

Installation, Operation and Maintenance Manual Oil Fired Warm Air Furnaces

O4LD-231A-20-R

FOR YOUR SAFETY:

Do not store or use gasoline or other flammable liquids or vapors in the vicinity of this, or any other appliance.

**ALL INSTALLATIONS MUST MEET
ALL LOCAL, PROVINCIAL/STATE,
AND FEDERAL CODES WHICH MAY
DIFER FROM THIS MANUAL**

NORDYNE

Read this complete manual before beginning installation. These instructions must be kept with the furnace for future



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1. INTRODUCTION

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

MODEL O4LD-231A-20-R

O4LD-231A-20-R MODELS are rear breeched oil fired forced air lowboy furnaces, with output capacity of 170,000 Btu/h to 190,000 Btu/h. They are shipped in two pieces; furnace section and blower section, which are assembled together at the installation site.

⚠ WARNING

DO NOT USE GASOLINE, CRANK CASE OIL, OR ANY OIL CONTAINING GASOLINE.

All models are CSA listed, for use with No. 1 (Stove) and No. 2 (Furnace) Oil. Please refer to the tables in Appendix A for performance and dimensional data.

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.

In the United States of America, 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.

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

The furnace should be carefully inspected for damage when being unpacked.

2. HEAT LOSS

The maximum hourly heat loss for each heated space shall be calculated in accordance with the procedures described in the manuals of the Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI), or by any other method which is suitable for local conditions, provided the results obtained are in substantial

agreement with and not less than those obtained using the procedure described in the manual.

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

3. 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.

The minimum installation clearances are listed in Table 1.

Table 1: Installation Clearance

Location	Clearance to / for	
	Combustibles	Service
Top	3 in.	3 in.
Bottom	0 in.	0 in.
S/A Plenum	0 in.	0 in.
Rear	1 in.	24 in.
Side 1	6 in.	6 in.
Side 2	6 in.	18 in.
Front	24 in.	24 in.
Flue Pipe	9 in.	9 in.
Enclosure	Standard	Standard

4. AIR CONDITIONING APPLICATIONS

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.

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.

5. COMBUSTION AIR

If the furnace is installed in a closet or utility room, two 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 above the level of the upper vent opening and one opening below the combustion air inlet opening in the front of the furnace. Each opening shall have a minimum free area of 1½ square inches per 1,000 Btu/h of total input rating of all appliances installed in the room.

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. The duct opening shall have a free area of 1½ square inches per 1,000 Btu/h of total input rating of all appliances to be installed. When a furnace is installed in a full basement, infiltration is normally adequate to provide air for combustion and draft operation. Furnace rooms under 65m³ (700 ft³) should automatically be treated as confined space.

6. CHIMNEY VENTING

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.

NOTE: THE FURNACE IS APPROVED FOR USE WITH TYPE L VENT OR EQUIVALENT.

▲ CAUTION

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

NOTE: THE RECOMMENDED FLUE DRAFT PRESSURE IS -0.02 IN. W.C. (AS MEASURED UPSTREAM OF THE BAROMETRIC DRAFT REGULATOR).

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. Refer to the latest edition of CAN/CSA B-139 for rules governing the installation of oil burning equipment. In the United States, refer to the latest edition of NFPA 31 for regulations governing the installation of oil burning equipment.

See Appendix A for burner set-up.

7. BAROMETRIC DAMPER CONTROL

This device is used on conventional chimney venting only. 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, when installed should be in the same room or enclosure as the furnace and should not interfere with the combustion air supplied to the burner. The control should also be located near the furnace flue outlet and installed according to the instructions supplied with the regulator. The flue outlet pressure (measured between the furnace and draft regulator) should be set to -0.02 in. w.c.

8. FAN AND LIMIT CONTROL

The **L6064A** temperature sensitive fan switch is actuated by a helical bi-metal sensing element enclosed in a metal guard, and controls the circulating air blower. This provides a delay between the burner ignition and blower start up to eliminate excessive flow of cold air when the blower comes on. Blower shutdown is also delayed to remove any residual heat from the heat exchanger and improve the annual efficiency of the furnace. Fan on settings of 110° F to 130° F

(43° C to 55° C) and fan off settings of 90° F to 100° F (32° C to 37°C) will usually be satisfactory.

The **L4064W** temperature sensitive fan switch contains a heater-wrapped bi-metal to actuate the fan switch independent of the temperature at the helical sensing element. The time from ignition, to the blower on function is approximately 30 seconds. If after 1 minute, the blower has not come on, replacement of the control may be necessary. The blower shutdown is the same as noted for the L6064A control.

The limit switch performs a safety function and breaks power to the oil burner primary control, which shuts off the burner if the furnace overheats. The limit control is thermally operated and automatically resets. The limit control is factory installed, pre-set and is not adjustable.

The limit control and fan control are incorporated in the same housing and are operated by the same thermal element.

9. ELECTRICAL CONNECTIONS

The furnace is listed by CSA to the North American standard. The furnace is factory wired and requires minimal field wiring. All field wiring should conform to CAN/CSA C22.1 Canadian Electrical Code, Part 1, and by local codes, where they prevail. 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.

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 possibility that it would be mistaken as a light switch or similar device.

Furnace Power Requirements				
Furnace Model	Volts AC	Amps	Phase	Cycles Hz
O4LD-231A-20-R	120	20	1	60

Accessories requiring 120 VAC power sources such as electronic air cleaners and humidifier transformers may be powered from the furnace circuit, but should have their own controls. Do not use the 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 in Appendix B. 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.

The thermostat heat anticipator should be adjusted to the amperage draw of the heating control circuit as measured at the "R" and "W" terminals of the thermostat. To reduce the risk of damaging the heat anticipator, do not measure this current with the thermostat connected to the circuit. Measure the amperage by connecting an ammeter between the two wires that will connect to the thermostat "R" and "W" terminals.

10. HUMIDIFIER

A humidifier is an optional accessory available through most heating supplies outlets. Installation should be carried out in accordance with the humidifier manufacturer's installation instructions. Water or water droplets from the humidifier should not be allowed to come into contact with the furnace heat exchanger. Do not use motor connections as a source of power for 120 VAC humidifiers and humidifier transformers.

11. PIPING INSTALLATION

The entire fuel system should be installed in accordance with the requirement of CAN/CSA B-

139, and local regulations. Use only an approved fuel oil tanks piping, fittings and oil filter.

In the United States the installation must be in accordance with NFPA No. 31 and local codes and authorities.

Install the oil filter as close to the burner as possible. For further details of the oil supply tank and piping requirements, please refer to the instructions and illustrations in the oil burner instructions shipped with the furnace.

12. OIL FILTER

All fuel systems should include an oil filter between the fuel oil storage tank and the oil burner. When using an oil burner nozzle smaller than 0.65 U.S. Gallons Per Hour install an additional 7 to 10 micron filter as close as possible to the oil burner.

13. OIL BURNER NOZZLES

The **O4LD-231A-20-R** model series is certified for multiple firing rates ranging from 170,000 to 225,000 Btu/h. By manipulating the oil burner nozzle, and temperature rise, these furnaces may be fired at an ideal rate for a wide range of structures. Refer to Table A-1, and the furnace rating plate to determine the proper combinations.

14. OIL BURNER ADJUSTMENT

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. The **O4LD-231A-20-R** furnaces operate most efficiently with a No. 1 smoke spot on the Bacharach Scale. This is not necessarily the optimum setting; however, because dust will inevitably build up on the air moving components of the oil burner assembly. This will result in decreased air supply with the potential result of soot building up in the flue gas passageways of the heat exchanger. Soot behaves as an insulator and impairs good heat transfer. Stack temperature will increase, and the overall efficiency will decrease. As a means of avoiding this problem, it is advisable to adjust the air supply to provide no more than a trace smoke spot on the Bacharach Scale.

⚠ 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 AS NECESSARY.

15. BURNER ELECTRODES

Correct positioning of the electrode tips with respect to each other, to the fuel oil nozzle, and to the rest of the burner is essential for smooth light ups and proper operation. Refer to the oil burner instructions shipped with the furnace for electrode specifications.

NOTE: Beckett AF Series Burner electrode specifications have been revised. They should be adjusted to be 5/16" above the nozzle centerline.

16. BURNER PRIMARY CONTROL

The furnace is equipped with a primary combustion control, sometimes refer to as the burner relay or burner protector relay, which uses a light sensing device (cad cell) located in the burner housing, to monitor and control combustion. Over time, dust or combustion residuals can build up on the lens of the cad cell impairing its response to the flame. The cad cell should be checked for cleanliness and proper alignment if the primary control frequently shuts down combustion.

⚠ CAUTION

ALL FURNACE CONTROLS ARE SENSITIVE AND SHOULD NOT BE SUBJECTED TO TAMPERING. IF PROBLEMS PERSIST, CALL YOUR SERVICE CONTRACTOR.

17. COMBUSTION CHAMBER

This furnace is equipped with a high quality cerafelt combustion chamber. It is held in place by a support bracket and stainless steel retaining band and clamp. **CHECK THE ALIGNMENT OF THE COMBUSTION CHAMBER AND OIL BURNER BEFORE FIRING. IT IS POSSIBLE FOR THE COMBUSTION CHAMBER TO SHIFT**

IF SUBJECTED TO ROUGH HANDLING DURING TRANSIT. The combustion chamber should be inspected for damage or carbon build up whenever the oil burner is removed for repairs or routine maintenance.

⚠ CAUTION

DO NOT START THE BURNER UNLESS THE BLOWER ACCESS DOOR IS SECURED IN PLACE.

18. CIRCULATING AIR BLOWER

The **O4LD-231A-20-R** furnaces are equipped with belt drive blower systems. 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 blower motor. Selecting a lower blower speed may correct this problem; however, with a belt drive blower system, motor RPM and CFM delivery is not particularly influenced by system external static pressure.

⚠ WARNING

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.

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

Do not use the blower speed wires as a source of power to accessories as electronic air cleaners and humidifier transformers unless it

is certain that only one motor speed will be used. Belt drive blower systems can be modified for a variety of speeds and air delivery by adjusting the variable speed motor pulley, and by changing the blower pulley.

The variable speed motor pulley may be adjusted by loosening the 5/32 Allen set screw in the outer sheave, and turning the outer sheave clockwise to increase blower speed; counter clockwise to reduce blower speed. Ensure that the setscrew is tightened at one of the "flat spots"; failure to do so will convert the variable speed pulley to a fixed speed pulley by ruining the threads. The blower speed can be modified by the changing of the blower pulley. A smaller blower pulley will cause the blower to turn faster; a larger pulley will reduce blower speed. Large increases in blower speed may increase power requirements. Check the amperage draw of the blower motor after changes have been made. If the amperage draw is greater than the value listed on the motor rating plate, replace with a motor of higher horsepower.

The fan belt tension is very important. There should be a deflection of $\frac{3}{4}$ of an inch to 1 inch. Less deflection places a strain on the blower bearings, and increases start up amperage draw. More deflection allows excess slippage and causes premature motor pulley wear. Automotive belt dressings are not recommended. A hard soap such as Sunlight[®] soap will work well as a belt dressing, for the purpose of reducing belt squeaks, etc. If used, the soap should be applied to the sides of the belt only.

⚠ WARNING

THE BELT DRIVE COMPONENTS OPERATE AT HIGH SPEEDS AND CAN EASILY SNAG LOOSE CLOTHING, CAUSING SERIOUS PERSONAL INJURY. THIS PROCEDURE SHOULD BE LEFT TO TRAINED SERVICE PERSONNEL.

If planning to operate the belt drive blower at speeds above 1100 RPM, it is advisable to use roller bearings. The blower assembly used in the **O4LD-231A-20-R** model is equipped with roller bearings.

▲ WARNING

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

19. 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. (See Appendix A, Table A-4).

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 advise your service or installation contractor.

Annual Service By Contractor

▲ CAUTION

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

The heat exchanger, and flue pipe on rear breach units, 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. The Flue Connector shall be removed to inspect and clean the flue pipe area. To clean the radiator, remove the round covers on the inner front panel to gain

access to the cleaning ports. Loosen the nuts on the radiator clean-outs. **DO NOT REMOVE THE NUTS.** Remove the covers carefully to avoid tearing the gaskets. 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 industrial a vacuum cleaner. Before replacing the clean-out covers, inspect the gaskets. If the gaskets are broken, remove the remnants and replace with new gaskets. Snug the cleanout covers. **DO NOT OVER-TORQUE THE CLEAN-OUT NUTS.** Replace the inner front panel clean-out covers.

NOTE: A radiator clean-out assembly inadvertently dropped into the interior of the furnace can usually be easily retrieved with a magnet on a wire handle or stout string.

The blower motor is factory oiled. Under normal operating conditions it does not require oiling for the first two years. Oil sparingly (a few drops) 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 causes premature electric motor failure.

Inspect the blower fan. Clean if necessary.

Oil Burner Maintenance: Follow the instructions of the oil burner manufacturer. (See oil burner manufacturer's instructions supplied with furnace). It is advisable to change the oil burner nozzle and oil filter 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 damper 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 should be checked to ensure that the "fan off" function continues to stop the blower fan at temperatures between 90°F to 100°F.

20. OPERATING INSTRUCTIONS

Before Lighting

1. Open all supply and return air registers and grilles.
2. Open all valves in oil pipes.
3. Turn on electric power supply

To Light Unit

1. Set the thermostat above room temperature to call for heat. The burner should start. NOTE: It may be necessary to press the RESET button on the primary combustion control relay.
2. After a short period of time, as the furnace becomes warm enough to act upon the fan control (L6064A), or preheats the bi-metallic element (L4064W), the blower should start.
3. Set the thermostat below room temperature. The oil burner should stop.
4. The air circulation blower will continue to run as long as the temperature remaining in the furnace is higher than the "FAN OFF" setting on the fan control. Typical "fan on" values range from 110°F to 130°F. Typical "fan off" temperatures range between 90°F and 100°F. The fan control adjustments may be altered if the air at the room registers is uncomfortably high upon blower start up or shutdown, the fan control settings can be lowered.
5. The adjustments to the fan control settings should be based on the temperature of the air in the supply air trunk, three feet from the unit. The side mid point of the trunk is usually ideal, providing that the thermometer probe is beyond the "line of sight" in relation to the Heat Exchanger, wherein false readings from radiant heat could be observed. The system temperature rise, *the difference in temperature between the supply air and return air*, be as indicated by the appliance rating plate.

To check the operation of the limit switch, shut off power to the furnace. Temporarily remove the fan belt. Restore the electrical power to the furnace and set the thermostat above room temperature. After three or four minutes of burner operation, the limit control should turn the burner off. The progress towards a high limit shut down can be monitored by watching the dial on the fan / limit control. When the limit function test is complete,

shut off electrical power to the furnace, replace the fan belt, and then restore power. The blower fan will start up immediately. Once the temperature has dropped, the oil burner will resume and continue until the thermostat is satisfied. Restore the thermostat setting to a comfortable temperature.

To Shut Down Unit

1. Set the thermostat to the lowest possible setting.
2. 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 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.

Appendix A

TABLE A-1: BECKETT AF OIL BURNER SET-UP

Beckett AF Series Oil Burners						
(For use with chimney vented units)						
Furnace Model	Burner Model	Nozzle	Pump Pressure	Flow Rate	Head ¹	Static Plate
O4LD-231A-20-R 170,000 BTUH	AF81WF	1.50 / 70°B	100 PSIG	1.50 USGPH	F16	2-¾ in.
O4LD-231A-20-R 190,000 BTUH	AF81WF	1.65 / 70°B	100 PSIG	1.65 USGPH	F16	2-¾ in.

¹ Head shielded by ceramic insulator.

A.1 OIL BURNER AIR ADJUSTMENT

For complete details, consult the oil burner instruction manual provided in the furnace documents envelope.

Beckett AF Burner

Adjust the air shutter by loosening the lock screws and moving the air shutter, and if necessary, the bulk air band.

A.2 BURNER ELECTRODES

Adjustment of the electrode tips with respect to each other, the nozzle, and to the rest of the burner is very important to ensure smooth start-ups and to permit efficient combustion. Refer to the Burner Manufacturers Instructions for details.

A.3 START UP

The furnace should be operated for a minimum of 15 minutes to reach steady state conditions before fine tuning combustion. The warm up time is ideal for testing the oil pump pressure.

Drill a 1/4-inch test port in the venting between the furnace flue outlet and draft regulator (barometric damper). Insert a stack thermometer and note the flue gas temperature. The flue gases should be within a range of 350°F to 575°F. 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. Temperature rise values are displayed on the appliance rating plate.

Perform a smoke spot test. The smoke spot should not exceed No. 1 on the Bacharach Scale.

After the air adjustments have been completed, re-check the draft pressure at the same point as the smoke spot test. The draft should be adjusted to 0.02 inches w.c.

In the United States, the Beckett AF Burner may be equipped with Beckett's "Inlet Air Shut-Off" to increase efficiency. (Beckett Part No. AF/A 5861).

NOTE: USE OF THE INLET AIR SHUT-OFF COULD CAUSE POST COMBUSTION NOZZLE DRIP.

TABLE A-2: BELT DRIVE BLOWER SET-UP

Furnace Model	Blower	Blower Set-Up								Cooling Capacity		
		0.20 in. w.c.				0.50 in. w.c.				Tons	Motor	CFM Range
		Pulley		Belt	Motor	Pulley		Belt	Motor			
		Motor	Blower			Motor	Blower					
O4LD-231A-20-R	G12	3½ x ½	6 x ¾	4L410	1 HP	3½ x ½	6 x ¾	4L410	1 HP	3 – 5	1 HP	1600 - 2200

TABLE A-3: RECOMMENDED MINIMUM INSTALLATION CLEARANCES (INCHES)

Furnace Model	Plenum Top	Front	Rear	Side 1	Side 2 ²	Flue Pipe	Floor	Enclosure
O4LD-231A-20-R	3	24	24	6	18	9	Combustible ¹	Standard

¹ Wood Floor Only, do not install on carpeted floor, tiled floor, etc.

² Note – Purpose of the 18” side clearance is to allow a passageway from the front to the back of the furnace.

TIP: Consider greater clearances front and back for easier servicing.

TABLE A-4: GENERAL DIMENSIONS (INCHES)

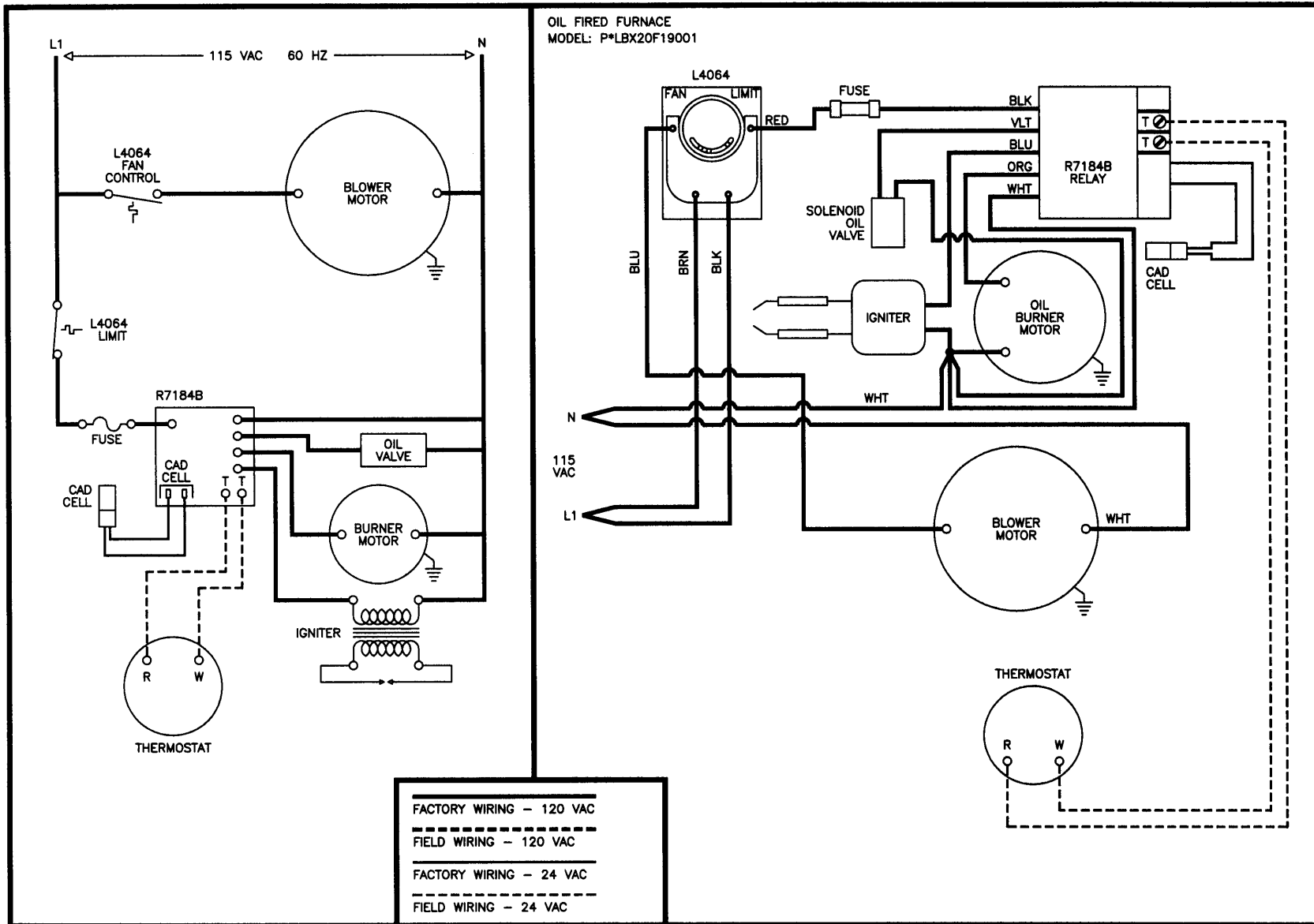
Furnace Model	Cabinet			Plenum Openings			Flue		Filter		Shipping Weight
	Width	Depth	Height	Supply	Gap	Return	Diameter	Height	Type	Size	
O4LD-231A-20-R	26	49	56	24 x 22	2½	24 x 22	7	47	Permanent	20 x 25 x 1 (2)	390

TABLE A-5: AIRFLOW CHARACTERISTICS – BELT DRIVE

Furnace Model	Motor HP	Motor FLA	ΔT	Blower	Blower Pulley	Motor Pulley Turns Out	CFM					
							External Static Pressure – Inches w.c.					
							0.20	0.25	0.30	0.40	0.50	0.60
O4LD-231A-20-R	1 HP	14.0	85°F	G12	6 x ¾	2	2601	2525	2449	2334	2164	2007
						3	2549	2474	2399	2288	2120	1967
						4	2497	2424	2350	2241	2077	1927
						5	2444	2373	2301	2194	2034	1887

Appendix B

WIRING DIAGRAM MODEL O4LD-231A-20-R



APPENDIX C R7184 DETAILED SEQUENCE OF OPERATION

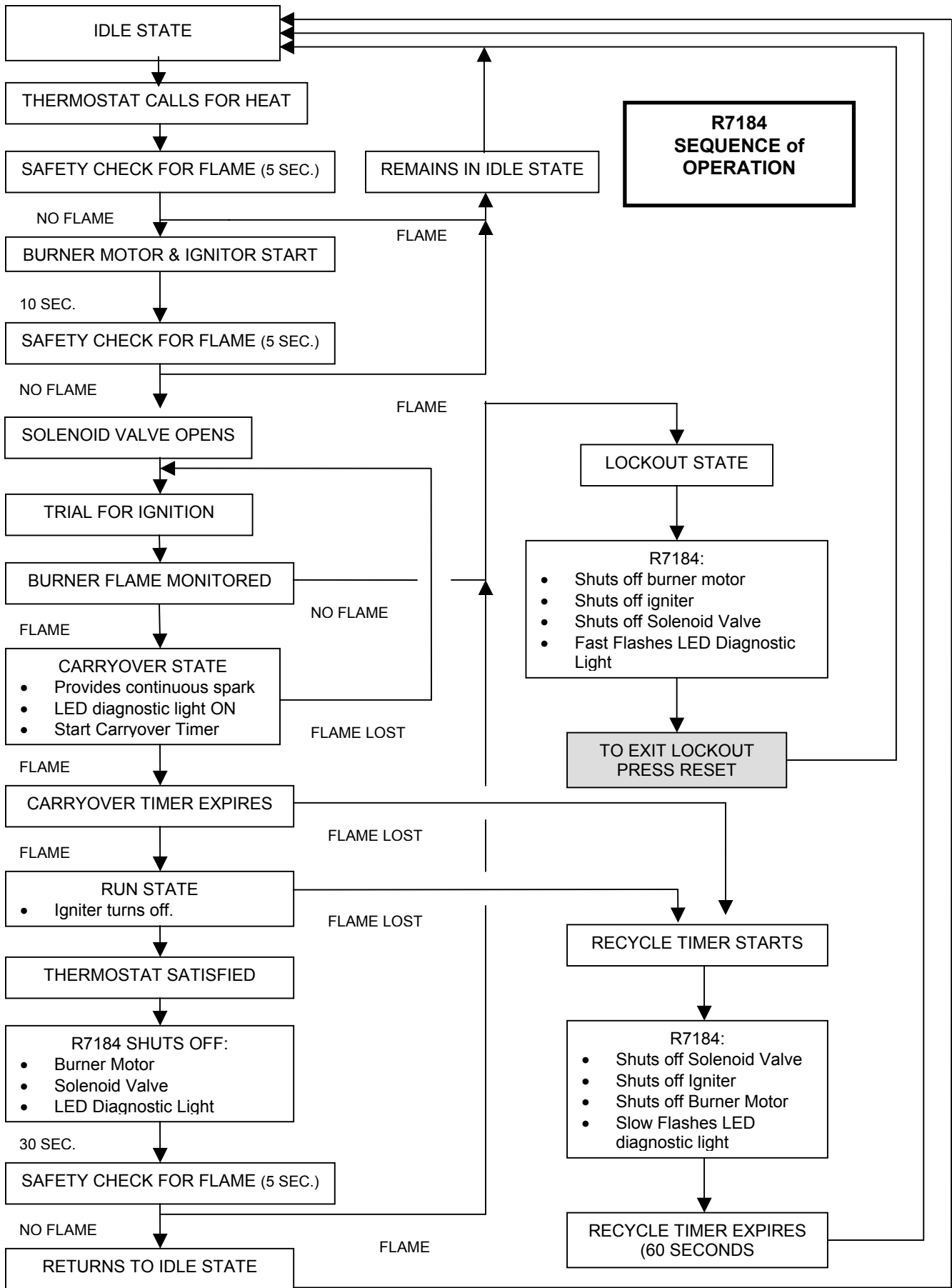
Power is applied to unit. The R7184 completes a self-diagnostic procedure. If no light or flame is present, and unit passes its self-diagnostic procedure, the control enters into the idle mode.

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.



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:

Table C-2: Cad Cell Resistance

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

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 IGNITER

If the trouble does not appear to be in the burner or ignition hardware, check the oil primary control and the igniter 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 those contacts are clean.

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

Refer to Table C-4 or C-5 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.	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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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 <p>If burner still doesn't start, check the oil burner motor. It may be seized or burned out.</p>

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.

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 igniter could be defective. Check for line voltage at igniter 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. <ul style="list-style-type: none"> • 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.

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

Procedure	Status	Corrective Action
10. Check cad cell. <ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> Disconnect line voltage power and open line switch. Remove cad cell wires from quick connect connectors on 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 C4: 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.

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 \square in absence of light; a maximum of 1500 \square 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.

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.

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 "fan on" dipswitch settings on EFT if control has this option.). Register air deflectors may help.
	Excessive duct losses.	Check supply air ductwork. Seal leaky joints and seams. Insulate ductwork if necessary.

FINAL CHECK OUT

ENSURE THAT ALL SAFETY DEVICES AND ELECTRICAL COMPONENTS HAVE BEEN SET FOR NORMAL OPERATION. ENSURE THAT ALL ELECTRICAL CONNECTIONS ARE TIGHT AND THAT THE WIRING IS SECURE.



IMPORTANT:

Please ensure that the homeowner is informed and understands:

1. Where the circuit breaker or fuse is located in the main electrical panel.
2. Where the furnace switch is located, and the switch "on" and "off" positions if not obvious.
3. Where the oil shut-off valve from the oil storage tank is located.
4. How to operate the thermostat, and other related accessories.
5. How to operate the manual reset button on the primary control, and especially when not to push the reset button.
6. How and where to visually inspect the venting system for leaks or other problems.
7. How to inspect, clean and replace the air filter, and other homeowner maintenance procedures.
8. Who to call for emergency service and routine annual service.
9. The terms and conditions of the manufacturer's warranty and the contractor's warranty.

HOMEOWNER'S REFERENCE TABLE

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

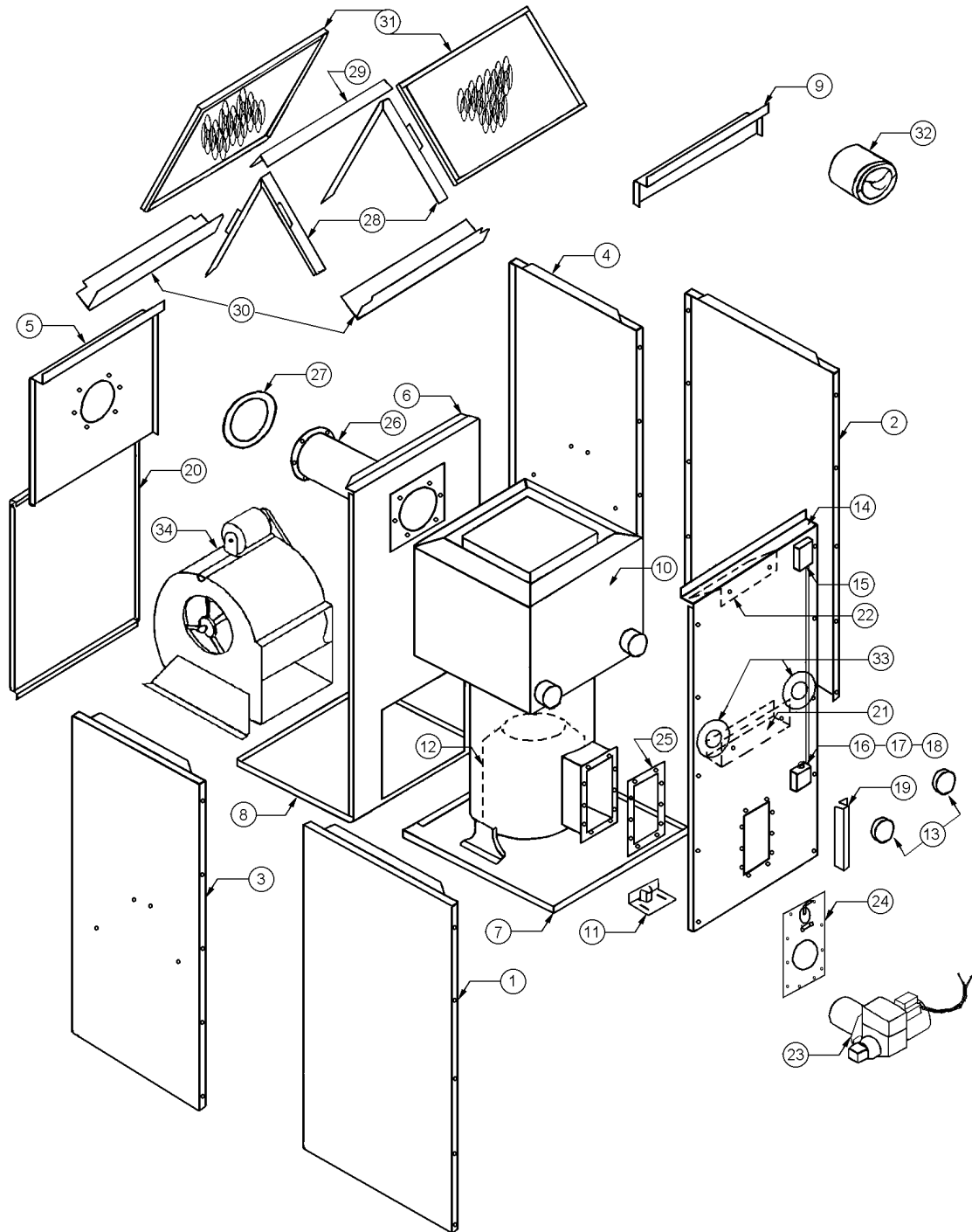
FUEL SUPPLIER

Fuel Oil Supplier	
Contact	
Telephone No.	
After Hours No.	

IF DIFFERENT FROM INSTALLATION CONTRACTOR:

Service Tech.	
Telephone No.	
After Hours No.	

MODEL O4LD-231A-20-R



PARTS LISTING: LOWBOY MODEL: O4LD-231A-20-R

Ref. No.	Description	Part No.
1	Left Side Panel Heating Compartment	29040N
2	Right Side Panel Heating Compartment	29040N
3	Left Side Panel Blower Compartment	29048N
4	Right Side Panel Blower Compartment	29047N
5	Upper Rear Panel Blower Compartment	29062N
6	Blower Partition Panel	29052N
7	Base Panel Assembly Heating Compartment	29043
8	Base Panel Assembly Blower Compartment	29056
9	Plenum Edge Panel Heating Compartment	29045N
10	Heat Exchanger Assembly	29224
11	Firepot Bracket Assembly	29225
12	Replacement Firepot	27000WP
13	Cleanout Pipe Cover (2 per unit)	29162
	Cleanout Cap Gasket (2 per unit)	240006333
14	Front Panel	29220N
15	Fan & Limit Control L4064W, 8" Insertion, Set @ 200° F	29041
16	Junction Box	21318
17	Fuse Holder	27089
18	Fuse, ABC-15	2200096
19	Wire Retainer Channel	27510
20	Blower Access Door	29053N
	Door Handle – P2-41	28673
21	Front Panel Baffle	3022140A
22	Top Front Panel Baffle	29223
23	Oil Burner assembly Beckett AF81WF	29597
	Burner Motor 1/7 HP 3450 RPM PSC	29689
	Beckett Cleancut Oil Pump A2EA6520	29688
	Solid State Ignitor FRANCE 10SAY-04	29522
	Primary Combustion Control R7184B	29664
	Air Tube Combination AF81WF	29530
	Flame Retention Head (F16)	29531
	Nozzle 1.50/70° B	2101010
	Nozzle 1.65/70° B	2101011
24	Oil Burner Mounting Plate Assembly	29869
	Inspection Door Assembly	8898A
	Inspection Door Gasket	2081055A
25	Pouch Gasket	2080175
26	Flue Pipe Assembly	1024B3
27	Flue Pipe Gasket (2 per unit)	2080181
28	Filter Rail Assembly (2 per unit)	29054
29	Top Filter Support	29063
30	Filter Support Front & Rear (2 per unit)	29055
31	Filter, 20" X 25" X1" Disposable (2 per unit)	2180012
31	Filter, 20" X 25" X1" Permanent (2 per unit)	2180024
32	Draft Regulator (7")	12401
33	Clean-out Gasket Retainer (2 per unit)	29161
	Cleanout Gasket (2 per unit)	29163

PARTS LISTING: LOWBOY MODEL: O4LD-231A-20-R

Ref. No.	Description	Part No.
34	Blower Assembly	29217
	Blower Housing and Wheel, G12 With Ball Bearings	29222
	Blower Motor, 1 hp Single Speed	29218
	Motor Pulley 3 1/2 X 5/8 Adjustable With Keyway	19779
	Blower Pulley 6 X 3/4	2240006
	Fan Belt 4L410	2240020
	Blower Base Feet LH	8173B2
	Blower Base Feet RH	8173B1
	Blower Base Feet Rubber Grommet (4 required)	26415