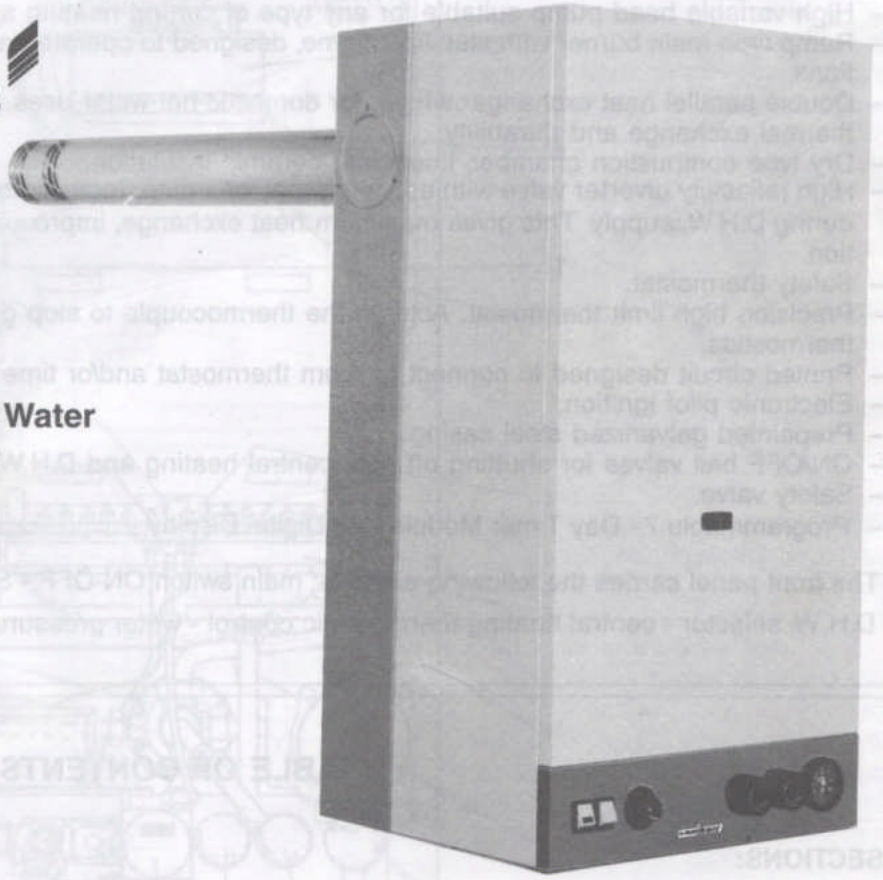
RAVENHEAT®
MANUFACTURING LIMITED

TIMER MODEL

RAVENHEAT RSF 820/20T FANNED COMBI

INSTALLATION AND SERVICING INSTRUCTIONS

British Gas
Tested, certified and service listed



Listed by The United Kingdom Water Fitting Byelaws Scheme

CE 0087 ISO 9001

G.C. No. 47 581 05

CE British Gas

THIS BOILER IS FOR USE WITH NATURAL GAS ONLY
LEAVE INSTALLATION AND SERVICING ADJACENT TO GAS METER

benchmark™

The code of practice for the installation, commissioning & servicing of central heating systems

Technical and illustrative data are not binding and can be modified without prior notice. The descriptions and illustrations in the present booklet are for guideline purposes only.

RAVENHEAT MANUFACTURING LTD., CHARTISTS WAY, MORLEY, LEEDS, LS27 9ET. - TELEPHONE (0113) 252 7007

BOILER FOR CENTRAL HEATING AND DOMESTIC HOT WATER

This new turbo-modulating wall mounted boiler is designed to meet the new needs of the modern home. It is extremely versatile and can even be installed in any room where the chimney is hard to get to or unusable.
The appliance is room sealed: there is no contact between combustion chamber and the inhabited space. This guarantees maximum safety.
The coaxial duct for fan-powdered ventilation comes designed to exit from the right or left back side of the boiler.
Component parts are exceptionally reliable, making this a high quality product that is built to last.
The RSF 820/20 TURBO modulating boiler is rapid in response whether used for central heat or to produce domestic hot water.

The boiler can be supplied with a programming clock on request. Sales technical information and commercial service are available throughout the entire UNITED KINGDOM.
This product is guaranteed in the U.K. by RAVENHEAT - CHARTISTS WAY - MORLEY - LEEDS LS 27 9ET.
Tel. (0113) 252 7007.

BASIS COMPONENTS (See Fig. 1)
Guarantee is for a full 12 months from date of purchase, provided it has been fitted in accordance with these instructions and all relevant codes of practice.

- Honeywell gas valve with flame modulator on the central heating circuit, keeping water temperature constant as flow rates vary. Also equipped with a slow ignition device on both central heating and domestic hot water circuits.
- High variable head pump suitable for any type of central heating system.
- Ramp type main burner with stabilizer flame, designed to operate under widely varying thermal capacity conditions.
- Double parallel heat exchanger which, for domestic hot water uses, the «countercurrent» system, offering high thermal exchange and durability.
- Dry type combustion chamber, lined with ceramic insulation.
- High reliability diverter valve with ethylenepropylene diaphragm permitting primary fluid circulation in the boiler during D.H.W. supply. This gives maximum heat exchange, improved efficiency and exceptionally silent operation.
- Safety thermostat.
- Precision high limit thermostat. Acts on the thermocouple to stop gas supply in case of failure by the normal thermostats.
- Printed circuit designed to connect to room thermostat and/or time clock.
- Electronic pilot ignition.
- Prepainted galvanized steel casing.
- ON/OFF ball valves for shutting off gas, central heating and D.H.W. circuits.
- Safety valve.
- Programmable 7 - Day Timer Module with Digital Display

The front panel carries the following controls: main switch ON-OFF - SWITCH (winter/summer) - switch D.H.W. selector - central heating thermostatic control - water pressure gauge.

TABLE OF CONTENTS

SECTIONS:		PAGE
1	INTRODUCTION	3
2	DESIGN PRINCIPLES AND OPERATING SEQUENCE	5
3	TECHNICAL DATA	6
4	GENERAL REQUIREMENTS	8
5	INSTALLATION	13
6	COMMISSIONING	25
7	SERVICING INSTRUCTIONS	28
8	FAULT FINDING	45
9	ELECTRICAL SYSTEM DIAGRAM	47
10	EXPLODED PARTS DIAGRAM / LIST OF SPARE PARTS	53

SECTION 1 INTRODUCTION

1.1 The Ravenheat boiler is for use of central heating and domestic hot water combined in one unit.
This boiler is designed for wall mounting and is for use on fully pumped sealed system only.
It is range rated, output heating from 10.3 kW (35,200 btu/h) to 23.6 kW (80,500 btu) maximum. It is fitted with an automatic domestic hot water priority valve with the same outputs as above. The appliance is fitted with a double, parallel, heat exchanger in copper keeping both domestic and central heating completely independent.

A ≡ / only (winter/summer) selector switch is fitted to the left hand side of control panel, only (summer) position being domestic hot water only, ≡ (winter) only position being central heating with domestic hot water priority. The boiler is equipped with a front cover which can be removed for the servicing. The data badge with technical data is placed on the lower right hand side of the frame.

1.2 Fig. 1 Illustrates the general layout of components. Fig. 2 Illustrates the operating principles described in section 2.

GENERAL LAYOUT

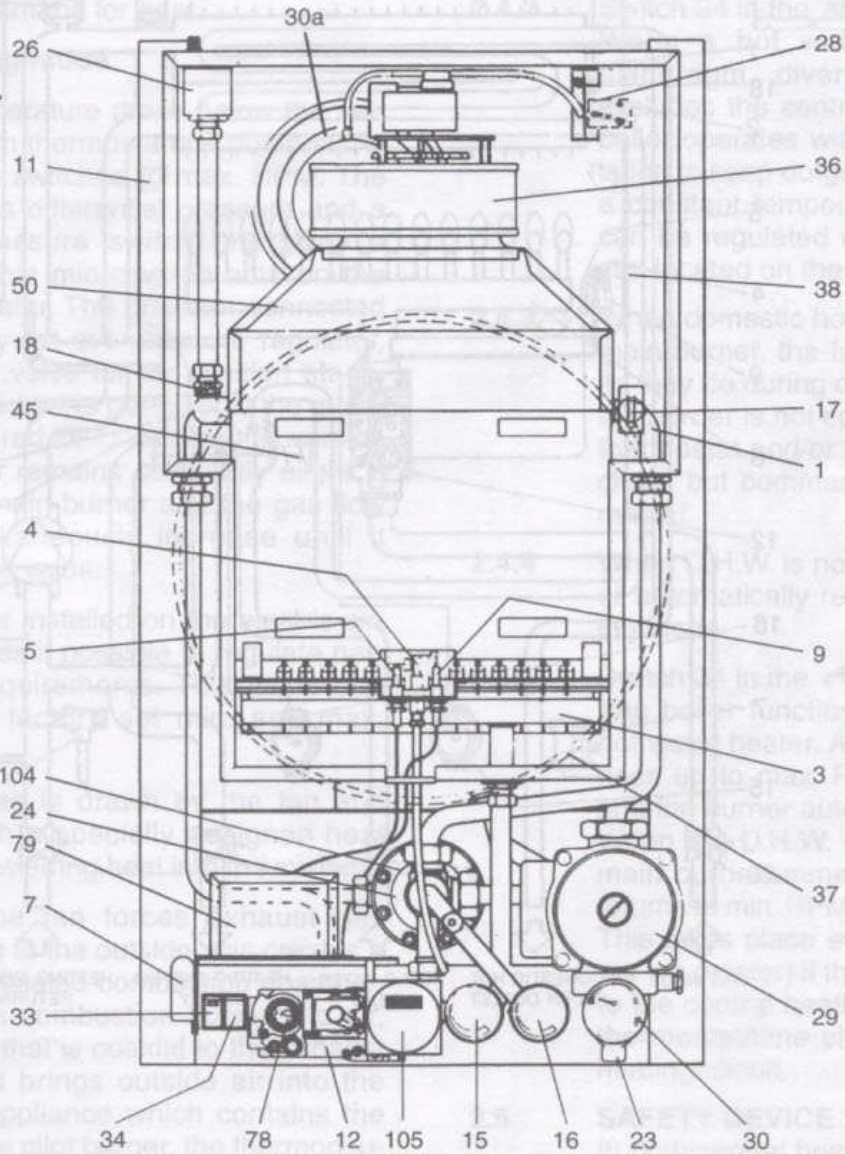


Fig. 1

KEY

1 - Heat exchanger
3 - Burner
4 - Pilot burner
5 - Thermocouple
7 - Electronic ignition
9 - Ignition electrode
11 - Frame
12 - Modulating gas valve
15 - Heating control thermostat
16 - Hot water control thermostat
17 - High limit thermostat
18 - Overheat cut-off thermostat
23 - Safety relief systems
24 - Three way valve
26 - Auto air vent valve
28 - Pressure switch
29 - Circulating pump
30 - Water pressure gauge
30a - Air restriction ring
33 - Main switch
34 - Summer/winter switch ≡ /
36 - Fan
37 - Expansion tank
38 - Sealed chamber
45 - Combustion chamber
50 - Flue gas exhaust hood
78 - Ignition/extinguish knob
79 - Control box
104 - DHW flow rate adjustment (at rear)
105 - Timer

OPERATING SCHEME

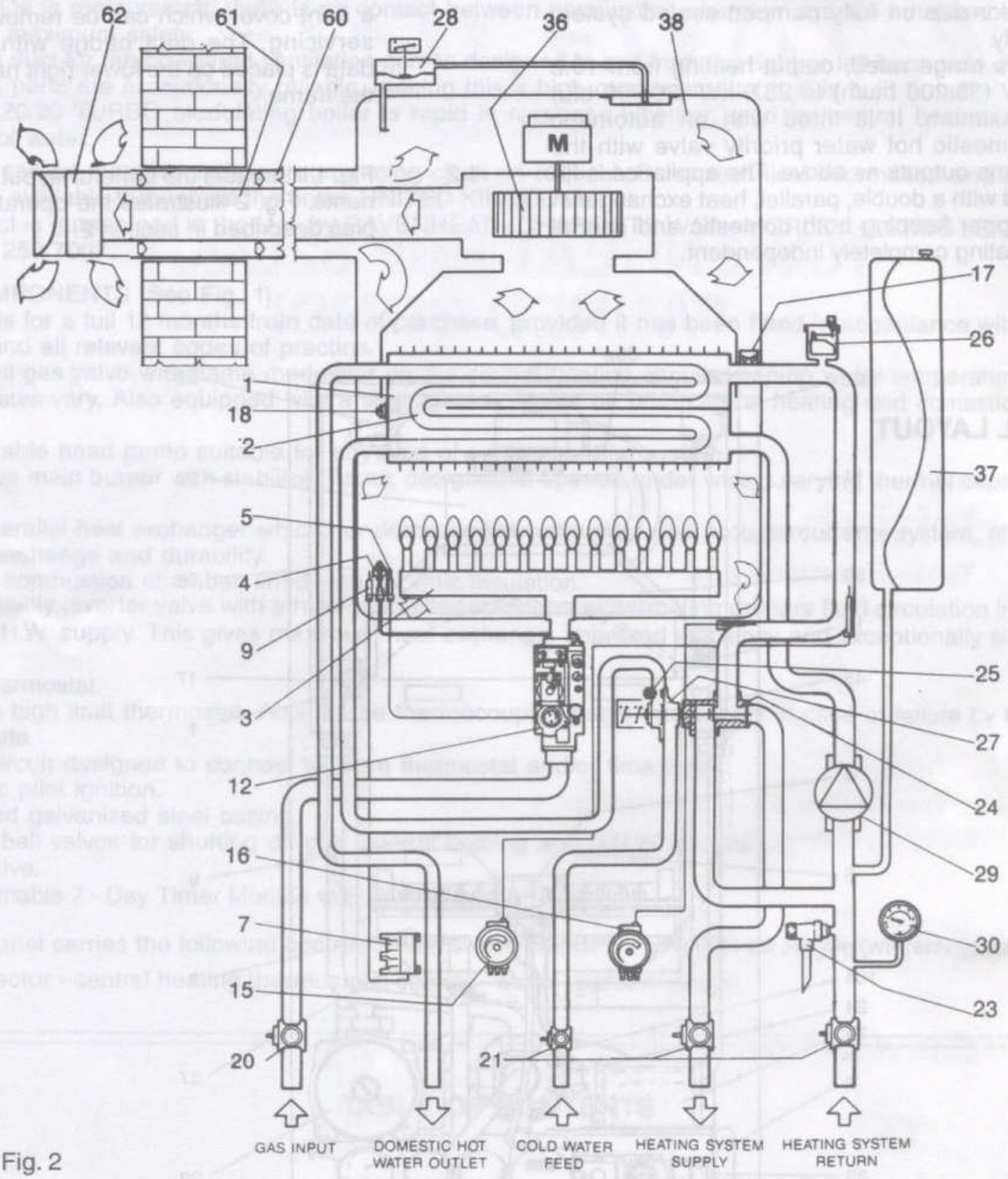


Fig. 2

KEY

1 - Heat exchanger
2 - Heat exchanger for tap water
3 - Burner
4 - Pilot burner
5 - Thermocouple
7 - Electronic ignition
9 - Ignition electrode
12 - Modulating gas valve
15 - Heating control thermostat
16 - Hot water control thermostat
17 - High limit thermostat
18 - Overheat cut-off thermostat
20 - Gas service cock
21 - Compression ball valves
23 - Safety relief systems
24 - Three way valve
25 - Flow regulator
26 - Auto air vent valve
27 - Pressure switch giving priority to DHW
28 - Air pressure switch
29 - Circulating pump
30 - Water pressure gauge
36 - Fan
37 - Expansion tank
38 - Sealed chamber
60 - Air intake duct
61 - Flue duct
62 - Terminal

SECTION 2 DESIGN PRINCIPLES

2 OPERATING SEQUENCE

2.2 Ignition and rest mode

2.2.1 When the main switch is on, the fan will function at the min. R.P.M. speed to maintain an air flow in the combustion chamber.

2.2.2 By pushing the knob of the gas valve the fan speed changes and functions at max. R.P.M. speed to bleed the combustion chamber. After few seconds, the electric ignition will spark, which will ignite the gas to the pilot burner.

2.2.3 The pilot buner is kept alight by the thermocouple safety device keeping the pressure on the gas valve when the gas valve knob is released, the fan returns to the min. R.P.M. speed until a demand for heat.

2.3 Central Heating mode

2.3.1 When the temperature drops below the setting on the room thermostat the pump starts up and the fan switches to max. RPM. The fan generates a differential pressure and a diaphragm pressure switch energizes a microswitch. This microswitch acts on the gas valve operator. The operator connected with the factory-set overpressure regulator, opens the gas valve for the ignition stage. Opening is sufficient to permit only the quantity of gas required for ignition. In this version the pilot burner remains constantly alight. It will ignite the main burner and the gas flow rate will simultaneously increase until it reaches its max. value.

2.3.2 A potentiometer installed on the electric circuit board makes it possible to regulate partial heating requirements. This value can vary between factory set min. and max. capacities.

2.3.3 Combustion gas is drawn by the fan and passes through a specially designed heat exchanger (transferring heat into the system).

2.3.4 Then the same fan forces exhaust gas through the flue to the outside, this creates a vacuum in the sealed combustion chamber, thus sucking in combustion supporting air, through a duct that is coaxial to the exhaust duct. This duct brings outside air into the room sealed appliance which contains the main burner, the pilot burner, the thermocouple, the ignition electrode, the combustion chamber, the heat exchanger, the fume exhaust hood and the fan.

2.3.5 Boiler water temperature is automatically controlled by a built-in thermostat. Setting range varies from 45 to 85° C.

2.3.6 Interior space temperature is set by the room thermostat to be installed in the heating system. The boiler already carries connection terminals for this thermostat, as well as for a time clock. The burner continues to operate until it is stopped by one of the thermostats.

2.3.7 When the heating thermostat intervenes the main burner shuts down. The fan drops to min. RPM and the pump continues to operate.

2.3.8 When the room thermostat intervenes the main burner shuts down. The fan drops to min. RPM and the pump turns off.

2.4 DOMESTIC HOT WATER MODE

2.4.1 The heat exchanger in the D.H.W. circuit is built into the main heat exchanger, and domestic water is heated by converting the water in the central heating circuit. The transferance of heat is very high because the two fluids move in counter current flow to each other.

2.4.2 Switch 34 in the (winter) position.
When a hot water tap is turned on a diaphragm diverter valve momentarily excludes the central heating circuit and the boiler operates with automatic flame modulation to keep outgoing domestic hot water at a constant temperature. Water temperature can be regulated using the D.H.W. thermostat located on the front control panel.

2.4.3 When domestic hot water is being drawn the main burner, the fan and the pump perform as they do during central heating except that the burner is not commanded by the heating thermostat and/or the room thermostat/time clock, but commanded by the D.H.W. thermostat.

2.4.4 When D.H.W. is no longer called for the boiler automatically returns to the central heating mode.

2.4.5 Switch 34 in the only (summer) position.
The boiler functions like an automatic gas hot water heater. As D.H.W. is drawn the fan rises up to max. RPM, the pump starts up and the burner automatically ignites.
When the D.H.W. is no longer required the main burner immediately turns off, the fan returns to min. RPM and the pump will turn off. This takes place even when switch 34 is on (winter) if there is no demand for heat to the central heating system until the room thermostat/time clock demands for central heating circuit.

2.5 SAFETY DEVICE

In both central heating and hot water modes safe operating is ensured by:
– A differential pressure switch which shuts off the main burner flame if the fan stops or the flue or combustion air intake duct is obstructed. A safety thermostat fitted intervenes in case of normal thermostat failure.
– A high limit thermostat set slighty higher than the safety thermostat acts on the thermocouple to turn off the pilot burner.
– A safety valve fitted on the central heating circuit set at 43 psi (3 bar).

SECTION 3 TECHNICAL DATA

TABLE 1

HEAT INPUT	max	26.1 kW	(89,100 Btu/h)
	mid	18.9 kW	(64,500 Btu/h)
	min	13.0 kW	(44,400 Btu/h)
HEAT OUTPUT	max	23.6 kW	(80,500 Btu/h)
	mid	16.6 kW	(56,700 Btu/h)
	min	10.3 kW	(35,200 Btu/h)
GAS RATE	max	2.6 m^3/h	(91.8 ft^3/h)
	mid	2.1 m^3/h	(74.1 ft^3/h)
	min	1.3 m^3/h	(45.9 ft^3/h)
INLET PRESSURE	20 mbar	(8.0 in w.g.)	
BURNER PRESSURE	max	8.1 mbar	(3.2 in w.g.)
	mid	4.1 mbar	(1.6 in w.g.)
	min	1.5 mbar	(0.6 in w.g.)
GAS CONTROL VALVE	HONEYWELL	V 4600 N	
MAIN BURNER	POLIDORO	MOD/NP	
MAIN BURNER INJECTORS N. 13X1.35			
PILOT BURNER	POLIDORO	PA525F	
PILOT INJECTOR 0.27	(MARKING)	2 HOLES	
ELECTRICAL SUPPLY	230 V ~ 50 HZ		
POWER CONSUMPTION	160 W		
EXTERNAL FUSE RATING	3A		
INTERNAL FUSE RATING	500 mA - 3.15 A (20 mm to BS4265)		
DRY WEIGHT	48 kg. (106 Lbs)		
WATER CONTENT D.H.W.	0.5 Lts. (0.9 pints)		
WATER CONTENT C.H.	3.0 Lts. (5.3 pints)		
GAS SUPPLY CONNECTION	RC 1/2''		
FLOW CONNECTION C.H.	22 m/m compression isolating valve		
RETURN CONNECTION C.H.	22 m/m compression isolating valve		
INLET CONNECTION D.H.W.	15 m/m compression isolating valve		
OUTLET CONNECTION D.H.W.	15 m/m copper pipe		
MAXIMUM PERMISSIBLE COLD WATER CAPACITY WITHOUT ADDITIONAL EXPANSION VESSEL 110 LITRES			
SAFETY DISCHARGE PIPE	15 m/m copper		
SEALED WATER SYSTEM C.H. SYSTEM MAX PRESSURE 3 bar (44 p.s.i.) MINIMUM WORKING PRESSURE 0.5 bar (7.35 p.s.i.) 8 LITRES EXPANSION VESSEL PRE-CHARGE PRESSURE 0.5 bar (7.35 p.s.i.)			
CENTRAL HEATING OPERATING TEMPERATURE MAX 85°C MIN 45°C			
DESIGN FLOW RATE 1013 l/h (223 gals) 20°C RISE MINIMUM FLOW RATE C.H. 650 Lts./h (143 gals/h)			
D.H.W. FLOW RATE 30°C rise 11.3 l/min (2.49 gals/min) D.H.W. FLOW RATE 35°C rise 9.7 l/min (2.1 gals/min) D.H.W. FLOW RATE 40°C rise 8.5 l/min (1.9 gals/min) 10°C inlet temperature			
D.H.W. TEMPERATURE	max 70°C min 35°C		
D.H.W. PRESSURE	max 10 bar (147 p.s.i.) min 0.8 bar (11.8 p.s.i.)		
D.H.W. MINIMUM FLOW RATE 3 l/m (0.66 gals/min)			
FLUE OUTLET NOM. DIA. 100 m/m specially supplied with boilers			
MAX. EFFECTIVE LENGTH OF FLUE PIPE 3.5 metres in a straight length only			

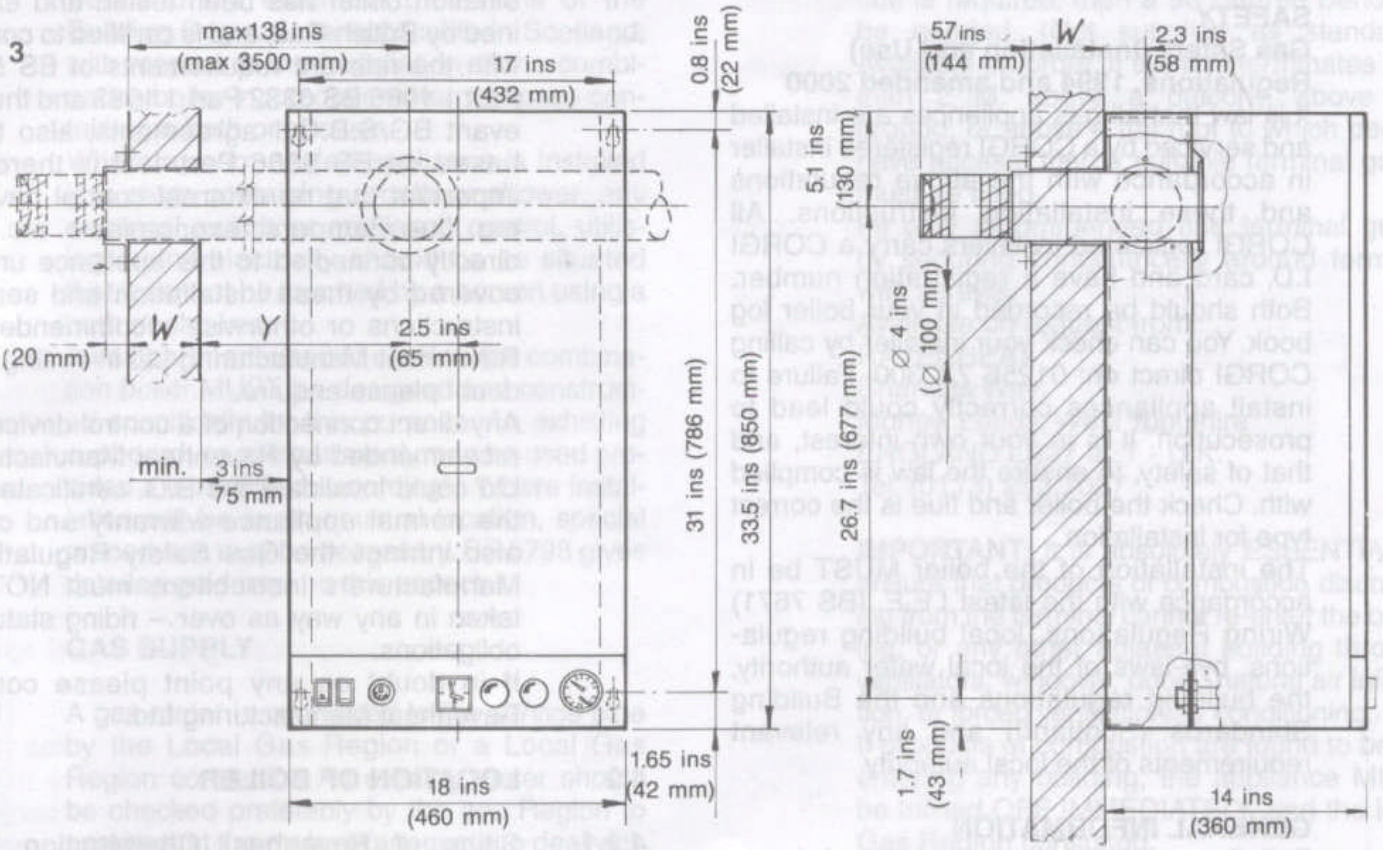
Fig. 3 Illustrates the dimensions of the boiler

Fig. 4 Shows the residual pump head available for the central heating system after allowing for the pressure loss through the appliance.

Fig. 5 Shows the actual pressure loss through the appliance.

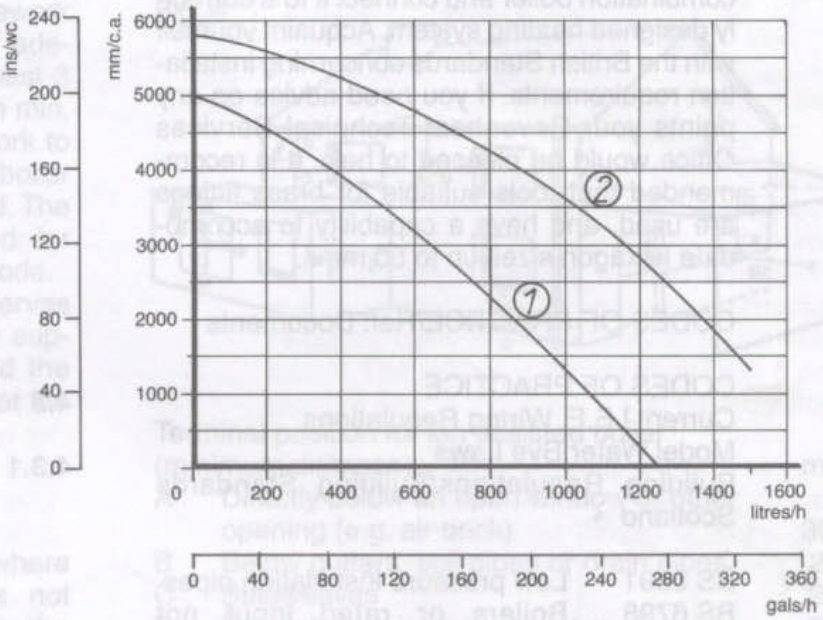
OVERALL DIMENSION

Fig. 3



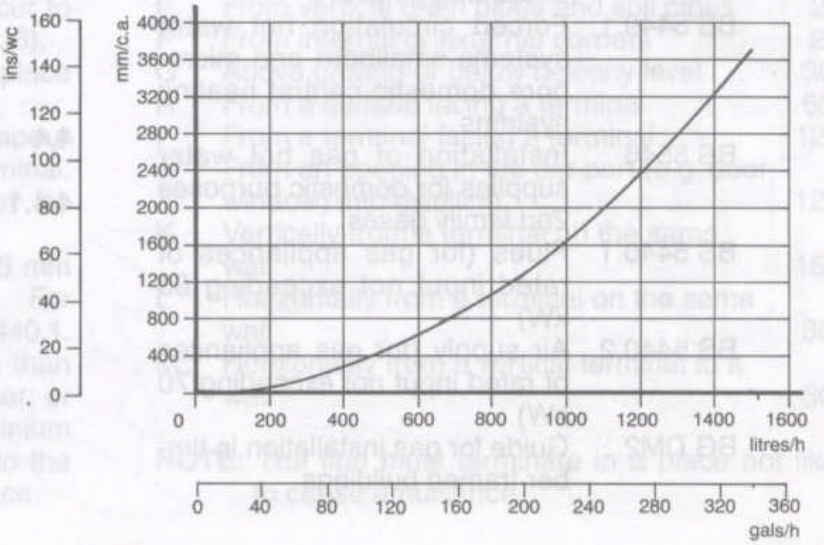
AVAILABLE PUMP HEAD

Fig. 4



PRESSURE DROP ACROSS APPLIANCE

Fig. 5



SECTION 4 GENERAL REQUIREMENTS

4.0 SAFETY

Gas Safety (Installation and Use) Regulations, 1994 and amended 2000

It is law that all gas appliances are installed and serviced by a CORGI registered installer in accordance with the above regulations and these installation instructions. All CORGI registered installers carry a CORGI I.D. card and have a registration number. Both should be recorded in your boiler log book. You can check your installer by calling CORGI direct on: 01256 732300. Failure to install appliances correctly could lead to prosecution. It is in your own interest, and that of safety, to ensure the law is complied with. Check the boiler and flue is the correct type for installation.

The installation of the boiler MUST be in accordance with the latest I.E.E. (BS 7671) Wiring Regulations, local building regulations, bye-laws of the local water authority, the building regulations and the Building Standards (Scotland) and any relevant requirements of the local authority.

4.1 GENERAL INFORMATION

Both the user and the manufacturer rely heavily on the installer, whose job it is to install the combination boiler and connect it to a correctly designed heating system. Acquaint yourself with the British Standards concerning installation requirements. If you need advice on any points your Ravenheat Technical Services Office would be pleased to help. It is recommended that tools suitable for brass fittings are used, and have a capability to accomodate hexagon sizes up to 50 mms.

CODES OF PRACTICE/Ref: Documents

CODES OF PRACTICE
Current I.E.E. Wiring Regulations
Model Water Bye Laws
Building Regulations/Building Standards Scotland

BS 6891	Low pressure installation pipes
BS 6798	Boilers or rated input not exceeding 60 kW
BS 5449.1	Forced circulation hot water systems smallbore and microbore domestic central heating systems
BS 5546	Installation of gas hot water supplies for domestic purposes 2nd family gases
BS 5440.1	Flues (for gas appliances of rated input not exceeding 60 kW)
BS 5440.2	Air supply (for gas appliances of rated input not exceeding 70 kW)
BG DM2	Guide for gas installation in timber framed buildings

NOTE: The Ravenheat RSF 820/20 (T) combination boiler has been tested and examined by British Gas, and is certified to comply with the relevant requirements of BS 5258 Part 1 1986 BS 6332 Part 1 1983 and the relevant BG/S.B.G.1 agreements, also tests based on BS 5386 Part 1. It is therefore important that no external control devices e.g. flue dampers, economisers etc. are directly connected to this appliance unless covered by these installation and service instructions or otherwise recommended by Ravenheat Manufacturing Ltd in writing. If in doubt please enquire.

Any direct connection of a control device not recommended by Ravenheat Manufacturing Ltd could invalidate the B.G. certificate and the normal appliance warranty and could also infringe the Gas Safety Regulations. Manufacturers instructions must NOT be taken in any way as over – riding statutory obligations.

If in doubt on any point please consult Ravenheat Manufacturing Ltd.

4.2 LOCATION OF BOILER

4.2.1 Siting of Ravenheat Combination RSF 820/20 (T) Boiler must be as follows. The position of installation should be within the building, unless otherwise protected by suitable enclosure. Adequate space for installation, servicing and air circulation around boiler must be allowed for.

The Ravenheat Combination RSF 820/20 (T) Boiler must be fitted on a flat and vertical wall capable of adequately supporting the weight of the boiler and any ancillary equipment.

The appliance may be installed on a combustible wall subject to the requirements of the Local Authority and Building Regulations.

4.3 CLEARANCES AROUND THE APPLIANCE

4.3.1 The following minimum free spaces, required for installation inspection and servicing, must be left around the boiler

18 inches (450 mm) in front
8 inches (200 mm) above
6 inches (150 mm) below
3 inches (75 mm) on each side
1 inch (25 mm) in front when installed in a cupboard

4.4 IMPORTANT NOTICE

4.4.1 If the combination boiler is to be fitted in a timber framed building it should be fitted in accordance with the British Gas Publication Guide for Gas installations in Timber Frame Housing Reference DM2. If in doubt advice must be sought from the Local Gas Region of British Gas.

The combination boiler may be installed in any room or internal space, although particular attention is drawn to the requirements of

the current I.E.E. Wiring Regulations, and in Scotland the electrical provisions of the Building Regulations applicable in Scotland, with respect to the installation of the combination boiler in a room or internal space containing a bath or shower.

Where a room sealed appliance is installed in a room containing a bath or shower, any electrical switch or appliance control, utilising mains electricity should be so situated that it cannot be touched by a person using a bath or shower.

A compartment used to enclose the combination boiler MUST be designed and constructed specifically for this purpose. An exhisting cupboard, or compartment, may be used provided it is modified accordingly. Where installation will be in an unusual location, special procedures may be necessary. BS 6798 gives detailed guidance on this aspect.

4.5 GAS SUPPLY

4.5.1 A gas meter is connected to the service pipe by the Local Gas Region or a Local Gas Region contractor. An existing meter should be checked preferably by the gas Region to ensure that the meter is adequate to deal with the rate of gas supply required for all appliances it serves. Installation pipes should be fitted in accordance with BS 6891. Pipework from the meter to the boiler must be of adequate size (22 mm) min. To within at least 3 metres of the boiler. Pipework of 15 mm min. can then be used for remaining pipe work to the appliance. A smaller size than the boiler inlet gas connection should not be used. The complete installation must be tested for soundness as described in the above Code.

N.B. if the gas supply for the boiler serves other appliances, ensure an adequate supply is available both to the boiler and the other appliances when they are in use at the same time.

4.6 FLUE SYSTEM

4.6.1 The terminal should be located where dispersal of combustion products is not impeded and with due regard for the damage or discoloration that might occur to building products in the vicinity (see fig. 6).

The terminal must not be located in a place where it is likely to cause a nuisance.

In cold and/or humid weather water vapour may condense on leaving the flue terminal. The effect of such "steaming" must be considered.

The terminal must not be closer than 25 mm (1 in) to any combustible material. For protection of combustibles, refer to BS 5440.1.

Where a flue terminal is installed less than 850 mm from a plastic, or painted gutter; or 450 mm from painted eaves, an aluminium shield 750 mm long, should be fitted to the underside of the gutter or painted surface.

IMPORTANT NOTICE: If a left or right side flue is required, then a 90 Degree Bend will be needed. (Not supplied as standard). Available on order. If the flue terminates less than 2 M. above a balcony, above the ground, or above a flat roof to which people have access, then a suitable terminal guard must be fitted.

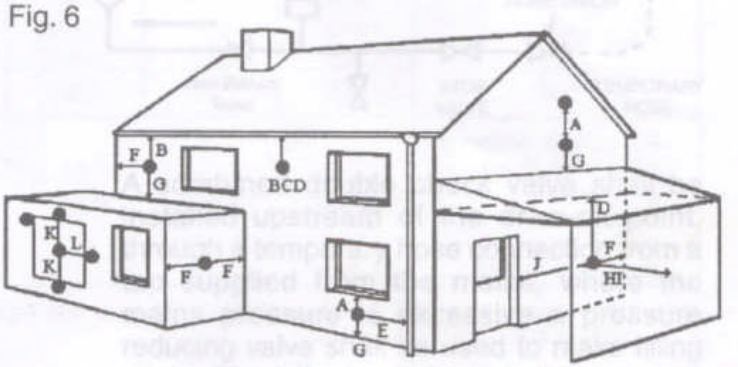
Fit only recommended flue terminal guard by securing concentrically around terminal with screws.

Available on request from:
RAVENHEAT
Chartists Way
Morley, Leeds, West Yorkshire
ENGLAND LS27 9ET - U.K.
Tel. (0113) 252 7007

IMPORTANT: It is absolutely ESSENTIAL to ensure that products of combustion discharging from the terminal cannot re-enter the building, or any other adjacent building through ventilators, windows, doors, natural air infiltration, or forced ventilation/air conditioning.

If products of combustion are found to be re-entering any building, the appliance MUST be turned OFF IMMEDIATELY, and the local Gas Region consulted.

Fig. 6



Terminal position for fan assisted boiler (minimum distance)

		mm
A	Directly below an open window or other opening (e.g. air brick)	300
B	Below gutters, soil pipes or drain pipes	25
C	Beloweaves	25
D	Below balconies or car port roof	25
E	From vertical drain pipes and soil pipes	25
F	From internal or external corners	25
G	Above ground or below balcony level	300
H	From a surface facing a terminal	600
I	From a terminal facing a terminal	1200
J	From an opening in the car port (e.g. door window) into dwelling	1200
K	Vertically from a terminal on the same wall	1500
L	Horizontally from a terminal on the same wall	300
M	Horizontally from a vertical terminal to a wall	300

NOTE: The flue must terminate in a place not likely to cause a nuisance.

4.6.2 **A concentric vertical flue kit is available, for flueing applications up to a maximum height of 4.5 metres.**
For further details see vertical flue installation instructions.

4.7.1 The following notes are intended for general guidance.
The roomsealed fan flued boiler does not require a permanent air vent for combustion air supply.
Where installed in a cupboard or compartment, ventilation is not required.

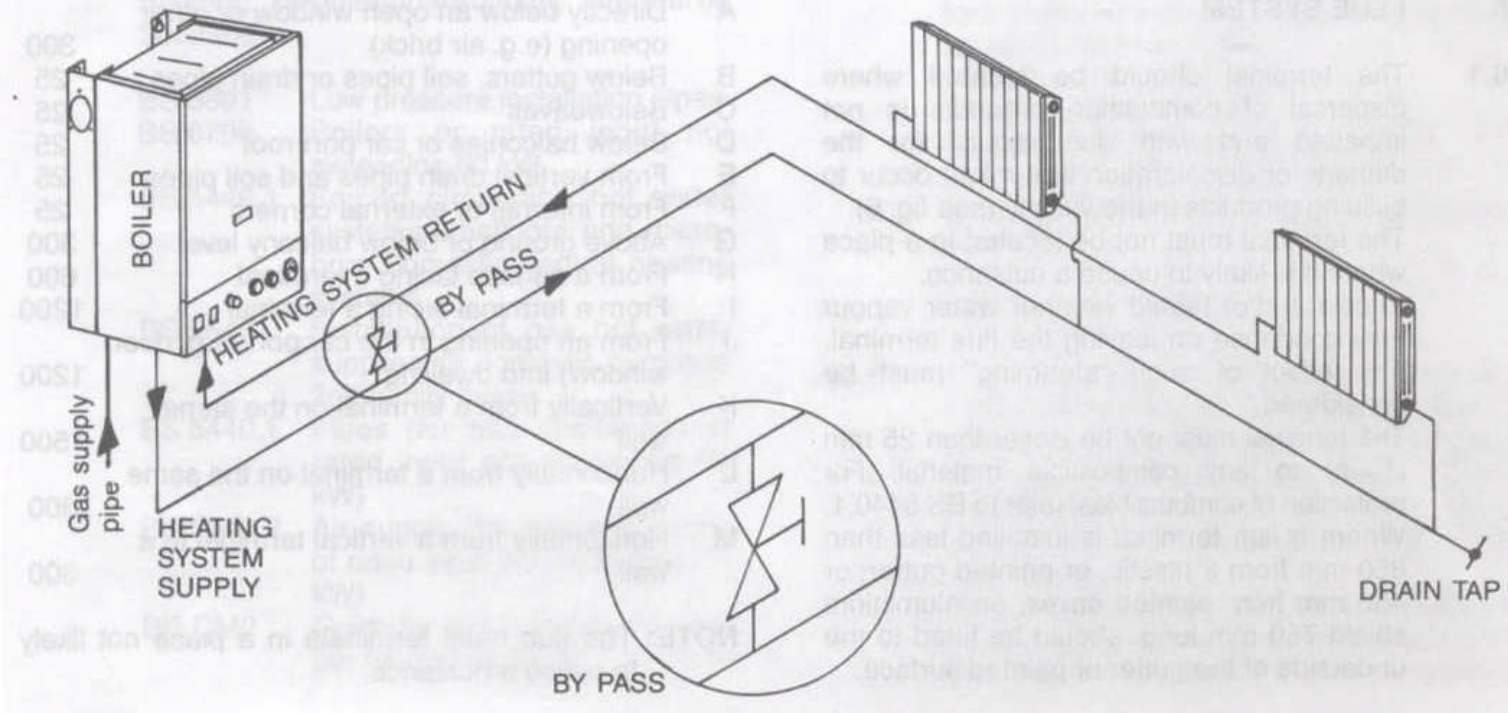
4.8 WATER CIRCULATION (central heating)

4.8.1 Detailed recommendations are given in BS 6798 5449.1.1977 (for smallbore and microbore central heating systems). The following notes are given for general guidance.

4.8.2 **Pipework**
Copper tubing to BS 2871 1.1.1971 is recommended for water pipes. Jointing should be either with capillary soldered or with compression fittings.
Where possible pipes should have a gradient to ensure air is carried naturally to air release points and water flows naturally to drain taps. It should be ensured as far as possible that the appliance heat exchanger is not a natural collecting point for air. Except where providing useful heat, pipes should be insulated to prevent heat loss and to avoid freezing. Particular attention should be paid to pipes passing through ventilated spaces in roofs and under floors.

4.8.3 The water through the appliance heat exchanger circuit must exceed the min. of 2.38 gals/min. (650 lt/h) when the burner is firing. It is important to ensure that this rate is achieved when sections of the system are shut off either manually or by automatic controls. **Therefore a by-pass must be fitted to the system (15 mm min.)** (Fig. 6A).
If the volume of circulating water is too low, the boiler water temperature will rise too rapidly. This could cause noise in the system or even cause the safety thermostat to trip.

Fig. 6A

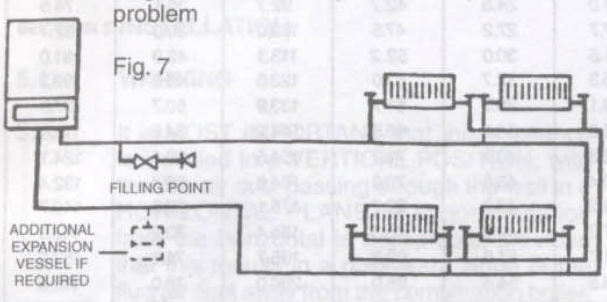


4.8.4 Draining tap
These must be located in accessible positions to permit the draining of the whole system. The taps must be at least 15 mm nominal size and manufactured in accordance with BS2870 1980.

4.8.5 Air release points
These must be fitted at all high points where air will naturally collect, and must be sited to facilitate complete fitting of the system.

4.8.6 The appliance has an integral sealed expansion vessel to accomodate the increase of water volume when the system is heated. It can accept up to 1.76 gal (8 lts) of expansion water. If the appliance is connected to a system with an unusually high water content, calculate the total expansion and add additional sealed expansion capacity as appropriate (Fig. 7).
In general modern systems will present no problem

Fig. 7



4.8.7 Mains water feed: central heating
There must be no direct connection to the mains water supply, even through a non-return valve, without the approval of the Local Water Authority.

4.8.8 Permissible methods of filling
Cistern method (Fig. 8).
The system may be filled by one of the following methods. Through a cistern used for no other purpose, via a ballvalve permanently connected directly to a service pipe and/or cold water distributing pipe. The static head available from the cistern should be adequate to provide the initial system design pressure. The cold feed pipe from the cistern should include a non-return valve, and a stop-valve with an automatic air vent connected between them, with the stop valve being located, between the cistern and the automatic air vent. The stop valve may remain open during normal operation of the the heating system to provide limited automatic water make up.
Mains topping up method (Fig. 9).
Here the temporary connection is supplied from a service pipe, or distributing pipe, which also supplies other draw-off points at a lower level.

Fig. 8

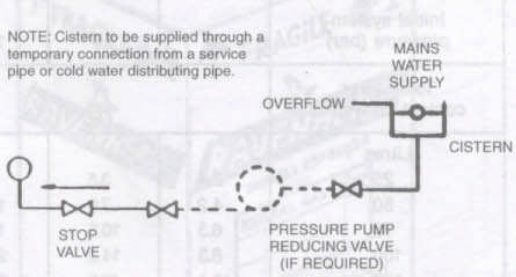
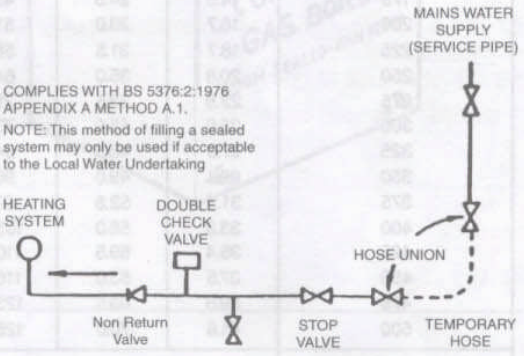


Fig. 9



A combined double check valve shall be installed upstream of the draw-off point, through a temporary hose connection from a tap supplied from the mains, where the mains pressure is excessive a pressure reducing valve shall be used to make filling easier. The following fittings shall form a permanent part of the system and shall be fitted in the order stated.

a) A stop valve complying with the requirements of BS 1010 Part 2 (the temporarary hose from the draw off tap shall be connected to this fitting).
b) A test clock.
c) Double check valve of an accepted type.
d) A non return valve of an accepted type. **We recommend use of a Ravenheat Filling Loop** designed for this method of filling the system. Available from your supplier.

SIZING OF ADDITIONAL EXPANSION VESSELS: TABLE 3

Deduct from the value given in the table the 7 litre vessel supplied.

Safety valve setting (bar)	3.0								
Vessel charge pressure (bar)	0.5				1.0			1.5	
Initial system pressure (bar)	0.5	1.0	1.5	2.0	1.0	1.5	2.0	1.5	2.0
Total water content of system	EXPANSION VESSEL VOLUME (LITRES)								
Litres									
25	2.1	3.5	6.5	13.7	2.7	4.7	10.3	3.9	8.3
50	4.2	7.0	12.9	27.5	5.4	9.5	20.6	7.8	16.5
75	6.3	10.5	19.4	41.3	8.2	14.2	30.9	11.7	24.8
100	8.3	14.0	25.9	55.1	10.9	19.0	41.2	15.6	33.1
125	10.4	17.5	32.4	68.9	13.6	23.7	51.5	19.5	41.3
150	12.5	21.0	38.8	82.6	16.3	28.5	61.8	23.4	49.6
175	14.6	24.5	45.3	96.4	19.1	33.2	72.1	27.3	57.9
200	16.7	28.0	51.8	110.2	21.8	38.0	82.4	31.2	66.2
225	18.7	31.5	58.3	124.0	24.5	42.7	92.7	35.1	74.5
250	20.8	35.0	64.7	137.7	27.2	47.5	103.0	39.0	82.7
275	22.9	38.5	71.2	151.5	30.0	52.2	113.3	42.9	91.0
300	25.0	42.0	77.7	165.3	32.7	57.0	123.6	46.8	99.3
325	27.0	45.5	84.1	179.1	35.7	61.7	133.9	50.7	107.6
350	29.1	49.0	90.6	192.8	38.1	66.5	144.2	54.6	115.8
375	31.2	52.5	97.1	206.6	40.9	71.2	154.5	58.5	124.1
400	33.3	56.0	103.6	220.4	43.6	76.0	164.8	62.4	132.4
425	35.4	59.5	110.1	239.2	46.3	80.7	175.1	66.3	140.7
450	37.5	63.0	116.5	247.9	49.0	85.5	185.4	70.2	148.9
475	39.6	66.5	123.0	261.7	51.8	90.2	195.7	74.1	157.2
500	41.6	70.0	125.9	275.5	54.5	95.0	206.0	78.0	165.5
For system volumes other than those given above, multiply the system volume by the factor across	0.0833	0.140	0.259	0.551	0.109	0.190	0.412	0.156	0.331

Note: This pressure can be increased up to 1.5 bar to suit high static head situations, see item 10, other appliance components in the SERVICING INSTRUCTIONS.

B) Where fitting a make up vessel would be difficult re pressurisation of the system can be done. See section on FILLING.

If the capacity of the central heating system should exceed 110 litres, an additional vessel should be installed on the return to the combination boiler from the heating system (Fig. 7). Guidance on vessel sizing is given in (Table 3).

Reference should be made to British Gas Publications «Material and Installation Specifications for Domestic Central Heating and Hot Water». Draining taps should be at least 1/2'' in BSP nominal size and be in accordance with BS 2879.

4.8.9 Installation to an existing central heating system

The combination boiler is designed to operate on a sealed system only. Therefore if the existing system is of the open water type it will have to be modified to comply with BS 5376 Part 2.

Before installing a new combination boiler to an existing system flush out the old system with a recommended descaling agent.

Also check pipework and renew any corroded pipework or fittings. Valve glands must be repacked or replaced wherever necessary and any defective controls exchanged.

4.8.10 Hard water areas

If the area of installation is recognized as a hard water area, (above 200 p.p.m.) it is recommended that a suitable water treatment device is installed in the mains.

The water hardness can be determined by using the standard test paper or by referring to local water authority.

4.9 DOMESTIC WATER

4.9.1 The domestic hot water must be in accordance with the relevant recommendations of BS 5546. Copper tubing to BS 2871. 1 is recommended for water carrying pipework and MUST be used for pipework carrying potable water.

4.10 ELECTRICAL SUPPLY

Warning: this appliance must be earthed

4.10.1 External wiring to the appliance must be carried out by a competent person and be in accordance with the current I.E.E. Regulations and local regulations which apply.
The Ravenheat boiler is supplied for connection to a 230 V~ 50 Hz supply. The supply must be fused at 3 A.

NOTE: The method of connection to the electricity supply MUST facilitate complete electrical isolation of the appliance, by the use of a fused, double pole isolator, having a contact separation of at least 3 mm in all poles. The point of connection to the electricity supply must be readily accessible and adjacent to the appliance except, where the appliance is installed in a bathroom, this MUST be sited outside the bathroom.

SECTION 5 INSTALLATION

5.1 WARNING

5.1.1 It is MOST IMPORTANT that this appliance is installed in a VERTICAL POSITION, with the flue air duct passing through the wall in a HORIZONTAL PLANE. A minor deviation from the horizontal is acceptable, provided that this results in a downward slope of the flue/air duct away from the combination boiler.

5.2 DELIVERY

5.2.1 The appliance will arrive on site in two cartons:

Boiler carton containing (Fig. 10-11):
a) boiler fully assembled
b) installation instructions and user instructions
c) white paper template
d) terminal cover plate (Fig. 12)
e) - 4 coach bolts and wall plugs
- screws and dowels

Polythene bag containing:
a) 2-22 mm compression ball valves (heating)
b) 1-15 mm compression ball valve (with drain screw for domestic cold water inlet)
c) 1-1/2" BSP Union gas cock
d) - 2 15 mm flanged copper tails complete with 1/2" brass nuts and washers
- 2 22 mm flanged copper tails complete with 3/4" brass nuts and washers

Fig. 10

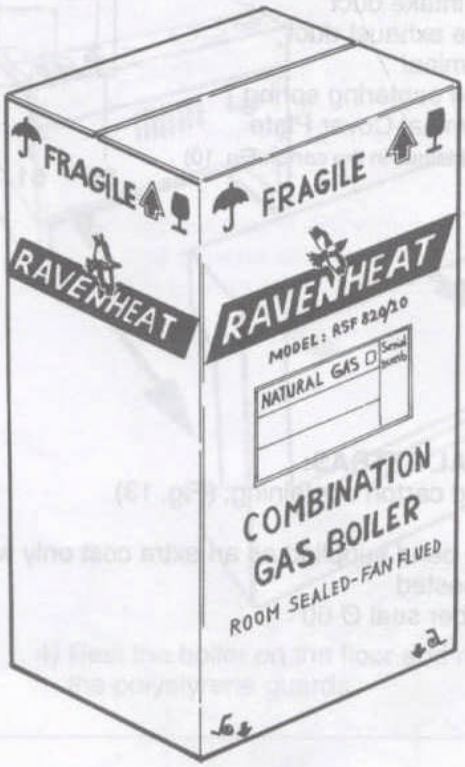
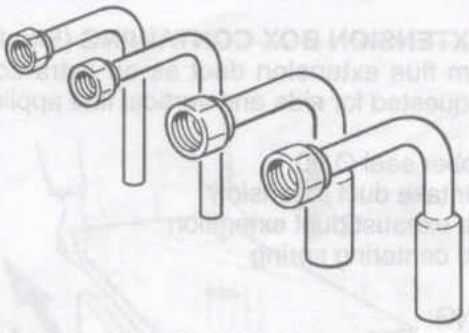


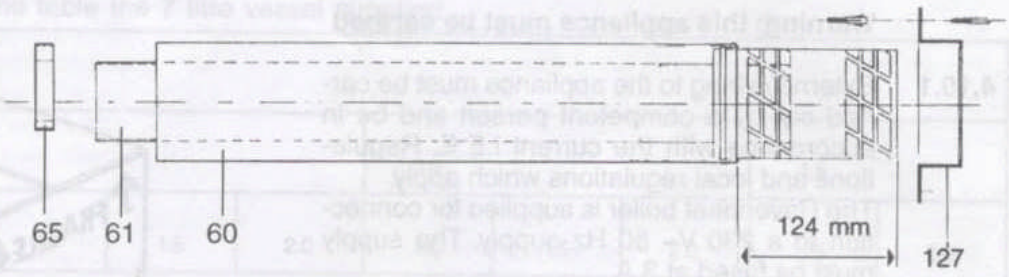
Fig. 11



FLUE BOX CONTAINING (Fig. 12):
Standard Flue Assembly

60 - Air intake duct
61 - Flue exhaust duct
62 - Terminal
65 - Pipe centering spring
127 - Terminal Cover Plate
(Contained in the carton Fig. 10)

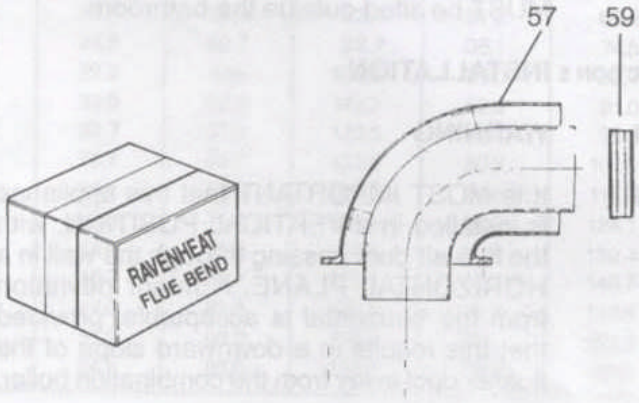
Fig. 12



OPTIONAL EXTRAS:
Flue bend carton containing: (Fig. 13)

57 - Flue bend supplied as an extra cost only when requested
59 - Rubber seal Ø 60

Fig. 13

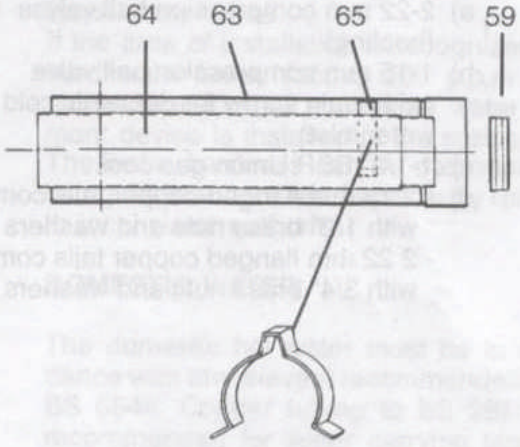


FLUE EXTENSION BOX CONTAINING (Fig. 14):
1000 mm flue extension duct as an extra cost only when requested for side and vertical flue applications

59 - Rubber seal Ø 60
63 - Air intake duct extension
64 - Flue exhaust duct extension
65 - Pipe centering spring

WARNING:
Maximum allowable flue length 3.5 m horizontal or 4.5 m vertical (Fig. 3) or page 21.
maximum No. 3x800 mm vertical No. 4x800 mm.
Flue duct extension used with standard flue

Fig. 14



5.3 UNPACKING

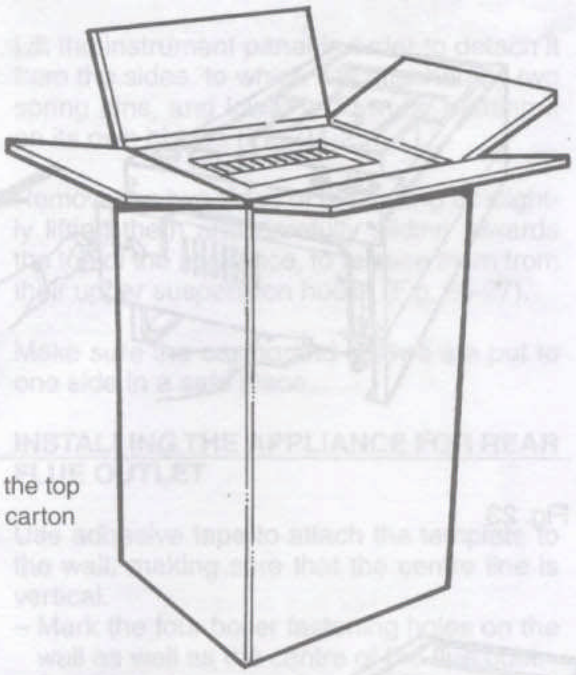


Fig. 15

1) Open the top of the carton

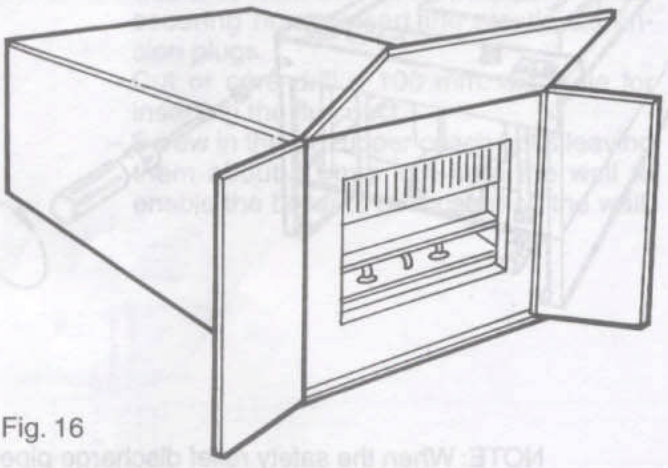


Fig. 16

2) Rest the carton on the floor (keeping the flaps open)

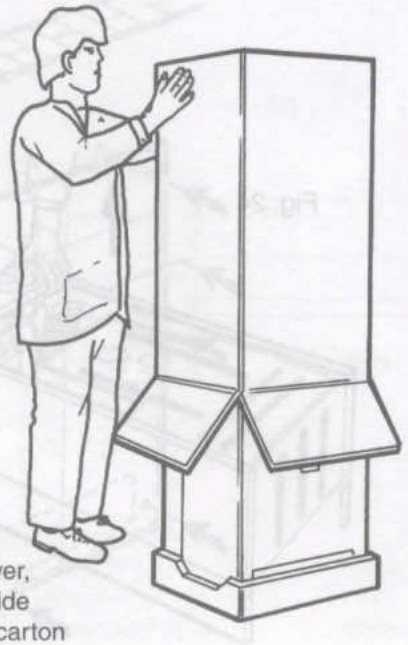


Fig. 17

3) Turn the carton over, with the boiler inside and then pull the carton

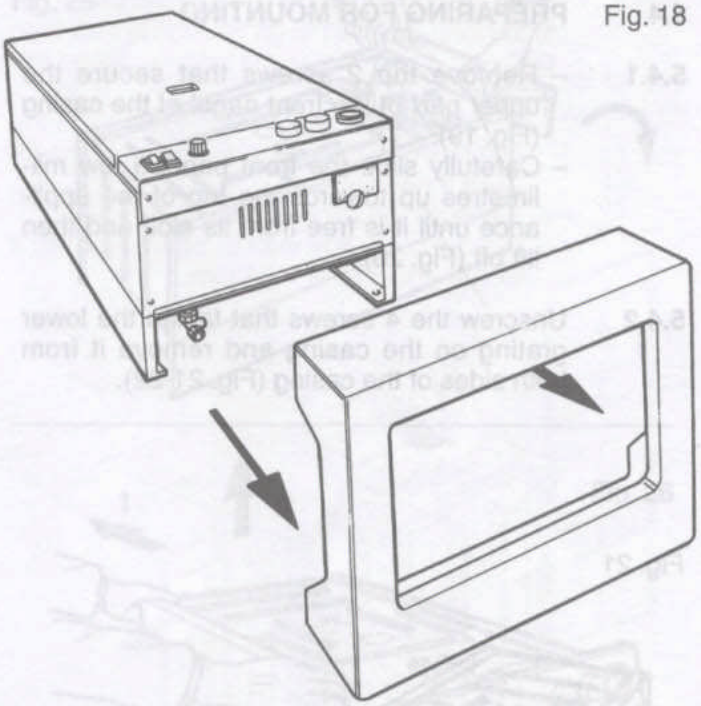


Fig. 18

4) Rest the boiler on the floor and remove the polystyrene guards

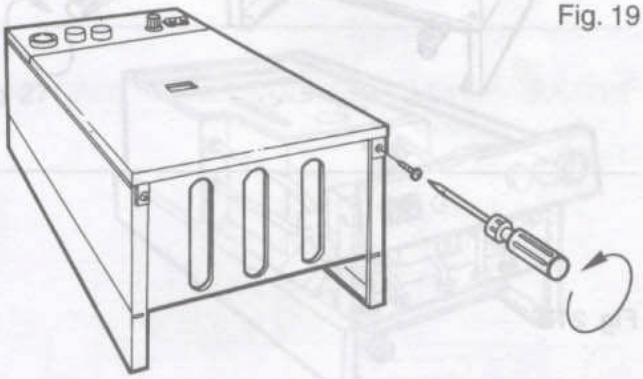


Fig. 19

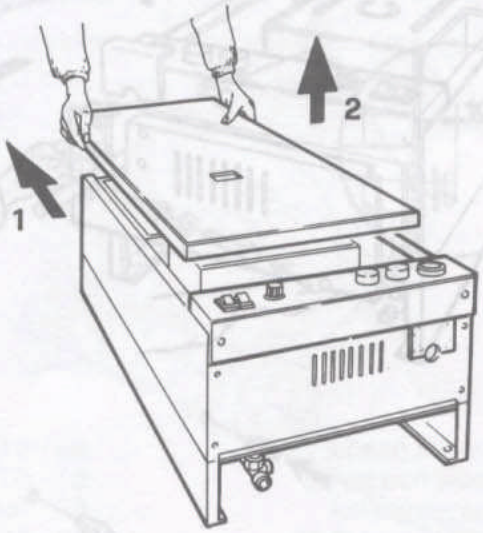


Fig. 20

5.4 PREPARING FOR MOUNTING

5.4.1 – Remove the 2 screws that secure the upper part of the front panel of the casing (Fig. 19).
– Carefully slide the front panel a few millimetres up towards the top of the appliance until it is free from its slot, and then lift off (Fig. 20).

5.4.2 Unscrew the 4 screws that fasten the lower grating on the casing and remove it from both sides of the casing (Fig. 21-22).

Fig. 21

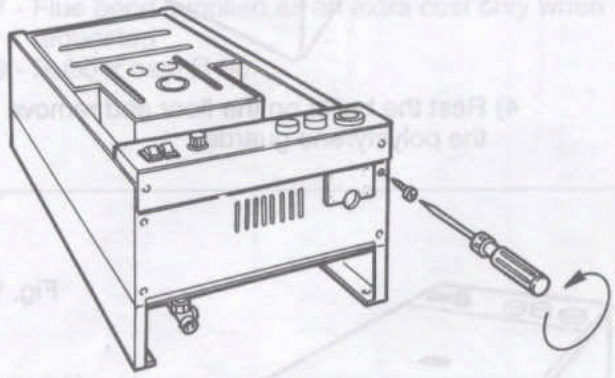


Fig. 21B

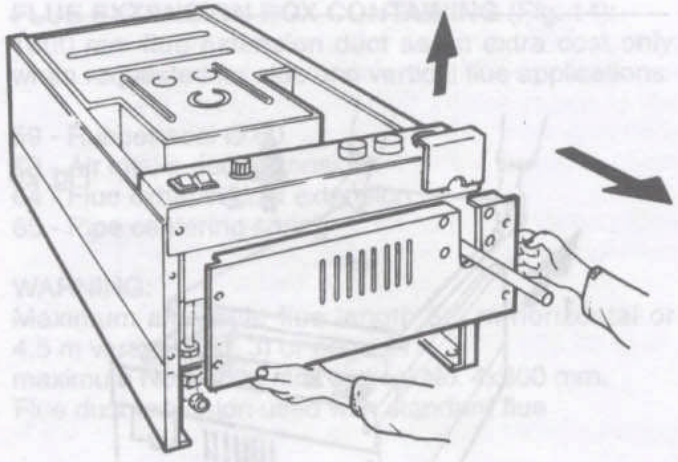


Fig. 22

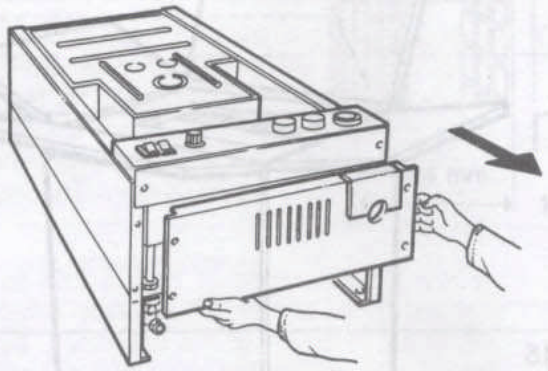
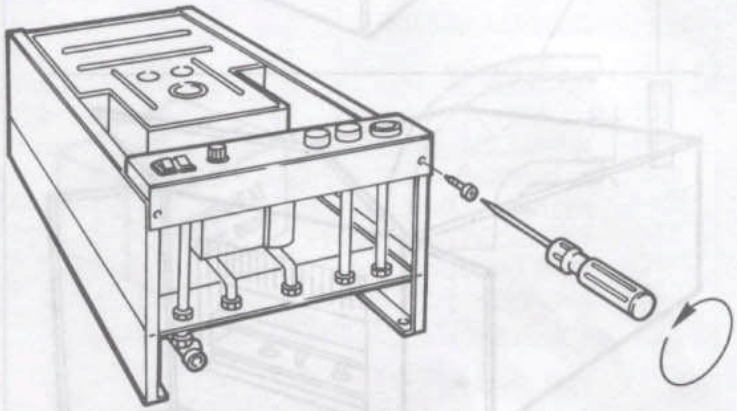
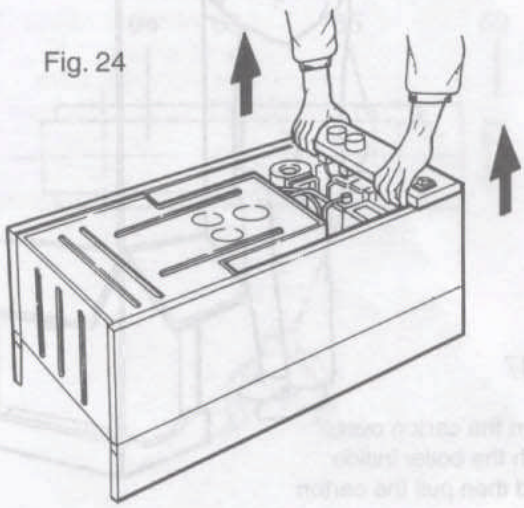


Fig. 23



NOTE: When the safety relief discharge pipe is connected the discharge pipe cover plate must be removed (Fig. 21B).
After the lower grating.

Fig. 24



5.4.3 Unscrew the 2 screws that fasten the lower part of the instrument panel (Fig. 23).

5.4.4 Lift the instrument panel in order to detach it from the sides, to which it is attached by two spring pins, and lower it down by rotating it on its own hinges (Fig. 24-25).

5.4.5 Remove the two sides of the casing by slightly lifting them and carefully sliding towards the top of the appliance, to release them from their upper suspension hooks (Fig. 26-27).

5.4.6 Make sure the casing and screws are put to one side in a safe place.

5.5 INSTALLING THE APPLIANCE FOR REAR FLUE OUTLET

5.5.1 Use adhesive tape to attach the template to the wall, making sure that the centre line is vertical.

- Mark the four boiler fastening holes on the wall as well as the centre of the flue duct.
- Detach the template from the wall.
- Use a 10 mm. dia drill to make the 4 boiler securing holes. Insert the plastic expansion plugs.
- Cut or core drill a 100 mm. dia. hole for inserting the flue duct.
- Screw in the two upper coach bolts leaving them about 10 mm. out from the wall to enable the boiler to be located on the wall.

Fig. 25

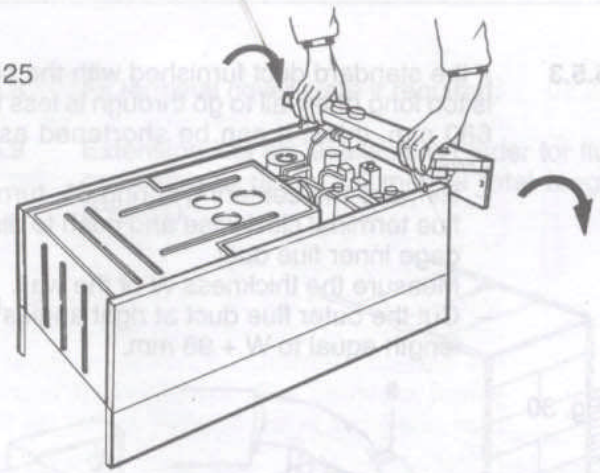


Fig. 26

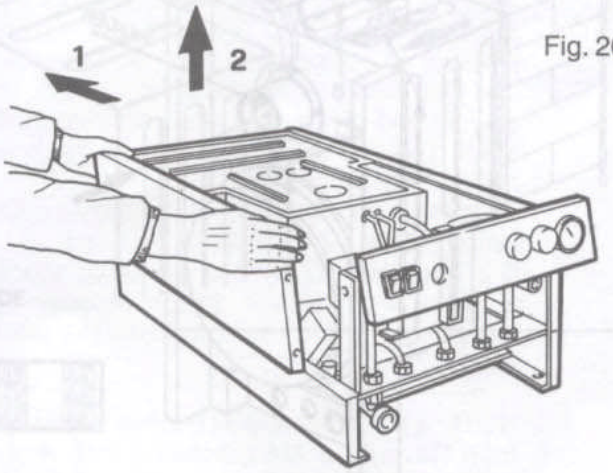


Fig. 27

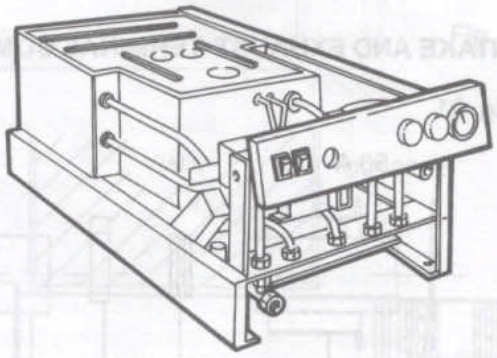


Fig. 28

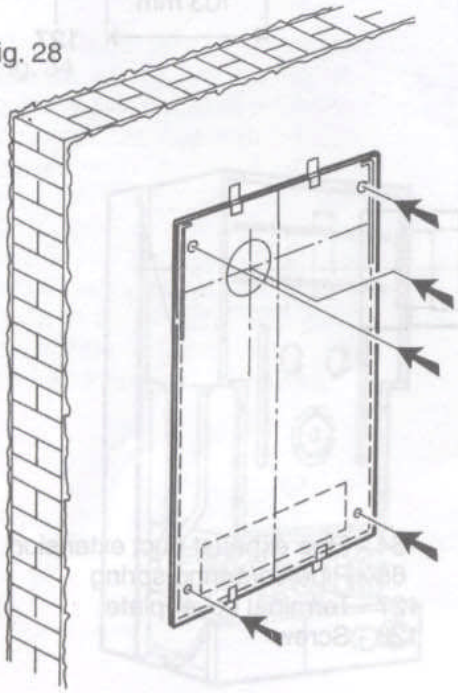
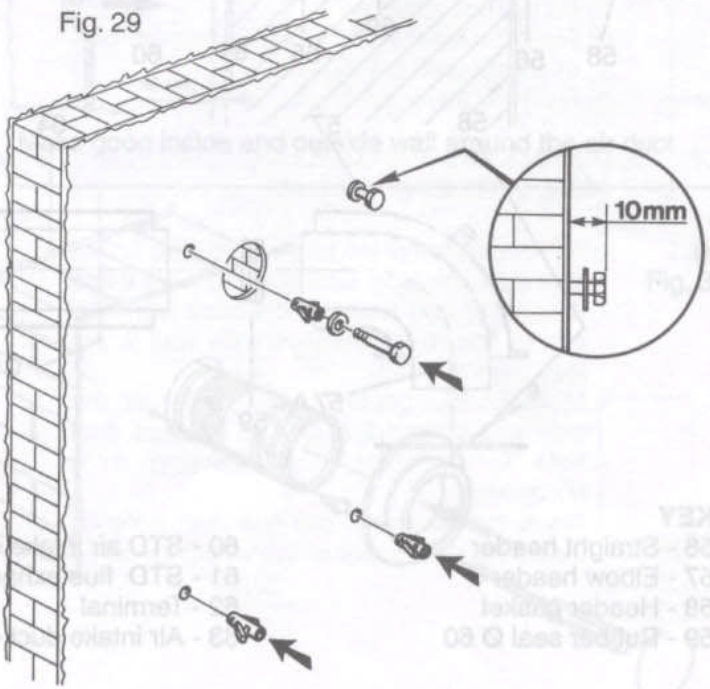


Fig. 29



5.5.3 If the standard duct furnished with the boiler is too long (the wall to go through is less than 680 mm. thick) it can be shortened as follows:

- Remove the centering spring 65, turn the flue terminal clockwise and push to disengage inner flue duct.
- Measure the thickness W of the wall.
- Cut the outer flue duct at right angles to a length equal to W + 98 mm.
- Cut the inner flue duct (60 mm) at right angles to a length equal to W + 201 mm.

Insert from cut end. Reassemble the two tubes turn the flue terminal anti clockwise to lock together. Insert centering spring 65. Must be de-burred.

Fig. 30

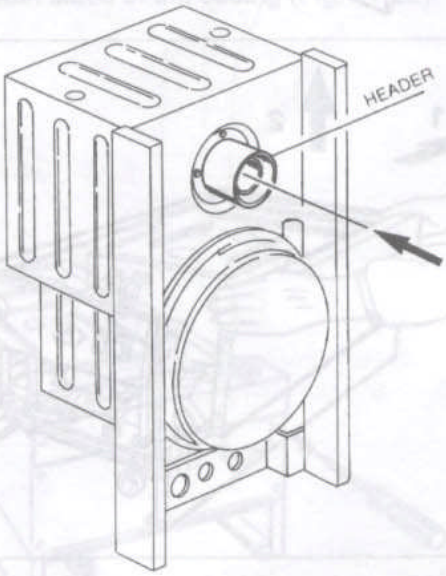
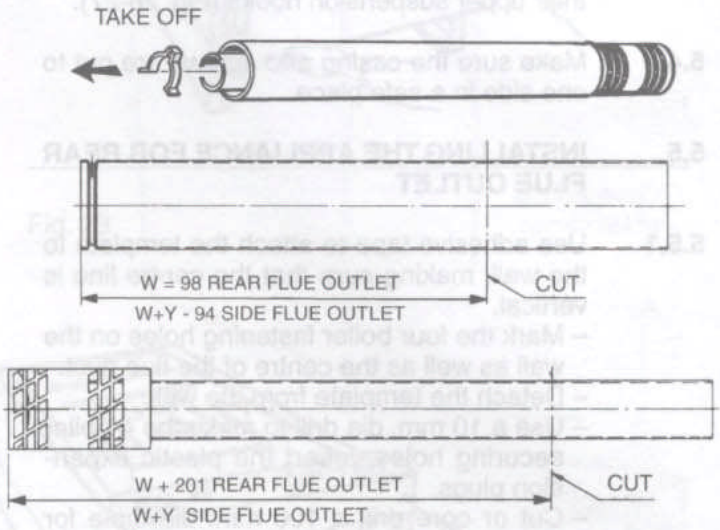
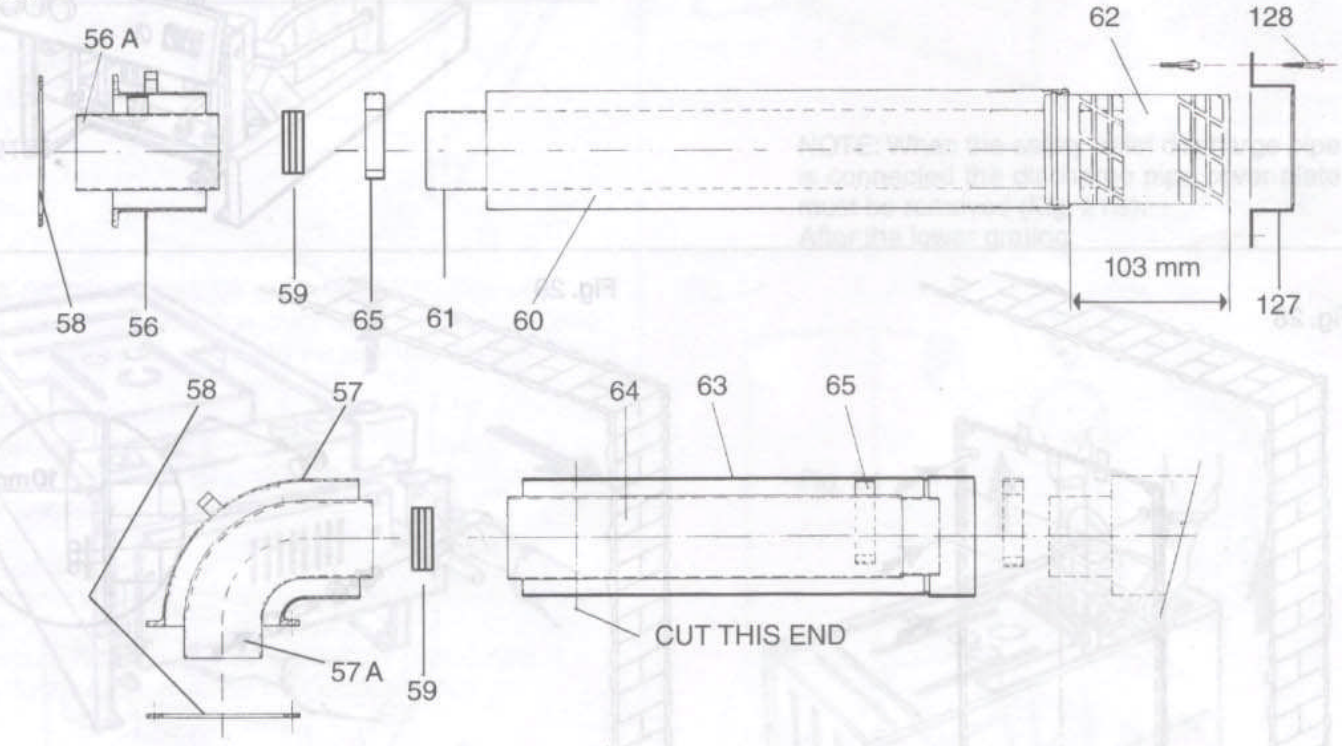


Fig. 32



INTAKE AND EXHAUST TERMINAL COMPONENTS

Fig. 31



KEY

56 - Straight header
57 - Elbow header
58 - Header gasket
59 - Rubber seal Ø 60
60 - STD air intake duct
61 - STD flue exhaust duct
62 - Terminal
63 - Air intake duct extension
64 - Flue exhaust duct extension
65 - Pipe centering spring
127 - Terminal cover plate
128 - Screw

5.5.4 Insert the flue assembly into the wall, being careful to make sure that the outer air duct comes flush to the inner surface of the wall.

5.5.5 Lift the boiler on to the wall (Fig. 34), locating onto the top coach bolts. Fit the two lower coach bolts and tighten all four securing bolts.

5.5.6 Working above the boiler pull the flue exhaust duct towards the boiler in order to engage tube 61 into its header 56A (Fig. 31-35).

5.5.8 Fit terminal cover plate if required.

5.5.9 Extension kits are available on order for flue extension of up to 3.5 metres total length (Fig. 31).

Fig. 35

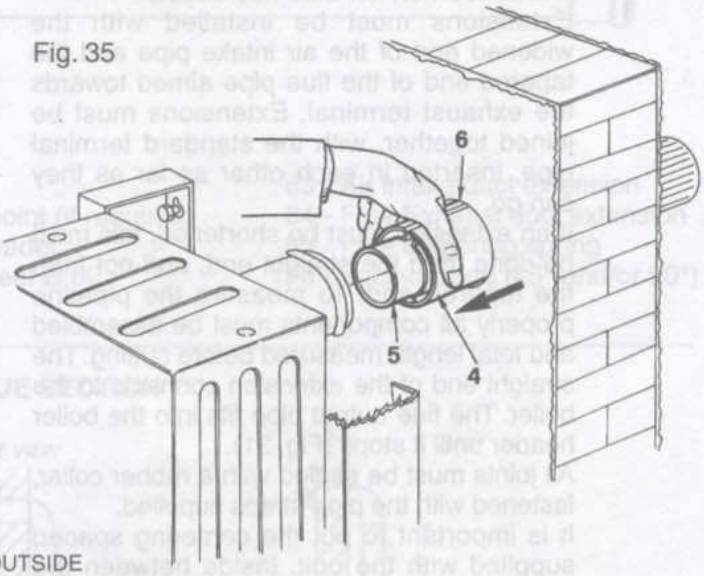


Fig. 33

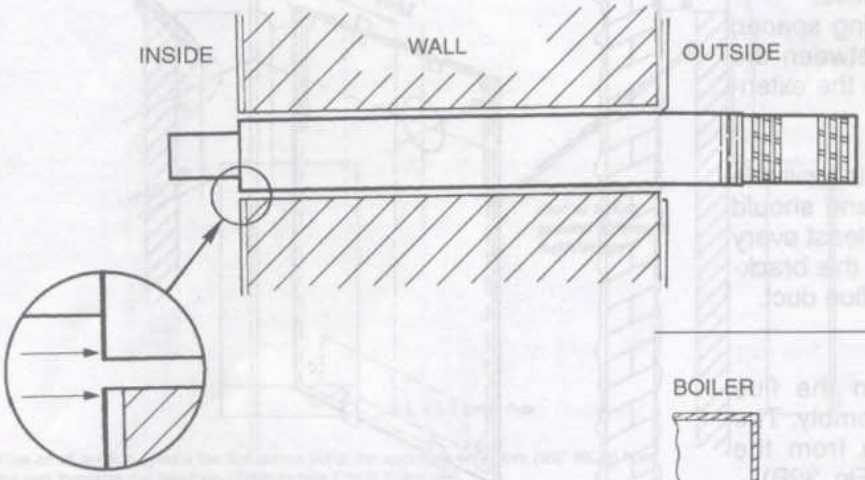
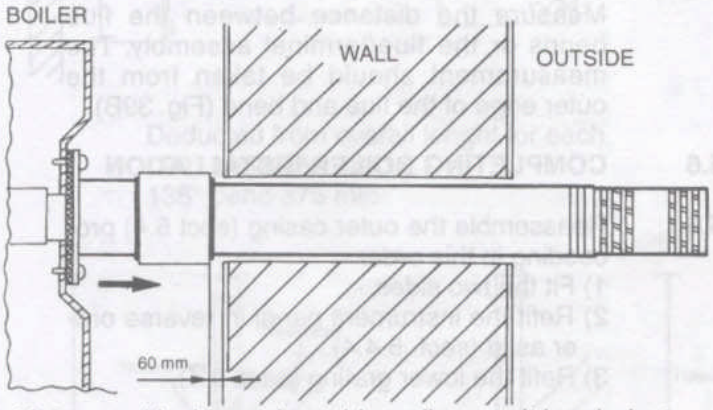


Fig. 36



Make good inside and outside wall around the air duct

Fig. 34

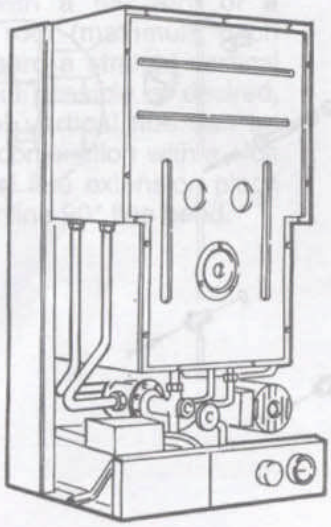
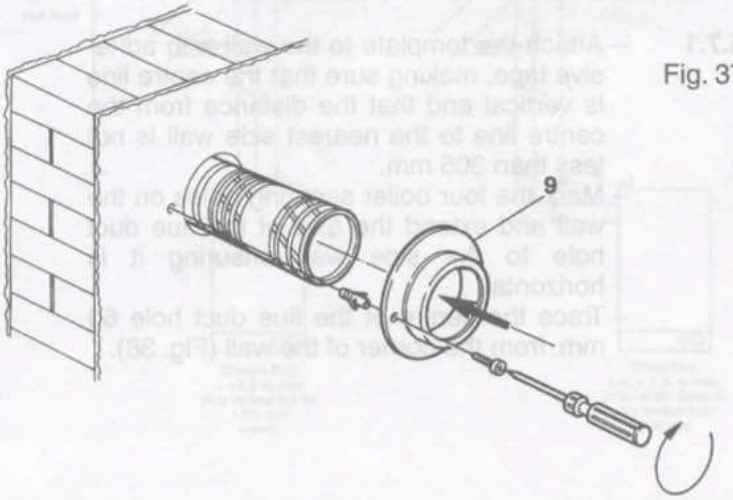


Fig. 37



5.5.10 Each extension length extends the pipe by approximately 1000 mm long up to a maximum of three extensions.
Pipeline length can be established using the instructions in section 5.5 for rear flue outlets and section 5.7 for side flue outlets.
Extensions must be installed with the widened end of the air intake pipe and the tapered end of the flue pipe aimed towards the exhaust terminal. Extensions must be joined together, with the standard terminal pipe, inserted in each other as far as they can go.
If an extension must be shortened, this must be done from the straight end, and not from the tapered end. To measure the pipeline properly all components must be assembled and total length measured before cutting. The straight end of the extension connects to the boiler. The flue output pipe fits into the boiler header until it stops (Fig. 31).
All joints must be sealed with a rubber collar, fastened with the pipe straps supplied.
It is important to put the centering spacer, supplied with the unit, inside between the two pipes, from the side opposite the extension's straight end.

NOTE: a suitable support bracket is available from Ravenheat Manufacturing and should be used to support flue length at least every 1.8 metre preferably at each joint this bracket should be secured to wall and flue duct.

5.5.11 INLINE FLUE BEND
Measure the distance between the flue bends or the flue/terminal assembly. The measurement should be taken from the outer edge of the flue and bend (Fig. 39B).

5.6 COMPLETING BOILER INSTALLATION

5.6.1 Reassemble the outer casing (sect 5.4) proceeding in this order
1) Fit the two sides.
2) Refit the instrument panel in reverse order as in (sect. 5.4.4).
3) Refit the lower grating (sect. 5.4).

5.7 INSTALLING THE APPLIANCE FOR SIDE FLUE OUTLET (Fig. 38-39)

5.7.1
- Attach the template to the wall with adhesive tape, making sure that the centre line is vertical and that the distance from the centre line to the nearest side wall is not less than 305 mm.
- Mark the four boiler securing holes on the wall and extend the axis of the flue duct hole to the side wall ensuring it is horizontal.
- Trace the centre of the flue duct hole 60 mm. from the corner of the wall (Fig. 38).
- Measure the distance Y between the centre of flue duct hole to the corner. Detach the template from wall.
- Use a dia. 10 mm. drill to make the 4 holes for securing the boiler. Insert the plastic expansion plugs. Core drill a 100 mm dia. hole in the side wall for inserting the flue duct.
- Screw in the two upper coach bolts leaving them about 10 mm. out from the wall in order to enable the boiler to be located.

Fig. 38

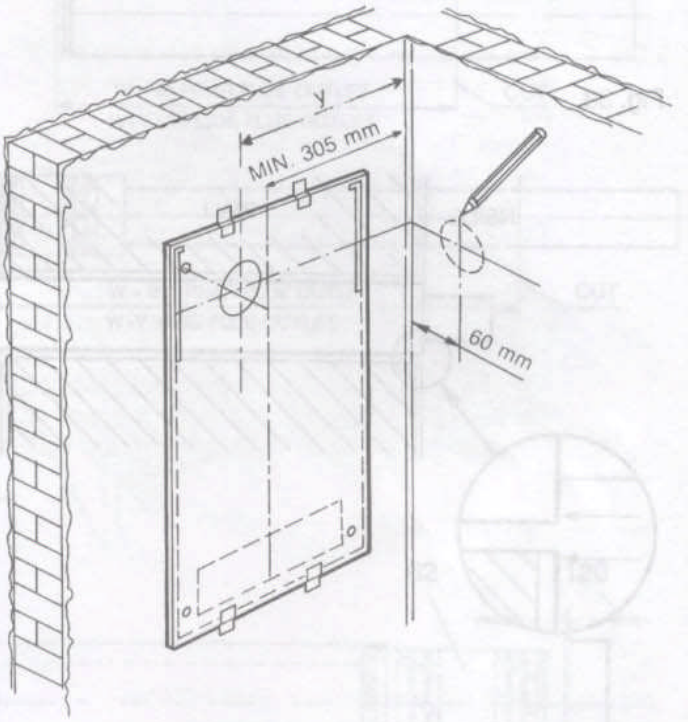


Fig. 39

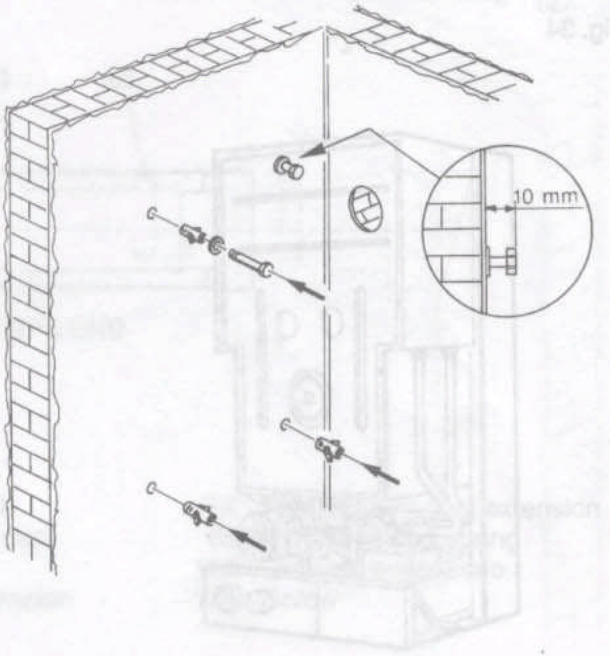
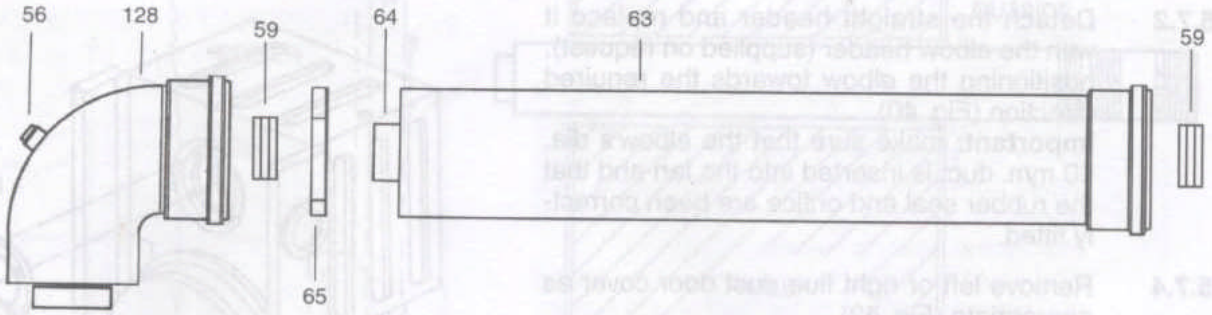


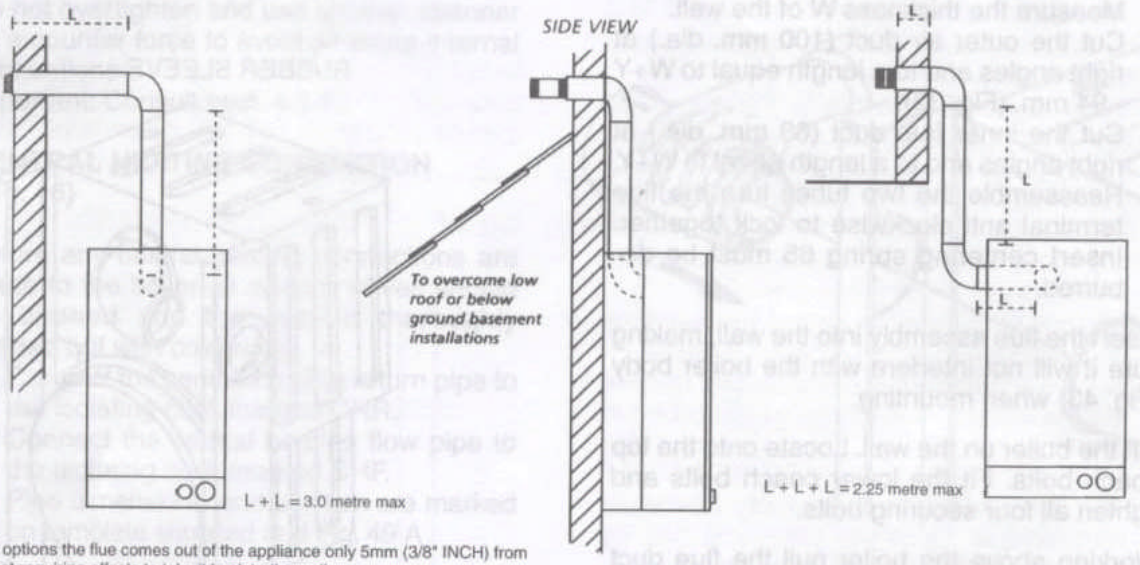
Fig. 39B



KEY

56 - Sample point (if required)
57 - Elbow Header
59 - Rubber seal Ø 60
63 - Air intake duct extension
64 - Flue Exhaust duct extension
65 - Pipe centering spring
128 - In Line Bend (45° and/or 90°)

USING AN INLINE 135° OR 90° BEND & VERTICAL FLUE SECTION

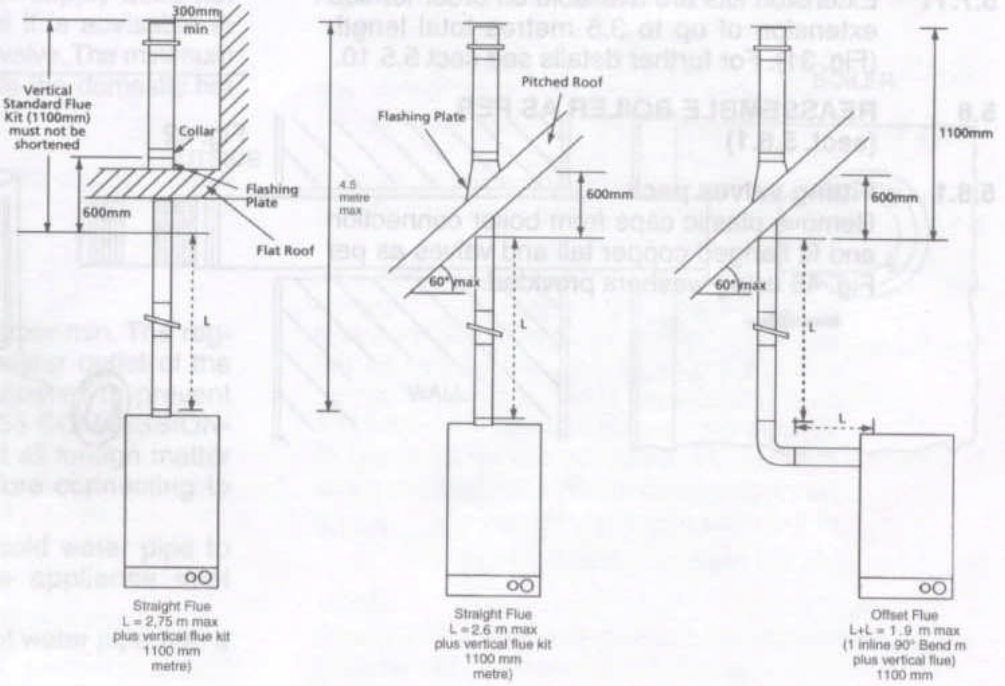


Note on all our flue options the flue comes out of the appliance only 5mm (3/8" INCH) from the wall therefore not requiring offsets to take it back to the wall.

Deducted from overall lenght for each
90° bend 750 mm
135° bend 375 mm

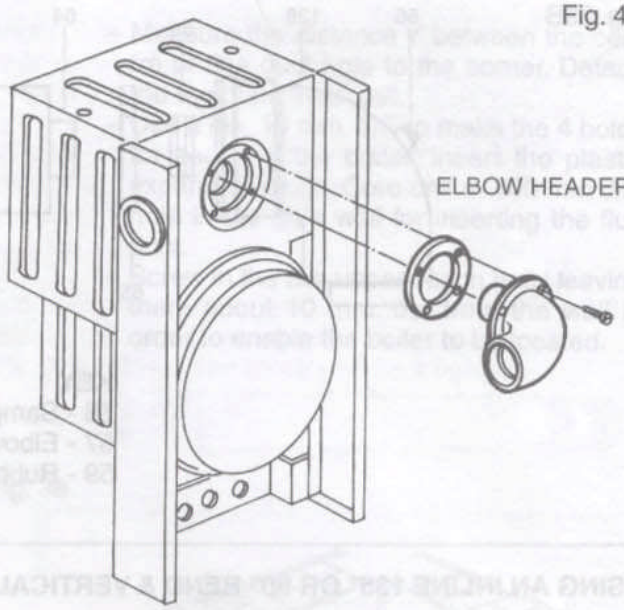
VERTICAL FLUE OPTIONS

The vertical flue kit is intended for use where a horizontal flue outlet is not possible or desired. The vertical flue can be used either with a flat roof or a pitched roof (maximum pitch 60°). Where a straight vertical flue is not possible or desired, an offset vertical flue can be used in conjunction with a side horizontal flue extension piece and an inline 90° flue bend.



5.7.2 Detach the straight header and replace it with the elbow header (supplied on request), positioning the elbow towards the required direction (Fig. 40).
Important: make sure that the elbow's dia. 60 mm. duct is inserted into the fan and that the rubber seal and orifice are been correctly fitted.

Fig. 40



5.7.4 Remove left or right flue duct door cover as appropriate (Fig. 42).

5.7.5
- If the standard duct furnished with the boiler is too long (position of the boiler from the wall to go through as illustrated in the drawing and wall thicknesses less than what was specified above) it can be shortened as follows: (Fig.31-32).
- Remove the centering spring 65, turn the flue terminal clockwise and push to disengage inner flue duct.
- Measure the thickness W of the wall.
- Cut the outer air duct (100 mm. dia.) at right angles and to a length equal to W+Y - 94 mm. (Fig. 32).
- Cut the inner flue duct (63 mm. dia.) at right angles and to a length equal to W+Y.
- Reassemble the two tubes turn the flue terminal anti clockwise to lock together. Insert centering spring 65 must be deburred.

5.7.6 Insert the flue assembly into the wall, making sure it will not interfere with the boiler body (Fig. 43) when mounting.

5.7.7 Lift the boiler on the wall. Locate onto the top coach bolts. Fit the lower coach bolts and tighten all four securing bolts.

5.7.8 Working above the boiler pull the flue duct towards the elbow in order to engage tube 61 into its header 57A.

5.7.10 Fit terminal cover plate if required (Fig. 37).

5.7.11 Extension kits are available on order for flue extension of up to 3.5 metres total length (Fig. 31). For further details see sect 5.5.10.

5.8 REASSEMBLE BOILER AS PER (sect. 5.6.1)

5.8.1 Fitting valves pack
Remove plastic caps from boiler connection and fit flanged copper tail and valves as per Fig. 46 using washers provided.

RUBBER SLEEVE

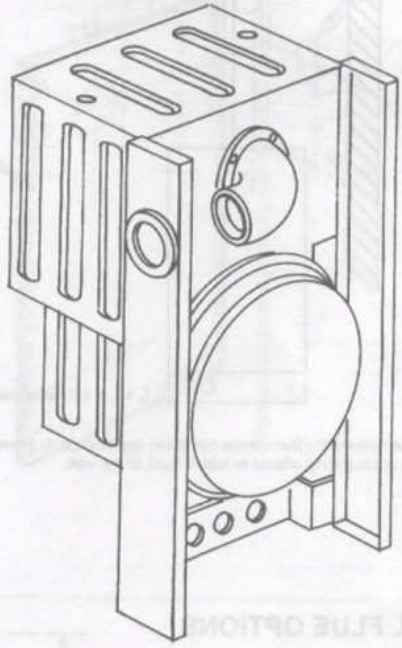


Fig. 42

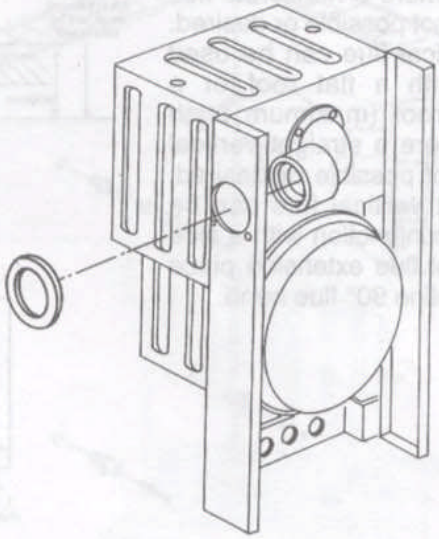
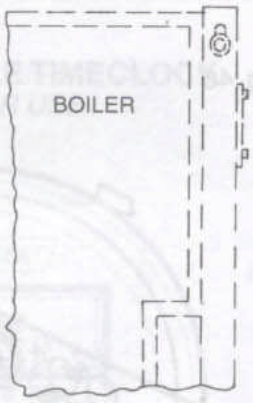


Fig. 43



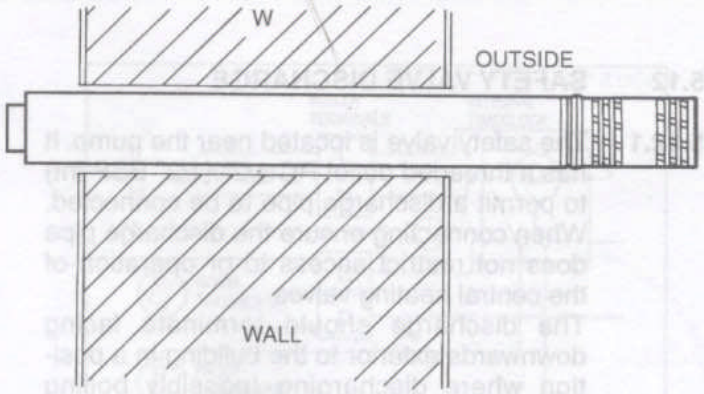


Fig. 44

5.9 GAS CONNECTION (Fig. 46)

5.9.1 A minimum gas pressure of 20 mbar (8 in w.g.) must be available at the boiler inlet at full flow rate.

5.9.2 Fit gas service cock to the boiler via the union nut and connect gas pipe.
Do not overtighten and use another spanner as a counter force to avoid straining internal connections.
Important: Consult sect. 4.5.1

5.10 CENTRAL HEATING CONNECTION (Fig. 46)

5.10.1 Before any central heating connections are made to the boiler all system valves should be opened and the system thoroughly flushed out with cold water.

- Connect the central heating return pipe to the isolating cock marked CHR.
- Connect the central heating flow pipe to the isolating cock marked CHF.
- Pipe dimension's and position are marked on template supplied and Fig. 49 A

5.11 DOMESTIC HOT WATER (Fig. 46)

5.11.1 The domestic hot water circuit does not need a safety valve but it is essential to ensure that the pressure of the cold water supply does not exceed 10 bar. If in doubt it is advisable to install a pressure reducing valve. The minimum pressure needed to operate the domestic hot water system is 0.5 bar

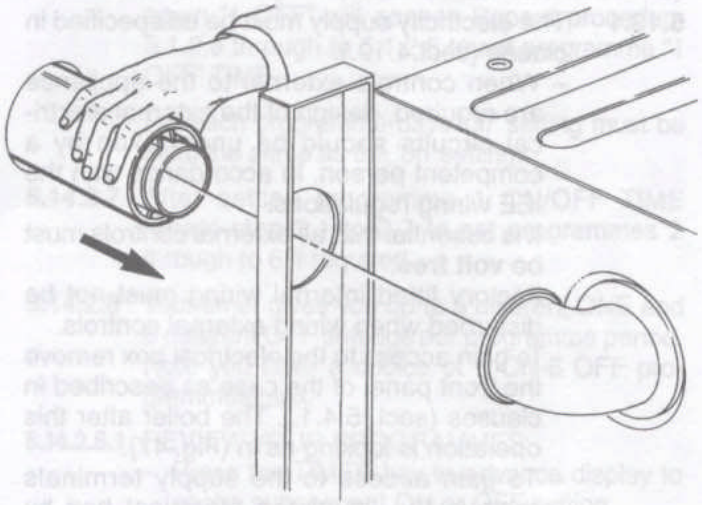
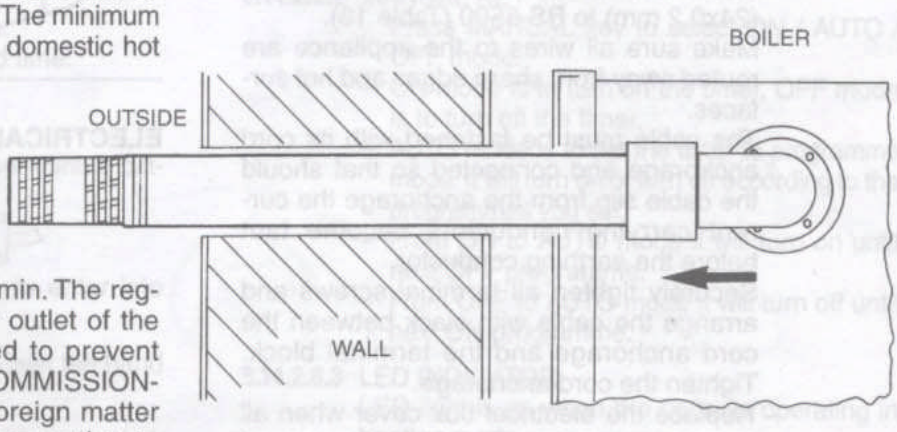


Fig. 45



with a flow of approx 3 Lts per min. The regulator screw on the cold water outlet of the diverter valve may be adjusted to prevent excess volume flow (Fig. 53 COMMISSIONING SECTION). Flush out all foreign matter from the supply pipe before connecting to the appliance.

- Connect the 15 mm. cold water pipe to the stop cock to the appliance inlet marked DCW.
- Connect the 15 mm. hot water pipe with a suitable connection.

5.12 SAFETY VALVE DISCHARGE

5.12.1 The safety valve is iocated near the pump. It has a threaded outlet RC 1/2" (1/2" BSP Int) to permit a discharge pipe to be connected. When connecting ensure the discharge pipe does not restrict access to or operation of the central heating valves.

The discharge should terminate facing downwards exterior to the building in a position where discharging (possibly boiling water & steam) will not create danger or nuisance, in easily visible position, and not cause damage to electrical components and wiring.

The discharge must not be over an entrance or a window or any other type of public access.

5.13 ELECTRICAL CONNECTIONS

5.13.1 The electricity supply must be as specified in clause (sect.4.10.).

- When controls external to the appliance are required, design of the external electrical circuits should be undertaken by a competent person. In accordance with the IEE wiring regulations.

  It is essential that all external controls must be **volt free**.

  Factory fitted internal wiring must not be disturbed when wiring external controls.
- To gain access to the electrical box remove the front panel of the case as described in clauses (sect. 5.4.1.). The boiler after this operation is looking as in (Fig. 47).
- To gain access to the supply terminals remove the lid of the electrical box by removing the fixing screw indicated in (Fig. 47).
- The terminals are easily visible on the front of the electronic control board (Fig. 48).
- Heat resistant flexible cable must be used between the isolator and the terminal block. It must be 3 core size 0.75 mm² (24x0.2 mm) to BS 6500 (Table 16).

  Make sure all wires to the appliance are routed away from sharp edges and hot surfaces.

  The cable must be fastened with its cord anchorage and connected so that should the cable slip from the anchorage the current carrying conductors become taut before the earthing conductor.

  Securely tighten all terminal screws and arrange the cable with slack between the cord anchorage and the terminal block. Tighten the cord anchorage.
- Replace the electrical box cover when all connections are made, and the front panel of the case after commissioning.

Fig. 46

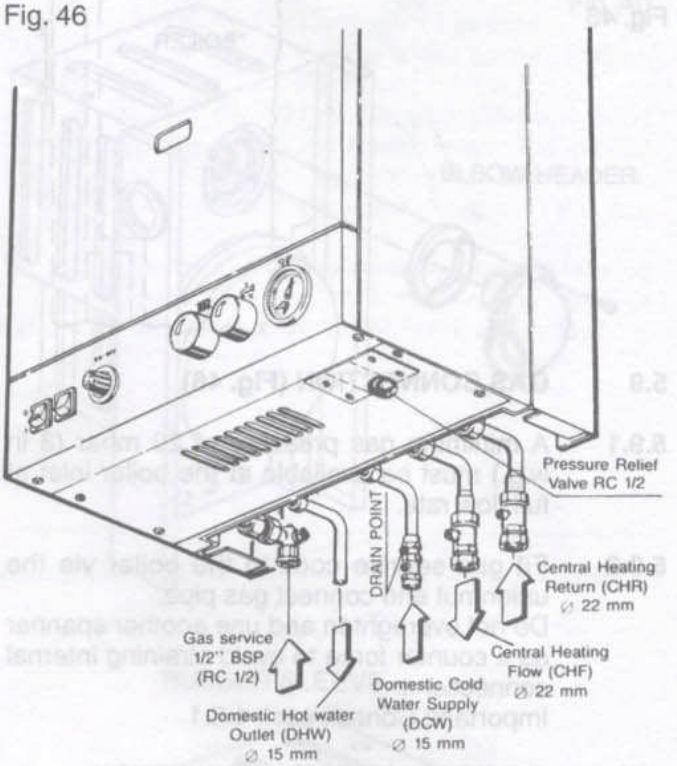
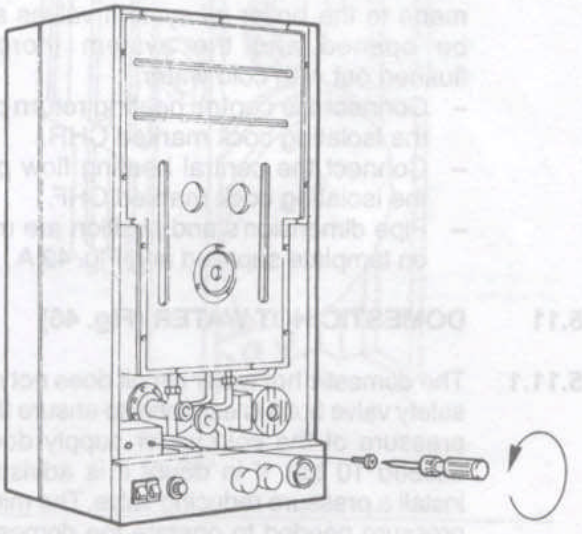


Fig. 47



ELECTRICAL CONNECTION

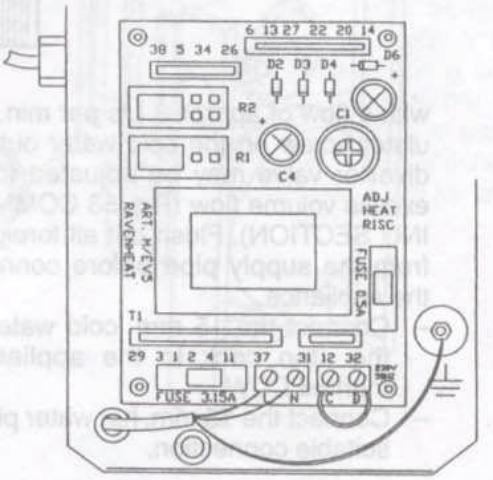
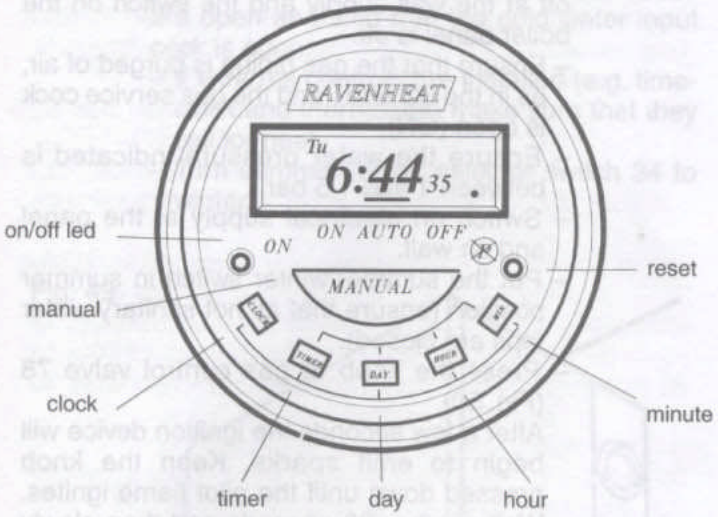


Fig 48

5.14 PROGRAMMABLE TIMECLOCK

INSTRUCTIONS FOR USE



Your Ravenheat boiler comes complete with (optional) digital programmer. The timeclock is supplied with a cover to prevent accidental loss of programme, or children tampering with pre-set programmes.

5.14.1 TO PROGRAMME TIMECLOCK

To access programming buttons remove clear cover. Press ⊗ reset key with a pencil before setting or reprogramming times.

5.14.1.1 TO SET TIME AND DAY OF THE WEEK:

5.14.1.2 SET DAY OF WEEK:
- Press clock button and hold in. Press day button to desired day.
- Release both buttons. The day of the week will be set.

5.14.1.3 SET HOUR:
- Press clock button and hold in. Press hour button to desired time.
- Release both buttons. The hour will be set.

5.14.1.4 SET MINUTE:
- Press clock button and hold in. Press minute button to desired time.
- Release both buttons. The minute will be set.

NOTE: When, setting time holding in the hour/minute button this will rapidly advance the display.

5.14.2 TO SET PROGRAMMES:

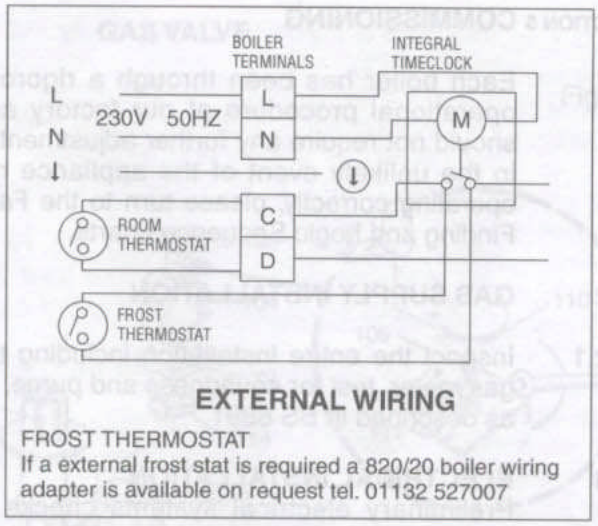
5.14.2.1 Press timer button and release to enter into programme mode.

5.14.2.2 Programme "1 ON" will show in lower left hand corner.

5.14.2.3 Press **DAY** key to select the programme period. There are 10 day settings for your choice. (1) Mo to Su (2) Mo (3) Tu (4) We (5) Th (6) Fr (7) Sa (8) Su (9) Mo+Tu+We+Th+Fr (10) Sa+Su.

You now have a choice of 6 programmes.

5.14.2.4 Press hour button to set the required hour 'on'.



EXTERNAL WIRING

FROST THERMOSTAT
If a external frost stat is required a 820/20 boiler wiring adapter is available on request tel. 01132 527007

5.14.2.5 Press minute button to set minute.

5.14.2.6 After setting the programme press **TIMER** key again "1 OFF" will appear. Repeat procedure 5.1.2.3 through to 5.1.2.5 to set programme "1 OFF" TIME.

For each programme days 'off' setting must be input the same as the 'on' setting.

5.14.2.7 After setting programme 1 ON/OFF TIME repeat step 2.1 to 2.7 to set programmes 2 through to 6 if required.

5.14.2.8 Your timer gives you up to 6 different ONE and 6 different OFF settings per programme period. Note you have a choice of 6 ON-6 OFF programmes max.

5.14.2.8.1 REVIEW YOUR PROGRAMMES:
- Press the TIMER key to advance display to eache subsequent ON or OFF setting.
- Check days and times displayed.
- To make a change, follow instructions under "TO SET PROGRAMMES".

Note on completion of programming operations press the clock button to show current time/day and replace the clear tamper proof cover.

5.14.2.8.2 MANUAL KEY
- Press MANUAL key to select ON / AUTO / OFF mode.
- ON mode is to turn on the timer, OFF mode is to turn off the timer.
- AUTO mode is to set the timer to programme mode. It will turn on or turn off according to the programmes you set.
- From ON to AUTO mode it will turn on until next OFF programme.
- From OFF to AUTO mode it will turn off until next ON programme.

5.14.2.8.3 LED INDICATOR
LED light is on when the boiler is operating in heating mode.

5.14.3 TO RESET TIMER:
Press reset button to reset the timer unit.

NOTE:
Once the reset button is pressed, the stored time and programme will be cleared to initial state.

N.B.: When the clock is either "programmed" on, or is on constant, the red indicator will illuminate

SECTION 5 COMMISSIONING

6.1 Each boiler has been through a rigorous operational procedure at our factory and should not require any further adjustment. If in the unlikely event of the appliance not operating correctly, please turn to the Fault Finding and Logic Sequence charts.

6.2 GAS SUPPLY INSTALLATION

6.2.1 Inspect the entire installation including the gas meter, test for soundness and purge, all as described in BS 6891.

6.3 ELECTRICAL INSTALLATION

Preliminary electrical systems checks to ensure electrical safety should be carried out by a competent person (earth continuity, polarity, resistance to earth). Those checks are outlined in the «Instructions for British Gas Multimeter» Booklet. If a fault has occurred on the appliance the fault finding procedure should be followed as specified under the servicing section of this document.

6.4 INITIAL FILLING OF THE SYSTEM

Open central heating flow and return valves.
Unscrew the cap on automatic air release valve one full turn (leave open permanently).

- Close all air release taps on the central heating system.
- Gradually open stopcock at the filling point connection to the central heating system until water is heard to flow.
- Starting with the lowest radiator open each air release tap in turn. Close it only when clear water, free of bubbles, flows out. In the same way release air from any high points in the pipework.
- Continue filling the system until at least 1.5 bar registers on gauge. Then turn off the filling points stopcock.
- Inspect the system for water soundness and remedy any leaks discovered.

6.5 SETTING THE SYSTEM DESIGN PRESSURE

The design pressure must be a min. 1 bar and max. 1.5. These figures are read off the pressure gauge.

- The actual reading should ideally be 1 bar + the height in metres to the highest point of the system above the base of the appliance (up to a max. of 1.5 bar).
  N.B. The safety valve is set to lift at 3 bars (30 mt/42.5 psig).
- To lower the system pressure to the required value turn the knob on the safety valve a quarter turn to release water until the gauge, reads the required figure.

6.6 FILLING THE HOT WATER SYSTEM

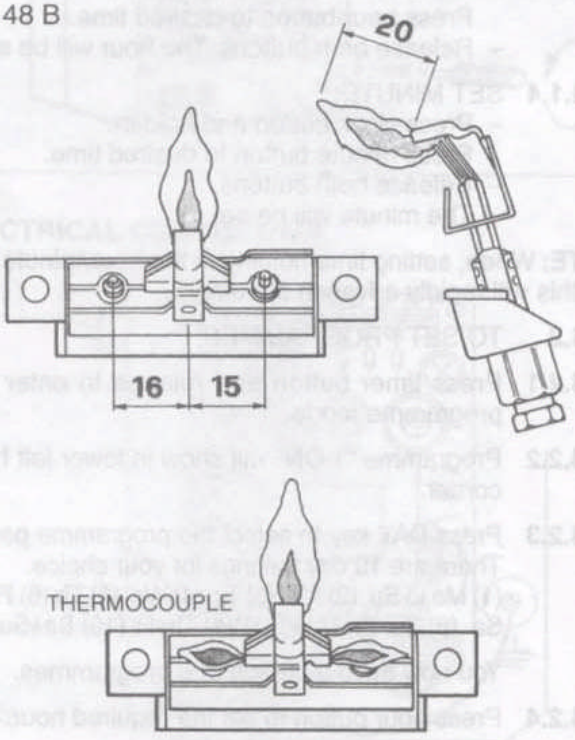
Close all hot water draw-off taps.
Open the cold water inlet cock.
Slowly open each draw-off tap until clear water is discharged.

6.7 ESTABLISHING THE PILOT FLAME (Fig. 49-50)

Ensure that the electrical supply is switched off at the wall supply and the switch on the boiler panel is off.

- Ensure that the gas piping is purged of air, as in the BS 6891 and the gas service cock is open (ON).
- Ensure the water pressure indicated is between 1 and 1.5 bar.
- Switch on electrical supply at the panel and on wall.
- Put the summer/winter switch in summer position (ensure that all hot sanitary water taps are closed).
- Press the knob of gas control valve 78 (Fig. 50).
  After a few seconds the ignition device will begin to emit sparks. Keep the knob pressed down until the pilot flame ignites. Wait another 20 seconds and then slowly release the knob.
  The pilot flame should remain lit and envelope the thermocouple. If it goes out wait three minutes and then repeat the procedure.
  With the front of combustion chamber removed for check soundness of pilot connection. Replace front of combustion chamber important ensure front is correctly fitted.
- Check that the pilot flame is correct (Fig. 48 B). If necessary, adjust the flame isolate electricity supply. To gain access to the adjustment devices lower the instrument panel as described in paragraph (sect. 5.4.3 & 4.).
  Figure 51 shows the regulation screw (112). Turn this clockwise to decrease the flame, and counter-clockwise to increase it.

Fig. 48 B

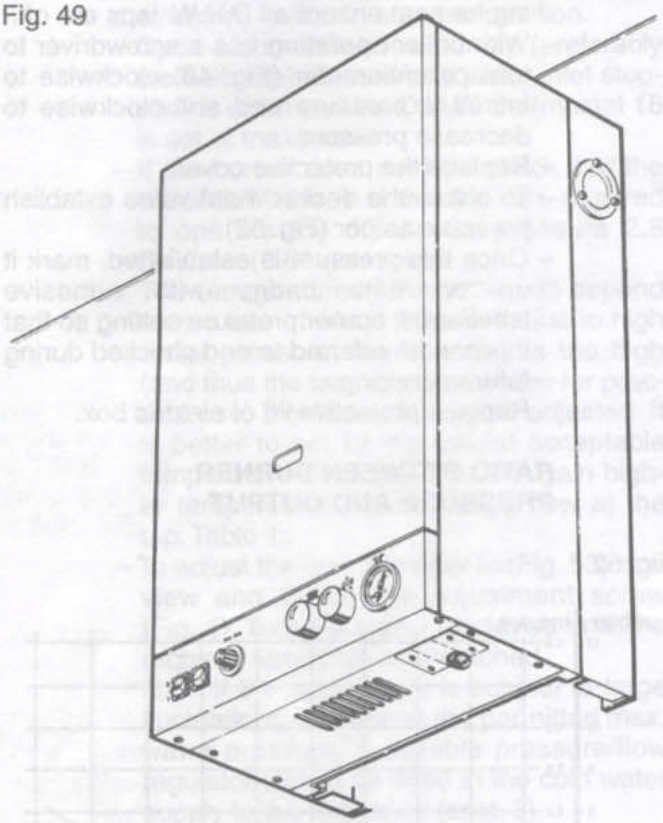


6.8 LIGHTING THE BOILER (Fig. 50)

Before lighting the main burner make sure that the heating circuit flow and return valves are open and also that the cold water input cock is open.

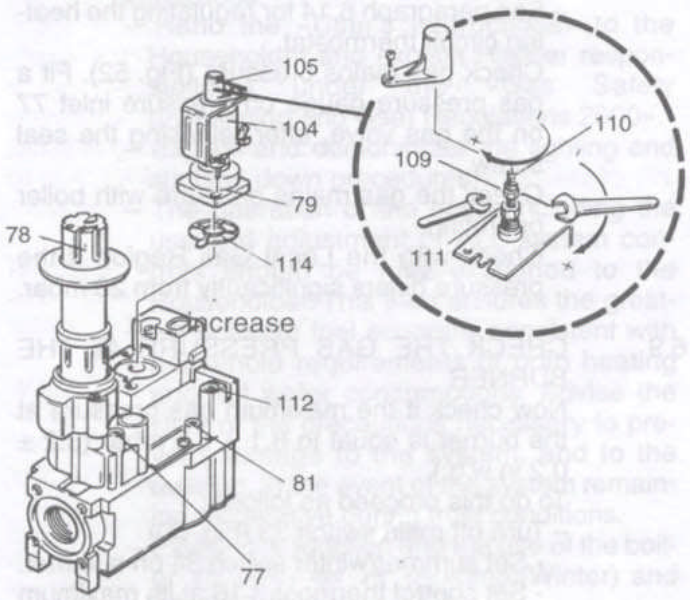
– If external controls are installed (e.g. time-clock and thermostat) make sure that they call for heat.
– Turn summer/winter selector switch 34 to winter.

Fig. 49



GAS VALVE

Fig. 51

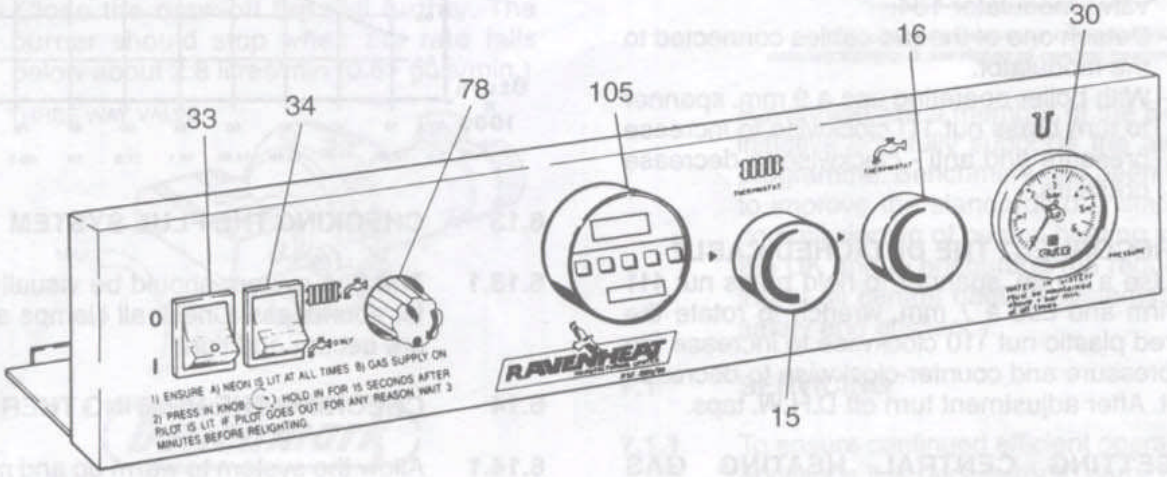


KEY

77 - Upstream pressure inlet
78 - Ignition and extinguish knob
79 - Pressure regulator
81 - Downstream pressure outlet
104 - Gas valve modulator
105 - Gas regulator screw cover
112 - Pilot flame regulator screw
114 - Seal
110 - Max. regulator nut
111 - Min. regulator nut

INSTRUMENT PANEL

Fig. 50



KEY

15 - Heating control thermostat
16 - Hot tap water control thermostat
30 - Water pressure gauge
33 - Main switch
34 - Summer/winter switch
78 - Ignition and extinguish khob
105 - Timer

– Turn control thermostat 15 up to its maximum setting.
– Now the main burner should turn on.
With leak detection fluid test for gas soundness of all gas components and joints.
– See paragraph 6.14 for regulating the heating circuit thermostat.
Check gas mains pressure (Fig. 52). Fit a gas pressure gauge on pressure inlet 77 on the gas valve, after releasing the seal screw.
Check the gas mains pressure with boiler operating.
Check with the Local Gas Region if the pressure differs significantly from 20 mbar.

6.9 CHECK THE GAS PRESSURE AT THE BURNER

Now check if the maximum gas pressure at the burner is equal to 8.1 ± 0.5 mbar (3.2 ± 0.2 in w.g.).
To do this proceed as follows:
– Turn off main switch 33 (Fig. 50)
- Set summer/winter switch 34 on summer.
- Set control thermostat 16 at its maximum setting.
- Fit a pressure gauge, using a hose, to pressure test point 81, (Fig. 51), after first loosening its close-off screw.
- Turn on main switch 33.
- Open one or more hot water taps so that at least 10÷12 litre of water flows per minute.
– The pressure indicated on the pressure gauge is the maximum operating gas pressure.
– Check if the minimum pressure corresponds to 1.5 m.bar (0.6 in w.g.) as is set at the factory.
Detach one of the wires going to modulator 104 (Fig. 51) and make the boiler operate same checking as maximum pressure.

6.10 ADJUSTING MINIMUM AND MAXIMUM PRESSURE (Fig. 51)

– Remove screw securing cover 105 to gas valve modulator 104.
– Detach one of the two cables connected to the modulator.
– With boiler operating use a 9 mm. spanner to turn brass nut 111 clockwise to increase pressure and anti - clockwise to decrease pressure.

6.11 RECONNECT THE DETACHED CABLE

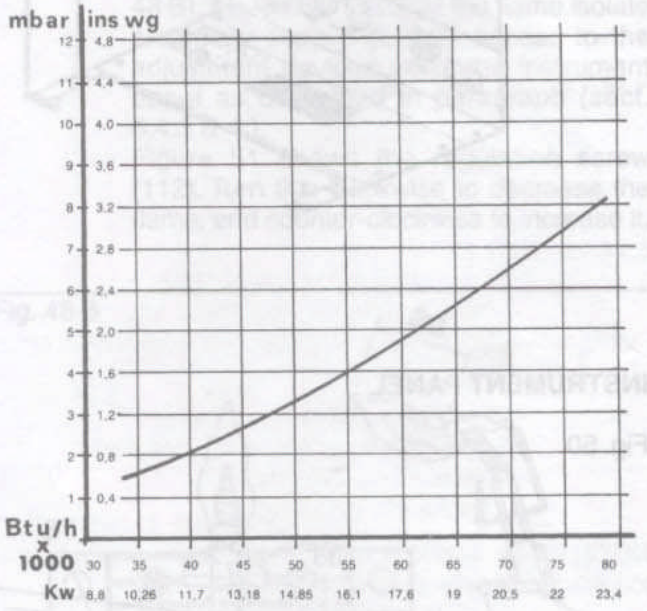
Use a 9 mm. spanner to hold brass nut 111 firm and use a 7 mm. wrench to rotate the red plastic nut 110 clockwise to increase the pressure and counter-clockwise to decrease it. After adjustment turn off D.H.W. taps.

6.12 SETTING CENTRAL HEATING GAS PRESSURE

The boiler is factory set for heating at 54600 Btu (16 kW).
When the boiler operates in the c/h mode the gas pressure at the burner can be set on a value between the min. and max. values (Table 1). This permits capacity to be adjusted to suit system demand. If adjustment is required proceed as follows (Fig. 48).
– Remove the cover of the electric box by removing the fixing screw (Fig. 47).
– Select ≈ / (winter) switch position.
– Turn control thermostat 15 to maximum setting.
– Check all external controls are on and calling for heat ensure all D.H.W. taps are off.
– With boiler operating use a screwdriver to turn potentiometer (Fig. 48) clockwise to increase pressure and anti-clockwise to decrease pressure.
– Replace the protective cover.
– To obtain the desired heat value establish pressure as per (Fig. 52).
– Once this pressure is established, mark it up on data badge with adhesive label/arrow burner pressure setting so that this can be referred to and checked during future servicing.
Replace protective lid of electric box.

RATIO BETWEEN BURNER PRESSURE AND OUTPUT

Fig. 52



6.13 CHECKING THE FLUE SYSTEM

6.13.1 The flue system should be visually checked for soundness. Check all clamps and fixings are secure and tight.

6.14 CHECKING THE HEATING THERMOSTAT

6.14.1 Allow the system to warm up and manipulate the c/h thermostat to ensure the main burner modulates from «high» to «low» and «low» to «off» and vice versa (scale range covers approx. 45 °C - 85 °C).

6.15 CHECKING THE OPERATION OF THE FLAME FAILURE DEVICE

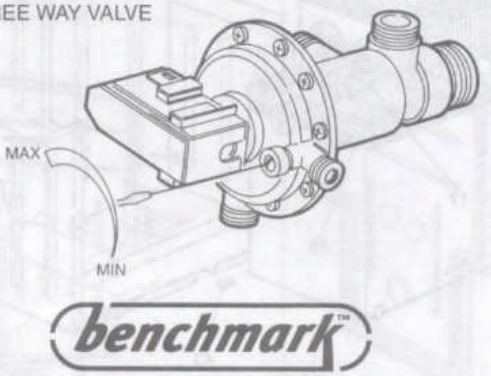
6.15.1 With the burner on high flame turn the gas knob 78 (Fig. 50) in a clockwise direction and confirm that a definite «click» is heard after about 20 seconds.

6.16 TESTING AND REGULATING THE DOMESTIC HOT WATER SYSTEM FLOW

6.16.1 Put the appliance in operation with the (summer/winter) switch in summer position.

- Open a domestic hot water tap (preferably the bath tap). Ensure cold water inlet stopcock is open and the D.H.W. thermostat 16 is set at maximum.
- If the burner does not light check that the water flow rate is above the min. required to operate the differential pressure 2.8 Lts./min. (0.61 gals/min.).
- The temperature of the water will depend on the rate at which it flows. If, due to high water pressure, the flow rate is too high (and thus the temperature too low for practical use) the flow rate may be adjusted. It is better to set for the lowest acceptable temperature since the user can gain higher temperatures by restricting flow at the tap. Table 1.
- To adjust the flow rate refer to (Fig. 53) rear view and locate the adjustment screw (Fig. 1). Turn the screw clockwise until the required temperature is reached.
  N.B.: If the cold supply is subject to large fluctuations or is above the permitted max. water pressure, a suitable pressure/flow regulator should be fitted in the cold water supply to the appliance (sect. 3).
- Turn the appliance mode selector switch (34) to the summer position.
  Slowly close the draw off tap to reduce the flow rate to above the min. (approx. 2.8 litres/min (0.61 gals/min.). Rotate the D.H.W. control thermostat to ensure it operates at its various settings.
- Close the draw-off tap still further. The burner should stop when the rate falls below about 2.8 litres/min (0.61 gals/min.)

Fig. 53



benchmark™

Once the process of commissioning the boiler is complete, the commissioning engineer MUST complete his section in the Benchmark log book.

6.17 HANDING OVER TO THE USER

6.17.1 After completion of installation and commissioning of the system, the installer should hand over to the Householder by the following actions:

- Hand the «User's Instructions» to the Householder and explain His/Her responsibilities under the «Gas Safety (Installation and Use) Regulations 2000».
- Explain and demonstrate the lighting and shutting down procedures.
- The operation of the boiler including the use and adjustment of ALL system controls should be fully explained to the Householder. This then ensures the greatest possible fuel economy consistent with household requirements of both heating and hot water consumptions. Advise the User of the precautions necessary to prevent damage to the system, and to the building, in the event of the system remaining inoperative during frost conditions.
- Explain the function and the use of the boiler only/ (Summer/Winter) and ON/OFF switches.
  After electrical failure it may be necessary to relight the pilot. Also ensure neon light is lit at all times.
- Explain and demonstrate the function of time and temperature controls, radiator valves etc. for the economic use of the system.
- If an optional time clock is fitted, then draw attention to the time clock User's Instructions and hand them to the Householder.
- Stress importance of regular servicing by a qualified Heating Engineer and that a comprehensive service should be carried out AT LEAST ONCE A YEAR.

Fill in the Benchmark log book and leave completed with the customer.

SECTION 7 SERVICING INSTRUCTIONS

benchmark™

The code of practice for the installation, commissioning & servicing of central heating systems

Ravenheat are a member of the Benchmark initiative and fully supports the aims of the programme. Benchmark has been instructed to improve the standards of installation and commissioning of central heating systems in the UK and to encourage the regular servicing of all central heating systems to ensure safety and efficiency.

7.1 SERVICING

7.1.1 To ensure continued efficient operation of the appliance it is necessary to carry out servicing and cleaning at regular intervals. The frequency of cleaning will depend upon the particular installation conditions and usage but in general, once a year should be adequate.

WARNING
Before the start of any servicing or replacement of components always isolate the electricity supply to the appliance and always turn off the appliance gas supply at the gas service cock. Data badge position – lower left hand sub frame.

- The following notes apply to the appliance and its controls (Fig. 54) but it should be remembered that attention must also be paid to the heating and hot water circuits with special attention to radiator valves, thermostats, clocks, leaking hot water taps etc.
- Where it is necessary to replace a gasket that relies on adhesive for securing - this adhesive will be supplied with the gasket as a spare item.
- In all cases prior to servicing, remove the outer case (sect. 5.4). Operate the appliance by turning the hot water services on to a high water flow, and observe the main burner.
- Check that the flame covers all the flame ports and is of a light blue colour. Yellow flames and excessive lifting of flames indicate poor combustion.
- **IMPORTANT:** After completing any servicing or replacement of gas carrying components it is essential that a test for gas soundness is always carried out along with functional checks in operation.

7.2 TO INSPECT AND CLEAN THE APPLIANCE

7.2.1 Before carrying out cleaning operation, cover the electrical control panel with a piece of waterproof material to protect it from debris.

7.2.2 Inspect the heat exchanger for any blockage. Deposits of any material should be brushed always using a soft brush.

NOTE: Do not use brushes with metallic bristles.

7.2.3 Examine internal pipe-work connections and automatic air vent for any water leaks. Rectify if necessary.

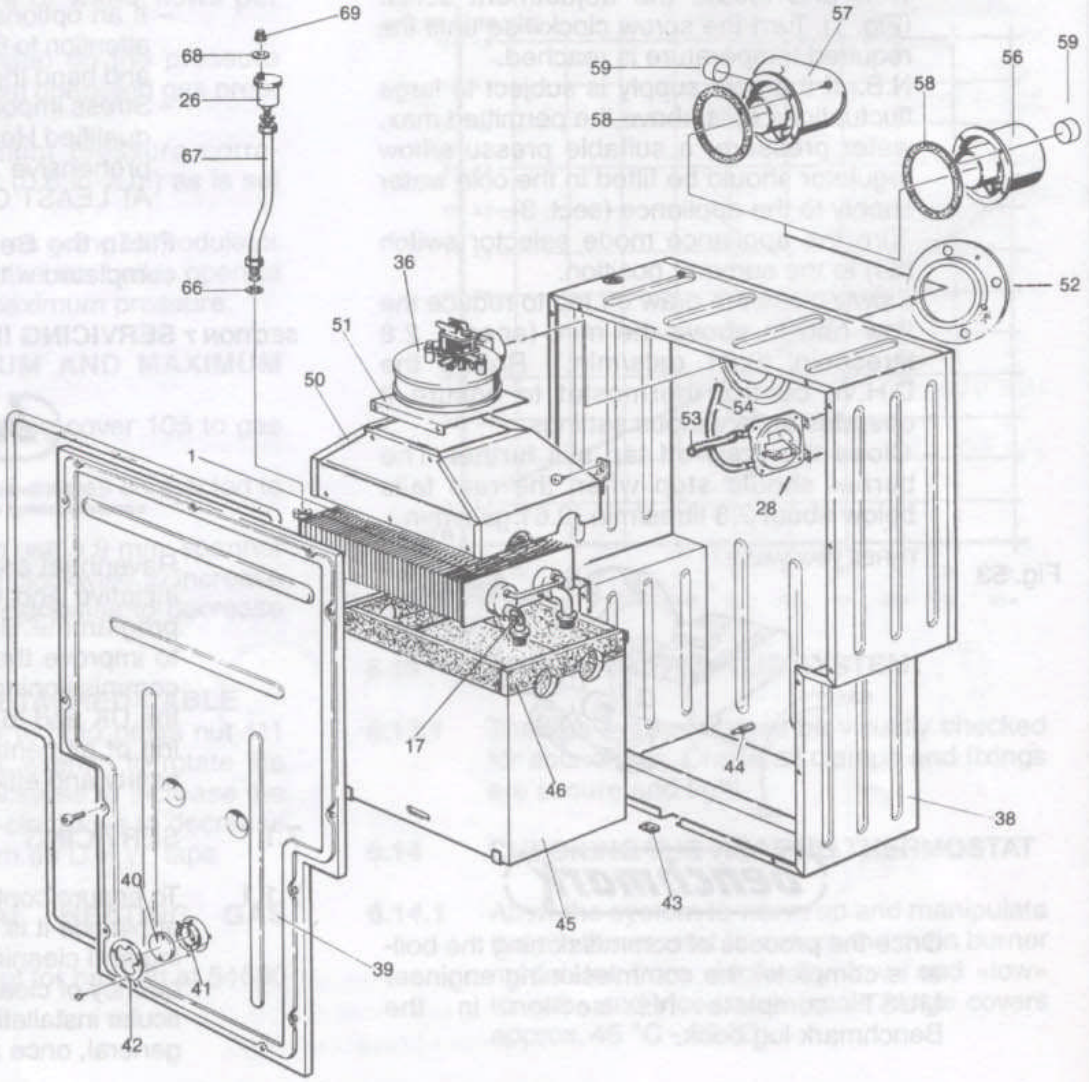
7.2.4 Examine the combustion chamber insulating material and renew if damaged (sect. 7.9).

7.2.5 Remove and examine the main burner injector and pilot injector clean or renew, as necessary (sec. 7.12 & 7.14).

7.2.6 Inspect the main burner and remove any deposit with a soft brush. Check the electrodes for damage or deterioration, clean or renew as necessary. Ensure that the spark gaps are correct to dimensions specified in (sect. 7.15).

EXPLODED DIAGRAM OF BOILER BODY

Fig. 54



KEY

1 - Heat exchanger
17 - Safety thermostat
26 - Auto air vent valve
28 - Pressure switch
36 - Fan
38 - Plenum chamber
39 - Plenum chamber cover
40 - Window
41 - Window seal
42 - Window clamp ring
43 - Thermocouple seal
44 - Burner centering pin
45 - Combustion chamber
46 - Ceramic insulation
50 - Flue gas exhaust hood
51 - Fan fastening bracket
52 - Air restriction ring
53 - Connection tube -
54 - Connection tube +
56 - Straight header
57 - Elbow header
58 - Header gasket
59 - Rubber seal Ø 60
66 - Seal
67- Connection pipe
68 - Seal
69 - Plug

7.2.7 Examine the fan for any mechanical damage, check to ensure free running of the fan wheel. Clean the wheel if necessary with a soft brush. Check sealing gasket and renew if damaged (sect. 7.6).

7.2.8 Examine flue duct and flue hood and ensure that there is no obstruction. Examine the gasket at the entry into the flue duct.

7.2.9 It is essential that a good seal is made at the outlet to the fan, renew this gasket if there is any sign of damage or deterioration, using the adhesive supplied.

7.3 TO REMOVE/REPLACE THE FRONT PANEL OF THE CASING (Fig. 19 & 20)

7.3.1 Remove the 2 screws that secure the upper part of the front panel of the casing.
Lift the front panel a few millimeters towards the top, until it is free from the slot and remove the panel.

7.4 TO REMOVE/REPLACE THE COMBUSTION CHAMBER COVER (Fig. 56)

7.4.1 Remove the front casing panel (sect. 7.3).

7.4.2 Unscrew all the screws that fasten the cover to the chamber body and put them into a container so that they don't get lost.

7.4.3 Detach the cover, being careful not to damage the seal.

Fig. 56

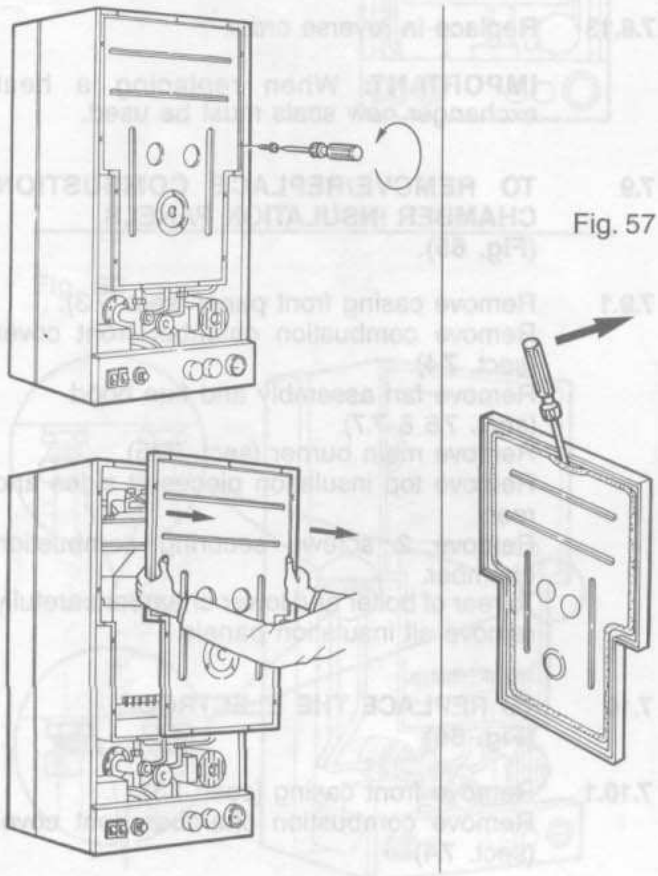


Fig. 57

7.4.4 Reassemble in reverse order.
Ensure good seal of cover when replacing.

7.5 REPLACE THE SEAL OF THE COMBUSTION CHAMBER COVER (Fig. 57)

7.5.1 Remove front casing (sect. 7.3).
Remove the combustion chamber cover as in (sect. 7.4).

7.5.2 The seal is fastened to the cover by silicone. The old seal can be easily removed by prying it out with a screwdriver.

7.5.3 Continue to use a screwdriver to remove any residual silicone remaining attached to the cover.

7.5.4 Now put in new silicone supplied and glue in the new seal.

7.5.5 Reassemble in reverse order.

7.6 TO REMOVE/REPLACE THE FAN ASSEMBLY (Fig. 58)

7.6.1 Remove front casing (sect. 7.3).
Remove combustion chamber front cover as in (sect. 7.4).

7.6.2 Disconnect the electrical connections from the fan motor and the earth connection from the motor bearing housing.

7.6.4 Support the fan and remove the two fixing screws and bracket from the front of the flue hood.
Carefully withdraw it from the appliance. Place in a safe place urltil required. Reassemble in reverse order.

Fig. 58

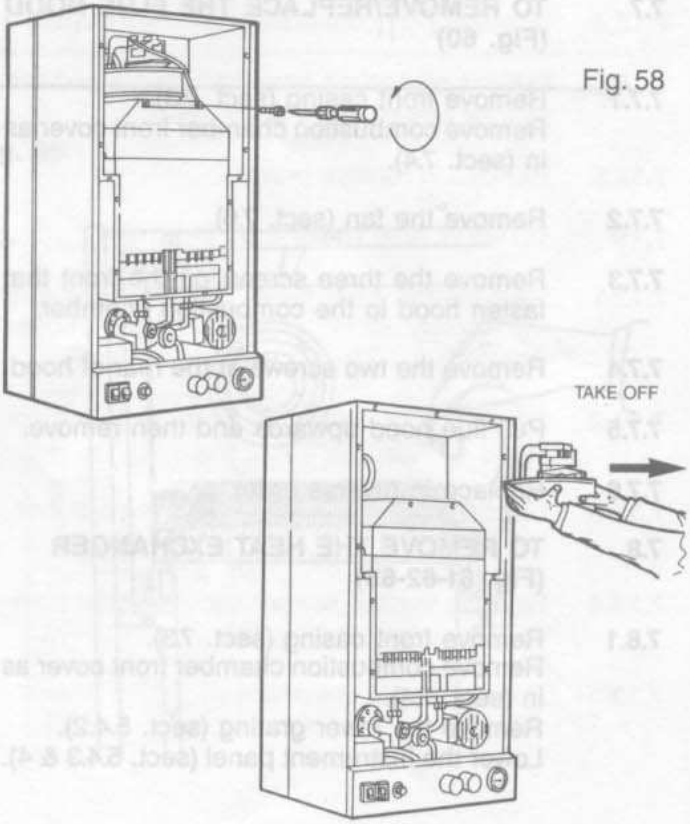
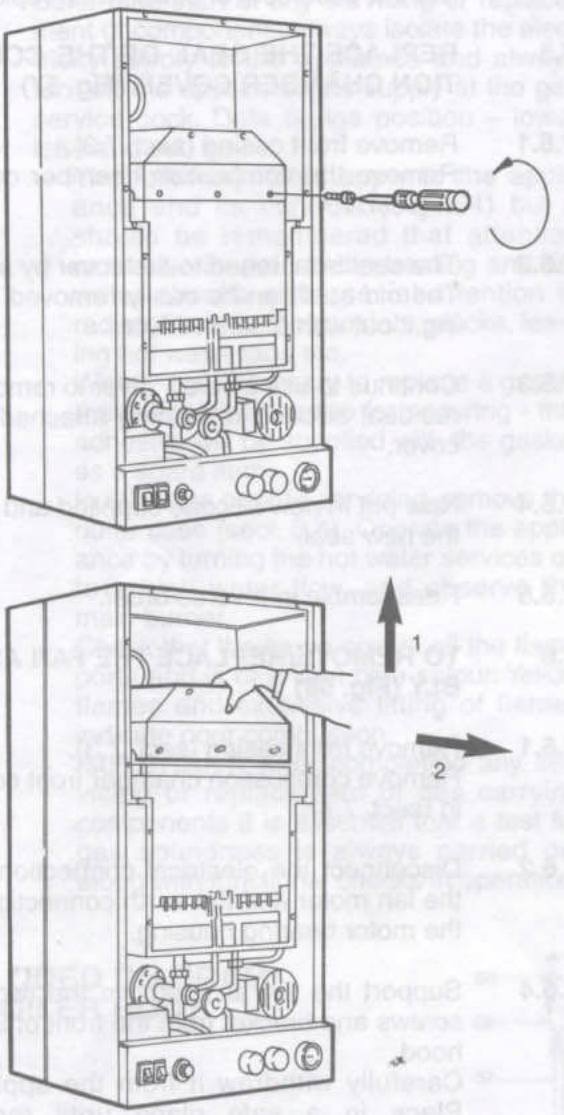


Fig. 60



7.7 TO REMOVE/REPLACE THE FLUE HOOD (Fig. 60)

7.7.1 Remove front casing (sect. 7.3).
Remove combustion chamber front cover as in (sect. 7.4).

7.7.2 Remove the fan (sect. 7.6)

7.7.3 Remove the three screws on the front that fasten hood to the combustion chamber.

7.7.4 Remove the two screws at the rear of hood.

7.7.5 Pull flue hood upwards and then remove.

7.7.6 Replace in reverse order.

7.8 TO REMOVE THE HEAT EXCHANGER (Fig. 61-62-63)

7.8.1 Remove front casing (sect. 7.3).
Remove combustion chamber front cover as in (sect. 7.4).
Remove the lower grating (sect. 5.4.2).
Lower the instrument panel (sect. 5.4.3 & 4).

7.8.2 Remove the two sides of the casing by slightly lifting them and sliding them towards the top of the appliance, to release them from their upper suspension hooks.

7.8.3 Close the on/off valves for the heating and the hot water circuits. Drain the heating system from the drain valve mounted on the system (Fig. 93) and drain the hot water from the lowest tap on its pipeline system and drain point on D.H.W. inlet cock (Fig. 46).

7.8.4 Remove the fan (sect. 7.6).

7.8.5 Remove the flue hood (sect. 7.7).

7.8.6 Detach the electrical connections for the high limit thermostat and remove the two screws.

7.8.7 Remove the over heat cut-off thermostat by removing the two screws.

7.8.8 Remove the automatic relief valve (sect. 7.29).

7.8.9 Disconnect unions for the hot water and heating water pipelines (Fig. 62).

7.8.10 Unscrew the rings that fasten the heat exchanger to the combustion chamber.

7.8.11 Remove the two side and rear insulation panels at top of heat exchanger (Fig. 63).

7.8.12 Pull the heat exchanger up until its connections come out from the combustion chamber and then remove it (Fig. 64).

7.8.13 Replace in reverse order.

IMPORTANT: When replacing a heat exchanger new seals must be used.

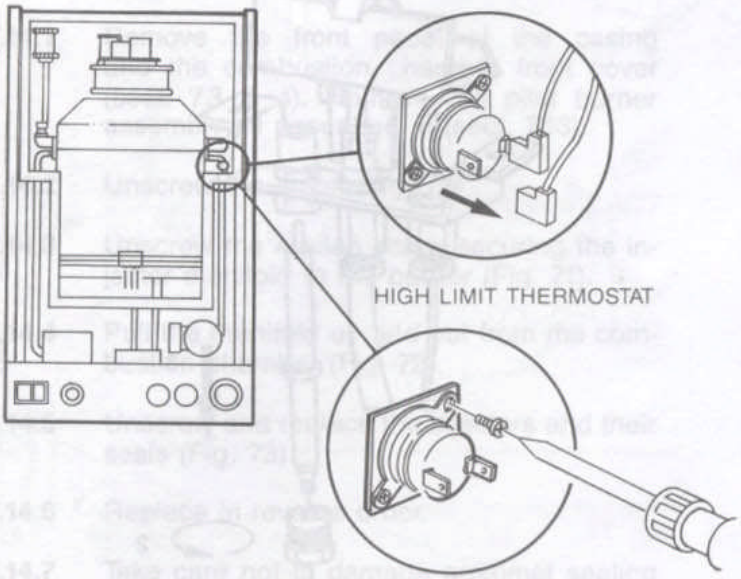
7.9 TO REMOVE/REPLACE COMBUSTION CHAMBER INSULATION PANELS (Fig. 65).

7.9.1 Remove casing front panel (sect. 7.3).
Remove combustion chamber front cover (sect. 7.4).
Remove fan assembly and flue hood (sect. 7.6 & 7.7).
Remove main burner (sect. 7.15).
Remove top insulation pieces at sides and rear.
Remove 2 screws securing combustion chamber.
To rear of boiler and lower chamber carefully remove all insulation panels.

7.10 TO REPLACE THE ELECTRODE (Fig. 66)

7.10.1 Remove front casing (sect. 7.3).
Remove combustion chamber front cover (sect. 7.4).

Fig. 61



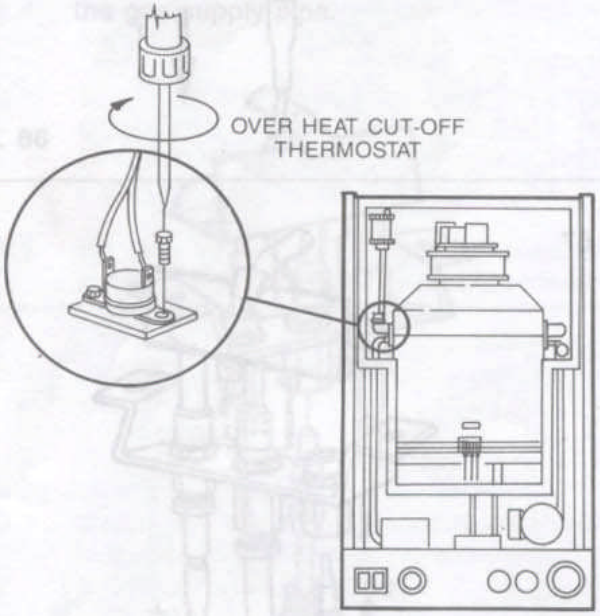


Fig. 62

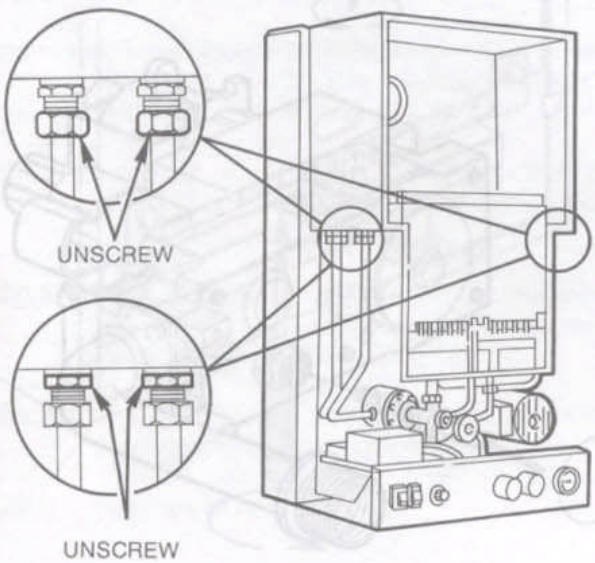


Fig. 63

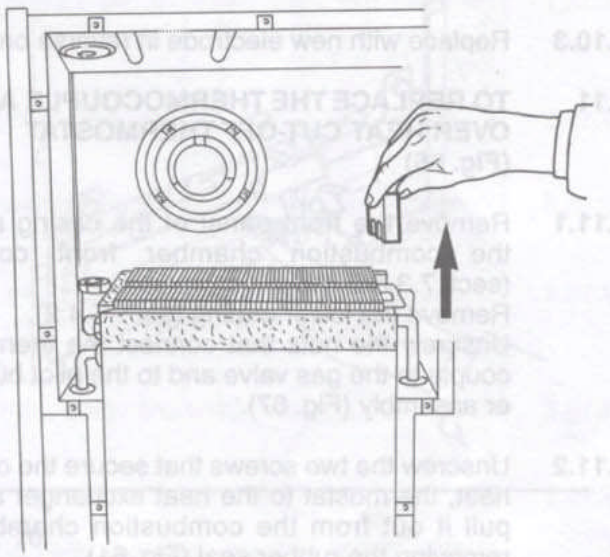


Fig. 64

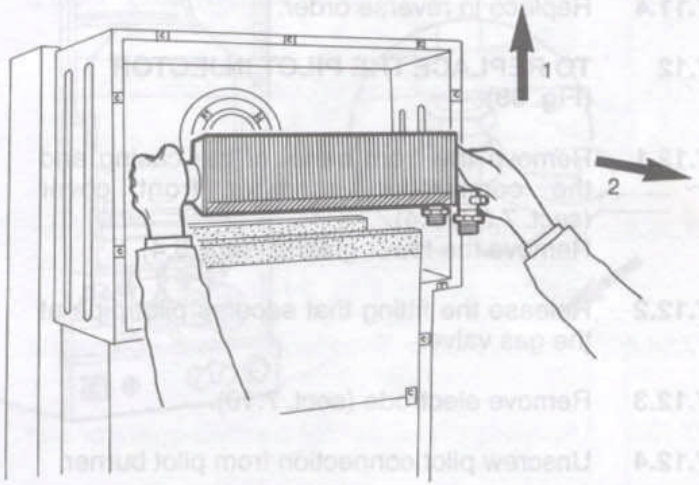
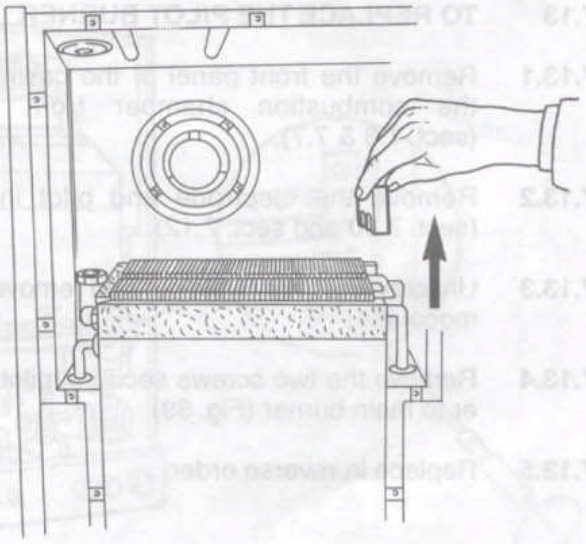


Fig. 65



7.10.2 Detach the wire from electrode and then unscrew the nut that secures it to the pilot burner assembly and remove.

7.10.3 Replace with new electrode in reverse order.

7.11 TO REPLACE THE THERMOCOUPLE AND OVER HEAT CUT-OFF THERMOSTAT (Fig. 66)

7.11.1 Remove the front panel of the casing and the combustion chamber front cover (sect. 7.3 & 7.4).
Remove the lower grating (sect. 5.4.2).
Unscrew the nuts that connect the thermocouple to the gas valve and to the pilot burner assembly (Fig. 67).

7.11.2 Unscrew the two screws that secure the over heat, thermostat to the heat exchanger and pull it out from the combustion chamber, removing the rubber seal (Fig. 61).

7.11.3 Pull the thermocouple downwards through rubber seal and remove it.

7.11.4 Replace in reverse order.

7.12 TO REPLACE THE PILOT INJECTOR (Fig. 68)

7.12.1 Remove the front panel of the casing and the combustion chamber front cover (sect. 7.3 & 7.4).
Remove the lower grating (sect. 5.4).

7.12.2 Release the fitting that secures pilot pipe at the gas valve.

7.12.3 Remove electrode (sect. 7.10).

7.12.4 Unscrew pilot connection from pilot burner.

7.12.5 Pull the aluminium tube downwards and the injector should come out by itself.

7.12.6 Replace in reverse order.

7.13 TO REPLACE THE PILOT BURNER

7.13.1 Remove the front panel of the casing and the combustion chamber front cover (sect. 7.3 & 7.7).

7.13.2 Remove the electrode and pilot injector (sect. 7.10 and sect. 7.12).

7.13.3 Unscrew thermocouple nut and remove thermocouple.

7.13.4 Remove the two screws securing pilot burner to main burner (Fig. 69).

7.13.5 Replace in reverse order.

Fig. 66

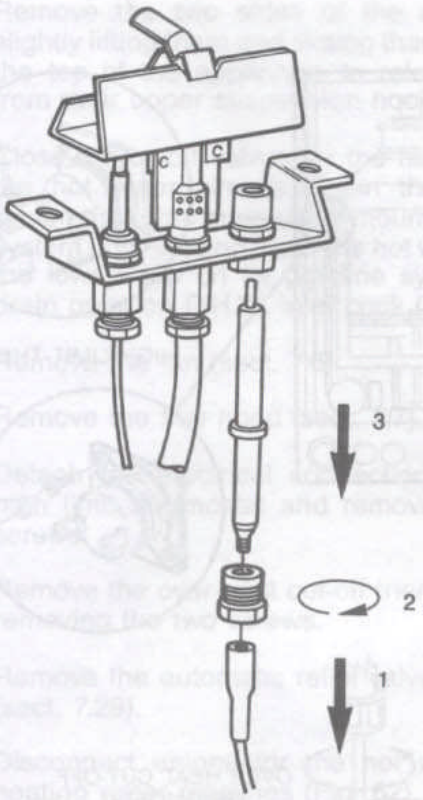
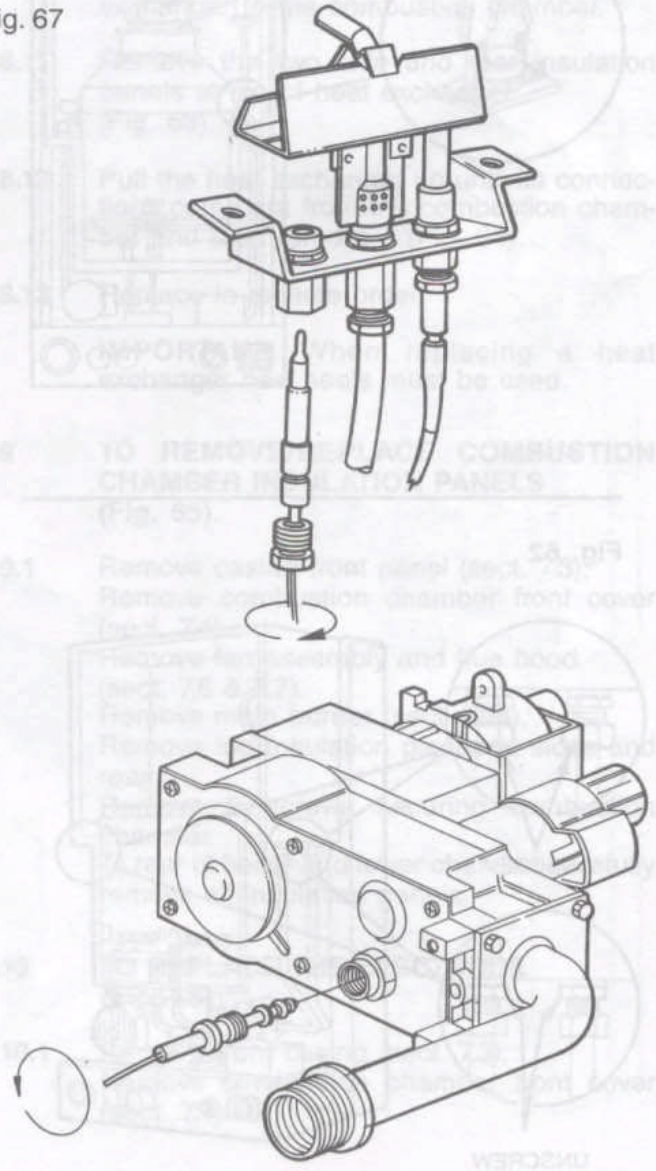


Fig. 67



7.14 TO REMOVE/REPLACE THE MAIN INJECTORS.

7.14.1 Remove the front panel of the casing and the combustion chamber front cover (sect. 7.3 & 4). Remove the pilot burner assembly as described in (sect. 7.13).

7.14.2 Unscrew the union (Fig. 70)

7.14.3 Unscrew the 4 allen screw securing the injector manifold to the burner (Fig. 71).

7.14.4 Pull the manifold up and out from the combustion chamber (Fig. 72).

7.14.5 Unscrew and replace the injectors and their seals (Fig. 73).

7.14.6 Replace in reverse order.

7.14.7 Take care not to damage grommet sealing the gas supply pipe.

Fig. 68

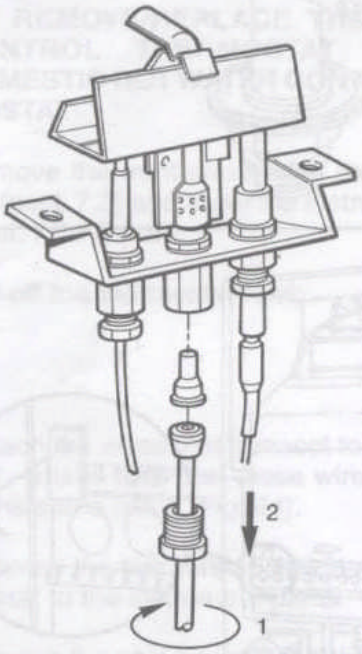


Fig. 69

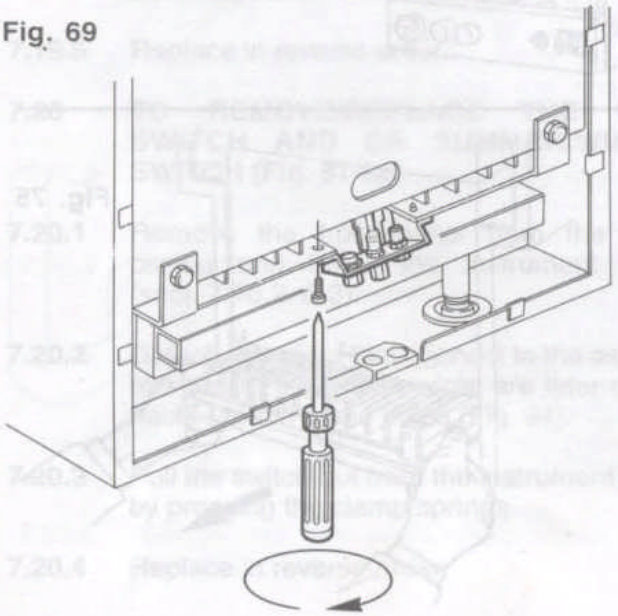


Fig. 69

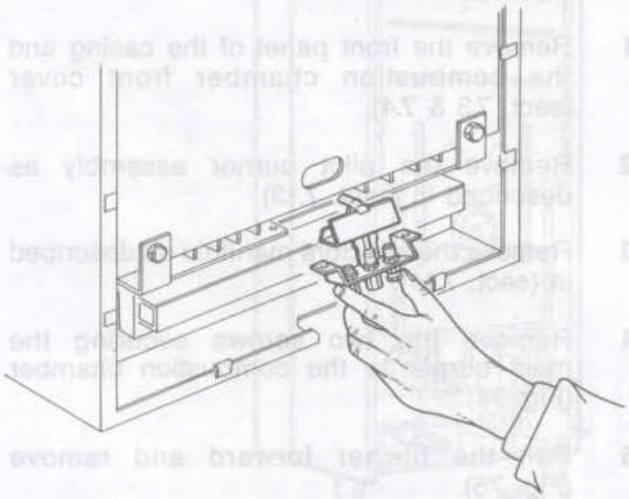


Fig. 70

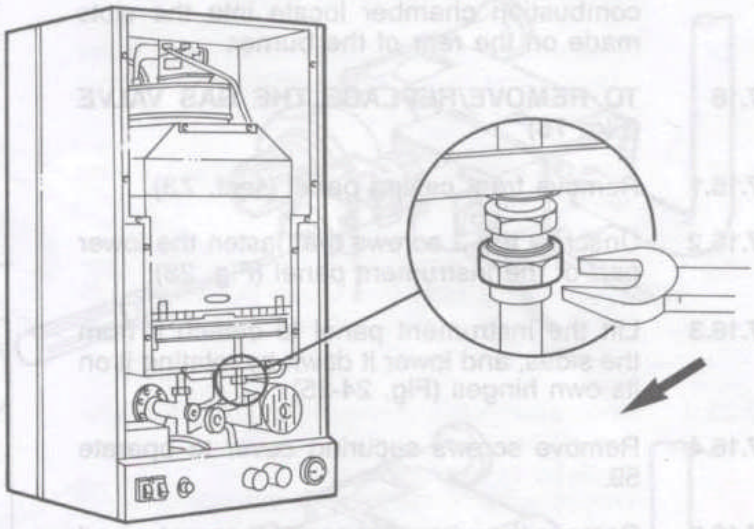
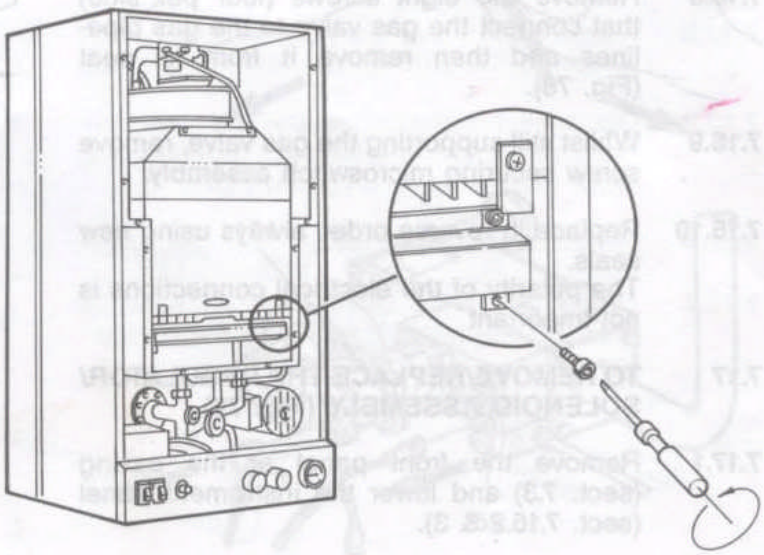


Fig. 71



7.15 TO REMOVE/REPLACE THE MAIN BURNER

7.15.1 Remove the front panel of the casing and the combustion chamber front cover (sect. 7.3 & 7.4).

7.15.2 Remove the pilot burner assembly as described in (sect. 7.13).

7.15.3 Remove the injectors manifold as described in (sect. 7.14).

7.15.4 Remove the two screws securing the main burner to the combustion chamber (Fig. 74).

7.15.5 Pull the burner forward and remove (Fig. 75).

7.15.6 Replace in reverse order.

IMPORTANT: When refitting the burner make sure that the pins at the rear of the combustion chamber locate into the slots made on the rear of the burner.

7.16 TO REMOVE/REPLACE THE GAS VALVE (Fig. 76)

7.16.1 Remove front casing panel (sect. 7.3).

7.16.2 Unscrew the 2 screws that fasten the lower part of the instrument panel (Fig. 23).

7.16.3 Lift the instrument panel to detach it from the sides, and lower it down by rotating it on its own hinges (Fig. 24-25).

7.16.4 Remove screws securing cover to operate 59.

7.16.5 Remove the wires that connect operator and to solendid 104 (Fig. 76).

7.16.6 Remove the lower grating (sect. 5.4.2).

7.16.7 Unscrew the thermocouple and the pilot burner tube connection (Fig. 67-77)

7.16.8 Remove the eight screws (four per side) that connect the gas valve to the gas pipelines and then remove it from its seat (Fig. 78).

7.16.9 Whilst still supporting the gas valve, remove screw securing microswitch assembly.

7.16.10 Replace in reverse order, always using new seals.
The polarity of the electrical connections is not important

7.17 TO REMOVE/REPLACE THE REGULATOR/ SOLENOID ASSEMBLY (Fig. 79)

7.17.1 Remove the front panel of the casing (sect. 7.3) and lower the instrument panel (sect. 7.16.2 & 3).

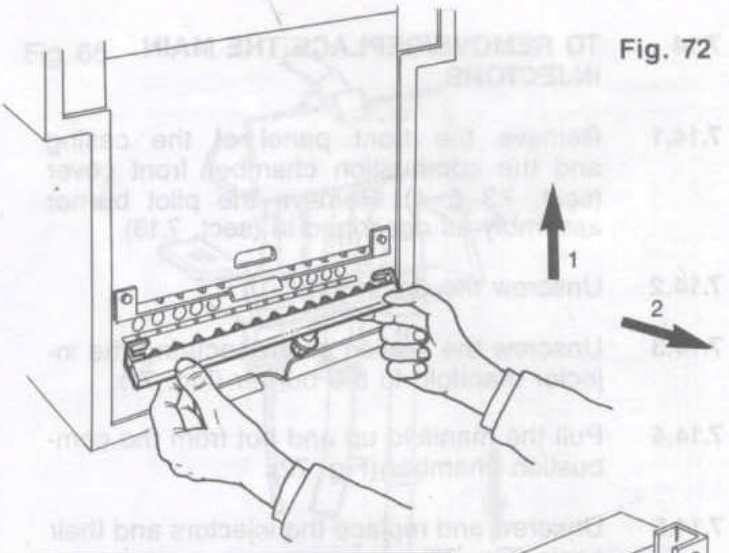
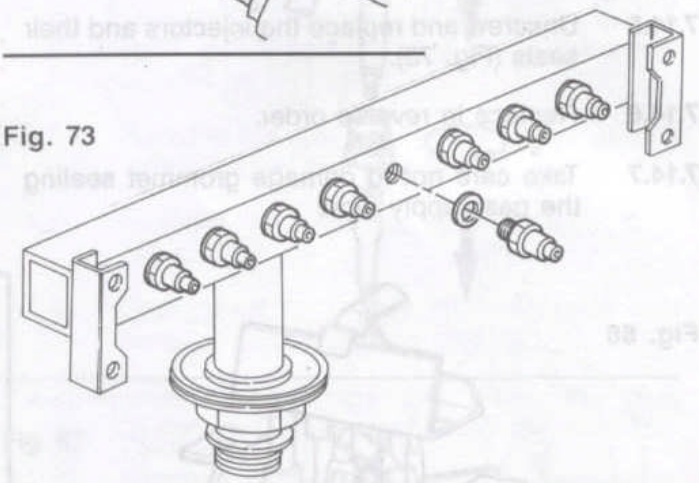
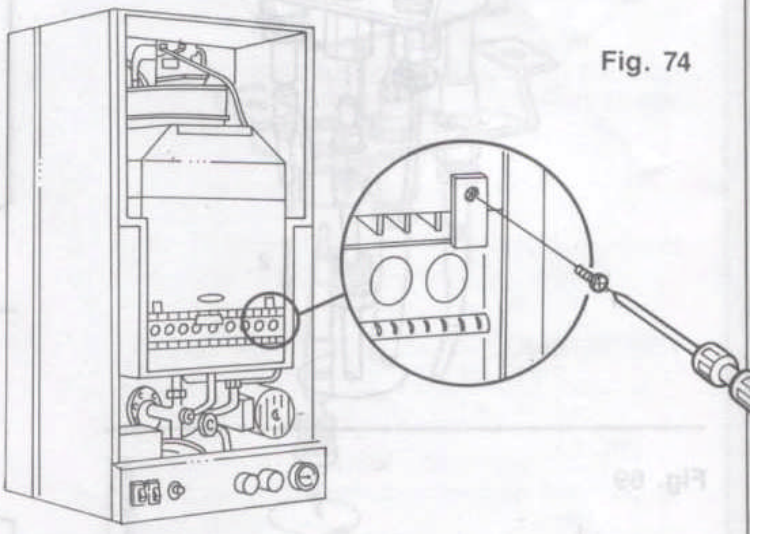
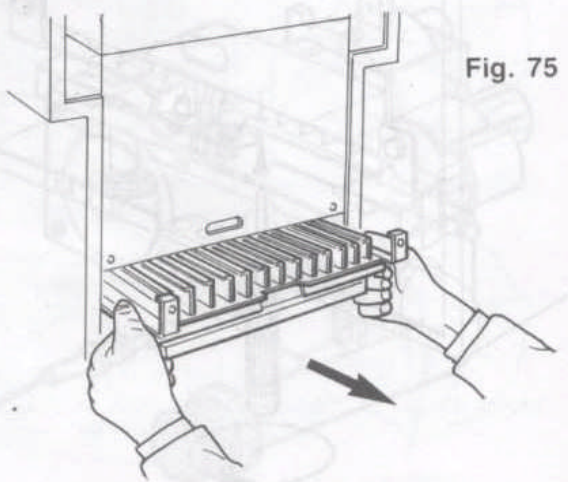


Fig. 72


Fig. 73


Fig. 74


Fig. 75

7.17.2 Remove the wires that connect to the solenoid.

7.17.3 Remove the two screws that secure the assembly to the gas valve.

7.17.4 Replace in reverse order.

7.18 TO REMOVE/REPLACE THE HIGH LIMIT THERMOSTAT

7.18.1 Remove the front panel from the outer casing and the combustion chamber front cover (sect. 7.3 & 4).

7.18.2 Remove the wires that connect to the thermostat (Fig. 61).

7.18.3 Remove the two screws that secure the thermostat. Replace in reverse order.

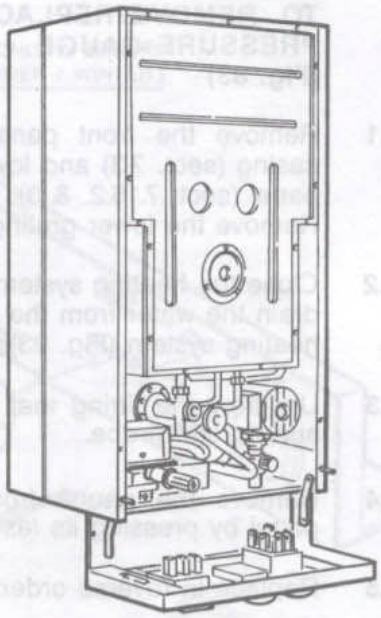
7.18.4 The polarity of the electrical connections is not important.

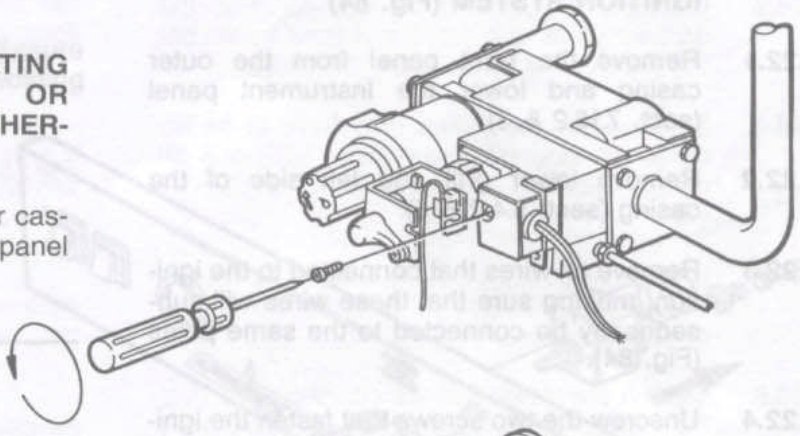
7.19 TO REMOVE/REPLACE THE HEATING CONTROL THERMOSTAT AND OR DOMESTIC HOT WATER CONTROL THERMOSTAT

7.19.1 Remove the front panel from the outer casing (sect. 7.3) and lower the instrument panel (sect. 7.16.2 & 3).

7.19.2 Pull off the thermostat knob.

Fig. 76





7.19.3 Detach the wires that connect to the thermostat – make sure that these wires reconnect to the same poles (Fig. 94).

7.19.4 Unscrew the two screws that fasten the thermostat to the instrument panel.

7.19.5 Remove the split pin and pull the thermostat from its pocket.

7.19.6 Replace in reverse order.

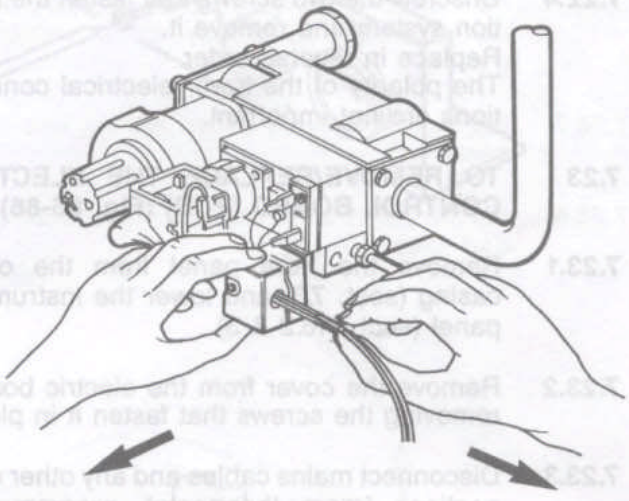
7.20 TO REMOVE/REPLACE THE MAIN SWITCH AND OR SUMMER/WINTER SWITCH (Fig. 81-82)

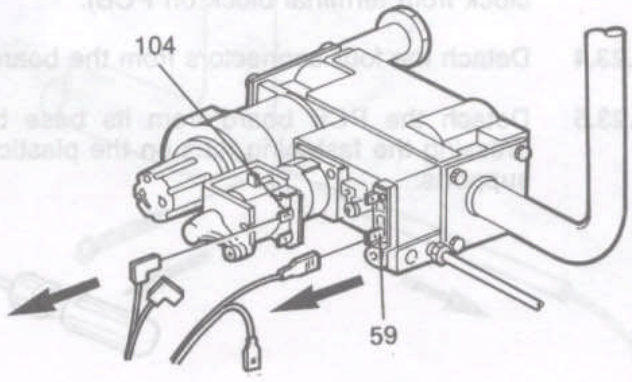
7.20.1 Remove the front panel from the outer casing and lower the instrument panel (sect. 7.16.2. & 3).

7.20.2 Detach the wires that connect to the switch – make sure that these wires are later reconnected to the same poles (Fig. 94).

7.20.3 Pull the switch out from the instrument panel by pressing the clamp springs.

7.20.4 Replace in reverse order.





7.21 TO REMOVE/REPLACE THE WATER PRESSURE GAUGE (Fig. 83)

7.21.1 Remove the front panel from the outer casing (sect. 7.3) and lower the instrument panel (sect. 7.16.2. & 3).
Remove the lower grating (sect. 5.4.2).

7.21.2 Close the heating system on/off valves and drain the water from the drain valve on the heating system (Fig. 93).

7.21.3 Unscrew the fitting that secures the pressure gauge probe.

7.21.4 Remove the gauge from the instrument panel by pressing its fastening springs.

7.21.5 Replace in reverse order.

7.22 TO REMOVE/REPLACE THE ELECTRIC IGNITION SYSTEM (Fig. 84)

7.22.1 Remove the front panel from the outer casing and lower the instrument panel (sect. 7.16.2 & 3).

7.22.2 Remove lower grill and left side of the casing (sect. 5.4.2 & 5).

7.22.3 Remove all wires that connected to the ignition, making sure that these wires will subsequently be connected to the same poles (Fig. 84).

7.22.4 Unscrew the two screws that fasten the ignition system and remove it.
Replace in reverse order.
The polarity of the lower electrical connections are not important.

7.23 TO REMOVE/REPLACE THE ELECTRIC CONTROL BOARD (PCB) (Fig. 85-86)

7.23.1 Remove the front panel from the outer casing (sect. 7.3) and lower the instrument panel (sect 7.16.2 & 3).

7.23.2 Remove the cover from the electric box by removing the screws that fasten it in place.

7.23.3 Disconnect mains cables and any other connections (room thermostat, programming clock from terminal block on PCB).

7.23.4 Detach the four connectors from the board.

7.23.5 Detach the PCB board from its base by pressing the fastening tabs on the plastic supports.

Fig. 77

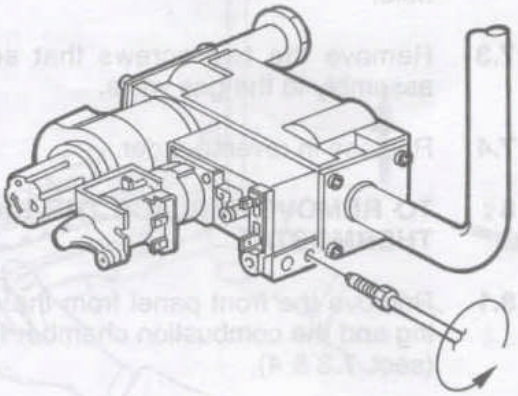


Fig. 78

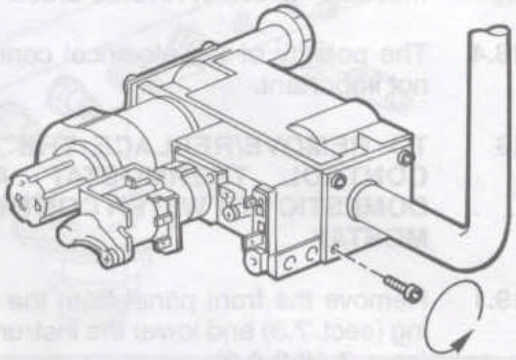
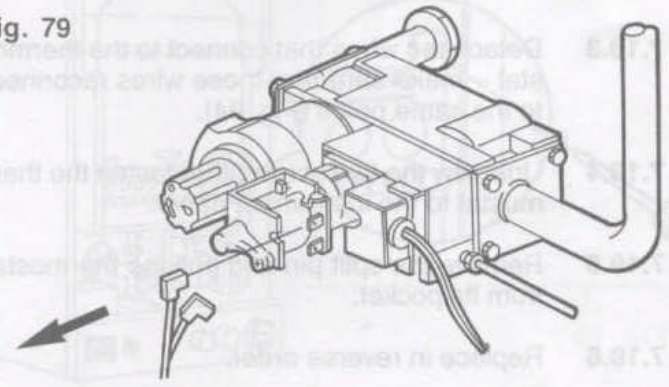
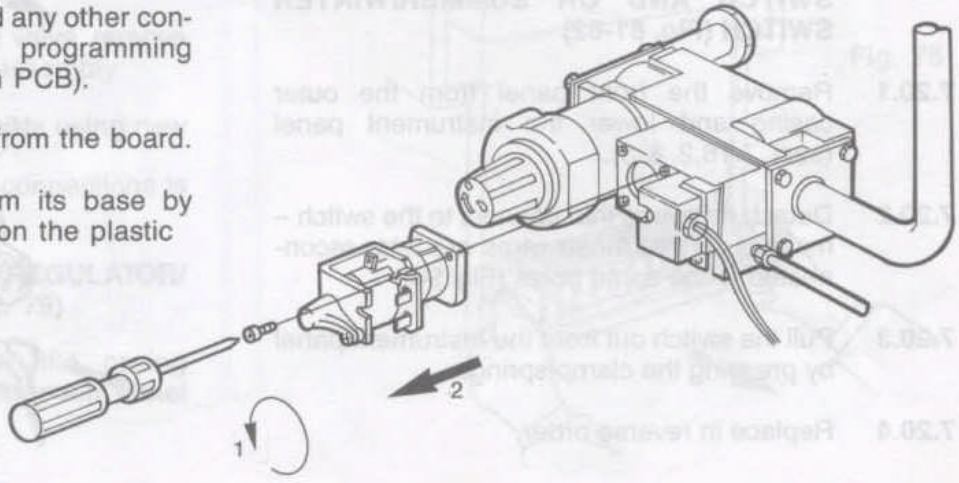


Fig. 79





7.23.6 Replace in reverse order (ensure all electrical connections are made correctly).

7.23.7 Having replaced PCB recomission boiler on heating mode (sect. 6.16).

7.24 TO REMOVE/REPLACE THE DIFFERENTIAL PRESSURE SWITCH (Fig. 87)

7.24.1 Remove front casing (sect. 7.3).

7.24.2 Remove the combustion chamber cover as in (sect. 7.4).

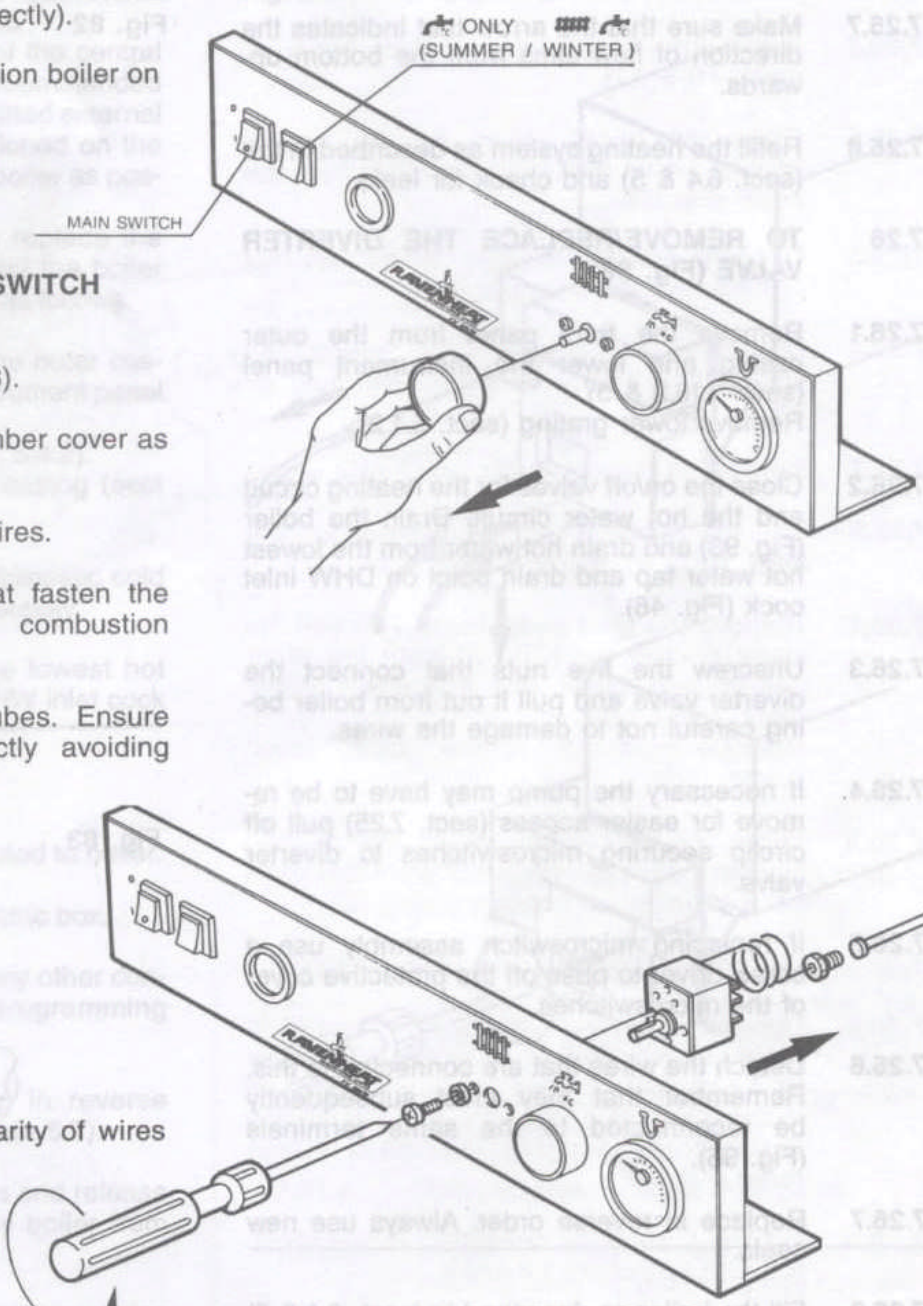
7.24.3 Remove the two connection wires.

7.24.4 Unscrew the two screws that fasten the pressure switch to the combustion chamber.

7.24.5 Remove the two silicone tubes. Ensure tubes are connected correctly avoiding kinks.

7.24.6 Replace in reverse order. Polarity of wires are not important.

Fig. 81



7.25 TO REMOVE/REPLACE THE PUMP (Fig. 88)

7.25.1 Remove the front panel from the outer casing (sect. 7.3) and lower the instrument panel (sect. 7.16.2 & 3).

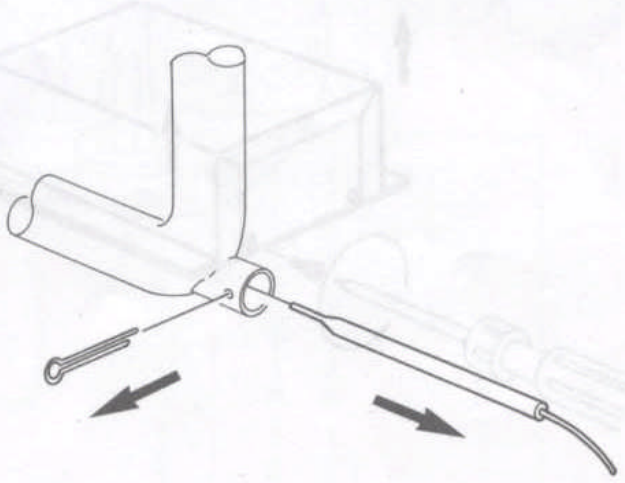
7.25.2 Remove lower grill right side of the casing (sect. 5.4.2 & 5).

7.25.3 Close the on/off valves on the heating circuit and drain water from the boiler (Fig. 93).

7.25.4 Remove the terminal covers and detach the supply wires.

7.25.5 Unscrew the two hexagonal nuts that fasten the pump to its pipes and remove the pump.

7.25.6 Always use new seals when re-fittings the new pump.



IMPORTANT:

7.25.7 Make sure that the arrow that indicates the direction of flow aims from the bottom upwards.

7.25.8 Refill the heating system as described in the (sect. 6.4 & 5) and check for leaks.

7.26 TO REMOVE/REPLACE THE DIVERTER VALVE (Fig. 89)

7.26.1 Remove the front panel from the outer casing and lower the instrument panel (sect. 7.16.2 & 3).
Remove lower grating (sect. 5.4.2)

7.26.2 Close the on/off valves for the heating circuit and the hot water circuit. Drain the boiler (Fig. 93) and drain hot water from the lowest hot water tap and drain point on DHW inlet cock (Fig. 46).

7.26.3 Unscrew the five nuts that connect the diverter valve and pull it out from boiler being careful not to damage the wires.

7.26.4 If necessary the pump may have to be remove for easier access (sect. 7.25) pull off circlip securing microswitches to diverter valve.

7.26.5 If replacing microswitch assembly use a screw driver to prise off the protective cover of the microswitches.

7.26.6 Detach the wires that are connected to this. Remember that they must subsequently be reconnected to the same terminals (Fig. 95).

7.26.7 Replace in reverse order. Always use new seals.

7.26.8 Fill the boiler as described in (sect. 6.4 & 5) and check for leaks.

Fig. 82

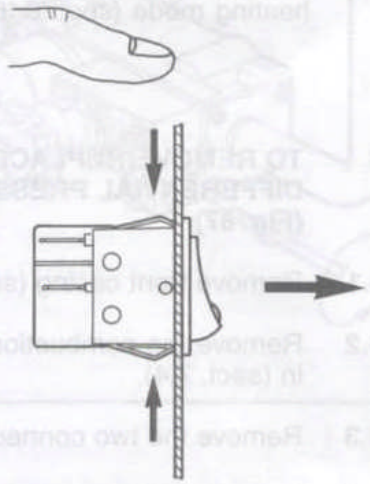
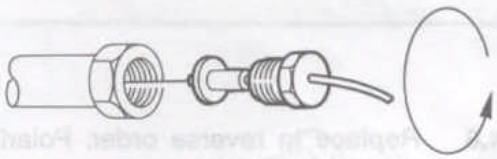
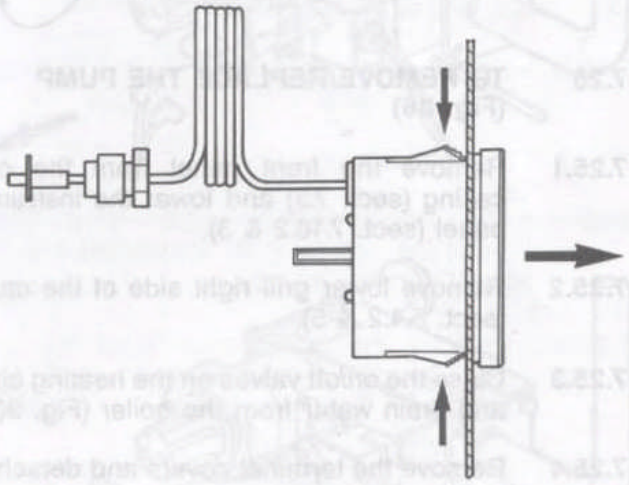


Fig. 83





7.28 TO REMOVE/REPLACE THE CENTRAL HEATING EXPANSION VESSEL

In the unlikely event of failure of the central heating expansion vessel it is recommended a suitable expansion vessel be fitted external to the boiler. It should be positioned on the return pipe and as close to the boiler as possible (Fig. 7).
However, if it is necessary to replace the central heating expansion vessel the boiler must be removed from the wall as follows.

7.28.1 Remove the front panel from the outer casing (sect. 7.3) and lower the instrument panel (sect. 7.15.2. & 3).
Remove the lower grating (sect. 5.4.2).
Remove the two sides of the casing (sect 5.4.5).

7.28.2 Close the on/off valve on the domestic cold water, central heating and gas supply.

7.28.3 Drain domestic water from the lowest hot water tap and drain point on DHW inlet cock (Fig. 46).

7.28.4 Drain the boiler (Fig. 93).

7.28.5 Disconnect all pipework connected to boiler.

7.28.6 Remove the cover from the electric box.

7.28.7 Disconnect mains cables and any other connections (room thermostat, programming clock).

7.28.8 Remove the duct proceeding in reverse order as described in (sect. 5.5. or 5.7).

7.28.9 Remove the 2 lower coach bolts and release 2 top coach bolts then remove boiler from the wall.

7.28.10 Unscrew the nut that connects the expansion vessel and remove it (Fig. 91).

7.28.11 Remove the bracket supporting expansion vessel (Fig. 91).

7.28.12 Remove the expansion vessel.

7.28.13 Replace all the components in reverse order using new seals.

7.28.14 Fill the system as described in the (sect. 6) and check for leaks.

7.29 TO REMOVE/REPLACE THE AUTOMATIC AIR VENT (Fig. 92)

7.29.1 Remove ttle front panel from the outer casing and the combustion chamber front cover (sect 7.3 & 7.4).

Fig. 84

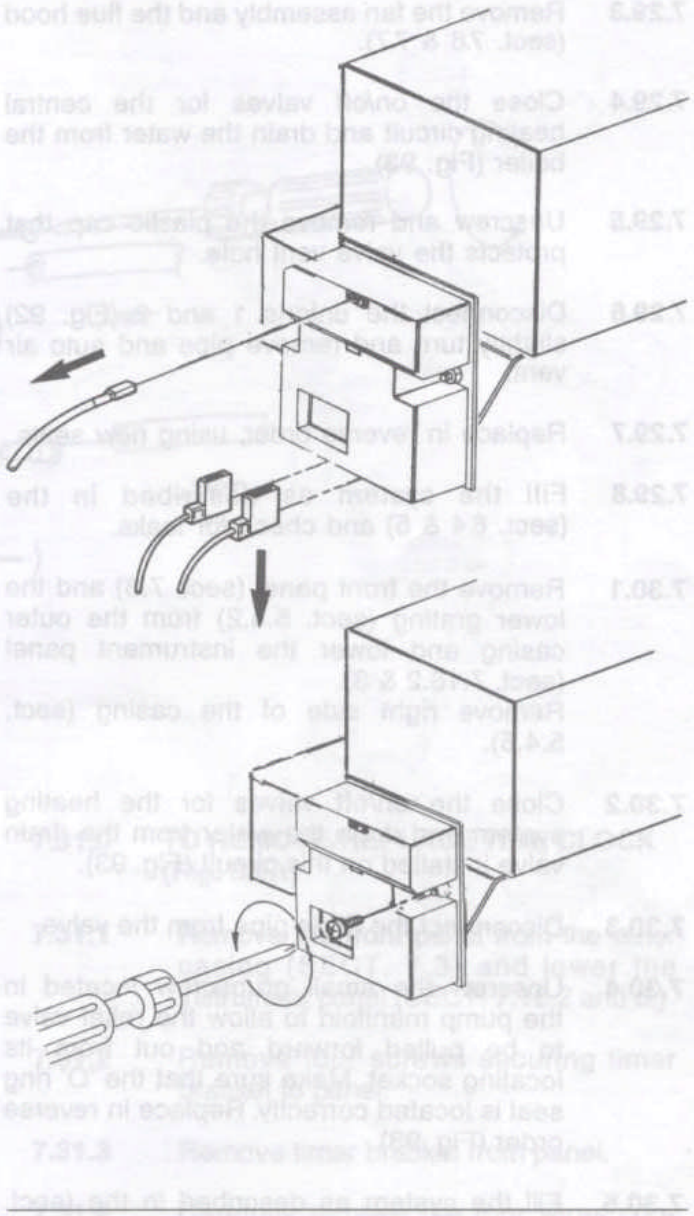
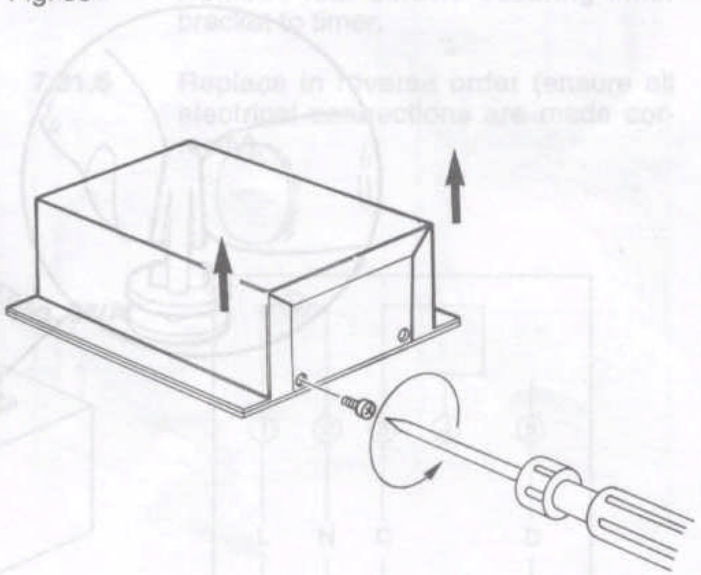


Fig. 85



7.29.2 Remove the lower grating (sect. 5.4.2).

7.29.3 Remove the fan assembly and the flue hood (sect. 7.6 & 7.7).

7.29.4 Close the on/off valves for the central heating circuit and drain the water from the boiler (Fig. 93).

7.29.5 Unscrew and remove the plastic cap that protects the valve vent hole.

7.29.6 Disconnect the unions 1 and 2 (Fig. 92) slightly turn and remove pipe and auto air vent.

7.29.7 Replace in reverse order, using new seals.

7.29.8 Fill the system as described in the (sect. 6.4 & 5) and check for leaks.

7.30.1 Remove the front panel (sect. 7.3) and the lower grating (sect. 5.4.2) from the outer casing and lower the instrument panel (sect. 7.16.2 & 3).
Remove right side of the casing (sect. 5.4.5).

7.30.2 Close the on/off valves for the heating system and drain the water from the drain valve installed on this circuit (Fig. 93).

7.30.3 Disconnect the drain pipe from the valve.

7.30.4 Unscrew the small grubscrew located in the pump manifold to allow the relief valve to be pulled forward and out from its locating socket. Make sure that the 'O' ring seal is located correctly. Replace in reverse order (Fig. 93).

7.30.5 Fill the system as described in the (sect. 6.4 & 5) and check for leaks.

Fig. 85

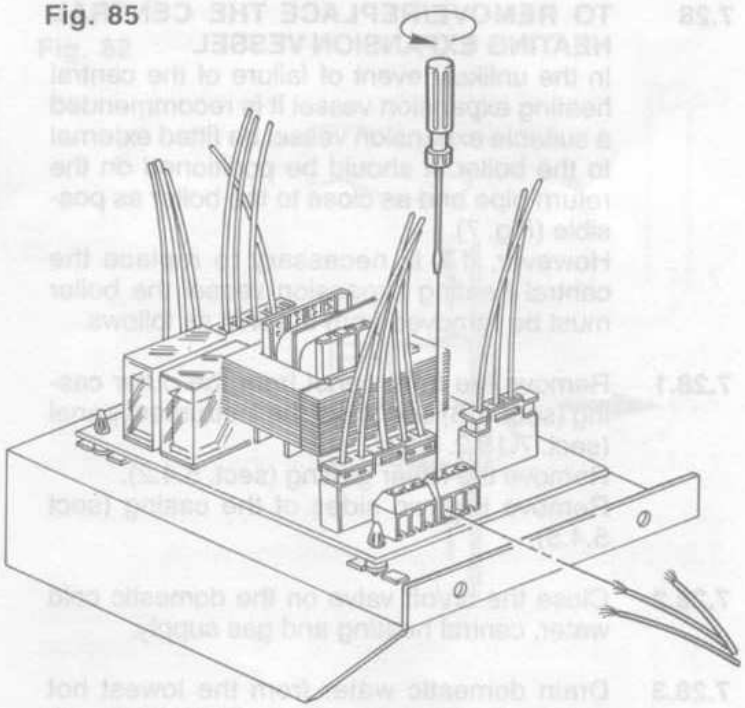
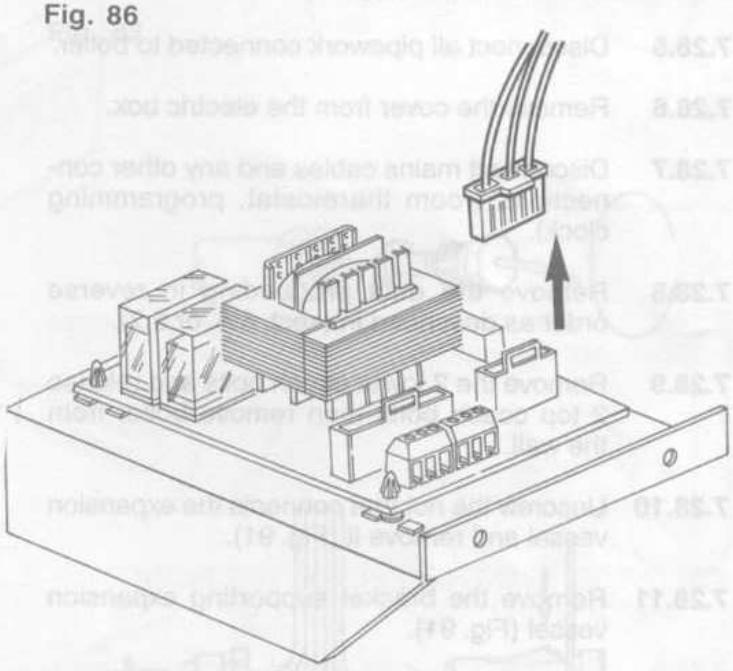


Fig. 86



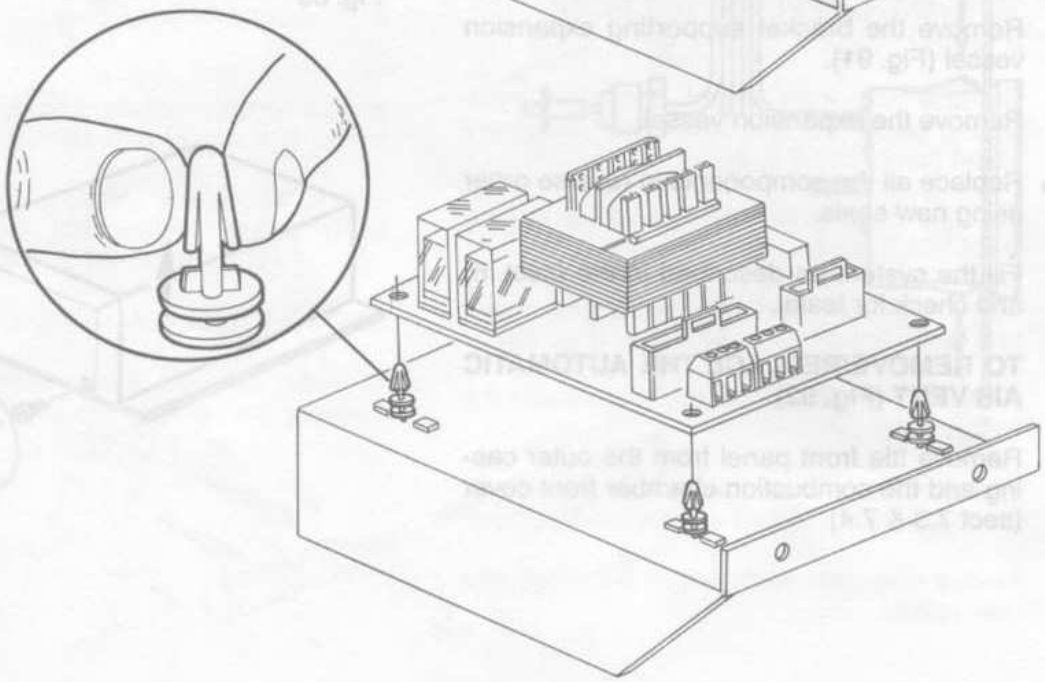


Fig. 87

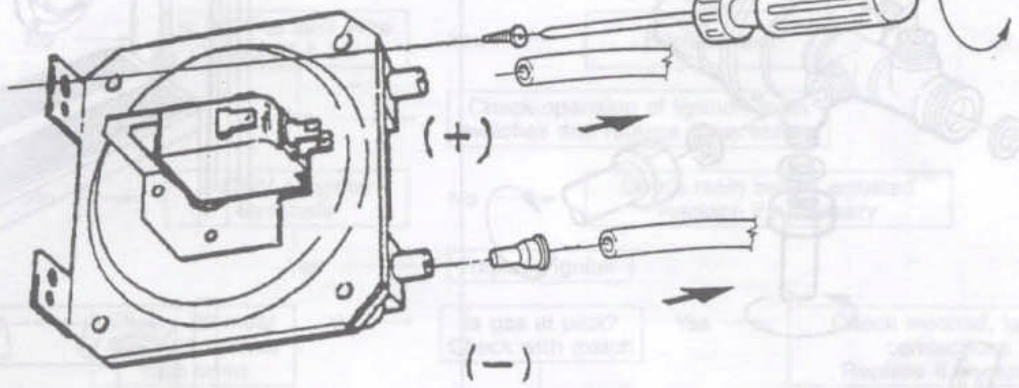
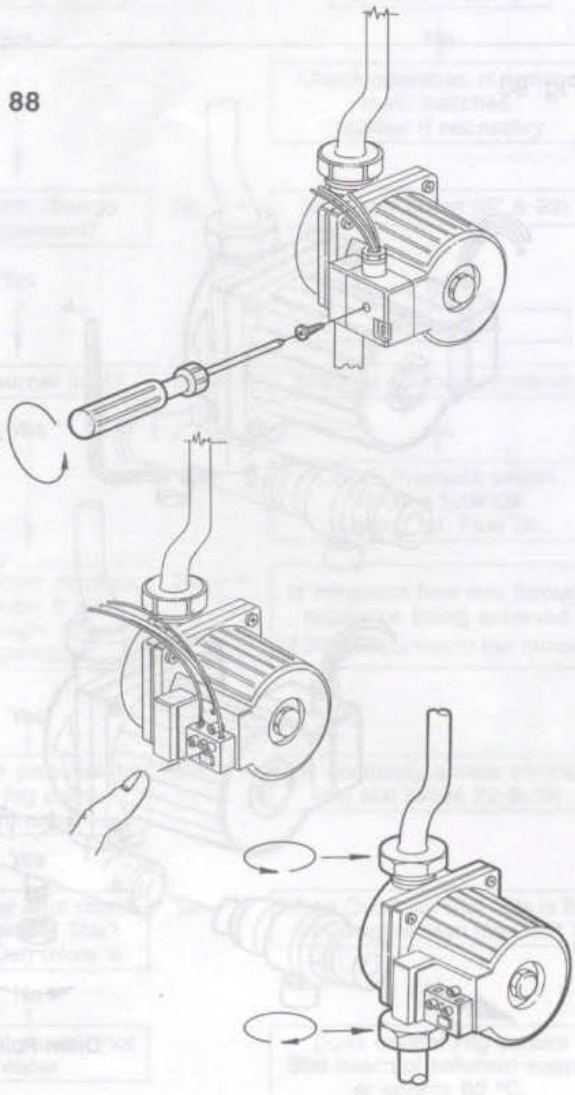


Fig. 88



7.31.0 TO REMOVE/REPLACE TIME CLOCK (Fig. 88/A)

7.31.1 Remove the front panel from the outer casing (SECT. 7.3) and lower the instrument panel (SECT. 7.16.2 and 3.)

7.31.2 Remove four screws securing timer bracket to panel.

7.31.3 Remove timer bracket from panel.

7.31.4 Carefully remove the four wires connecting timer by pulling spade connectors from timer.

7.31.5 Remove four screws securing timer bracket to timer.

7.31.6 Replace in reverse order (ensure all electrical connections are made correctly).

Fig. 88/A

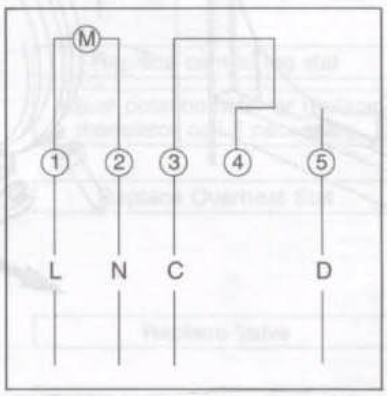


Fig. 89

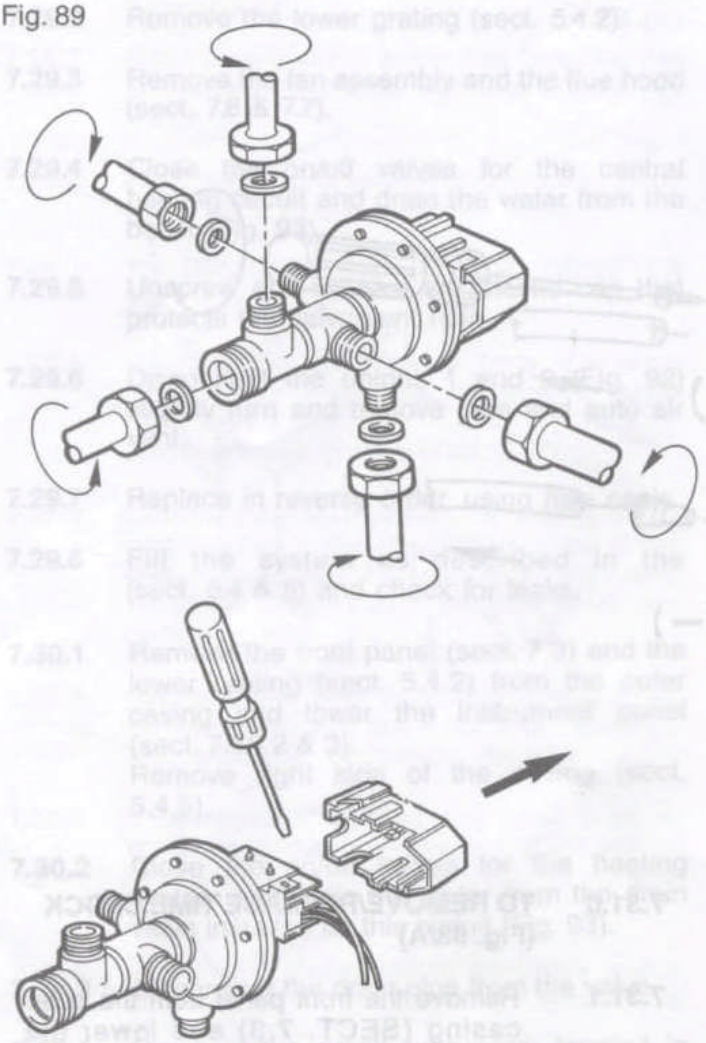


Fig. 91

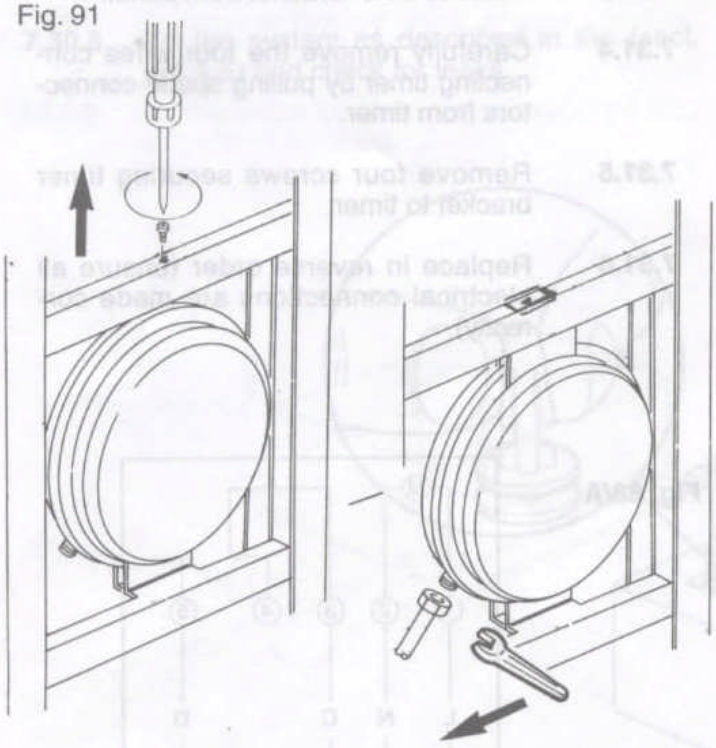


Fig. 92

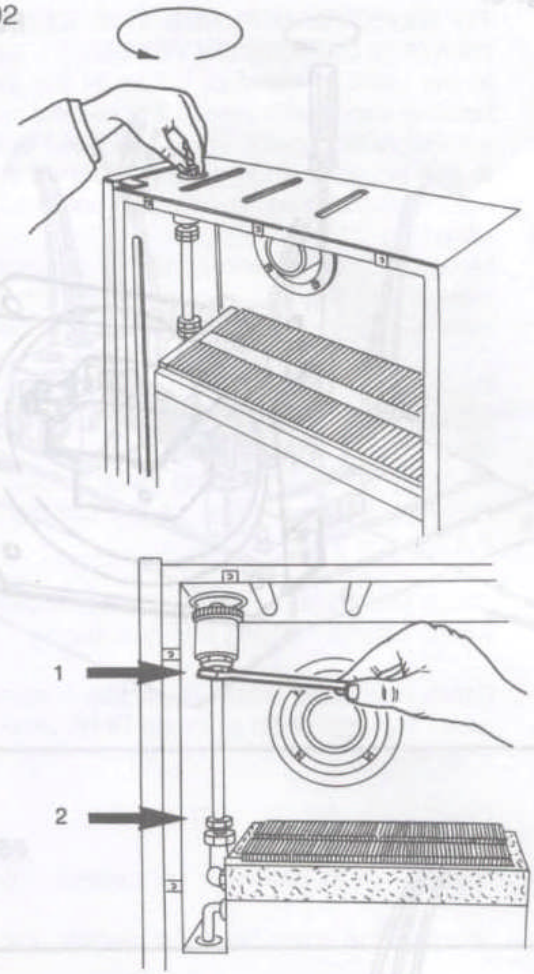
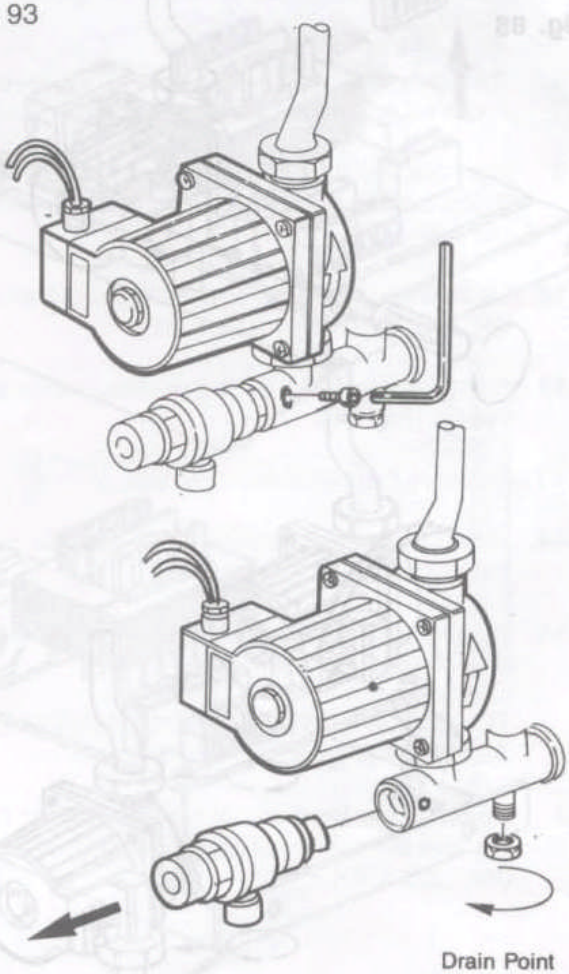
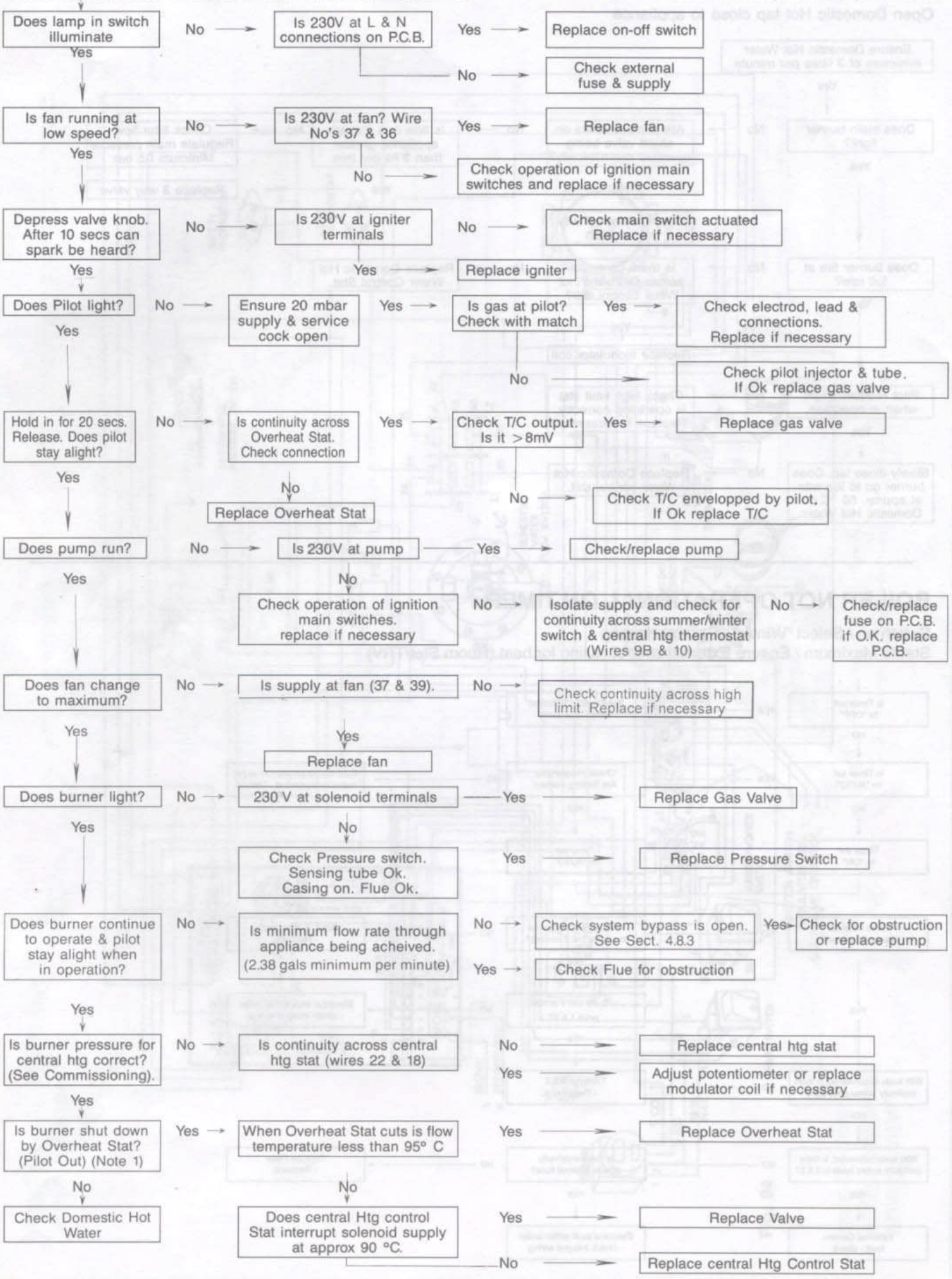


Fig. 93



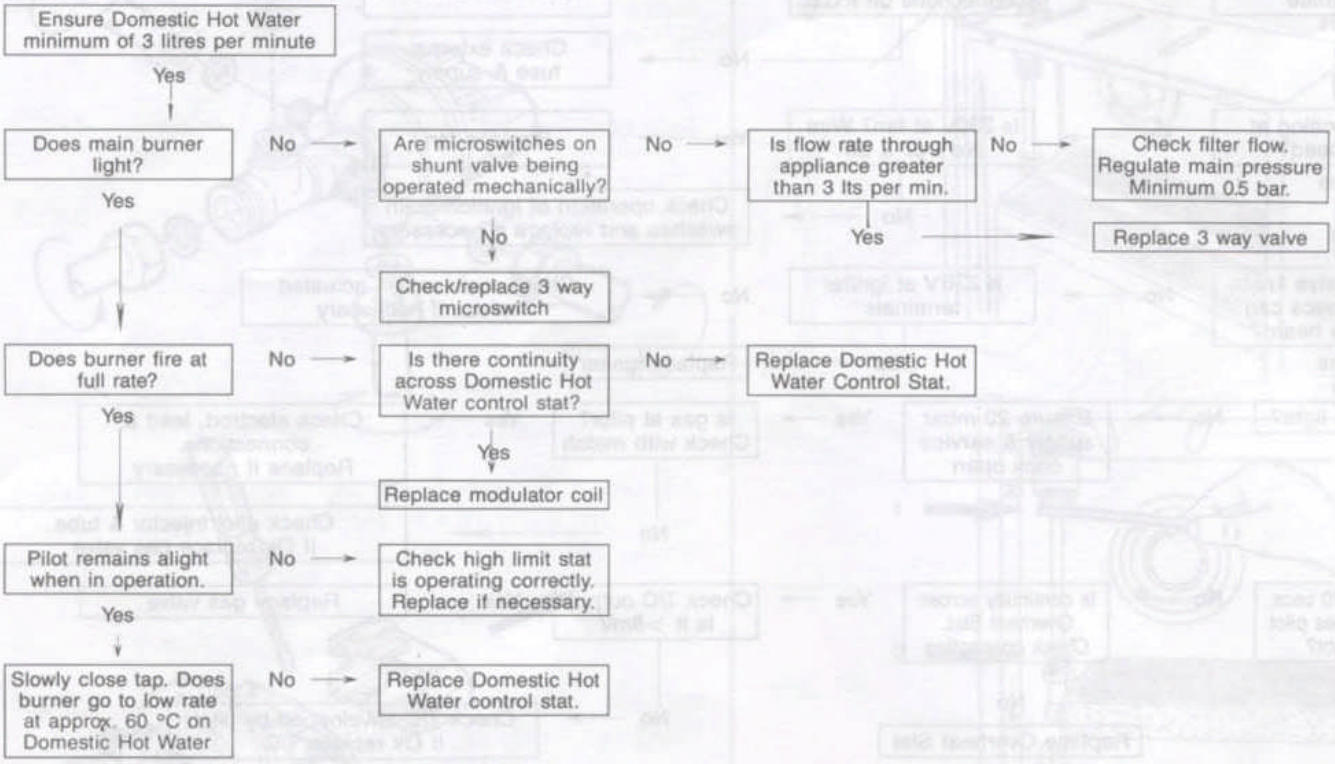
FAULT FINDING CENTRAL HEATING

Switch on
Select "Winter"
Central Heating
Stat to maximum
Ensure external controls calling for heat (Room Stat/Time Clock/TRV)



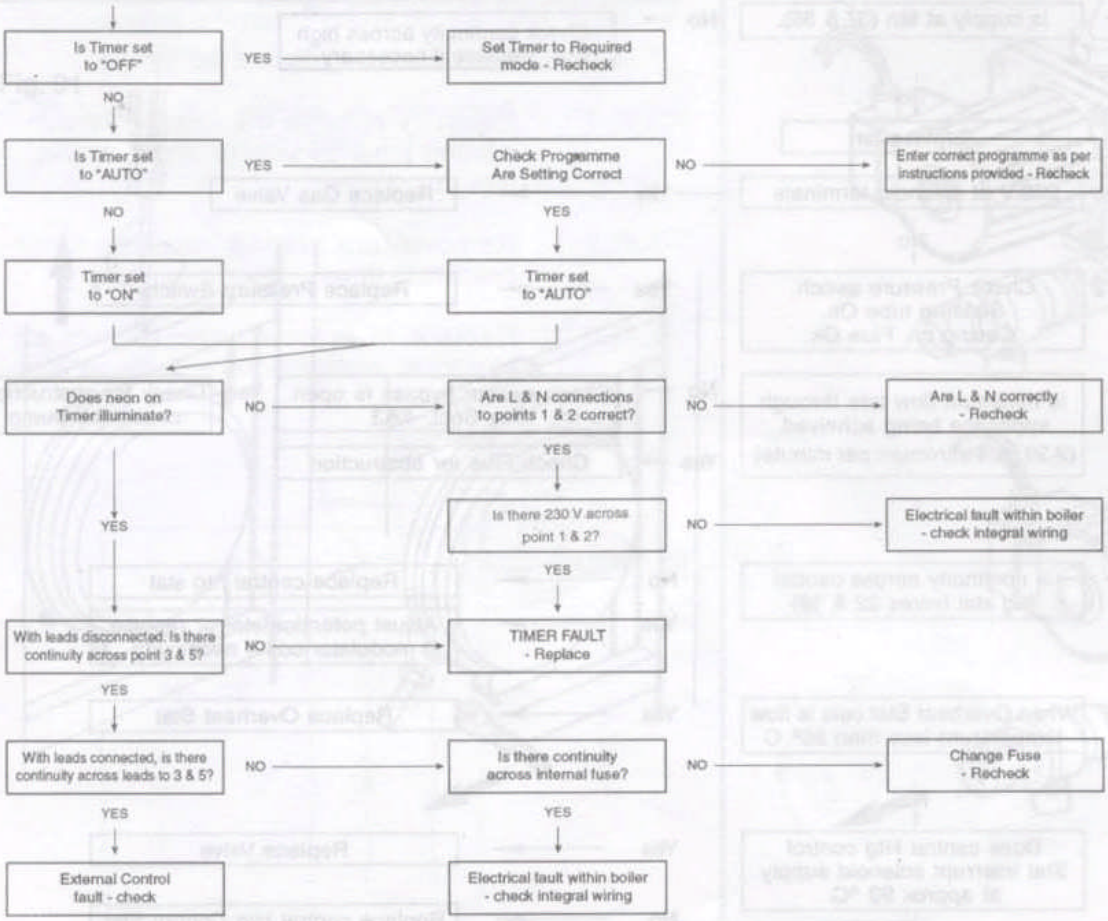
FAULT FINDING DOMESTIC HOT WATER

Before continuing it may be necessary to see Central Heating Fault Finding.
Select only (Summer) Domestic Hot Water.
Open Domestic Hot tap close to appliance



BOILER NOT OPERATIONAL ON TIMER

Switch on / Select "Winter" / Central Heating
Stat to Maximum / Ensure External control calling for heat (Room Stat/TRV)



ELECTRICAL SYSTEM DIAGRAM

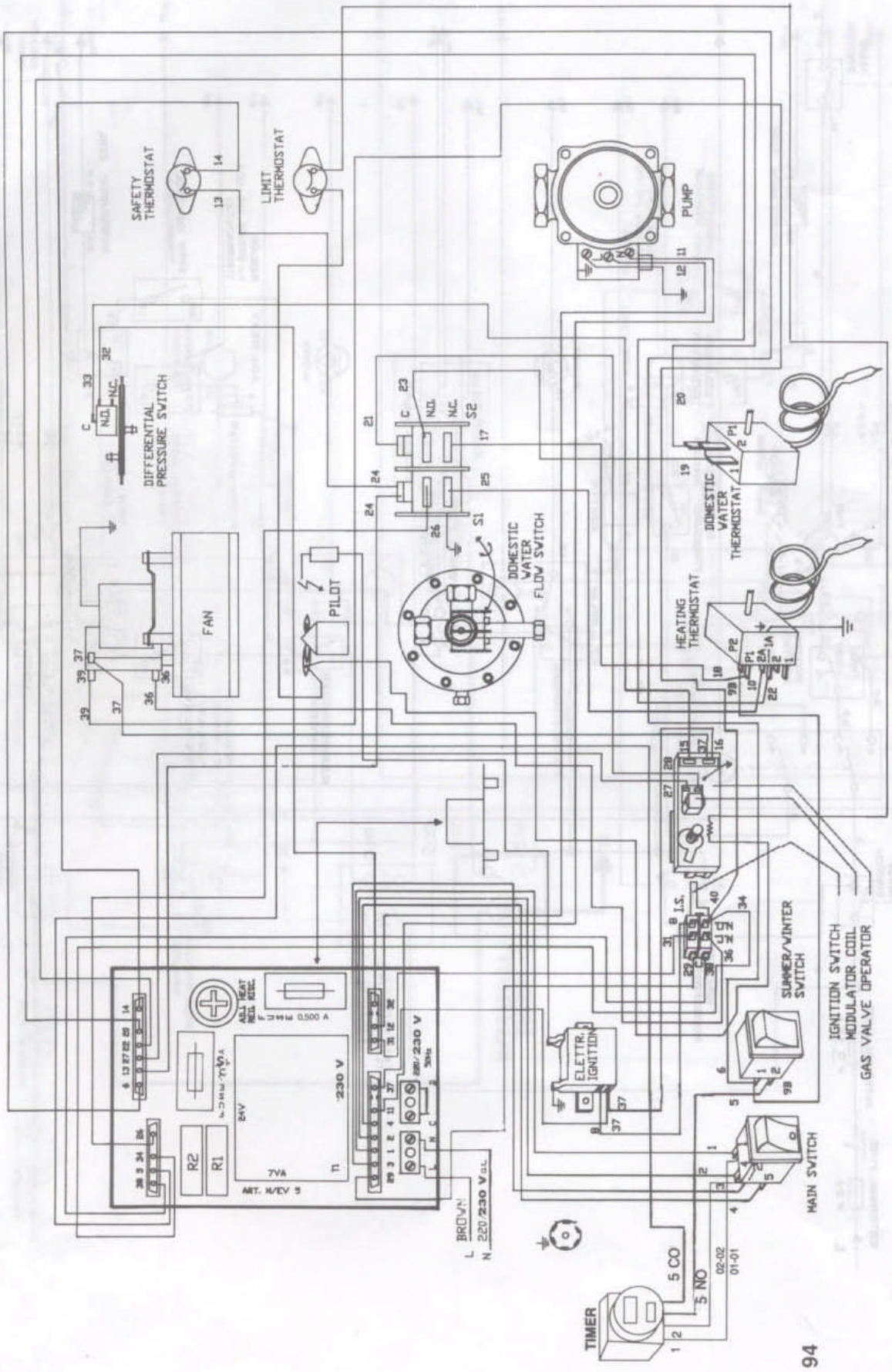


Fig. 94

FUNCTIONAL FLOW DIAGRAM

General Layout

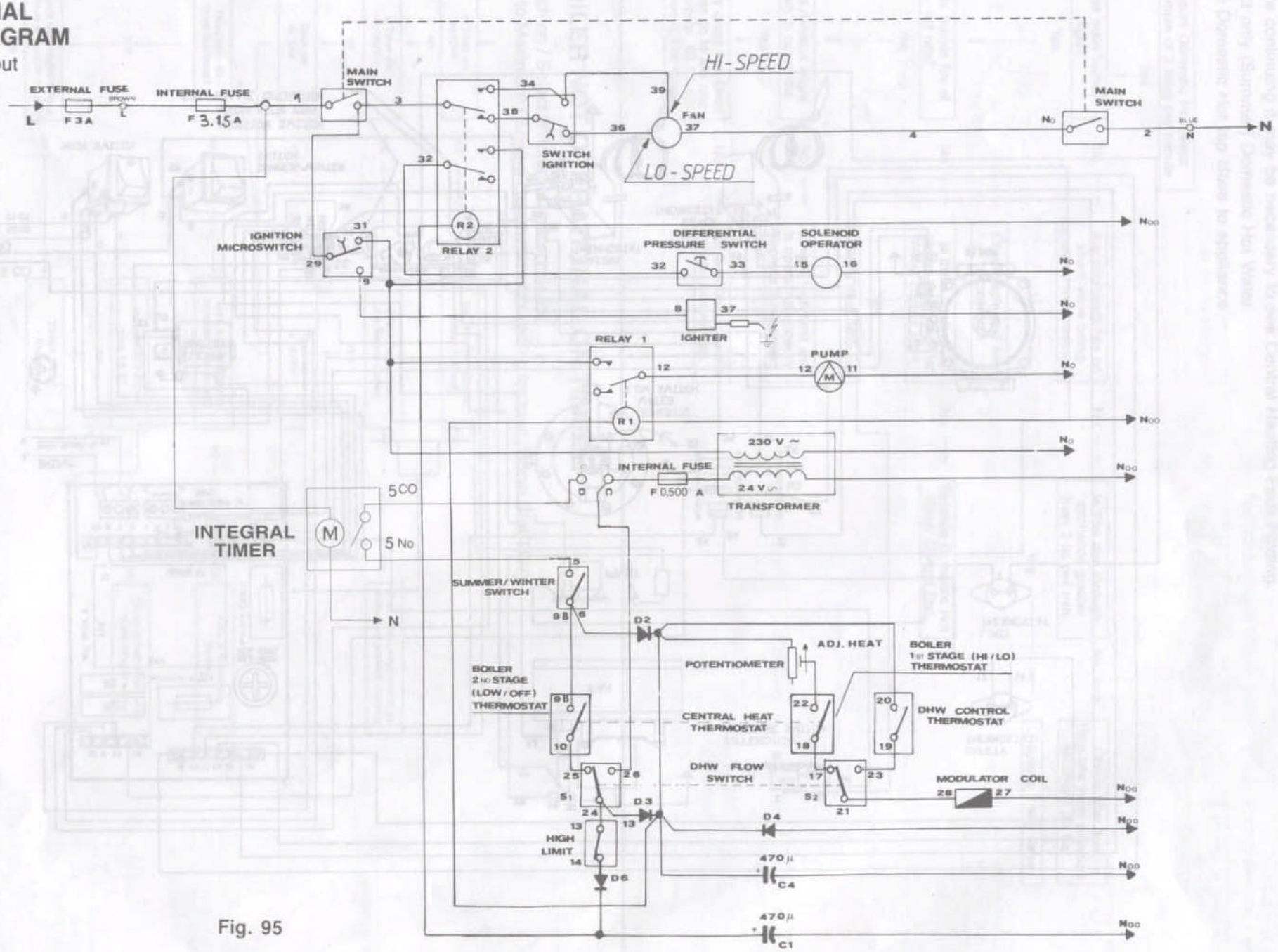


Fig. 95

FUNCTIONAL FLOW DIAGRAM

At rest on low speed

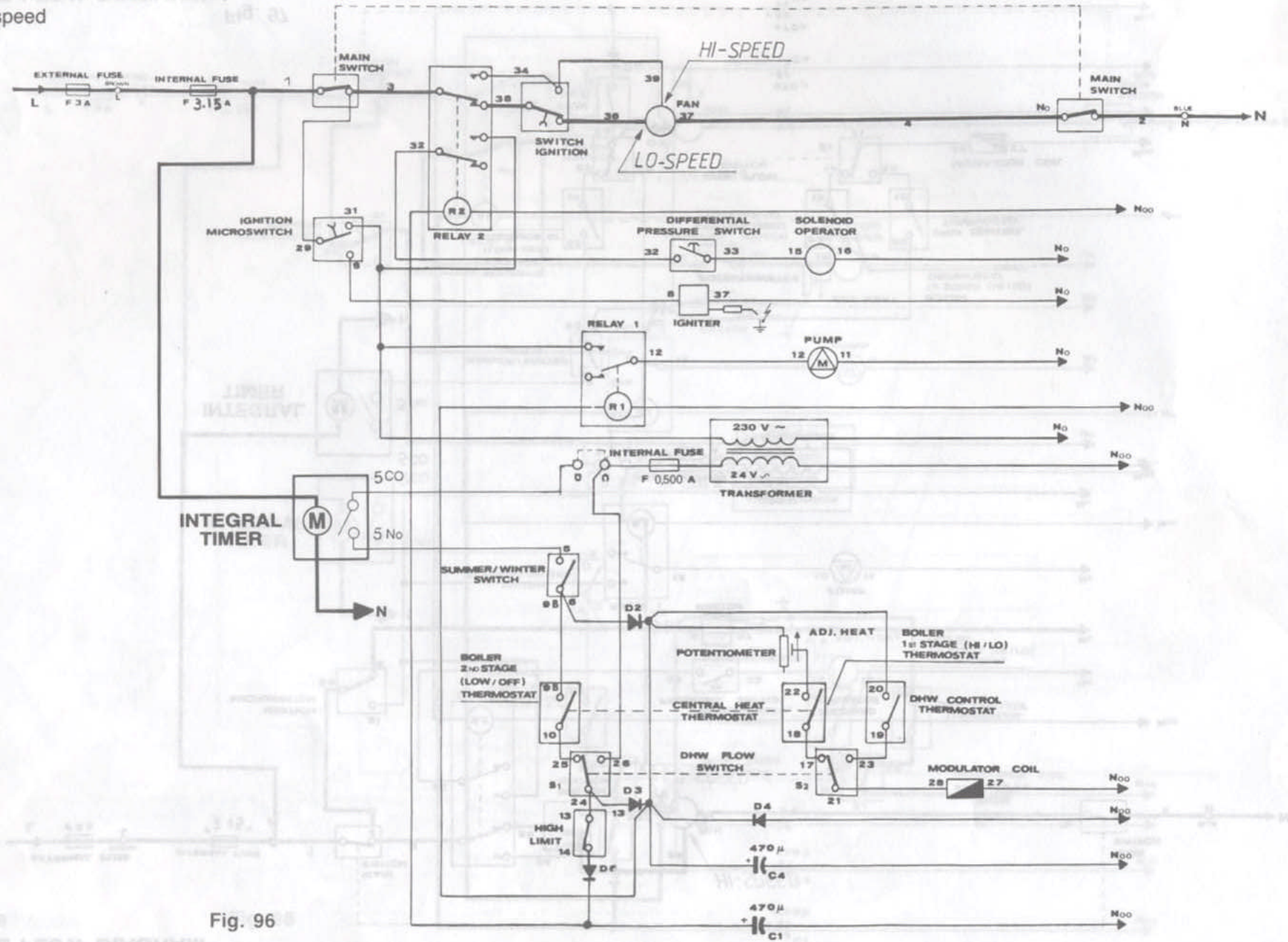


Fig. 96

FUNCTIONAL FLOW DIAGRAM

In ignition mode

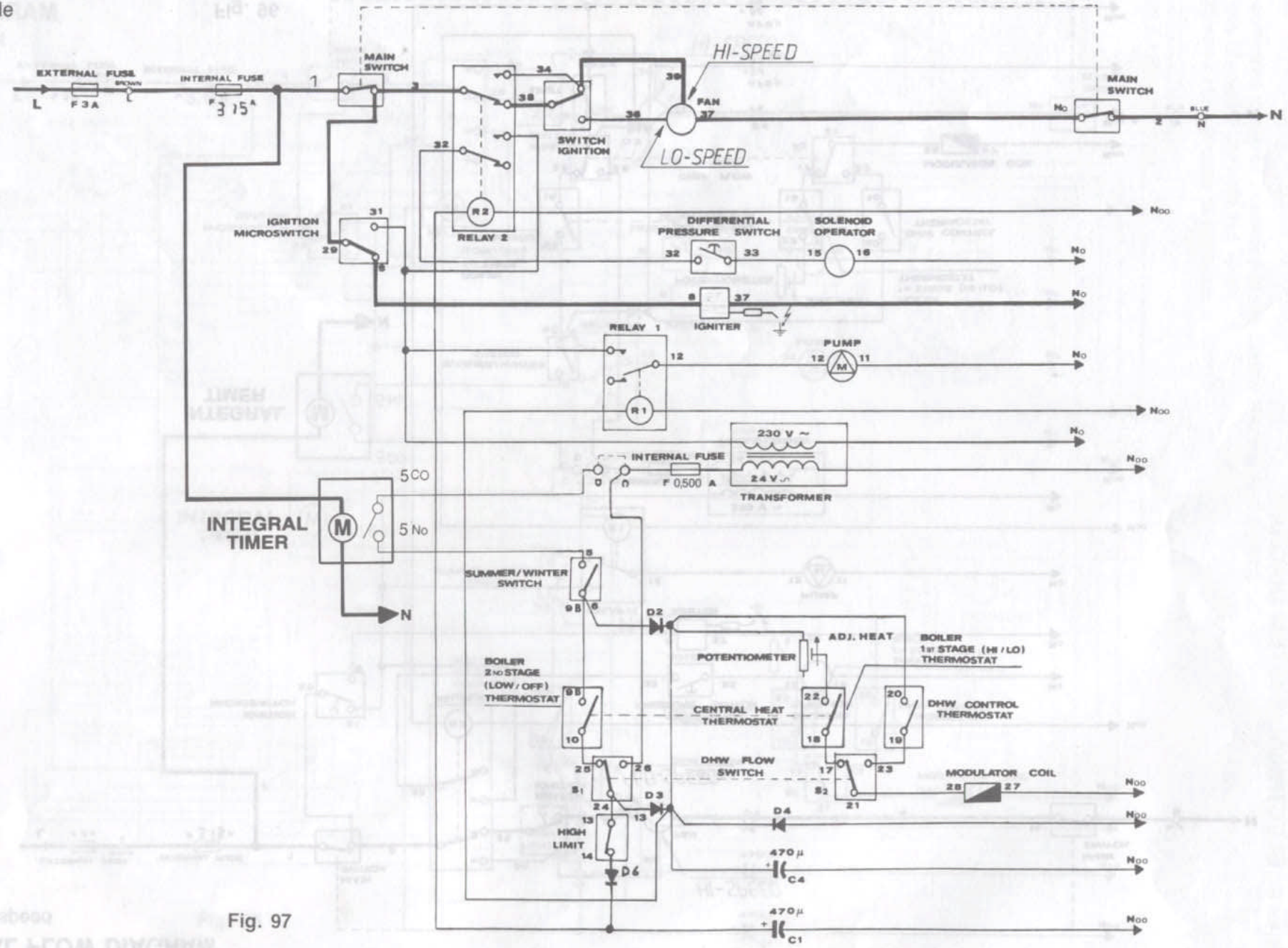


Fig. 97

FUNCTIONAL FLOW DIAGRAM

In D.H.W. mode

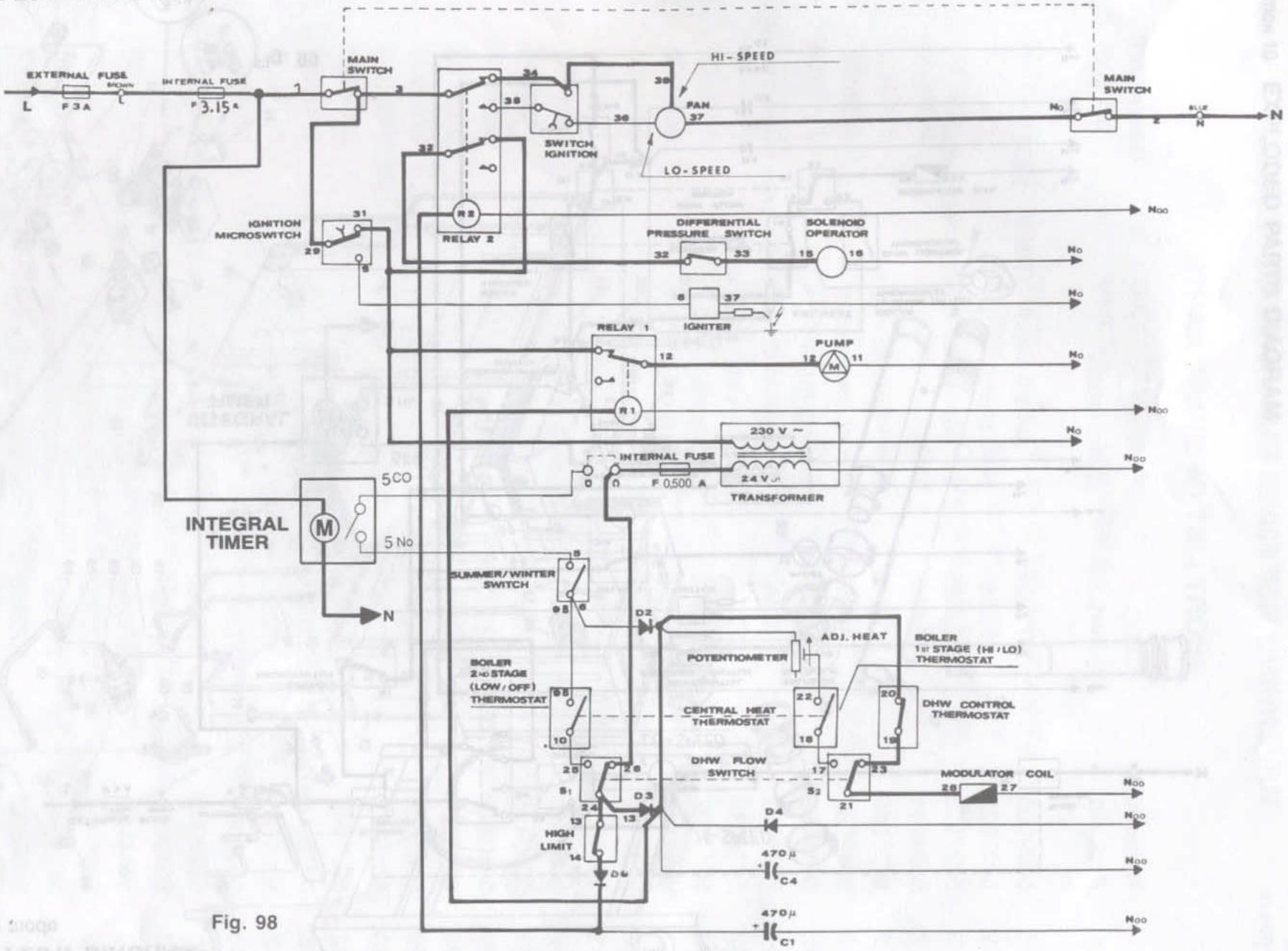


Fig. 98

FUNCTIONAL FLOW DIAGRAM

In central heating mode

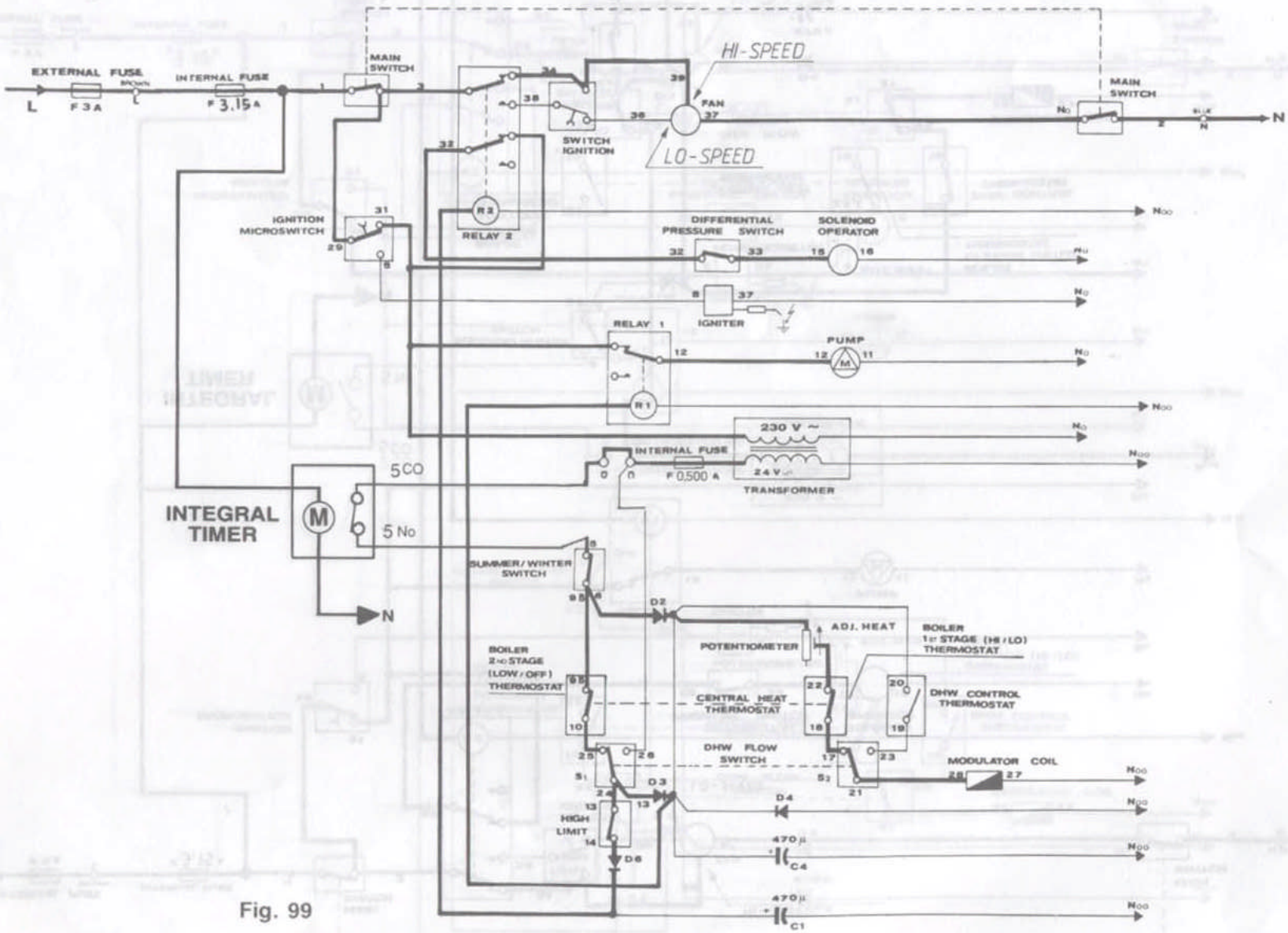
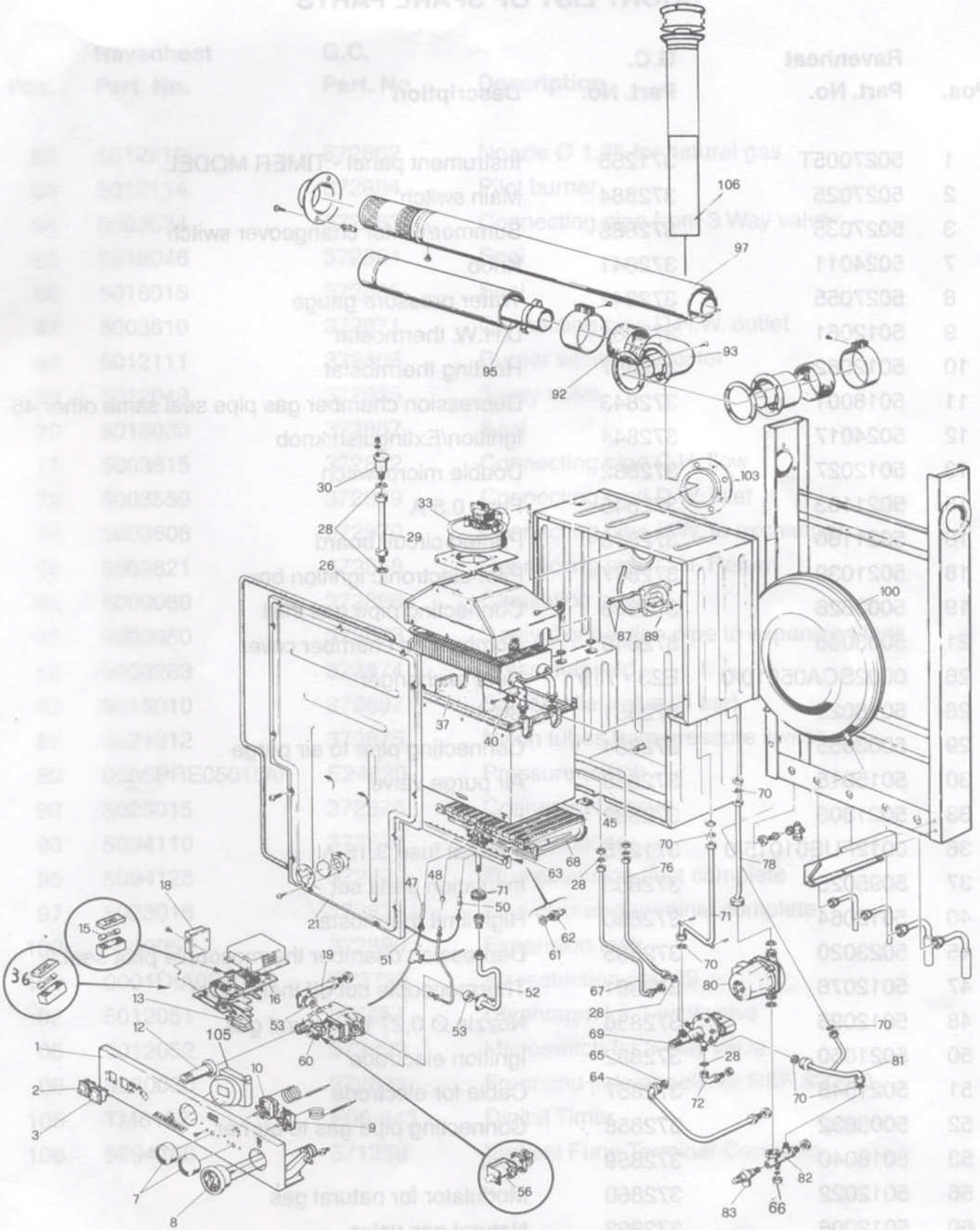


Fig. 99

SECTION 10 EXPLODED PARTS DIAGRAM



RAVENHEAT RSF 820/20 FANNED COMBI BOILER

SHORT LIST OF SPARE PARTS

Pos.	Ravenheat Part. No.	G.C. Part. No.	Description
1	5027005T	371255	Instrument panel - TIMER MODEL
2	5027025	372884	Main switch
3	5027035	372885	Summer/winter changeover switch
7	5024011	372841	Knob
8	5027055	372842	Water pressure gauge
9	5012061	372886	D.H.W. thermostat
10	5012062	372887	Heating thermostat
11	5018001	372843	Depression chamber gas pipe seal same other 45
12	5024017	372844	Ignition/Extinguish knob
13	5012027	372882	Double microswitch
15	5021103	372845	Fuse 0.5 A
16	5021160	372846	Printed circuit board
18	5021039	372847	Pilot electronic ignition box
19	5003626	372848	Connecting pipe gas inlet
21	5003066	372849	Combustion chamber cover
26	0002SCA05010/0	E23 - 719	Heat exchanger
28	5018025	372851	Seal
29	5003655	372854	Connecting pipe to air purge
30	5015015	372888	Air purge valve
33	5021305	372889	Fan
36	0012FUS01015/0	371275	Internal fuse 3.15 A
37	5095025	372853	Insulation pads set
40	5012064	372890	High limit thermostat
45	5023020	372855	Depression chamber thermocouple pilot seal
47	5012076	372891	Thermocouple cut off thermostat
48	5012096	372856	Nozzle Ø 0,27 for natural gas
50	5021050	372892	Ignition electrode
51	5021048	372857	Cable for electrode
52	5003632	372858	Connecting pipe gas to burner
53	5018040	372859	Seal
56	5012022	372860	Modulator for natural gas
60	5012006	372893	Natural gas valve
61	5012125	372861	Seal

Pos.	Ravenheat Part. No.	G.C. Part. No.	Description
62	5012210	372862	Nozzle Ø 1,35 for natural gas
63	5012114	372894	Pilot burner
64	5003534	372863	Connecting pipe from 3 Way valve
65	5018046	372864	Seal
66	5018015	372865	Seal
67	5003610	372871	Connecting pipe D.H.W. outlet
68	5012111	372866	Burner without collector
69	5012049	372895	3-way valve
70	5018030	372867	Seal
71	5003615	372872	Connecting pipe C.H. flow
72	5003559	372869	Connecting pipe D.W. inlet
76	5003606	372870	Connecting pipe D.W. to exchanger
78	5003621	372868	Connecting pipe C.H. Return
80	5009080	372896	Circulation pump
81	5003650	372873	3 way Connection pipe to expansion tank
82	5003283	372874	Brass manifold
83	5015010	372897	Safety relief valve (3 bar)
87	5021312	372875	Nylon tubes from pressure switch
89	0005PRE05015/0	E24629	Pressure switch
92	5023015	372876	Connection sleeve
93	5094110	372877	Elbow header
95	5094125	372878	Flue extension duct complete
97	5023016	372879	Flue duct and terminal complete
100	5009057	372880	Expansion tank
103	0001DIA05005/0	E23730	Air restriction ring 79
02	5012051	371257	Diaphragm for 3-way valve
05	5012052	372899	Microswitch for 3-way valve
06	5030030	372883	Front and side panels for RSF 820/20
105	TM6192	E06-043	Digital Timer
106	5094130	371259	Vertical Fune Terminal Complete



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Ravenheat reserves the right to make changes and improvements in our products which may affect the accuracy of the information contained in this leaflet.

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