

Installation & Operation Instructions

Direct Vent

Oil Fired Warm Air Furnaces

IMPORTANT

INFORMATION CONTAINED IN THIS MANUAL PERTAINS TO OIL FIRED DIRECT VENT FURNACES EQUIPPED WITH A MANUFACTURER INSTALLED BLOCKED VENT SAFETY CONTROL SYSTEM (PRESSURE SWITCH).

FOR YOUR SAFETY:

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

NORDYNE INC.

Homeowner Caution

Be sure to keep area around vent terminal free of snow, ice, and debris

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

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



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WARNINGS AND SAFETY SYMBOLS

 DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

 WARNING

Indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury.

 CAUTION

Indicates an imminently hazardous situation which, if not avoided, may result in injury or property damage.

1. DIRECT VENTING OF NORDYNE OIL FIRED FURNACES

Installation shall be done by a “Qualified Installer. “Qualified Installer” shall mean an individual who has been properly trained or is a licensed installer.

The 04HD-091A-14-F-DV and 04LD-091A-14-R-DV oil fired furnaces, are certified for venting through the wall using ducted outdoor air for combustion.

The Direct Vent series is ideal for applications where a conventional chimney is unavailable, nor easily installed; an electrically heated home being retro-fitted for oil forced air heating for example.

The term Direct Vent refers to a sealed combustion system.

Direct vented appliances require some foresight and planning, since the range of flue lengths is restricted, clearances are critical, and national and local codes are quite strict with respect to safety. Be sure that the furnace can be installed within the physical limitations of the home, and accordance with local codes and regulations.

Physical limitations include practical issues such as sufficient clearance to grade. It is advisable to install the vent termination in an area sheltered from winter prevailing winds. Avoid vent termination locations subject to frequent strong wind gusts.

Oil Burners:

Beckett AFII

The standard Beckett AF or AFG Series is not certified for use, or recommended for direct vent applications.

Venting Materials and Fittings:

For components available from Nordyne, please see Table 1.

2. VENT TERMINAL LOCATION

The through the wall termination shall be installed in accordance with the latest editions of CAN/CSA B-139 (Canada), NFPA-31 (United States), and / or any applicable local codes.

Please refer to the diagram on page 4, figure 2. In Canada, the vent terminal shall not terminate:

- A. directly above a paved sidewalk or a paved driveway that is located between two buildings, and that serves both of them.
- B. Less than 7 feet (2.13 m) above any paved sidewalk or a paved driveway.
- C. within 6 feet (1.80m) of a window, door, or mechanical air supply inlet to any building, including soffit openings.
- D. above a gas / regulator assembly within 3 feet (1 m) horizontally of the centerline of the regulator.
- E. within 6 feet (1.80 m) of any gas service regulator vent outlet or within 3 feet (1 m) of any oil tank vent or any oil tank fill inlet.
- F. less than 1 foot (0.3 m) above grade level within 6 feet (1.80 m) of any combustion air inlet, unless the appliance is otherwise certified.
- G. within 6 feet (1.80 m) of the property line.
- H. underneath a verandah, porch, or deck.
- I. so that the flue gases are directed at combustible material or at any openings of surrounding buildings that are within 6 feet (1.80 m).
- J. less than 3 feet (1 m) from an inside corner of an L-shaped structure.
- K. so that the bottom of the vent termination opening is less than 1 foot (0.3 m) above any surface that may support snow, ice, or debris.
- L. so that the flue gases are directed towards bricks, siding, or other construction, in such a manner that may cause damage from heat or condensate from the flue gas.
- M. within 4 feet (1.2 m) of a power venter.

Please refer to the diagram on page 4 Figure 3. In the United States, a vent terminal shall not terminate:

- less than 7 feet (2.13 m) above any adjacent public walkway.
- less than 4 feet (1.22m) below, 4 feet horizontally, or 1 foot (0.3m) above a door, window, or gravity air inlet of the structure.
- less than 1 foot (0.3m) above grade.
- less than 1 foot (0.3m) from the soffit of the roof of the structure.
- less than 3 feet (0.9m) from the inside corner of an L shaped structure.
- less than 5 feet (1.6m) of a gas regulator vent outlet, or oil tank vent outlet.

The vent terminal can be installed in any wall having a minimum thickness of 5”, and a maximum thickness of 10”.

Figure 1 - Standard Vent Terminal Assembly



Figure 2 - Canada : Vent Terminal Location

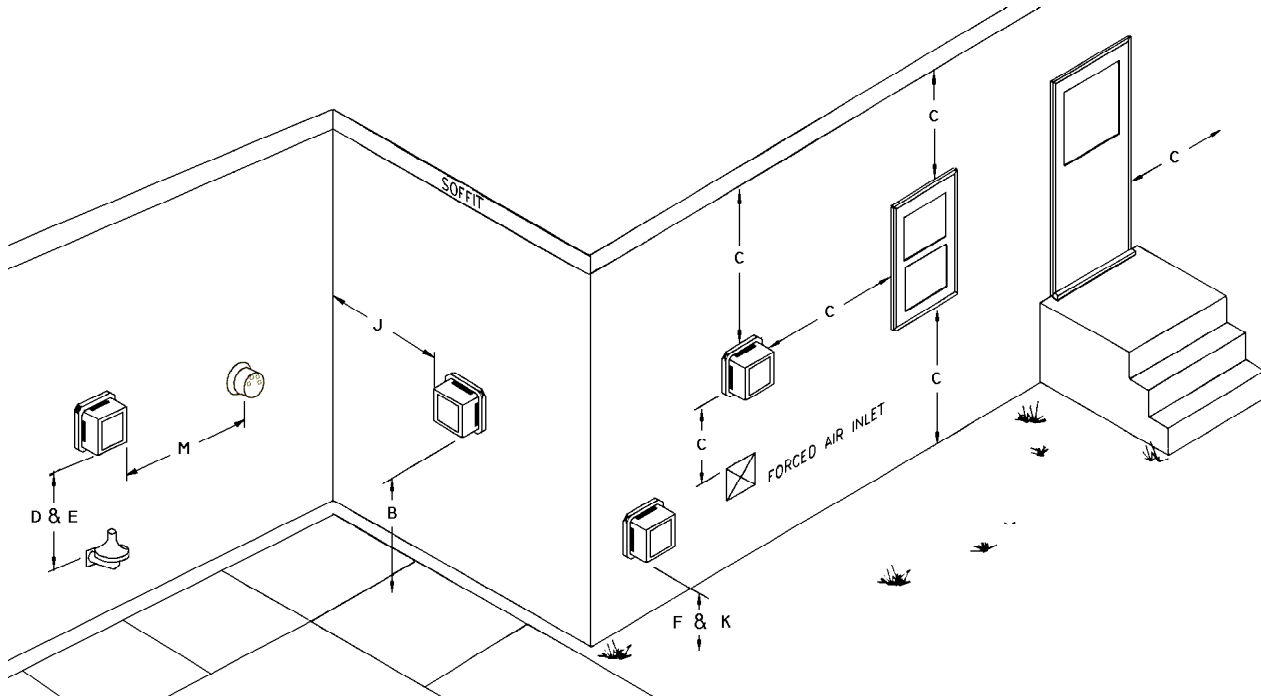
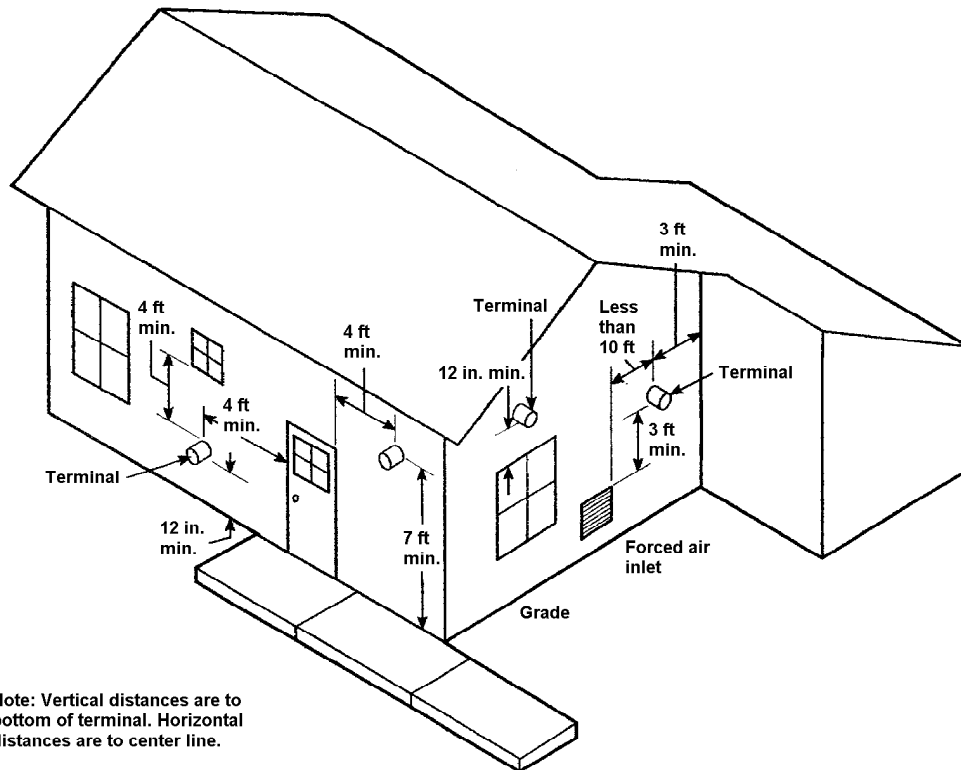


Figure 3 - United States: Vent Terminal Locations



Note: Vertical distances are to bottom of terminal. Horizontal distances are to center line.

3. VENT TERMINAL INSTALLATION

This applies to the standard Direct Vent Oil Vent Terminal. Select the location of wall penetration that conforms to the code for exterior location, as close to the appliance as possible, maintains clearance to combustibles and where the minimum 1/4-inch per foot slope back to the appliance can be maintained.

- Cut a 6-1/2" diameter hole through the wall.
- Remove the Intake Air Sleeve from the Terminal.
- Insert the Terminal through the wall from outside, secure with 4 screws to the wall, and seal to wall with a weather-proof sealant.
- From inside the building, re attach the Intake Air Sleeve and secure the inner sleeve to the outer sleeve with 2 screws. Use 4 screws to secure Sleeve to the wall. Ensure that the Intake Air Connector is located for ease of attachment and complies with code.

4. VENT TERMINAL RISER KIT

This Kit has been designed to increase the height of the Vent Terminal by approximately 3 feet, (see diagram below for typical Vent Riser setup). This is ideal where excessive snow build up could occur or where more flexibility is required to maintain minimum clearances to grade.

Figure 4 - Inside View of Vent Terminal



5. DIRECT VENT INTAKE AIR PIPE INSTALLATION



WARNING

FLEXIBLE DUCT FOR COMBUSTION AIR USE IS NOT PERMITTED

IMPORTANT: OUTDOOR AIR FOR COMBUSTION MUST BE USED.

The oil burners approved for use with ducted outdoor air for combustion is the Beckett AFII. All units obtain outdoor air by the following means:

Acceptable combustion air intake materials:

Beckett AFII Burner -

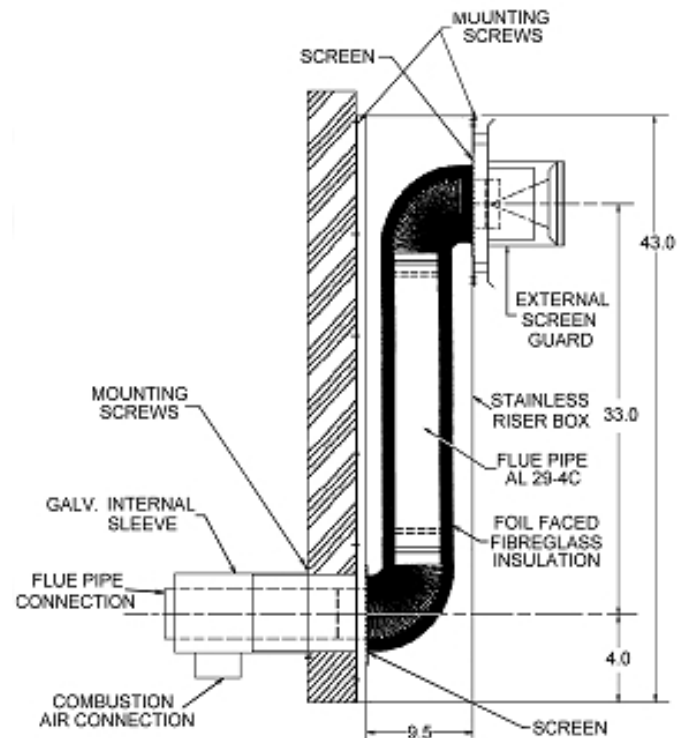
1. 4-inch "C" Vent (single wall galvanized).
2. 4 inch Rigid Aluminum pipe (0.030" wall thickness).

IMPORTANT: Intake pipe and fittings should be sealed with foil tape, duct tape, or silicone caulking and attached mechanically with screws.

Maximum combustion air intake length is 25 feet using 8 90° elbows. Venting installation dictates that the length from the termination cannot be further than 20 feet; therefore any longer piping for the combustion air intake would be unnecessary. Combustion air intake does not have a minimum length.

Condensation may become a problem during some climatic conditions. It may be necessary to wrap a portion, or the entire intake piping (particularly metal intake piping) with a waterproof insulation material.

Figure 5 - Direct Vent Terminal



6. VENTING INSTALLATION - DIRECT VENT

VENT CLEARANCE TO COMBUSTIBLES: ONE (1) INCH.

⚠ WARNING

- DO NOT ENCLOSE VENT.
- DO NOT ROUTE VENT THROUGH WALLS, FLOORS OR CEILINGS.

INSTALLATION OF "INSULATED DOUBLE WALL FLEXIBLE VENT".

The inner pipe is constructed of 3 or 4 inch 316 stainless steel, with a two-ply aluminum outer pipe. High temperature insulation separates the inner and outer flex pipes.

IMPORTANT: The venting and vent terminal are dedicated to the furnace only; do not attempt to vent any other appliance through it.

The venting should be installed generally as follows and must comply with CAN/CSA B139 Installation Code for Oil Burning Equipment (Canada) or NFPA 31 Standard for the Installation of Oil Burning Equipment (United States), and / or with local codes and regulations.

- In as short and straight a run as possible without any unnecessary bends.
- There should not be any dips or sags throughout the full length of vent.
- The connector or vent should be sloped upwards from the appliance at least 1/4" per foot.
- Do not bend the connector or vent more than 90 degrees.
- The vent may be cut to a minimum of 5 feet in length using a fine tooth (24 teeth per inch) hacksaw blade.
- The male and female ends of the appliance adapters and connectors must be cleaned with residue free brake cleaner solvent.
- Apply a minimum 1/4" bead of Si-Ultra Copper Sealant provided, onto the outside of the male end of the vent to appliance connector. Fit the connector to the vent by threading it counter-clockwise until it stops. Ensure the joint is not cross-threaded. Tighten the gear clamp on the outer sleeve.
- Apply a minimum 1/4" bead of the same sealant as mentioned above onto the female end inside of the connector. Slip connector over the end of the appliance collar until it stops. Tighten the attached gear clamp.
- Support the Vent every 36" to prevent sagging.
- Attach the Terminal Connector as described in the two steps listed above.
- The maximum vent length is 20 feet (using a 20 foot vent kit) Piecing vent kits together (i.e. using 2 ten foot kits is strictly prohibited).

⚠ CAUTION

USE APPROPRIATE SAFETY PRECAUTIONS! ALL THIN METAL EDGES ARE EXTREMELY SHARP.

This Double Wall Vent is available in kits, from your NORDYNE Dealer. See venting components matching guide in this document. High wind conditions can adversely affect the combustion process; therefore, avoid locating the terminal on walls facing the prevailing winds.

7. BLOCKED VENT SAFETY SWITCH PRESSURE TUBING CONNECTIONS.

The connections should be checked on all furnaces prior to firing the unit. The tubing used to connect the burner mounting plate to the positive side of the pressure switch is a high temperature viton tubing, which is black in color. Care must be taken to ensure that the tubing slopes slightly toward the burner mounting plate to ensure that if condensation occurs, there is drainage to the burner mounting plate.

The tubing used on the combustion air intake is clear silicone tubing and should not require any modifications.

Figure 6- Pressure Tubing Connections

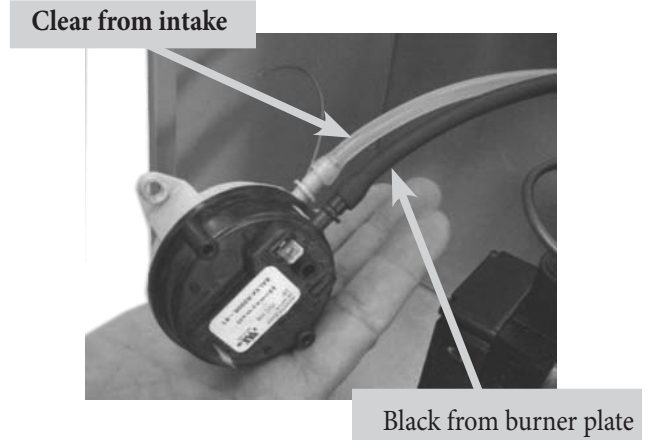
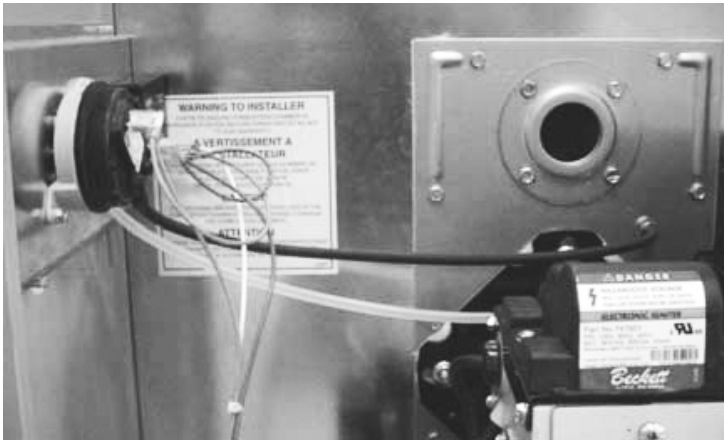


Figure 7 -Combustion Air Intake Connection



Figure 8 - Pressure Tubing Connections On Units With Vestibule



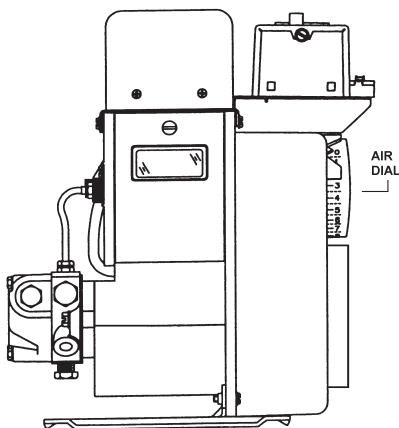
8. OPERATION OF OIL BURNERS

Once the furnace flue pipe and intake pipe are completely installed, use the following instructions to set the burner:

- Shut off the electrical power to the furnace.
- Install an oil pressure gauge to the pressure port on the oil pump. (Refer to the oil pump specification sheet included with the burner instructions & the Furnace Installation Instructions).
- Restore electrical power to the furnace.
- Start the furnace and bleed all air from the fuel oil lines.
- Set burner air settings for initial firing as indicated in the following sections for AFII burners.
- Close the purge valve and fire the unit.
- Allow the furnace to warm up to normal operating temperatures. During this time, set the pump pressure in accordance with the data provided in Furnace Installation Manual.

When the furnace has reached "steady state" (after approximately 10 to 15 minutes), remove the bolt from the center of the Appliance Adapter to the furnace. Set the combustion air damper on the Burner to get a TRACE to ZERO smoke.

Figure 8 - Beckett AFII Burner:



Using the chart below, select the appropriate air dial setting according to the required firing rate. This initial setting should be adequate to start the burner. Final adjustments will be required once the burner has been started.

BECKETT AFII APPROXIMATE AIR SETTINGS	
Firing Rate	Dial Setting
	AF II 85
0.40 to 0.65	3
0.60 to 0.75	4
0.70 to 0.85	5
0.75 to 1.00	-
0.95 to 1.20	-

FINAL ADJUSTMENTS

- Pull a smoke spot reading to make sure it is no more than a trace of smoke.
- Using suitable testing instruments for CO₂ (or O₂), measure the combustion products. The CO₂ in the stack should be a minimum of 12% CO₂ (4.6% O₂) at a trace of smoke. For clean operation of the burner, open the air control to introduce enough excess air into the system to reduce the CO₂ by 10% of the original trace point.

EXAMPLE: 12% CO₂ minus 1.2 (which is 10% of 12) equals 10.8% CO₂).

- When the proper combustion & smoke spot readings are achieved, tighten the locking screw on the dial.
- Recheck draft, smoke and combustion.

9. FURNACE SET UP ADJUSTMENTS

1. Check the system temperature rise.
2. The temperature rise is the difference between the return air temperature measured at a point near the return air inlet, and the supply air temperature measured near the furnace outlet. The system temperature rise will typically range between 65°F and 85°F. If the temperature rise is too high, the airflow must be increased. If the temperature rise is too low, the airflow must be decreased.
3. Adjust the post purge timing between 3 to 5 minutes. Longer post purge times may help to control oil odors.
4. Check the system temperature rise.

For furnaces equipped with a fan timer board- The United Technologies 1158-120 has an adjustable fan on time that is set by selecting the dipswitch combination displayed in the installation manual. 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 United

Technologies 1158-120 have an adjustable fan off time of 2, 3, 4 or 6 minutes displayed in the installation manual. The fan off delay time starts when the burner motor 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 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 control initiates a two-minute delay. When this delay is finished, 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.

To check the operation of the limit switch, shut off power to the furnace. Temporarily remove the neutral wire from the direct drive blower motor. 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. When the limit function test is complete, shut off electrical power to the furnace, replace the neutral wire to the blower fan motor, and then restore power. The blower fan will start up immediately. Once the temperature has dropped and the limit control has reset, the fan will operate until the fan off time is achieved. The oil burner will then resume operation and continue until the thermostat is satisfied. Restore the thermostat setting to a comfortable temperature.

Set the heat anticipator adjustment in the thermostat (if so equipped), by removing the "R" or "W" wire to the thermostat, then reading the amperage draw between the two wires.

NOTE: THE FURNACE SHOULD BE RUN THROUGH AT LEAST THREE FULL CYCLES BEFORE LEAVING THE INSTALLATION, TO ENSURE THAT ALL CONTROLS ARE OPERATING PROPERLY AND AS EXPECTED.

NOTE: ALL JOINTS IN ANY POSITIVE PRESSURE VENTING SYSTEM MUST BE CHECKED FOR LEAKS BEFORE LEAVING THE INSTALLATION SITE.

10. BLOCKED VENT SAFETY SHUT OFF SYSTEM

Each direct vent furnace is equipped with a Blocked Vent Safety shut off system (BVS). This safety circuit will shut the burner off in the event of a combustion air blockage or venting blockage.

The components of this BVS consist of a pressure switch and bypass timer.

Beckett AFII

The BVS is wired in series with the oil valve.

11. SEQUENCE OF OPERATION BECKETT AFII

1. Room temperature drops, thermostat calls for heat.
2. Pre-purge begins, lasting 5 to 15 seconds.
3. The oil solenoid and BVS are energized
4. Oil Solenoid opens allowing oil to reach the Burner Electrodes. Burner ignition begins.
5. Cad cell detects light from combustion, disconnects the primary control safety circuit, allowing combustion to continue.
6. 10 seconds after the bypass timer is energized, the pressure switch is permitted to control the oil solenoid valve.
7. After 15 to 45 seconds (depending on primary control characteristics), the electric spark across the electrode tips stops, combustion continues.
8. Fan timer board- The United Technologies 1158-120 has an adjustable fan on time that is set by selecting the dipswitch combination displayed in the installation manual. This fan on delay can be set at 30, 60, 90 or 120 seconds.
9. Furnace continues to operate and will eventually reach "steady state", the point at which the system temperature stabilizes.
10. Room temperature rises, thermostat is satisfied, heating contacts open.
11. Oil Solenoid Valve closes, combustion stops, Burner Motor remains on to complete the Post Purge Cycle. Post Purge will continue up to 6 minutes depending on the control switch settings.
12. The fan off delay time starts when the burner motor is de-energized at the end of a call for heat.
13. Furnace remains idle until the next call for heat.

12. FINAL CHECK OUT

Before the final test cycle, carefully examine the complete vent system for leaks. This may be done by spraying a soapy solution on all joints and watching for bubbles during the pre-purge. The hot vent can be checked with a lit taper for signs of air movement around joints or seams.

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 the following information:

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. to keep the area around the vent terminal free of snow, ice, and debris.
5. how to operate the thermostat, and other related accessories.
6. how to operate the manual reset button on the primary control, and especially when not to push the reset button.
7. how and where to visually inspect the venting system for leaks or other problems.
8. how to inspect, clean and replace the air filter, and other homeowner maintenance procedures.
9. who to call for emergency service and routine annual service.
10. the terms and conditions of the manufacturer's warranty and the contractor's warranty.

Figure 9 - Applying bead of silicone to the male portion of the appliance/vent adaptor

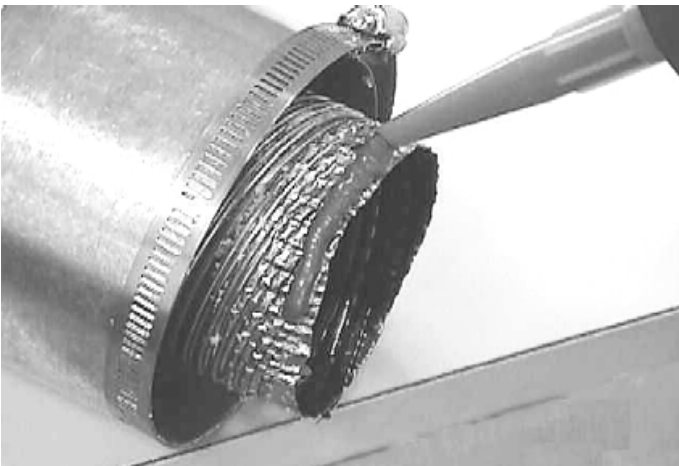


Figure 10 - Applying bead of silicone to the female portion of the appliance/vent adaptor

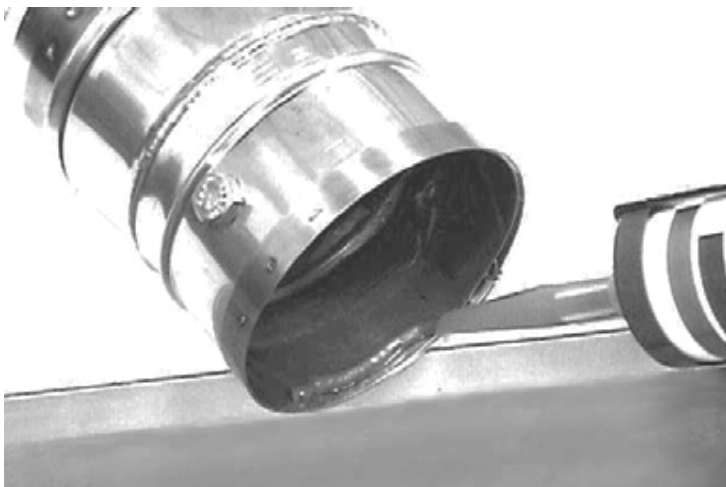


Figure 11 - Typical Appliance Connector with test port

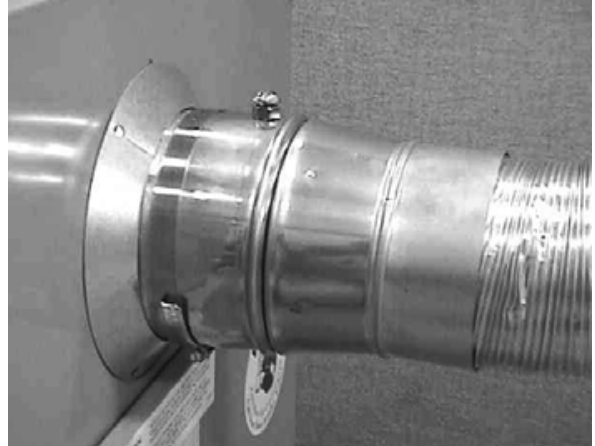


Figure 12 - Typical Standard Vent Terminal Installation

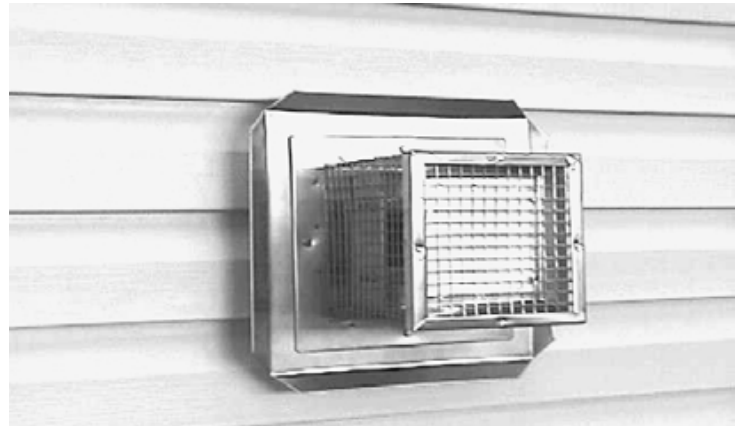


Figure 13 - Silicon Bead Application

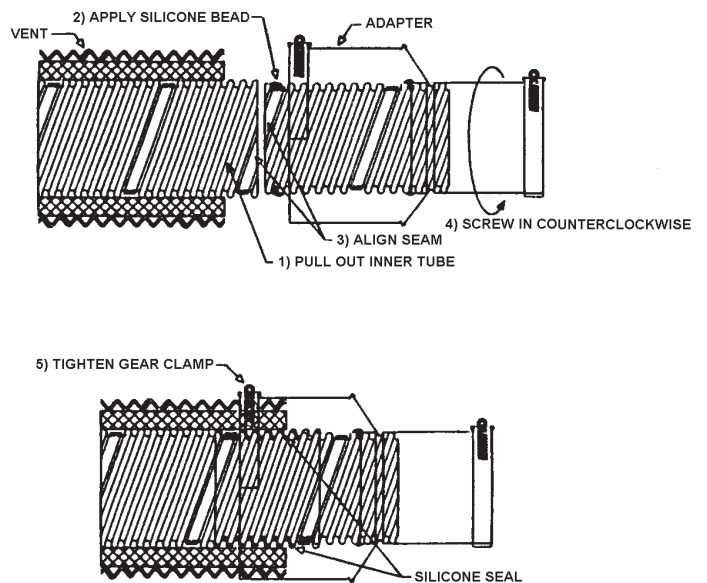
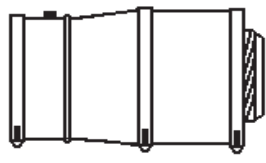
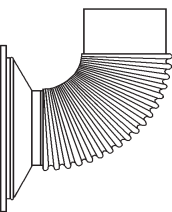
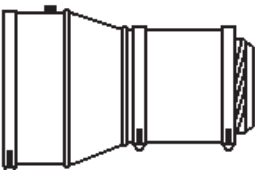


TABLE 1 -Z-FLEX VENTING COMPONENTS/MATCHING GUIDE

Z-FLEX VENTING COMPONENTS/ MATCHING GUIDE							
MODEL	ITEMS PACKED WITH FURNACE		ITEMS AVAILABLE FROM NORDYNE				FIELD SUPPLIED COMPONENTS
			TERMINATION STD or RISER		YOUR CHOICE of		
	ITEM	P/N	ITEM	P/N	ITEM	P/N	
04LD-091A-14-R-DV	5" X 3" Appliance Adapter	240006904	Oil Vent Terminal	555691	3" x 10' Vent	555688A	Combustion Air Piping
			<i>or</i>		3" x 15' Vent	555689A	
			Oil Vent Riser	555692	3" x 20' Vent	555690A	
04HD-091A-14-F-DV	Connector, 4" Flue, DV	109007268	Oil Vent Terminal	555691	3" x 10' Vent	555688A	Combustion Air Piping
	<i>and</i>		<i>or</i>		3" x 15' Vent	555689A	
	4" x 3" Appliance adapter	240006902	Oil Vent Riser	555692	3" x 20' Vent	555690A	

PARTS IDENTIFICATION

PARTS IDENTIFICATION			
ILLUSTRATION	DESCRIPTION	PART NO.	USED WITH
	4" x 3" Appliance Adapter	240006902	04HD-091A-14-F-DV
	Connector 4" Flue, DV	109007268	04HD-091A-14-F-DV
	5" x 3" Appliance Adapter	240006904	04LD-091A-14-R-DV

AFII BURNER WITH BLOCKED VENT SAFETY (BVS) OPERATION

AFII BURNER WITH BLOCKED VENT SAFETY (BVS) OPERATION	
EXTERNAL ACTION	APPLIANCE RESPONSE
Power applied to 7184 control	Internal safety check conducted. If no light or flame is detected and all internal conditions are correct, control enters idle mode.
Thermostat calls for heat.	<ol style="list-style-type: none"> 1. Contacts between T and T on THE PRIMARY CONTROL are closed. 2. THE PRIMARY CONTROL Safety period (4 seconds) internal and external check for flame or light. If flame is detected, control remains in idle mode. 3. When flame is not present, THE PRIMARY CONTROL will apply power to the burner motor and igniter, complete a 15 second valve on delay period and then apply power to the oil valve circuit. 4. When valve is energized, the bypass timer on the BVS is energized. <ol style="list-style-type: none"> a. The bypass timer contacts close, bypassing the pressure switch for 10 seconds. b. After 10 seconds, the bypass timer contacts open and the pressure switch contacts are in series with the oil solenoid valve. In the event of a vent or combustion intake air blockage the pressure switch, will open and shut the oil solenoid valve off. 5. THE PRIMARY CONTROL enters the trial for ignition period. <ol style="list-style-type: none"> a. Monitors burner for flame. b. When flame is not detected: <ol style="list-style-type: none"> i. Enters lockout mode after 15 seconds. ii. Shuts off valve, igniter and burner motor. iii. Flashes indicator light at 1 Hz (½ second on, ½ second off). iv. Depress reset button to return to power up sequence. c. When flame is detected, Carry-Over period begins: 6. THE PRIMARY CONTROL enters 10-second Ignition Carry-Over period. <ol style="list-style-type: none"> a. Turns on indicator light b. If flame is lost and lockout time has not expired, THE PRIMARY CONTROL returns to trial for Ignition period. c. If flame is lost and lockout time has expired, THE PRIMARY CONTROL enters Recycle Mode. 7. Carry-over time expires and igniter turns off. 8. Enters a run mode: <ol style="list-style-type: none"> a. Flame is monitored until call for heat ends or flame is lost. If flame is lost: <ol style="list-style-type: none"> i. Control enters Recycle Mode. ii. Recycle time starts (60 seconds). iii. Burner and valve are turned off. iv. Indicator light flashes at ¼ Hz (2 seconds on, 2 seconds off). v. Returns to Idle mode at end of Recycle mode.
Call for heat is satisfied.	<ol style="list-style-type: none"> 1. Oil valve circuit is de-energized and valve shuts off. 2. Burner motor runs for selected burner motor-off delay. 3. Burner motor turns off. THE PRIMARY CONTROL returns to Idle mode
Reset button pushed two times without device completing a call for heat.	<ol style="list-style-type: none"> 1. THE PRIMARY CONTROL enters restricted mode. 2. Indicator light flashes 1 Hz (½ second on, ½ second off). 3. Reset device by pressing and holding reset button for a minimum of 30 seconds.

BECKETT AFII BURNER TROUBLESHOOTING

Condition 1: 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 cad cell lead wires from THE PRIMARY CONTROL and recheck. • If indicator light is still on, replace the THE PRIMARY CONTROL control. • If the indicator light turns off, replace cad cell bracket assembly.

BECKETT AFII BURNER TROUBLESHOOTING- CONTINUED

BECKETT AFII BURNER TROUBLESHOOTING-CONTINUED		
Condition 1: Burner motor does not start when there is a call for heat.		
Procedure	Status	Corrective Action
5. Verify that the oil valve is closed during the "valve on delay" period by observing the view port and verifying that no flame is present during the 15-second "valve on delay".	Indicator light is on.	If flame is present, replace the oil valve.
6. Jumper thermostat (T -T) terminals on THE PRIMARY CONTROL 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 THE PRIMARY CONTROL.
		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 1/2 second on, 1/2 second off.		
Procedure	Status	Corrective Action
1. Reset oil primary control by pushing in and releasing red reset button.	Indicator light stops flashing.	Go to Step 2.
	Indicator light continues to flash at 1/2 second on, 1/2 second off rate.	Verify that the control is not in restricted mode. (See notes at end of this table.) If not in restricted mode, replace THE PRIMARY CONTROL
2. 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 THE PRIMARY CONTROL.
	Ignition is on.	Go to Step 3.
	Ignition is on but no oil is being sprayed into the combustion chamber.	Wait for "Valve ON" delay to complete. <ol style="list-style-type: none"> 1. Check oil supply. 2. Ensure BVS bypass timer contact close and bypass pressure switch for 10-seconds. 3. After 10-seconds, check pressure switch on BVS to ensure closed. <ol style="list-style-type: none"> a. Pressure switch open. <ol style="list-style-type: none"> i. Check pressure tubes for proper connection or possible obstructions. ii. Check venting for blockage. iii. Check combustion air intake for blockage. iv. Check pressure switch operation. 4. Check oil line valve. 5. Check for filter blockage or seized oil pump.
3. 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 THE PRIMARY CONTROL
	Indicator light stays off.	Go to step 4.

BECKETT AFII BURNER TROUBLESHOOTING- CONTINUED

Condition: Burner starts then locks out on safety with indicator light flashing at 1/2 second on, 1/2 second off.		
Procedure	Status	Corrective Action
4. Check cad cell sighting for view of flame. a. Disconnect line voltage power and open line switch. b. Unplug cad cell and clean cad cell face with soft clothe. Check sighting for clear view of flame. Replace cad cell in socket. c. Reconnect line voltage power and close line switch. d. Start burner.	Burner locks out.	Go to step 6.
	Burner keeps running.	System is OK.
5. Check cad cell. a. Disconnect line voltage power and open line switch. b. Remove existing cad cell and replace with new cad cell. c. Disconnect all wires from thermostat terminals to ensure that there is no call for heat. d. Reconnect line voltage power and close line switch. e. Expose new cad cell to bright light such as a flashlight.	Indicator light is on.	Remount control onto burner housing. Go to step 1.
	Indicator light is off.	Go to step 6.
6. Check cad cell bracket assembly. a. Disconnect line voltage power and open line switch. b. Remove cad cell wires from quick connect connectors on the THE PRIMARY CONTROL and leave control lead wires open. c. Apply power to device. d. 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 THE PRIMARY CONTROL.

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.

BECKETT AFII BURNER TROUBLESHOOTING- CONTINUED

Condition: Burner starts then locks out on safety with indicator light flashing at 1/2 second on, 1/2 second off.		
Procedure	Status	Corrective Action
7. Check cad cell sighting for view of flame. e. Disconnect line voltage power and open line switch. f. Unplug cad cell and clean cad cell face with soft clothe. Check sighting for clear view of flame. Replace cad cell in socket. g. Reconnect line voltage power and close line switch. h. Start burner.	Burner locks out.	Go to step 8.
	Burner keeps running.	System is OK.
8. Check cad cell sighting for view of flame. i. Disconnect line voltage power and open line switch. j. Unplug cad cell and clean cad cell face with soft clothe. Check sighting for clear view of flame. Replace cad cell in socket. k. Reconnect line voltage power and close line switch. l. Start burner.	Burner locks out.	Go to step 9.
	Burner keeps running.	System is OK.
9. Check cad cell. f. Disconnect line voltage power and open line switch. g. Remove existing cad cell and replace with new cad cell. h. Disconnect all wires from thermostat terminals to ensure that there is no call for heat. i. Reconnect line voltage power and close line switch. j. Expose new cad cell to bright light such as a flashlight.	Indicator light is on.	Remount control onto burner housing. Go to step 1.
	Indicator light is off.	Go to step 10.
10. Check cad cell bracket assembly. e. Disconnect line voltage power and open line switch. f. Remove cad cell wires from quick connect connectors on the THE PRIMARY CONTROL and leave control lead wires open. g. Apply power to device. h. 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 THE PRIMARY CONTROL.
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.		

BECKETT AFII SYSTEM AND GENERAL TROUBLESHOOTING

BECKETT AFII: 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.
Furnace will not start.	Photo Cell wiring shorted or room light leaking into photo cell compartment	Check photocell (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)	Photo Cell (Cad Cell) defective.	If call 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).
	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.
	Blocked Vent Safety Circuit opening.	Ensure BVS bypass timer contact close and bypass pressure switch for 10-seconds. After 10-seconds, check pressure switch on BVS to ensure closed. Pressure switch open: <ul style="list-style-type: none"> • Check pressure tubes for proper connection or possible obstructions. • Check venting for blockage. • Check combustion air intake for blockage. • Check pressure switch operation.
	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.	

BECKETT AFII SYSTEM AND GENERAL TROUBLESHOOTING - CONTINUED

BECKETT AFII: SYSTEM AND GENERAL TROUBLESHOOTING		
Problem	Possible Cause	Remedy
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.
	Blocked Vent Safety Circuit opening.	<p>Ensure BVS bypass timer contact close and bypass pressure switch for 10-seconds.</p> <p>After 10-seconds, check pressure switch on BVS to ensure closed.</p> <p>Pressure switch open.</p> <ul style="list-style-type: none"> • Check pressure tubes for proper connection or possible obstructions. • Check venting for blockage. • Check combustion air intake for blockage. • Check pressure switch operation.
	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).	
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.
	Blocked Vent Safety Circuit opening intermittently.	<p>Ensure BVS bypass timer contact close and bypass pressure switch for 10-seconds.</p> <p>After 10-seconds, check pressure switch on BVS to ensure it remains closed.</p> <p>Pressure switch open.</p> <ul style="list-style-type: none"> • Check pressure tubes for proper connection or possible obstructions. • Check venting for blockage. • Check combustion air intake for blockage. <p>Check pressure switch operation.</p>

BECKET AFII SYSTEM AND GENERAL TROUBLESHOOTING - CONTINUED

BECKETT AFII: 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.
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.

HOMEOWNER'S REFERENCE TABLE

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.	

**Installation & Operation Instructions
Direct Vent
Oil Fired Warm Air Furnaces**

NORDYNE INC.