



0063

This appliance is for use with natural or propane gas. Read these instructions thoroughly before commencing installation.

# AMBI-RAD Models TA, TB, TE Gas-Fired Unit Heaters

Installation Form WA/010/0501

APPLIES TO: Installation, Commissioning, and Service

## Table of Contents

<b>1.0 Introduction</b>	4.3 Fitting the Flue	<b>8.0 Removal and Replacement of Parts</b>
1.1 Basic Information	4.4 Gas Connection	8.1 Main Burner
1.2 Warranty	4.5 Electrical Connections	8.2 Pilot Burner Injector
<b>2.0 Technical Data</b>	4.6 Room Thermostat Siting	8.3 Pilot Burner Assembly
2.1 Specifications	<b>5.0 Air Distribution Systems</b>	8.4 Pilot Ignition System (Optional)
2.1.1 TA Specifications	5.1 Horizontal Louvres	8.5 Main Burner Injectors
2.1.2 TB and TE Specifications	5.2 Vertical Louvres (Option)	8.6 Blower Motor - TB, TE
2.2 Burner Injector Size and Pressure	5.3 Downturn Air Nozzles (Option)	8.7 Fan Motor/Blade - TA
2.3 Dimensions	5.4 Fitting Outlet Duct - Models TB, TE	8.8 Multifunctional Control Valve
2.3.1 Dimensions - TA Models	5.5 Fitting Return Air Duct - Model TE	8.9 Limit and High Temperature Limit Controls
2.3.2 Dimensions - TB Models	<b>6.0 Commissioning and Testing</b>	8.10 Fan Temperature Control
2.3.3 Dimensions - TE Models	6.1 Electrical Check	<b>9.0 Circuit Diagrams</b>
<b>3.0 General Requirements</b>	6.2 Gas Connection	9.1 Site Wiring Connections
3.1 Related Documents	6.3 Suspension and Support	9.2 Model TA
3.2 Heater Locations	6.4 Lighting the Heater	9.3 Models TB and TE
3.3 Flue System	6.5 Heater Pipework	<b>10.0 Fault Finding Charts</b>
3.4 Gas Supply	6.6 Adjustments - Main Burner and Pilot	<b>11.0 Exploded Diagrams</b>
3.5 Air Distribution System	6.7 Air Distribution System	<b>12.0 Short List of Parts</b>
3.6 Electrical Supply	6.8 Heater Controls	
<b>4.0 Installation</b>	6.9 Handing Over	
4.1 Uncrating and Preparation	<b>7.0 Servicing Instructions</b>	
4.2 Fitting the Heater	7.1 Requirements and Procedure	

**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.**

### HAZARD INTENSITY LEVELS

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

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.

## 1.0 INTRODUCTION

### 1.1 Basic Information

The instructions in this manual apply to Model T Series warm air heaters. Model TA heaters have an axial fan for air delivery. Models TB and TE have a centrifugal blower for air delivery and are intended for installation with or without ductwork. Model TE heaters include a blower cabinet. The T Series heaters are designed for either overhead suspension or mounting on a non-combustible surface and are suitable for indoor installation only.

A permanent electricity supply of 230 volts, 50 Hz, single phase is required for all TA Models. Models TB and TE may use either single phase or three phase.

Models T Series heaters are approved for:

**Type B<sub>II</sub>** - Gravity Vent, Open Flue

**Category II<sub>2H3P</sub>** - use with G20 natural gas or G31 propane gas

Each unit is fitted with a permanent pilot. A thermoelectric flame supervision device monitors the pilot flame to prevent an explosive condition occurring.

#### Warranty is void if ...

- Heater is installed in atmospheres containing flammable vapours or atmospheres containing chlorinated or halogenated hydrocarbons or atmospheres containing any silicone, aluminium oxide, etc. that adheres to spark ignition flame sensing probes.
- The installation is not in accordance with these instructions.
- 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

### 2.1 Specifications

2.1.1 TABLE 1 - Model TA SPECIFICATIONS										
Size	Heat Input		Heat Output		Maximum Gas Rate ① for G20 Natural Gas	Maximum Gas Rate ② for G31 Propane Gas	Air Volume	Running Amps③	Power ③ Consumption	Fuse Size
	kw	BTUH	kw	BTUH	m <sup>3</sup> /hr	m <sup>3</sup> /hr	m <sup>3</sup> /hr			
100	29.3	100,000	23.1	79,000	2.73	1.11	2040	1.0	240	2
125	36.6	125,000	28.9	98,750	3.41	1.39	2460	1.0	240	2
150	43.9	150,000	35.1	120,000	4.10	1.67	3300	1.0	240	2
175	51.3	175,000	40.5	138,250	4.78	1.95	3300	1.0	240	2
200	58.6	200,000	46.9	160,000	5.46	2.23	4260	1.5	375	5
225	65.9	225,000	52.1	177,750	6.15	2.50	4260	1.5	375	5
250	73.2	250,000	58.6	200,000	6.83	2.78	5700	2.0	480	5
300	87.9	300,000	69.4	237,000	8.20	3.34	5700	2.0	480	5
350	102.5	350,000	81.0	276,500	8.57	3.90	6600	2.9	750	7.5
355	102.5	350,000	81.0	276,500	8.57	3.90	7560	2.9	750	7.5
400	117.1	400,000	92.5	316,000	10.95	4.45	7560	2.9	750	7.5

① Gas flow rate is based on a gas with a gross C.V. of 39.9 MJ/m<sup>3</sup> (1030 BTUH) and includes a pilot flow rate of 351 watts (1200 BTUH)  
 ② Gas flow rate is based on a gas with a gross C.V. of 101.6 MJ/m<sup>3</sup> (2500 BTUH) and includes a pilot flow rate of 351 watts (1200 BTUH)  
 ③ Based on normal operation at 240 volts and 50 hertz.

2.1.2 TABLE 2A - Model TB and Model TE SPECIFICATIONS														
Size	Heat Input		Heat Output		Maximum Gas Rate① for G20 Natural Gas	Maximum Gas Rate ② for G31 Propane Gas	Blower ③	Air Volume④ Free Blow		Air Volume⑤ Flow @ 125 Pa		Running Amps ⑥	Power Consumption ⑥	Fuse Size ⑥
	kw	BTUH	kw	BTUH	m <sup>3</sup> /hr	m <sup>3</sup> /hr	RPM	m <sup>3</sup> /hr	Rise °C	m <sup>3</sup> /hr	Rise °C			
75	22.0	75,000	17.6	60,000	2.05	0.83	550	2900	18	2050	26	5.4	696	10
100	29.3	100,000	23.1	79,000	2.73	1.11	710	3650	19	2400	29	5.4	696	10
125	36.6	125,000	28.9	98,750	3.41	1.39	710	3650	23	2900	30	5.4	696	10
150	43.9	150,000	35.1	120,000	4.10	1.67	670	4700	25	2900	36	5.4	696	10
175	51.3	175,000	40.5	138,250	4.78	1.95	670	4700	29	2900	42	5.4	696	10
200	58.6	200,000	46.9	160,000	5.46	2.23	700	4600	30	3750	37	5.6	879	10
225	65.9	225,000	52.1	177,750	6.15	2.50	700	4600	34	3750	42	5.6	879	10
250	73.2	250,000	58.6	200,000	6.83	2.78	800	6400	27	5250	33	7.5	1025	15
300	87.9	300,000	69.4	237,000	8.20	3.34	800	6400	33	5250	40	7.5	1025	15
350	102.5	350,000	81.0	276,500	8.57	3.90	810	8400	29	7500	33	7.8	1429	15
355	102.5	350,000	81.0	276,500	8.57	3.90	770	8850	28	8150	30	7.8	1429	15
400	117.1	400,000	92.5	316,000	10.95	4.45	770	8850	32	8150	34	7.8	1429	15

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 351 watts (1200 BTUH)  
 ② Gas flow rate is based on a gas with a C.V. of 101.6 MJ/m<sup>3</sup> (2500 BTUH) and includes a pilot flow rate of 351 watts (1200 BTUH)  
 ③ Approximate speed of factory setting of standard drive components.  
 ④ Approximate air performance at factory blower speed setting of standard drive components.  
 ⑤ Approximate air performance when standard drive components are at maximum setting.  
 ⑥ Based on normal operation at 240 volts and 50 hertz with standard motor. Refer to TABLE 2B, Optional Motor Table, for motor amps and power consumption ratings when equipped with other-than-standard motors.

2.1.2 TABLE 2B - STANDARD MOTOR SIZE, Model TB or TE		
TB or TE Size	Blower Motor	
	kw	HP
75, 100, 125, 150, 175	0.375	0.5
200, 225	0.56	0.75
250, 300	0.73	1
350, 355, 400	1.12	1.5

2.1.2 TABLE 2C - ELECTRICAL SPECIFICATIONS of Model TB or TE with OPTIONAL MOTOR									
Blower Motor	kw	0.375	0.56	0.73	1.12	0.75	1.12	1.5	2.25
	HP	0.5	0.75	1	1.5	1	1.5	2	3
Voltage		220-240 V, 1 PH, 50 Hz				400-415 V, 3 Ph, 50 Hz			
Starting Current		20.1	26	37.5	41.7	12.4	17.2	22.3	27.3
Running Current		5.4	5.6	7.5	7.8	2.0	2.8	3.4	4.9
Power Consumption		696	879	1025	1429	1023	1459	1831	2750
Fuse Size		10	10	15	15	5	5	7.5	7.5

## 2.2 Burner Injector Size and Pressure

### Natural Gas

**2.2.1 TABLE 3 - G20 (Natural) GAS INJECTOR SIZE, BURNER PRESSURE, AND INLET PRESSURE**

Size	Injector Quantity	Injector Size	Injector Marking	Burner Pressure		Minimum Inlet Pressure	Maximum Inlet Pressure	Gas Rate Per Burner
		mm		mbar	in. w.g.	mbar	mbar	M <sup>3</sup> /Hr
75	4	2.10	45	8.5	3.4	12.5	30	0.52
100	4	2.35	42	8.5	3.4	12.5	30	0.69
125	5	2.35	42	8.5	3.4	12.5	30	0.69
150	7	2.20	44	9.0	3.6	14.0	30	0.59
175	7	2.35	42	8.5	3.4	16.0	30	0.69
200	9	2.25	43	8.5	3.4	12.5	30	0.61
225	9	2.35	42	8.5	3.4	12.5	30	0.69
250	12	2.20	44	8.5	3.4	15.0	30	0.57
300	12	2.35	42	8.5	3.4	15.0	30	0.69
350	14	2.35	42	8.5	3.4	17.0	30	0.69
355	16	2.35	42	7.0	2.8	17.0	30	0.60
400	16	2.35	42	8.5	3.4	17.5*	30	0.69

\*When fitted with optional modulating burner control, Model 400 requires minimum inlet pressure of 19 mbar of natural gas.

### Propane Gas

**2.2.2 TABLE 4 - G31 (Propane) GAS INJECTOR SIZE, BURNER PRESSURE AND INLET PRESSURE**

Size	Injector Quantity	Injector Size	Injector Marking	Burner Pressure		Minimum Inlet Pressure	Maximum Inlet Pressure	Gas Rate per Burner
		mm		mbar	in. w.g.	mbar	mbar	M <sup>3</sup> /Hr
75	4	1.20	1.20	21.5	8.6	27	35	0.21
100	4	1.45	1.45	21.5	8.6	27	35	0.28
125	5	1.45	1.45	21.5	8.6	27	35	0.28
150	7	1.35	1.35	21.5	8.6	27	35	0.24
175	7	1.45	1.45	21.5	8.6	28	35	0.28
200	9	1.40	54	21.5	8.6	28	35	0.25
225	9	1.45	1.45	21.5	8.6	28	35	0.28
250	12	1.35	1.35	21.5	8.6	30	35	0.23
300	12	1.45	1.45	21.5	8.6	30	35	0.28
350	14	1.45	1.45	21.5	8.6	30	35	0.28
355	16	1.35	1.35	21.5	8.6	30	35	0.24
400	16	1.45	1.45	21.5	8.6	30	35	0.28

## 2.3 DIMENSIONS

### 2.3.1 Dimensions of Standard Model with Axial-Fan for Air Delivery

Figure 2

NOTE: Sizes 100-225 have a single axial fan. Sizes 250-400 have dual fans.

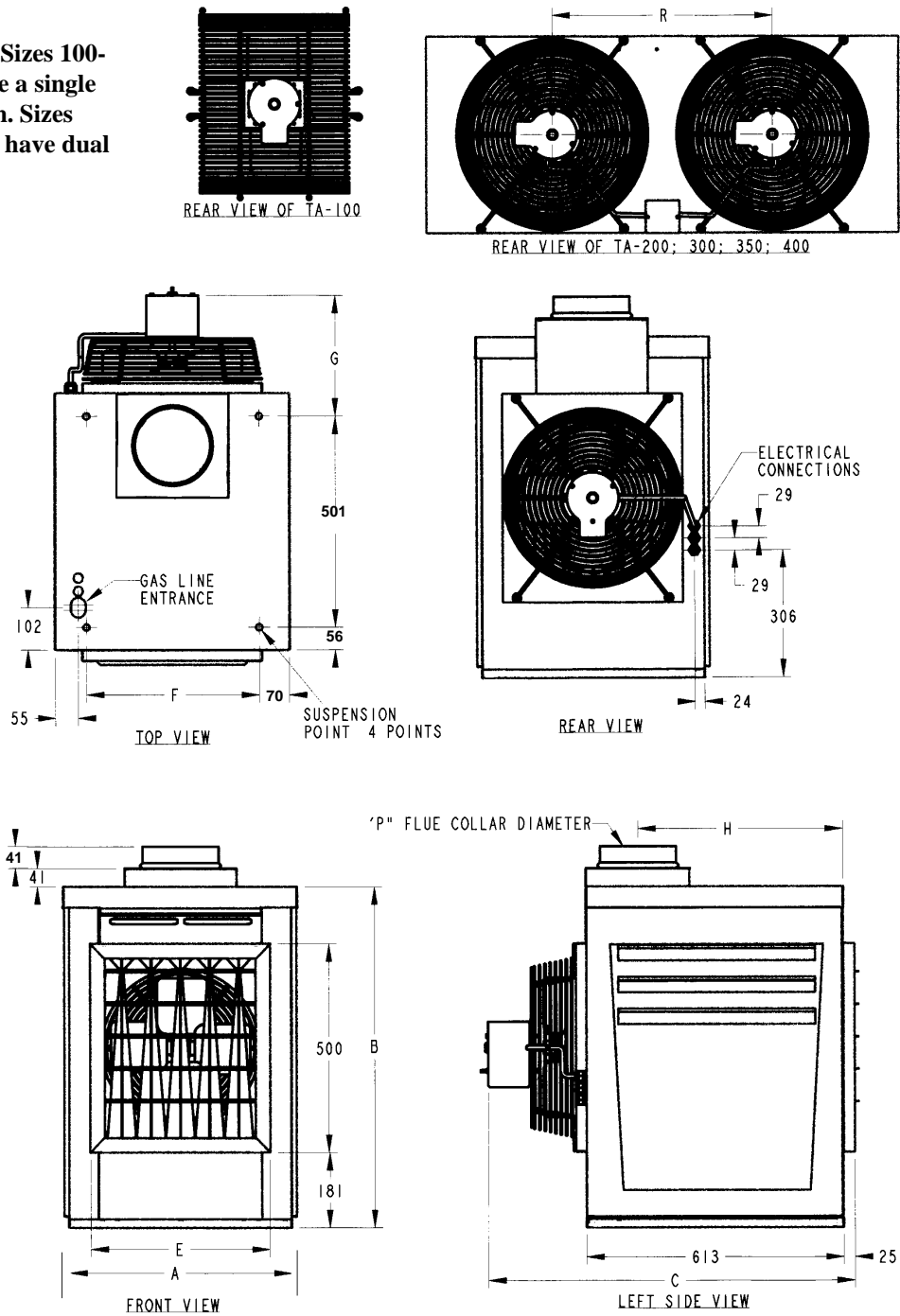
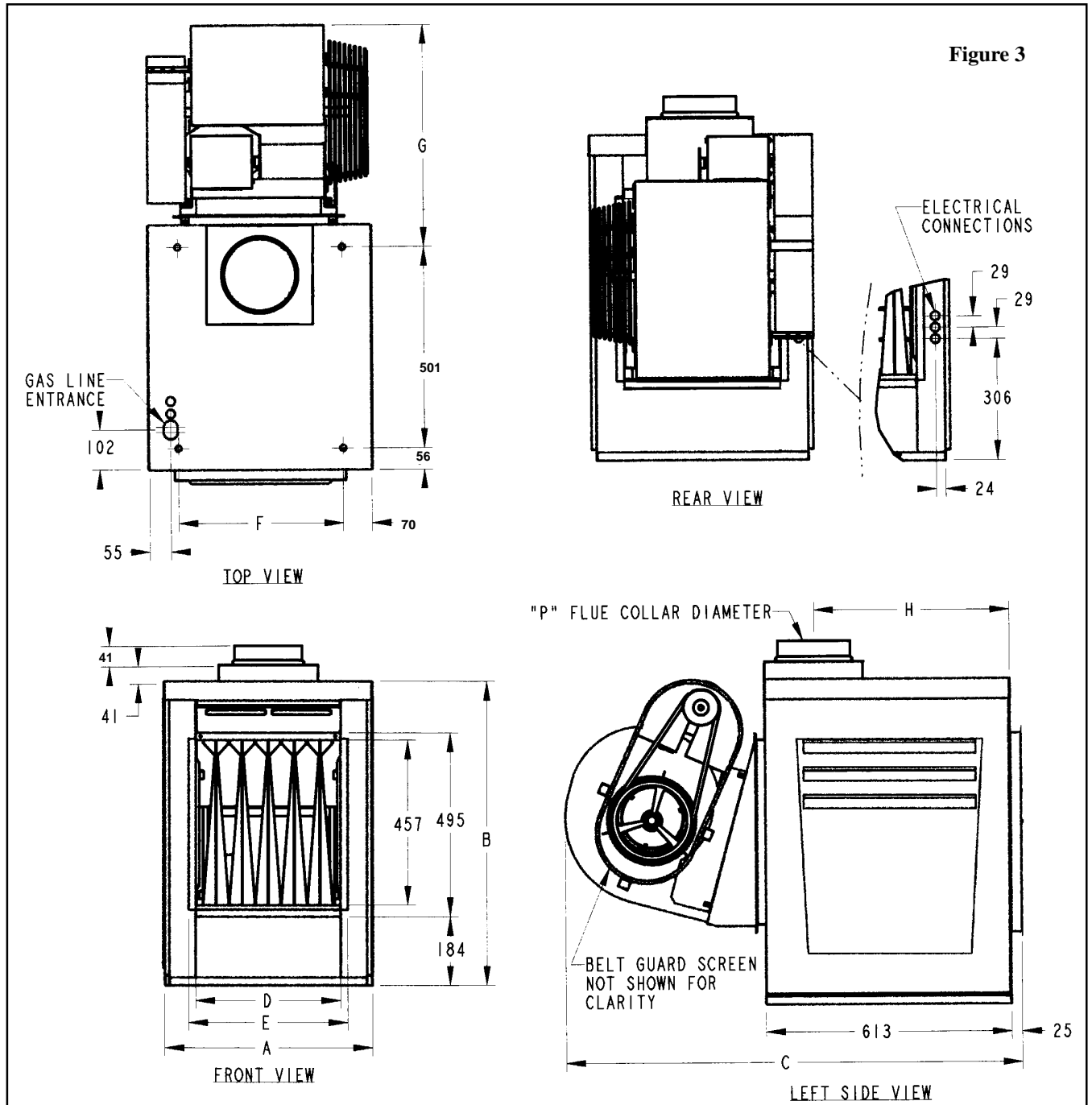


TABLE 5

Model TA	A mm	B mm	C mm	E mm	F mm	G mm	H mm	P mm	R mm
100	489	819	865	360	348	283	489	150	—
125	559	819	908	430	418	326	489	175	—
150	699	819	927	570	558	345	489	200	—
175	699	819	927	570	558	345	489	200	—
200	838	895	929	710	698	347	438	200	—
225	838	895	929	710	698	347	438	200	—
250	1048	895	921	919	908	339	438	200	432
300	1048	895	921	919	908	339	438	250	432
350	1187	895	929	1059	1048	347	438	250	508
355	1327	895	929	1199	1187	347	438	250	559
400	1327	895	929	1199	1187	347	438	250	559

### 2.3.2 Dimensions of Standard Model with Centrifugal Blower (less Cabinet) for Air Delivery



**TABLE 6**

Model TB	A mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	P mm
75	489	819	1133	317	355	348	551	489	125
100	489	819	1133	317	355	348	551	489	150
125	559	819	1133	387	425	418	551	489	175
150	699	819	1226	527	565	558	644	489	200
175	699	819	1226	527	565	558	644	489	200
200	838	895	1226	667	705	698	644	438	200
225	838	895	1226	667	705	698	644	438	200
250	1048	895	1133	876	914	908	551	438	200
300	1048	895	1133	876	914	908	551	438	250
350	1187	895	1226	1016	1054	1048	644	438	250
355	1327	895	1226	1156	1194	1187	644	438	250
400	1327	895	1226	1156	1194	1187	644	438	250

## 2.3 DIMENSIONS (cont'd)

### 2.3.3 Dimensions of Standard Model with a Blower Cabinet

Figure 4

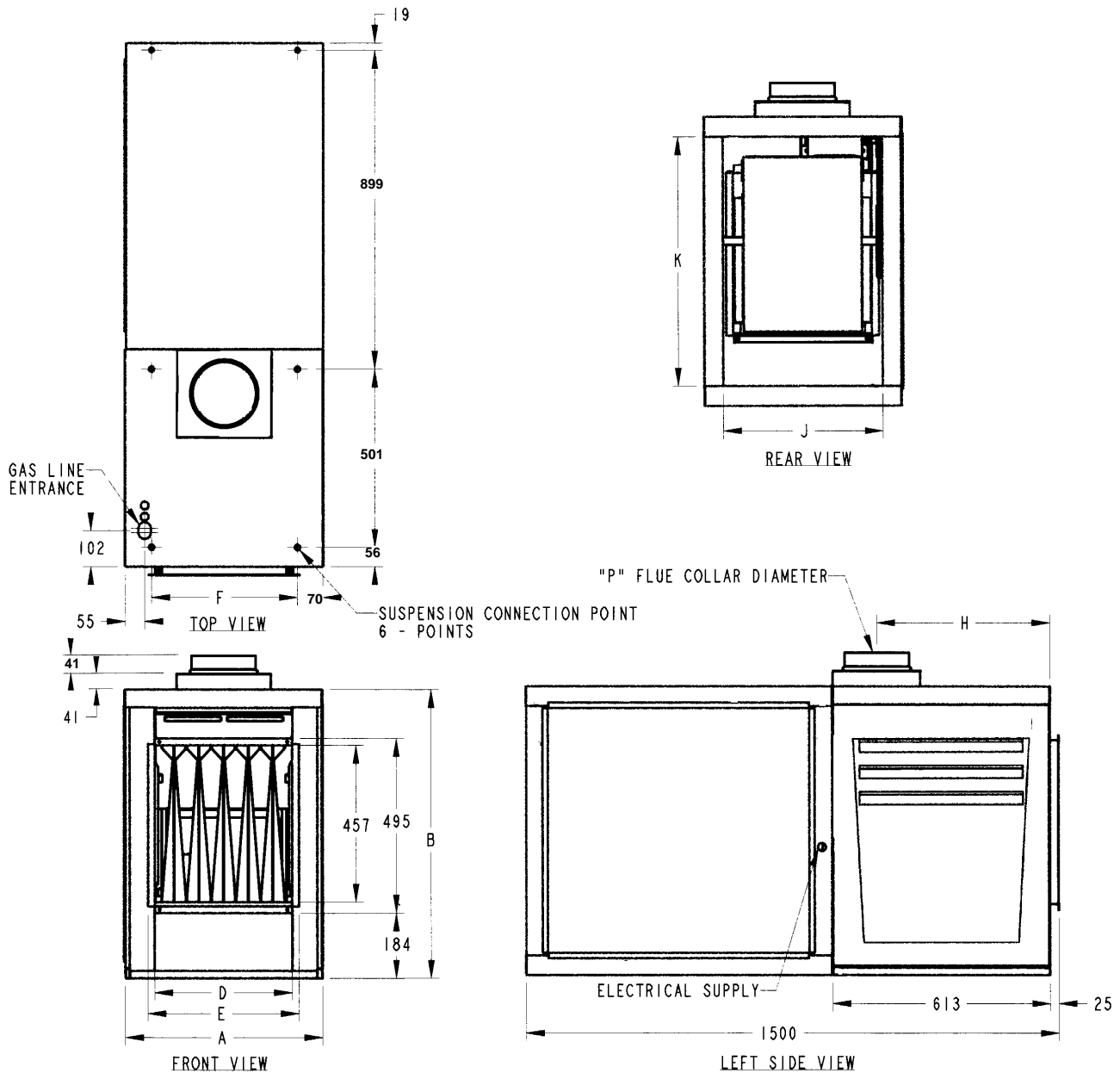


TABLE 7

Model TE	A	B	D	E	F	H	J	K	P
	mm	mm	mm	mm	mm	mm	mm	mm	mm
75	489	819	317	355	348	489	451	706	125
100	489	819	317	355	348	489	451	706	150
125	559	819	387	425	418	489	451	706	175
150	699	819	527	565	558	489	591	706	200
175	699	819	527	565	558	489	591	706	200
200	838	895	667	705	698	438	730	783	200
225	838	895	667	705	698	438	730	783	200
250	1048	895	876	914	908	438	940	783	200
300	1048	895	876	914	908	438	940	783	250
350	1187	895	1016	1054	1048	438	1080	783	250
355	1327	895	1156	1194	1187	438	1219	783	250
400	1327	895	1156	1194	1187	438	1219	783	250

## 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 relevant requirements of the following regulations.

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 combustion air and flue system. The location must also provide required clearances and adequate space for servicing.

**TABLE 8 - REQUIRED CLEARANCES (mm) - All Sizes**

Top	Sides		Bottom		Rear
	Control	Other	To Combustibles	To Non-Combustibles	(Measuring from cabinet)
152	See Note	152	152	0	750

**NOTE:** Service Clearance for Control Side is the width of the unit plus 152 mm in order to remove the drawer-type burner rack.

**CAUTION: 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 9 for recommended mounting height. Air heaters with centrifugal fans are designed for higher airflows. Downflow nozzles are recommended for heaters at upper mounting heights, and 90° downturn heads for heaters mounted above these heights.

**TABLE 9 - RECOMMENDED MOUNTING HEIGHTS (m)**

Size	75-175	200-250	300-400
<b>Axial Fan</b>	2.5-3.0	2.5-3.5	3.0-3.5
<b>Centrifugal Fan</b>	2.5-4.0	3.0-4.0	3.0-5.0

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, units 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(s) so tempered air is discharged directly toward the source of cold air from a distance of 4.5 to 6.0 meters. The use of downturn 30°, 60°, or 90° nozzles is recommended for units at the higher mounting heights.

### 3.3 Flue System

Each heater must be fitted with an adequately sized flue (See Table 10). Stainless steel flue pipe is recommended.

Model Size	Nominal Flue Diameter (mm)	Minimum Flue Height (m)
75	125	2
100	150	2
125	175	2
150	200	2
175	200	2
200	200	2
225	200	2
250	200	2.5
300	250	2
350	250	2.5
355	250	2.5
400	250	2.5

**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 natural draught gas burning equipment requires a properly operating flue system, correct provision for combustion air, and regular maintenance and inspection.**

The unit heater is fitted with an integral draught diverter. Do not use an external draught diverter, barometric damper and/or restrictive damper.

When condensation is possible within the flue, double wall flue pipe is recommended. When double wall flue pipe is used, it should be a type complying with British Standards. Double wall flue pipe requires the use of a special flue socket adapter. 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 (3/4 in.) diameter.

### 3.0 GENERAL REQUIREMENTS (cont'd)

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.

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 (1 inch) 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 (2 in.) from any other combustible material.

The joint between the female flue socket of the heater and the flue must be sealed. If twin wall flue piping is used, the appropriate adapter must be fitted.

The joints between the flue and the roof must be made good to prevent water ingress.

#### 3.4 Gas Supply Pressure

These heaters are designed to operate on either G20 natural gas or G31 propane gas. Refer to Tables 3 and 4 or the data plate for minimum and maximum supply pressure. Before installation, check that the local distribution conditions, nature of gas and pressure, and adjustment of the appliance are compatible.

The gas meter and service must be checked by the gas supplier to ensure that it is adequate to deal with the total connected load of the completed installation.

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 Document IGE/UP/1.

#### 3.5 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).

#### 3.6 Electrical Supply

Wiring external to the air heater must be installed in accordance with local requirements and meet national regulations including I.E.E. Regulations. Wiring must be carried out by a qualified electrician.

A constant 220-240V, 50 Hz single phase supply is required for all heaters equipped with axial fan(s) for air delivery. Depending on the electrical components, heaters with a centrifugal blower may use either 220-240V, 50 Hz single phase or 415V, 50Hz three phase supply. All heaters and controls must be correctly earthed. An isolator with a contact separation of at least 3 mm on all poles should be installed 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.

Electrical supply entrance is on the rear of the heater. The final connection to the heater should be to the appliance terminal block in the heater electrical box. See the connection diagram in Paragraph 9.1.

Supply cable size should be 1.0 mm for a model equipped with an axial fan. Larger cable may be required for heaters with a centrifugal blower. See Section 2, Technical Data, for required fuse size.

Fit the cord anchor supplied with the heater. 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.

### 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 fitted 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.

#### 4.2 Fitting the Heater

Before fitting 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 weights in Table 11.

Model with following type of Air Delivery Equipment		Size							
		75	100	125	150 175	200 225	250 300	350	355 400
With Axial Fan	kg	—	80	86	93	118	146	166	191
With Blower	kg	90	90	115	134	145	175	195	221
With Blower and Cabinet	kg	106	106	134	151	160	206	213	251

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 lifting a centrifugal-blower unit, support the blower and motor to prevent the unit from tipping. When lifting a unit with a blower cabinet, support the blower cabinet. Blower models may have legs to support the blower assembly during shipping. After the unit is fitted at the site, these legs should be removed.

Material used to support any heater whether suspended or base mounted 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: Units must be level for proper operation. Do not place or add additional weight to the heater.**



## 4.2 Fitting the Heater (cont'd)

### 4.2.1 Suspending the Heater

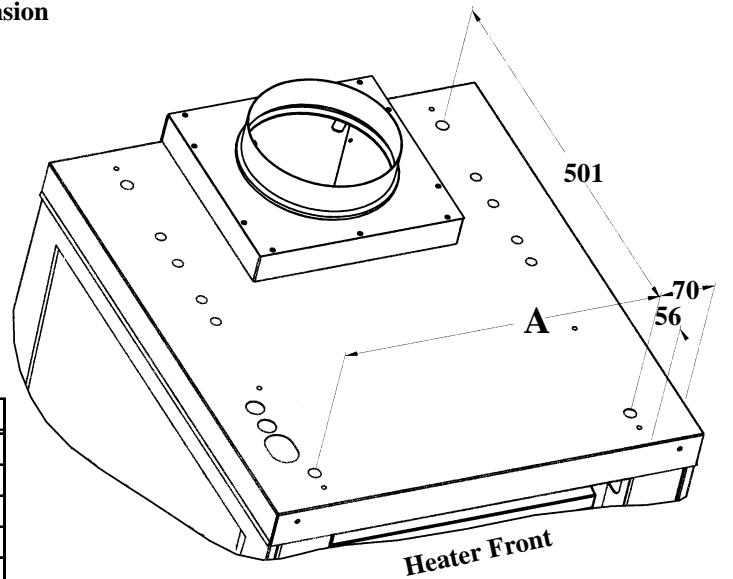
Heaters are equipped with four suspension points to receive an M10 eyebolt or threaded rod. See dimensions in Figure 5.

Blower models must be suspended with rigid support material. Do not use chain or flexible support material for heaters with centrifugal blowers. Blower models with a cabinet have six suspension points.

**WARNING: Suspend the heater only from the suspension points. Do not suspend from the heater side or top panel.**

**Figure 5 - Suspension Dimensions**

Size	A (mm)
75/100	348
125	418
150/175	558
200/225	698
250/300	908
350	1048
355/400	1187



**NOTE: Blower Models with a blower cabinet have six suspension points. See additional dimensions on page 6.**

### 4.2.2 Mounting the Heater

These heaters may be base mounted on a non-combustible support. Always ensure the heater is adequately secured.

## 4.3 Fitting the Flue System

The flue pipe system attaches directly to the flue socket provided on the heater. The socket is sized to accept standard metric sheetmetal flue pipe. When double wall flue pipe is used, a suitable adapter is required.

It is recommended that a split socket is fitted so that if necessary the heater may be removed for servicing.

Any joints should be secured using three pop rivets or sheradized sheet metal screws at each joint. The joints of the flue must be sound. The flue pipe should be supported so that the heater does not carry any of the flue weight. Flues must be fitted with an approved flue terminal.

## 4.4 Gas Connection

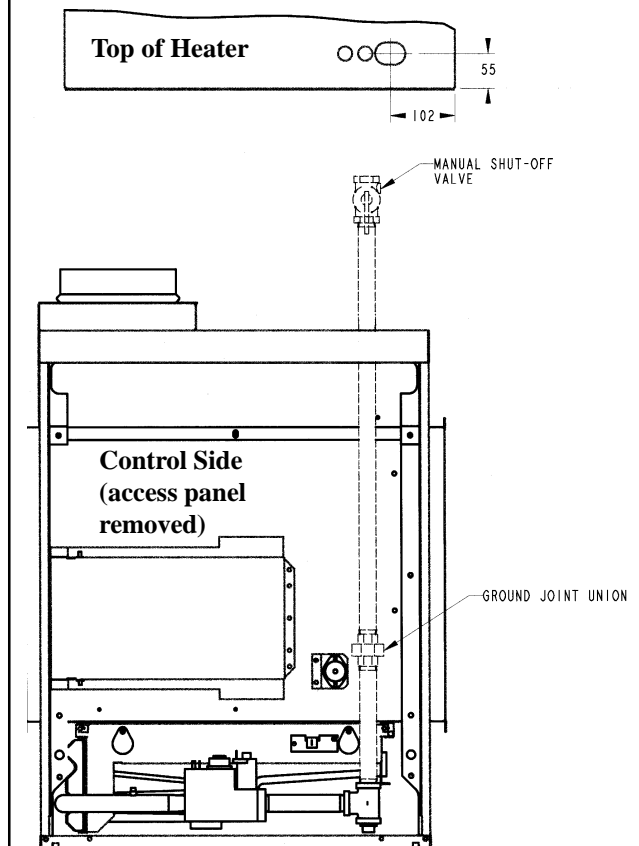
Fit the heater with the piping arrangement shown in Figure 6.

**NOTE:** When removed, the side access panel is designed to hang from the bottom of the heater. Place the extended top edge of the side panel over the lip on the bottom panel of the heater. The side panel will "hang" suspended from the bottom panel until ready to be re-installed on the heater.

Heaters suspended by flexible support material or drop rods should 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.

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

**Figure 6 - Recommended Gas Supply Piping Arrangement**



Dotted lines indicate site provided piping and connections

## 4.0 INSTALLATION (cont'd)

### 4.5 Electrical Connections

All electrical connections should be made in the heater terminal box. Screw-type terminals are provided. Connections should be in accordance with terminal markings 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/blower.** Control panels that incorporate time and temperature control and/or remote reset are available from AMBI-RAD.

Units fitted with automatic spark ignition may have a remote reset facility by wiring to the terminal strip in the electrical box as indicated on the wiring diagram. **CAUTION:** The cause for activating the lockout control should be identified and corrected before resetting. If the first reset is not successful, wait 15 seconds before pushing the reset button.

### 4.6 Room Thermostat Siting

The siting of the thermostat or panel is particularly important. It should not be fitted on an outside wall. Avoid locating the thermostat in draughty areas or where it may be directly exposed to heat from the sun or other heat sources. The thermostat or panel should be mounted on an internal wall or column about 1.5 m above the floor. Follow the thermostat manufacturer's instructions when fitting a thermostat. The thermostat must be suitable for switching 240 volts.

Do not attempt to control more than one heater from a thermostat or panel unless a properly wired relay is fitted. If correctly fitted with relays, a thermostat or panel can be used to control several heaters. An AMBI-RAD SU4 slave panel allows up to four heaters to be controlled from a single panel.

## 5.0 AIR DISTRIBUTION SYSTEMS -- Standard and Optional

### 5.1 Horizontal Louvres

Model TA heaters are factory supplied with adjustable horizontal louvres. Model TB and TE heaters are factory supplied less louvres for direct attachment to ductwork. For free blowing applications, optional horizontal louver frames may be added to a Model TB or TE heater. 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 Optional Vertical Louvres

Louvre frames 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.

### 5.3 Optional Downturn Air Nozzles

Heaters can be fitted with optional downturn nozzles to direct the discharge air toward the floor. Downturn nozzles are recommended for Sizes 75-175 installed above 3 m and Sizes 200-400 installed above 4 m. Downturn nozzles should always be fitted to units mounted above the recommended heights in Table 9.

A 30° downturn nozzle changes discharge air direction up to 57°. A 60° downturn nozzle changes discharge air direction up to 90°. A 30° downturn nozzle may be used with vertical louvres. Do not fit vertical louvres on an axial fan heater with a 60° downturn nozzle. When vertical louvres are required with a 60° nozzle, a centrifugal fan unit must be used. A 90° nozzle with optional two-way or four-way discharge plenum is also available for centrifugal fan models.

All downturn nozzles are designed for site assembly and fitting.

### 5.4 Fitting Outlet Ductwork - Model TB and Model TE

Low heat capacity materials should be used for the construction of warm air delivery and should be insulated when passing through unheated spaces. Joints and seams of all outlet air ducts and fittings must be securely fastened and made airtight.

It is good practice to fit an access door 250 mm high x 150 mm wide in the side of the outlet duct, adjacent to the heater, to allow for observation of the heat exchanger at annual service.

All ducting must be securely supported in such a way that there is no undue strain. The heater should not be used to provide any support for the ductwork. If equipped with louvres, remove the louvres and louver frame before attaching ductwork. Attach the ductwork to the flanges; **do not attach ductwork to the heater cabinet.** Joints to the heater outlet must be securely sealed to prevent air leakage into the draughthood or burner area. Leakage can cause poor combustion and/or a pilot problem and shorten heat exchanger life.

**TABLE 12 - OUTLET DUCT CONNECTION SIZE**

Heater Size	Width	Height
	mm	mm
75 - 100	317	462
125	387	462
150 - 175	527	462
200 - 225	667	462
250 - 300	876	462
350	1016	462
355 & 400	1156	462

### 5.5 Fitting Return Air Ductwork - Model TE

Return air (inlet) ducting may be attached to the blower cabinet. The rear of the standard blower cabinet is totally open.

The cabinet is available with a smaller inlet opening with a spigot or as a mixing box with two openings with spigots.

**TABLE 13 - INLET DUCT CONNECTION SIZE (mm)**

Heater Size	Standard Blower Cabinet		Optional Blower Cabinet	
	Width	Height	Width	Height
75 - 100 - 125	451	706	451	495
150 - 175	591	706	591	495
200 - 225	730	783	730	495
250 - 300	940	783	940	495
350	1080	783	1080	495
355 & 400	1219	783	1219	495

## 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 and check for proper voltage.  
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.
- ❑ Centrifugal Fan Models -- Check belt tension; see Section 6.7.5. Check blower rotation; see Section 6.7.6. After heater is in operation, verify that the amp draw does not exceed maximum allowed on motor data plate.

### 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 Document IGE/UP/1.

### 6.3 Suspension and Support

Check to ensure that the heater is adequately suspended or supported 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 (Read and understand all steps before lighting.)

The heater is fitted with either a permanent pilot which requires lighting or an automatic spark ignition system. Determine the type of pilot and follow the appropriate instructions.

#### 6.4.1 Lighting a Heater with a Permanent Pilot

- ❑ Ensure that the electrical supply to the heater is turned "On"
- ❑ Set the room temperature controller to lowest setting. If a clock control and a summer/winter switch have been fitted, ensure that they are set to "ON" and winter.
- ❑ Turn on the main gas supply to the heater.

Remove the access panel on the control side of the heater. (While servicing the heater, the side access panel is designed to "hang" from the bottom panel of the heater. Place the extended top edge of the side panel over the lip on the bottom panel of the heater. The side panel will "hang" suspended from the bottom panel until ready to be re-installed on the heater.)

With the panel removed, the pilot lighting hole is in view (on the right side of the burner rack).

### **WARNING: If for any reason the pilot light goes out, allow three minutes before relighting.**

Locate the multifunctional control valve and identify the control knob. While lighting the pilot, depress the control knob. Once the pilot is established continue to depress the knob for 20 seconds and then release slowly.

Re-attach the access panel.

Adjust the room temperature control setting to above the ambient temperature. The main burners will light (the main burners can be seen through the viewing port).

#### 6.4.2 Turning "OFF" a Heater with a Permanent Pilot

To turn off both the pilot and the main burner, rotate the knob on the multifunctional valve in a clockwise direction. **WAIT THREE MINUTES BEFORE RELIGHTING THE HEATER.**

#### 6.4.3 Turning "ON" a Heater with Spark Ignition

The ignition spark ignites the gas creating a pilot flame. The flame is detected by the flame rod. If a pilot flame is not detected within 50 seconds, the ignition controller locks out and must be manually reset. The reset button is on the heater (or a site-provided, remote button may be fitted).

- ❑ Ensure that the electrical supply and the gas supply to the heater are turned "ON"
- ❑ If fitted with a clock control, set to "ON".
- ❑ 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.

#### 6.4.4 Turning "OFF" a Heater with Spark Ignition

To turn "OFF" the heater for a short period, 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.

To turn "OFF" the heater for a long period, 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 be 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 1, Technical Data (Table 3 or 4), the correct burner pressure for the heater.
- 2) Turn the room temperature control to its lowest setting.
- 3) Remove the screw from the outlet pressure test point of the gas valve (See Figure 7, page 12). Connect a manometer to the test point.

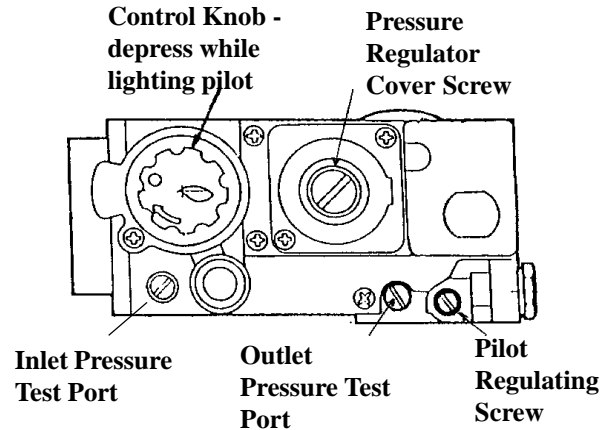
## 6.0 COMMISSIONING AND TESTING (cont'd)

### 6.6.1 Burner Gas Adjustment (cont'd)

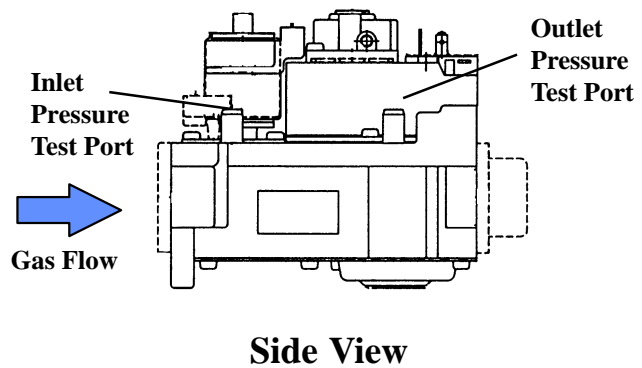
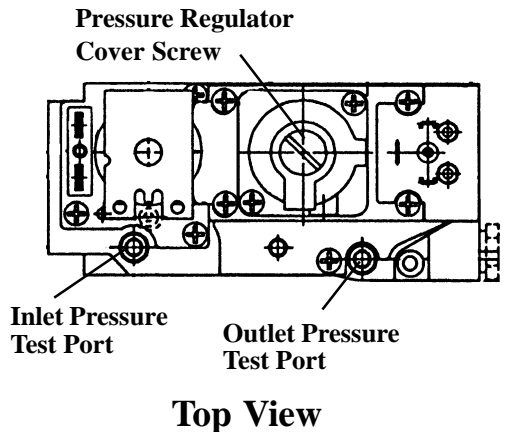
Figure 7 - Multifunctional Control Valves

(NOTE: When measuring gas pressure, do not remove screw. Loosen enough to allow gas pressure to register.)

Multifunctional Control Valve on a Heater with a Standard Permanent Pilot



Multifunctional Control Valve on a Heater with Optional Spark Ignition



#### 6.6.1 Burner Gas Adjustment (cont'd)

- 4) Adjust the room temperature control to a setting above ambient temperature.
- 5) Observe the gas pressure on the manometer and compare to 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.

Reset temperature control to required operating temperature.

#### 6.6.2 Pilot Flame Adjustment - Permanent Pilot

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 G20 natural gas inlet pressure to the heater exceeds 25 mbar (10 inches W.G.), the pilot rate should be reduced.

##### Pilot Flame Adjustment Instructions

- 1) Remove the cover screw (see Figure 7).
- 2) To adjust the pilot flame, turn the adjusting screw clockwise to reduce the flow.
- 3) Replace the cover screw after pilot adjustment is completed.

## 6.7 Air Distribution System

### 6.7.1 General Requirements

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

### 6.7.2 Free Blowing Heaters

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.**

The free blowing heater is equipped with a motor with thermal overload protection of the automatic reset type. Should the motor refuse to run, it may be because of improper current characteristics. Make certain that the correct voltage is available at the motor.

### 6.7.3 Ducted Heaters - Model TB or Model TE

Heaters with a centrifugal blower for air delivery are limited to a maximum external pressure of 500 Pa (2.0 inches W.G.) and a temperature rise of 42°C.

Most motors are equipped with thermal overload protection of the automatic reset type. If a motor is not equipped with thermal overload protection, the unit will be and the starter must be manually reset.

After the installation is complete including all ductwork, check the amp draw of the motor with an amp meter to verify that the motor amp rating on the motor data plate is not being exceeded. Amps may be adjusted downward by reducing blower speed or by increasing the duct system static pressure. The temperature rise must be within the range specified on the unit rating plate.

### 6.7.4 Adjusting Centrifugal Fan (Blower) Speed

The blower speed may be adjusted to achieve the desired outlet temperature, as long as the adjustment is within the temperature rise and the static pressure limits shown on the heater rating plate. Motors are factory set between maximum and minimum blower speeds.

If the duct resistance is low, the blower may deliver too high an air volume. If the resistance is very low, the blower may deliver excess air to overload the motor, causing the overload protector to cycle the motor. Reducing the blower speed will correct these conditions. If ductwork is added to an installation, it may be necessary to increase the blower speed. Decreasing blower speed will increase outlet temperature; increasing blower speed will decrease outlet temperature. The belt drive on these units is equipped with an adjustable pulley which permits adjustment of the blower speed. Follow these instructions to adjust the blower speed.

1. Turn off the gas and the electric power.
2. Loosen belt tension and remove the belt.
3. Loosen the set screw on the side of the pulley away from the motor.
4. **To increase the blower speed, decreasing outlet temperature, turn the adjustable half of the pulley inward. To decrease the blower speed, increasing the outlet temperature, turn the adjustable half of the pulley outward.** One turn of the pulley will change the speed 8-10%.
5. Tighten the set screw on the flat portion of the pulley shaft.
6. Replace the belt and adjust the belt tension. Adjust tension by turning the adjusting screw on the motor base until the belt can be depressed 19 mm. (See Figure 13, page 16.) Re-tighten the lock nut on the adjusting screw.
7. Turn on the gas and electric. Light the heater following the instructions on the lighting instruction plate.
8. Check the motor amps with an amp meter. The maximum motor amp rating on the motor nameplate must not be exceeded.

When service is complete, carry out commissioning procedure, Section 6.0-6.8.

### 6.7.5 Check Belt Tension

Check the belt for proper tension. Proper belt tension is important to the long life of the belt and motor. A loose belt will cause wear and slippage. Too much tension will cause excessive motor and blower bearing wear. Adjust the belt tension by turning the adjusting screw on the motor base until the belt can be depressed 19 mm. (See Figure 13, page 16.) After correct tension is achieved, re-tighten the locknut on the adjusting screw.

### 6.7.6 Blower Rotation

Each blower housing is marked for proper rotation. Rotation may be changed on single-phase motors by re-wiring in the motor terminal box. Three-phase motors may be reversed by interchanging two wires on the 3-phase supply connections.

## 6.8 Heater Controls

### 6.8.1 Standard Heater Controls

Check heater operation after all adjustments have been carried out. Set the room temperature control to above ambient temperature. The main burner will light. Within approximately 30 seconds, the fan thermostat control will sense a rise in the temperature of the heat exchanger and energize the fan or blower motor. (The fan control has a fixed setting and cannot be adjusted.)

Continue to operate the heater for several minutes to ensure the limit switch does not activate. The limit switch is a manually reset switch which must be cooled to room temperature before being reset. The reset button is accessible by opening the heater control panel. 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 main burners should extinguish while the fan or blower 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 or blower motor.

The circuit diagram on the heater indicates the type of gas control.

### 6.8.2 Heater with Optional Two-Stage Gas Control

Checks and operation sequence are the same as in Section 6.8.1, except that the heater is controlled by a two-stage temperature controller and a two-stage valve (50% and 100%). Depending on the temperature control setting, the gas valve fires the burner at either 50% or 100%.

### 6.8.3 Heater Controls with Optional Electronic Modulation Gas Control

Checks and operation sequence are the same as in Section 6.8.1, except that the gas valve is electrically controlled to modulate between 50% to 100% firing rate depending on the temperature requirement.

## 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. A complete after sales service is available from AMBI-RAD.

## 7.0 SERVICING INSTRUCTIONS

**WARNING: Only competent and qualified engineers should carry out servicing and fault finding on this equipment. Complete after-sale 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.

### 7.1 Servicing Requirements/Procedure

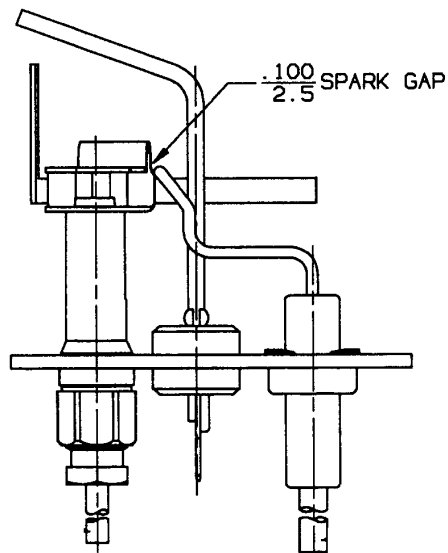
The following procedures should be carried out at least annually:

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. 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 thermocouple or flame rod and clean with an emery cloth. Remove all deposits. If signs of erosion are visible, renew the thermocouple or flame rod. On pilots with a flame rod (spark ignition), check the spark gap (2.5 mm).

**Figure 8 - Check Spark Gap on Optional Spark Pilot Assembly**



- 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. **Model TA** — The fan blade, fan guard and motor should be cleaned to remove any buildup of dust, fluff, etc.

**Model TB** — The blower, belt guard, inlet guard and motor should be cleaned to remove any buildup of dust or fluff. The blower belt should be checked for tension and wear. Worn belts should be replaced (See Section 8.6).

**Model TE** — The blower and motor should be cleaned to remove any buildup of dust or fluff. The blower belt should be checked for tension and wear. Worn belts should be replaced (See Section 8.6).

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.
8. When service is complete, carry out commissioning procedure, Section 6.0-6.8.

## 8.0 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.

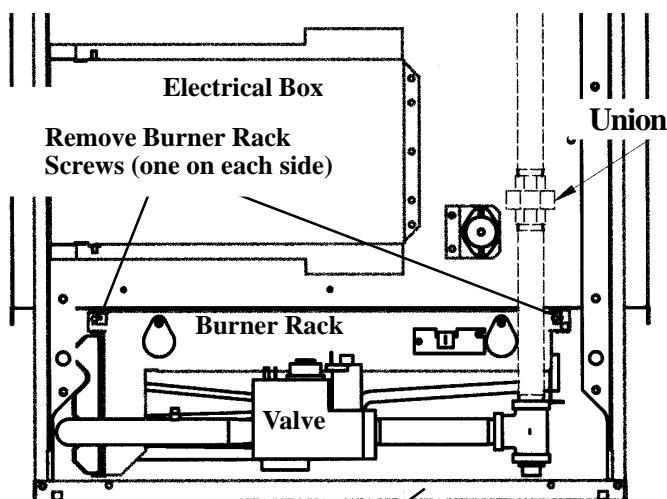
After maintenance work, the heater **MUST** be fully commissioned (See Section 6).

### 8.1 Main Burner Removal

#### Instructions for Burner rack Removal

1. Remove the control access panel from the heater. (The side panel is designed to "hang" from the bottom panel of the heater. Place the edge over the lip on the side of the bottom panel of the heater, carefully allowing the side panel to "hang".)
2. If equipped with spark ignition, open the electrical box cover and disconnect the ignitor lead from the ignition controller. Disconnect the flame sensor lead (wire from the ignition controller to the probe) from the auxiliary flame probe.
3. Mark and disconnect electric valve leads.
4. Uncouple the union in the gas supply line upstream from the valve.
5. Remove the two screws holding the bottom of the burner rack assembly. Slide the "drawer-type" burner rack out of the heater.

**Figure 9 - Control Side with Access Panel Removed for Removal of Burner Rack**



The access panel will "hang" over the edge of the bottom panel.

#### Instructions to remove the individual burners from the burner rack assembly :

1. With the burner assembly upside down, remove the screws (located at the rear) that secure the retaining bracket.
2. 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).
3. 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.

**Figure 10 - Individual Burner Removed from the Burner Rack**



#### Instructions to Re-Assemble

1. Reverse the Steps to disassemble and remove the burner rack.
2. 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.

**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.

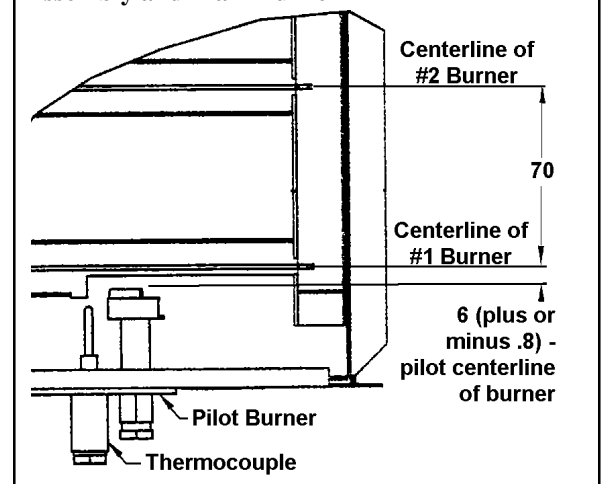
### 8.2 Pilot Burner Injector

1. If connected, disconnect the pilot tubing from the pilot burner.
2. Fit a new pilot burner injector.
3. Re-assemble in reverse order.

### 8.3 Pilot Burner Assembly

1. To remove the pilot assembly, remove its two fixing screws.
2. Refit the new pilot burner by re-assembling in reverse order.
3. Check relationship of the pilot burner with the adjacent main burner. Refer to Figures 11 and 12.

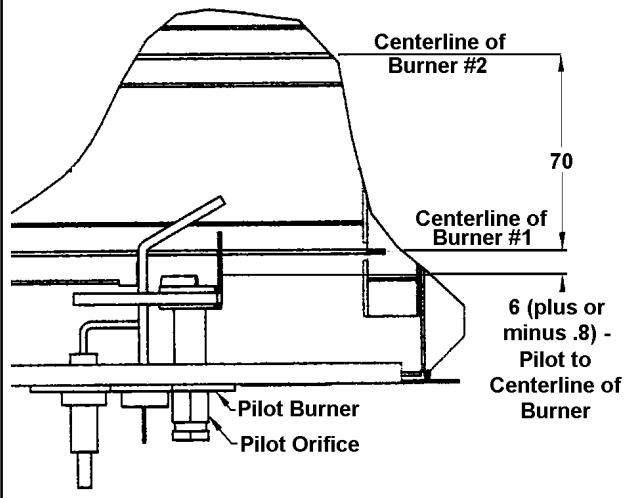
**Figure 11 - Relationship of Permanent Pilot Assembly and Main Burner**



## 8.0 REMOVAL AND REPLACEMENT OF PARTS (cont'd)

### 8.3 Pilot Burner Assembly (cont'd)

**Figure 12 - Relationship of Spark Pilot Assembly and Main Burner**



### 8.4 Optional Spark Pilot Ignition System

The ignition controller of the intermittent electronic ignition pilot system is located in the electrical box. 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 0.7 micro amps as measured by a micro amp meter.

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

### 8.5 Main Burner Injectors

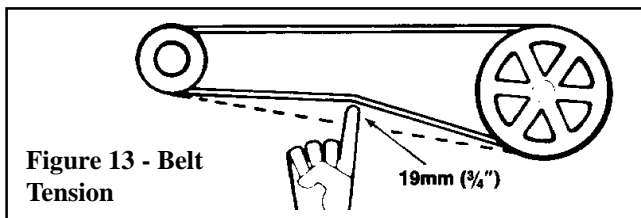
1. Remove the burner rack (See Paragraph 8.1).
2. Remove the manifold bracket screws and manifold.
3. Unscrew the main burner injectors.
4. Re-fit new injectors.
5. Re-assemble in reverse order.

### 8.6 Blower Motor and Belt

#### 8.6.1 Belt Tension

Check belt tension. Belt should depress approximately 19 mm. See Figure 13.

Adjust belt tension by means of the adjusting screw on the motor mounting plate.



When belt is adjusted properly, tighten the lock on the adjusting screw.

#### 8.6.2 Blower Motor

Check motor amps with an ammeter. The maximum motor amp rating on the motor badge must not be exceeded.

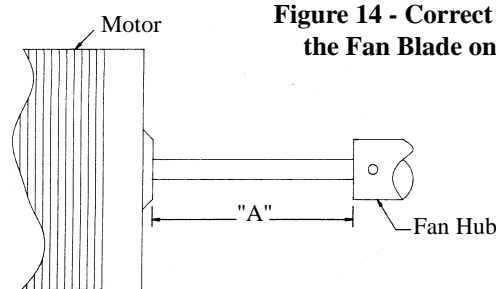
**CAUTION: A ducting system having excessive static pressure may cause the limit control to actuate.**

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

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

1. Turn off the gas supply.
2. Disconnect the electrical power to the heater.
3. Disconnect the fan motor wires and push out the cable retaining gland.
4. To remove the subassembly including the fan motor, the blades, and the fan guard, remove the screws that attach the fan guard to the heater.
5. Either the fan motor, fan blade or both may now be replaced. Space the fan blade on the shaft as shown in Figure 14.
6. Re-assemble in reverse order.

**Figure 14 - Correct Spacing of the Fan Blade on the Motor Shaft**



Heater Size	"A" -- Hub to Motor Spacing
100	65 mm
125	52 mm
150, 175, 200, 225	65 mm
250, 300	52 mm
350, 355, 400	65 mm

### 8.8 Multifunctional Control Valve

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.

### 8.9 Limit and High Temperature Limit Controls

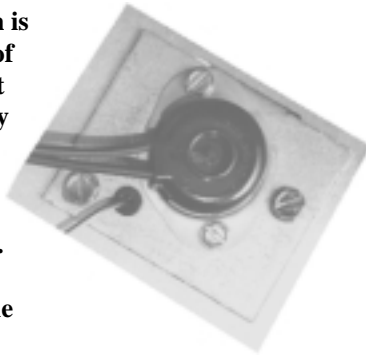
The heater is fitted with a limit control and a high temperature limit control.

The limit control switch fitted on the side of the heater (Refer to Figures 15 and 16) has a sensor capillary tube that stretches two times across the heat exchanger discharge opening. The switch is a manual reset type which interrupts the circuit to the heater operating controls. Before replacing, be certain that the limit control sensor capillary tube has cooled sufficiently. If it has been determined that the limit control needs replacing, use only a factory-authorized replacement.

The high temperature limit control is a redundant safety device calibrated to open at a much higher temperature than the limit control. The high temperature limit control is a manual reset type. A high temperature limit control interruption indicates a major failure caused by a malfunction of the primary safety controls or miswiring. The cause must be determined and corrected; both the fan control and the limit control must be replaced; and the entire heater must be inspected for damage to wiring and controls.



**Figure 15 - The "Lower Temperature" Limit Control Reset Switch is on the Control Side of the Heater. This limit switch has a capillary tubing sensor that stretches two times across the heat exchanger discharge. When activated, the switch "turns off" the gas controls.**



### 8.9.1 Instructions for Replacement of Limit Switch Control

1. Remove the heater side panel on the non-control side of the heater and the access panel on the control side of the heater. The limit switch reset button is visible; see Figure 15.
3. Disconnect the limit switch wires from the gas valve.
4. The one-piece capillary tube extends twice across the outlet of the heat exchanger. To replace: **a)** from the non-control side of the heater (See Figure 16), pull the upper portion of the "copper-coloured" capillary tube out of stainless steel tube. **b)** From the control side, withdraw the full length of capillary tubing.
5. Remove the limit switch control from the bracket by removing the two retaining screws.
6. Replace the limit control switch and re-assemble in reverse order, ensuring that the capillary tube extends two times across the full width of the heat exchanger.
7. Carry out a complete commissioning procedure. Refer to Section 6.0 to 6.8.

### 8.9.2 High Temperature Limit Switch Location

The high temperature limit control is located in the electrical box above the fan temperature control. If the high temperature limit switch activates, the primary limit switch and fan control must be replaced. The high limit switch may be reset.

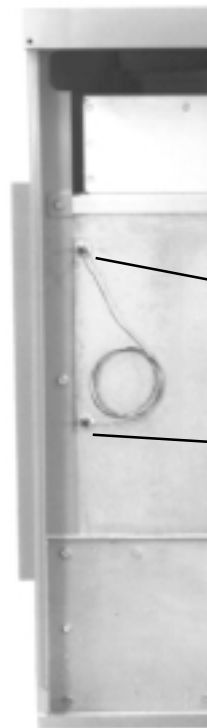
## 8.10 Fan Temperature Control

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.)

The fan control is located in the electrical box.

As with all service procedures, carry out a complete commissioning procedure after replacement of the fan control. Refer to Sections 6.0 to 6.8.

**Figure 16 - Non-Control Side of the Heater with Cabinet Panel Removed showing the Limit Control Capillary Tubing**



#### When Removing Tubing:

On this side, pull the "copper coloured" capillary tubing from the upper row of stainless steel tubing so that the full length can be pulled through the lower row of tubing and removed from the control side of the heater.

**(1) To remove, pull out here.**

**(2) Uncoil and pull through to the other side.**

#### When Installing New Tubing:

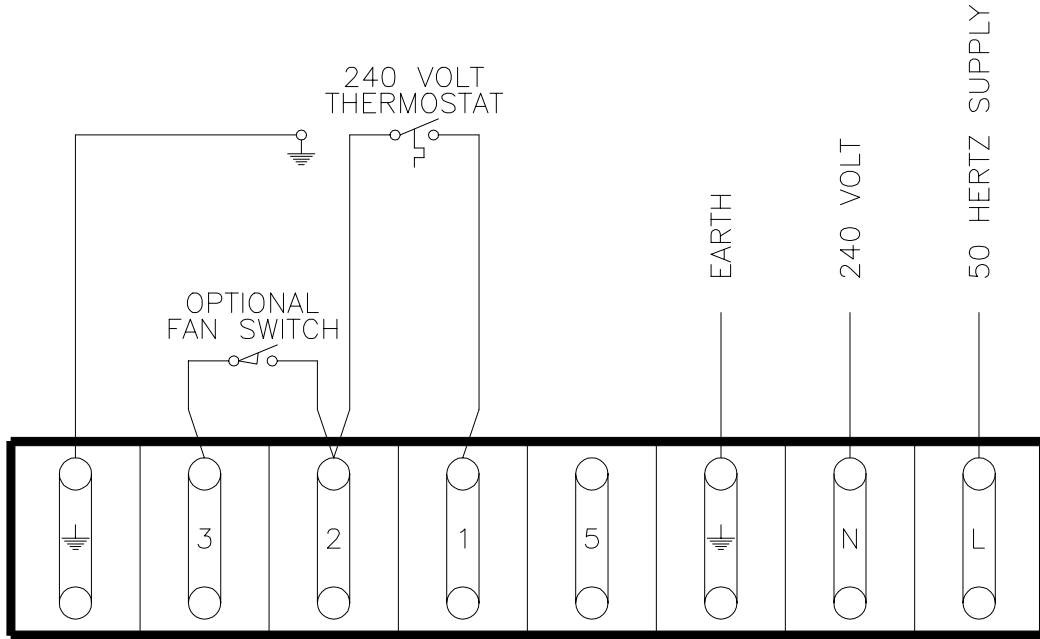
Be sure tubing extends twice across the full width of the heat exchanger. "Coil" excess capillary tubing (on non-control side) as illustrated.

# 9.0 CIRCUIT DIAGRAMS

## 9.1 Site Wiring

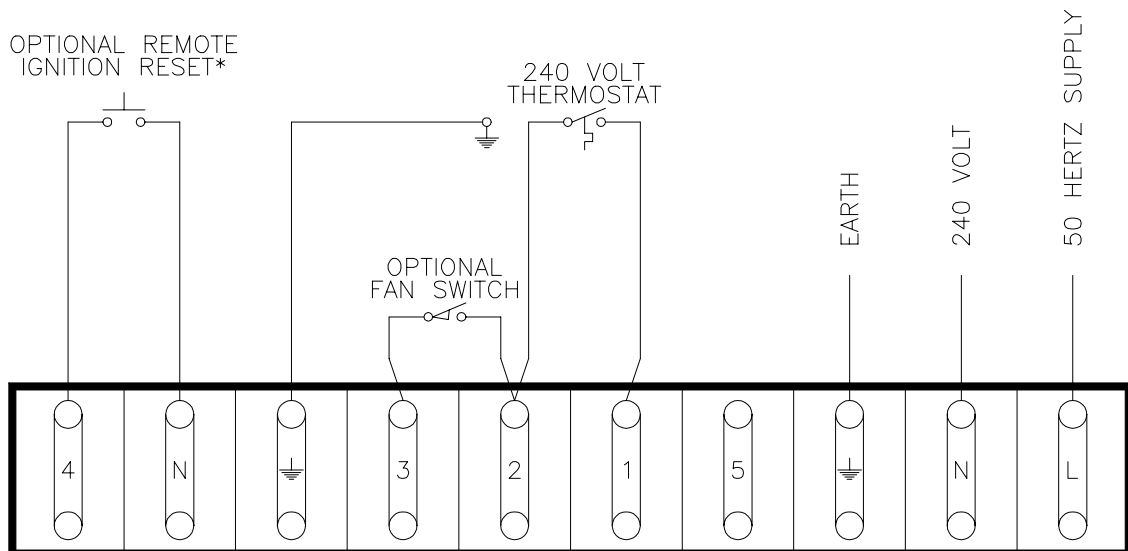
### 9.1.1 Site Wiring for Heater with Standard Permanent Pilot and Single Stage Control

SITE CONNECTION DIAGRAM  
CUSTOMER SUPPLIED WIRING



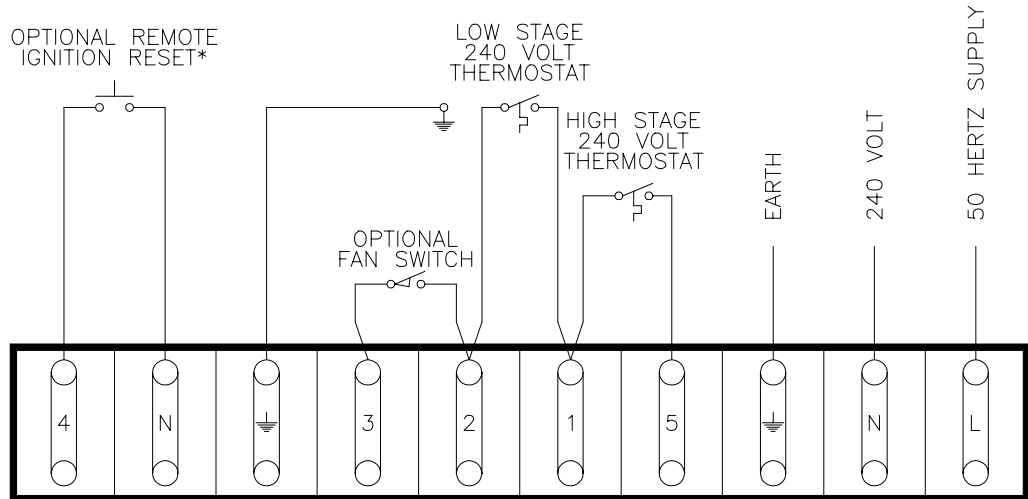
### 9.1.2 Site Wiring for Heater with Optional Spark Ignition and Standard Single Stage Control

SITE CONNECTION DIAGRAM  
CUSTOMER SUPPLIED WIRING



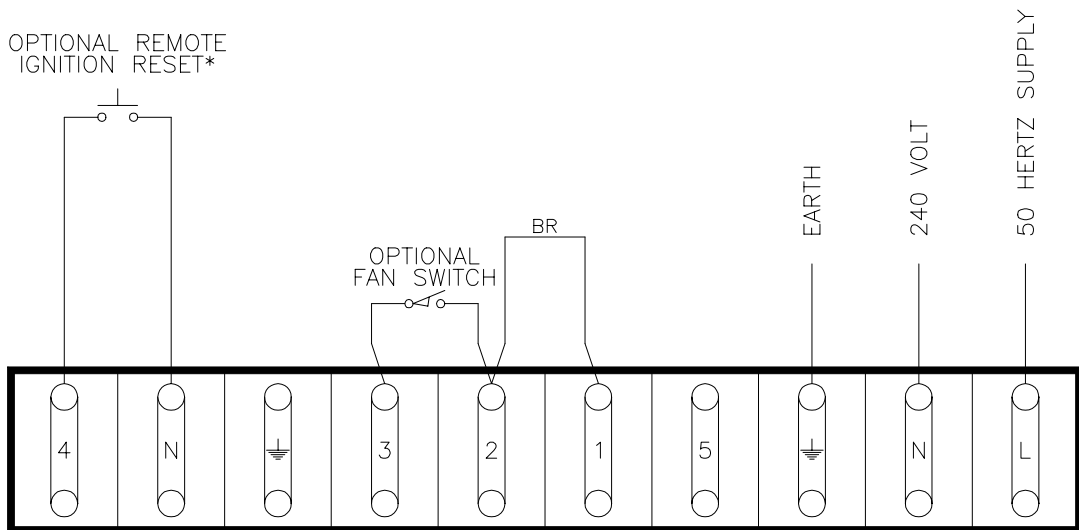
**9.1.3 Site Wiring for a Heater with Optional Spark Ignition and Optional Two-Stage Control**

SITE CONNECTION DIAGRAM  
CUSTOMER SUPPLIED WIRING



**9.1.4 Site Wiring for a Heater with Optional Spark Ignition and Optional Electronic Modulation Control**

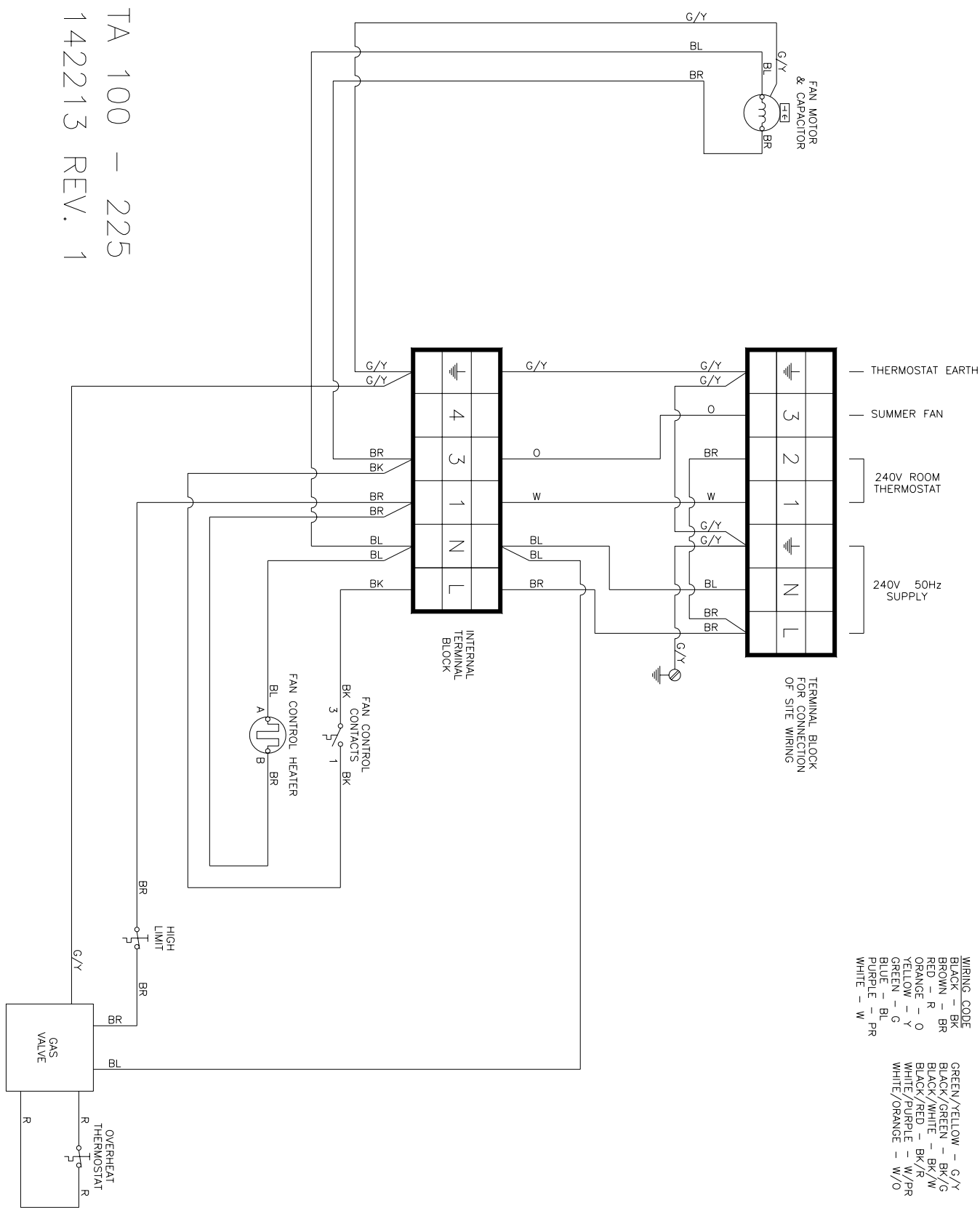
SITE CONNECTION DIAGRAM  
CUSTOMER SUPPLIED WIRING



# 9.0 CIRCUIT DIAGRAMS (cont'd)

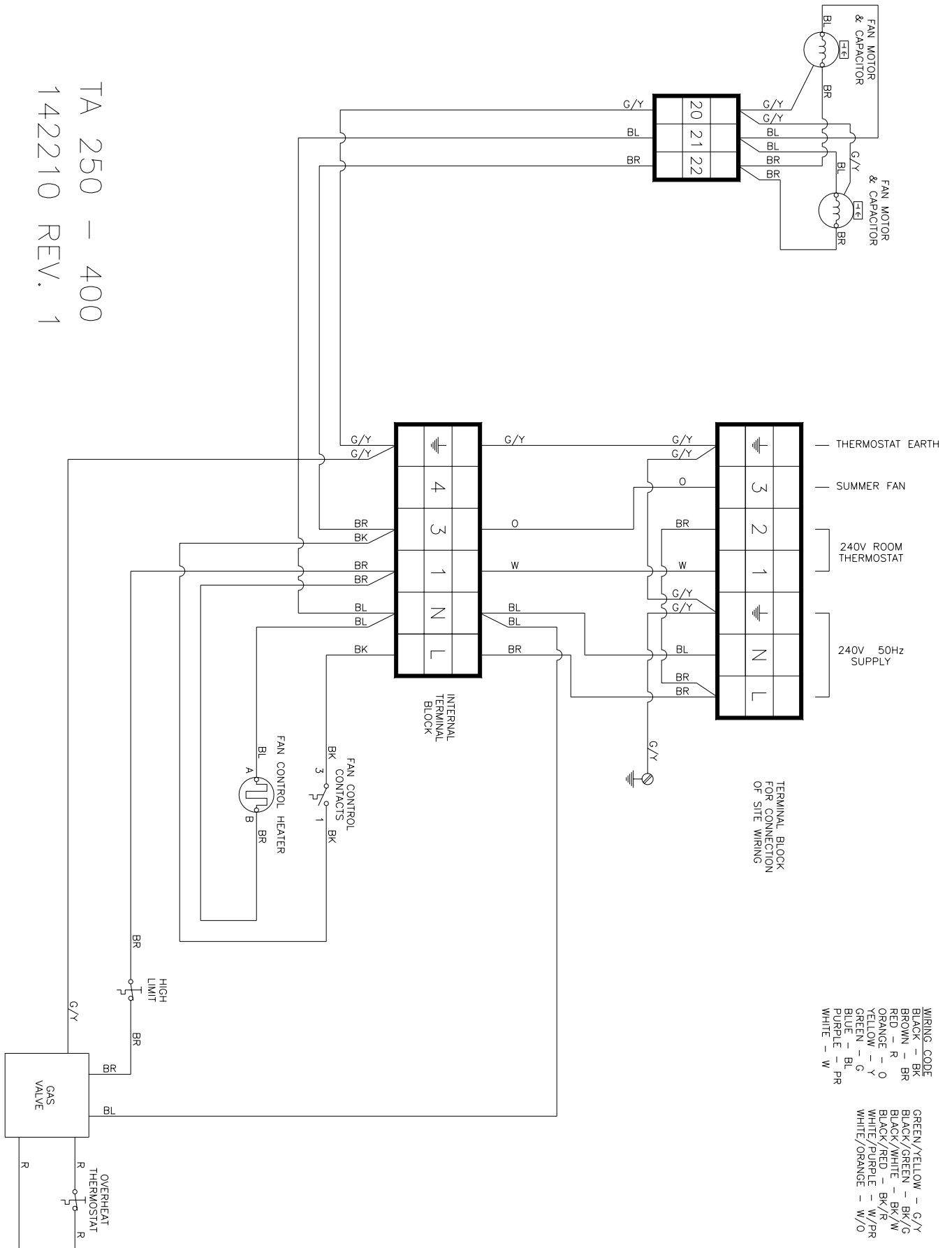
## 9.2 Circuit Diagram -- Standard Heater with an Axial Fan(s) for Air Delivery

### 9.2.1 Model TA with Permanent Pilot, Sizes 100-225 (W.D. #142213)



## 9.2 Circuit Diagram -- Standard Heater with an Axial Fan(s) for Air Delivery (cont'd)

### 9.2.2 Model TA with Standard Permanent Pilot, Sizes 250-400 (W.D. #142210)

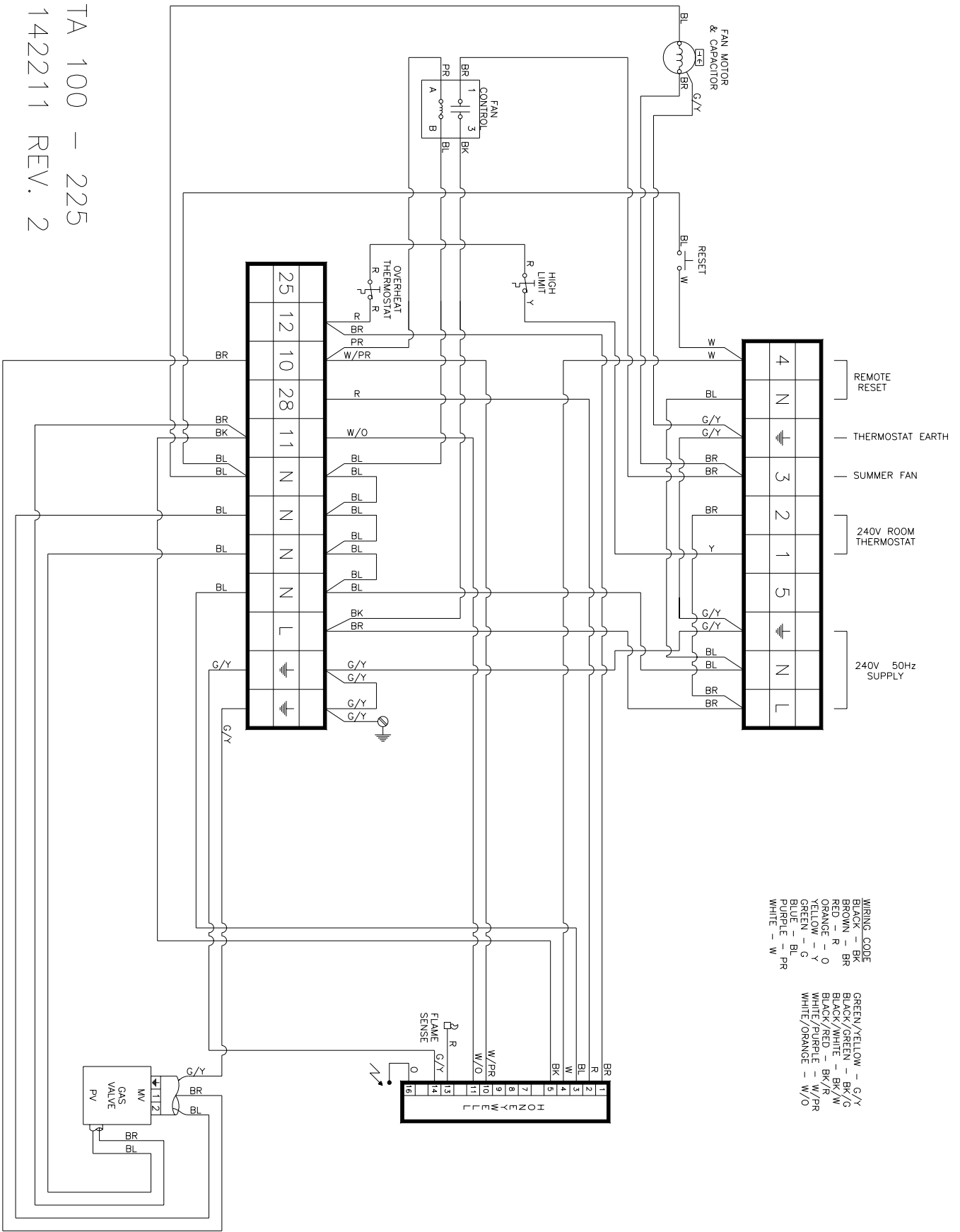


TA 250 - 400  
142210 REV. 1

# 9.0 CIRCUIT DIAGRAMS (cont'd)

## 9.2 Circuit Diagram -- Standard Heater with an Axial Fan(s) for Air Delivery (cont'd)

### 9.2.3 Model TA with Optional Spark Ignition, Sizes 100-225 (W.D. #142211)

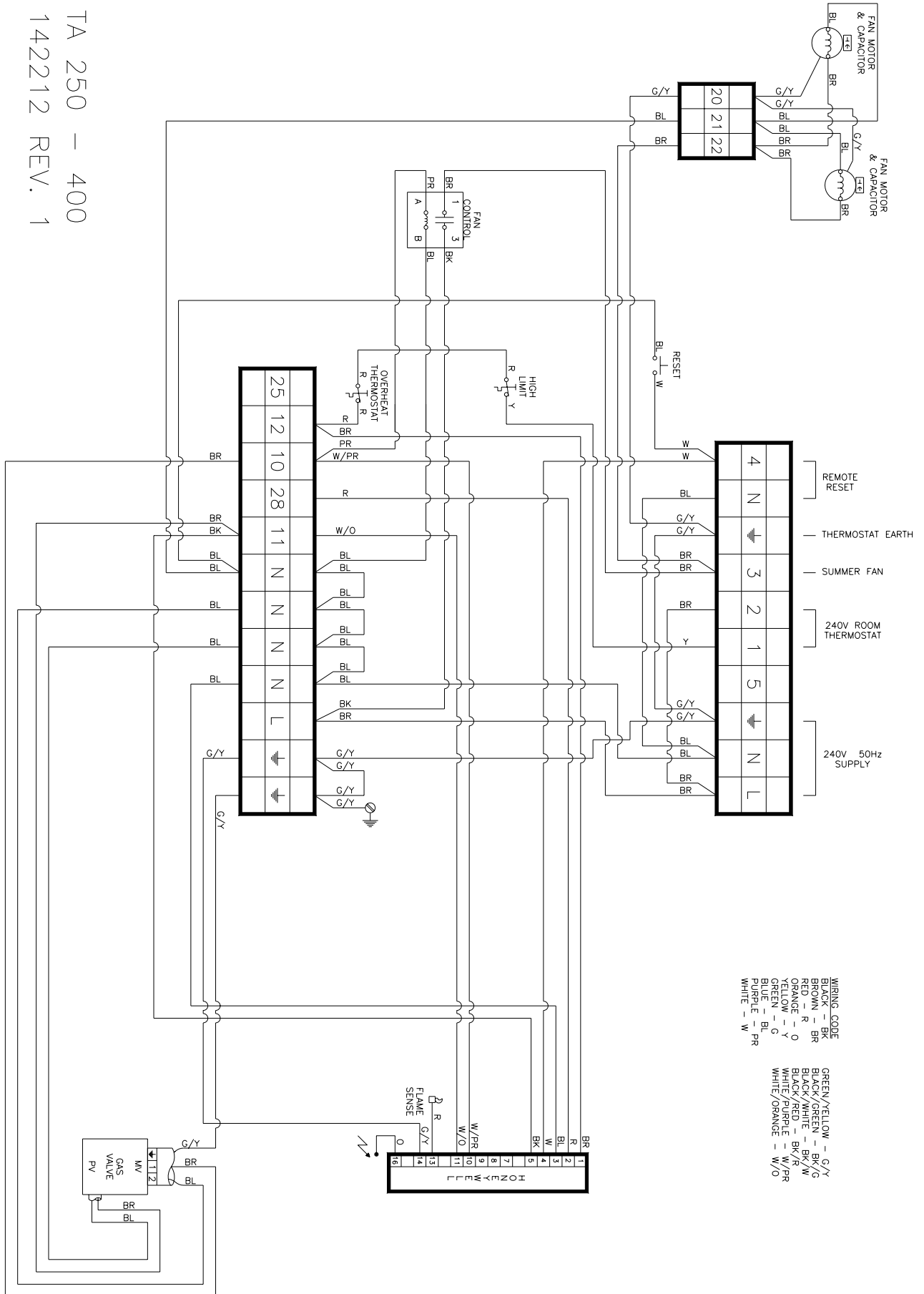


TA 100 - 225  
142211 REV. 2

# 9.2 Circuit Diagram -- Standard Heater with an Axial Fan(s) for Air Delivery (cont'd)

## 9.2.4 Model TA with Optional Spark Ignition, Sizes 250-400 (W.D. #142212).1 Model TA, Sizes 100-175 (W.D. #141389)

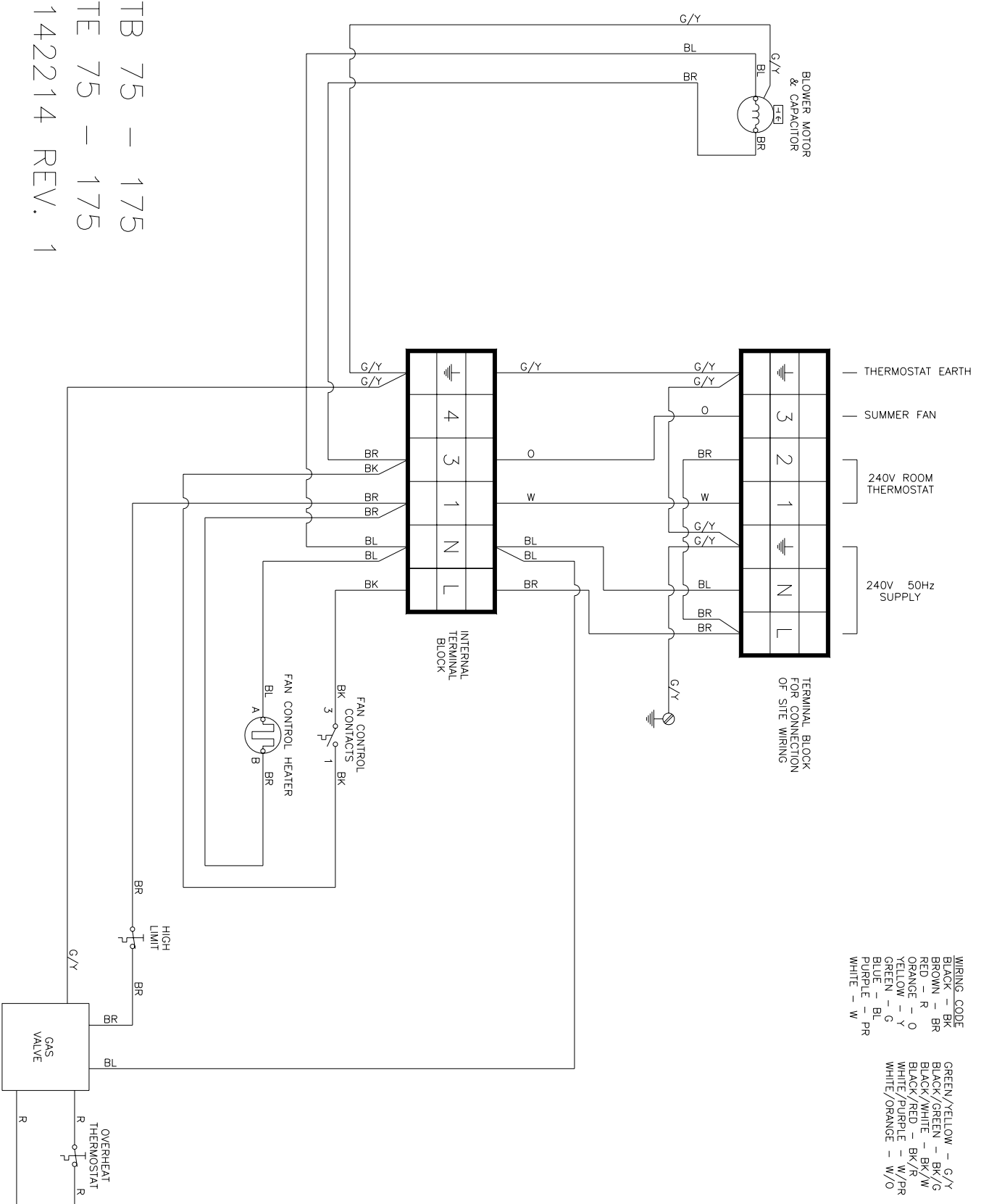
TA 250 - 400  
142212 REV. 1



# 9.0 CIRCUIT DIAGRAMS (cont'd)

## 9.3 Circuit Diagram -- Standard Heater with a Centrifugal Blower (with or without a cabinet) for Air Delivery

### 9.3.1 Models TB and TE with Standard Permanent Pilot, Sizes 75-175 (W.D. #142214)

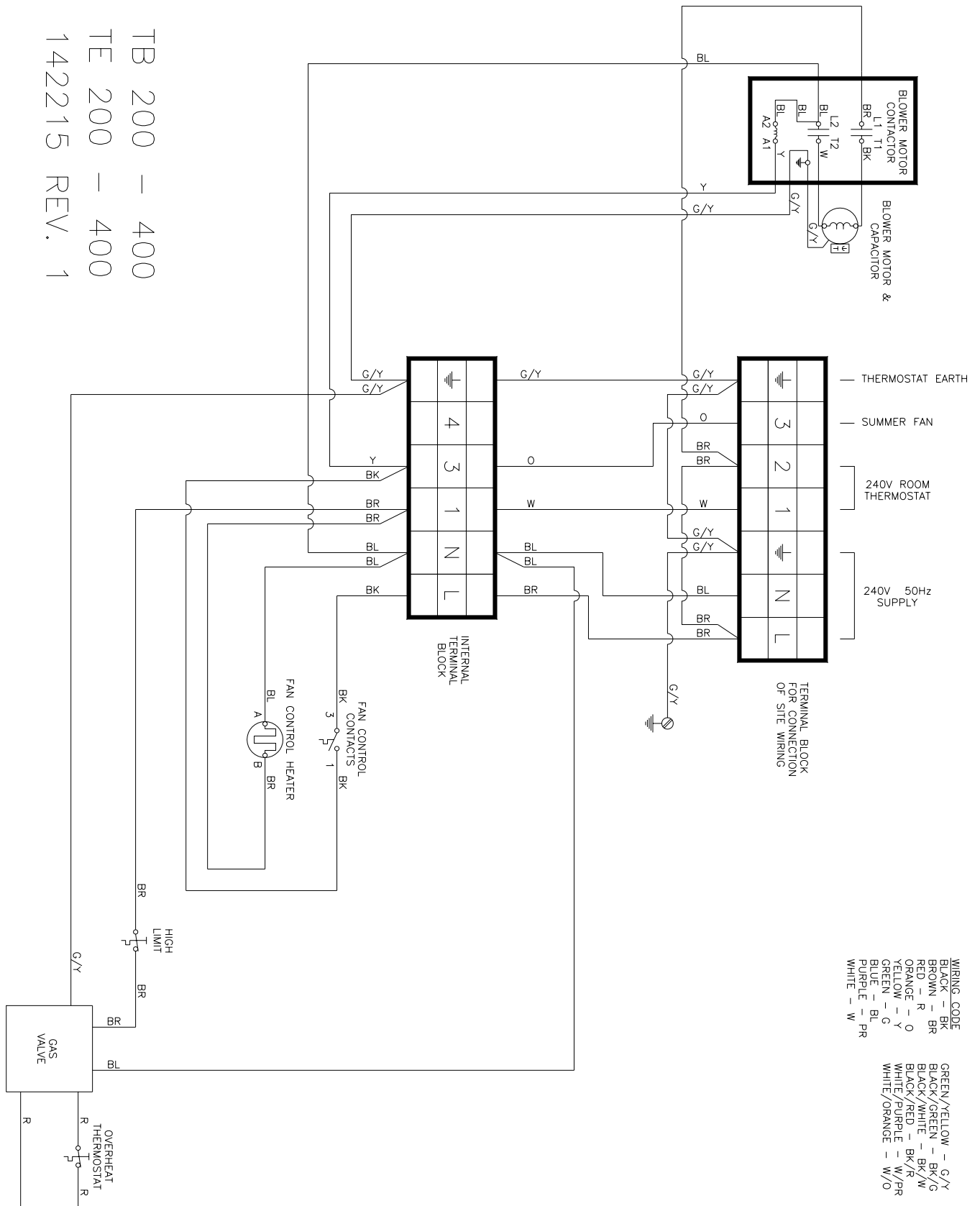


TB 75 - 175  
 TE 75 - 175  
 142214 REV. 1



# 9.3 Circuit Diagram -- Standard Heater with a Centrifugal Blower (with or without a cabinet) for Air Delivery

## 9.3.2 Models TB and TE with Standard Permanent Pilot, Sizes 200-400 (W.D. #142215)

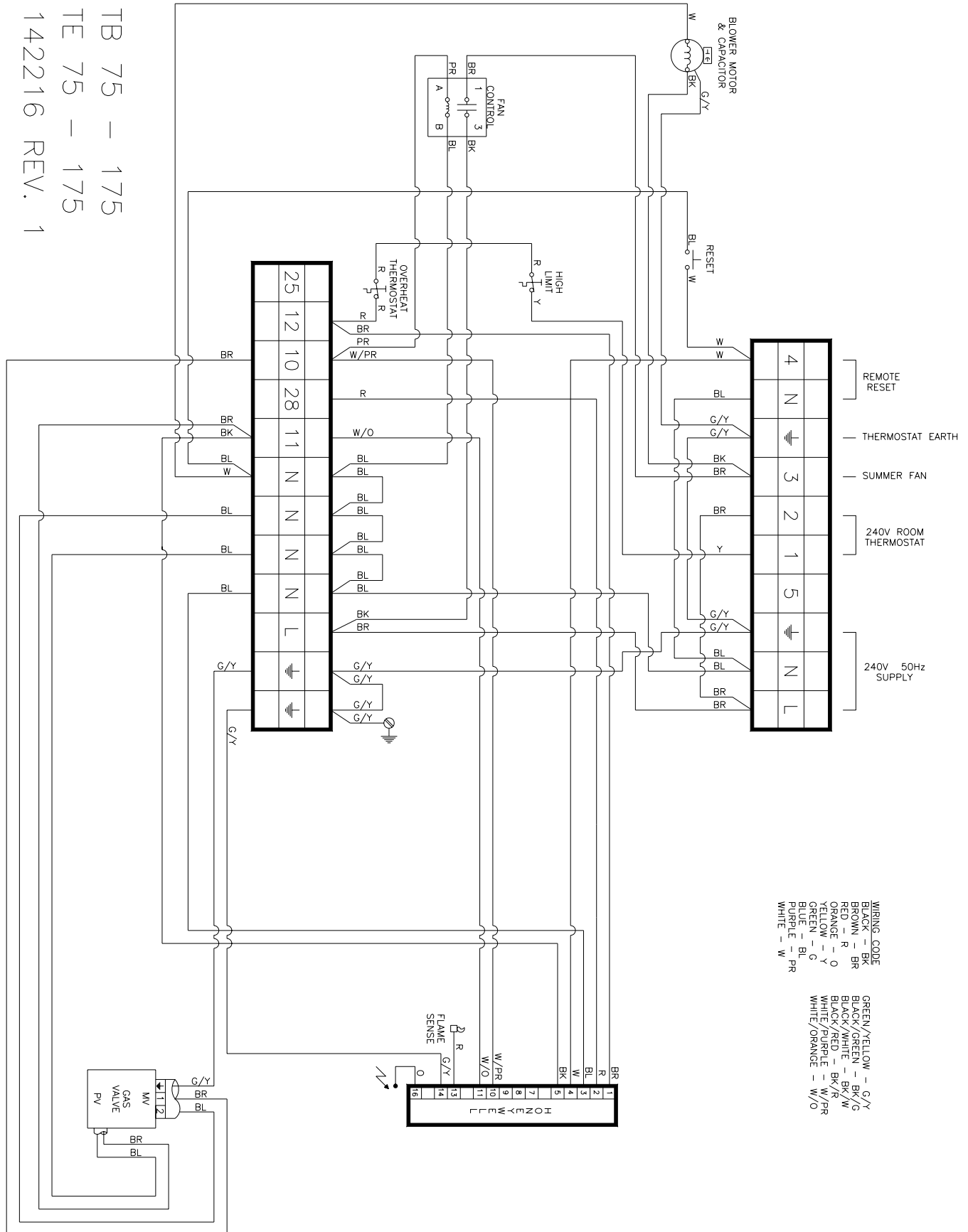


TB 200 - 400  
 TE 200 - 400  
 142215 REV. 1

# 9.0 CIRCUIT DIAGRAMS (cont'd)

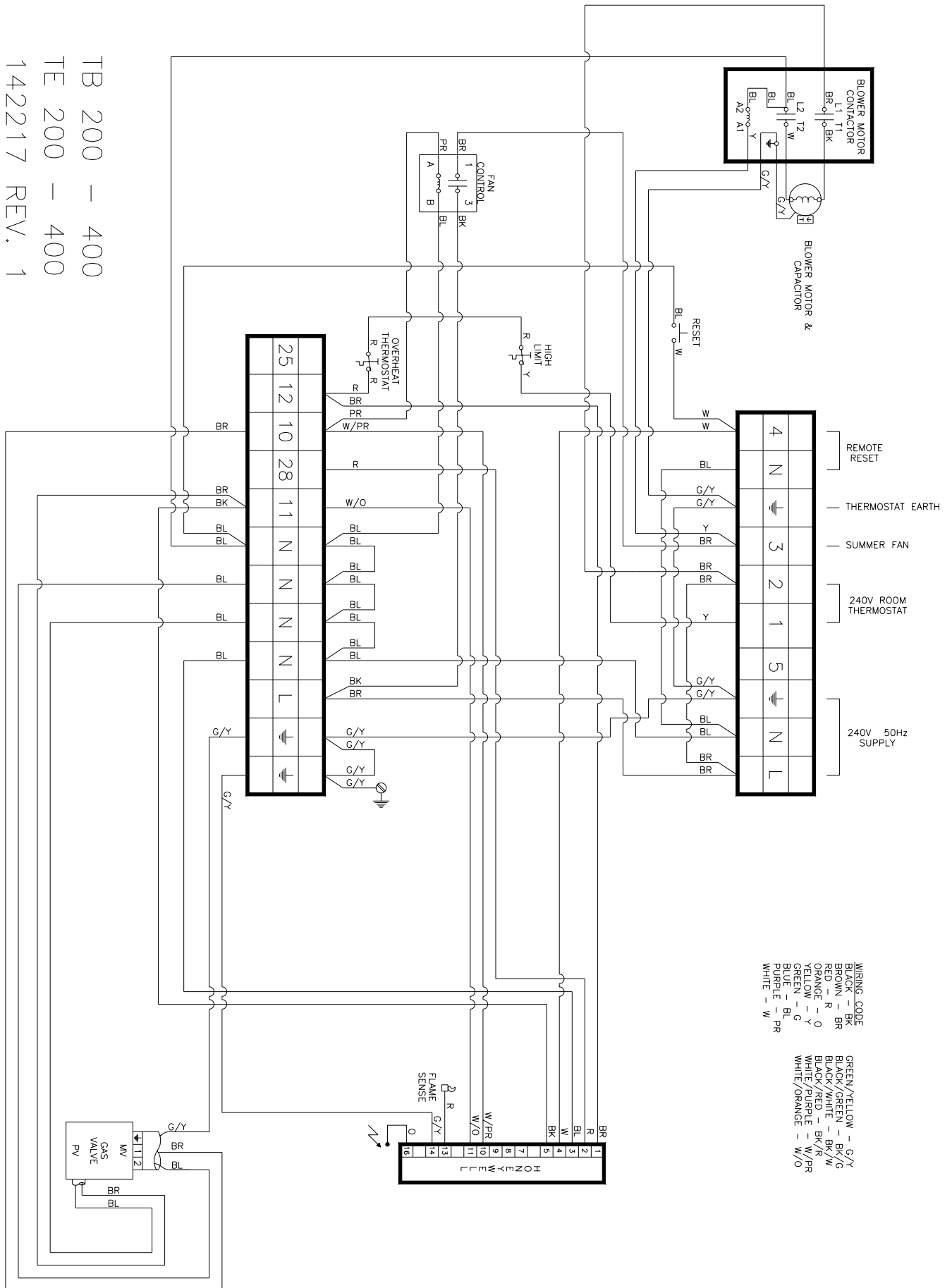
## 9.3 Circuit Diagram -- Standard Heater with a Centrifugal Blower (with or without a cabinet) for Air Delivery

### 9.3.3 Models TB and TE with Optional Spark Ignition, Sizes 75-175 (W.D. #142216)



### 9.3 Circuit Diagram -- Standard Heater with a Centrifugal Blower (with or without a cabinet) for Air Delivery

#### 9.3.4 Models TB and TE with Optional Spark Ignition, Sizes 200-400 (W.D. #142217)



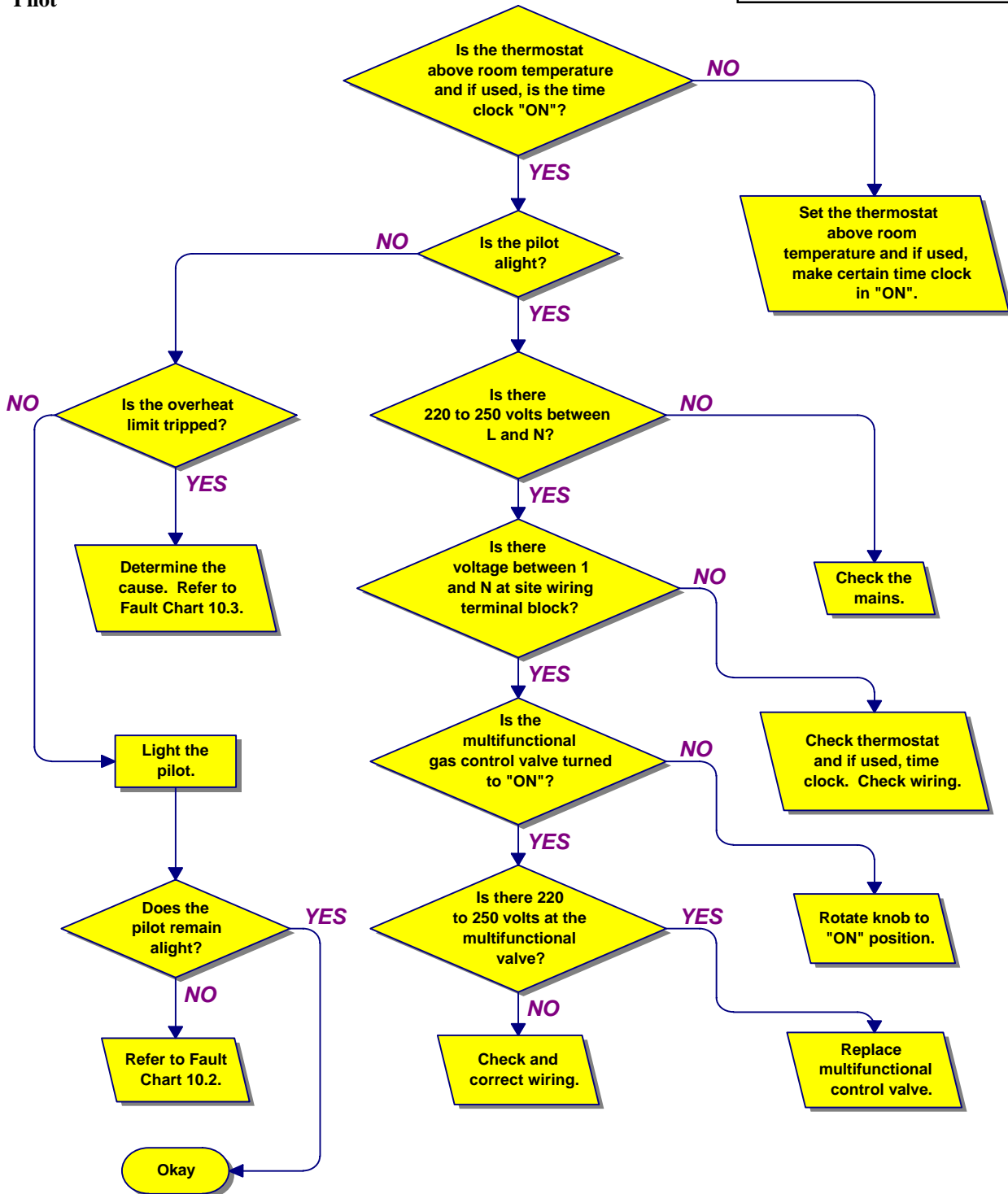
TB 200 - 400  
 TE 200 - 400  
 142217 REV. 1

# 10.0 FAULT FINDING CHARTS

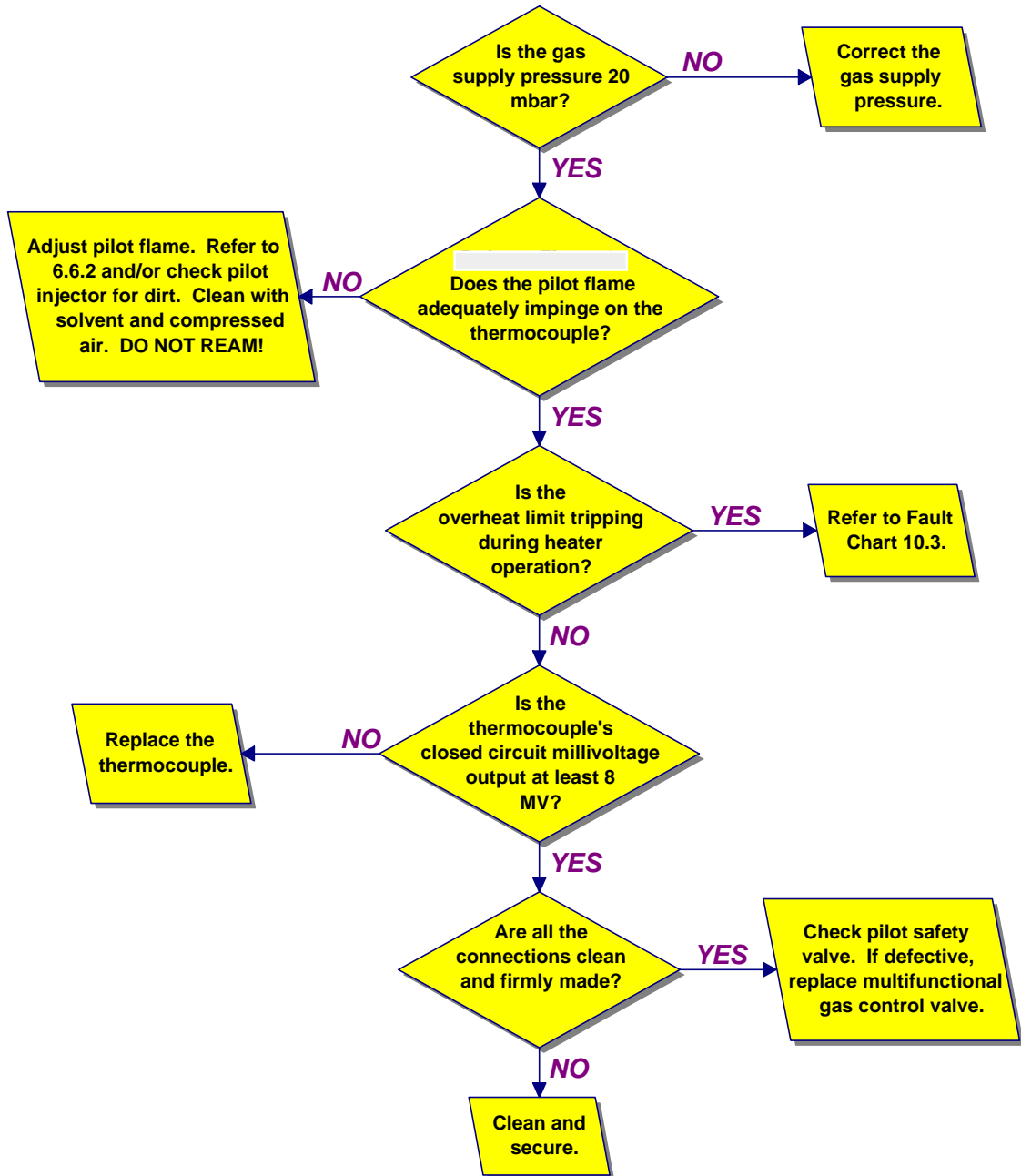
## 10.1 Main Fault Finding Chart

Applies to Model TA, TB or TE  
with a Standard Permanent  
Pilot

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

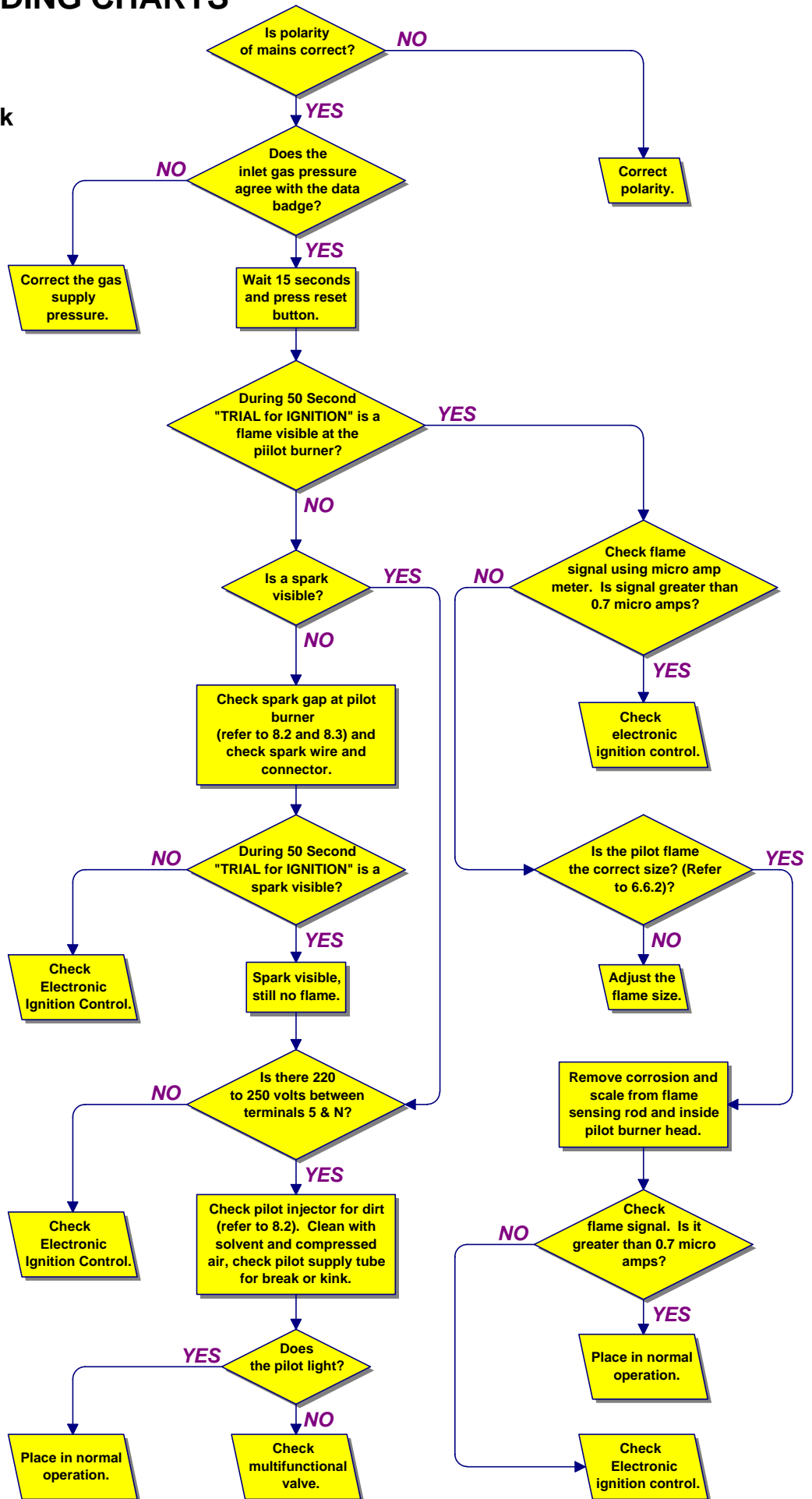


## 10.2 .1 Permanent Pilot Does not Remain Alight



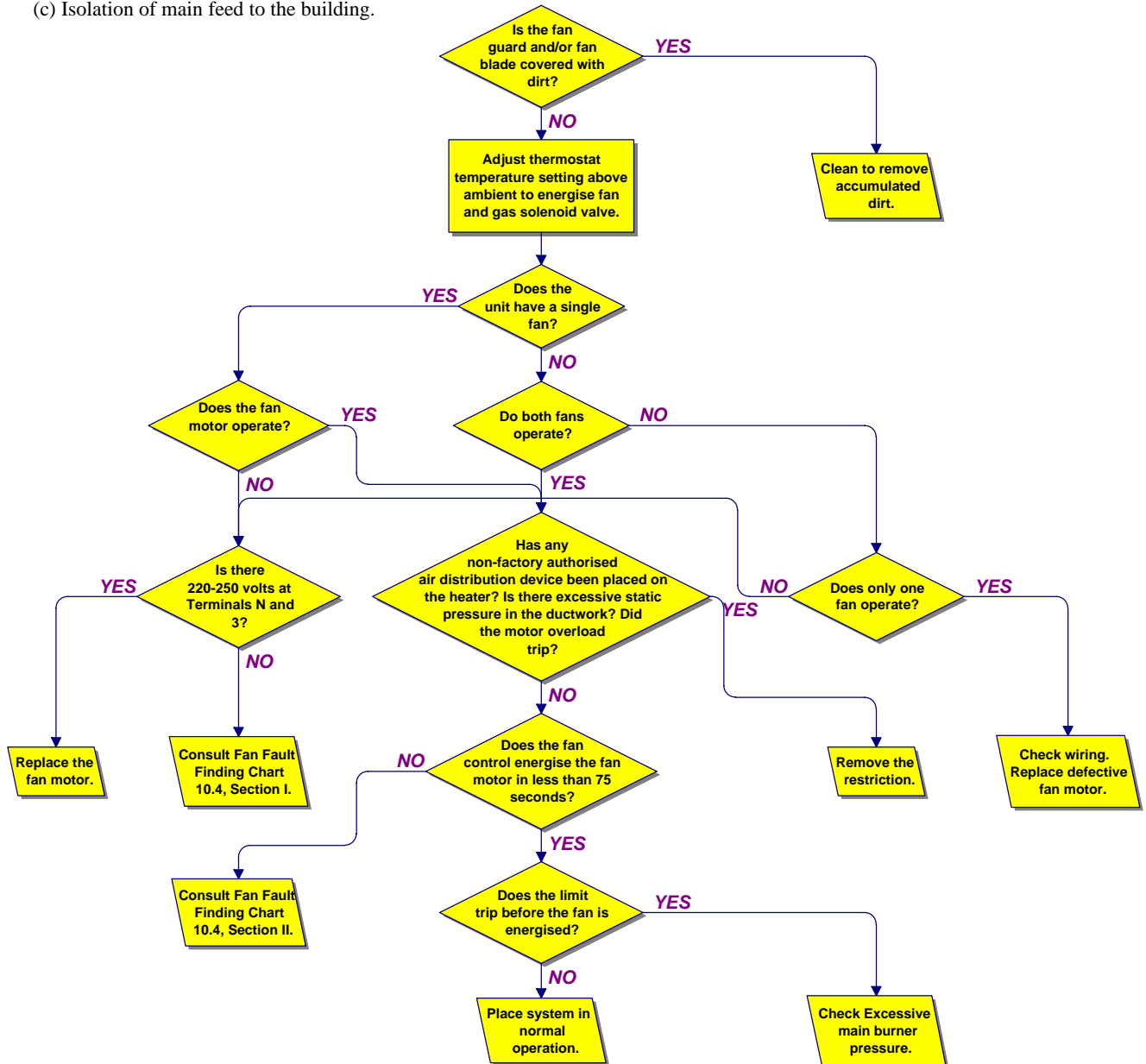
# 10.0 FAULT FINDING CHARTS (cont'd)

## 10.2.2 Heater with Optional Spark Ignition -- Ignition Controller Repeatedly Locks Out



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

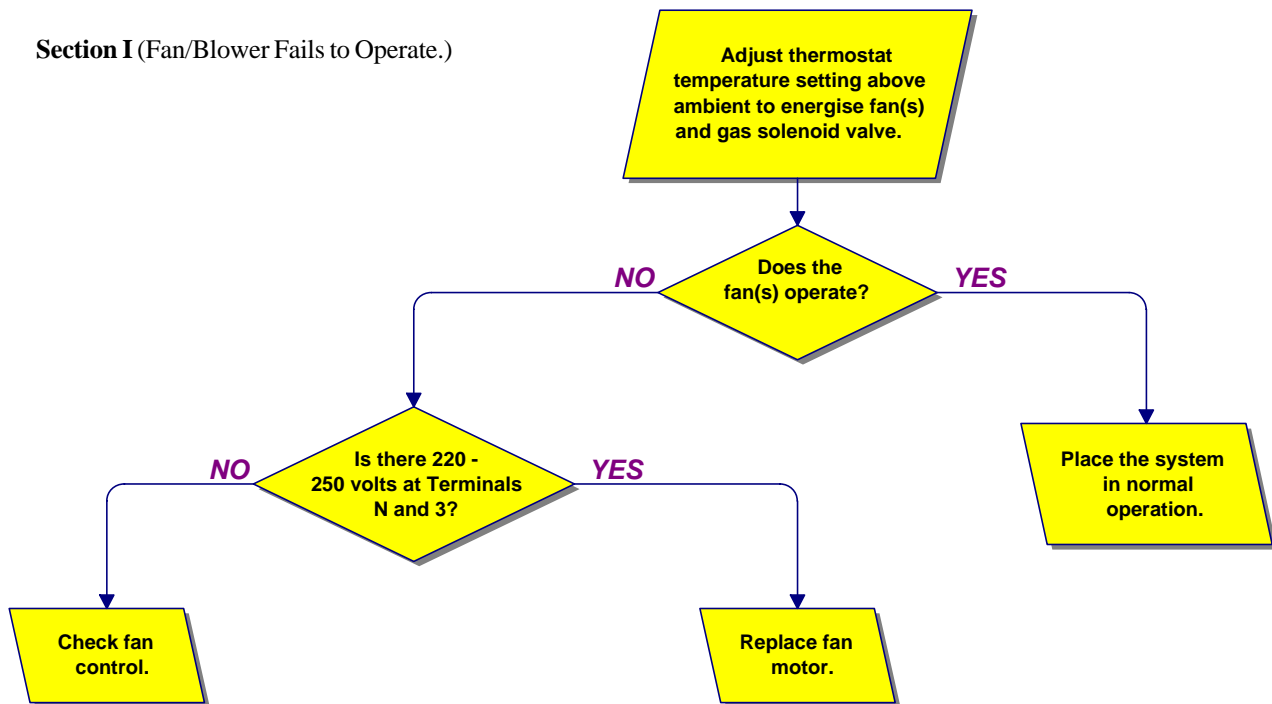
**NOTE:** Interruption of the main electrical supply to the heater when the heater is in operation may cause the limit control to trip. Check that the supply to the heater is not being interrupted incorrectly by (a) Incorrect wiring of the time clock; (b) Fire alarm systems, etc.; or (c) Isolation of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



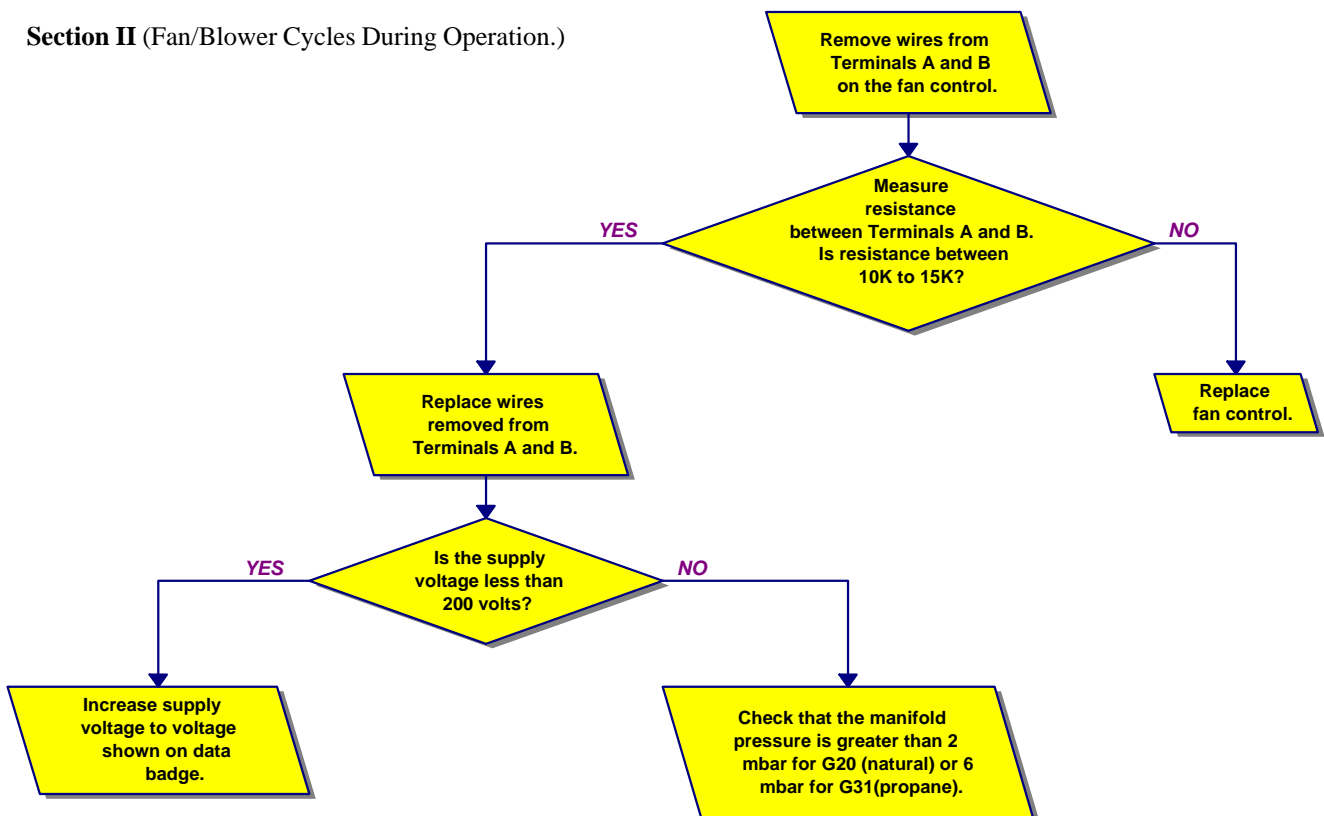
# 10.0 FAULT FINDING CHARTS (cont'd)

## 10.4 Fan/Blower Fault Finding Charts

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



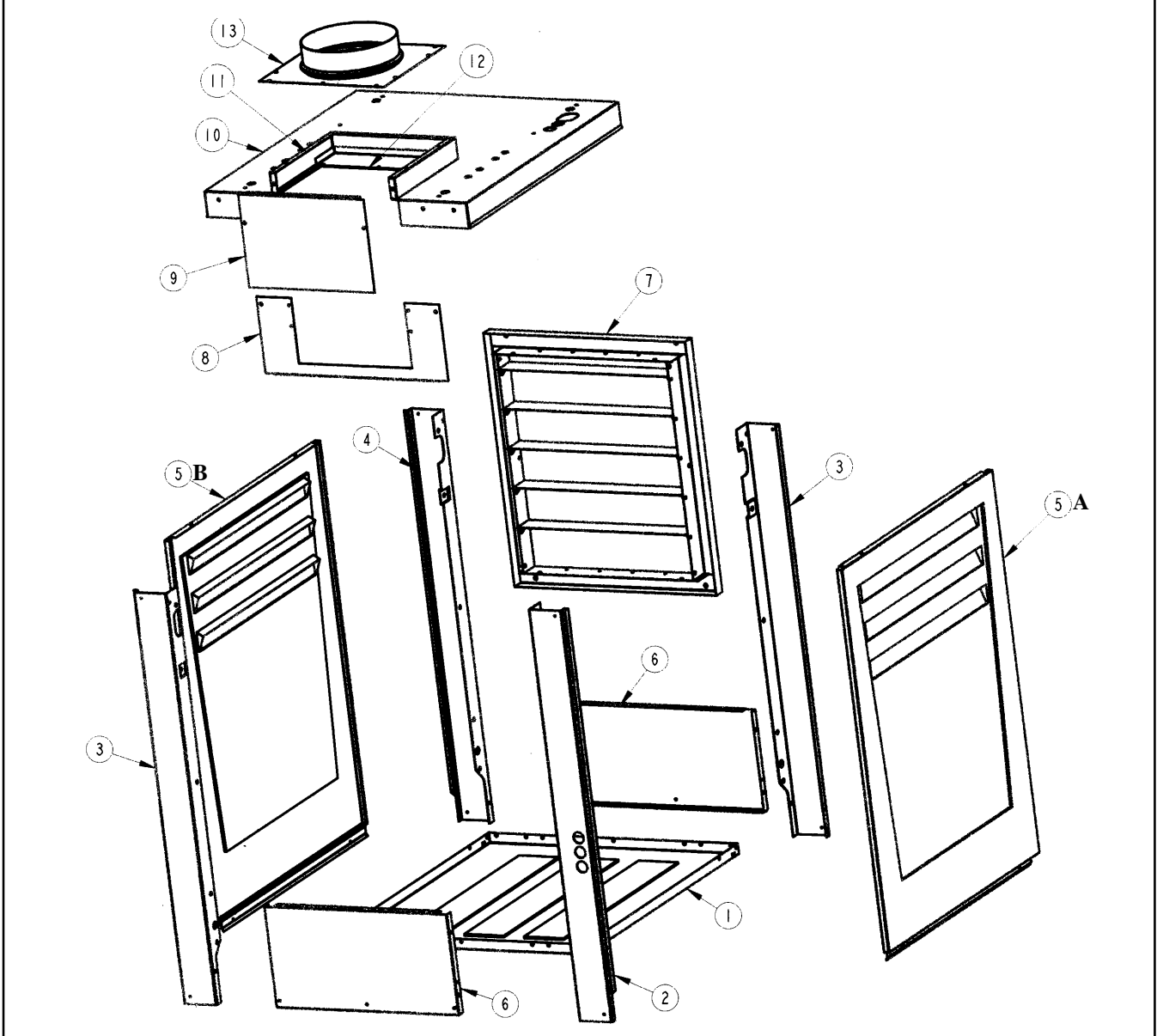
### Section II (Fan/Blower Cycles During Operation.)





# 11.0 EXPLODED DIAGRAMS

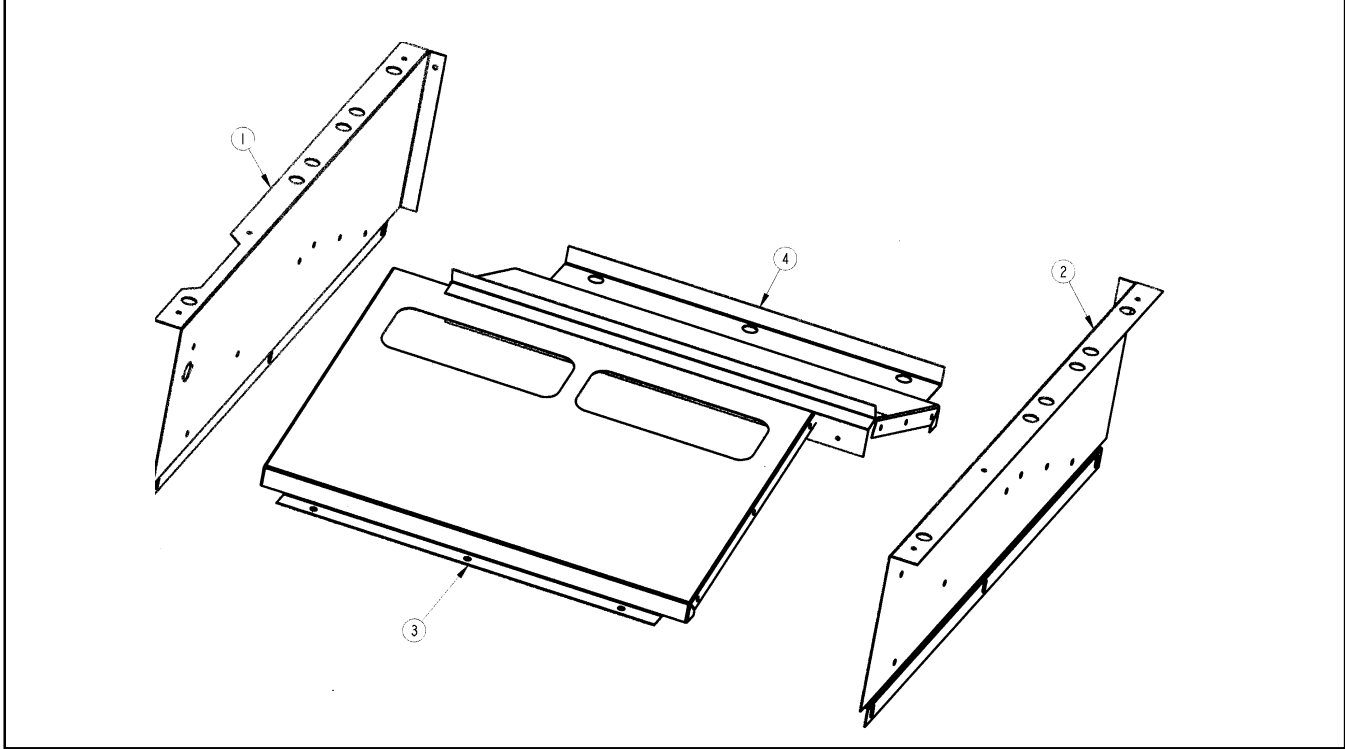
## 11.1 Standard Heater Cabinet Parts -- All Models



Item No.	Description	Qty	75	100	125	150	175	200	225	250	300	350	355	400
1	Bottom Pan	Aluminized	1 15244	15244	15248	14618	14618	14624	14624	14625	14625	15249	14632	14632
		Stainless Steel	1 --	15978	26167	15979	15979	15980	15980	15981	15981	26168	15982	15982
2	Rear Corner Leg w/Wire Access Holes	1	11004	11004	11004	11004	11004	11006	11006	11006	11006	11006	11006	11006
3	Right Front/Left Rear Corner Leg	2	10310	10310	10310	10310	10310	10312	10312	10312	10312	10312	10312	10312
4	Left Front Corner Leg	1	10309	10309	10309	10309	10309	10311	10311	10311	10311	10311	10311	10311
5A	Casing Side Panel - Control Side (with hanger flange)	1	144870	144870	144870	144870	144870	144871	144871	144871	144871	144871	144871	144871
5B	Casing Side Panel - for side opposite controls	1	9853	9853	9853	9853	9853	9547	9547	9547	9547	9547	9547	9547
6	Bottom Front and Rear Panel	2	9926	9926	9889	9850	9850	9810	9810	9771	9771	9735	9542	9542
7	Louvre Frame and Louvre Assy - Model TA only	1	--	146841	146842	146843	146843	146844	146844	146845	146845	146846	146847	146847
8	Top Back	1	9916	9916	9880	9840	9840	9801	9801	9762	9762	9729	9684	9684
9	Flue Adapter Back Plate	1	132390	132390	132390	132390	132390	132391	132391	132391	132391	132391	132391	132391
10	Casing Top Assembly	1	9912	9912	9876	9836	9836	9797	9797	9758	9758	9725	9534	9534
11	Flue Collar Support	1	132392	132392	132392	132392	132392	132393	132393	132393	132393	132393	132393	132393
12	Flue Collar Support Hold Down	1	132394	132394	132394	132394	132394	132395	132395	132395	132395	132395	132395	132395
13	Flue Collar Assembly	1	148084	144634	144635	144636	144636	144637	144637	144637	144639	144639	144639	144639

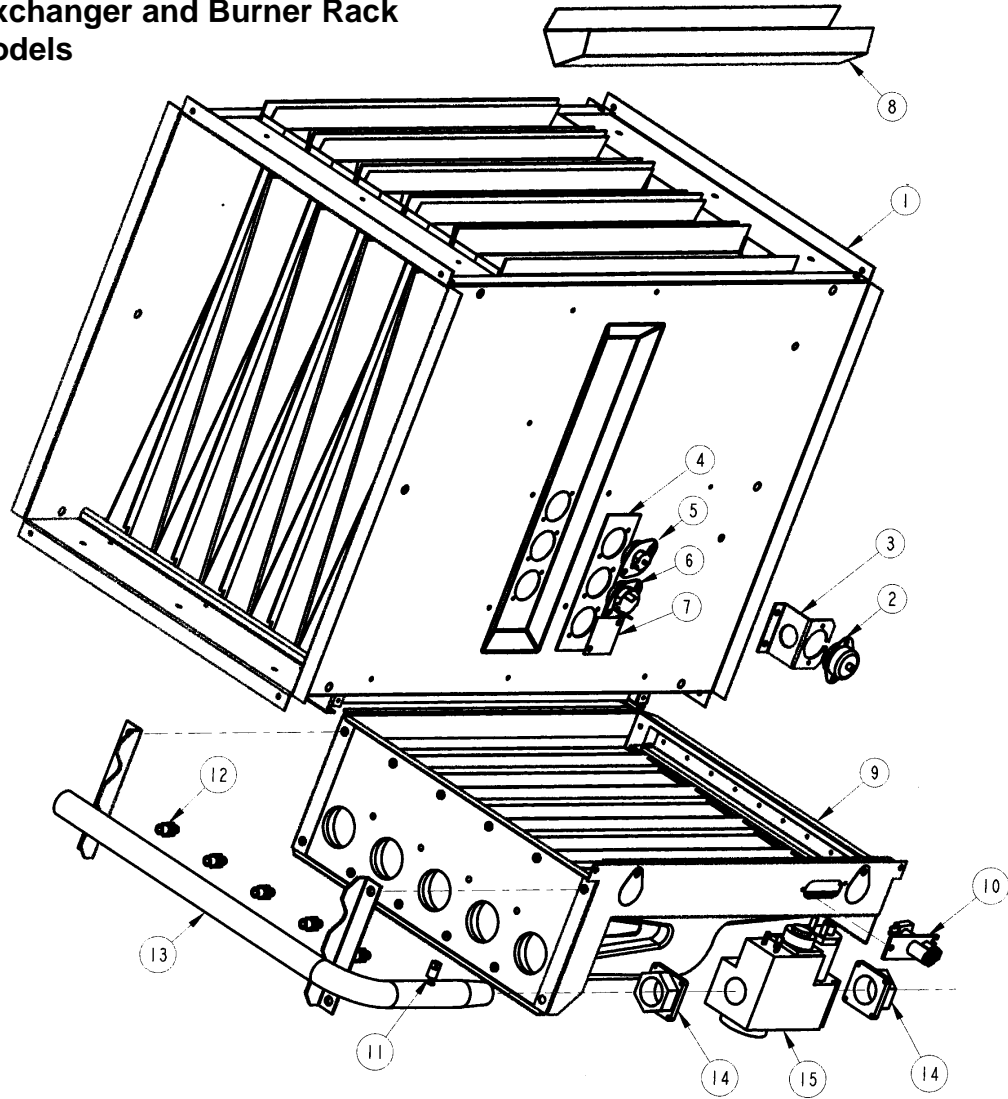
# 11.0 EXPLODED DIAGRAMS (cont'd)

## 11.2 Drafthood/Inner Cabinet Parts -- All Models



Item No.	Description	Qty	75	100	125	150	175	200	225	250	300	350	400
1	Draft Hood Left Side	1	17483	17483	17483	17483	17483	17483	17483	17483	17483	17483	17483
2	Draft Hood Right Side	1	17484	17484	17484	17484	17484	17484	17484	17484	17484	17484	17484
3	Draft Hood Rear Baffle	1	85778	85778	85782	85786	85786	85790	85790	85793	85793	85796	85799
4	Draft Hood Front Baffle	1	85803	85803	85536	85804	85805	67699	17486	67701	17507	17525	17540

### 11.3 Heat Exchanger and Burner Rack -- All Models

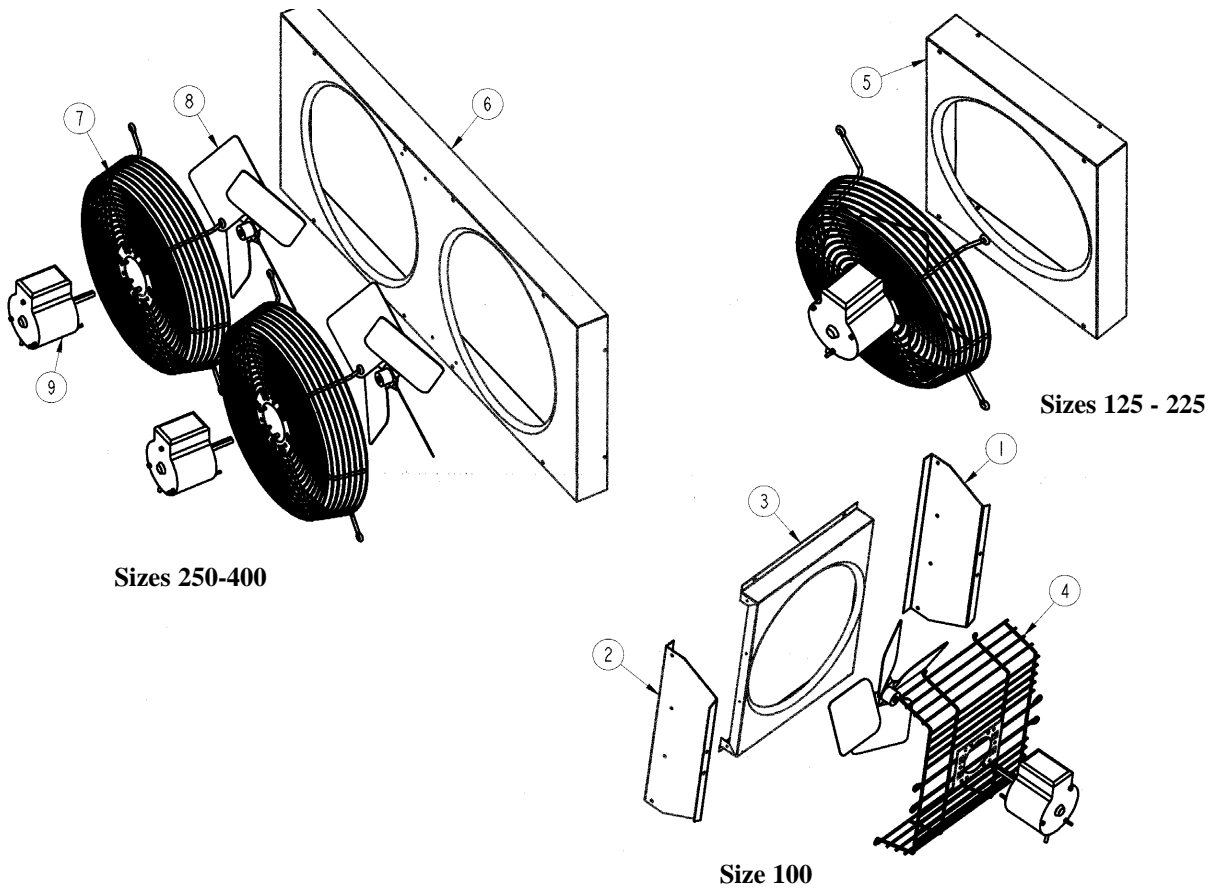


Item No.	Description	Qty	75	100	125	150	175	200	225	250	300	350	355	400
1	Heat Exchanger Assembly	Aluminized	1	145496	145496	145497	145498	145498	145499	145500	145500	145501	145502	145502
		321 Stainless	1	145513	145513	145514	145515	145515	145516	145517	145517	145518	145519	145519
		409 Stainless	1	145506	145506	145507	145508	145508	145509	145510	145510	145511	145512	145512
2	Limit Control w/Capillary Tube	1	134808	134808	134808	134808	134808	134808	134808	141749	141749	141749	141749	141749
3	Limit Control Bracket	1	141676	141676	141676	141676	141676	141676	141676	141676	141676	141676	141676	141676
4	Control Gasket	1	17083	17083	17083	17083	17083	17083	17083	17083	17083	17083	17083	17083
5	High Limit Switch	1	112752	112752	112752	112752	112752	112752	112752	112752	112752	112752	112752	112752
6	Fan Control	1	141750	141750	141750	141750	141750	141750	141750	141750	141750	141750	141750	141750
7	Patch Plate	1	9814	9814	9814	9814	9814	9814	9814	9814	9814	9814	9814	9814
8	Tube Baffle		85727	85727	85727	85727	85727	85727	85727	85727	85727	85727	85727	85727
		*	(4)	(5)	(5)	(7)	(7)	(9)	(9)	(12)	(12)	(14)	(16)	(16)
9	Burner Rack Assembly	Aluminized	1	40573	40573	40574	40575	40575	40576	40576	40577	40577	40578	40579
		409 Stainless	1	—	128642	128643	128644	128644	128645	128645	128646	128646	128647	128648
10	Pilot Burner	1	144599	144599	144599	144599	144599	144599	144599	144599	144599	144599	144599	144599
	Thermocouple	1	125835	125835	125835	125835	125835	125835	125835	125835	125835	125835	125835	125835
11	Pipe Plug	1	142665	142665	142665	142665	142665	142666	142666	142666	142666	142666	142666	142666
12	Main Orifices	Natural Gas	*	11792	11792	84437	11833	84437	11828	84437	11833	84437	84437	84437
				(4)	(5)	(5)	(7)	(7)	(9)	(9)	(12)	(12)	(14)	(16)
		Propane Gas	*	63003	61652	61652	97360	61652	146090	61652	97360	61652	97360	61652
		*	(4)	(5)	(5)	(7)	(7)	(9)	(9)	(12)	(12)	(14)	(16)	(16)
13	Manifold	1	141761	141761	141762	141763	141763	141764	141764	141765	141765	141766	141767	141767
14	Flange	2	--	--	--	--	--	--	134809	133913	133913	133913	133913	133913
	O-Ring	2	--	--	--	--	--	--	--	125842	125842	125842	125842	125842
15	Gas Valve - Permanent Pilot	1	113766	113766	113766	113766	113766	113766	113766	113766	113766	113766	113766	113766
	Gas Valve - Spark Pilot	1	134778	134778	134778	134778	134778	134779	134779	134779	134779	134779	134779	134779
	Gas Conversion Kit - to propane	1	146469	146118	146119	146120	146121	146122	146123	146124	146125	146126	146127	146128

\*Quantity in parenthesis

# 11.0 EXPLODED DIAGRAMS (cont'd)

## 11.4 Model TA -- Standard Heater Cabinet Back and Fan Components

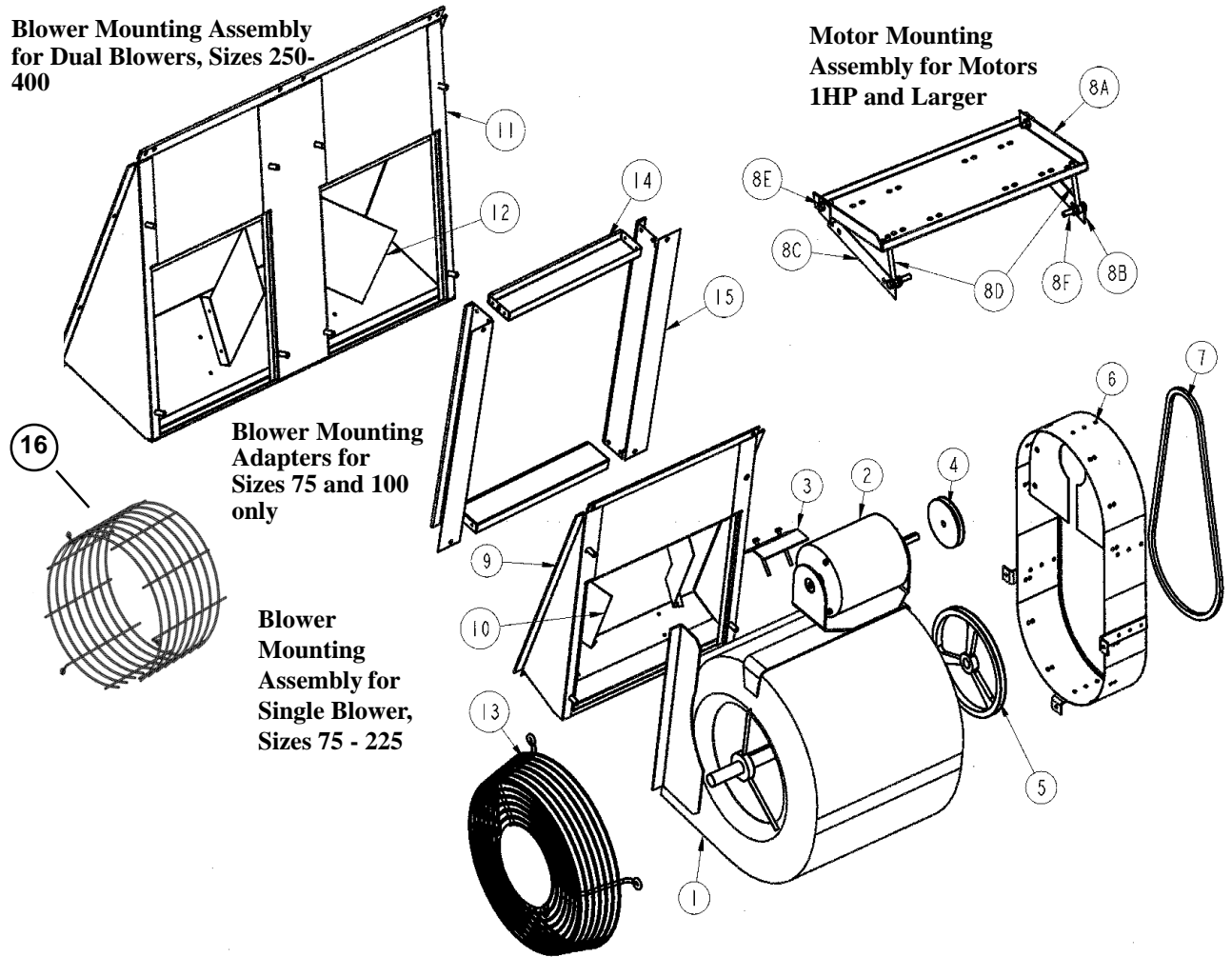


Item No.	Description	Qty	100	125	150	175	200	225	250	300	350	355	400
1 & 2	Fan Back Sides	2	125136	--	--	--	--	--	--	--	--	--	--
3	Fan Back	1	125137	--	--	--	--	--	--	--	--	--	--
4	Fan Guard Assembly including motor mounting plate	1	114681	--	--	--	--	--	--	--	--	--	--
5 & 6	Casing Back Assembly	1	--	59289	59291	59291	59293	59293	73801	73801	73802	73803	73803
7	Fan Guard	1	--	136950	136949	136949	136949	136949	--	--	--	--	--
		2	--	--	--	--	--	--	136950	136950	136949	136949	136949
8	Fan Blade	1	41004	125563	125564	125564	141598	141598	--	--	--	--	--
		2	--	--	--	--	--	--	125566	125566	125564	141598	141598
9	Fan Motor	1	121277	121277	121277	121277	126688	126688	--	--	--	--	--
		2	--	--	--	--	--	--	121277	121277	126688	126688	126688

# 11.5 Models TB and TE - Standard Heater Cabinet Back and Blower Components

**Blower Mounting Assembly for Dual Blowers, Sizes 250-400**

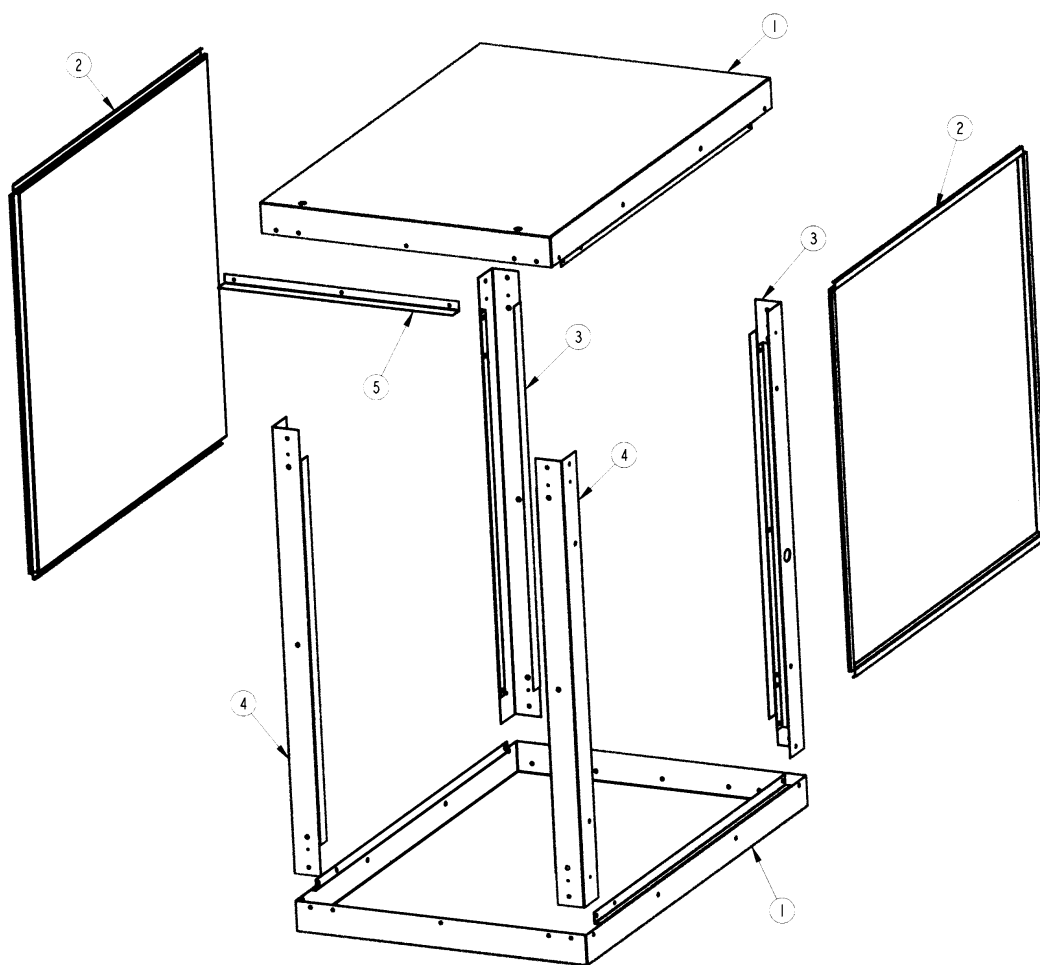
**Motor Mounting Assembly for Motors 1HP and Larger**



Item No.	Description	Qty	75	100	125	150	175	200	225	250	300	350	355	400
1	Blower	1	36428	36428	36428	36429	36429	36429	36429	36430	36430	36432	36432	36432
		1	--	--	--	--	--	--	--	36431	36431	36433	36433	36433
	Blower Bearings	2	--	--	--	--	--	--	--	10437	10437	10437	10437	10437
	Blower Shaft	1	--	--	--	--	--	--	--	10120	10120	10121	10121	10121
2	Blower Motor	1	113761	113761	113761	113761	113761	113762	113762	113763	113763	113764	113764	113764
		1	--	--	--	--	--	133436	133436	133436	133436	133436	133436	133436
3	Motor Adjustment Bracket Assembly	(for motors	1	12585	12585	12585	12585	12585	12585	--	--	--	--	--
	Hardware Bag including Rubber Feet for Adjustment Screws	less than 1HP)	1	64940	64940	64940	64940	64940	64940	--	--	--	--	--
4	Motor Sheave	1	13580	13580	13580	13580	13580	13580	13580	13659	13659	13659	13659	13659
5	Blower Sheave	1	116394	116394	116394	116398	116398	116397	116397	116398	116398	105483	105483	105483
6	Belt Guard (Model TB only)	1	42801	42801	42801	42807	42807	42807	42807	42801	42801	42807	42807	42807
7	Drive Belt	1	10960	10960	10960	7949	7949	10960	10960	105490	105490	105493	105493	105493
8A	Motor Mounting Plate	(for motors 1HP and larger)	1	--	--	--	--	--	--	12579	12579	12579	12579	12579
8B	Motor Mounting Plate Left Support		1	--	--	--	--	--	--	12576	12576	12576	12576	12576
8C	Motor Mounting Plate Right Support		1	--	--	--	--	--	--	12577	12577	12577	12577	12577
8D	Rod Bolt 5/16-18		2	--	--	--	--	--	--	12489	12489	12489	12489	12489
8E	Hex Nut 5/16-18		2	--	--	--	--	--	--	1035	1035	1035	1035	1035
8F	Hex Nut 5/16-18 (Keps)		6	--	--	--	--	--	--	6554	6554	6554	6554	6554
9&11	Blower Mounting Plate Assembly	1	17421	17421	17421	17449	17499	17491	17491	17510	17510	17528	17542	17542
10&12	Air Baffle	2	--	--	68434	68434	68434	68435	68435	68435	68435	68435	68435	68435
13	Blower Inlet Guard (TB only)	1	102474	102474	102474	102475	102475	102475	102475	102475	102475	102475	102475	102475
14	Blower Adapter Top and Bottom	2	53277	53277	--	--	--	--	--	--	--	--	--	--
15	Blower Adapter Sides	2	53278	53278	--	--	--	--	--	--	--	--	--	--
16	Double Blower Guard (TB only)	2	--	--	--	--	--	--	--	143575	143575	143575	143575	143575

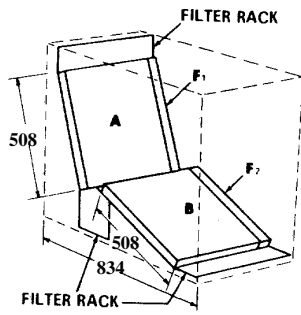
## 11.0 EXPLODED DIAGRAMS (cont'd)

### 11.6 Model TE - Standard Blower Cabinet Parts

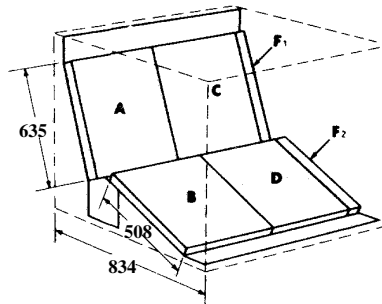


Item No.	Description	Qty	75	100	125	150	175	200	225	250	300	350	355	400
1	Top and Bottom Assembly	2	11522	11522	11522	11529	11529	11197	11197	11564	11564	11574	11583	11583
2	Door Panel	2	51041	51041	51041	51041	51041	51042	51042	51042	51042	51042	51042	51042
3	Corner Support	1	11518	11518	11518	11518	11518	11211	11211	11211	11211	11211	11211	11211
	Corner Support	1	11519	11519	11519	11519	11519	19982	19982	19982	19982	19982	19982	19982
4	Corner Support	2	11517	11517	11517	11517	11517	11210	11210	11210	11210	11210	11210	11210
5	Top Duct Connecting Angle	1	11523	11523	11523	11530	11530	11536	11536	11567	11567	11576	11584	11584

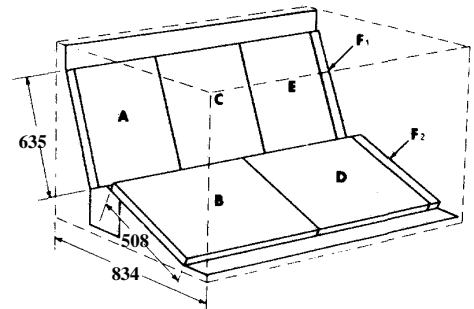
## 11.7 Model TE - Filter Arrangements



Sizes 75-175



Sizes 200-350



Sizes 355 & 400

Model TE Size	Dimensions (mm)						
	Filters					Metal Fillers	
	A	B	C	D	E	F1	F2
75	508 x 508	508 x 508					
100	508 x 508	508 x 508					
125	508 x 508	508 x 508					
150	508 x 635	508 x 635				21	21
175	508 x 635	508 x 635				21	21
200	406 x 635	406 x 508	406 x 635	406 x 508			
225	406 x 635	406 x 508	406 x 635	406 x 508			
250	508 x 635	508 x 508	508 x 635	508 x 508			
300	508 x 635	508 x 508	508 x 635	508 x 508			
350	508 x 635	508 x 635	508 x 635	508 x 508		122	
355	406 x 635	508 x 635	406 x 635	508 x 635		67	27
400	406 x 635	508 x 635	406 x 635	508 x 635	406 x 635	67	27

## 12.0 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.

Component	SIZE											
	75	100	125	150	175	200	225	250	300	350	355	400
Permanent Pilot Burner Assembly including Injector	144599	144599	144599	144599	144599	144599	144599	144599	144599	144599	144599	144599
Thermocouple	125835	125835	125835	125835	125835	125835	125835	125835	125835	125835	125835	125835
Spark Ignition Pilot Burner Assembly including Injector	144900	144900	144900	144900	144900	144900	144900	144900	144900	144900	144900	144900
Ignition Controller	145714	145714	145714	145714	145714	145714	145714	145714	145714	145714	145714	145714
Fan Control	141750	141750	141750	141750	141750	141750	141750	141750	141750	141750	141750	141750
Limit Control with Capillary	134808	134808	134808	134808	134808	134808	134808	141749	141749	141749	141749	141749
High Limit Control	112752	112752	112752	112752	112752	112752	112752	112752	112752	112752	112752	112752
Reset Switch	121925	121925	121925	121925	121925	121925	121925	121925	121925	121925	121925	121925
Injector - Main (G20 Gas)	11792	11792	84437	11833	84437	11828	84437	11833	84437	84437	84437	84437
Natural Gas	(4)	(4)	(5)	(7)	(7)	(9)	(9)	(12)	(12)	(14)	(16)	(16)
Injector - Main (G31 Gas)	61652	61652	61652	97360	61652	11834	61652	97360	61652	61652	97360	61652
Propane Gas	(4)	(4)	(5)	(7)	(7)	(9)	(9)	(12)	(12)	(14)	(16)	(16)
Gas Control Valve - Standard Single Stage, Permanent Pilot	113766	113766	113766	113766	113766	113766	113766	113766	113766	113766	113766	113766
Gas Control Valve - Optional Single Stage, Spark Ignition	134778	134778	134778	134778	134778	134779	134779	134779	134779	134779	134779	134779
Axial Fan Motor - TA	--	121277	121277	121277	121277	126688	126688	121277	121277	126688	126688	126688
		(1)	(1)	(1)	(1)	(1)	(1)	(2)	(2)	(2)	(2)	(2)
Centrifugal Blower Motor - TB/E (standard size; check motor size)	113761	113761	113761	113761	113761	113762	113762	113763	113763	113764	113764	113764
	.5 HP	.5 HP	.5 HP	.5 HP	.5 HP	.75 HP	.75 HP	1 HP	1 HP	1.5 HP	1.5 HP	1.5 HP
Gas Conversion Kits - Natural to G31 Propane Gas	146469	146118	146119	146120	146121	146122	146123	146124	146125	146126	146127	146128

Sales & Service by:

# **AMBI-RAD<sup>®</sup>**

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