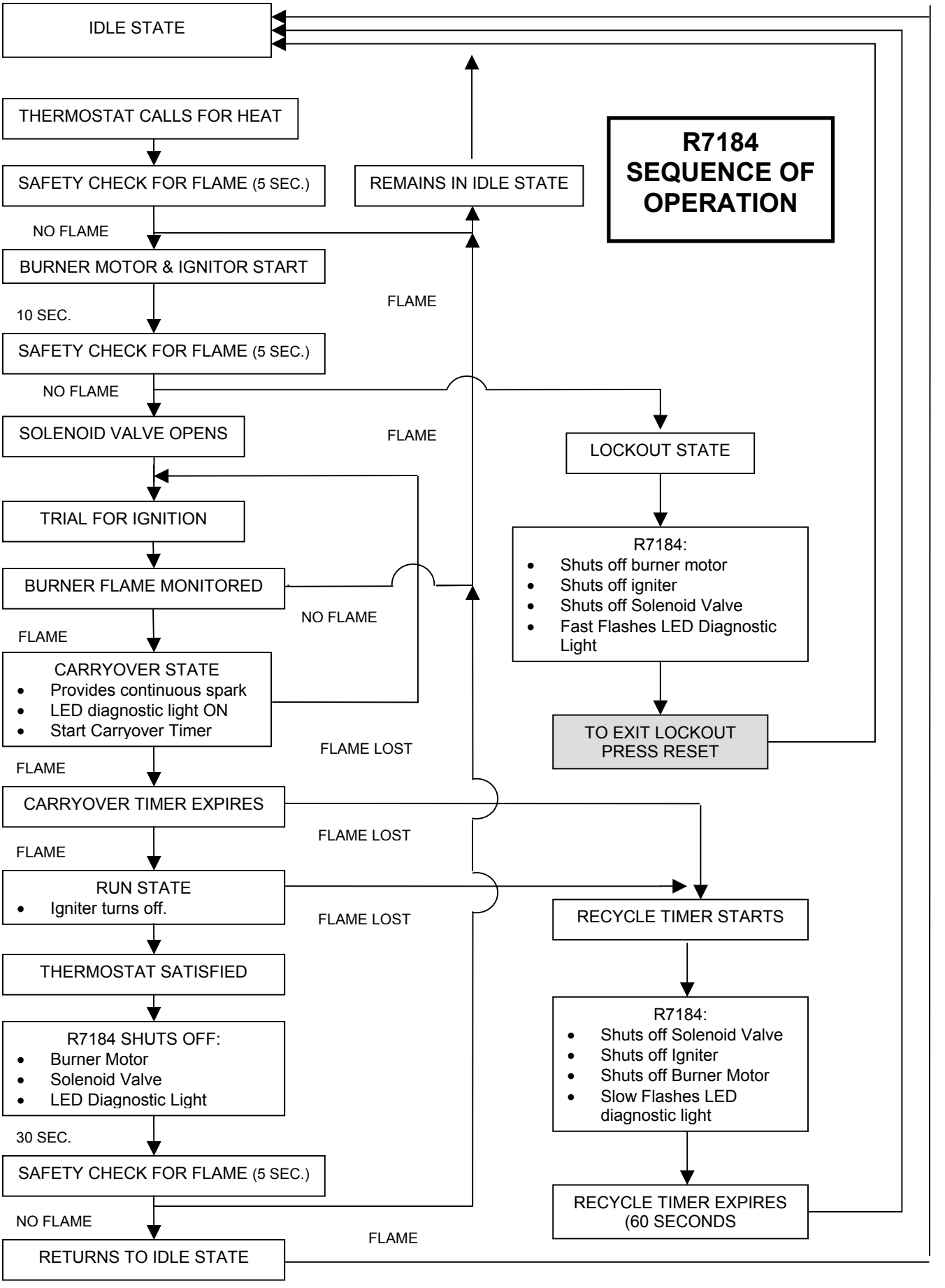

IDLE STATE
THERMOSTAT CALLS FOR HEAT
SAFETY CHECK FOR FLAME (5 SEC.)
NO FLAME
BURNER MOTOR & IGNITOR START
10 SEC.
SAFETY CHECK FOR FLAME (5 SEC.)
NO FLAME
SOLENOID VALVE OPENS
TRIAL FOR IGNITION
BURNER FLAME MONITORED
FLAME
CARRYOVER STATE
• Provides continuous spark
• LED diagnostic light ON
• Start Carryover Timer
FLAME
CARRYOVER TIMER EXPIRES
FLAME
RUN STATE
• Igniter turns off.
THERMOSTAT SATISFIED
R7184 SHUTS OFF:
• Burner Motor
• Solenoid Valve
• LED Diagnostic Light
30 SEC.
SAFETY CHECK FOR FLAME (5 SEC.)
NO FLAME
RETURNS TO IDLE STATE
REMAINS IN IDLE STATE
FLAME
FLAME
NO FLAME
FLAME LOST
FLAME LOST
FLAME LOST
FLAME
R7184 SEQUENCE OF OPERATION
LOCKOUT STATE
R7184:
• Shuts off burner motor
• Shuts off igniter
• Shuts off Solenoid Valve
• Fast Flashes LED Diagnostic Light
TO EXIT LOCKOUT PRESS RESET
RECYCLE TIMER STARTS
R7184:
• Shuts off Solenoid Valve
• Shuts off Igniter
• Shuts off Burner Motor
• Slow Flashes LED diagnostic light
RECYCLE TIMER EXPIRES (60 SECONDS

TABLE C-1: EFT DETAILED SEQUENCE OF OPERATION

Mode	Action	System Response
HEAT	Thermostat calls for heat. ("W" terminal is energized).	a. Electronic fan timer energizes oil burner. (T – 3/T connections for Beckett R7184). b. R7184 oil primary control starts the oil burner. Oil flows as long as the oil primary control senses flame. c. Burner motor and valve is energized and heat "fan on" delay timing begins. When timing is complete, the circulator fan is energized at heat speed.
	Thermostat ends call for heat. ("W" terminal is de-energized).	a. R7184 oil primary control is de-energized, terminating the burner cycle. b. Heat "fan off" delay timing begins. Length of delay depends on electronic fan timer dipswitch settings. When timing is complete, the circulator fan is de-energized. c. Electronic fan timer returns to standby mode, (Oil primary control and circulator fan are off, unless continuous fan operation is selected at the thermostat).
	Burner fails to light.	a. Oil primary control locks out within lockout timing, (30 seconds). b. Burner motor is de-energized. (Even though thermostat is still calling for heat). c. If circulator fan has started, it continues through the selected heat “fan off” delay period.
	Established flame fails.	a. Burner motor is de-energized and oil primary control goes into recycle mode. b. If the selected heat “fan off” delay timing is longer than the recycle delay timing, the circulator fan continues to run through the next trial for ignition.
COOL	Thermostat begins call for cool. (G and Y terminals are energized).	a. Cooling contactor is energized immediately. b. Circulator fan is energized at cool speed.
	Thermostat ends call for cool. (G and Y terminals are de-energized).	a. Cooling contactor is de-energized immediately. b. Circulator fan turns off immediately.
FAN	Thermostat begins call for fan. (G terminal is energized).	a. Circulator fan is energized immediately at cooling speed.
	Thermostat ends call for fan. (G terminal is de-energized).	a. Circulator fan is de-energized immediately.
LIMIT	Limit switch string opens.	a. Oil primary control shuts off burner. b. Circulator fan is energized immediately at heat speed. c. Electronic fan timer opens oil primary control. (T – 3/T connections for Beckett R7184).

Continued on following page.

Continued from last page

Mode	Action	System Response
LIMIT	Limit switch string opens. (*Continued*)	d. Circulating fan runs as long as limit string stays open. If there is a call for cooling or fan, the circulating fan switches from heating to cooling speed.
	Limit switch string closes (with existing call for heat).	a. Electronic fan timer begins heat “fan off” delay sequence. b. Circulating fan turns off after the selected heat “fan off” timing. c. Electronic fan timer re-closes oil primary control. (T – 3/T connections for Beckett R7184). d. Oil primary control is energized, initiating burner light-off.
	Limit switch string closes (without existing call for heat).	a. Circulator fan turns off when heat “fan off” delay time is complete. b. Normal operation resumes; electronic fan timer control is in standby mode awaiting next thermostat command.
FAN	Continuous circulating fan is connected.	a. Circulating fan is energized when there is no call for heat, cool, or fan. b. If fan operation is required by a call for heat, cool, or fan, the electronic fan timer switches off the continuous fan speed tap before energizing the other fan speed.
EAC	Electronic Air Cleaner is connected.	• Electronic air cleaner (EAC) connections are energized when the heat or cool speed of the circulator fan is energized. EAC connections are not energized when the optional continuous fan terminal is energized.
HUM	Humidity control is connected.	• Humidifier connections are energized when the oil burner motor is energized.

R7184 LED DIAGNOSTIC LIGHT

The LED diagnostic light has several functions. It indicates the state or mode in which the oil burner is operating. It will also indicate fault conditions, and help determine cad cell resistance while the burner is operating.

NORMAL CONDITIONS:

The LED diagnostic light will turn on when the burner enters the carryover state; the point at which ignition spark is on, and will remain on through the run state, where the ignition spark is terminated but the burner continues to fire.

The LED diagnostic light will turn off at the end of the burner cycle as the R7184 enters the idle state, and will remain off until the next heating cycle.

FAULT CONDITIONS:

If the LED diagnostic light is flashing quickly; 1 Hz (½ second on / ½ second off), the R7184 is in the lockout state or in restricted mode. To exit the lockout state, press the reset button.

If the LED diagnostic light is flashing slowly; ¼ Hz (2 seconds on / 2 seconds off), the R7184 is in the recycle state. This indicates that flame sensing was lost after the lockout timer expired during the ignition carryover state. The R7184 will return to the idle state within 60 seconds.

CAD CELL CONDITION:

If the LED diagnostic light is off, the cad cell is not sensing flame.

If the LED diagnostic light is on, the cad cell is sensing flame, or viewing ambient light.

The resistance of the cad cell may be checked while the R7184 is in the run state by pressing the reset button. The LED diagnostic light will flash the following code:

Flashes	Resistance in Ohms
1	Less than 400
2	Between 400 - 800
3	Between 800 – 1600
4	Between 1600 - 5000

Table C-2: Cad Cell Resistance

Troubleshooting

IMPORTANT:

Due to the potential hazard of line voltage, only a trained, experienced service technician should perform the troubleshooting procedure.

PRELIMINARY STEPS:

Check the diagnostic light for indications of burner condition. Refer to R7184 LED DIAGNOSTIC LIGHT section for details.

⚠CAUTION

When simulating a call for heat at the R7184, disconnect at least one thermostat lead wire from the T1 - T2 terminals to prevent damage to the thermostat. Neglecting this procedure may burn out the heat anticipator of a standard 24 VAC thermostat, or cause harm to components within a micro-electronic thermostat.

Before checking the oil primary control, perform these preliminary checks, (repair or replace controls as necessary):

- Check the power supply; fuse box or breaker, any service switches, all wiring connections, and burner motor reset button (if equipped).
- Check the limit switches to ensure that the switch contacts are closed.
- Check the electrode gap and position.
- Check the contacts between the oil primary control and the electrodes.
- Check oil supply (tank gauge).
- Check the oil nozzle, oil filter, and oil valves.
- Check the piping or tubing to the oil tank.
- Check the oil pump pressure.

CHECK OIL PRIMARY CONTROL AND IGNITOR

If the trouble does not appear to be in the burner or ignition hardware, check the oil primary control and the ignitor by using the following equipment:

Screwdriver.

Voltmeter (0 - 150 VAC)

Insulated jumper wires with both ends stripped.

⚠WARNING

ELECTRICAL SHOCK HAZARD.

Troubleshooting is done with the system powered. Be careful to observe all necessary precautions to prevent electrical shock or equipment damage.

PRELIMINARY CHECKS:

Make sure that limit switches are closed and that contacts are clean.

Check for line voltage power on the oil primary control black and white lead wires.

Refer to Table C-3 or C-4 for further troubleshooting information.

Table C-3: R7184 TROUBLESHOOTING

Condition: Burner motor does not start when there is a call for heat.

Procedure	Status	Corrective Action
1. Check that limit switches are closed and contacts are clean. This includes the burner motor reset button.	N/A	N/A
2. Check for line voltage power at the oil primary control. Voltage should be 120 Vac between the black and white lead wires on the oil primary control.	N/A	N/A
3. Check indicator light with burner off, no call for heat (no flame).	Indicator light is on.	Cad cell is defective, sees external light, or connections have shorted. Go to step 4.
	Indicator light is off.	Go to step 5.
4. Shield cad cell from external light.	Indicator light turns off.	Eliminate external light source or permanently shield cad cell.
	Indicator light stays on.	• Replace cad cell with new cad cell and recheck. • If indicator light does not turn off, remove yellow lead wires from R7184 and recheck. • If indicator light is still on, replace the R7184 control. • If the indicator light turns off, replace cad cell bracket assembly.
5. Jumper thermostat (T -T) terminals on R7184 IMPORTANT First remove one thermostat lead wire.	Burner starts.	Trouble is in thermostat circuit. Check thermostat wiring connections. If connections are clean and tight, check thermostat wires for continuity.
	Burner does not start.	• Disconnect line voltage power and open line switch. • Check all wiring connections. • Tighten any loose connections and recheck. • If burner still doesn't start, replace R7184
		If burner still doesn't start, check the oil burner motor. It may be seized or burned out.

Condition: Burner starts then locks out on safety with indicator light flashing at 1 Hz rate (½ second on, ½ second off)

Procedure	Status	Corrective Action
1. Check that the limit switches are closed and contacts are clean.	- - -	- - -
2. Check for line voltage power at the oil primary control. Voltage should be 120 vac (nominal)	- - -	- - -
3. Check indicator light with burner off, no call for heat (no flame).	Indicator light is on.	Cad cell or controller is defective, sees external light, or connections are shorted. Go to step 4.
	Indicator light is off.	Go to step 5.

Continues on next page

Table C-3: R7184 Troubleshooting *continued from previous page*		
Procedure	**Status**	**Corrective Action**
4. Shield cad cell from external light.	Indicator light turns off.	Eliminate external light source or permanently shield cad cell.
	Indicator light stays on.	4. Replace cad cell with new cad cell and recheck. 5. If indicator light does not turn off, remove cad cell lead wires from R7184 and recheck. 6. If indicator light turns off, replace cad cell bracket assembly. 7. If indicator light does not turn off, replace controller.
5. Jumper thermostat (T -T) terminals on R7184 **IMPORTANT** First remove one thermostat lead wire.	Burner starts.	Trouble in thermostat or limit circuit. Check thermostat or limit wiring connections.
	Burner does not start.	Disconnect the line voltage power and open line switch. Check all wiring connections. Tighten any loose connections and recheck. If burner does not start, replace R7184

Condition: Burner starts then locks out on safety with indicator light flashing at 1 hz rate (½ second on, ½ second off)

6. Reset oil primary control by pushing in and releasing red reset button.	Indicator light stops flashing.	Go to Step 7.
	Indicator light continues to flash at 1 Hz rate.	Verify that the control is not in restricted mode. (See notes at end of this table.). If not in restricted mode, replace R7184
7. Listen for spark after burner turns on (after 2 second delay).	Ignition is off	Spark ignitor could be defective. Check for line voltage at ignitor terminals. If line voltage is present, replace R7484.
	Ignition is on.	Go to Step 8.
	Ignition is on but no oil is being sprayed into the combustion chamber.	Wait for "Valve ON" delay to complete. Check oil supply, and oil line valve. Check for filter blockage or seized oil pump.
8. Check indicator light after flame is established, but before oil primary control locks out.	Indicator light is on until the control locks out and starts flashing during lockout.	Replace R7184
	Indicator light stays off.	Go to step 9.
9. Check cad cell sighting for view of flame. • Disconnect line voltage power and open line switch. • Unplug cad cell and clean cad cell face with soft clothe. Check sighting for clear view of flame. Replace cad cell in socket. • Reconnect line voltage power and close line switch. • Start burner.	Burner locks out.	Go to step 10.
	Burner keeps running.	System is OK.

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Table C-3: R7184 Troubleshooting *continued from previous page*

Procedure	Status	Corrective Action
10. Check cad cell. • Disconnect line voltage power and open line switch. • Remove existing cad cell and replace with new cad cell. • Disconnect all wires from thermostat terminals to ensure that there is no call for heat. • Reconnect line voltage power and close line switch. • Expose new cad cell to bright light such as a flashlight.	Indicator light is on.	Remount control onto burner housing. Go to step 6.
	Indicator light is off.	Go to step 11.
11. Check cad cell bracket assembly. • Disconnect line voltage power and open line switch. • Remove cad cell wires from quick connect connectors and leave control lead wires open. • Apply power to device. • Place jumper across cad cell terminals after burner motor turns on.	Indicator light is on.	Replace cad cell bracket assembly.
	Indicator light is off.	Replace R7184.
NOTE: Restricted Mode - (Limited Reset): In order to limit the accumulation of unburned oil in the combustion chamber, the control can be reset only 3 times, after which, the control locks out. The reset count returns to zero each time a call for heat is successfully completed. To reset from RESTRICTED MODE: press and hold the reset button for 30 seconds. When the LED flashes twice, the device has reset.		
NOTE: Disable function: Pressing and holding the reset button will disable all functions until the button is released. The burner will restart at the beginning of the normal heat cycle on SAFETY CHECK.		

Table C-4: System and General Troubleshooting

Problem	Possible Cause	Remedy
Furnace will not start.	Thermostat not calling for heat.	Check thermostat and adjust. Also, check thermostat for accuracy; if it is a mercury switch type, it might be off level.
	No power to furnace.	Check furnace switch, main electrical panel furnace fuse or circuit breaker. Also look for any other hand operated switch, such as an old poorly located furnace switch, which was not removed during furnace replacement.
	Thermostat faulty.	Remove thermostat wires from oil primary control terminals T-T. Place a jumper across T-T. If furnace starts, replace thermostat, thermostat sub-base (if equipped), or both.
	Oil primary control faulty.	Check reset button on oil primary control. Remove thermostat wires from oil primary control terminals T1 - T2. Check for 24v across T -T. If no voltage is present, check for 115v to oil primary control. If 115v is present, go to Table C-3.

Continues on next page

Table C-4: System and General Troubleshooting *continued*

Problem	Possible Cause	Remedy
Furnace will not start.	Photo Cell wiring shorted or room light leaking into photo cell compartment	Check photo cell (cad cell) wiring for short circuits. Also, check for room light leaking into cad cell compartment. Repair light leak if necessary. See Table C-3.
	Open safety switch.	Check for open limit or auxiliary limit. Also, check internal wiring connections; loose connectors, etc.
Furnace will not start without first pushing oil primary control reset button. (Happens on frequent basis)	No fuel oil.	Check fuel oil supply. Check that all hand operated fuel oil valves are in the open position. Fill oil storage tank if necessary.
	Clogged nozzle.	Replace nozzle with high quality replacement. Use rating plate or Tables in Appendix A as a guide.
	Clogged oil filter.	Replace oil tank filter or in-line filter if used.
	Low oil pump pressure.	Connect pressure gauge to oil pump. Adjust pump pressure, or replace oil pump if necessary. Ensure that erratic pressure readings are not caused by defective fuel oil line.
	Air getting into fuel oil lines, or fuel oil line dirty, clogged, or in some manner defective.	Check fuel oil lines. Replace any compression fittings found with high quality flared fittings. Check for any signs of oil leaks. Any oil leak is a potential source of air or contaminants.
	Defective burner motor.	Check burner motor. If burner motor is cutting out on over-load, determine why. Replace if necessary.
Furnace starts, but cuts out requiring manually resetting the oil protector reset button.	Photo Cell (Cad Cell) defective.	If cad cell is dirty, clean it. (Determine why cad cell is getting dirty). If cad cell is poorly aimed, realign it. NOTE: The photocell should have a resistance of 100K Ω in absence of light; a maximum of 1500 Ω in the presence of light. Ensure that room light is not leaking into the cad cell compartment. (See diagnostic light section).
Furnace starts, but cuts out requiring manually resetting the oil protector reset button.	No fuel oil.	Check fuel oil supply. Check that all hand operated fuel oil valves are in the open position. Fill oil storage tank if necessary.
	Clogged nozzle.	Replace nozzle with high quality replacement. Use rating plate or Tables in Appendix A as a guide.
	Clogged oil filter.	Replace oil tank filter or in-line filter if used.
	Low oil pump pressure.	Connect pressure gauge to oil pump. Adjust pump pressure, or replace oil pump if necessary. Ensure that erratic pressure readings are not caused by defective fuel oil line.
	Air getting into fuel oil lines, or fuel oil line dirty, clogged, or in some manner defective.	Check fuel oil lines. Replace any compression fittings found with high quality flared fittings. Check for any signs of oil leaks. Any oil leak is a potential source of air or contaminants.
	Defective burner motor.	Check burner motor. If burner motor is cutting out on over-load, determine why. Replace if necessary.
	Water or contaminants in oil.	Drain fuel oil storage tank, replace fuel oil. (Consult with fuel oil supplier).
	Frozen oil line.	Gently warm oil line. Insulate oil line. (Outdoor piping size may require increased diameter).
Oil burner sputtering at nozzle	Electrodes out of adjustment or defective.	Check electrode settings. Check electrodes for dirt build-up or cracks in porcelain.
	Poor transformer high voltage connections or defective transformer.	Check contacts between the igniter and electrodes. If OK, replace the igniter
	Fuel oil filter clogged.	Replace fuel oil storage tank filter and / or fuel oil in-line filter.
	Defective oil pump.	Check burner motor / fuel oil pump coupling. Check oil pump pressure. Replace fuel oil pump if necessary.
	Fuel oil line partially clogged or contains air.	Bleed air from oil line. If problem persists, replace oil line.

Continues on next page

Table C-4: System and General Troubleshooting *continued*

Problem	Possible Cause	Remedy
Excessive fuel oil consumption.	System temperature rise too high.	System temperature rise ideally should not exceed 85°F. Check for clogged air filters. Check blower fan for excess dirt build-up or debris. Speed up blower fan if necessary.
	Poor "fan off" delay timing selection, (fan stops too soon).	Check "fan off" delay timing setting. Use a duct thermometer in the supply air plenum take-off or first few inches of the supply air trunk duct. Ideally, the fan will shut off at a temperature of 90° - 100°F. Manipulate the dip switch settings to come as close as possible to this "fan off" temperature.
	Fuel oil leak.	Check fuel oil line for leaks. Repair or replace if necessary.
	Stack temperature too high.	Check stack temperature. Stack temperatures will normally range from 350° to 450°F. Check draft regulator. Draft should be set to 0.02 in. w.c.
	Thermostat improperly adjusted or in poor location.	Check thermostat heat anticipator setting against measured amperage draw. Increase heat anticipator setting if necessary. If the thermostat is being influenced by drafts, sunlight, duct work, etc., relocate to more suitable location.
Too much smoke.	Insufficient combustion air adjustment at oil burner, or improper draft pressure.	Adjust the oil burner combustion air band and draft regulator to gain the highest practical CO_2 or lowest practical O_2 content in the flue gases. See Burner Set Up.
	Heat exchanger partially clogged.	Check for soot build-up in heat exchanger flue passages, especially in the outer radiator.
Soot building up on blast tube (end coning).	Poor alignment between oil burner blast tube and fire pot.	Check alignment. Blast tube should be centered with fire pot burner opening. Oil burner head should be ¼ inch back from the inside surface of the fire pot.
	Flame impingement caused by Incorrect nozzle angle.	Check nozzle size and angle. (See Appendix A). Check distance from head to inside surface of the fire pot.
	Defective fire-pot	Check fire-pot. Repair or replace.
Furnace will not warm home to desired temperature.	Airflow blocked or dirty air filter.	Clean or replace air filter.
	Thermostat adjustments or location.	Check thermostat heat anticipator setting against measured amperage draw. Increase heat anticipator setting if necessary. If the thermostat is being influenced by drafts, sunlight, duct work, etc., relocate to more suitable location.
	Insufficient airflow.	Check all dampers. Open closed dampers including registers in unused rooms. Check system temperature rise. If temperature rise is too high, speed up blower fan.
	Defective high limit control.	Test high limit function of all limit switches. Use a duct thermometer to assess accuracy of limit control. Check for obstructions to airflow around limit switch bi-metal elements. Replace control if necessary.
	Under-sized nozzle.	Check nozzle. If problem is not caused by air flow problems, use larger nozzle, if permitted by rating plate.
	Blower fan motor stopping intermittently on overload.	Check blower fan motor amperage draw. Check motor ventilation ports, clean if necessary. Replace motor if necessary.
	Burner motor stopping intermittently on overload.	Check burner motor. Replace if necessary.
Home does not heat evenly	Improper distribution of heat.	This is not likely to be a furnace problem. Balance duct system.

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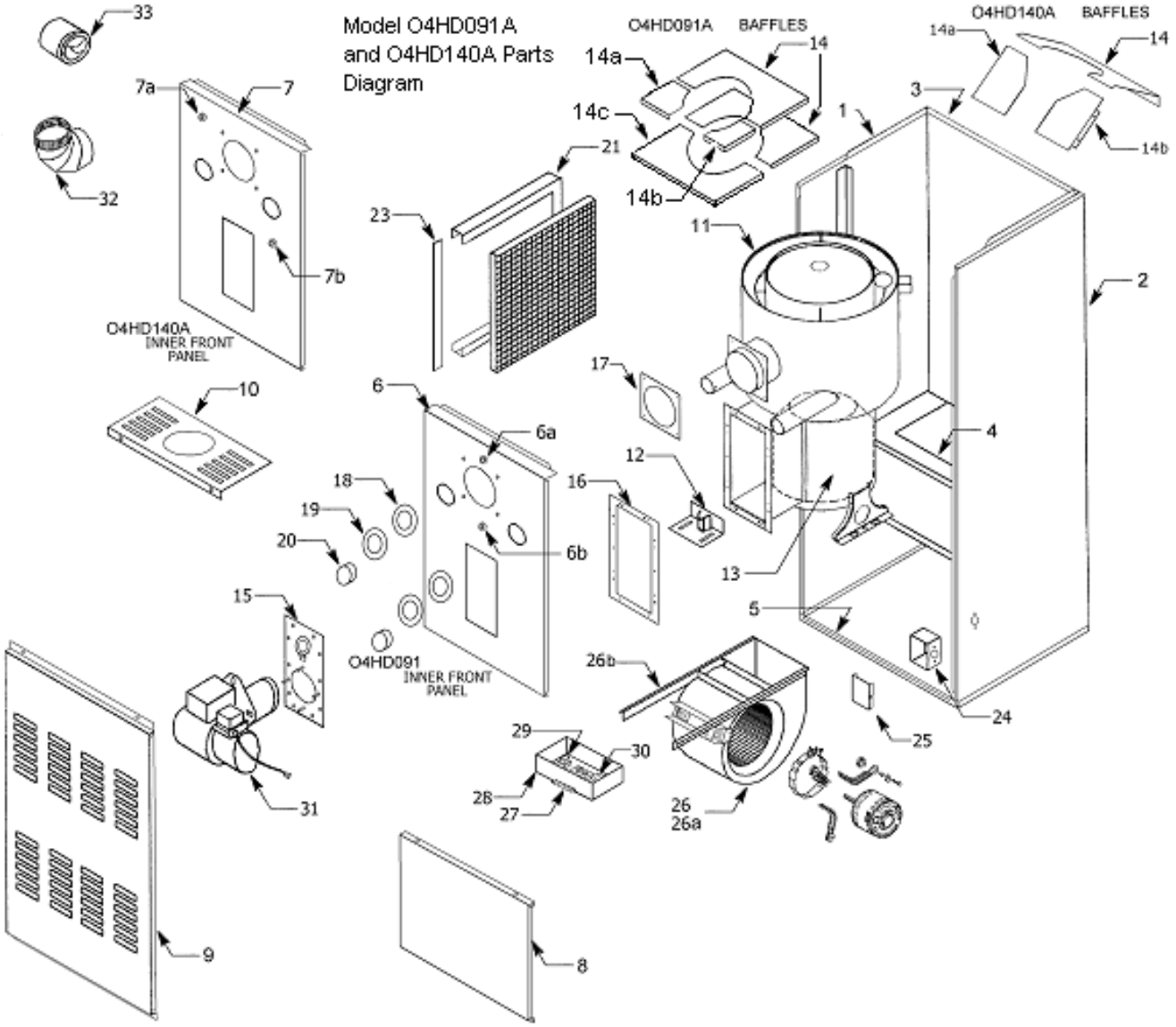
Table C-4: System and General Troubleshooting *continued*

Problem	Possible Cause	Remedy
Supply air temperature too hot.	Airflow blocked or dirty air filter.	Clean or replace air filter.
	Insufficient airflow.	Check all dampers. Open closed dampers including registers in unused rooms. Check system temperature rise. If temperature rise is too high, speed up blower fan.
Supply air temperature too cool.	Excess airflow.	Check system temperature rise. Slow down blower fan if necessary.
	Excessive duct losses.	Check supply air ductwork. Seal leaky joints and seams. Insulate ductwork if necessary.
Supply air temperature too cool during first moments of furnace cycle.	Fan control "fan on" setting too low.	Increase differential between fan control "fan off" and "fan on" settings. (L4064B, L6064A fan / limit controls only, no adjustments available for L4064W fan / limit control). Register air deflectors may help.
	Excessive duct losses.	Check supply air ductwork. Seal leaky joints and seams. Insulate ductwork if necessary.

Air Filter Location

O4HD Models

PARTS


Model O4HD091A and O4HD140A Parts Diagram
O4HD091A BAFFLES
O4HD140A BAFFLES
O4HD140A INNER FRONT PANEL
O4HD091 INNER FRONT PANEL
33
32
7a
7
7b
10
15
31
9
6
6a
6b
18
19
20
21
23
14a
14c
14b
14
1
3
2
11
17
12
16
13
4
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24
25
26b
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26a
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27
8

PARTS LISTING: HIGHBOY MODEL: O4HD091

Ref. No.		Description	Part No.
1		Left Side Panel Assembly	29178N
2		Right Side Panel Assembly	29177N
3		Rear Panel Assembly	29131N
4		Blower Division Panel Assembly	29587
5		Base Panel Assembly	26216
6		Inner Front Panel Assembly	29132
	6a	Limit Control, 60T11 160°F BOF (Black Oxide Finish) (Upper Position)	29662
	6b	Limit Control, 60T11 140°F BOF (Black Oxide Finish) (Lower Position)	29198
8		Blower Access Door	29122N
		Door Handle – P2-41	28673
9		Front Door Panel	29183N
10		Top Panel	29140N
11		Heat Exchanger Assembly	29135
12		Firepot Bracket Assembly	4141185A
13		Firepot Replacement	29673
14		Rear Panel Baffle	29157
	14a	Left Side Panel Baffle	29159
	14b	Right Side Panel Baffle	29158
	14c	Front Lower Panel Baffle	109006350
15		Oil Burner Mounting Plate Assembly	29873
		Inspection Door Gasket	29871
16		Pouch Gasket	2080175
17		Flue Pipe Gasket	29176
18		Clean-out Pipe Gasket 2 per unit	29163
19		Clean-out Pipe Gasket Retainer 2 per unit	29161
20		Clean-out Cover 2 per unit	29162
21		Filter Frame – 16 x 25 x 1	18020
22		Air Filter – 16 x 25 x 1 (Permanent)	2180023
23		Filter Frame End Support	5592B2
24		Junction Box	28723
25		Junction Box Cover	28722
26		Blower Assembly, Complete, Direct Drive, 3/4 hp, ECM O4HD-091A-V-F	30381
	26a	Blower Assembly 11-10 (Nordyne #904075)	30371
		Blower Wheel 11-10 (Nordyne #667280)	29667
26		Blower Assembly, Complete, Direct Drive, 1/2 hp, PSC O4HD-091A-12-FA	29581
	26a	O4HD-091A-12-FA Blower Assembly 10-10 (Nordyne #917968)	29572
		O4HD-091A-12-FA Blower Wheel 10-10 (Nordyne #)	
	26b	Blower Slide Rails (2 per unit)	29583
		Wire Harness Fan Timer Board	29364
		Wire Harness Transformer	29367
		Wire Harness Supply	29366
		Wire Harness Relay (O4HD-091A-V-F Only)	30369
	27	Electronic Fan Timer Board Honeywell ST9103A or UTC 1158-150	29388
	28	Control Box	29362
	29	Transformer, 4000-01V18BB2, 120/24v, 40 va	240005330
	30	Blower Relay T92S7A22-120 (O4HD-091A-V-F Only)	30328
31		Oil Burner Assembly, AF76B0	29884
		Oil Burner Motor, 1/7 hp, 3450 RPM PSC	29689
		Oil Pump, Beckett Clean-cut A2EA6520	29688
		Solid State Ignitor	29522
		Protector Relay, R7184B	29664
		Flame Retention Head, F0	11960
		Air Tube Combination, AF76B0	28583
		Oil Electronic Ignitor	29522
		Nozzle 0.50 gph /70° w	29640
		Nozzle 0.65 gph /70° w	29666
		Nozzle 0.70 gph /70° w	29641
32		Flue Pipe Elbow 5 Inch Dia.	30A046501
33		Draft Regulator, 5 Inch	27494

PARTS LISTING: HIGHBOY MODEL: O4HD140A

Ref. No.		Description	Part No.
1		Left Side Panel Assembly	28457N
2		Right Side Panel Assembly	28456N
3		Rear Panel Assembly	26209N
4		Blower Division Panel Assembly (O4HD140A-16-FA Only)	29588
		Blower Division Panel Assembly (O4HD-140A-V-F Only)	29357
5		Base Panel Assembly	26216
7		Inner Front Panel Assembly	29710
	7a	Limit Control, 60T11 220°F (Black Oxide Finish) (Upper Position O4HD140A-V-F)	28841
	7a	Limit Control, 60T11 180°F (Black Oxide Finish) (Upper Position O4HD140A-16-FA)	28654
	7b	Limit Control, 60T11 180°F (Black Oxide Finish) (Lower Position O4HD140A)	28654
8		Blower Access Door	29122N
		Door Handle – P2-41	28673
9		Front Door Panel	29743N
10		Top Panel	29140N
11		Heat Exchanger Assembly	29358
12		Firepot Bracket Assembly	4141185A
13		Firepot Replacement	29673
14		Rear Panel Baffle	29744
	14a	Right Side Panel Baffle	29745
	14b	Left Side Panel Baffle	29746
15		Oil Burner Mounting Plate Assembly	29873
		Inspection Door Gasket	29871
16		Pouch Gasket	2080175
17		Flue Pipe Gasket	29390
18		Clean-out Cover Gasket 2 per unit	29163
19		Clean-out Gasket Retainer 2 per unit	29161
20		Clean-out Cover 2 per unit	29162
21		Filter Frame – 16 x 25 x 1	18020
22		Filter Frame End Support	5592B2
23		Air Filter – 16 x 25 x 1 (Permanent)	2180023
24		Junction Box	28723
25		Junction Box Cover	28722
26		Blower Assembly, Complete, Direct Drive, 3/4 hp, O4HD-140A-16-FA	29582
	26a	Blower Assembly 11-10 (Nordyne #904075)	29573
		Blower Wheel 11-10 (Nordyne #667280)	29667
	26b	Blower Slide Rails (2 per unit)	29584
26		Blower Assembly, Complete, Direct Drive, 3/4 hp, ECM O4HD-140A-V-F	30381
	26a	Blower Assembly 11-10 (Nordyne #904075)	30371
		Blower Wheel 11-10 (Nordyne #667280)	29667
	26b	Blower Slide Rails (2 per unit)	30537
		Wire Harness Fan Timer Board	29364
		Wire Harness Transformer	29367
		Wire Harness Supply	29366
		Wire Harness Relay (O4HD-140A-V-F Only)	30369
	27	Electronic Fan Timer Board Honeywell ST9103A or UTC 1158-150	29388
	28	Control Box	29362
	29	Transformer, 4000-01V18BB2, 120/24v, 40 va	240005330
	30	Blower Relay T92S7A22-120 (O4HD-140A-V-F Only)	30328
31		Oil Burner Assembly, AF76BZHS	29887
		Oil Burner Motor, 1/7 hp, 3450 RPM	29689
		Oil Pump, Beckett Clean-cut A2EA6520	29688
		Solid State Ignitor	29522
		Protector Relay, R7184B	29664
		Flame Retention Head, F3	11961
		Air Tube Combination, AF76XN	27610
		Oil Electronic Ignitor	29522
		Nozzle 1.00 gph /70° w	29643
32		Flue Pipe Elbow 6 Inch Dia.	29476
33		Draft Regulator, 6 Inch	12240

HOME OWNER'S REFERENCE TABLE:

Installation Contractor:

Model No.	
Serial No.	
Date Installed	
Contractor	
Contact	
Address	
Postal Code	
Telephone No.	
After Hours No.	

Service Contractor if different from Installation Contractor:

Service Tech.	
Telephone No.	
After Hours No.	

Fuel Supplier:

Oil Supplier	
Contact	
Telephone No.	
After Hours No.	

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