



Read these instructions thoroughly before commencing installation.

# AMBI-RAD Model UFE Power-Vented Gas-Fired, Unit Heaters

Installation Form WA/006/0500

APPLIES TO: Installation, Commissioning, and Service

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**WARNING: Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. All work must be carried out by competent persons, i.e. a registered CORGI installer.**

**PLEASE READ THESE INSTRUCTIONS THOROUGHLY BEFORE COMMENCING WORK.**

## 1.0 INTRODUCTION

### 1.1 Basic Information

The instructions in this manual apply to Model UFE gas-fired/fan-assisted warm air heaters. Model UFE heaters have an axial fan for air delivery.

These heaters are designed for overhead suspension and are suitable for indoor installation only.

A permanent electricity supply of 230 volts, 50 Hz, single phase is required for all UFE Models.

Model UFE heaters are **Appliance Type B<sub>22</sub>, Category I<sub>2H3P</sub>**, self-contained warm air units supplied ready for installation on site. They are fitted with an intermittent pilot. A spark ignition/flame supervision device monitors the pilot flame to prevent an explosive condition occurring.

When the external controls call for heat, the power venter activates, the pilot flame ignites, the multifunctional control valve opens, and the main burner ignites supplying heat to the heat exchanger. After approximately 30 seconds the air delivery fan will start to run and supply warm air.

When the required room temperature is reached, the main burner will shut down leaving the fan running to cool down the heat exchanger. When cool enough, the fan thermostat will turn off the fan.

### HAZARD INTENSITY LEVELS

- 1. DANGER:** Failure to comply will result in severe personal injury or death and/or property damage.
- 2. WARNING:** Failure to comply could result in severe personal injury or death and/or property damage.
- 3. CAUTION:** Failure to comply could result in minor personal injury and/or property damage.

**WARNING: The electrical isolator should only be used in an emergency and should not be used for closing down the main burner, as it switches off the fan prematurely and may damage the heat exchanger, invalidating the warranty.**

### 1.2 Warranty

**Warranty is void if . . .**

- Model UFE heater is installed in atmospheres containing flammable vapours or atmospheres containing chlorinated or halogenated hydrocarbons or atmospheres containing any silicone, aluminum oxide, etc. that adheres to spark ignition flame sensing probes.
- The installation is not in accordance with these instructions.
- Model UFE, axial fan-type unit heater, is connected to a duct system or fitted with a non-factory authorised air distribution device.
- Fitted in the printing industry where fine starch or sugar dusts are used.

## 2.0 TECHNICAL DATA - Model UFE

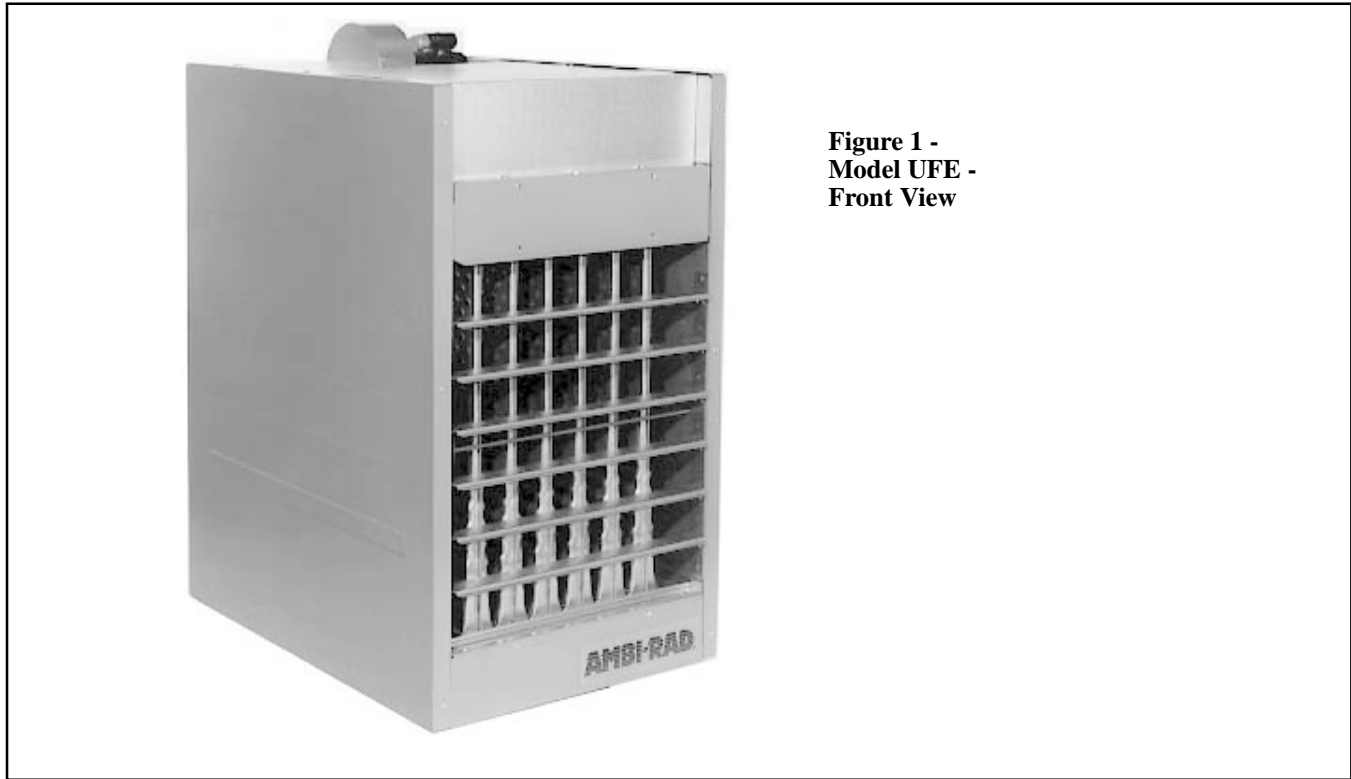


Figure 1 -  
Model UFE -  
Front View

### 2.1 Specifications

Table 1 - UFE Specifications

Model	Heat Input		Heat Output		Maximum Gas Rate <sup>①</sup>		Air Volume		Running	Power	Fuse
	kw	BTUH	kw	BTUH	m <sup>3</sup> /h	ft <sup>3</sup> /h	m <sup>3</sup> /h	ft <sup>3</sup> /min	Amps <sup>②</sup>	Consumption <sup>②</sup>	Size
UFE25	7.3	25,000	5.9	20,000	0.69	24.3	573	337	0.75	150 watts	2 Amp
UFE50	14.6	50,000	11.7	40,000	1.38	48.5	1143	673	0.75	150 watts	2 Amp
UFE75	22.0	75,000	17.6	60,000	2.06	72.8	1888	1111	0.80	170 watts	2 Amp
UFE100	29.3	100,000	23.4	80,000	2.75	97.1	2516	1481	1.30	280 watts	5 Amps
UFE125	36.6	125,000	29.3	100,000	3.44	121.4	3272	1926	1.35	310 watts	5 Amps
UFE165	48.3	165,000	38.7	132,000	4.54	160.2	4152	2444	1.40	340 watts	5 Amps
UFE200	58.6	200,000	46.9	160,000	5.50	194.2	5034	2963	1.60	370 watts	5 Amps
UFE250	73.2	250,000	58.6	200,000	6.87	242.7	6293	3704	2.20	430 watts	5 Amps
UFE300	87.9	300,000	70.3	240,000	8.25	291.3	7550	4444	2.40	530 watts	5 Amps
UFE400	117.2	400,000	93.8	320,000	11.00	388.3	10068	5926	2.90	670 watts	5 Amps

① Gas flow rate is based on a gas with a C.V. of 39.9 MJ/m<sup>3</sup> (1030 BTUH) and includes a pilot flow rate of 264 watts (900 BTUH).

② Based on normal operation at 230 volts and 50 hertz.

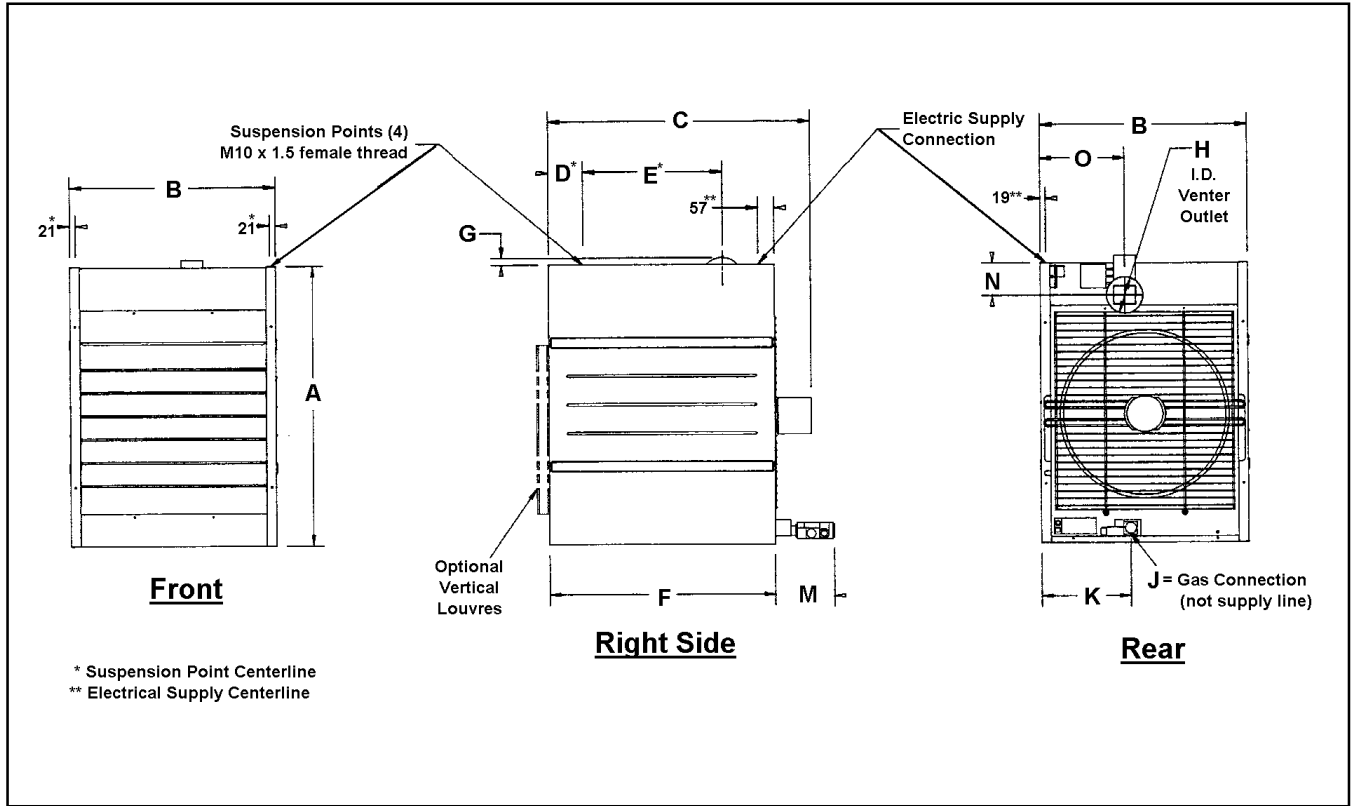
#### 2.2A Burner Injector Size and Pressure - Natural Gas

Model	Qty	Injector Size	Injector	Burner Pressure
		mm	Marking	
UFE25	2	1.70	51	8.8
UFE50	3	1.99	47	8.8
UFE75	4	2.08	45	8.8
UFE100	5	2.18	44	8.8
UFE125	6	2.18	44	8.8
UFE165	5	2.79	35	9.0
UFE200	6	2.79	35	9.0
UFE250	8	2.79	35	9.0
UFE300	9	2.79	35	9.0
UFE400	12	2.79	35	9.0

#### 2.2B Burner Injector Size and Pressure - Propane Gas

Model	Qty	Injector Size	Injector	Burner Pressure
		mm	Marking	
UFE25	2	1.02	60	25
UFE50	3	1.20	1.2MM	25
UFE75	4	1.30	1.3MM	25
UFE100	5	1.32	55	25
UFE125	6	1.32	55	25
UFE165	5	1.65	1.65MM	25
UFE200	6	1.65	1.65MM	25
UFE250	8	1.65	1.65MM	25
UFE300	9	1.65	1.65MM	25
UFE400	12	1.65	1.65MM	25

## 2.3 DIMENSIONS - Model UFE



**Table 3**

Model	A	B	C	D	E (Hanger)	F
	mm	mm	mm	mm	mm	mm
UFE25	737	344	687	148	367	687
UFE50	737	344	687	148	367	687
UFE75	737	395	687	148	367	687
UFE100	737	446	794	148	367	687
UFE125	737	592	794	148	367	687
UFE165	990	516	911	124	495	802
UFE200	990	592	911	124	495	802
UFE250	990	732	937	124	495	802
UFE300	990	732	937	124	495	802
UFE400	990	941	937	124	495	802

Model	G	H	J*	K	M	N	O	Approx. Net Wt
	mm	mm	BSP in.	mm	mm	mm	mm	kg
UFE25	83	102	3/4	261	213	64	267	35
UFE50	83	102	3/4	261	213	64	267	38
UFE75	83	102	3/4	267	213	64	283	42
UFE100	83	102	3/4	328	102	64	283	46
UFE125	83	127	3/4	366	102	64	310	59
UFE165	79	127	3/4	363	152	102	297	71
UFE200	79	127	3/4	366	152	102	297	80
UFE250	79	127	3/4	314	152	102	297	96
UFE300	79	152	3/4	314	152	102	297	103
UFE400	79	152	3/4	330	152	102	297	128

\*Gas connection is not line size. Always run adequately sized pipe to the heater connection and reduce at the heater.

# 3.0 GENERAL REQUIREMENTS

## 3.1 Related Documents

It is important that all gas appliances are installed by competent persons, i.e. a registered CORGI installer, in accordance with the requirements of the relevant regulations. The installation should comply with national and local instructions.

Failure to install appliances correctly could lead to prosecution. It is in your own interest and that of safety to ensure compliance with the law.

### THE RELEVANT REGULATIONS ARE ...

#### GAS SAFETY (INSTALLATIONS & USE) (Amendment) REGULATIONS 1990

#### THE HEALTH AND SAFETY AT WORK, ETC. ACTS

- **BS6230 1991 SPECIFICATION FOR THE INSTALLATION OF GAS FIRED FORCED CONVECTION AIR HEATERS FOR COMMERCIAL AND INDUSTRIAL SPACE HEATING OF RATED INPUT EXCEEDING 60 KW.**
- **BS5588 PART 1 (SECTION 1) 1990; PART 2 1985 AND 1990; AND PART 3 1983 AND 1989**
- **BS5440 PART 2 1989 FLUES AND AIR SUPPLY FOR GAS APPLIANCES NOT EXCEEDING 60 KW**
- **BS6891 1988 LOW PRESSURE INSTALLATION PIPES**

#### BRITISH GAS PUBLICATIONS

IGE/UP/1 PURGING PROCEDURES FOR NON-DOMESTIC INSTALLATIONS and SOUNDNESS TESTING PROCEDURES FOR INDUSTRIAL INSTALLATIONS

I.E.E. REGULATIONS FOR ELECTRICAL INSTALLATIONS AND THE REQUIREMENTS OF THE FOLLOWING...THE LOCAL REGION OF BRITISH GAS Plc

**WARNING: Air heaters should not be installed in corrosive atmospheres, i.e., near plating or degreasing plants or in areas where there is a fire risk. Consult BS6230 for further information on hazardous areas.**

## 3.2 Heater Location

The location chosen for the heater must permit the provision of a satisfactory flue system and an adequate air supply. The location must also provide space for servicing and air circulation around the unit.

**Table 4 - Required Clearances (mm)**

Sizes	Top	Flue	Sides	Bottom	Rear	Front
25-125	152	152	460	610	610	1830
165-250	152	152	460	610	610	2440
300-400	152	152	460	610	610	3050

For service purposes, rear must have 610 mm clearance. When supplied with optional downturn nozzle, bottom clearance is 1.0 m.

The location should be free of draughts.

**WARNING: Avoid installing a unit in an extremely draughty area. Extreme draughts can shorten the life of the heat exchanger and/or cause safety problems.**

Refer to Table 5 for recommended mounting height for UFE Models.

**Table 5 - Recommended Mounting Heights**

UFE Models	25-125	165-250	300-400
Mounting Height	2.5 - 3 m	2.5 - 3.5 m	3 - 5 m

Units should always be arranged to blow toward or along exposed wall surfaces, if possible. Where two or more units are installed in the same room, a general scheme of air circulation should be maintained for best results.

Suspended heaters are most effective when located as close to the working zone as possible. However, care should be exercised to avoid directing the discharge air directly on the room occupants.

Partitions, columns, counters, or other obstructions should be taken into consideration when locating the unit heater so that a minimum quantity of air will be deflected by any such obstacles. When units are suspended in the centre of the space to be heated, the air should be discharged along exposed walls. In large areas, unit should be located to discharge air along exposed walls with extra units provided to discharge air in toward the centre of the area. At those points where infiltration of cold air is excessive, such as at entrance doors and loading doors, it is desirable to locate the unit so it will discharge directly toward the source of cold air from a distance of 4.5 to 6.0 meters.

## 3.3 Flue System Requirements

Each heater must be fitted with an **individual** appropriately sized flue; single-wall stainless steel or aluminum flue pipe is recommended. Common flue systems are not permitted with power vented heaters as this could result in unsafe operation.

See Table 6 for flue pipe sizes and maximum vent lengths. Minimum length for horizontal flue is one meter.

**Table 6 - Flue Pipe Diameter and Maximum Vent Length**

Model	Vent Pipe Diameter (mm)	Maximum Total Vent Length* (meters)	Equivalent Straight Length for 90° Elbows** (meters)
25	102	9	1
50	102	12	1
75	102	12	2
100	102	15	2
	127	12	1
125-165	127	15	3
200-250	127	15	3
	152	18	2
300-400	152	15	3
	178	18	2

\* The total combined length of straight pipe, 90° elbows, and 45° elbows, must not exceed the Maximum Total Vent Length.

\*\* For 45° elbows, use half of the 90° value.

**Warning: The flue must be installed in accordance with BS5440 Part 1 1990 for all models up to and including Size 200 or BS6230 1991 for all Models Size 250 and over.**

**Failure to provide proper flueing could result in death, serious injury and/or property damage. The unit must be installed with a flue to the outside of the building. Safe operation of any power vented gas equipment requires a properly operating flue system, correct provision for combustion air and regular maintenance and inspection.**

The unit is fitted with a power venter permitting either a vertical or a horizontal flue system. Single-wall flue pipe is required. All joints must be sealed to prevent combustion products from leaking into the building. An approved terminal cap is required.

If the flue passes through a wall or ceiling of combustible material, it must be enclosed by a sleeve of non-combustible material and separated from the sleeve by at least 25 mm air gap. The temperature of any combustible material near the flue or heater must not exceed 65°C

when the heater is in operation. The flue must also be at least 50 mm from any other combustible material.

Single-wall flue pipe exposed to cold air or run through unheated areas must be insulated. Where condensation is unavoidable, provision should be made for condensation to flow freely to a point at which it can be released, preferably into a gully. The condensation pipe from the flue to the disposal point should be of non-corrodible material, not less than 19 mm diameter.

The joints between the flue and the roof must be made good to prevent water ingress. The flue must terminate outside the building in a freely exposed position so as to prevent products of combustion from entering any opening in a building.

### 3.4 Air Supply

It is important to ensure that there is adequate air supply at all times for both combustion and heating requirements. Modern construction methods involve the greater use of insulation, improved vapour barriers and weather-stripping, with the result that buildings generally are much tighter structurally than they have been in the past. Combustion air supply for gas-fired equipment can be affected by these construction conditions because infiltration that would have existed in the past may not be adequate. Extensive use of extract fans aggravates the situation. It is important to ensure that there is an adequate air supply at all times. The use of doors or windows which may be closed is not allowed for the provision of ventilation.

Always ensure that adequate combustion air is provided in compliance with BS5440 and/or BS6320 dependent on heat output of unit(s).

**WARNING: Model UFE heaters are designed to take combustion air from the space in which the unit is installed. Do not restrict combustion air intakes or fit the heater with combustion air ducts.**

### 3.7 Electrical Supply

Wiring external to the air heater must be installed in accordance with the I.E.E. Regulations and be carried out by a qualified electrician.

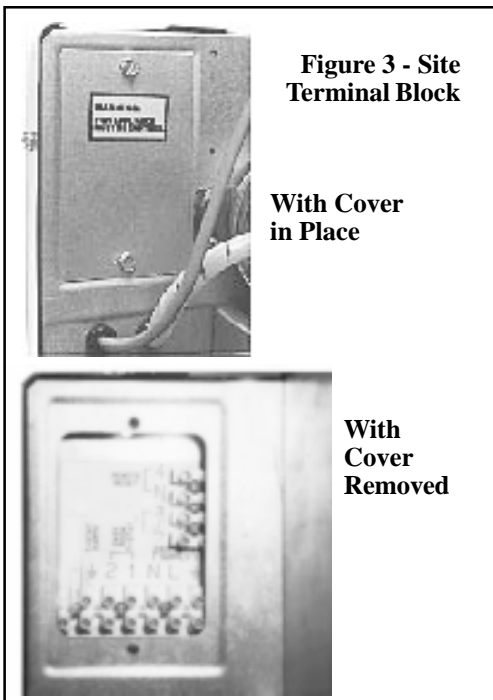
A constant 230V, 50 Hz single phase supply is required for all UFE models. All heaters and controls must be correctly earthed. A switch with a contact

separation of at least 3 mm on all poles should be installed in the field wiring adjacent to the heater.

When a number of heaters are to be wired as part of a single installation, each heater must be provided with a separate isolator.

The final connection to the heater should be to the appliance terminal block (See Fig 3.) Cable size should be 1.0 mm. See Section 2, Technical Data, for required fuse size.

The length of the conductors between the cord anchorage and the terminals must be such that the current-carrying conductors become taut before the earthing conductor, if the cable or cord slips out of the cord anchorage.



**Figure 3 - Site Terminal Block**

With Cover in Place

With Cover Removed

### 3.5 Gas Supply

Model UFE heaters are designed to operate on G20 natural gas. Minimum inlet gas pressure is 17.5 mbar. Maximum inlet gas pressure is 30 mbar. A normal supply pressure of 20 mbar is recommended.

**NOTE:** If the supply pressure exceeds 25 mbar, the pilot rate should be reduced. Refer to Paragraph 6.6.2, Pilot Flame Adjustment.

The gas meter and service must be checked by the gas supplier.

Model UFE heaters may be used on propane gas only if fitted with the correct propane orifices. If operated on propane gas, minimum inlet pressure is 27.5 mbar and maximum inlet pressure is 35 mbar.

The installation must comply with British Standard 6891, and the complete installation including the meter must be purged and tested for soundness as described in the above standard and in British Gas documents IGE/UP/1.

### 3.6 Air Distribution System

Recommendations for the air distribution system are given in the document entitled "Standards of Installation for Gas Fired Industrial Warm Air Heaters".

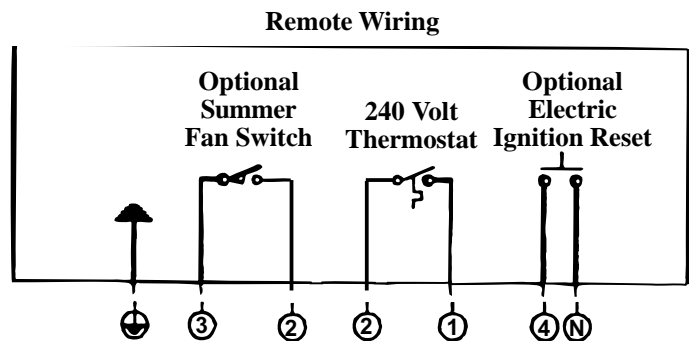
The following notes are of particular importance...

"For free-blowing units, it must be taken into account that the buoyancy of the heated air leaving the heater and air patterns with the space being heated will modify the air throw pattern achieved.

In buildings having a low heat loss where single units are required to cover a large floor area and in buildings with high roof or ceiling heights, air recirculation may be fitted to ensure even heat distribution and minimise stratification respectively. Care should be taken to avoid impeding the air throw with racking, partitions, plant machinery, etc." Various outlet configurations are available as optional extras to modify the air throw pattern to suit particular site conditions. (See Section 5).

**Figure 4 - Wiring for External Controls**

**NOTE:** Where an Ambi-Rad control panel is used, consult the wiring diagram supplied with the panel.



Connections at heater's site wiring terminal strip

**IMPORTANT:** The main feed L/N/E must not be switched by time clock or thermostat.

# 4.0 INSTALLATION

## 4.1 Uncrating and Preparation

Prior to despatch, the unit was operated and tested at the factory. If the heater has incurred any damage in shipment, file a claim with AMBI-RAD within 48 hours.

Check the data plate for the gas specifications and electrical characteristics of the heater to be sure that they are compatible with the gas and electric supplies at the installation site. Read this booklet and become familiar with the installation requirements of your particular heater. Before beginning, make preparations for necessary supplies, tools, and manpower.

Check to see if there are any site-installed options that need to be assembled on the heater prior to installation. Each of the option packages includes a list of components and complete, step-by-step instructions. For a brief explanation of frequently specified site-installed options, see Section 5. After becoming familiar with the instructions, assemble and install the options that are required for your heater.

**Do not remove the wooden base pallet until after the unit has been suspended, otherwise the bottom access panel could be damaged.**

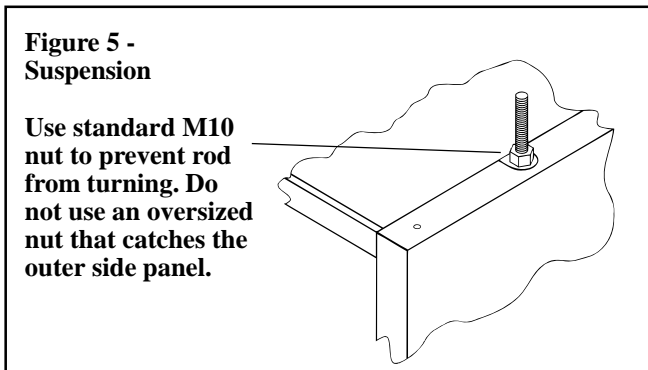
## 4.2 Suspending the Heater

These heaters are designed to take combustion air via slots in the base panel. The units are therefore not suitable for base mounting and must be suspended from the roof structure or suitable wall brackets.

Before suspending the heater, check the supporting structure to be used to verify that it has sufficient load-carrying capacity to support the weight of the unit and the ancillary equipment. (See Table 7)

Size	25	50	75	100	125	165	200	250	300	400
kg	35	38	42	46	59	71	80	96	103	128

Each heater is equipped with four suspension brackets that are threaded to receive a M10 x 1.5 eyebolt or threaded rod. See Figure 5 for proper eyebolt or threaded rod attachment. Do not use chain or flexible support material.



Material used to support the heater should be corrosion resistant and of sufficient strength. The gas supply pipe and electrical connections should not support any of the weight of the heater.

**WARNING: Suspend the heater only from the threaded hanger brackets. Do not suspend from the heater side panel.**

Where the location of the air heater is such that it might suffer external mechanical damage, i.e., from overhead cranes, fork lift trucks, it must be suitably protected.

When the heater is being lifted for suspension, the bottom must be protected. Do not remove the heater from the pallet before suspension.

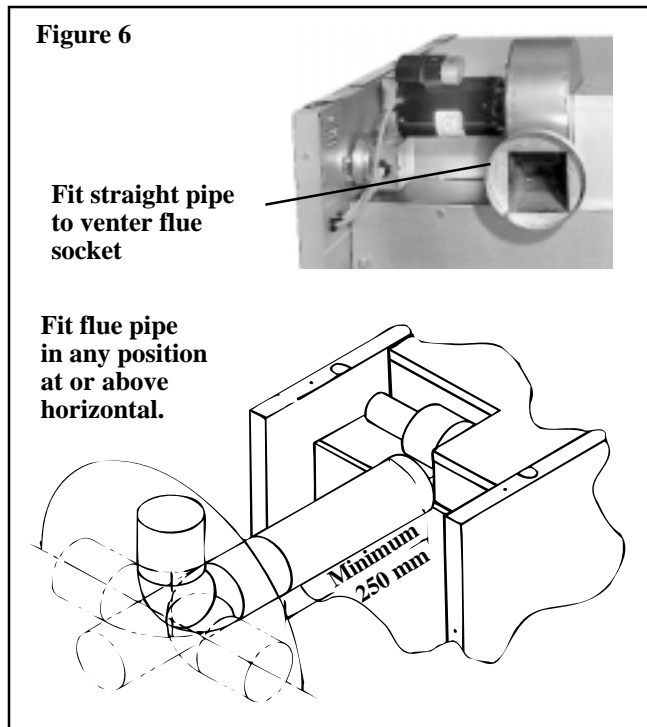
**WARNING: Units must be level for proper operation. Do not place or add additional weight to the suspended unit.**

## 4.3 Fitting the Flue System

The flue pipe system attaches directly to the flue socket provided on the power venter fitted on the heater. The socket is sized to accept standard metric sheetmetal flue pipe. Stainless steel or aluminum flue pipe is recommended.

UFE	Flue Socket Size
25-100	102 mm
125-250	127 mm
300-400	152 mm

A minimum length of 250 mm of straight pipe must be fitted at the venter flue socket before installing an elbow in the flue system. Do not fit an elbow directly to the venter flue socket. An elbow attached to the straight pipe can be in any position at or above horizontal; do not vent downward. See Figure 6.



Flue pipe runs may be horizontal or vertical and terminate either through a wall or roof. The flue pipe must be single wall. See illustrations on page 7 for specific flue terminal requirements.

See Table 6, page 4, for maximum flue lengths and flue pipe sizes. Minimum horizontal flue length is 1 meter; there is no minimum length requirement for a vertical flue. The flue pipe should be supported so that the heater does not carry any of the flue weight.

All flue pipe joints must be sound and sealed. Flue systems with silicone sealing rings are recommended. Alternative standard flue may be used provided joints are sealed with high-temperature (288°C) tape.

**WARNING: Model UFE units installed in multiples require individual flue pipe runs and flue terminal caps. DO NOT MANIFOLD FLUE RUNS.**

### 4.3.1 VENT TERMINAL ARRANGEMENTS

Figure 7A - Vertical Vent Terminal

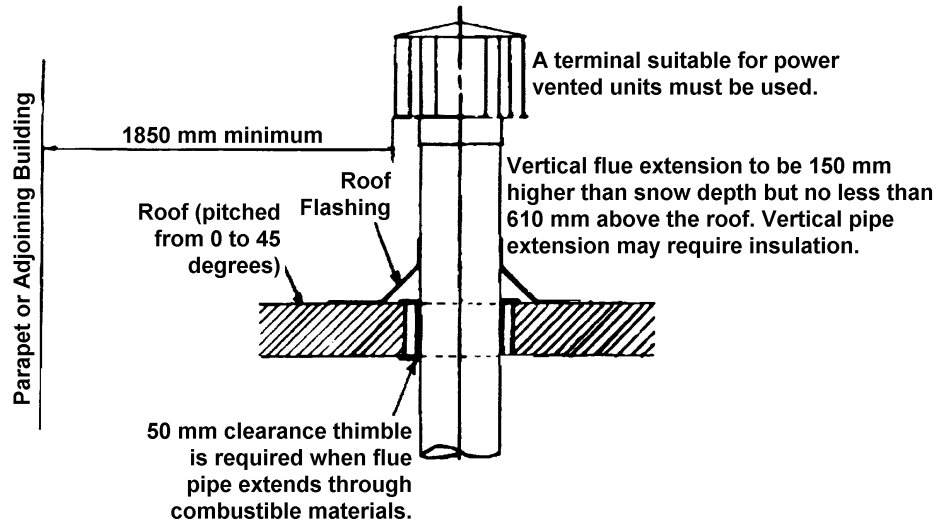
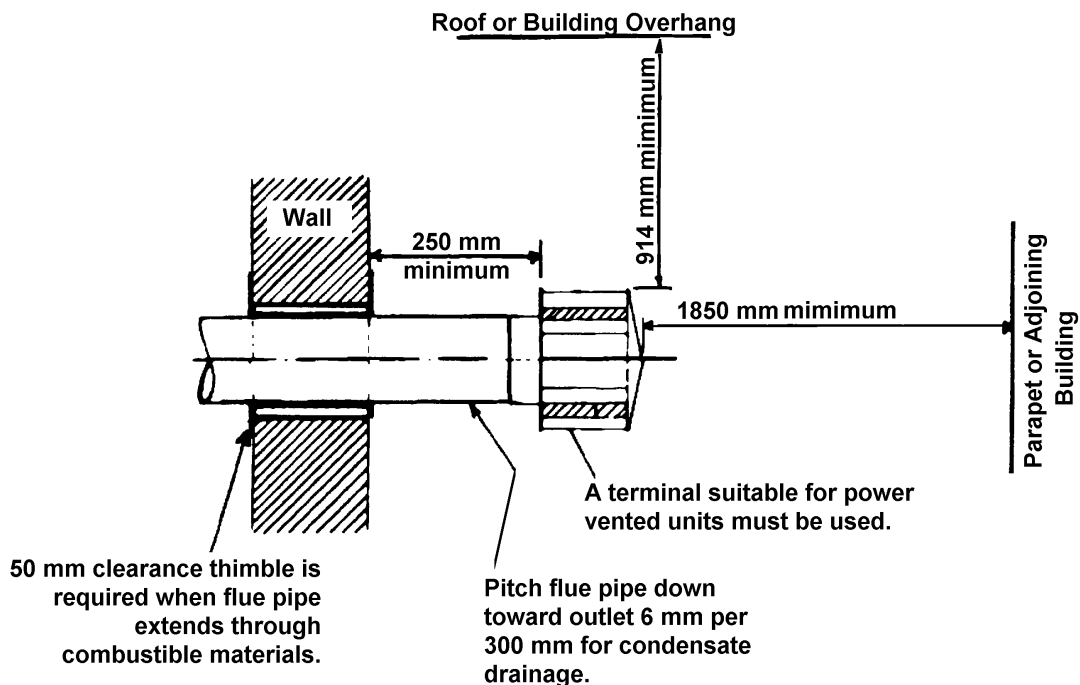


Figure 7B - Horizontal Vent Terminal



## 4.0 INSTALLATION (cont'd)

### 4.4 Gas Connection

To facilitate servicing, the heater must be fitted with an approved service gas cock and union or union cock.

Heaters suspended by flexible support material or drop rods must be connected to the gas service using a flexible connector. Sufficient slack must be provided in the flexible connector to allow for normal movement of the heater. Use a flexible connector of suitable size to reduce pressure drop and the possibility of flow noise.

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**WARNING: Do not use the gas supply connection to balance heater or support any weight of the heater.**

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### 4.5 Electrical Connections

All electrical connections should be made in the site terminal box (refer to Figure 3). Screw-type terminals are provided. Connections should be in accordance with terminal markings and the site terminal box and the wiring diagram affixed to the heater or shown in Section 9.

The minimum control scheme must have a room thermostat, and in all cases, **it is essential that the main input to terminals L and N remains alive at all times to ensure the correct operation of the fan.**

### 4.6 Control Panel Siting

The siting of the controls is particularly important. Avoid locating the panel in draughty areas or where it may be directly exposed to heat from the sun or other heat sources. The panel should be mounted on an internal wall or column about 1.5m above the floor. Follow the manufacturer's instructions when fitting the controls. Any thermostat must be suitable for switching 240 volts. Do not attempt to control more than one heater from a thermostat unless a properly wired relay is fitted. An Ambi-Rad multi-heater panel is available to control up to four heaters.

## 5.0 AIR DISTRIBUTION SYSTEMS

### 5.1 Horizontal Louvres

All sizes of Model UFE heaters are factory supplied with adjustable horizontal louvres.

Horizontal louvres may be adjusted from 10 to 55 degrees to direct the airflow down to the floor. **IMPORTANT:** Do not adjust the louvres beyond their stops.

### 5.2 Vertical Louvres (Option CD1)

Model UFE heaters can be fitted with optional vertical louvres to increase the air pattern spread. This option is normally used on heaters that are installed at minimum mounting heights. The vertical louver assembly is designed to be assembled and fitted at the installation site. Complete instructions including a parts list are packaged with the option.

### 5.3 Downturn Air Nozzles (Options CD2, CD3, and CD4)

Model UFE heaters can be fitted with optional downturn nozzles to direct the discharge air toward the floor. This option is normally used with the heaters that are installed at heights above the minimum recommended. Option CD2 is a 30° downturn nozzle which changes discharge air direction up to 57°. Option CD3 is a 60° downturn nozzle which changes discharge air direction up to 90°. Option CD4 is a 30° downturn nozzle with vertical louvres. Vertical louvres should not be fitted to Option CD3.

All downturn nozzles are designed for site assembly and fitting. Each option package includes complete assembly and installation instructions.

## 6.0 COMMISSIONING AND TESTING

The commissioning and testing should only be carried out by a competent person. This section should be read completely and fully understood. A commissioning service is available from AMBI-RAD.

### 6.1 Electrical Check

After completion of the installation and before switching on the electrical supply, a preliminary check must be performed by a qualified electrician. Check the following:

- Check that all site wiring is connected in accordance with the appropriate circuit diagram in Section 9.
- Ascertain that the correct fuse and cable size are fitted.
- Check that the earthing of the heater has been carried out by conducting an earth continuity test. Connect a test meter, one lead to the appliance earth point and the other lead to the main incoming earth at the isolator. A resistance reading of 0.1 ohm or less must be indicated. If a higher reading is obtained, check earth connections for being clean and tight. If problem still exists, seek expert advice.
- Carry out a polarity test. Connect one lead of a suitable AC voltmeter to earth and connect the other lead to the live supply terminal at the heater. Turn on power to the heater. A reading of approximately 240 volts should be given.

The same result should be obtained by connecting the test leads from live to neutral.

Connect the voltmeter test leads to N and E. A reading of between 0-15 volts at maximum should be obtained. If these tests do not conform to the above, there is a fault which must be rectified before progressing further with the commission.

- Check that a suitable thermostat or control panel has been fitted.
- Ensure that an isolation switch has been fitted.

### 6.2 Gas Connection

The whole of the gas installation, including the meter, should be inspected, tested for soundness, and purged in accordance with BS6891 and British Gas Documents IGE/UP/1.

### 6.3 Suspension

The suspension of the heater should be checked to ensure that it is adequate to safely support the heater and that no other parts have been fitted that are not properly supported or secured. For safe heater operation, check that the heater is level in all directions.

### 6.4 Lighting the Heater

Model UFE heaters are fitted with an automatic spark ignition system. When sufficient air flow is detected by the air proving switch and after a 10-second pre-purge time, both the spark and pilot gas flow are started. Under normal conditions the spark ignites the pilot gas after several seconds. The pilot flame is electronically detected almost instantly. Main burner gas flow is started 40 to 50 seconds after the pilot flame is detected. During the first startup of the heater or if the heater has not been operated for a period of time, the pilot gas may not be ignited in the 50-second trial for ignition. The automatic spark ignition system will make two additional trials for ignition. If the pilot flame fails to ignite after three trials, the ignition system can be manually reset.

#### 6.4.1 To Turn the Heater "On"

The following checks should be carried out before attempting to light the heater.

- Ensure that the electrical supply and the gas supply to the heater are turned "On"

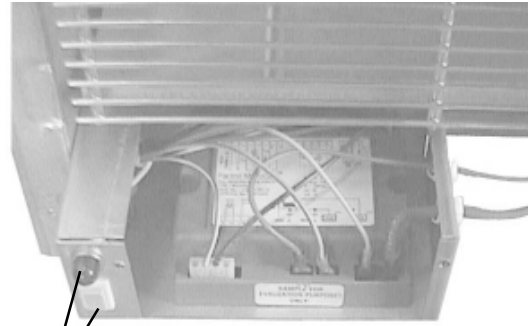


**Figure 8 - Spark Ignition System**



**Ignition Controller Box**

**Ignition Controller Box with Cover Removed**



**Lockout Indicator Light and Reset Button**

- If fitted with a clock control, set to "On".
- Set the room temperature control to above the ambient temperature. The main burners will light. (The main burners can be seen through the viewing port).
- Adjust the room temperature control to the required operating temperature. The heater will operate automatically.

**NOTES:** If heater will not "start" on initial start up, the ignition controller may be in lockout position. Depress the reset button. Several attempts at lighting the pilot may be required to remove the air from the multifunctional valve.

**6.4.2 To Turn the Heater "OFF" for Short Periods**

Adjust the room temperature control to its lowest temperature or "Off". The fan will continue to run to cool the heat exchanger before turning off automatically.

**6.4.3 To Turn the Heater "Off" for Long Periods**

Adjust the room temperature control to its lowest temperature or "off". When the fan has stopped, turn "off" the gas and the electricity supplies.

**6.5 Heater Pipework**

The soundness of the heater's pipework has been checked at the factory. However, during shipment or installation, connections may have loosened. Check the soundness of the pipework using a leak-detecting fluid such as a soap and water solution. If any leaks are found, they must be rectified immediately.

**WARNING: Never use a naked flame for checking the soundness of any gas connections.**

**6.6 Adjustments**

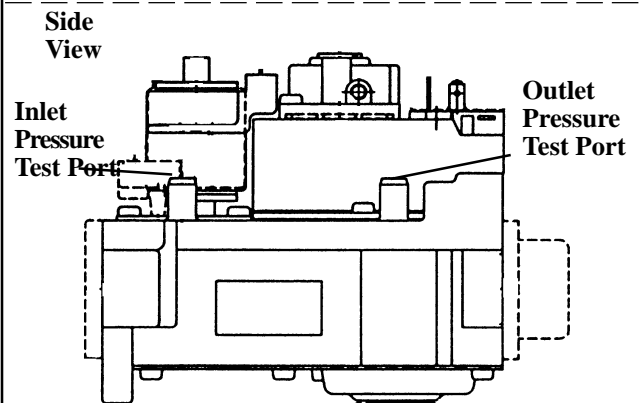
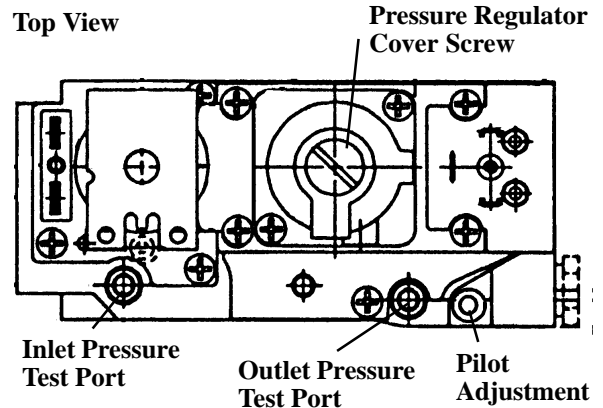
**6.6.1 Burner Gas Adjustment**

The gas pressure is set for the required heat input before the heater leaves the factory, and normally the gas pressure will not require re-setting. To check gas pressure, the following procedure should be carried out:

- 1) Ascertain from Section 2, Technical Data (Table 3), the correct burner pressure for the heater.
- 2) Turn the room temperature control to lowest setting.
- 3) Remove the screw from the outlet pressure test point of the gas valve (See Figure 9). Connect a manometer to the test point.
- 4) Adjust the room temperature control to setting above ambient temperature.

- 5) Observe the gas pressure on the manometer and compare to the required burner pressure.
- 6) If necessary, adjust the burner gas pressure. Remove the cover screws. Turn the regulator screw anti-clockwise to decrease the pressure or clockwise to increase the pressure.
- 7) Set the room temperature control to lowest setting to turn off the main burners. Replace the pressure test point screw and cover screw (if removed) and with the main burner turned on, test for gas soundness using a leak-detection fluid such as a soap and water solution.

**Figure 9 - Multifunctional Control Valve**

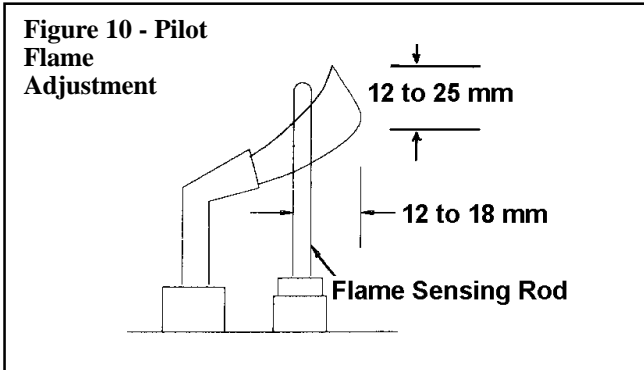


**Note:** When measuring gas pressure, do not remove screw. Loosen enough to allow gas pressure to register.

## 6.0 COMMISSIONING AND TESTING (cont'd)

### 6.6.2 Pilot Flame Adjustment

The pilot regulating screw is contained in the multifunctional control valve. The pilot regulating screw is factory set for the maximum pilot rate. If the gas inlet pressure to the heater exceeds 25 mbar, the pilot rate should be reduced. Remove the cover screw. To adjust the pilot flame, screw the adjusting screw clockwise to reduce the flow. Figure 10 shows the approximate flame length. Replace the cover screw after pilot adjustment is completed.



### 6.7 Air Distribution System

The system should be checked to ensure that the installation work has been carried out in accordance with the design requirements.

Adjust the discharge louvres to provide a satisfactory spread of heated air. Direct the heated air to the floor avoiding direct draught on personnel who may be working nearby.

**CAUTION: To avoid getting burned, adjust louvres prior to heater operation. If louvres need re-adjusting after startup, wear protective gloves.**

### 6.8 Heater Controls

Check heater operation after all adjustments have been carried out. Set the room temperature control to above ambient temperature.

Model UFE power vented heaters are equipped with a pressure-sensitive, combustion air safety switch that monitors airflow. The switch is a single-pole, double-throw switch that operates with the following settings (settings are for sea level installation).

All Models	Start-Up	Equilibrium	Set Point	Set Point
	Cold	"Off"	"On"	
mbar	-2.5	-1.5	-1.17	-1.62

When the combustion air safety switch closes verifying airflow, the pilot will be lighted and the multifunctional control valve will open. The main burner will light. Within approximately 30 seconds, the time delay relay will activate the fan thermostat control which will energize the fan or blower motor.

Continue to operate the heater for several minutes to ensure the limit switch does not activate. The limit switch is a manual reset switch which must be cooled to room temperature before being reset. Reset button is on the control side of the heater (left side when facing the rear of the heater.) If for any reason, the limit switch trips, the cause must be determined. See Fault Finding Chart, Section 10.3.

Turn the room temperature control to its lowest setting. The venter motor will stop and the main burners will extinguish while the fan continues to cool the heat exchanger. When the heat exchanger is sufficiently cooled (usually within five minutes), the fan control will de-energize the fan motor.

### 6.9 Handing Over

Upon the satisfactory completion of commissioning and testing, hand the instructions to the user or purchaser. Advise the user/purchaser how to safely use and operate the heater, including all associated equipment and controls. Ensure that the user/purchaser understands how to start the heater and how to turn it off.

Suggest that the instructions be placed close to the heater for future reference. Instruct the user/purchaser not to place the instructions adjacent to a hot surface or in a place where they may restrict air flow.

Advise the user/purchaser that for safe and efficient operation, the heater must be serviced at least annually.

## 7.0 SERVICING INSTRUCTIONS

**WARNING: Only competent and qualified engineers should carry out servicing and fault finding on this equipment. A complete after sales service is available from AMBI-RAD.**

**Before maintenance is carried out, ensure that both gas and electrical supplies are turned off and the appliance is cold.**

This heater will operate with a minimum of maintenance. To ensure long life, satisfactory performance and continued safety, a heater that is operated under normal conditions should be inspected and cleaned annually. Heaters that are operated in areas where an unusual amount of dust or impurities are present in the air, require more frequent maintenance.

**NOTE 1: Check all pipe joints for gas soundness. Any leaks found must be repaired before leaving the heater in operation.**

**NOTE 2: After routine maintenance, the commission procedure, Section 6, should be carried out to ensure efficient and safe operation.**

### 7.1 Servicing Procedure

The following procedures should be carried out at least annually:

1. Remove the Burner Assembly as in Section 8.1.
  - a) Check the condition of the pilot burner and clean off any deposits which may have formed. See Figure 18. Clean the inside of the burner hood with an emery cloth. Clean the pilot injector with solvent and compressed air. **CAUTION: Wearing eye protection is recommended.** Check the condition of the flame rod and clean with an emery cloth. Remove all deposits. Check the spark gap (2.5 mm/.100 inches).
  - b) Clean any deposits from the main burner, paying particular attention to lint or fluff, etc., which may have formed around the injectors in the venturi of the burner. Clean using compressed air and a soft brush. **CAUTION: Wearing eye protection is recommended.**
  - c) Clean any deposits from the burner tray.
2. The heat exchanger should remain clean unless some problem has developed with combustion. Examine the heat exchanger internally and externally for any sign of deterioration.
3. The fan blade, fan guard and motor should be cleaned to remove any build up of dust, fluff, etc.
4. Ensure that any purpose provided air vents for ventilation and combustion are free from obstruction.
5. The flue system should be checked for soundness. Reseal/replace any parts that do not appear sound.
6. Check the wiring for any signs of damage. Replace wiring with an equivalent specification.

7. Check operation of the fan control.  
Check if the fan control turns on the fan. (Note: In some situations the limit control may be tripped -- reset before leaving heater.) If the fan control does not actuate the fan, correct by replacing the fan control (See Section 8.9).
8. When service is complete, carry out commissioning procedure, Section 6.0-6.8.

## 8.0 INSTRUCTIONS FOR REMOVAL AND REPLACEMENT OF PARTS

**WARNING: To comply with legislation, only certificated spares may be fitted to heaters supplied after 1/1/96. A full spares service is provided by AMBI-RAD. Only a competent and qualified engineer should carry out servicing on this equipment. Before maintenance is carried out, ensure that both gas and electrical supplies are turned off and the appliance is cold.**

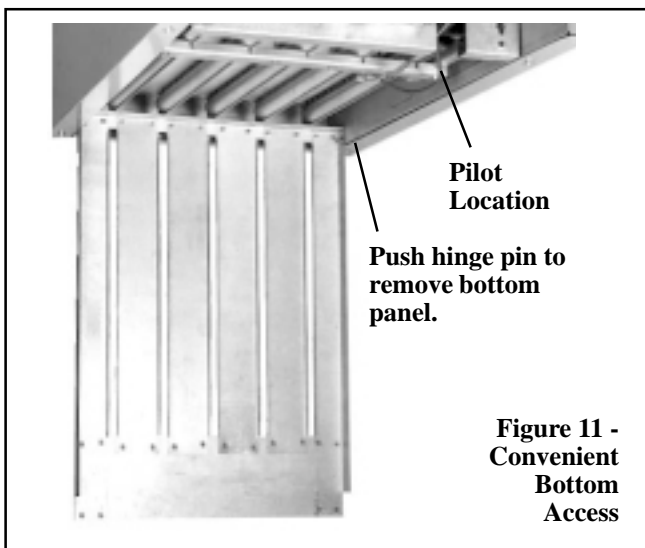
**After maintenance work, the heater MUST be fully commissioned (See Section 6).**

### 8.1 Main Burner Removal

Model UFE units have been designed with convenient bottom access. The pilot is attainable with the bottom access panel open. With the access panel removed, the burner rack assembly will hinge down for removal. Use the following step-by-step instructions for removal of the bottom access panel and the burner rack assembly.

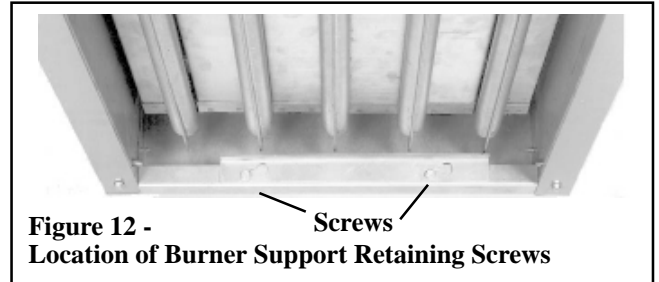
**Instructions for Burner rack Removal (Refer to Figures 11 to 16 inclusive):**

1. Remove the two screws located at the rear bottom panel.
2. Allow bottom panel to hinge down from the front. Refer to Figure 11.

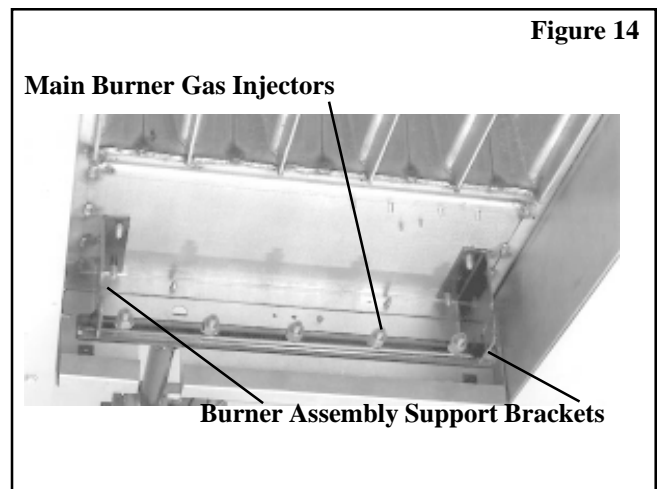
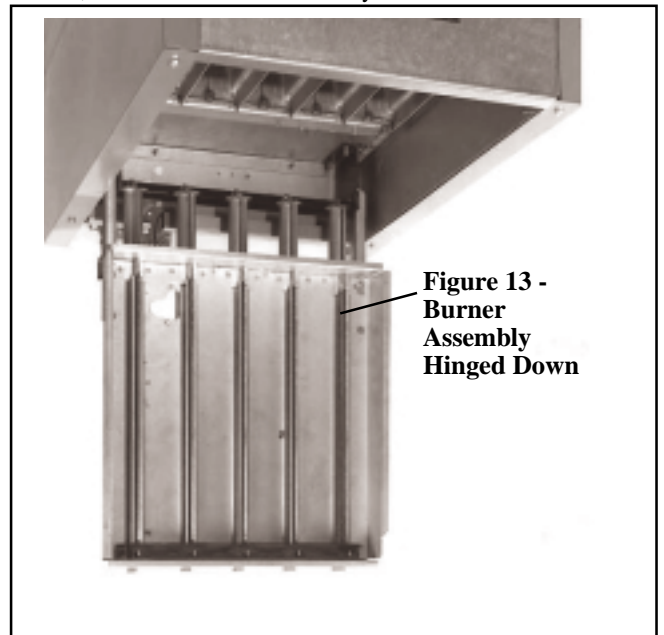


3. Push in one of the two spring-loaded hinge pins located at the front of the bottom panel (inside), and completely remove the bottom panel.

4. The bottom of the pilot is now visible (See Figure 11).
  - a) Disconnect the pilot tubing from the multifunctional gas control valve and the pilot burner, taking care not to lose the pilot injector which is located inside the pilot burner and fitted over the pilot burner tube.
  - b) Disconnect the flame sensing wire and the high tension (spark) lead from the ignition controller. (Remove the cover from the ignition controller box. See Figure 18.)
5. Remove the sheetmetal screws (two or three) located at the front of the burner assembly. (See Figure 12.) These screws retain the slotted burner support bracket. Remove the bracket taking care to support the burner assembly.



6. Allow the front of the burner assembly to drop down. Lift up on the rear part to disengage it from the locating slots at the manifold, and slide the whole assembly out.



## 8.0 Removal and Replacement of Parts (cont'd)

### 8.1 Main Burner Removal (cont'd)



Figure 15 - Burner Rack Removed (top view)

- To remove the individual burners from the burner assembly:
  - With the burner assembly upside down, remove the screws (located at the rear) that secure the retaining bracket.
  - Lift the front of the burner upwards slightly and pull it back, removing the individual burner (a slight tap with a wooden mallet is sufficient to dislodge it).

Clean individual burners using air pressure or soft brush. Use an air nozzle to blow out scale and dust accumulation from the burner ports. **CAUTION: Wearing eye protection is recommended.** Alternately blow through burner ports and venturi. Use fine wire to dislodge any stubborn particles. Do not use anything that might change the port size.

- Re-assemble in reverse order.
- When lighting, always follow the lighting instructions on the heater. After any service work, the heater must be fully commissioned. See Section 6.0-6.8.

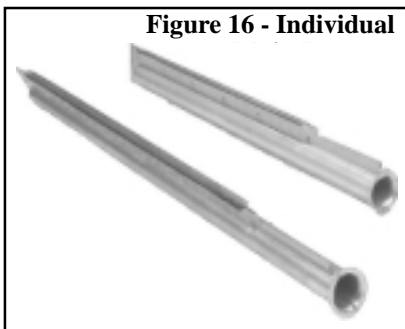


Figure 16 - Individual Burner

**NOTE: Use only factory-authorized replacement parts. Heaters supplied after 1/1/96 must use certificated spares to comply with legislation. A complete spares service is available from AMBI-RAD.**

### 8.2 Pilot Burner Injector (Figure 17)

- Carry out Steps 1 to 2 of Section 8.1.
- The bottom of the pilot is now visible (See Figure 11). Disconnect the pilot tubing from the pilot burner.

**CAUTION: Take care that the pilot injector does not fall out of the pilot burner (located on the end of the pilot supply tube.)**

- Fit a new pilot burner injector. Natural gas size is  $-0.38\text{mm}$  (0.015 in.) with 9731-713 stamped on the injector. Propane gas injector has 9733-410 stamped on it.
- Re-assemble in reverse order.

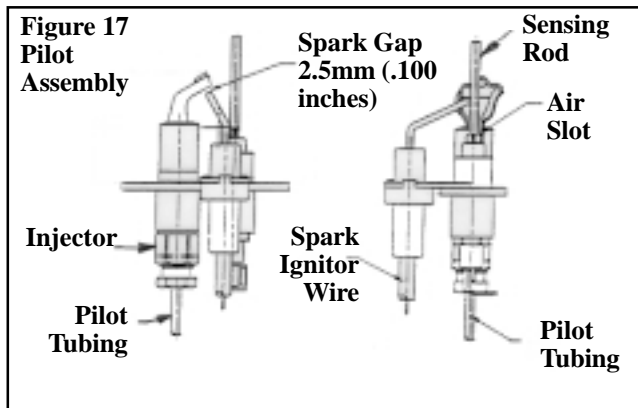


Figure 17  
Pilot  
Assembly

### 8.3 Pilot Burner Assembly

- Carry out Steps 1 to 2b of Section 8.2.
- To remove the pilot assembly, remove its two fixing screws.
- Refit the new pilot burner by re-assembling in reverse order. Be sure that the pilot shield is fitted.
- Check relationship of the pilot burner with the adjacent main burner. Refer to Figure 18.

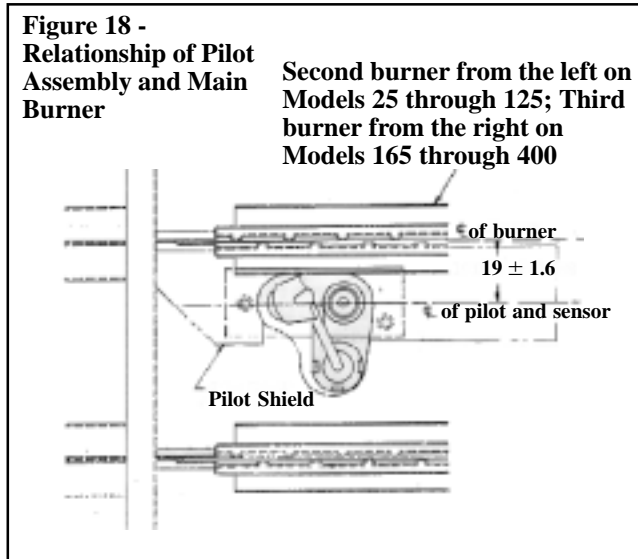


Figure 18 -  
Relationship of Pilot  
Assembly and Main  
Burner

Second burner from the left on  
Models 25 through 125; Third  
burner from the right on  
Models 165 through 400

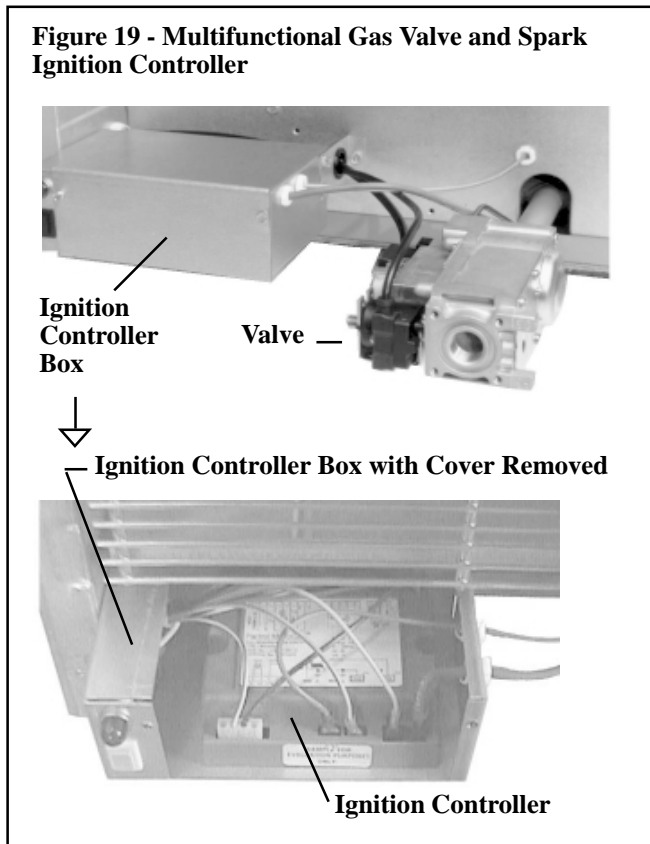
### 8.4 Pilot Ignition System

The ignition controller of the intermittent electronic ignition pilot system is located in a box on the back of the heater. See the illustration in Figure 19. There are no field-replaceable components in the ignition controller. Check the lead wires for insulation deterioration and good connections.

Proper operation of the electronic spark ignition system requires a minimum flame signal of 1.0 microamps as measured by a microammeter.

**CAUTION: Due to high voltage on pilot spark wire and pilot electrode, do not touch when energized.**

**Figure 19 - Multifunctional Gas Valve and Spark Ignition Controller**



**REPLACEMENT NOTE:** Units manufactured prior to 4/00 have a Honeywell brand ignition controller, P/N 136758. Units manufactured beginning 4/00 have a Pactrol brand ignition controller, P/N 174681. **These ignition controllers are not interchangeable.** If a replacement is required, the ignition controller must be the same as was originally supplied on the unit.

Units with a Pactrol brand ignition controller are also equipped with a noise filter in the electrical circuit; see Figure 21A and the circuit diagram on page 16.

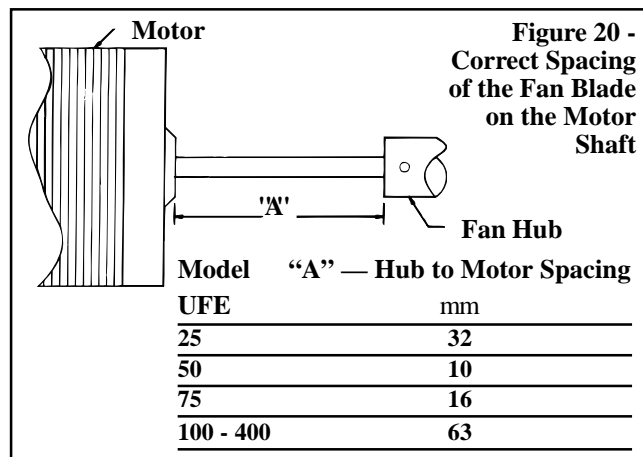
### 8.5 Main Burner Injectors

1. Remove the two screws located at the rear of the bottom panel. Allow the bottom panel to hinge down from the front.
2. Unscrew the main burner injectors (See Figure 14).
3. Re-fit new injectors
4. Re-assemble in reverse order.

### 8.6 Replacement of Fan Motor and/or Blade

Follow these instructions for removal and replacement of fan motor and/or fan blade.

1. Remove left hand side panel (left when facing the rear of the unit) by unscrewing its seven fixing screws (4 front and 3 back).
2. Disconnect the fan motor wires and push out the cable retaining gland.
3. To remove the sub-assembly including the fan motor, the blades, and the fan guard, remove the eight screws that attach the fan guard to the heater.
4. Either the fan motor, fan blade or both may now be replaced. Space the fan blade on the shaft as shown in Figure 20.
5. Re-assemble in reverse order.



### 8.7 Multifunctional Control Valve (See Figure 19)

1. Ensure the electrical supply is isolated.
2. Remove the pilot supply tube and the spark tension lead.
3. Remove the terminal cover and disconnect the electricity connections.
4. Disconnect the union between the multifunctional control valve and the gas service cock. Remove the valve.
5. Re-fit the replacement valve making all the required connections. If the connection includes an O-ring, fit a new O-ring.
6. Carry out a complete commissioning procedure. Refer to Sections 6.0 to 6.8.

### 8.8 Limit Control Switch (Overheat Thermostat)

This heater is fitted with two temperature-activated limit control switches that when activated will interrupt the electrical power to the gas valve. The limit in the "lower" portion of the airstream is a manual reset type limit switch, which if activated, must be reset before the heater will operate. The manual reset limit is reset by depressing the small button in the center of the switch body. The reset button is accessible without removing the heater outer side panel. The limit in the "upper" portion of the airstream is an auto reset switch. If the auto reset limit is activated, it must be sufficiently cooled before the heater will operate.

If it is determined that either limit control switch needs replacing, use only a factory-authorized replacement.

#### 8.8.1 Instructions for Replacement of Limit Switch Control

Model UFE heaters manufactured prior to 3/97 have only a manual reset limit control; see Figure 21B on page 14. Model UFE heaters manufactured beginning 3/97 have a manual reset limit control and an automatic recycling limit control; see Figure 21A.

Follow the instructions that apply to the heater being serviced:

**Instructions for Replacement of limit switches on a heater with both a manual reset limit and an automatic recycling limit (manufactured beginning 3/97). Refer to Figure 21A.**

1. Remove the outer side panel (left when facing the rear of the heater).
2. Remove the limit switches.
  - **Automatic Reset Limit (located on the upper left corner of the side panel)**
    - a) Disconnect the wires from the limit control switch.
    - b) Remove the screws holding the limit control switch.
    - c) Fit the replacement limit switch by reversing the procedure.

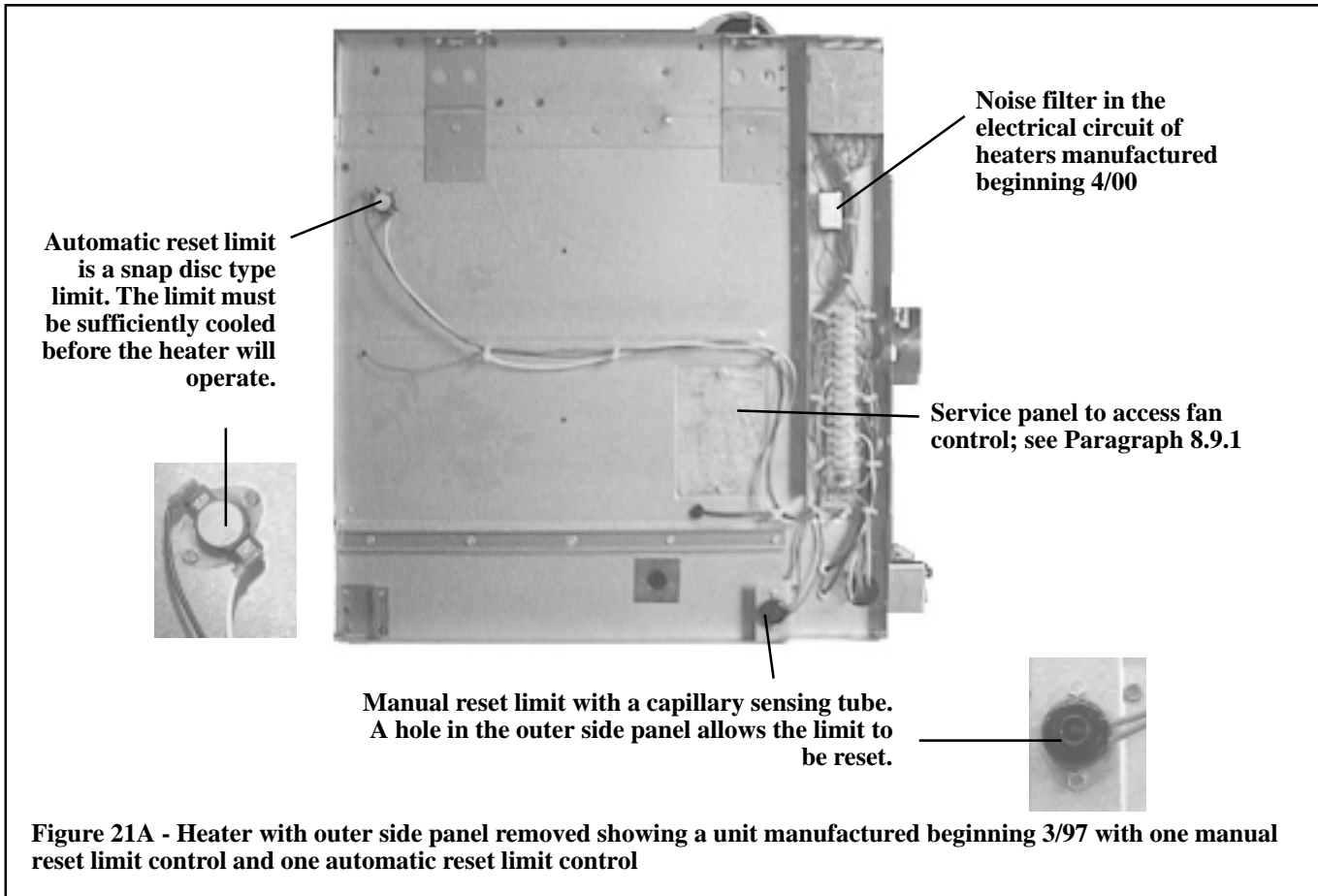
## 8.0 Removal and Replacement of Parts (cont'd)

### 8.8.1 Limit Control Replacement Instructions (cont'd)

- **Manual Reset Limit (located on the lower right corner of the side panel)**

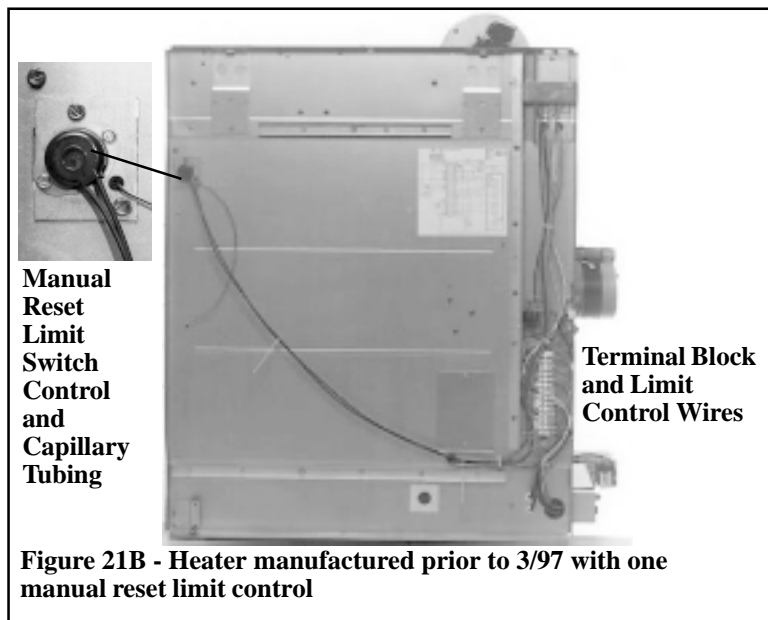
- a) Disconnect the limit switch wires from the terminal block.
- b) The manual reset limit switch has a capillary sensing tube that stretches across the air discharge. To remove the switch and capillary — (1) pull the copper-coloured capillary tubing out of the tube that is fitted across the heater discharge; (2) remove the screws holding the limit switch; (3) pull the capillary tubing out through the plastic retainer clips on the side of the heater.

- c) Fit the replacement limit switch by reversing this procedure. Be sure that the capillary tube is stretched across the full width of the discharge opening. Depending on the heater size and tube length, a loop may have to be made in the capillary tube between the plastic retainer clips and where it enters the heater side panel. Be careful not to kink or squeeze the capillary tube.
3. Replace the outer side panel. Carry out a complete commissioning procedure. Refer to Section 6.0-6.8 in the heater installation manual.



#### Instructions for Replacement of a limit switch on a heater with only a manual reset limit located on the upper left corner of the side panel (manufactured prior to 3/97). Refer to Figure 21B.

1. Remove the outer side panel (left when facing the rear of the heater).
2. Remove the small access plate on the inner side panel.
3. Remove the retaining bush holding the two limit wires.
4. Disconnect the limit wires from the gas valve and feed wires through.
5. Remove the two retaining screws holding the limit control switch capillary assembly bracket to the inner side panel and withdraw the assembly.
6. Remove the limit switch control from the bracket; replace with a new switch.
7. Re-attach the limit control switch and assembly in reverse order, ensuring that the capillary tube extends across the full width of the heat exchanger.
8. Carry out a complete commissioning procedure. Refer to Section 6.0 to 6.8.



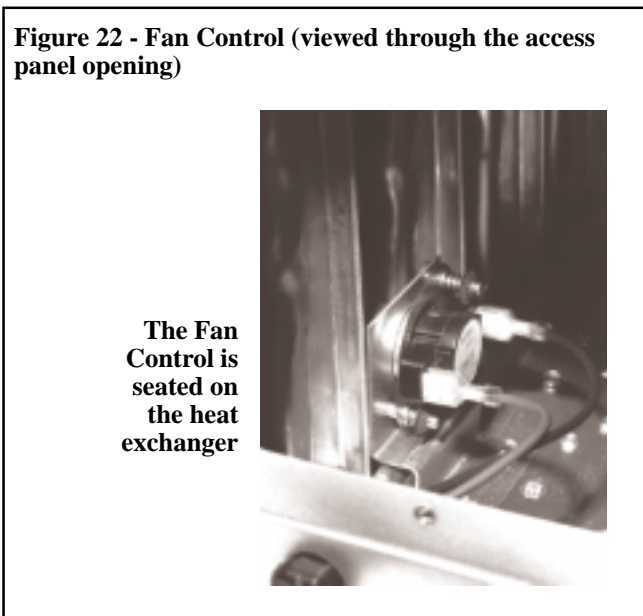
## 8.9 Fan Control

The fan temperature control senses the temperature of the heat exchanger. The fan temperature control has a fixed setting and may not be site adjusted. If it is determined that the fan temperature control needs replacing, use only a factory-authorized replacement part. (See Section 8.0.)

### 8.9.1 Instructions for Replacement of Fan Temperature Control (See Figure 22)

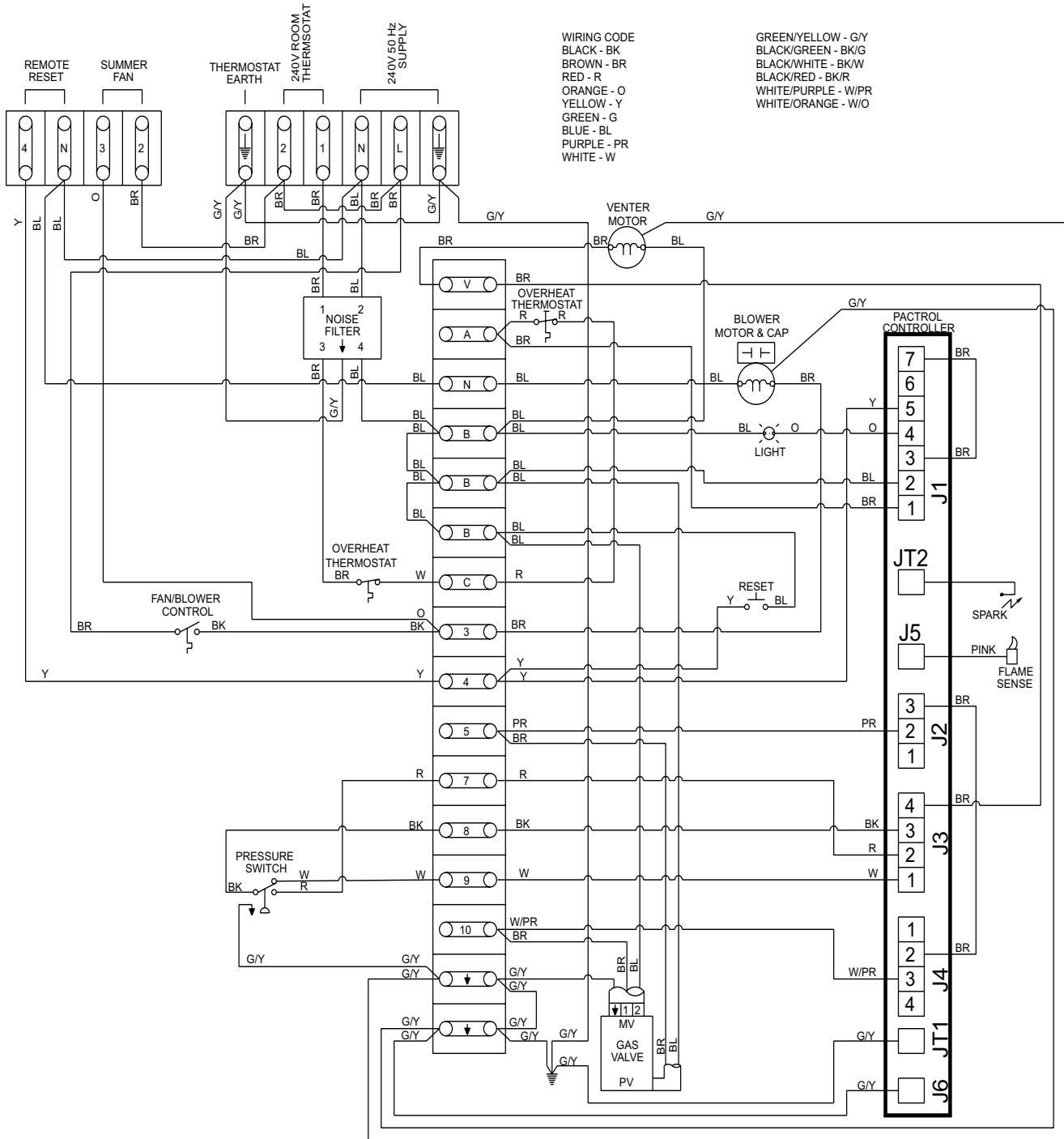
1. Remove the outer left side panel (left when facing the rear of the heater).
2. Remove the small access plate on the inner side panel (See Figure 21A).
3. Remove defective control and install new control in the same mounting holes
4. Re-fit access panel and outer side panel.
5. Turn on the electricity supply and the gas service valve. Carry out a complete commissioning procedure. Refer to Sections 6.0 to 6.8.

**Figure 22 - Fan Control (viewed through the access panel opening)**



# 9.0 CIRCUIT DIAGRAM

## 9.1 Circuit Diagram - Model UFE

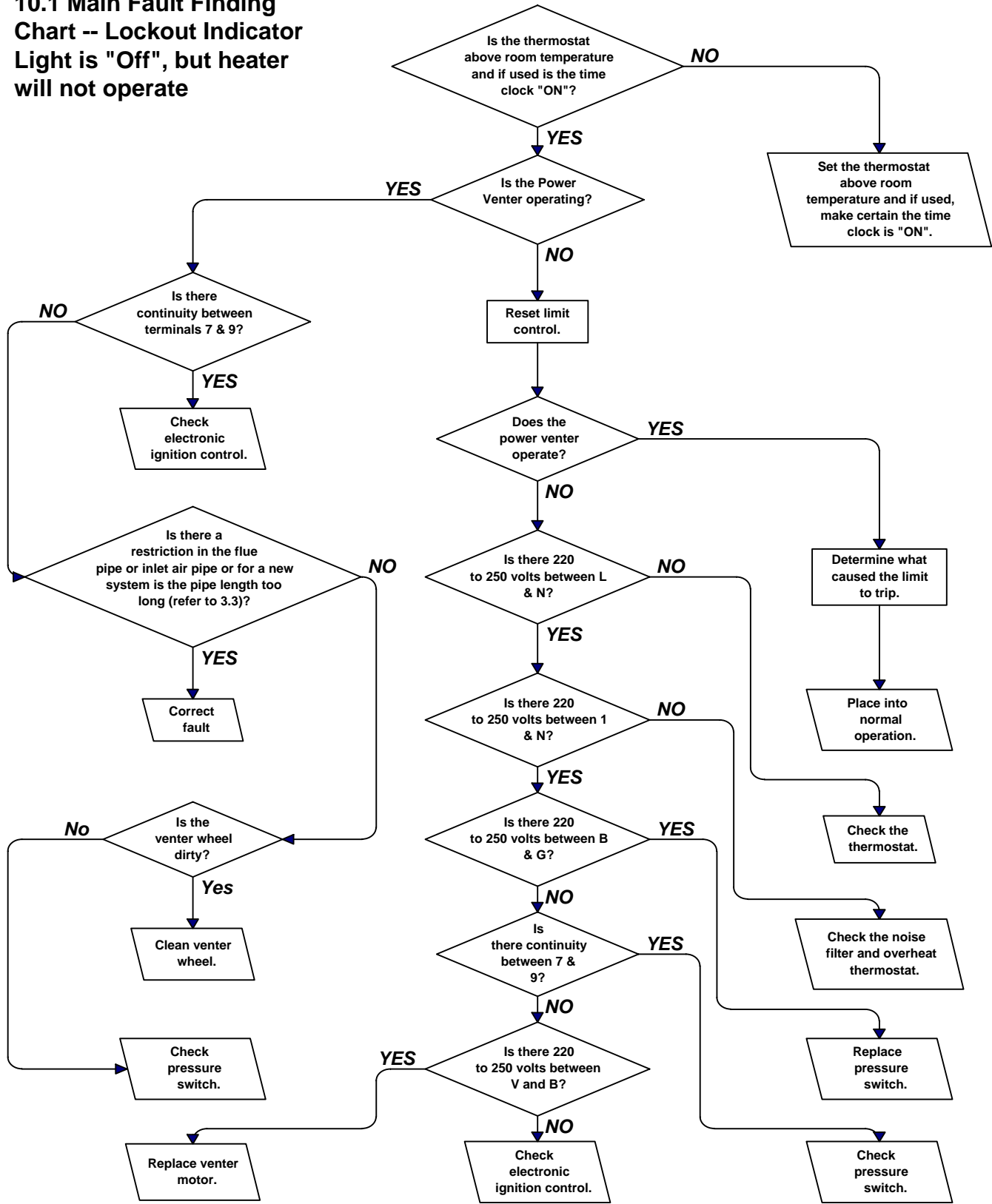




# 10.0 FAULT FINDING CHARTS

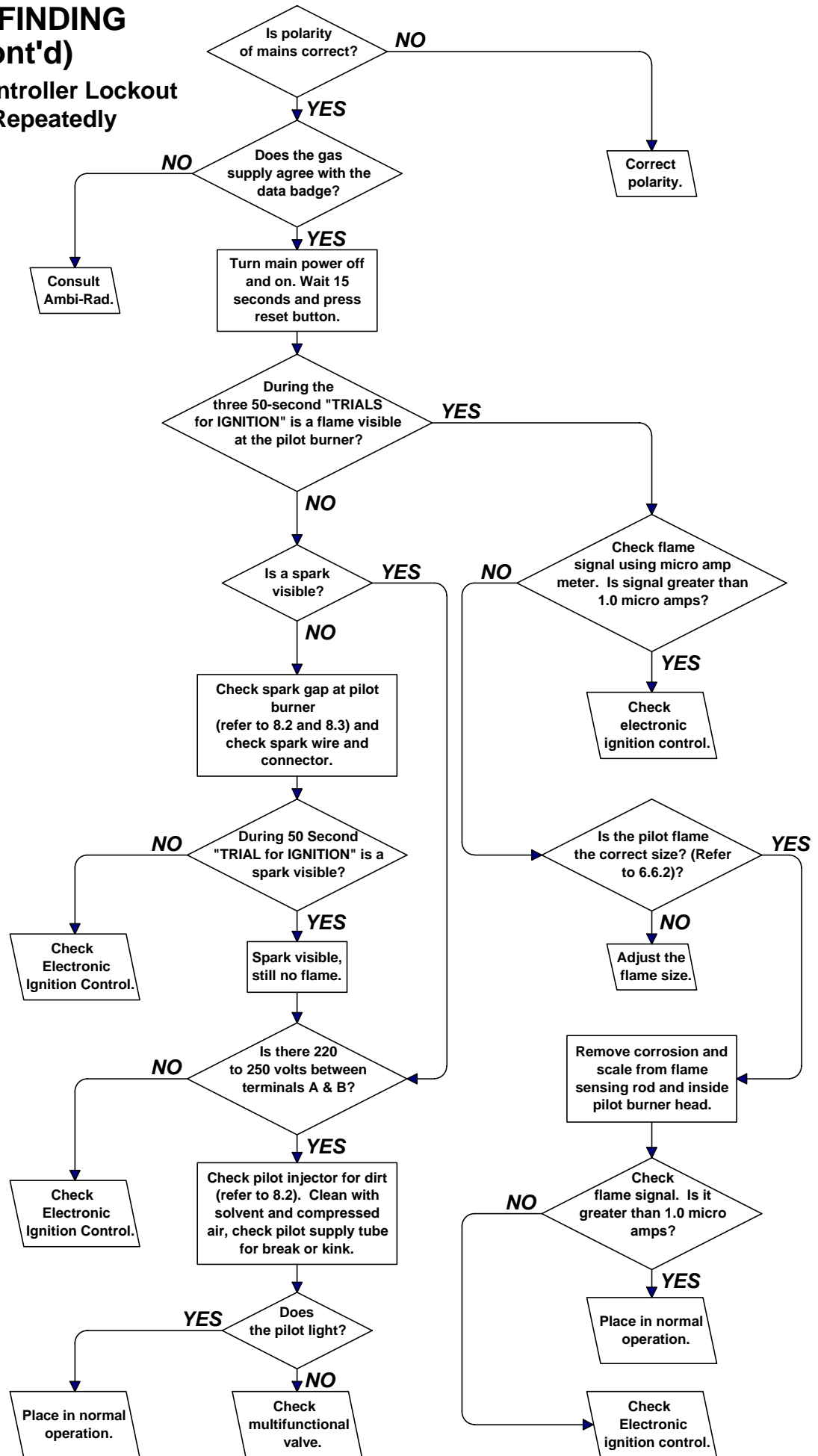
**WARNING:** Fault finding should only be carried out by a competent service engineer.

## 10.1 Main Fault Finding Chart -- Lockout Indicator Light is "Off", but heater will not operate



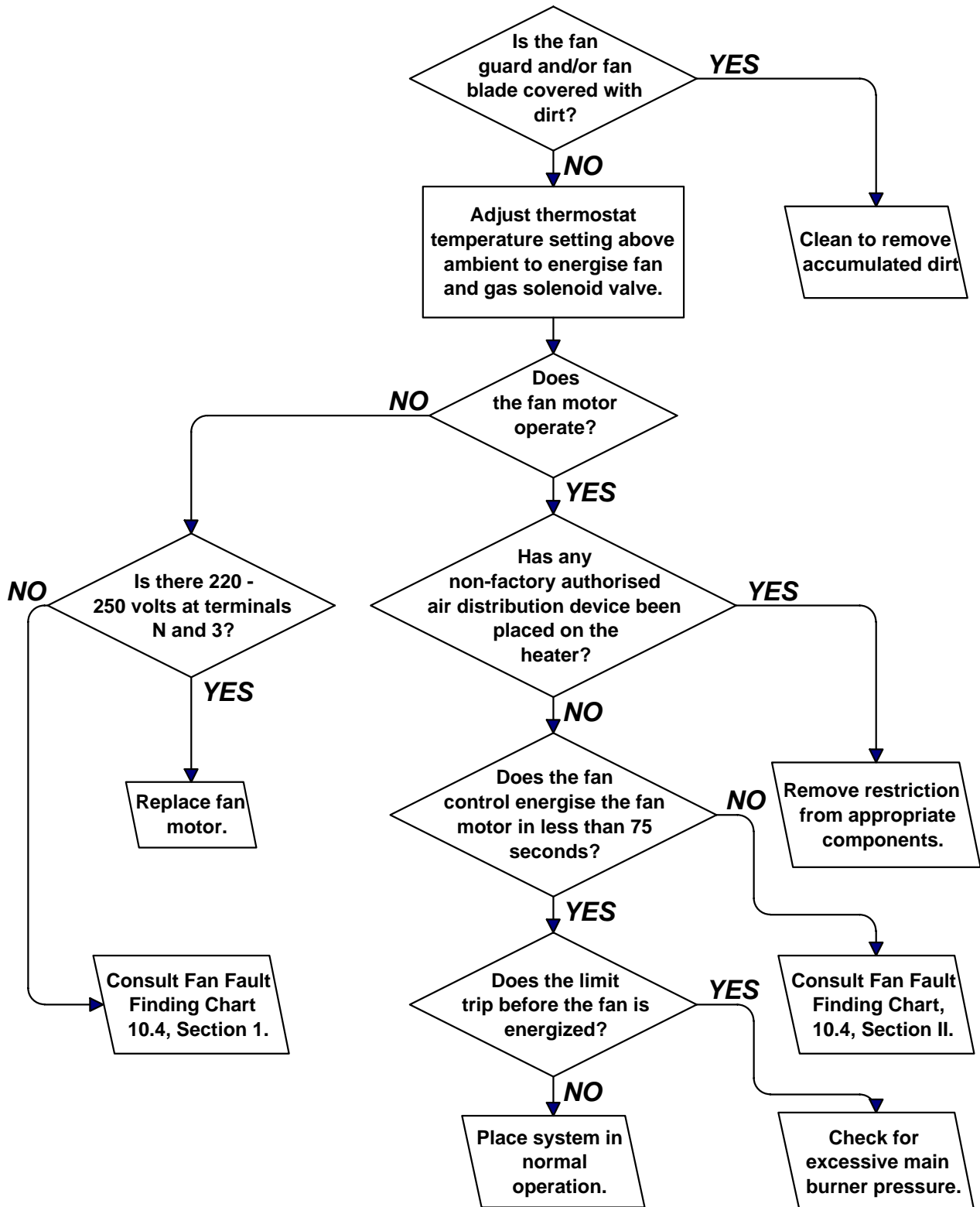
# 10.0 FAULT FINDING CHARTS (cont'd)

## 10.2 Ignition Controller Lockout Indicator Light Repeatedly Comes "ON"



### 10.3 Limit Control Fault Finding Chart (Limit Control Trips)

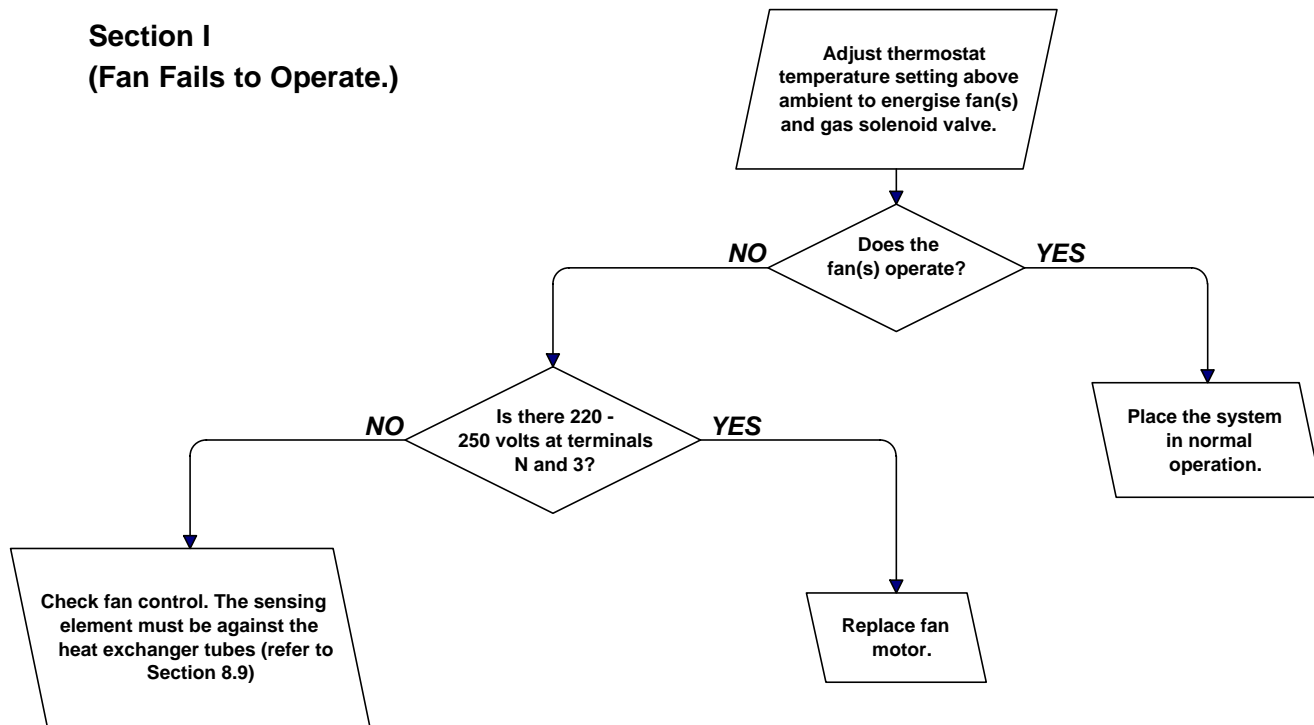
**NOTE:** Interruption of the main electrical supply to the heater when the heater is in operation may cause the limit control to trip. Check that the supply to the heater is not being interrupted incorrectly by (a) Incorrect wiring of the time clock; (b) Fire alarm systems, etc.; or (c) Isolation of main feed to the building.



# 10.0 FAULT FINDING CHARTS (cont'd)

## 10.4 Fan Fault Finding Chart

### Section I (Fan Fails to Operate.)



## 11.0 SHORT LIST OF PARTS

A "replacement parts tag" listing the most common replacement parts is affixed to the rear of the heater. Each tag is "custom made" for that particular size and style of heater.

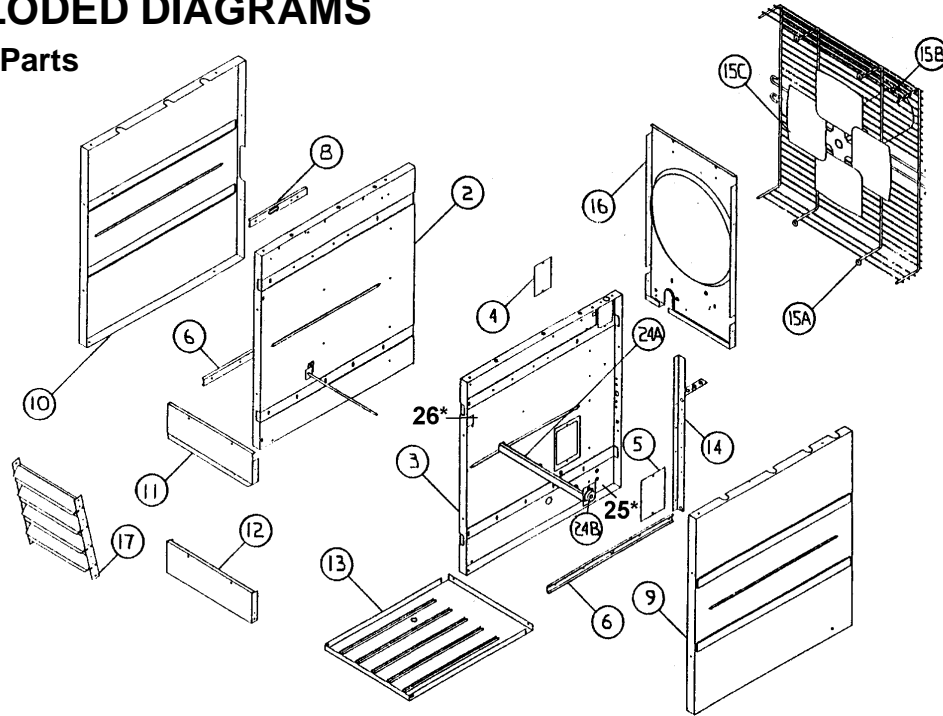
Below is a short list of replacement parts.

### SHORT PARTS LIST FOR MODEL UFE HEATERS

Component		SIZE									
		25	50	75	100	125	165	200	250	300	400
Pilot Burner Assembly including Injector - Natural Gas		135365	135365	135365	135365	135365	135365	135365	135365	135365	135365
Pilot Injector only	Natural Gas	103034	103034	103034	103034	103034	103034	103034	103034	103034	103034
	Propane Gas	--	98695	98695	98695	98695	98695	98695	98695	98695	98695
Ignition Controller	Prior to 4/00	134780	134780	134780	134780	134780	134780	134780	134780	134780	134780
	Beginning 4/00	174681	174681	174681	174681	174681	174681	174681	174681	174681	174681
Fan Control Assembly		123974	123976	123976	123976	123976	123976	123974	123974	123974	123974
Injector - Main	Natural Gas	39650 (2)	84853 (3)	38678 (4)	11833 (5)	11833 (6)	11831 (5)	11831 (6)	11831 (8)	11831 (9)	11831 (12)
	Propane Gas	--	63003 (3)	64676 (4)	11830 (5)	11830 (6)	96344 (5)	96344 (6)	96344 (8)	96344 (9)	96344 (12)
Main Burner		94777 (2)	94777 (3)	94777 (4)	94777 (5)	94777 (6)	94781 (5)	94781 (6)	94781 (8)	94781 (9)	94781 (12)
Gas Control (Valve) - Natural Gas		134778	134778	134778	134778	134778	134779	134779	134779	134779	134779
Fan Motor		133789	133789	133789	121277	121277	121277	121277	172794	172794	172794
Venter Motor		133787	133787	133787	133787	133787	133787	134974	134974	134974	134974
Manual Reset Limit Control		151789	151789	151789	151789	151789	151790	151790	151791	151791	151791
Automatic Reset Limit control		50418	57953	57953	57953	57953	151792	57953	57953	57953	57953

# 12.0 EXPLODED DIAGRAMS

## 12.1 Cabinet Parts

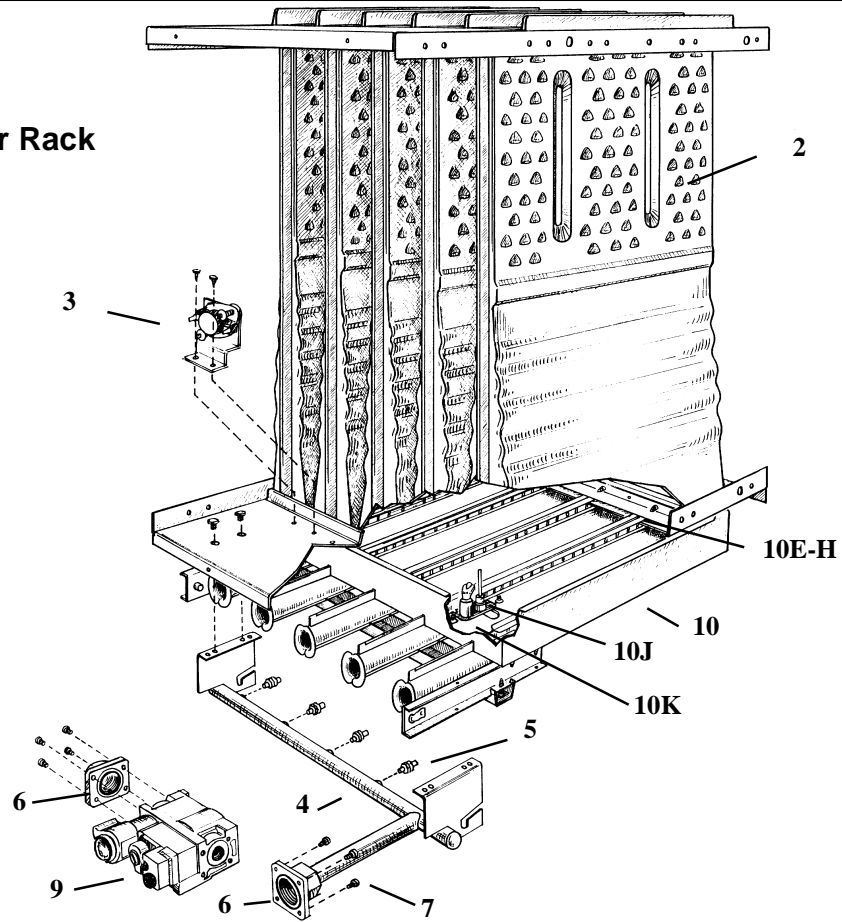


**\*Beginning 3/97, Model UFE heaters have two limit controls. The replacement part numbers for these limit controls are listed as Items 25 and 26 below. They are not illustrated in the drawing. Code 25 on the drawing indicates the approximate location of the manually reset limit with capillary sensor. An opening in the outer panel makes the reset button accessible without removing the panel. Code 26 indicates the approximate location of a snap-disk type automatic reset limit control. For a better view of their locations, see Figure 21A on page 14.**

Item No.	Description	Qty	25	50	75	100	125	165	200	250	300	400
2	Inner Left Side Panel Assembly	1	134444	134445	134445	134446	134446	134447	134448	134448	134448	134449
3	Inner Right Side Panel Assembly	1	174079	174079	174079	174079	174079	174080	174080	174080	174080	174080
4	Wiring Access Panel	1	94897	94897	94897	94897	94897	94897	94897	94897	94897	94897
5	Fan/Limit Access Panel	1	94898	94898	94898	94898	94898	94898	94898	94898	94898	94898
6	Lower Stiffening Channel	2	100868	100868	100868	100868	100868	100870	100870	100870	100870	100870
8	Upper Stiffening Channel	2	100867	100867	100867	100867	100867	100869	100869	100869	100869	100869
9	Outer Side Panel Right	1	133727	133727	133727	133727	133727	133728	133728	133728	133728	133728
10	Outer Side Panel Left	1	104969	104969	104969	104969	104969	104871	104871	104871	104871	104871
11	Top Front	1	133694	133694	133695	133696	133697	133698	133697	133699	133699	133700
12	Bottom Front	1	133686	133686	133687	133688	133689	133690	133689	133691	133691	133692
13	Bottom Panel	1	133714	133715	133716	133717	133718	133719	133720	133721	133722	133723
14	Vertical Barrier & Top Terminal Bracket Assembly	1	136197	136197	136197	136197	136197	136198	136198	136198	136198	136198
15	Fan & Motor Assy (includes 15A-15C)	1	133915	133916	130897	130898	133676	130900	130901	130902	130903	130904
15A	Fan Guard	1	114639	114639	114640	114681	132365	114682	114683	114684	114684	114685
15B	Fan Motor	1	133789	133789	133789	121277	121277	121277	121277	172794	172794	172794
15C	Fan Blade	1	132465	129853	121354	41004	131970	96380	96381	96382	96383	96384
16	Fan Back	1	94675	94675	94676	94677	131645	94679	94680	94681	94681	94682
17	Louvre Frame Assembly	1	94851	94851	94855	94857	131803	94863	94865	94867	94867	94869
21	Hinge Pin Assembly (not illustrated)	Right	1	96445	96445	96445	96445	96445	96445	96445	96445	96445
		Left	1	99351	99351	99351	99351	99351	99351	99351	99351	99351
22	Hanger Assembly (not illustrated)	4	130869	130869	130869	130869	130869	130869	130869	130869	130869	130869
24	Limit and Limit Bracket Assy (includes 24A-24C)	1	134803	134803	134803	134803	134803	134804	134804	134805	134805	134805
24A	Limit Bracket	For units manufactured prior to 3/97	1	130523	130523	130523	130523	130523	130524	130524	130524	130524
24B	Limit Control	1	134806	134806	134806	134806	134806	134807	134807	134808	134808	134808
24C	Snap Bushing (not illustrated)	▶	130233 (5)	130233 (5)	130233 (5)	130233 (5)	130233 (5)	130233 (7)	130233 (7)	130233 (7)	130233 (7)	130233 (7)
25	Manual Reset Limit with Capillary Sensor	For units manufactured beginning 3/97	1	151789	151789	151789	151789	151789	151790	151790	151791	151791
26	Automatic Reset Limit Control	1	50418	57953	57953	57953	57953	15792	57953	57953	57953	57953

# 12.0 EXPLODED DIAGRAMS (cont'd)

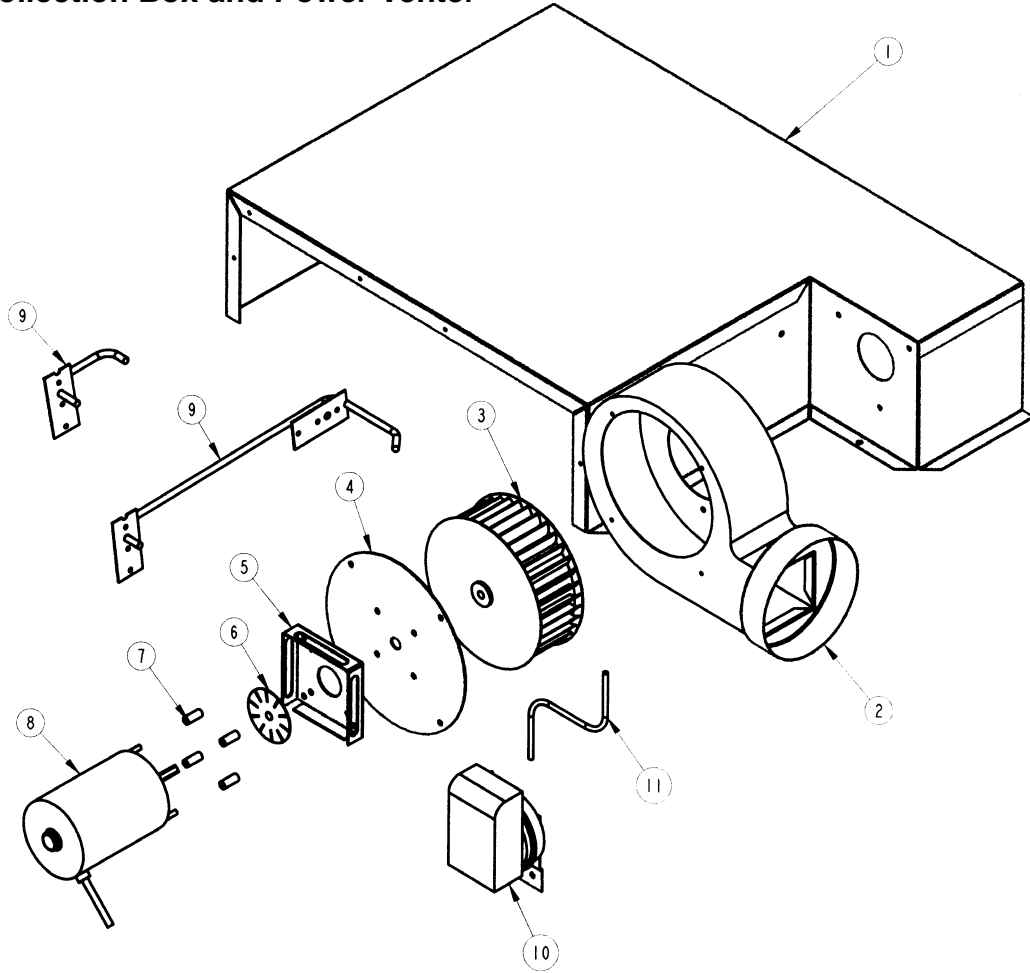
## 12.2 Heat Exchanger/Burner Rack



Item No.	Description		Qty (each)	25	50	75	100	125	165	200	250	300	400
2	Heat Exchanger Sub-assembly	Aluminized	1	174081	174082	174083	174084	174085	174086	174087	174088	174089	174090
		Stainless	1	174091	174092	174093	174094	174095	174096	174097	174098	174099	174100
3	Fan Control Bracket Assembly		1	123974	123976	123976	123976	123976	123976	123974	123974	123974	123974
4	Manifold		1	133618	133619	133620	133621	133622	133621	133622	133623	133624	133625
5	Burner Orifice	Natural Gas	→	39650 (2)	84583 (3)	38678 (4)	11833 (5)	11833 (6)	11831 (5)	11831 (6)	11831 (8)	11831 (9)	11831 (12)
		Propane Gas	→	--	63003 (3)	64674 (4)	11830 (5)	11830 (6)	96344 (5)	96344 (6)	96344 (8)	96344 (9)	96344 (12)
6	Flange (19mm / 3/4")		2	133913	133913	133913	133913	133913	133913	133913	133913	133913	133913
7	Socket Head Screw		8	125843	125843	125843	125843	125843	125843	125843	125843	125843	125843
8	O-Ring (not illustrated)		2	125842	125842	125842	125842	125842	125842	125842	125842	125842	125842
9	Gas Valve - <b>Natural Gas</b>		1	134778	134778	134778	134778	134778	134779	134779	134779	134779	134779
10	Burner Rack Assembly - <b>Natural Gas</b> (includes 10A-7K)		1	135355	135356	135357	135358	135359	135360	135361	135362	135363	135364
10A	Aeration/Radiation Panel (not illustrated)		1	133702	133703	133704	133705	133706	133707	133708	133709	133710	133711
10B	Burner Assembly	→		94777 (2)	94777 (3)	94777 (4)	94777 (5)	94777 (6)	94781 (5)	94781 (6)	94781 (8)	94781 (9)	94781 (12)
10C	Burner Rack Bracket Assembly		2	96363	96363	96363	96363	96363	96363	96363	96363	96363	96363
10D	Burner Holddown (not illustrated)		1	94762	94763	94764	94765	94766	94765	94766	94766	94768	94769
10E	Carryover Assembly		1	96769	47690	63128	96042	96044	96042	96044	--	--	--
10F	Right Carryover Assembly		1	--	--	--	--	--	--	--	96045	96046	96045
10G	Left Carryover Assembly		1	--	--	--	--	--	--	--	96047	96047	96047
10H	Center Carryover Assembly		1	--	--	--	--	--	--	--	--	--	63156
10J	Pilot Assembly - <b>Natural Gas</b>		1	135365	135365	135365	135365	135365	135365	135365	135365	135365	135365
10K	Pilot Shield		1	97204	97204	97204	97204	97204	97204	97204	97204	97204	97204
11	Time Delay Relay		1	136758	136758	136758	136758	136758	136758	136758	136758	136758	136758
12A	Ignition Controller*	Units mfgd prior to 4/00	1	134780	134780	134780	134780	134780	134780	134780	134780	134780	134780
12B	Ignition Controller*	Units mfgd beginning 4/00	1	174681	174681	174681	174681	174681	174681	174681	174681	174681	174681
13	Noise Filter and Wire Assy		1	178302	178302	178302	178302	178302	178302	178302	178302	178302	178302
14	Ignition Controller Box		1	134763	134763	134763	134763	134763	134763	134763	134763	134763	134763
15	Ignition Controller Box Cover	See illustration page 9.	1	134764	134764	134764	134764	134764	134764	134764	134764	134764	134764
16	Ignitn Cntrlr Box Mtng Brkt		1	134765	134765	134765	134765	134765	134765	134765	134765	134765	134765
17	Lockout Indicator Light (Red)		1	122075	122075	122075	122075	122075	122075	122075	122075	122075	122075
18	Ignition Controller Reset Switch		1	121925	121925	121925	121925	121925	121925	121925	121925	121925	121925

\*These ignition controllers are not interchangeable. Check controller - 12A is a Honeywell brand; 12B is a Pactrol brand.

### 12.3 Flue Collection Box and Power Venter



Item No.	Description	Qty (each)	25	50	75	100	125	165	200	250	300	400
1	Flue Collection Box Assembly	1	135893	135894	135895	135896	135897	135898	135899	135900	135901	135902
2	Venter Housing Assembly	1	135970	135970	135970	135970	135971	135972	135972	135972	135973	135973
3	Venter Wheel	1	135979	135979	135979	135979	135979	135980	135980	135980	135980	135980
4	Motor Plate	1	135981	135981	135981	135981	135981	135982	135982	135982	135982	135982
5	** Venter Fan Guard	1	136204	136204	136204	136204	136204	136204	136204	136204	136204	136204
6	*** Fan	1	68005	68005	68005	68005	68005	141570	141570	141570	141570	141570
7	Spacers	4	97721	97721	97721	97721	97721	97722	97722	97722	97722	97722
8	Venter Motor	1	133787	133787	133787	133787	133787	134974*	134974	134974	134974	134974
9	**** Sensing Tube Assembly	1	129859	129859	129859	129859	129859	129860	129860	129860	129860	129860
10	Pressure Switch	1	135054	135054	135054	135054	135054	135054	135054	135054	135054	135054
11	Tubing	1	130388 - 264mm (10-1/2")				130389- 76mm (3")		131795- 83mm (3-1/4")			

\* Size 165 - When ordering a replacement venter motor, check the shaft diameter of the motor being replaced. If the shaft measures 8mm (5/16"), a replacement venter wheel is required; order P/N 135980.

\*\* The same venter fan guard is used on all sizes, but it must be positioned differently on Sizes 25-125 than on Sizes 165-400. The guard always encloses or "faces" the fan blade.

Sizes 25-125, position the guard between the fan and the motor plate "facing" the motor.

Sizes 165-400, position the guard between the fan and the motor "facing" the motor plate.

\*\*\* Center the fan between the motor and the mounting plate with the fan hub away from the motor.

\*\*\*\* Both sensing tube assemblies are labeled as Item 9. The smaller is used on Sizes 25-125; the larger on Sizes 165-400.

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