



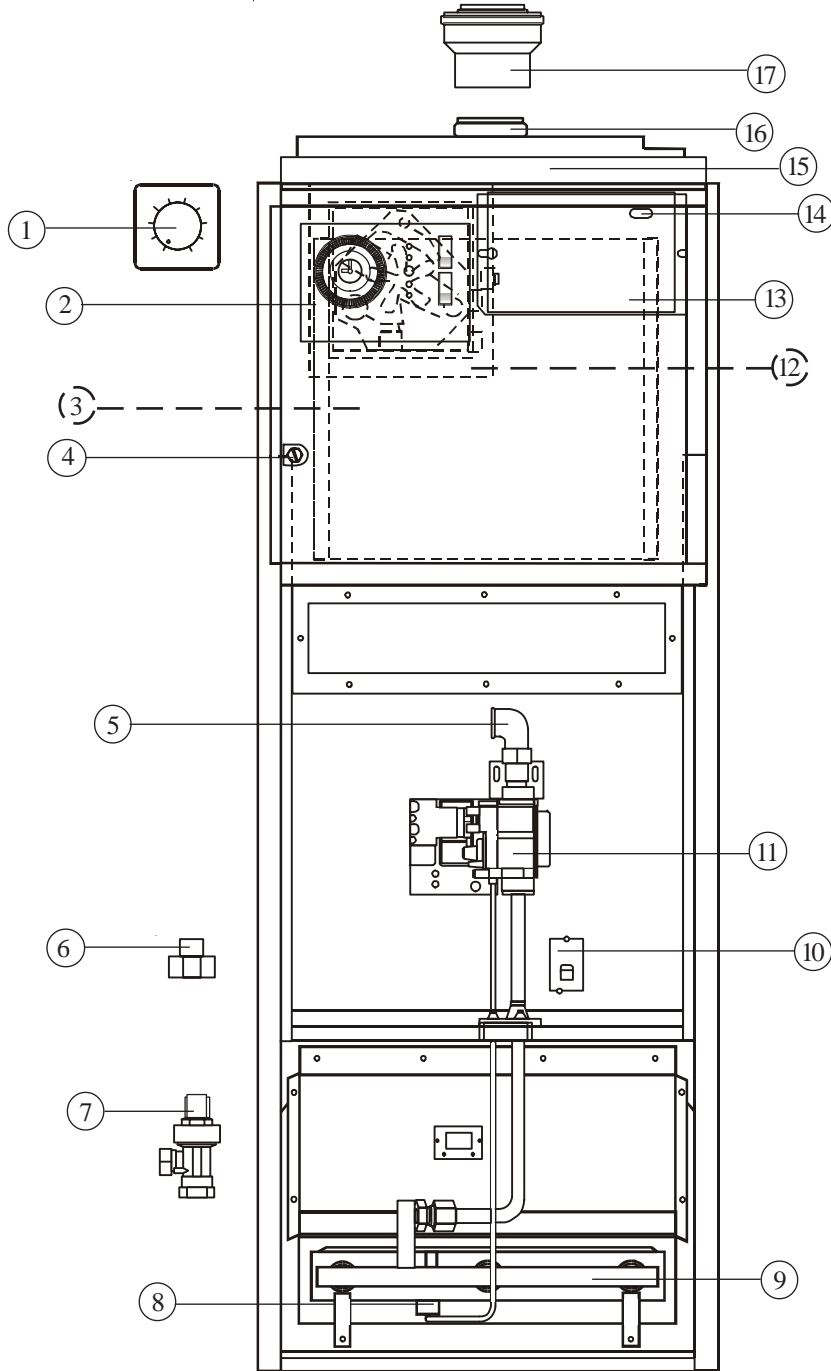
These instructions are to be left with the User or adjacent to the Gas Meter

ECONOMAIRE 90
WARM AIR HEATER
INSTALLATION, COMMISSIONING & SERVICING INSTRUCTIONS
G.C. 42-416-19



Publication No. ZZ 1110/6
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ECONOMAIRE 90 HAS BEEN TESTED AND CERTIFIED BY ADVANTICA FOR USE WITH NATURAL GAS G20.



1. Thermosta-stat
2. Time control
3. Air circulator fan
4. Flue gas test point
5. Gas connection
6. Union
7. Gas cock
8. Ignition burner
9. Main burner assembly
10. FDC & limit switch
11. Multifunction control
12. Combustion air fan
13. Control module
14. LED diagnostics indicator
15. Filter
16. Flue adapter
17. 4" to 5" flue enlarger

WARNING!
 This appliance requires a 5" flue.

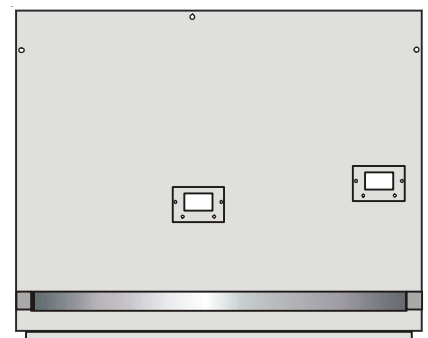


Fig. 1
Heater with Sealing Panel removed

Fig. 2
Sealing Panel

1. BRIEF DESCRIPTION

- 1.1 ECONOMAIRE 90 is a fan assisted downflow ducted warm air heater, which is fan flued and room sealed. The heater is supplied with digital temperature control for maximum comfort!
- 1.2 The air heater output can be adjusted between 20.5kW (73.8MJ/h, 70,000 Btu/h) and 26.4kW (94.9MJ/h, 90,000 Btu/h) "summer air circulation" of unheated air is available by manual selection (see the user's instructions).

Installation shall be in accordance with the current editions of:-

- Building Standards (Scotland) (Consolidation) Regulations
- Building Regulations
- Gas Safety (Installation and Use) Regulations (as amended)
- BS 7671 Institute of Electrical Engineers (I.E.E.) Wiring Regulations
- BS 6891 Installation of Low Pressure Gas Pipework of up to 28mm (R1) in domestic premises (2nd family gases).
- BS 5440 Pt. 1 (Flues for Gas Appliances)
- BS 5440 Pt. 2 (Air Supply for Gas Appliances)
- BS 5864 Installation of Gas Fired Ducted Air Heaters
- British System Design Manual “Gas Fired Warm Air Heating”
- Model and Local Authority Bye-laws

IMPORTANT: IT IS A STATUTORY REQUIREMENT THAT ALL GAS APPLIANCES ARE INSTALLED BY COMPETENT PERSONS, (i.e. CORGI REGISTERED INSTALLERS) IN ACCORDANCE WITH THE GAS SAFETY (INSTALLATION AND USE) REGULATIONS (CURRENT EDITION). FAILURE TO COMPLY WITH THESE REGULATIONS MAY LEAD TO PROSECUTION.

1.3 TECHNICAL DATA

Weight	90Kg
Gas	G20
Gas Supply Pressure	20mbar
Gas Category	I ₂ H
Countries of Installation	GB & IE
Electrical Supply	230 ~ 50Hz fused 5A 570W
Nox Class	1

	LOW RATE			HIGH RATE		
	KW	MJ/h	Btu/h	KW	MJ/h	Btu/h
INPUT (Gross)	27.1	97.6	92,500	33.0	118.70	112,500
OUTPUT	20.5	73.8	70,000	26.4	94.9	90,000
Gas rate cv 1037Btu/ft ³	2.60m ³ /h (91.8ft ³ /h)			3.10m ³ /h (109.4ft ³ /h)		
Burner setting pressure (hot)	11.8mbar (4.7 in wg)			17.2mbar (6.9 in wg)		
Main Injector	Bray Cat 23/700					
Cross-light injector	Bray Cat 10/110					

2. HEATER COMPARTMENT AND CLEARANCES (SEE BS 5864)

- 2.1 **IMPORTANT:** If the heater is to be fitted to an existing base duct (warm air plenum), always ensure that installation is carried out such that the rear left hand corner of the heater is aligned with the rear left hand corner of the base duct, so that any overhang or blanking off will be at the front and/or right hand side. In any event, blanking plates must be mechanically secured and all joints sealed.
- 2.2 When the heater is fitted into a compartment, a minimum clearance from the compartment walls of 38mm (1½in) at the rear, 75mm (3in) total at the sides (with a minimum of 25mm (1in) at any one side), and 63mm (2½in) at the front must be left. Consideration should also be given to the space required for the removal and replacement of the filter tray and the entry of the gas and electrical supplies.
- 2.3 For service access, a minimum of 450mm (18ins) is required at the front of the heater. Space must also be allowed, in a compartment installation, to permit the removal of the heater. The clearance between the appliance and the compartment should be not less than 75mm (3 in). However, if clearances are less than 75mm, the internal surface of the compartment must be lined with non-combustible material and the compartment must be of a fixed rigid structure.

- 2.4 In airing cupboard installations, the part used as the air heater compartment must comply with the relevant section of BS 5864 and must be completely separated by either a non-combustible partition or a perforated metal partition with the perforations not exceeding 13mm (1/2in). The secondary flue must be a tight fit where it passes through the partition and must be suitably protected (see BS 5440: Part 1).
- 2.5 In under-stairs installations, the compartment must comply with the relevant section of BS 5864, provided that in addition all internal surfaces (including the base) are non-combustible or lined with non-combustible material. This requirement is applicable only to dwellings of more than two storeys.
- 2.6 In free-standing installations, only one or two walls will be in close proximity to the air heater and these **MUST** be non-combustible.
- 2.7 Where the air heater is to be installed onto a combustible surface and under-floor ducting used, a suitable base tray (BT65/90) **MUST** be used in order to provide insulation. **NB where a base plenum is used no base tray is required!**

3. VENTILATION AIR

3.1 When installed in a compartment two permanent ventilation openings into the compartment are required, one at high level and one at low level. The minimum effective areas specified in Table 1 are related to the rated heat input of the air heater.

4. DUCT SYSTEM

(See British Design Manual - Gas fired Warm Air Heating)

4.1 RETURN AIR

- 4.1.1 Room-sealed appliances may be installed without return air ducting, provided that the path between the return air grille and the appliance return air inlet is protected in such a manner that the required air-flow will be maintained at all times. The return air grille **MUST** have a free area of not less than 2118cm² (328in²). It is recommended that the return air duct not be routed directly from the main living area, but from a convenient central area serving the remainder of the dwelling.
- 4.1.2 The return air system should be constructed of fire-resistant material. The flue shall not be run through an area serving as a return air plenum. It is extremely important that the correct size of return air grilles and ducting is used. For heaters on maximum output the return air duct size should not be less than the equivalent of 400mm x 300mm (16" x 12"). If flexible duct is used the duct diameter should not be less than 406mm (16") dia. The return air grille should have a free area of not less than 2118cm² (328in²).
- 4.1.3 An adequate and unobstructed return air path is essential from areas not served by a directly ducted return and to which warm air is delivered. All such rooms should be fitted with relief grilles which have a free area of 0.0088m²/kW (1in²/250Btu/h) of heat supplied to the room. The only exceptions are kitchens, bathrooms and WC.'s.
- 4.1.4 The return air duct should allow for ease of removal for access to the flue.
- 4.1.5 All duct work in the room or internal space in which the heater is installed shall be mechanically secured and sealed with ducting tape.

4.2 WARM DELIVERED AIR

- 4.2.1 All duct work, including riser ducts, should be fully insulated with 50mm (2in) fibreglass or similar. If short extended duct runs are taken below floor level these should be similarly insulated and in addition wrapped with a sound vapour proof barrier. They must also be protected from crushing.
- 4.2.2 The duct system should be carefully designed (as given in the guidelines in the British System Design Manual) to suit the needs of specific heating requirements and building layout. The type of duct system (e.g. radial/extended plenum/ stepped) should be installed using the least number of fittings to minimise airflow resistance. The base duct, which equalises the air pressure to supply ducts, must be constructed to support the weight of the heater, which must be sealed using self-adhesive foam strip, ducting tape or sealing compound. All ducting and blanking plates must be mechanically secured and sealed.

VENTILATED FROM INSIDE BUILDING	Low level grille 297cm ² (48in ²)
	High level grille 297cm ² (48in ²)
VENTILATED FROM OUTSIDE BUILDING	Low level grille 149cm ² (24in ²)
	High level grille 149cm ² (24in ²)

**Table 1:
Minimum Effective Areas**

5. INSTALLATION REQUIREMENTS

NOTE: THIS APPLIANCE MUST ONLY BE INSTALLED WITH THE SUPPLIED ACCESSORIES AND TERMINAL.

5.1 FLUES

The **ECONOMAIRE 90** is designed to be used with a 125mm flue and the supplied flue enlarger **MUST** be fitted directly on top of the flue adaptor! The heater can be used with horizontal or vertical flue types C12 and C32 and you should also consult (or be familiar with) British Standards BS 5440 Pt. 1 Flues

- 5.1.1 All joints must be soundly sealed.
- 5.1.2 Sufficient support brackets must be used in order to support the total weight of the flue system.
- 5.1.3 The flue must conform with Building Regulations and British Gas Materials and Installations specification (3rd edition) regarding clearance and shielding from combustible materials.
- 5.1.4 The horizontal flue length **MUST NOT** be less than 300mm plus 90° bend and **MUST NOT** exceed 18m excluding terminal.
- 5.1.5 The total vertical flue length **MUST NOT** be less than 1m and **MUST NOT** exceed 18m excluding terminal.
- 5.1.6 Total length refers to the equivalent worked flue length and therefore includes bends and **NOT** the distance from the heater to the flue terminal.
- 5.1.7 When calculating total flue length, reference **MUST** be made to the following 'equivalent lengths':
 - A) 90° bend = 3m B) 45° bend = 1.5m
- 5.1.8 The maximum number of 90° bends that can be used is:
 - A) Horizontal = 6 B) Vertical = 6
- 5.1.9 If a 'short flue' is used, the factory fitted flue orifice **MUST** be left in place (see Fig.3).
- 5.1.10 'short flue' refers to a total flue length not exceeding:
 - A) Horizontal (plus 90° bend) = 0.8m B) Vertical (including terminal) = 7m
- 5.1.11 Where the total flue length exceeds these lengths, the flue orifice **MUST** be removed.
- 5.1.12 The heater is supplied with either a horizontal or vertical flue, dependant upon your specification when ordering. Reference should be made to Table 2 for extra flue/terminal components.

5.2 HORIZONTAL TERMINAL LOCATION:

- 5.2.1 The terminal must be positioned on the outside of the building and allow for the free passage of air across it at **ALL** times.
- 5.2.2 Avoid positions where the terminal is adjacent to projections, particularly under a balcony or immediately adjacent to a drain pipe.
- 5.2.3 The terminal position must ensure that combustion products cannot enter the building in which the heater is installed (or any adjacent building) through windows, doors or by any others means.
- 5.2.4 Fig. 4 shows recommended terminal positions
- 5.2.5 The flue **MUST** be fitted with the protrusion as shown in Fig. 5
- 5.2.5 If the heater is to be installed in a timber framed building you **MUST** consult the Institute of Gas Engineers document UP/7, or your local gas region.
- 5.2.6 Where the lowest part of the flue terminal is located less than 2 metres above the ground, a balcony, or above a flat roof across which there is access, the terminal **MUST** be fitted with a Tower Flue Components guard, part number: TGD1111105 (or similar) such that the distance between the guard and the nearest part of the terminal is no less than 50mm.
- 5.2.7 Reference should be made to Table 2 for required terminal components and guard.
- 5.2.8 **NOTE: TO ENSURE THAT RAINWATER CANNOT ENTER THE HEATER UNIT, THE FLUE MUST BE INSTALLED WITH A SLIGHT FALL AWAY FROM THE HEATER.**

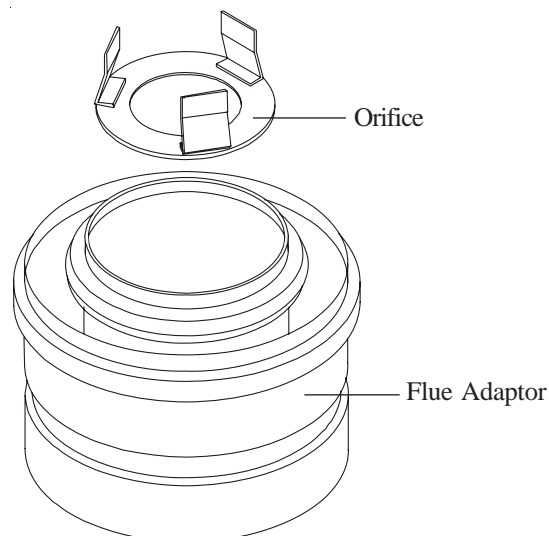


Fig. 3
Flue Adaptor and Orifice

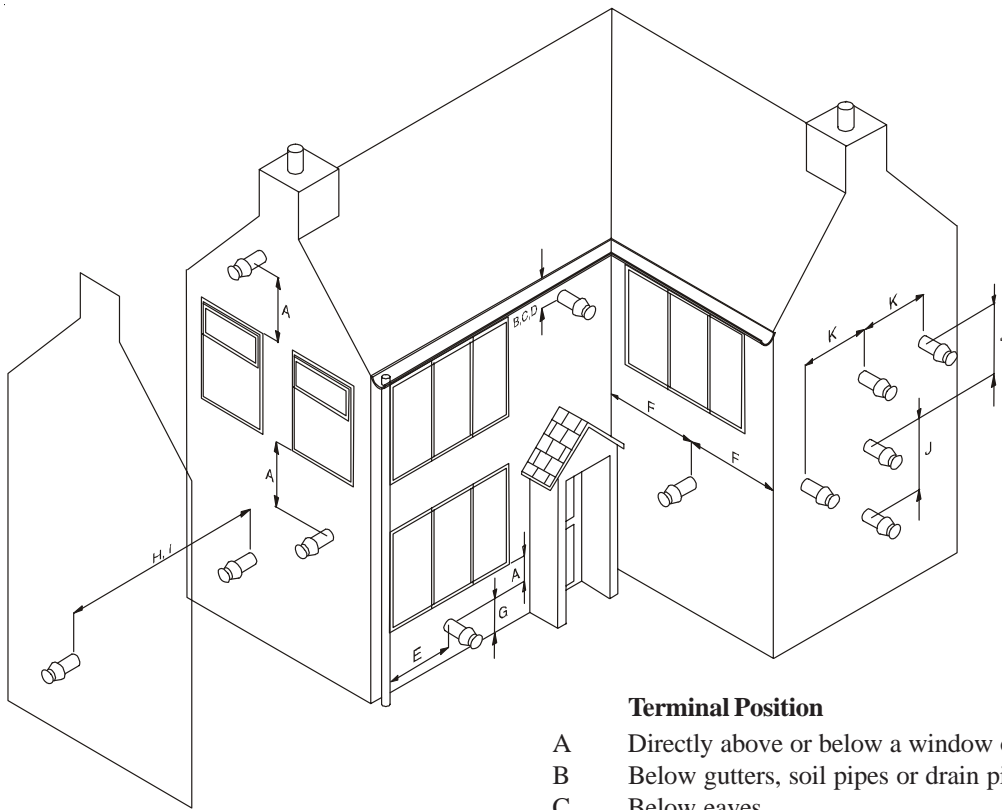


Fig.4
Recommended (Horizontal)
Terminal Positions

Terminal Position	Min Distance	
A	Directly above or below a window or other opening	300mm
B	Below gutters, soil pipes or drain pipes	75mm
C	Below eaves	200mm
D	Below balcony	200mm
E	From vertical drain/soil pipes	150mm
F	From internal or external corners	300mm
G	Above ground or balcony level	300mm
H	From a surface facing terminal	600mm
I	From a terminal facing a terminal	1200mm
J	Vertically from a terminal on the same wall	1500mm
K	Horizontally from a terminal on the same wall	300mm

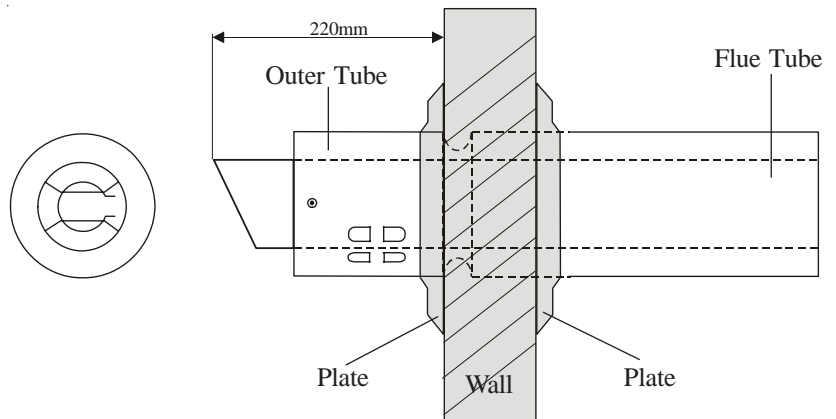


Fig. 5
Horizontal Flue Terminal

5.3 VERTICAL TERMINAL LOCATION:

5.3.1 The ECONOMAIRE 90 is designed to be used with a vertical flue where the installation of a horizontal flue is either not possible or not desired.

5.3.2 Installation of a vertical flue can be achieved on either a flat or pitched roof with a pitch angle of between 25° and 50°.

5.3.3 The terminal **MUST** be positioned on the outside of the building and allow for the free passage of air across it at **ALL** times.

5.3.4 Avoid positions where the terminal is adjacent to projections; particularly under a balcony.

5.3.5 The terminal position must ensure that combustion products cannot enter the building in which the heater is installed (or any adjacent building) through windows, doors or by any other means.

5.3.6 Fig. 6 shows recommended terminal positions.

5.3.7 Reference should be made to Table 2 for the required terminal components.

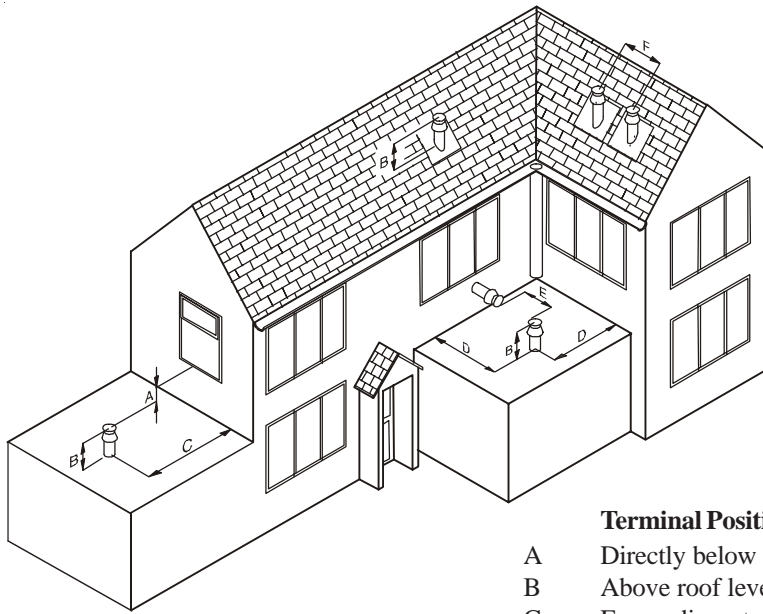


Fig. 6
Recommended (Vertical)
Terminal Positions

	Terminal Position	Min Distance
A	Directly below a window or other opening	300mm
B	Above roof level (to base of terminal)	300mm
C	From adjacent wall to flue	300mm
D	From internal corner to flue	400mm
E	From facing terminal	1200mm
F	Between terminals	300mm
G	Below eaves or balcony	NOT RECOMMENDED

PART No	CONTENTS	COLOUR
1000-0016520	1 X 90° Standard Flue Elbow	White
1000-0016530	1 X 45° Flue Elbows	White
1000-0016550	1 X 500mm Extension	White
1000-0016540	1 X 1000mm Extension	White
1000-0016560	1 X Vertical Terminal 1 X Support Bracket	Anthracite
1000-0016630	1 X Vertical Terminal 1 X Support Bracket	Terracotta
1000-0014890	1 X Lead Pitched Roof Flashing 1 X Collar	Anthracite
1000-0014990	1 X Lead Pitched Roof Flashing 1 X Collar	Terracotta
1000-0014900	1 X Aluminium Flat Roof Flashing	Aluminium
1000-0016570	1 X Horizontal Wall Terminal	White
1000-0016580	1 X Wall Plates (for above)	White
1000-0016590	1 X Horizontal Wall Terminal 2 X Wall Plates	White
1000-0016600	1 X Condensation Drain	White
1000-0014950	1 X Syphon Kit (for above)	N/A
1000-0016610	1 X Condensation Drain 1 X Syphon Kit	N/A
1000-0016620	1 X Wall Bracket (125mm dia)	N/A
1000-0017130	1 X Terminal Guard	N/A

Table 2.
Flue and Terminal Components

5.4 ELECTRICAL

WARNING: THIS APPLIANCE MUST BE EARTHED!

5.4.1 Mains.

- a. The heater is supplied with mains cable (PVC sheathed, heat resisting to 85°C), 3 core: Brown; Blue; Green/Yellow, 6A, 0.75mm²), connected to a terminal block and exiting through the heater at the right hand top. The cable is suitable for a 230V 50Hz supply and requires connection to the fixed wiring using a double pole switched, fused spur with a contact separation of at least 3mm in ALL poles. The fuse fitted must be rated 5A to BS 1362. Connections must also be in accordance with the current edition of I.E.E Regulations BS 7671.

NOTE: If, for any reason, the heater is re-wired, then 3 core cable that meets the above specification **MUST** be used. Under **NO** circumstances, should 5 core cable be used for the combined purpose of supplying power to the heater and connecting the thermista-stat!

- b. Fan delay and overheat (limit controls) are not adjustable and are factory set so that the limit switch opens at 93°C and closes at 76°C.
- c. An electronic controller (thermista-stat) is supplied which acts like a room thermostat.

5.4.2 Thermista-stat and its location.

- a. The thermista-stat should be located where there is free air circulation and positioned approx. 1.5m (5ft) from the floor.
- b. Avoid the following locations:
 - i. In a room where temperature is greatly affected by the sun or any other heat source, e.g. radiant fire, wall light fittings or TV set.
 - ii. Near an outside door or windows, or on an outside wall.
 - iii. Where it will be affected by warm air ducts, diffusers, waste pipes or the heater itself.
 - iv. Where it will be subjected to vibration.
- c. Connect the thermista-stat wires to terminals '8' and '9' on the terminal block (see Figs. 13 & 14).

5.5 GAS (SEE BS 5864 AND BS 6891)

- 5.5.1 The local gas supply conditions **MUST** be adequate for the specified burner pressures as stated in the technical specification (para. 1.3)
- 5.5.2 An independent gas supply pipe from the meter is to be preferred wherever possible. Where this is not possible, the pipe must be capable of taking the complete input of the heater and all other gas appliances being served by the same pipe. This supply should be suitably sized to conform to British Standards requirements of no more than 1.0 mbar (0.4in wg) pressure drop (See table of discharge in BS 6891).
- 5.5.3 The 1/2in union gas cock (supplied) **MUST** be fitted to the gas inlet of the heater for easy isolation during servicing. The gas pipe should be fitted and installed so as to be durable, substantial and gas tight. To assist in determining where a gas connection may not be tight, a leak detection fluid should be applied around the connection. Under no circumstances should a flame be used to locate a gas leak. Gas entry to the air heater is through either side or the base, to a Rp1/2 (1/2in BSP. internal [parallel] thread). NB Sealing grommets are supplied for sealing around the gas feed pipe.

6. AIR HEATER COMMISSIONING

6.1 PREPARATION:

After installation of the appliance, you **MUST** do the following:

- 6.1.1 Test for gas leakage using proprietary detection fluid and seal any leaks found.
- 6.1.2 Carry out preliminary electrical system checks.
- 6.1.3 Ensure that:
 - a. filter, fan and fan compartments are free from obstructions.
 - b. all registers or grilles are open and conform to design specifications.
 - c. return, relief and ventilation air installations are adequate.

6.2 SYSTEMBALANCING:

- 6.2.1 Set the air heater electrical supply **ON**.
- 6.2.2 Set the thermista-stat to the “SUMMER AIRFLOW” position.
- 6.2.3 Balance the system to provide the required volume proportions at the warm air outlets.

Note: If the system includes ceiling diffusers, the air through these should be **NOT LESS THAN 1.5m/s (300ft/min)**, except for very small rooms, (i.e. bathrooms etc.). Outlet faces may require partial blanking in order to achieve this.

6.3 LIGHTINGIGNITION ANDMAINBURNER:

- 6.3.1 Turn on the gas supply to the heater.
- 6.3.2 Set the “AIR HEATER” switch on the time control unit to the “OFF” position.
- 6.3.3 Set the thermista-stat to “9”.
- 6.3.4 Locate the status LED indicator which can be observed through the inspection hole in the bottom right hand corner of the control module.
- 6.3.5 Turn on the mains power supply to the heater
- 6.3.6 Set the “AIR HEATER” switch on the time control to “CONT.” and observe the LED status indicator.
- 6.3.7 Whilst the control module runs through its diagnostic cycle the decimal point (DP) in the bottom right hand corner of the LED display will flash continuously.
- 6.3.8 The igniter will spark for a maximum period of 60 seconds during which time the ignition and main burners **SHOULD** ignite and the igniter will stop sparking.
- 6.3.9 When the control module reaches stage 5, (indicated by “5” on the LED) power is fed to the gas valve and the green LED “ON” light on the indicator panel will illuminate. After a period of approx. 5 seconds, the module will move on to stage 6 (indicated by “6” on the LED). **NOTE: regardless of when the burner ignites during the 60 second period, the LED will continue to display stage 6.**
- 6.3.10 If, after the 60 second period, the main burner has ignited the LED indicator will show “0” and the green LED “ON” light on the indicator panel will remain steady.
- 6.3.11 If the main burner fails to ignite, the red LED marked “LOCKOUT” will illuminate on the display panel and the LED status indicator will display an alphanumeric character relevant the the fault detected.

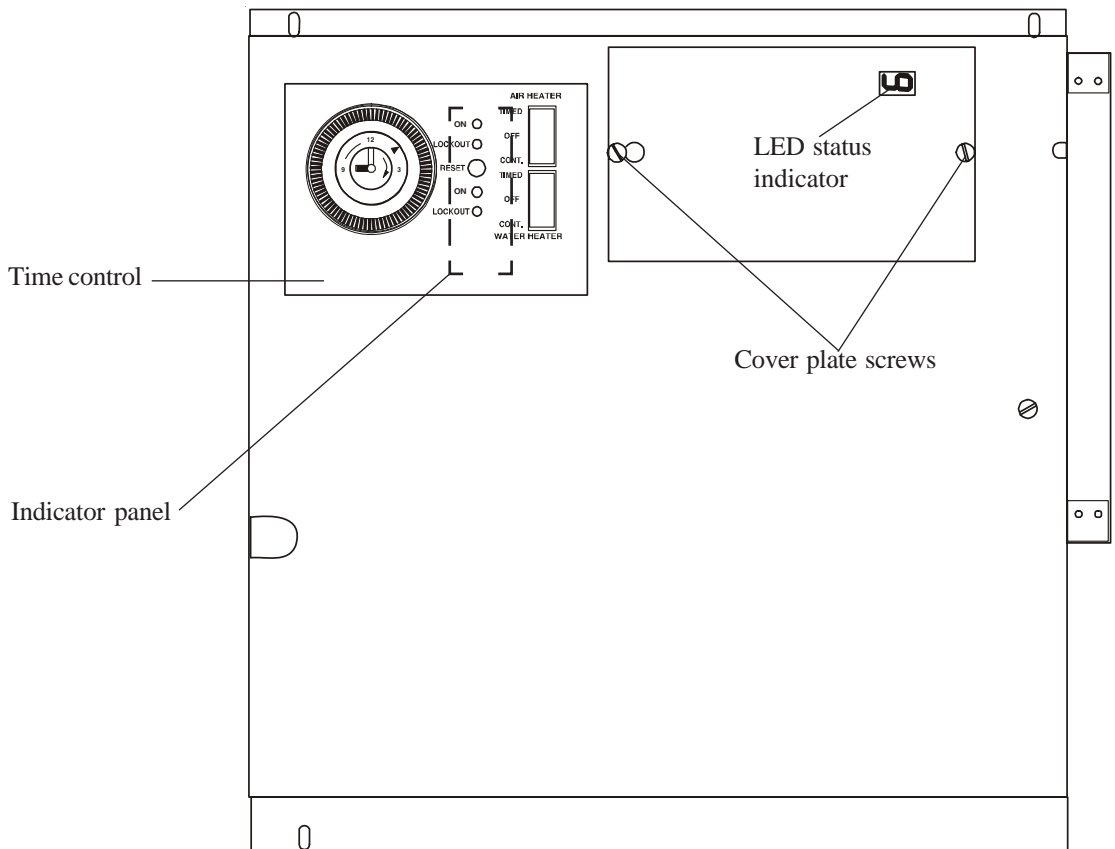


Fig. 7
Electrical Door Assembly
(showing time control, indicator panel and status indicator)

- 6.3.12 In the event of a lockout and the ignition and main burners failing to ignite, reference should be made to table 4 in the fault finding section of these instructions in order to establish the fault condition.
- 6.3.13 Allow the air heater to operate for a minimum of 15 minutes to ensure stability.
- 6.3.14 Reset the thermista-stat to the desired comfort level
- 6.3.15 Set the time control to the desired “on” and “off” periods.
- 6.3.16 Set the “AIR HEATER” switch on the time control to “TIMED”.

6.4 MAIN BURNER PRESSURE TEST:

NOTE: AIR HEATER BURNERS ARE FACTORY SET TO PROVIDE A NOMINAL HIGH RATE OUTPUT AS DETAILED IN SUB PARA 1.2

- 6.4.1 Loosen the screw on the outlet pressure test point and fit a pressure test gauge (see Fig. 8)
- 6.4.2 Check the gauge reading against the information at paragraph 1.3.
- 6.4.3 If necessary, use the burner pressure adjuster to obtain required gauge reading in accordance with paragraph 1.3.
- 6.4.4 Remove the pressure gauge and re-tighten screw on the outlet pressure test point.

6.5 AUTOMATIC CONTROLS CHECK

- 6.5.1 Light the ignition and main burners as detailed in 6.3 above.
- 6.5.2 Allow the heater to operate for 15 minutes to ensure stability.
- 6.5.3 After a short period, ensure that the fan increases to full speed.
- 6.5.4 When the temperature reaches the control setting, check that the main burner cycles ON and OFF at intervals of approx. 75 to 120 seconds.

6.6 SAFETY CHECK:

In order to check the correct operation of the control module, run the heater for a short period and introduce a fault condition by carrying out the following sequence:

- 6.6.1 Check for gas soundness within the appliance.
- 6.6.3 Turn on both the gas and electrical supplies to the heater.
- 6.6.4 Set the “AIR HEATER” switch on the time control unit to “CONT”.
- 6.6.5 Light the ignition and main burners as described in section 6.3
- 6.6.6 Allow the heater to run for a period of 5 minutes to stabilise.
- 6.6.7 Turn off gas supply to heater at the heater Gas Cock. **DO NOT TURN OFF AT GAS METER!**
- 6.6.8 Having detected the fault condition, the module should cause the red LED on the indicator panel to flash and the module will go through the ignition sequence. Having detected the fault condition a second time, the control module should cause the heater to go into lockout, indicated by a constant red LED and the LED status indicator will show “6”
- 6.6.9 Reinststate gas supply and wait for a minimum period of 10 seconds.
- 6.6.10 Depress the “RESET” button on the Indicator Panel.
- 6.6.11 The heater will go through its ignition procedure and the ignition and main burners **SHOULD** ignite.
- 6.6.12 Set the “AIR HEATER” switch on the time control unit to “TIMED”

7. INSTRUCTIONS FOR USERS

- 7.1 If the building is unoccupied, ensure that the user instructions are left taped to the air heater for the user’s reference and that the installation instructions are left at or near the air heater for use on future service calls.
- 7.2 If the building is occupied, hand the user instructions over and ensure that the user understands:
 - 7.2.1 How to light the air heater.
 - 7.2.2 How to re-set the air heater if “LOCKOUT” occurs.
 - 7.2.3 How to operate the time control, thermista-stat and the SUMMER AIRFLOW switch.
 - 7.2.4 That the time control must be reset following a power failure.
 - 7.2.5 How to turn off the heater and switch off the electrical supply to the heater.
 - 7.2.6 How to remove, clean and refit the air filter and at what intervals, (i.e. fortnightly, or weekly for new houses).

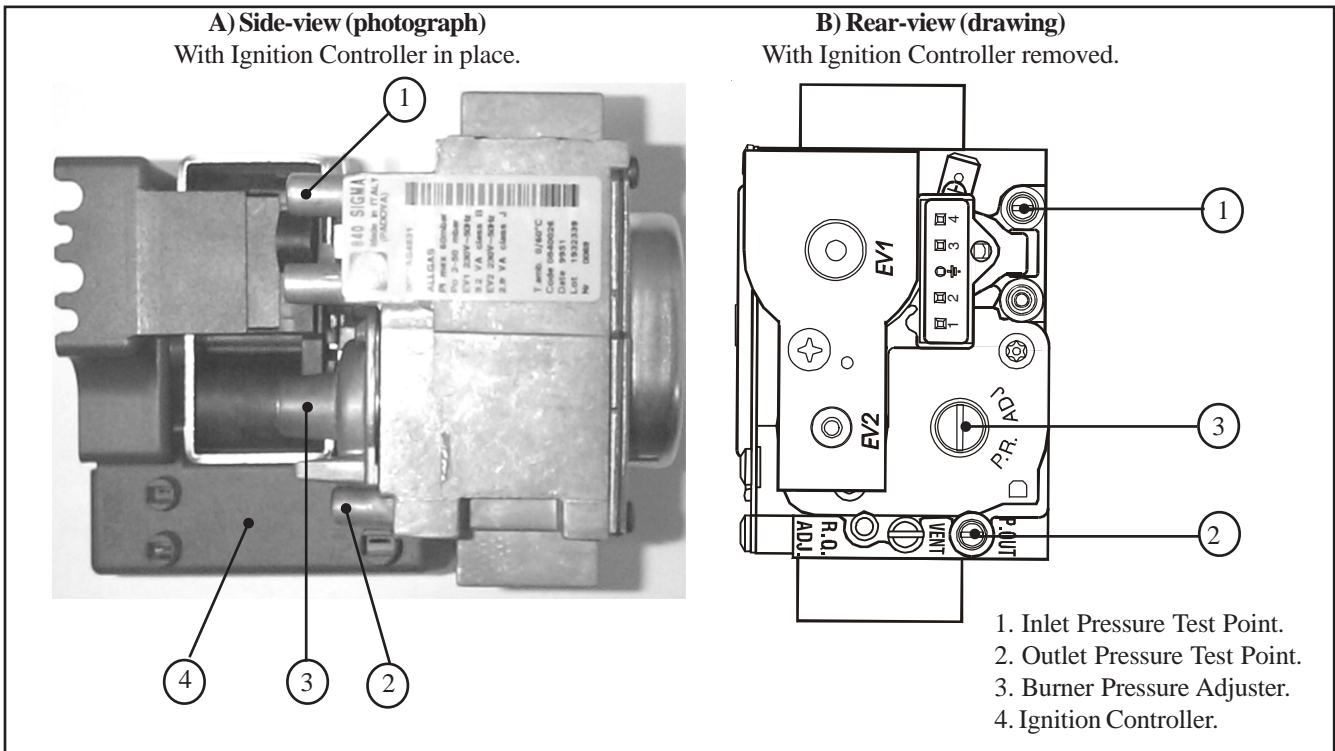
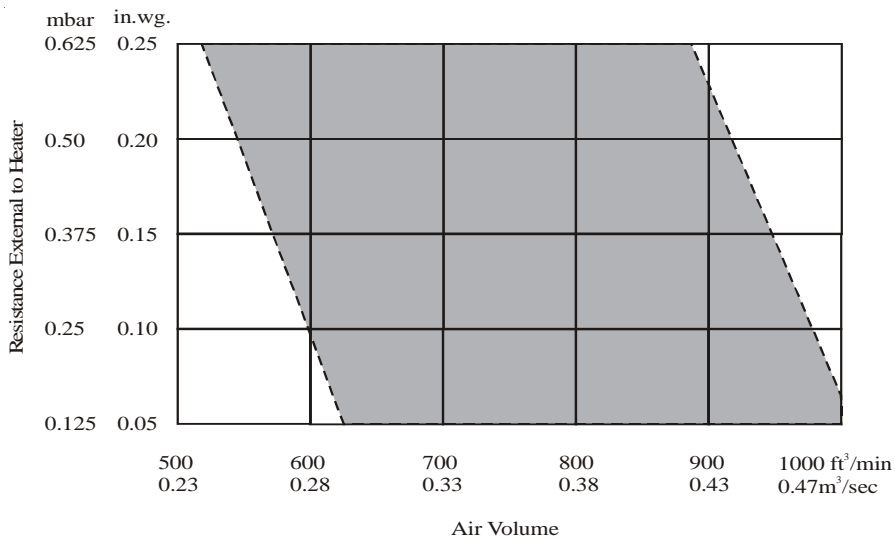


Fig. 8
Multifunction Control



Fan Performance Curve

- 7.2.7 How to control the heating system by opening and closing warm air outlets.
- 7.2.8 How to obtain summer air circulation.
- 7.2.9 That the air grilles on the heater or heater compartment; grilles and ventilators in the walls, windows or doors of the building **MUST NOT BE OBSTRUCTED**.
- 7.2.10 That the heater must be serviced at least once a year by a competent person to ensure efficient and safe operation.
- 7.2.11 That the red instructions for safe use have been pointed out and understood.
- 7.2.12 That expert help must be obtained if persistent “LOCKOUT” occurs.

NOTE: It is recommended that this appliance be serviced at intervals of no less than 12 months.

IMPORTANT: Ensure that the gas and electricity supplies are isolated before commencing any maintenance or replacement of components. Because the appliance is room sealed, it is also imperative that if at any stage of repairs the gasket on the sealing plate is damaged it MUST be replaced! After completion of any maintenance, always test for gas soundness and carry out a complete functional test of the appliance in accordance with the Commissioning Instructions at paragraphs 6.1 to 6.6 inclusive.

8.1 ROUTINEMAINTENANCE:

- 8.1.1 Operate the appliance and check for the correct function of the burner and controls.
- 8.1.2 Turn OFF the gas and electrical supplies to the appliance.
- 8.1.3 Remove the air heater front panel.
- 8.1.4 Remove and check the return air filter/cleaner for cleanliness, remove and clean the air circulation fan as detailed in para 10.6.
- 8.1.5 Remove the burner and controls assembly as detailed in para 10.2, inspect and clean the main burner and injector as necessary. Examine the main burner for cracks, including hairline cracks, exchanging the burner as necessary.
- 8.1.6 Inspect and clear the ignition burner orifice.
- 8.1.7 Clean the heat exchanger flueways by thoroughly brushing from above and below.
- 8.1.8 By viewing through the fan aperture, and using a torch or similar, examine the heat exchanger externally for signs of cracks or holes, particularly around welded joints.
- 8.1.9 Using a torch or similar, introduce a light source into the heat exchanger burner aperture and upper access port, and again examine the heat exchanger for signs of cracks or holes, particularly around welded joints, whilst again viewing through the fan aperture.
- 8.1.10 Refit the air circulation fan, burner and controls assembly, and air filter/air cleaner.
- 8.1.11 Allow the air heater to operate for approximately 15 minutes to ensure stability and, with the main burner lit, ensure that the operation of the air circulation fan does not affect the main burner flame profile.
- 8.1.12 Locate the flue gas test point (see fig.1) and attach a flue gas analyser to the test point in accordance with the manufacturer's instructions. **NOTE:** the CO/CO₂ ratio should be no greater than 0.008
- 8.1.13 Fully commission the appliance in accordance with paragraphs 6 and 8.

NOTE: The flue gas test MUST NOT be used as an alternative to servicing the heater!

8.2 MULTIFUNCTION CONTROL AND BURNER ASSEMBLY REMOVAL:

NOTE: Both the burner and ignition burner assemblies MUST be removed as a complete unit together with the multifunction control.

PROCEDURE:

- 8.2.1 Ensure that the gas and electrical supplies are switched OFF.
- 8.2.2 Remove the front door from the heater.
- 8.2.3 Remove the fixing screws that hold the sealing panel in place and carefully remove the panel.
- 8.2.4 Disconnect the electronic module from the multifunction control by removing the securing bolt and sliding it towards the left of the heater unit, taking care not to cause damage.
- 8.2.5 Remove the burner assembly fixing screws.
- 8.2.6 Break the gas supply at the gas union and remove the gas feed pipe fixing screw.
- 8.2.7 Whilst supporting the assembly, carefully remove the fixing screws securing the multifunction control.
- 8.2.8 Carefully remove the complete assembly, by sliding the sealing grommet out of the bulkhead, taking care not to cause damage to the grommet!
- 8.2.9 Refitting the burner assembly is a reverse procedure of the above instructions.

8.3 BURNERASSEMBLYCLEANING:

- 8.3.1 Remove the burner assembly as detailed above.
- 8.3.2 Disconnect the ignition burner gas feed pipe from the ignition burner
- 8.3.3 Release the single screw, nut and washer securing the ignition burner to the main burner and remove the ignition burner.

- 8.3.4 Release the 2 screws, nuts and washers securing the main burner to the mounting bracket and remove the main burner.
- 8.3.5 Clean the burner thoroughly both inside and out with a soft brush. **DO NOT ENLARGE, DISTORT OR DAMAGE BURNERHOLES.**
- 8.3.6 Reassemble in reverse order.

8.4 IGNITIONBURNERANDELECTRODEREMOVALANDREPLACEMENT:

- 8.4.1 Remove the burner as detailed in 8.2 above.
- 8.4.2 Disconnect the igniter lead from electrode.
- 8.4.3 Break the gas feed at the burner end of the gas feed pipe.
- 8.4.4 Release the single screw, nut and washer securing the ignition burner to the main burner assembly and carefully remove the ignition burner assembly.
- 8.4.5 Release the electrode securing nut from the ignition burner assembly and withdraw the electrode.
- 8.4.6 Release the ignition burner feed pipe securing nut from the ignition burner assembly and withdraw the feed pipe and injector from the ignition burner assembly. Disconnect the ignition burner injector from the ignition burner feed pipe hook.
- 8.4.7 Release the 2 x 5mm screws securing the ignition burner bracket to the ignition burner mounting bracket and remove the ignition burner bracket.
- 8.4.8 Refitting or replacement is in reverse order.

8.5 AIRCIRCULATINGFAN,REMOVALANDCLEANING:

- 8.5.1 Ensure that the electrical supply is isolated.
- 8.5.2 Remove the front door from the heater and remove the 3 x fixing screws on the electrical door assembly.
- 8.5.3 Open the door assembly outwards on its hinges (see fig. 7) such that access is gained to the rear of the assembly.
- 8.5.4 Disconnect the fan flying leads from the fan assembly.
- 8.5.5 Release the fan assembly securing screws and withdraw the fan assembly from the heater cabinet, avoiding damage to the fan blades.
- 8.5.6 Remove all dust from both the impeller and motor, taking care to not disturb the balance of the fan.
- 8.5.7 Refitting or replacement is in reverse order.

8.6 CONTROLMODULEREMOVAL:

- 8.6.1 Ensure that the electrical supply is isolated.
- 8.6.2 Remove the front door from the heater.
- 8.6.3 Loosen the top and bottom screws holding the electrical cover plate in place on the electrical door assembly. (see fig. 7) **DO NOT COMPLETELY REMOVE THE SCREWS AT THIS STAGE.**
- 8.6.4 Remove the cover plate by sliding it upwards, such that it exposes the control module.
- 8.6.5 Carefully disconnect the module by lifting the connecting blocks off the circuit board (see fig. 11)

NOTE: There is no need to loosen any of the connection screws on the connector blocks!

- 8.6.6 Completely remove the top and bottom cover plate screws and pull the control module free of the electrical door assembly.
- 8.6.7 Fit the new control module in place and partially fit the cover plate fixing screws. **DO NOT TIGHTEN SCREWS AT THIS STAGE!**
- 8.6.8 Re-connect the module by carefully pushing the connector blocks onto the circuit board.
- 8.6.9 Re-fit the electrical cover plate and tighten the cover plate screws.
- 8.6.10 Re-establish electrical supply.
- 8.6.11 Commission the heater as described in the relevant sections above.

8.7 TIME CONTROL,SWITCHANDLEDINDICATOR(DAUGHTERBOARD)REMOVAL:

Preparation:

- 8.7.1 Ensure that the electrical supply is isolated.
- 8.7.2 Remove the appliance front door and release the 3 x securing screws on the electrical door assembly.

8.7.3 Open the door assembly outwards on its hinges (see fig. 7) such that access is gained to the rear of the assembly.

Time Control removal:

8.7.4 Disconnect spade terminal connectors “C1”, “C2”, “C3” and “C5” from the time control.

8.7.5 Release the 3 x fixing screws securing the clock mounting plate to the electrical door and withdraw the total assembly from the door.

8.7.6 Remove the 3 x M3 bolts that secure the time clock mechanism and remove from the mounting plate.

8.7.7 Refitting or replacement is in reverse order.

LED Indicator (Daughter Board)

8.7.8 Disconnect the daughter board by unplugging the flylead from the control module board.

8.7.9 Release the 3 x fixing screws securing the clock mounting plate to the electrical door and withdraw the total assembly from the door.

8.7.10 Remove the 2 x M3 nuts holding the board onto the bolts and remove.

8.7.11 Replacement is in reverse order, ensuring to refit the spacers.

Switch removal:

8.7.11 Disconnect the spade terminal connectors “S1”, “S2” and “S3” from the switch terminals.

8.7.12 Release the switch by pressing out from the back of the electrical door assembly.

8.7.13 Fit new switch and lock into position by pressing home until the locking tabs locate on the top and bottom of the switch.

8.7.14 Re-connect the spade connectors.

8.7.15 Re-fitting of the electrical door assembly is in reverse order.

8.7.16 Close the electrical door assembly and secure using the 3 x fixing screws.

8.7.17 Set the time control to correct time.

8.7.18 Set the time control to the required “ON” and “OFF” periods.

8.8 FANDELAY CONTROL/LIMIT SWITCH REMOVAL:

8.8.1 Ensure that the electrical supply is isolated.

8.8.2 Remove the appliance front door.

8.8.3 Remove the 2 x fixing screws holding the FDC/limit switch assembly in place and withdraw from the appliance.

8.8.4 Refitting or replacement is in reverse order.

8.9 HEATEXCHANGER ACCESS:

8.9.1 Ensure that the gas and electrical supplies are isolated.

8.9.2 Remove the appliance front door.

8.9.3 Remove the fixing screws holding the sealing panel in place and carefully remove the panel.

8.9.4 Remove the burner assembly as detailed at 8.2

8.9.5 Release the screws securing the combustion chamber heat shield and withdraw the heat shield.

8.9.6 Release the screws securing the top access cover plate and withdraw the cover plate and gasket.

8.9.7 Release the screws securing the heat exchanger top sealing plate and withdraw the sealing plate and gasket.

8.9.8 Reassembly is in reverse order.

NOTE: When reassembling ensure that gaskets are soundly sealed and replaced where necessary (See cautionary note at paragraph 10) Prior to use, you MUST fully commission the heater in accordance with these instructions.

8.10 FLUE FAN, REMOVAL AND CLEANING

8.10.1 Remove the air circulation fan as detailed at 8.5

8.10.2 Carefully open the plastic insulators on the fan fly-lead and break the electrical connections.

8.10.3 Remove the fixing screws holding the flue fan sealing plate in place and remove the plate.

8.10.4 Carefully remove the feed pipes to the pressure switch TAKING CARE TO NOTE THEIR POSITION.

8.10.5 Release the 4 x fixing screws holding the flue fan in place

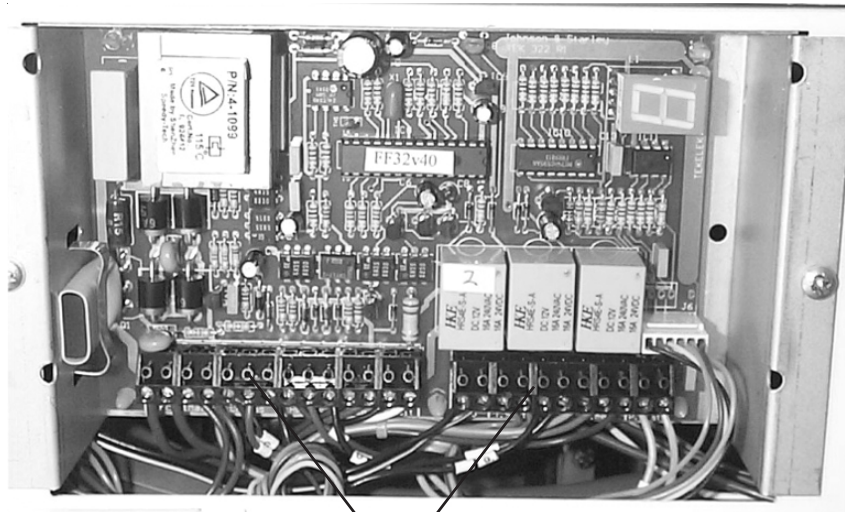
8.10.6 Carefully withdraw the fan and its gasket from the collector box, taking care not to damage the fan blades.

8.10.7 Remove all dust from both the impeller and motor, taking care not to disturb the balance of the fan.

8.10.8 Refitting/replacement is in reverse order.

NOTE:

To disconnect the module, LIFT the connector blocks off the circuit board. DO NOT remove the wires from the connector blocks!



Connector blocks

Fig. 11

Control module, showing connector blocks.

9.

DEFECT DIAGNOSIS

The following table shows the LED status indicator display and the corresponding fault condition. It should be noted that under certain conditions the red LED relating to the air heater may flash. This is part of the control sequence and the module should reset automatically. It is ONLY necessary to press the “RESET” button if the red LED is continually illuminated !

LED Display	Cycle	Fault Condition
0	Running	None: all is well
1	Air Proving	Air switch closed
2	Air Proving	Gas valve relay ON
3	Air Proving	Air switch closure failed
4	Prove Heater Relay	Gas valve current, relay should be open
5	Prove Heater Valve	None (wait for Ignition Burner)
6	Prove Heater Valve	Flame failure
7	Prove Circulator Relay	Gas valve current, relay should be open
8	Prove Circulator Valve	None (wait for Ignition Burner)
9	Prove Circulator Valve	Flame failure
A	Running	Excessive cabinet temperature
C	Running	Air flow sensor out of range
E	Running	Problem with air circulator fan
F	Running	Air heater limit stat
L	Running	Open air flow sensor

Table. 4

Control module fault indications

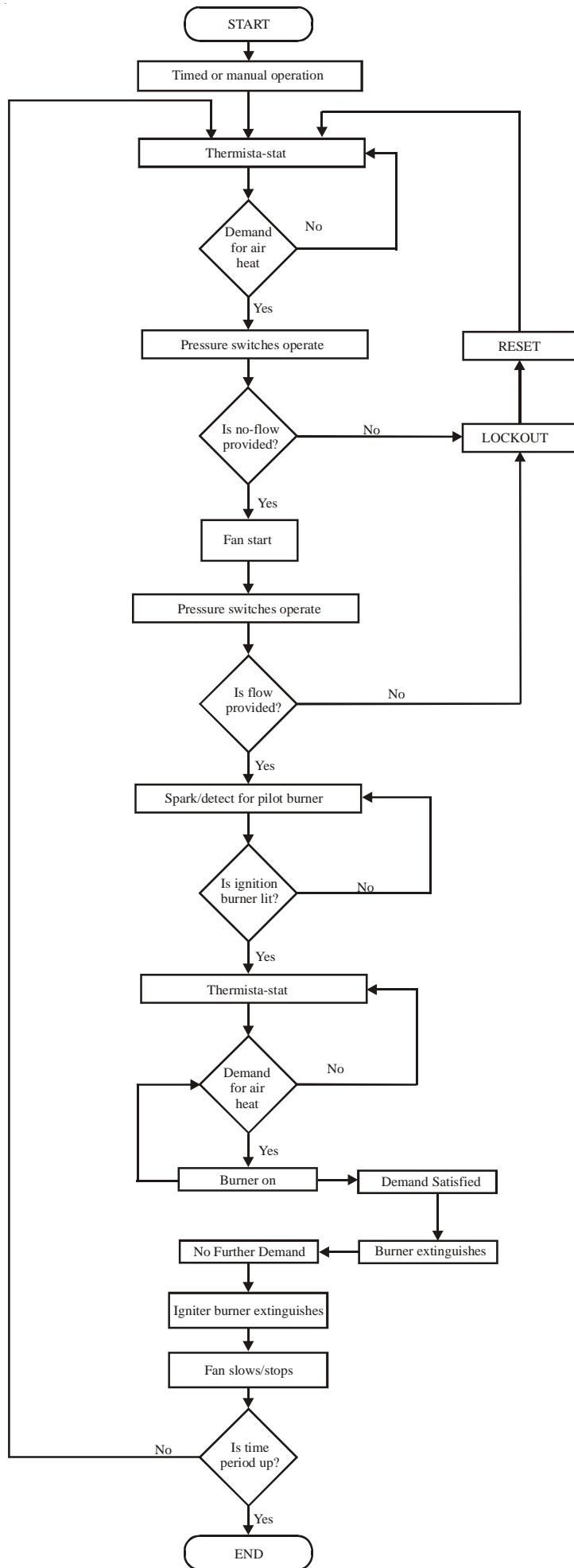
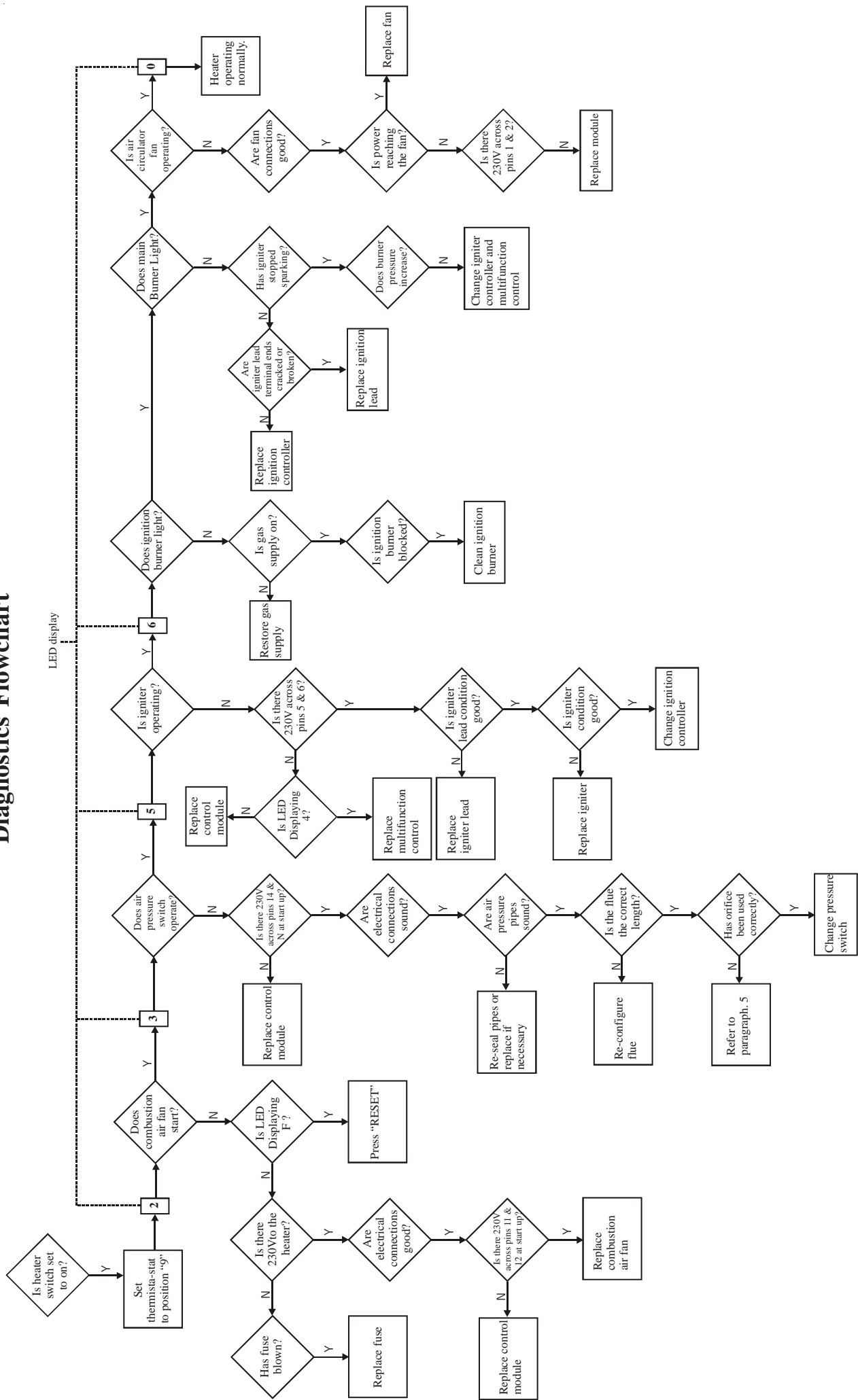


Fig. 12
Control Flowchart
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Diagnostics Flowchart



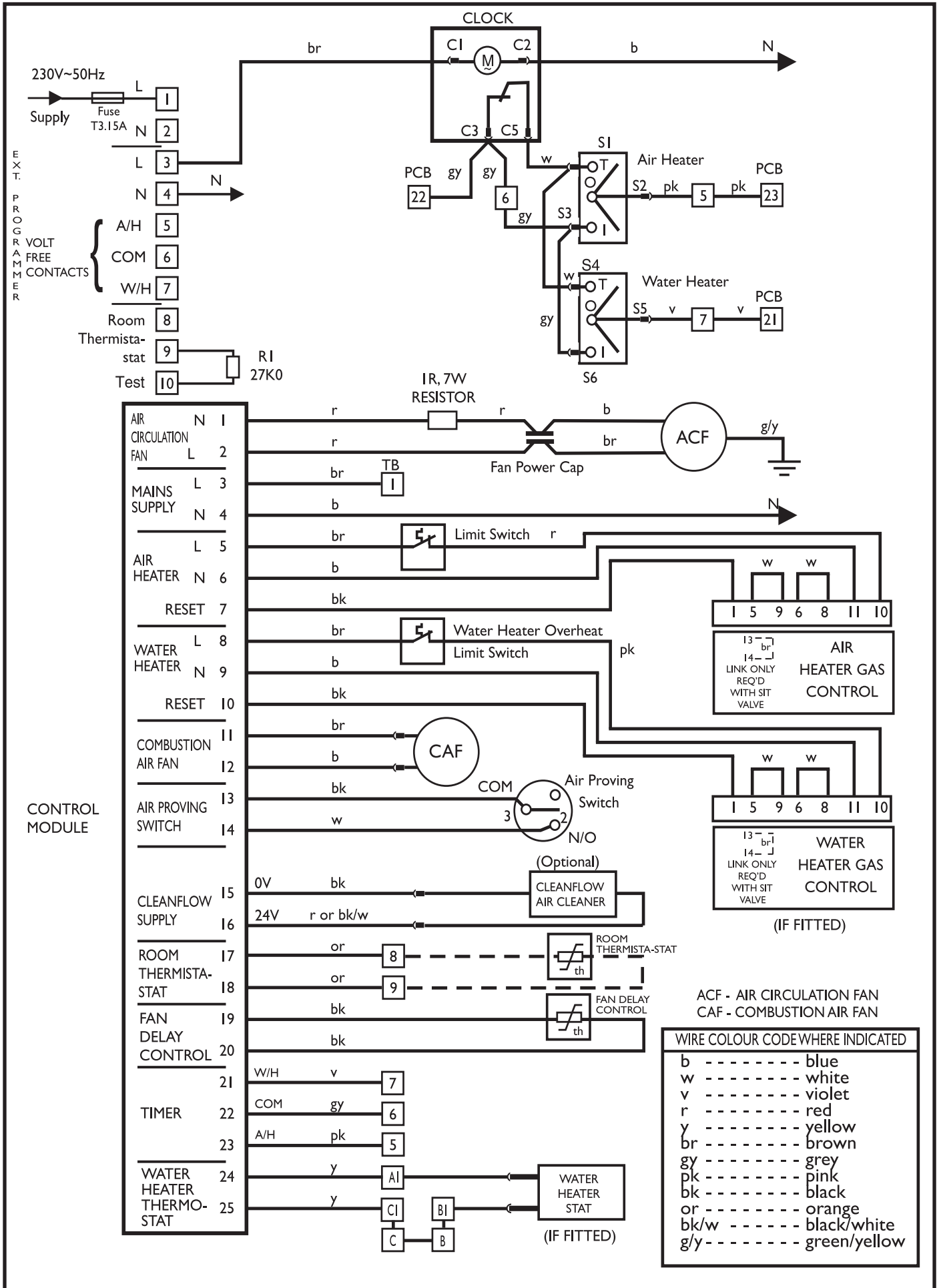
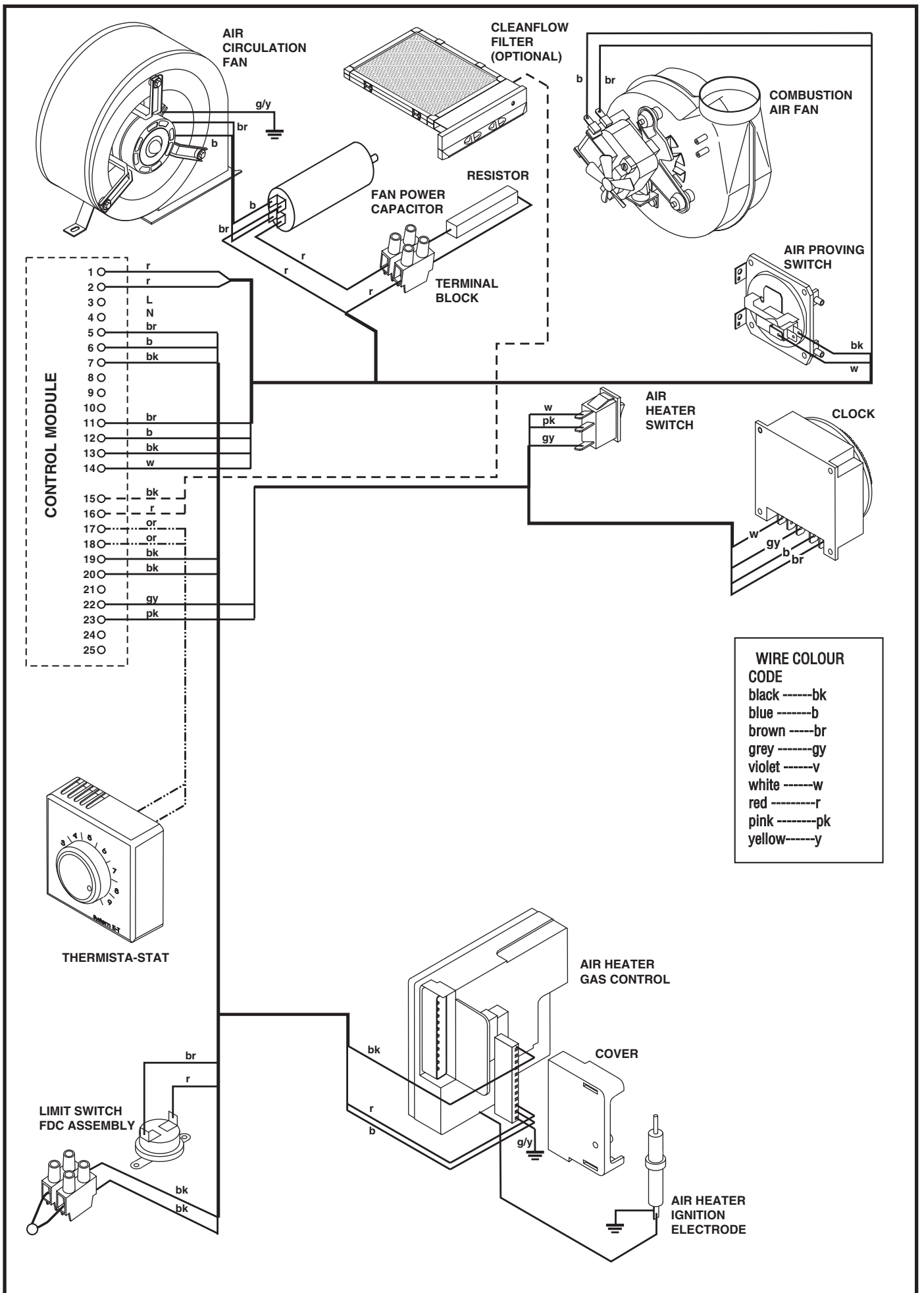


Fig.13
ECONOMAIRE 90 Flow Diagram
17



WIRE COLOUR CODE

black	-----	bk
blue	-----	b
brown	-----	br
grey	-----	gy
violet	-----	v
white	-----	w
red	-----	r
pink	-----	pk
yellow	-----	y

Fig.14
ECONOMAIRE 90 Logic Diagram

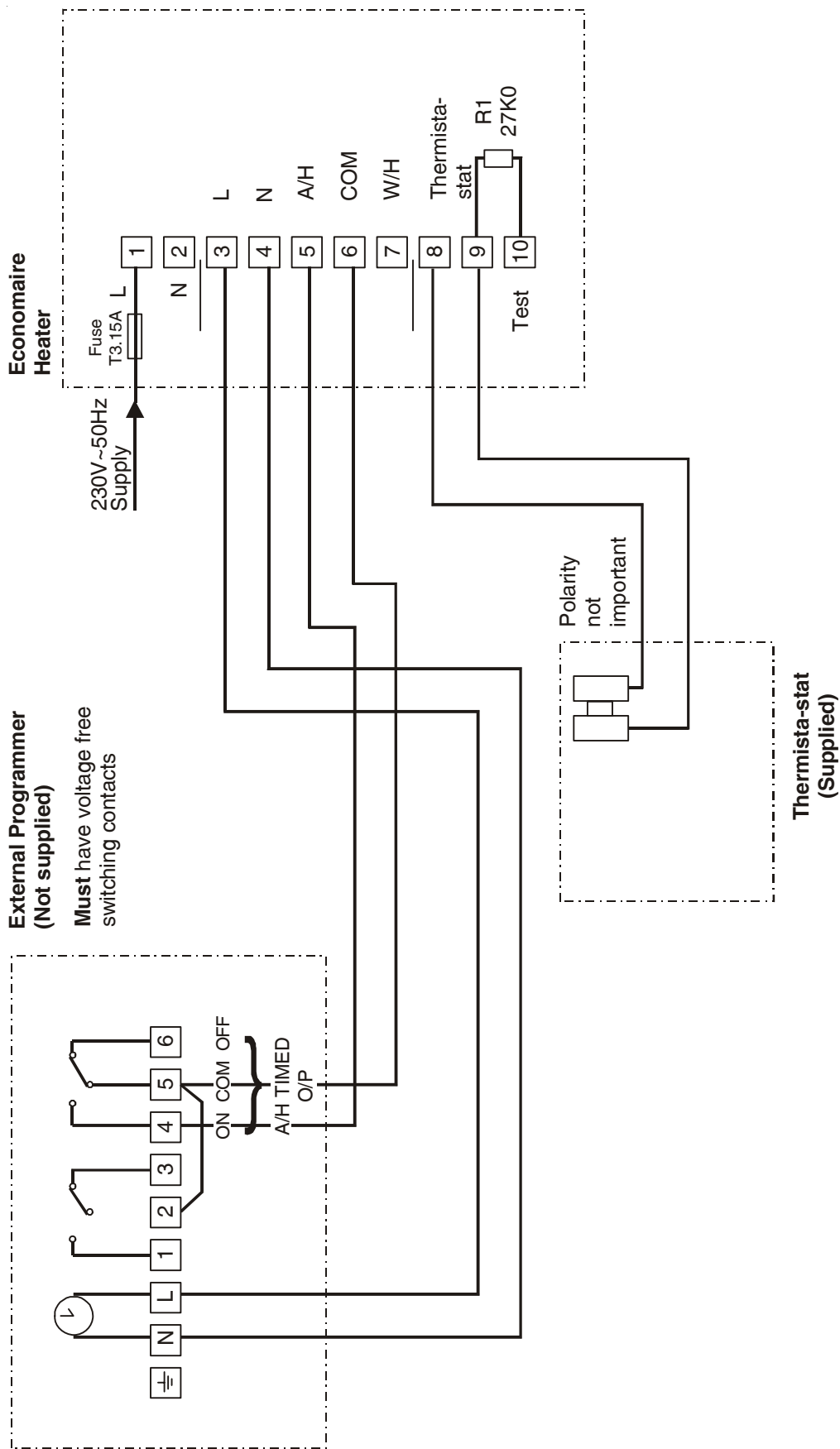


Fig. 15
Schematic Diagram (showing connection of an external controller)

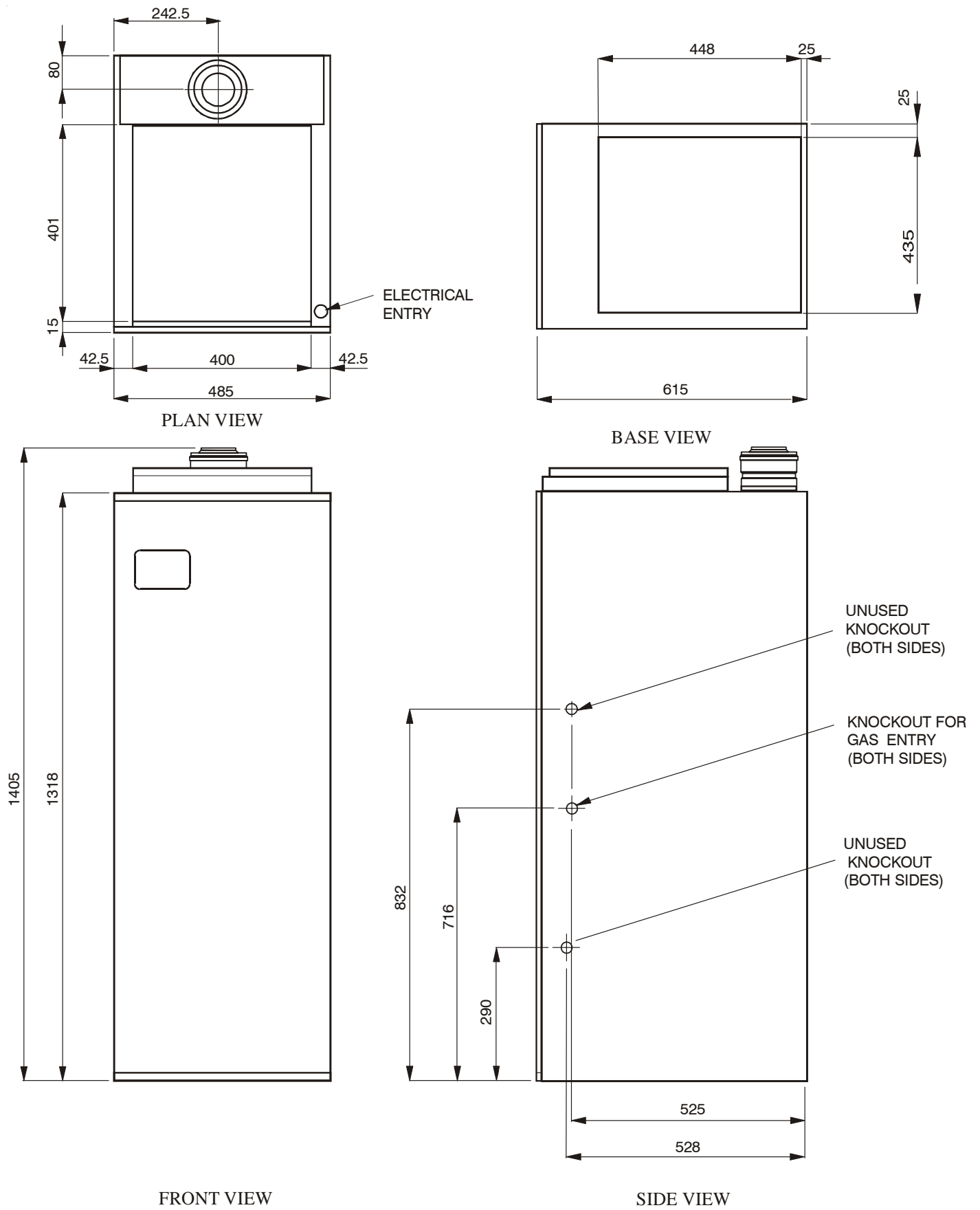


Fig. 16
ECONOMAIRE 90 - Principal Dimensions

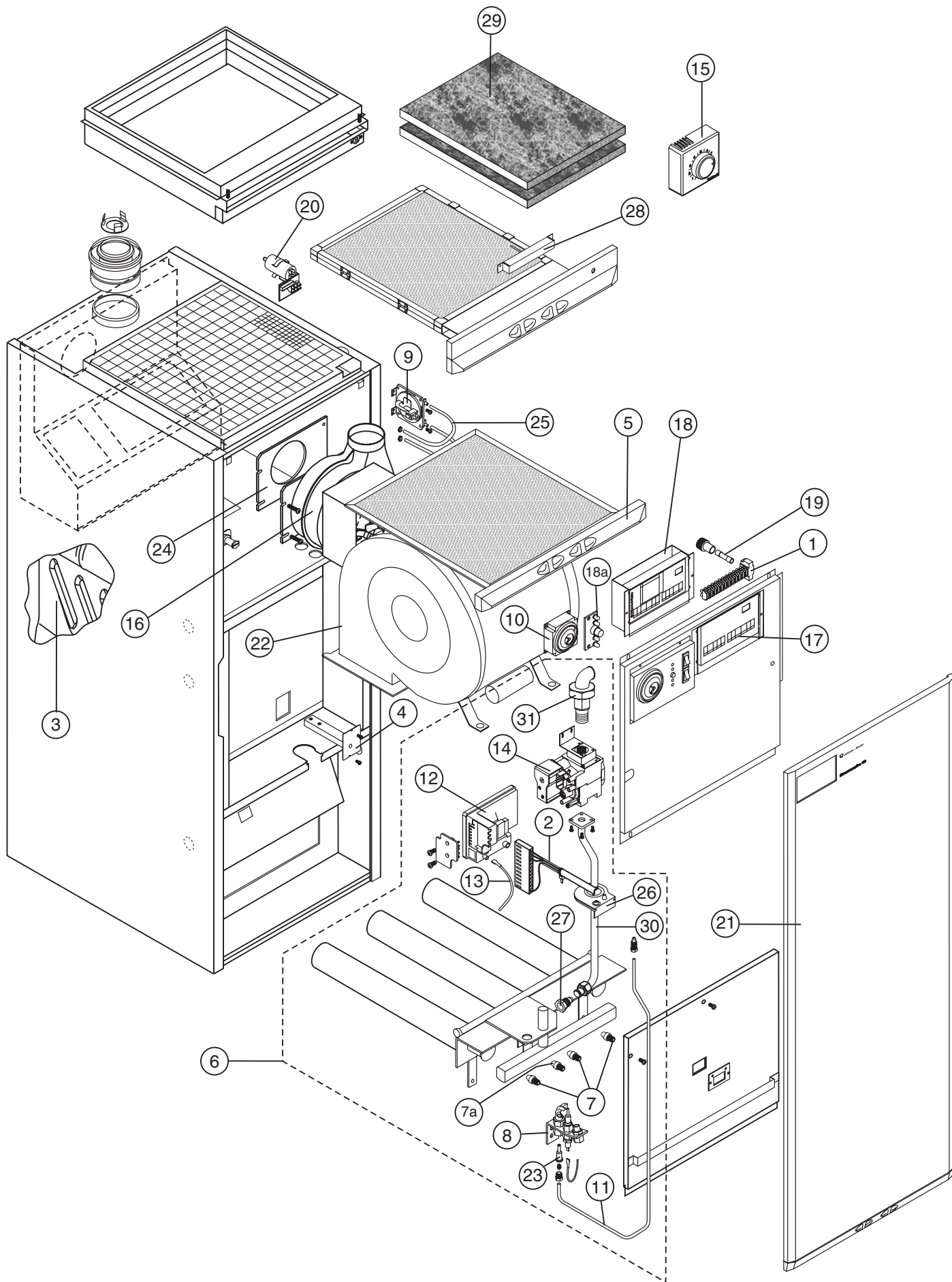


Fig. 17
Exploded Diagram
21



BENCHMARK Number

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WARM AIR HEATER AND CIRCULATOR COMMISSIONING CHECKLIST

WARM AIR UNIT

APPLIANCE SERIAL NUMBER: NOTIFICATION No:

HOT WATER GENERATOR

APPLIANCE SERIAL NUMBER: NOTIFICATION No:

CONTROLS to comply with the Building Regulations, each section must have a tick on one or other of the boxes

REQUIREMENT	MEASURES PROVIDED		
1. Time & temp control to heating	Room stat & integral timer	<input type="checkbox"/>	
2. Time & temp control to hot water	Cylinder stat & Integral timer	<input type="checkbox"/>	
3. Heating zone valves	Fitted	<input type="checkbox"/>	Not Required <input type="checkbox"/>
4. Thermostatic Radiator Valves	Fitted	<input type="checkbox"/>	Not Required <input type="checkbox"/>
5. Boiler interlock	Provided	<input type="checkbox"/>	Not Required <input type="checkbox"/>

FOR WARM AIR HEATERS ONLY

Has the system been balanced in accordance with the heater manufacturer's instructions? YES NO

Was an anemometer used? YES NO

Have balancing dampers been fitted? YES NO

FOR WARM AIR HEATING: MEASURE AND RECORD

Burner operating pressure Mbar

Heat input KW

Temperature differential between return air inlet and nearest outlet °C

FOR HOT WATER GENERATORS: MEASURE AND RECORD

Burner operating pressure Mbar

Heat input KW

Water flow temperature °C

FOR ALL PRODUCTS

Does the heating & hot water system comply with the appropriate building regulations? YES NO

Has the appliance and associated controls been installed & commissioned in accordance with manufacturer's instructions? YES NO

Have you demonstrated the operation of the appliance & system controls to the customer? YES NO

Have you left all the manufacturer's literature with the customer YES NO

Competent person's signature Customer's Signature
(To confirm demonstration of equipment & receipt of appliance instructions)

COMMISSIONING ENGINEER'S DETAILS

Name Commissioning Date

Address

Tel No

CORGI REGISTRATION No CORGI ID SERIAL No

SERVICE INTERVAL RECORD

It is recommended that your heating system is serviced regularly and that your service engineer completes the appropriate service interval record below.

SERVICE PROVIDER

Before completing the appropriate service interval record below, please ensure that you have carried out the service as described in the heater manufacturer's instructions and in compliance with the Gas Safety Regulations

SERVICE 1 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 6 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 2 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 7 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 3 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 8 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 4 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 9 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 5 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 10 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

When all of the above services have been completed, please contact your service engineer for an additional service record sheet.

10.

**LIST OF SPARES (SEE FIG.17)
ECONOMAIRE 90**

Item	G.C.No	Part No	Description	Qty
1		1000-0522180	Wiring harness	1
2	E80119	1000-0521860	Wiring harness (air heater)	1
3		N900-0101000	Heat exchanger (cabinet sub assembly)	1
4		1000-0521820	FDC & limit switch	1
5	E80123	N650-0182000	Filter assembly	1
6		N900-0702000	Complete burner assembly	1
7	398360	BOS 01204/4	Main burner injector (Bray Cat 23/700)	3
7a		1000-0705350	Cross-light injector (Bray Cat 10/110)	1
8	E39538	BOS 02397/1	Ignition burner assembly	1
9		1000-0522250	Air pressure switch	1
10	E69632	1000-0520830	Clock mechanism	1
11		1000-0708860	Ignition burner feed pipe	1
12	E69638	N320-0505000	Electric flame control device (S.I.T.)	1
13	E08159	1000-0708990	Igniter lead	1
14	E69640	1000-0708190	Multifunction control	1
15	245 514	1000-0515620	Thermista-stat	1
16	E84230	N650-0504005	Combustion air fan (SIFAN)	1
17		N900-0500000	Complete electrical panel	1
18	E80146	1000-0520850	Control module	1
18a	E69648	1000-0520880	Reset panel (daughter board)	1
19	245 509	1000-0513820	Fuse T3.15A (anti surge)	1
20	245 542	1000-0515970	Capacitor 15µf	1
21		N900-0160000	Cabinet door assembly	1
22		J903-0525000	Air circulation fan	1
23	381712	1000-0701260	Ignition burner injector (No 27)	1
24	E69653	1000-1507310	Gasket	1
25	E69709	1000-0000390	Air Pressure Tube (0.7m)	1
26	E80151	1000-2501050	Grommet	1
27		1000-0708570	12mm Bulkhead Fitting	1
28	E69656	1000-0505540	Electronics box (cleanflow)	1
29	E05248	AO354x0357	Cleanflow filter medium (pad)	1
30		1000-0708850	Gas feed pipe	1
31		BOS 00570	Union Elbow	1

Johnson and Starley prides itself on its ability to supply spare parts quickly and efficiently. If you have a problem in obtaining a spare part, please contact our Spares Department at the address below.

Telephone: (01604) 762881

Fax: (01604) 767408

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Northampton NN4 7LZ**