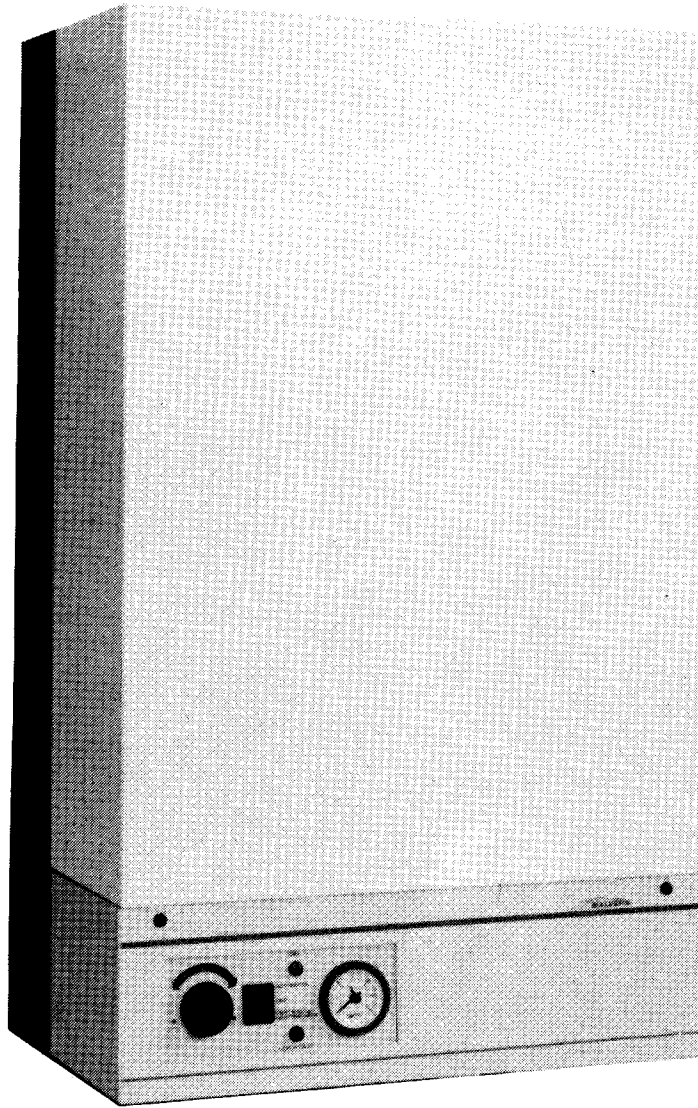


CONDENSING COMBI BOILER



installation

& service instructions

CE
0087

WALL MOUNTED, FAN POWERED,
BALANCED FLUE, CONDENSING
COMBINATION BOILER.

GC No. 47 555 02, WRc No. 95 110 46

IMPORTANT: The appliances are for use with NATURAL GAS ONLY.

NOTE TO INSTALLER: Leave these instructions adjacent to the gas meter.



by **MALVERN**

MO891

Datatable

Factory settings	Burner Pressure	INPUT	OUTPUT
HEATING INPUT MAX (60 – 80°C)	11.3 mbar	87000 Btu/h (25.5 kW)	74800 Btu/h (22.0kW)
HEATING INPUT MIN (60 – 80°C)	5.5 mbar	61075 Btu/h (17.9 kW)	50155 Btu/h (14.7kW)
HEATING INPUT MAX (40 – 60°C)	11.3 mbar	87000 Btu/h (25.5 kW)	80000 Btu/h (23.5kW)
HEATING INPUT MIN (40 – 60°C)	5.3 mbar	61075 Btu/h (17.9 kW)	54590 Btu/h (16.0kW)
HOT WATER INPUT MAX	11.3 mbar	87000 Btu/h (25.5 kW)	76560 Btu/h (22.3kW)
HOT WATER INPUT MIN	1.5 mbar	32620 Btu/h (9.56 kW)	26954 Btu/h (7.9kW)
Central Heating Flow & Return	22 mm compression for 28mm pipework	Appliance water capacity	4.85 litres
Mains water in & out	15 mm compression	Minimum static head	1.0 m (0.15 bar)
Safety valve & drain	15 mm copper	Maximum static head	25 m (2.5 bar)
Expansion vessel size	10 litres @ 0.8 bar	Flow rate for 35°C rise	2.1 gpm (9.6 l/m)
Main burner injector	4.1 mm	Safety valve setting	3 bar
Gas inlet	½" BSP	Maximum flow temperature	82°C
Maximum flue length	2000mm (78")	Minimum CH flow	16 l/m
Flue Diameter	110mm (4½")	Maximum pump head	2.3 m
Gas consumption after 10 mins (CV 1015)	2.4 m³/h (85.7 ft³/h)	MIN DHW Inlet pressure for 95% rated output	2.5 bar *
Height	890mm (35")	MAX DHW temperature	61°C ± 2C°
Width	500mm (19¾")	MAX DHW Inlet pressure	10 bar
Depth	340mm (13½")	Maximum lift weight	52 kg
Service clearance, LEFT & RIGHT	75mm (3")	Shipping weight	60 kg
Service clearance ABOVE	30mm (1¼")	Electrical supply, Fused	230V ~ 50 Hz ,3A
Service clearance FRONT	450mm (18")	Power Consumption	120W

* For applications requiring lower pressures, please contact the manufacturer.

CONTENTS

Section	Page
Introduction	2
Boiler Location	3
Gas Supply	3
Flueing	4
Air Supply	4
Water Supply	5
Condensate Drain	5
Sealed Systems	5
Electricity Supply	6
Installation	6
Removing Case	6
Turning Box	7
Flue and Air Duct	7
Terminal	7
Plumbing	7
Gas Connection	8
Condensate	8
System Design	8
Electrical Connections	9
Commissioning	9
Fault Finding	20
Servicing	23

List of Figures	Page
Fig 1. Installation Dimensions	11
Fig 2. Boiler Panel Assembly	12
Fig 3. Schematic Wiring	13
Fig 3a. Functional Flow Wiring	14
Fig 4. Physical Wiring	15
Fig 5. Fixing Positions	16
Fig 6. Flue Positioning	17
Fig 7. Air Duct Positioning	17
Fig 8. Example Condensate Disposal	18
Fig 9. Condensate Trap Detail	18
Fig 10. Appliance Water Flow Paths	19
Fig 11. Electrical Spares	28
Fig 12. Major Components	29
Fig 12a. Waterside Spares	30

INTRODUCTION

These Instructions cover a lightweight, wall hung, gasfired, condensing combination boiler. The boiler is room-sealed and fan assisted on the flue side. The ignition system is fully automatic, and it incorporates an electronically controlled modulation gas control.

The boiler casing is of white enamelled mild steel.

The boiler is suitable for connection to sealed central heating systems. These systems must be fully pumped and utilise the pump integral in the design.

There is no requirement for a scale reducer to be fitted to this appliance.

Priority is given to instantaneous domestic hot water, with the boiler input automatically varying between 9.56kW (32,620 Btu/h) and 25.5 kW (87,000 Btu/h) according to demand.

The heat output is automatically controlled by demand on both domestic hot water and central heating.

Adequate arrangements for completely draining the system, by provision of drain cocks **MUST** be provided.

Gas Safety (Installation and Use) Regulations, 1994

It is the law that competent persons (e.g. CORGI) install all gas appliances in accordance with the above Regulations.

Failure to install appliances correctly could lead to prosecution.

It is in your own interest, and that of safety, to ensure that the law is complied with. The installation of the boiler **MUST** also be in accordance with the current I.E.E.. Wiring Regulations, the Local Building Regulations, Building Standards (Scotland), the Bye Laws of the Local Water Undertaking, any relevant requirements of the Local Authority, and Health and Safety document No 635, "Electricity at Work Regulations 1989".

Detailed recommendations are contained in the following British Standard Codes of Practice.

Codes of Practice.

BS.6798 Installation of gas fired hot water boilers of rated input not exceeding 60kW.

BS.5449 :1 Forced circulation hot water systems (small bore and microbore domestic central heating systems).

BS.5546 Installation of gas hot water supplies for domestic purpose (2nd Family Gases).

BS.5440 :1 Flues (for gas appliances of rated input not exceeding 60kW).

BS.5440 :2 Air supply (for gas appliances of rated input not exceeding 60kW).

BS 6891 Specification for installation of low pressure gas pipework.

IMPORTANT. It is important that no external control devices are directly connected to this appliance - unless covered by these 'Installation and Servicing Instructions' or otherwise recommended by the manufacturer.

If in doubt please enquire.

Any direct connection of a control device not recommended by the manufacturer could infringe the Gas Safety (Installation & Use) Regulations, the above regulations and the normal appliance warranty.

Manufacturer's notes must NOT be taken, in any way, as overriding statutory obligations.

LOCATION OF BOILER

The boiler MUST be installed on a flat and vertical non-combustible wall, capable of adequately supporting the weight of the boiler and any ancillary equipment.

THE BOILER IS NOT SUITABLE FOR EXTERNAL INSTALLATION.

IMPORTANT NOTICE.

If the 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 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 to Scotland with respect to the installation of the 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 then the appliance and any electrical switch or appliance control, utilising mains electricity should be so situated that it cannot be touched by a person using the bath or shower.

Where installation will be in an unusual location then special procedures may be necessary and BS.6798 gives detailed guidance on this aspect.

A compartment used to enclose the boiler MUST be designed and constructed specially for this purpose. An existing cupboard, or compartment, may be used provided it is modified for the purpose. Details of essential features of cupboard compartment design, including airing cupboard installations are given in BS.6798.

In siting the boiler, the following limitations MUST be observed:

1. The position selected for installation MUST allow adequate space for servicing in front of the boiler and for air circulation around the boiler.
2. This position MUST also permit the provision of a satisfactory balanced flue termination.
3. This position MUST also permit the provision of a satisfactory connection to the condensate drain.

GAS SUPPLY

The Local Gas Region should be consulted, at the installation planning stage, in order to establish the availability of an adequate supply of gas.

An existing service pipe must NOT be used without prior consultation with the Local Gas Region, or by 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.

Installation pipes should be fitted in accordance with BS.6891: 1988.

Do NOT use pipes of a smaller size than the boiler inlet gas connection.

FLUEING

Detailed recommendations for flueing are given in BS.5440:1

The following notes are intended for general guidance.

1. Be aware of the plume from the flue and the wetting effect it has to adjacent property.
2. The flue can be taken to the left, right or rear of the appliance.
3. The boiler is provided with a standard flue kit that will reach 500mm (20 in).

An extended flue kit is available which enables the flue to be extended straight to 2000mm (79in), (Part No 0509). The air duct must be supported every 700mm (30 in) with the clips provided.

4. The boiler MUST be installed so that the terminal is exposed to external air.
5. It is important that the terminal allows the free passage of air across it at all times.
6. The acceptable spacing from the terminal to obstructions and ventilation openings are specified in Table 1.
7. Where the lowest part of the terminal is fitted less than 2m(6.6ft.) above a balcony, above ground, or above a flat roof to which people have access then the terminal MUST be protected by a purpose designed guard.

Terminal guard Model K3. 6.5 x 11 (plastic coated) (GC No 393554) is available from: -

Tower Flue Components Ltd.

Tower House.

Vale Rise.

Tonbridge KENT TN9 1TB

01732 351555

TERMINAL

The terminal assembly of the balanced flue can be adapted to accommodate various wall thicknesses from 100mm to 2000mm. If a terminal guard is fitted, then the terminal must be central.

Note. Reference for the terminal position can be made from Table 1.

Terminal Position	Minimum
Below window or vent	300mm
Below gutter or pipes	75mm
Below eaves	200mm
Below balcony or roof	200mm
From a window	200mm
From vertical pipe	75mm
From corners	300mm
Above ground, roof or balcony	300mm
From facing surface	600mm
From facing terminal	1200mm
From opening under a car port	1200mm
Vertically from a terminal	1500mm
Horizontally from a terminal	300mm

Table 1.

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

If this should occur, the appliance MUST be turned OFF IMMEDIATELY and the Local Gas Region consulted.

AIR SUPPLY

Detailed recommendations for air supply are given in BS.5440 Pt. 2.

The following notes are intended for general guidance.

1. It is NOT necessary to have a purpose provided air vent in the room or internal space in which the boiler is installed.
2. If the boiler is to be installed in a cupboard or compartment, permanent air vents are required (for cooling purposes) in the cupboard or compartment, at both high and low levels.

The air vents must either connect to a room/internal space, or vent directly outside. Vents required for a cupboard/compartment are specified in Table 2, and are related to the maximum rated heat input of the boiler.

Model	Position of vent	Air from room	Air direct from outside
Combi	High & Low	240 cm ²	120 cm ²

Table 2.

Note: Either air vents MUST connect to the same room or internal space, or MUST both be on the same wall to outside air.

WATER SUPPLY

The central heating system should be in accordance with the relevant recommendations given in BS.6798 and, in addition, for smallbore and microbore systems - BS.5449:1.

The domestic hot water system should be in accordance with the relevant recommendations of BS.5546.

The mains water supply should be checked to be sufficient to produce the required flow rate, see the Data Table.

The appliance incorporates a strainer and flow regulator, set at 8.5 litres/min, on the Cold water Mains Inlet.

The Inlet pressure should not exceed 10 bar, a reducing valve should be fitted if it does.

Copper tubing to BS 2871:1 must be used in the last 600mm (24in) to connect to the boiler.

Taps and fittings should be suitable for mains pressure supply.

The ancillary pipework, not forming part of the useful heating surface should be lagged, to prevent heat loss and any possible freezing, particularly where pipes run through roof spaces and ventilated underfloor spaces.

Draining taps MUST be located in accessible positions that permit the draining of the whole system, including boiler and hot water storage vessel. Draining taps should be at least ½ in. nominal size and be in accordance with BS.2879.

CONDENSATE DRAIN.

Refer to Fig. 1, and 8.

A condensate drain is provided on the boiler, this drain must be connected to the household drainage point, or soak-away on site.

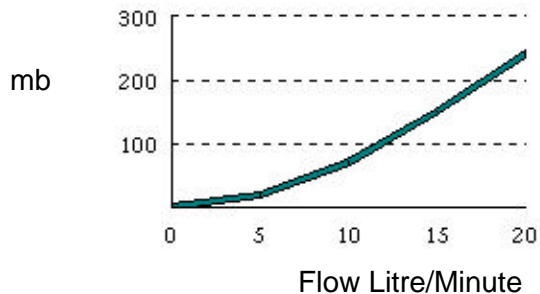
All pipework and fittings in the condensate drainage system MUST be made of plastic. Refer to British Gas publication "Guidance notes for installation of domestic condensing boilers"

No other materials may be used.

The drain outlet on the boiler is:

Polypipe, 21.5mm pushfit overflow pipe.

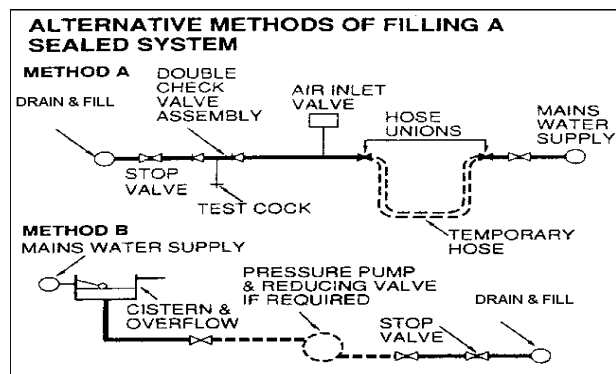
Pump Head pressure Loss



SEALED SYSTEMS

The available pump head is shown in the graph above. A sealed system should follow the guide-lines given in the Code of Practice BS 7074 :1. The boiler includes a safety valve to BS 6750 Pt1.

A design as detailed below should be used for the filling connection, it utilises a BS 1010 stop valve, a double non-return valve and filling loop, and should be installed with the approval of the local Water Undertaking.



A 10 litre expansion vessel complying with BS 4814 is fitted in the appliance and, depending upon its initial charge pressure and the pressurisation of the system, can accommodate different system volumes.

Table 3 below shows the details.

If it is found that the system volume is in excess of that catered for an extra vessel can be added close as possible to the return connection of the appliance.

Vessel Pressure Bar	System Volume litres				
	50	60	70	100	150
0.5	4	4	8	8	12
1.0	8	8	8	12	18
1.5	8	12	12	18	24

Table 3.

ELECTRICITY SUPPLY.

Refer to Figs. 3, and 4.

Wiring external to the appliance MUST be in accordance with the current I.E.E.. Wiring Regulations and any Local Regulations that apply.

The boiler is supplied for 230V ~ 50Hz. Single phase. Fuse rating is 3A.

The method of connection to the mains electricity supply MUST facilitate complete electrical isolation of the boiler, preferably by the use of a fused double pole switch having a 3mm (1/8in.) contact separation in both poles and servicing only the boiler and system controls.

The point of connection to the mains should be readily accessible and adjacent to the boiler, except that, for bathroom installations, the point of connection to the mains MUST be situated outside the bathroom.

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

INSTALLATION OF BOILER

Suggested procedure:

1. Site to suit system and terminal limitations.
2. Mark fixing and flueing positions (Fig. 5).
3. Drill flue hole.
4. Fix boiler turning box to the wall.
5. Remove the case from boiler module
6. Hang module on turning box and fix to the wall.
7. Connect electrical plugs and Gauge sensor.
8. Plumb tails to system and gas.
9. Test for leaks.
10. Commission.

Space Required for Installation and Service.

Right or Left	75 mm	3 in
Above	30mm	1in.
Below	100mm.	4in.
In Front	450mm.	18in

REMOVAL OF THE CASE

Refer to Fig. 2

1. Lower the electrical cover. This is detached by unscrewing the two pozidrive screws located at the top of the control panel, pulling the cover towards you and carefully lowering.

Note: The appliance is supplied with the two electrical connectors, disconnected, and the Pressure Gauge sensor loose and with its water fitting point sealed with a bung. Ensure these are reconnected before commissioning. If the appliance has already been commissioned care should be taken to prevent strain on the cables and connections, use the support provided or, unplug the cables and withdraw the pressure gauge sensor. (Note; the sensor is in the water flow, valve off and seal hole if the system has been filled)

2. Remove the case by unscrewing the two pozidrive screws located at the bottom and rear of the case, and lifting and pulling forward off the two pegs which are located at the top. The case should be kept vertical as it is removed. Examine the sealing strip for damage and replace if necessary.
3. Refitting is the reverse.

IMPORTANT: FAILURE TO CORRECTLY LOCATE THE APPLIANCE CASE COULD RESULT IN LEAKAGE OF COMBUSTION PRODUCTS INTO THE ROOM.

TURNING BOX

1. Site to suit system and terminal limitations.
2. Mark wall using the template for flue outlet then core drill 128 mm to give a 0 to 3 degree slope down towards the boiler.
3. Prepare the turning box for the required flue outlet. For rear entry use as supplied. For left or right outlet, remove appropriate blanking plate and assemble on rear outlet.
4. Screw the turning box to the wall with the four screws and rawlplugs supplied. Ensure that the top of the turning box is level and at the desired height for the top of the boiler. See Fig.2, and 6.

(The flue tube is supplied with the straight and elbow connectors being pre-assembled, the one NOT required should be cut off during installation.)

Note: Blanking plate holes should be left with a screw in, to seal them.

ASSEMBLY OF FLUE PIPE AND AIR DUCT PIPE TO TURNING BOX

Right, Left or Rear Outlet

1. Use the saddle clamp secured with two self tapping screws to clamp the 50mm flue tube with ELBOW CONNECTOR in the turning box. See Fig.6.
2. Measure carefully and saw off the 50mm tube to give required projection from wall. See Fig. 6.
3. Temporarily, assemble the air duct tube through wall and into the turning box up to the stop. (See Fig.7) and measure it carefully to give required projection from the wall.
4. Remove and saw off tube. The flue pipe must project more than the outer air duct when assembled, see Fig.7.

Note: It is acceptable to obtain this dimension by pulling the air duct away from the air duct stop, provided there is a minimum of 10mm (1/2in.) insertion into the turning box and that a satisfactory seal is achieved as in item 5 below.

5. In order to seal the air duct to the turning box apply a 4mm diameter bead of silicone sealant around tube 10mm from the end and rotate home wiping the sealant into the joint.

For extended flues, position the air duct support clips every 700mm.

TERMINAL

Fix to the outside wall with the screws provided. The top has no holes and is marked 'TOP'.

If a guard is fitted, the terminal should be at its centre.

PLUMBING

If the requirement for Heating exceeds 50,000 Btu/h (15 kW), the Flow and Return pipework from the appliance should be 28mm for sufficient distance, until the heat load allows smaller bore pipework.

Plumb the Flow, Return, Cold Water Mains and DHW Hot Outlet pipe work to the valve connectors at the base of the boiler.

Facing the boiler the FLOW connection is at the bottom left and the RETURN at the top right.

SECURING THE BOILER ON TO THE TURNING BOX

1. Lower the boiler module onto the Turning Box with the bottom of the boiler away from the wall. Now by gently lowering the bottom of the boiler against the wall the fan spigot should engage in the flue connector. Observe the correct engagement of the fan spigot into the flue.
2. Replace the two M5 screws around the fan that hold the turning box to the back panel.
3. Replace the decorative top trim, if required,

LOWER BOILER FIXING

The boiler is finally attached to the wall by two screws, washers and a rawlplugs. See Fig.5.

Level the boiler and drill through the fixing holes in the Back Plate, to secure.

GAS CONNECTION

The ½" BSP gas connection point is shown in Fig.1.

A minimum of 20mb. (8in. w.g.) must be available at the boiler inlet, with the boiler and other connected appliances firing.

Check for gas soundness (BS 6891: 1988) in pipework to boiler using a manometer.

Open the gas cock

Gas soundness within the boiler should be checked using sense of smell and/or leak detection fluid.

CONDENSATE CONNECTION.

The position of the plastic condensate drain pipe is shown in Fig 1.

Where possible an internal termination of the Condensate discharge pipework should be used.

Installation pipework must be in plastic to a suitable drain location with a gradient of 2.5° (45mm/ meter run) minimum. If connected to another drainage a trap, an air break is required between the boiler drain and that trap. (See Figs.8).

Internal runs may be in a minimum of 19mm pipe. External runs MUST be made in a minimum of 32mm pipe, starting inside the building, and if possible insulated to defer problems from freezing.

The British Gas booklet "Guidance for the installation of Domestic Condensing Boilers" should also be referred to.

SYSTEM DESIGN

General principals

Condensing Boilers give their best performance when the system water temperature is as low as possible and still achieve the desired room temperatures. Oversized radiators make this easier to achieve but are not essential as, even in a standard designed installation, most of the

boilers' working hours are spent with the system producing much less than the designed output. This is because the outside temperature is often higher than the figure used for the design, typically -1 to -2°C.

The Manufacturer strongly recommends the use of a programmable room thermostat, alternatively separate clock and room thermostat can be used.

Terminals 3 and 4 on the main wiring strip are provided for an external Frost Thermostat. A Frost Thermostat should be located in the coldest part of the house but in a position where it can respond to a rise in temperature as a result of switching on the appliance.

If the appliance is fitted in a garage or outhouse it is recommended that a pipe thermostat should also be used to switch off the boiler when the return temperatures reaches a set level.

The Installer can set the pump speed for Central Heating, the speed in DHW operation is controlled by the appliance.

Thermostatic radiator valves can be used but it is essential to fit a bypass to maintain minimum flow conditions. A TRV controlled system would also be improved by the addition of an anti-cycling device.

The boiler waterside is completely copper. All corrosion inhibitors that are suitable can be used. There is no specific requirement for the fitting of a scale reducer.

Designs

The following designs are all acceptable:

1. Sealed system to BS.6798 and BS.5449 :1
2. Combined Feed and Vent systems.
3. Separate Cold Feed and Vent systems.

The pump is on the return and careful note of its position relative to the feed and vent MUST be made to avoid pumping over, or sucking in air. The design temperature difference across the boiler for optimum operating efficiency is 20°C. If thermostatic valves or zone valves are used ensure the minimum flow shown in the Technical Data is possible.

ELECTRICAL CONNECTIONS


WARNING: The appliance MUST be earthed.

All wiring for the boiler and system controls MUST conform to I.E.E. Wiring Regulations, and work should be tested using a suitable meter, for Earth Continuity, Polarity, Short Circuit and Resistance to Earth.

The supply must be through a common isolator a double pole 3A fused isolating switch with a contact separation of 3mm minimum on both poles. The cable used should be no less than 0.75mm² to BS.6500 PVC, 3 core, and fixed using the built in securing clamps, ensuring the earth connection is longer than the Live and Neutral.

Access to the boiler terminal strip is made by releasing the two screws on the front panel and by sliding the bottom section of the boiler forward until it clears.

The boiler internal wiring is shown in schematic form in Fig.3, and 4 connections are as follows:-

Terminal	Connection
	Earth
L	Mains Live
N	Mains Neutral
1.	External Time switch
2.	External Time switch
3.	Frost Thermostat
4.	Frost Thermostat

The boiler includes a thermostatic pump overrun.

For systems using an external time switch, the electrical wiring should follow the relevant control manufacturer's recommendations.

The Manufacturer recommend the use of a combined clock thermostat.

COMMISSIONING General

The elimination of air from systems is essential to minimise the occurrence of heat exchanger and general system noise. It is particularly important for lightweight boilers. Metal swarf and flux chemicals make a very aggressive mixture, the destructive nature of

which can be drastically reduced by flushing. Consequently this is a mandatory step in the commissioning procedure.

Low water content, fabricated boilers are vulnerable to damage by air, particularly when the system water is 'hard'. (Contains a lot of dissolved calcium salts). The result of this damage is evident in noisy boilers and reduced service life.

Removal of air from a system mainly takes place when the water is stopping, starting or not moving at all. It is removed most easily when it is in large bubbles, but the action of the pump is to chop it up so that it becomes a foam, which is extremely difficult to remove.

Two or three second bursts on the pump at the initial stage will reduce the risk of foam formation. Sloping the pipe runs towards the vent points will greatly aid air removal. Sloping pipes are not just a feature of gravity systems but can greatly aid the pumped system - because air can move towards a vent when the pump stops.

Air is dissolved in water but is released when heated. Always run a system at maximum temperature for at least 15 minutes to enable this potential problem to be removed during commissioning.

COMMISSIONING PROCEDURE

The boiler is fitted with automatic ignition and will start when the gas cock is open, mains is connected to the boiler and the controls calling for heat. It is strongly suggested that the following stages of commissioning are followed, and not an immediate connection of all services.

Carry out electrical tests as stated in Electrical Connections if not already done so.

With all radiator valves fully open and with the temporary hose connected, fill from the mains supply, but do not start the pump, then follow the procedure below.

- Check for water soundness and rectify where necessary.
- **DO NOT TURN ON GAS**
- Drain the system by opening all draincocks. This will flush the system of flux and swarf.
- If required add water treatment, as per BS7593. Fill to required pressure plus 0.5 bar (to allow for venting)

- Switch the electrical supply to the boiler on and then switch the programmer/thermostat on. Switch off after about five seconds and vent all points again. Repeat this for 5 minutes. Re-pressurise if required

(This procedure prevents substantial amounts of air being dispersed through the system as small bubbles).

- Turn on pump (do not turn on gas) and run for at least 30 minutes with 3 port valve in DHW position most of the time. Stop pump at five minute intervals and vent until no more air can be removed and air noises are no longer produced at the boiler. While the system is venting check again for water soundness.
- Check for gas soundness (BS 6891: 1988) in pipework to boiler using a manometer. Open the gas cock and after purging the system, the boiler will light automatically. Run system at maximum thermostat setting.
- Gas soundness within the boiler should be checked using sense of smell and/or leak detection fluid. Continue running for 15 minutes, venting every 5 minutes.

IMPORTANT: With the front panel switch set to HOT WATER, check that the burner pressure is as detailed in the Datable by using a manometer connected to the outlet of the multifunctional control. If it is low check the inlet pressure is at least 20 mbar.

- Set the front panel switch to Hot Water, run hot water for a short while, the pressure should initially be as shown in the Datable. The pressure will slowly reduce as the temperature stabilises. To check the minimum burner pressure, it will be necessary to reduce the flow from the tap.
- The Maximum Hot Water temperature is factory set at its highest position, if required it can be reduced using the potentiometer inside the electrical tray, marked HOT WATER TEMPERATURE.
- To set the Central Heating output, select CENTRAL HEATING & HOT WATER on the front panel switch and then adjust the burner pressure potentiometer on the driver Pcb (Fig. 3) to that given in the Datable.
- The pilot is non-adjustable.
- If fitted, check the operation of the system bypass with system hot, the minimum flow rate through the boiler should be as shown in the Datable.

- Set the pump speed to the highest setting that does not provoke unreasonable operational noise within the system.
- Re-pressure the system to required pressure and set the gauge indicator
- With the system hot, check again for water soundness.
- Refit the case to the boiler.
- Balance the system in the normal way to obtain even heating of all radiators.
- For boilers supplied with a factory fitted timeswitch, set as per the separately supplied Instructions.
- Explain and demonstrate the operation of the system to the user.

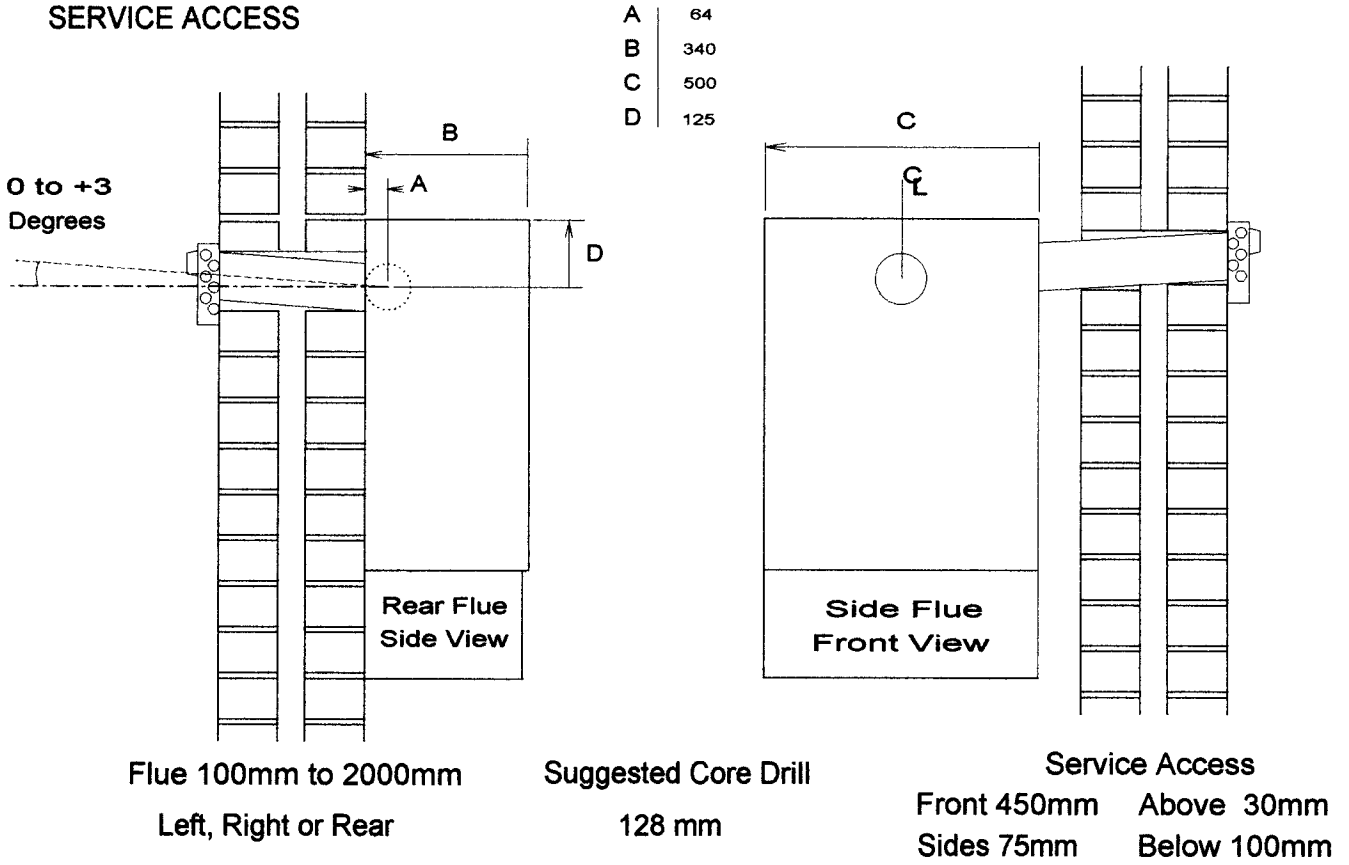
Note: *The boiler condensate trap is fitted with a blocked drain device and syphon trap to safeguard the boiler and help defer the effects from the possible freezing of the condensate pipework in extreme weather. The householder should be made aware of this feature and, that in the event of blocked condensate pipework, for example it has frozen, the boiler will automatically stop functioning. It will start again as soon as the blockage has cleared.*

Commission Checklist (hydraulic)

The key points that must be observed closely are shown below.

- With radiator valves and vents open fill system.
- Do not use pump. Do not light gas
- Check for and rectify leaks.
- Drain to flush system.
- Refill system.
- Do not light boiler.
- Vent all radiator and air release points.
- Run pump for 5-10 second bursts and re-vent.
- Do not light boiler.
- Run pump for at least 30 minutes.
- Stop at 5 minute intervals to vent.
- Continue venting until no more air noise can be heard.
- Light boiler and run at max thermostat setting. Continue for 15 minutes, venting every 5 minutes.

**INSTALLATION DIMENSIONS
SERVICE ACCESS**



**PIPE CONNECTIONS
AND LOCATIONS**

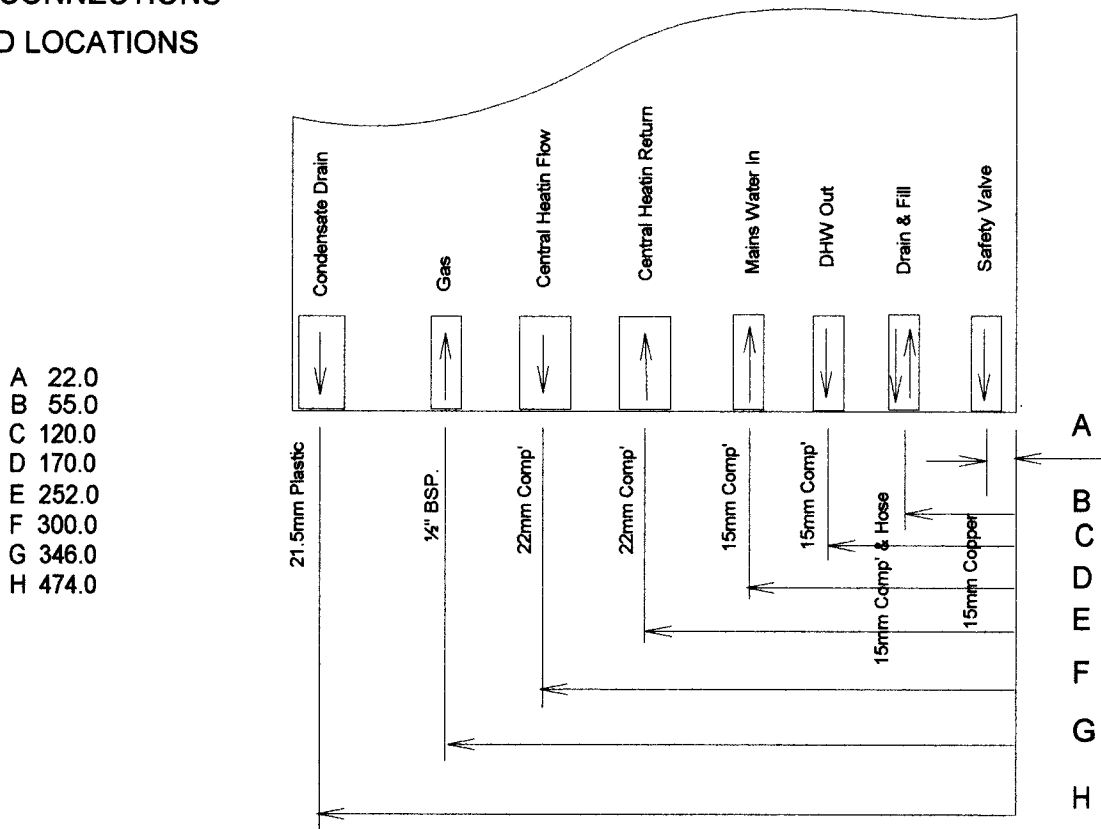


Fig. 1

BOILER PANEL ASSEMBLY

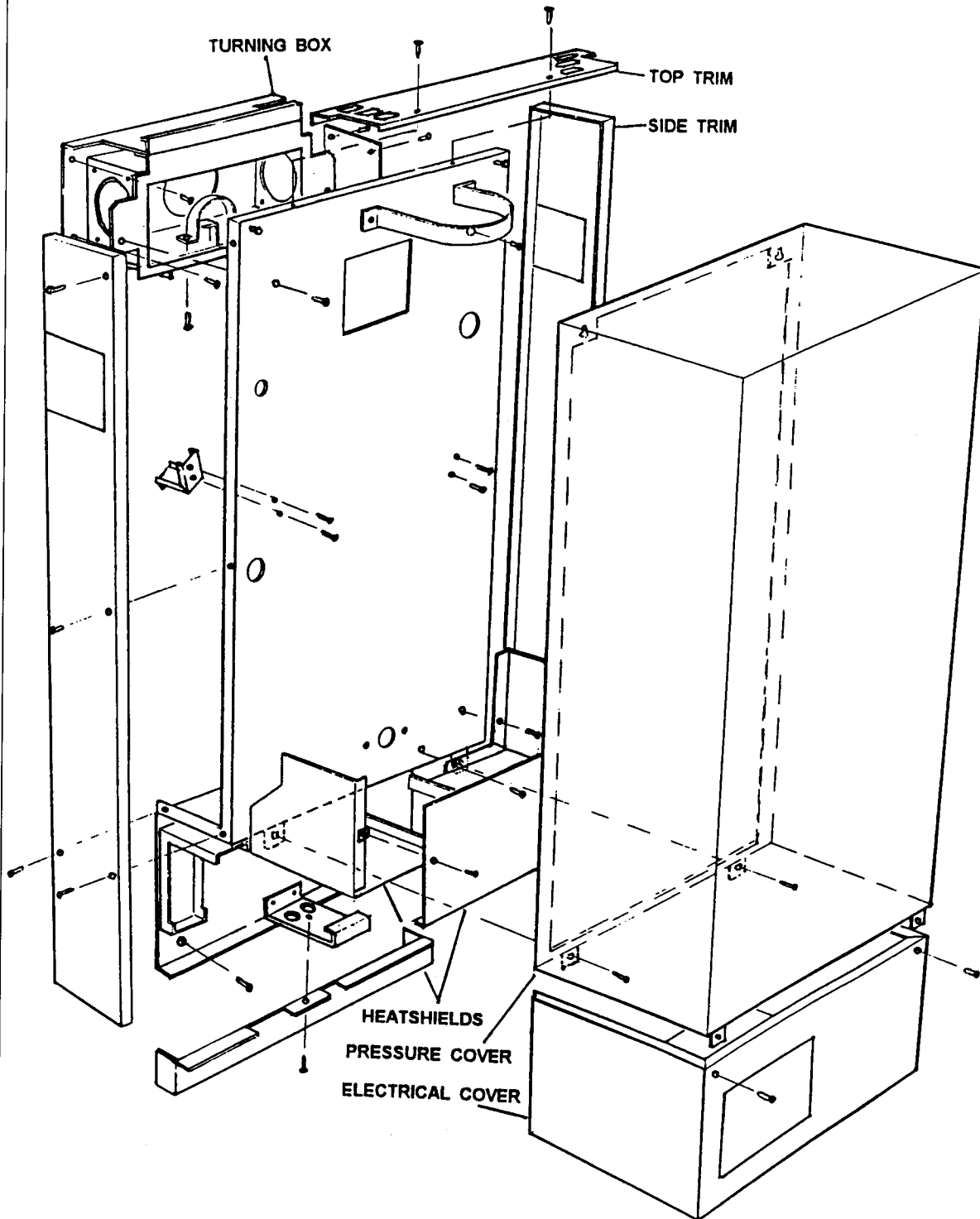


Fig.2

PHYSICAL WIRING

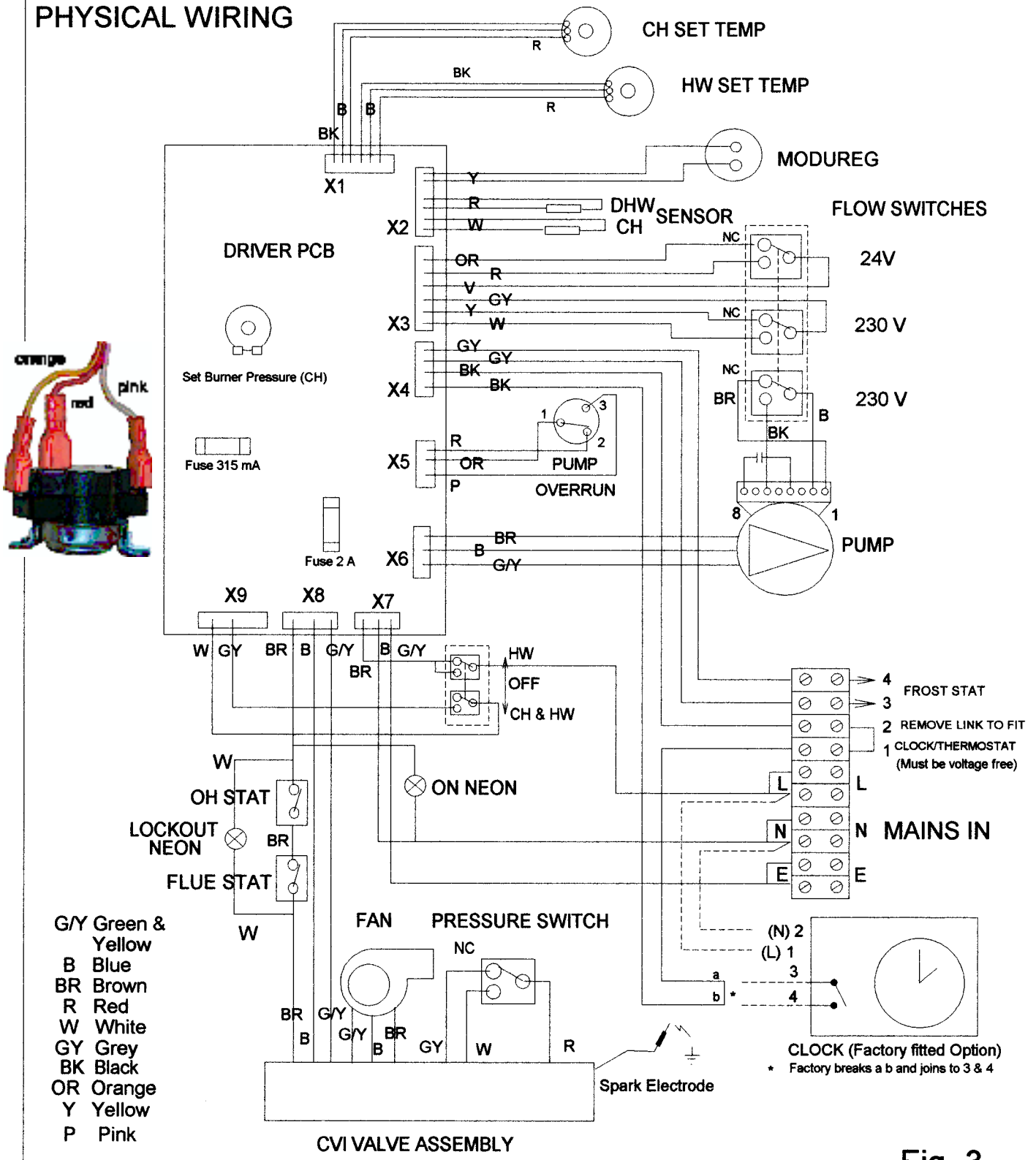


Fig. 3

7/6/99

FUNCTIONAL FLOW WIRING

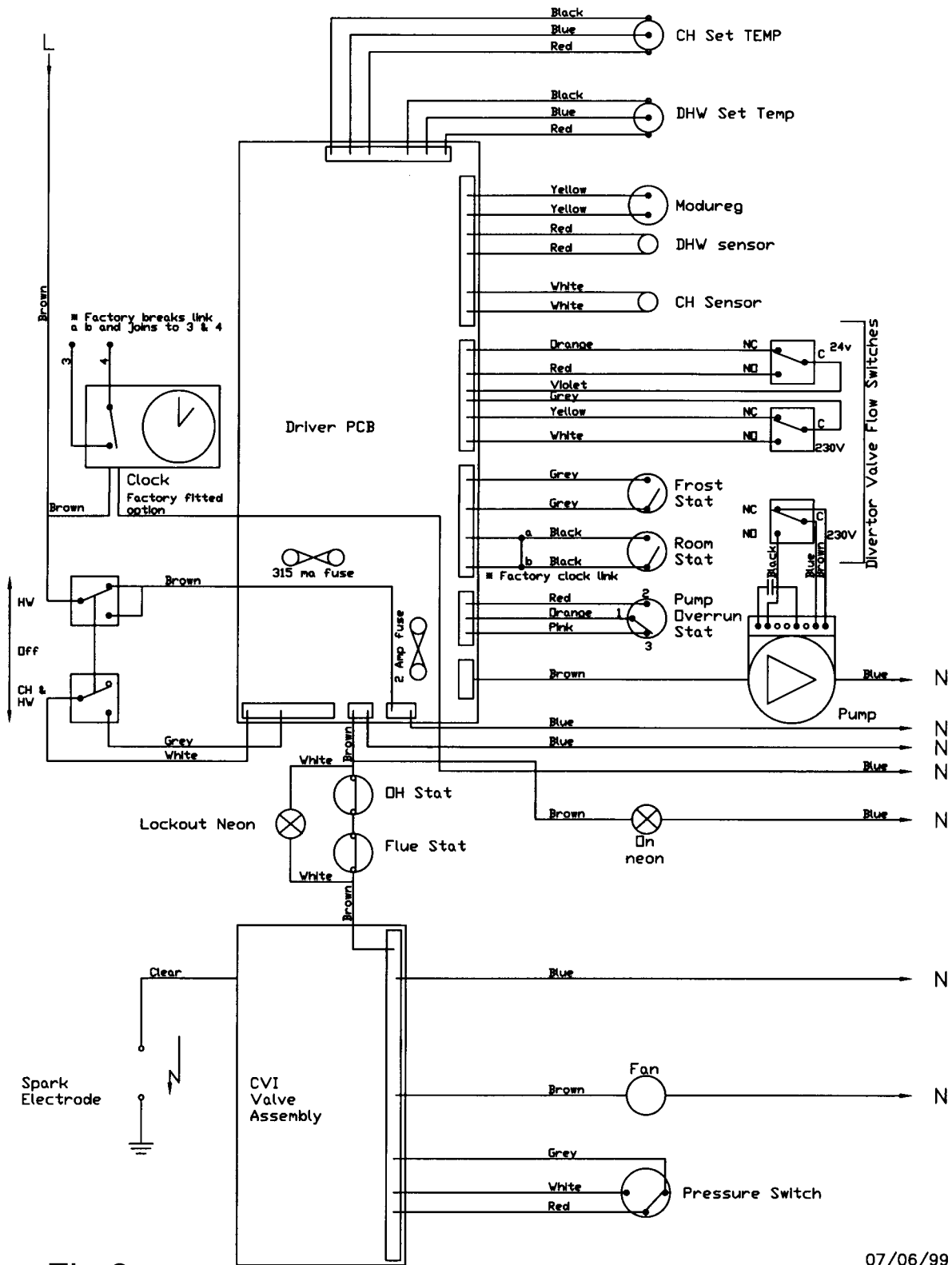
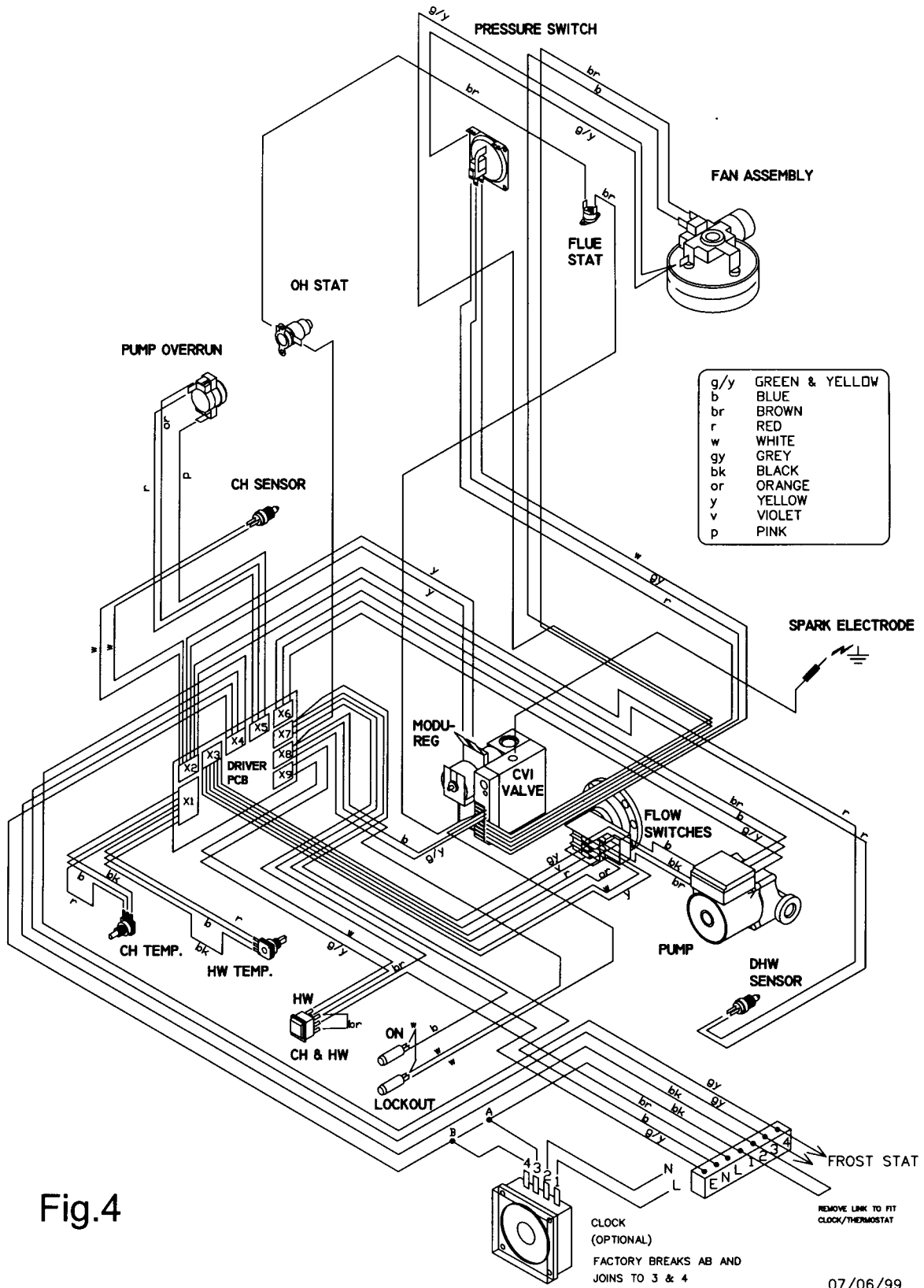


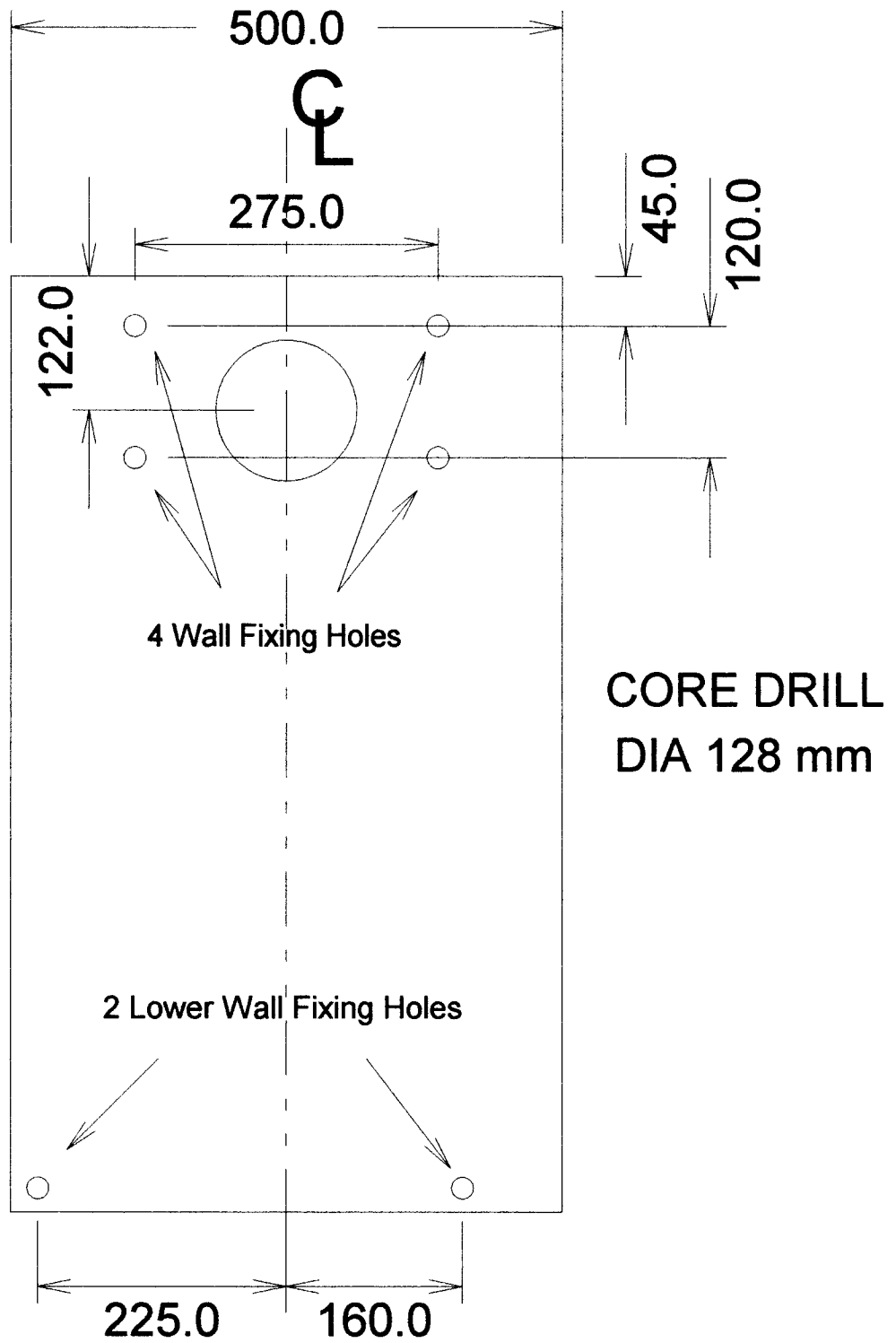
Fig.3a

07/06/99

PHYSICAL WIRING



FIXING POSITIONS



596072

Fig. 5

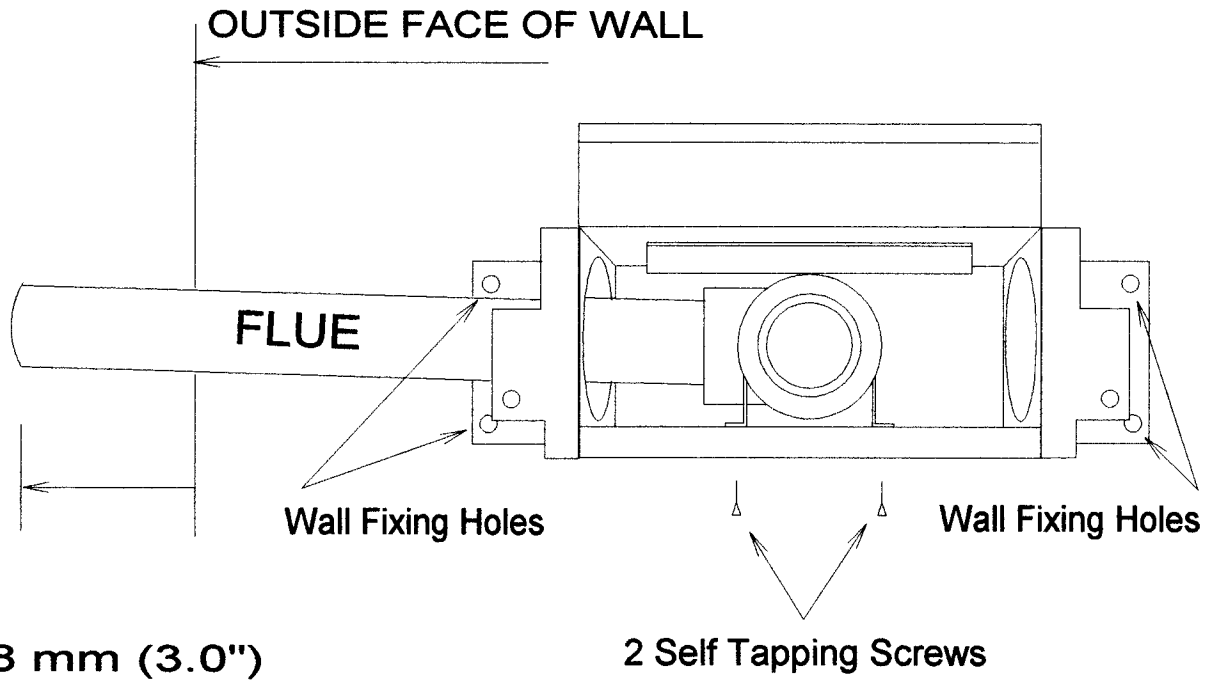


Fig. 6

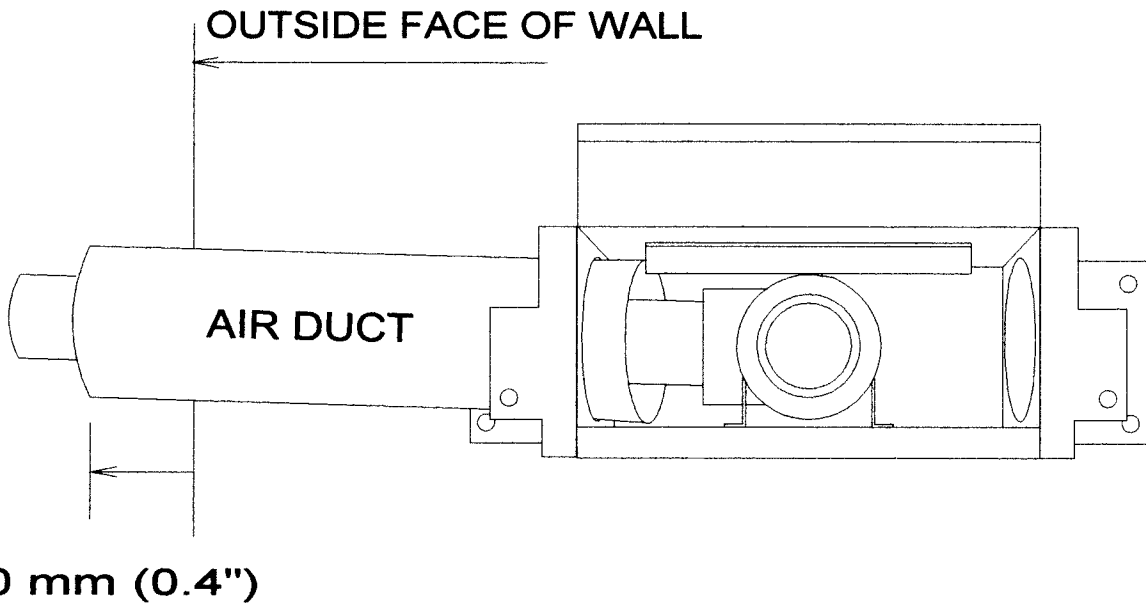


Fig. 7

595021

EXAMPLE CONDENSATE DISPOSAL METHODS

Note: Minimum Internal 15mm
Minimum External 32mm

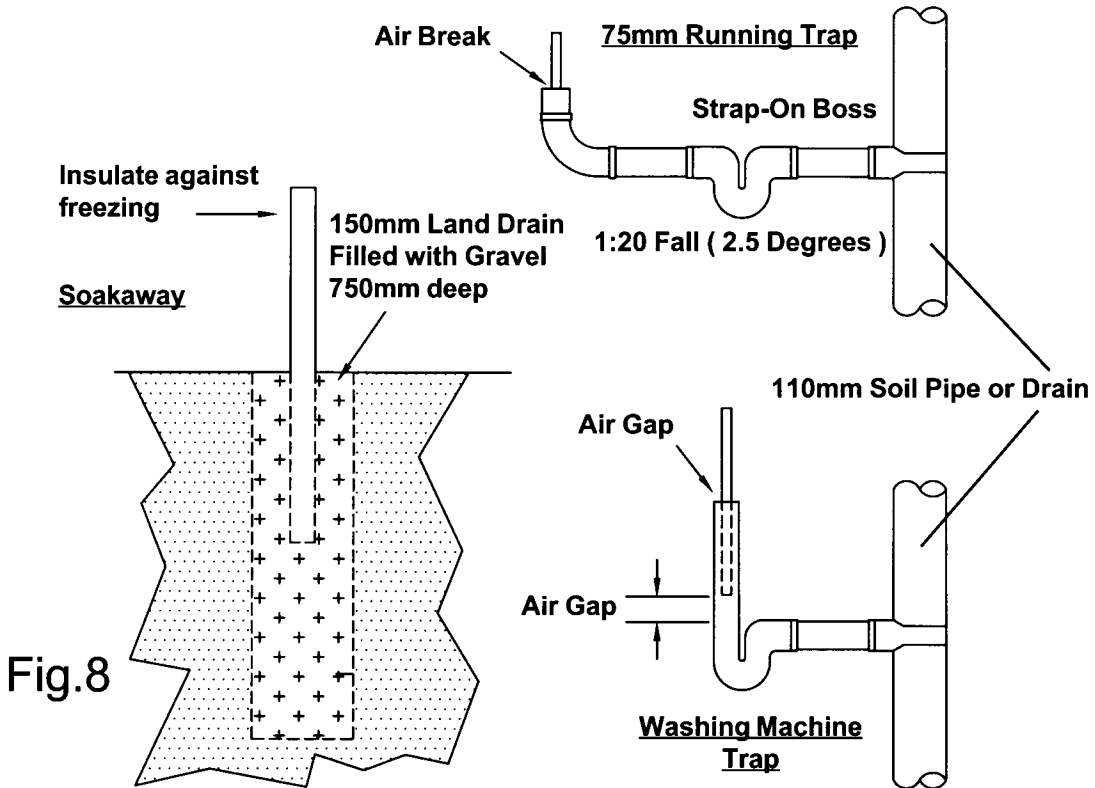


Fig.8

CONDENSATE DRAIN TRAP

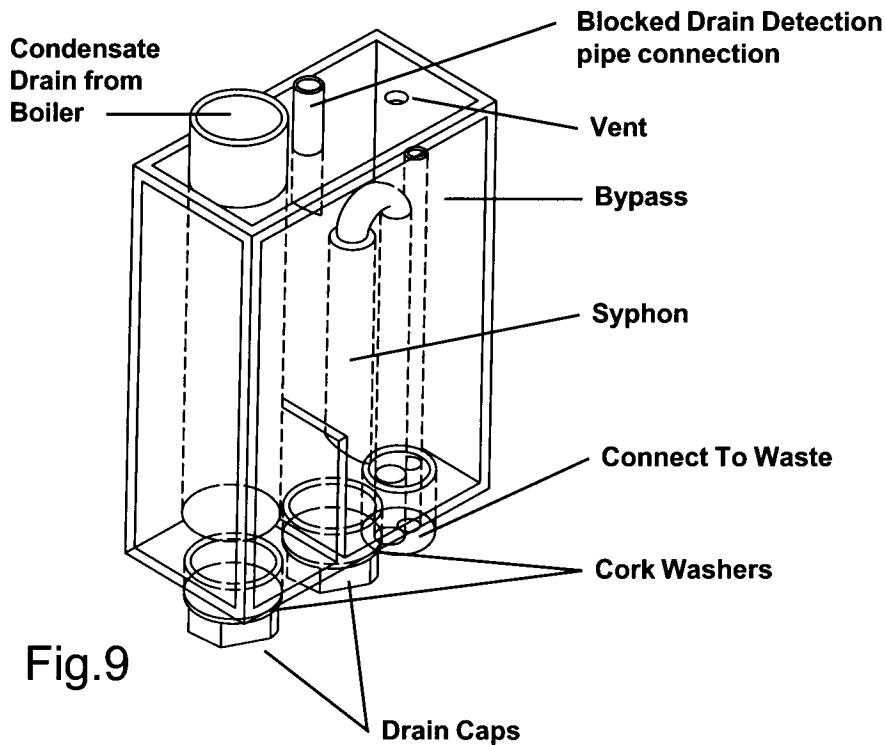
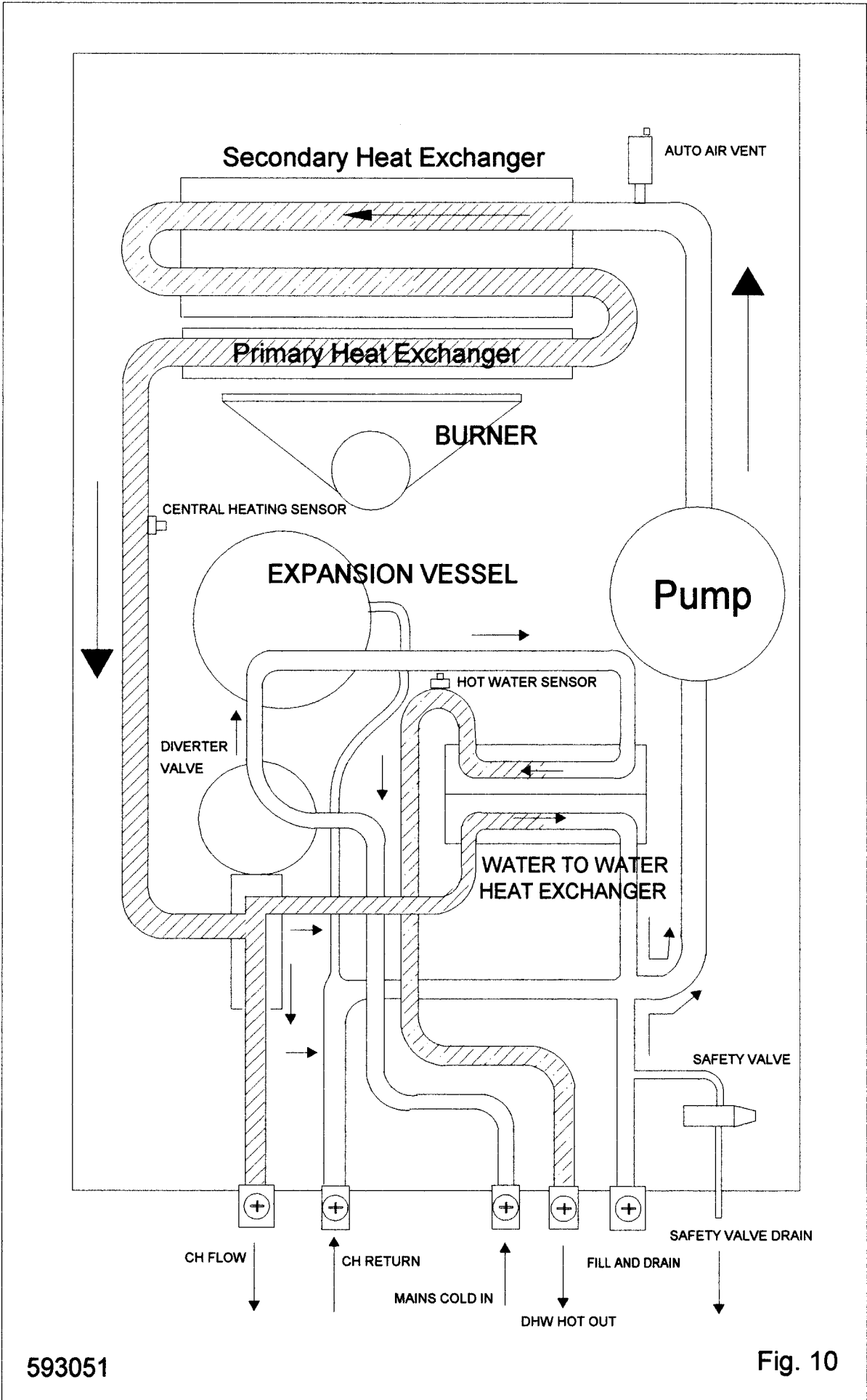


Fig.9



593051

Fig. 10

FAULT FINDING

Operation Sequence

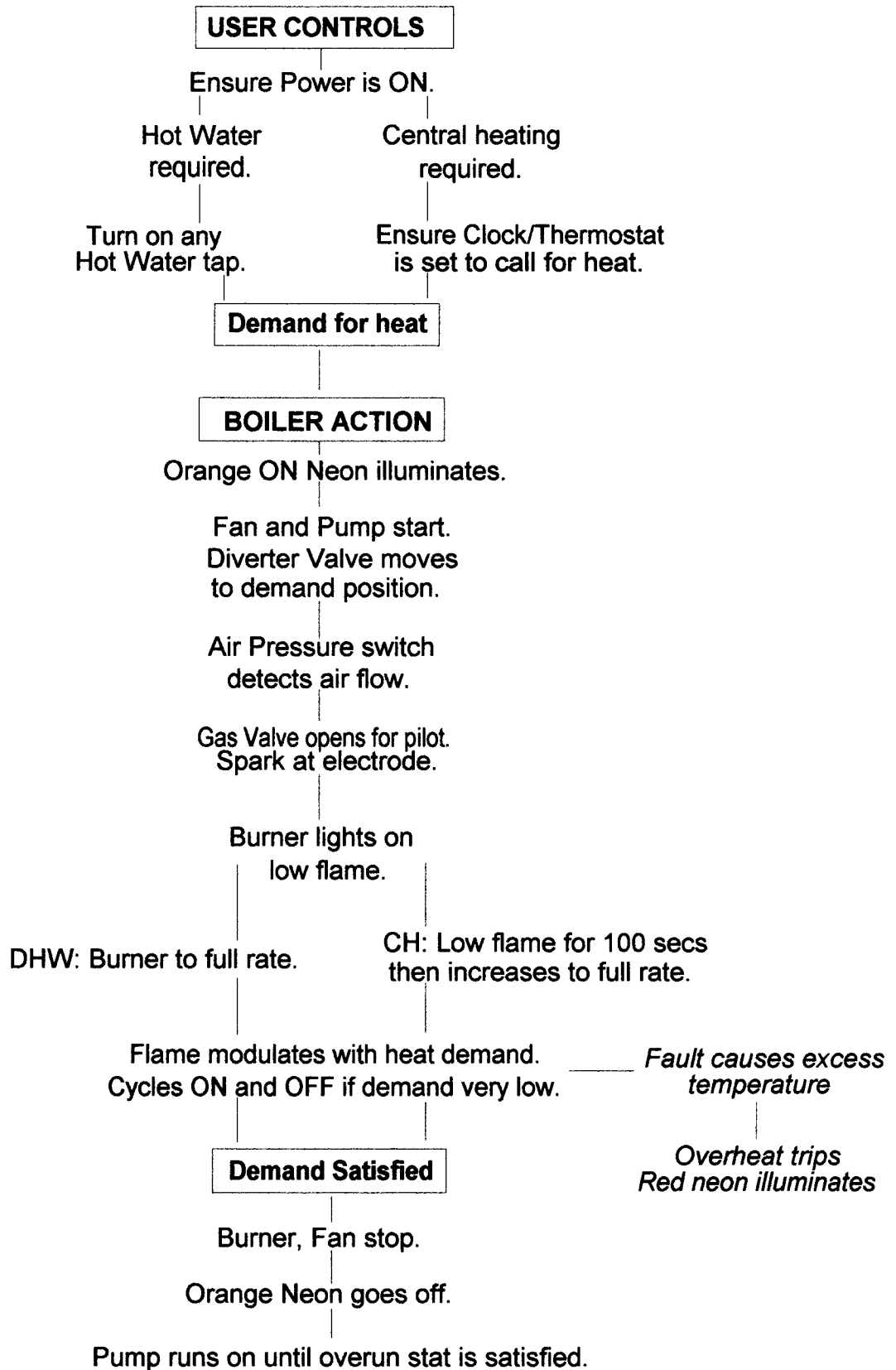
By using the flow charts basic problems can be identified.

If the particular fault cannot be immediately identified, follow the charts from beginning to end

Before commencing, always check that the Mains is ON and the system controls are calling for heat, the gas cock is open.

If the system is pressurised, it is at normal pressure, and all valves are open.

Test the electrical system for short circuit, polarity, and resistance before attempting any electrical fault finding.

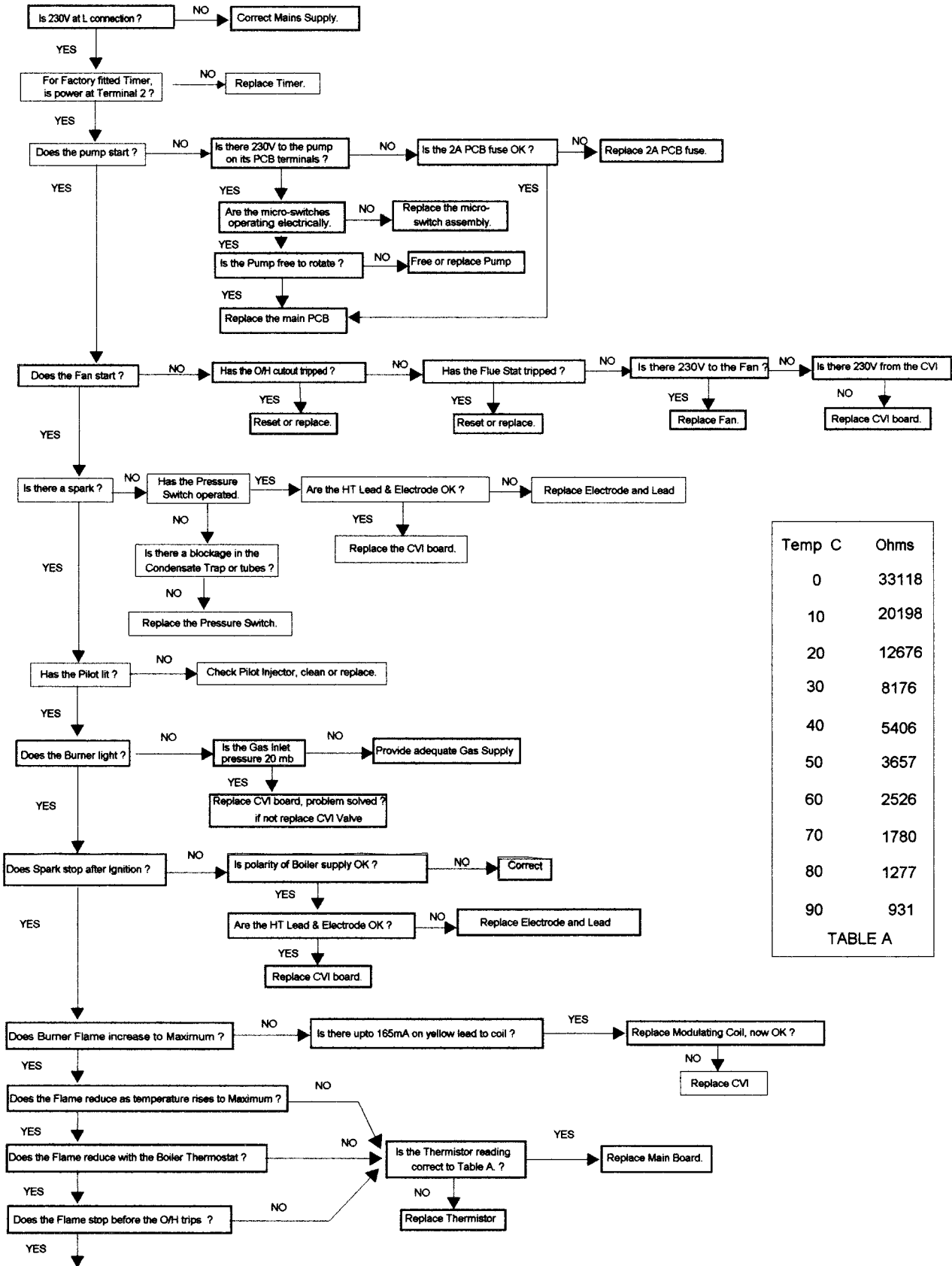


25/11/95

FAULT FINDING Central Heating Operation

Start with system and boiler cold, with the power ON and no Hot Water taps open.

Set the Boiler Thermostat to Maximum, and set system controls to call for heat.



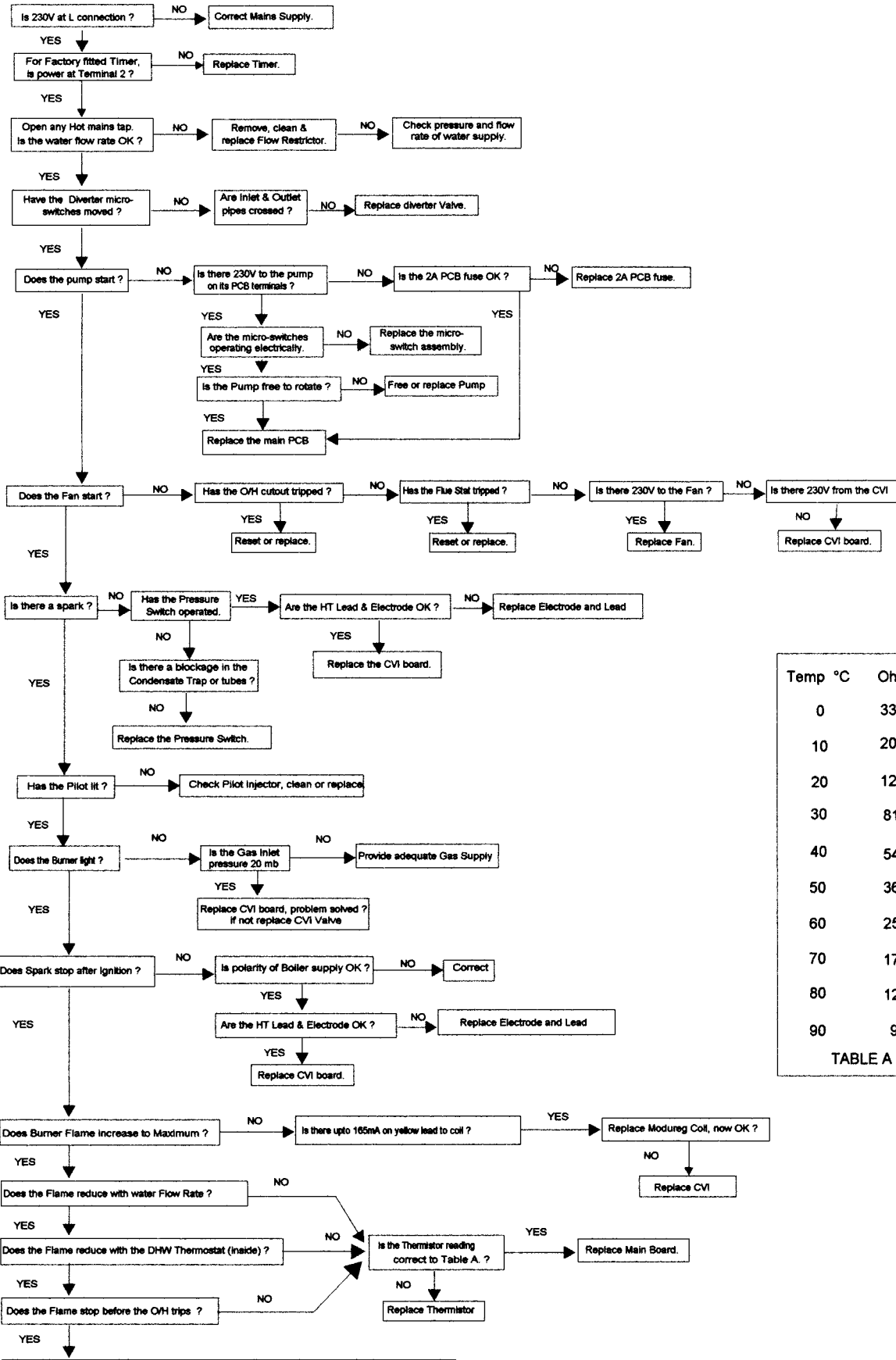
Temp C	Ohms
0	33118
10	20198
20	12676
30	8176
40	5406
50	3657
60	2526
70	1780
80	1277
90	931

TABLE A

BOILER OPERATION SATISFACTORY (CVI = Combined Valve & Ignition) 6/12/95

FAULT FINDING Hot Water Operation

Start with system and boiler cold, with the power ON and no Hot Water taps open. Then Use a hot tap to operate the boiler.



Temp °C	Ohms
0	33118
10	20198
20	12676
30	8176
40	5406
50	3657
60	2526
70	1780
80	1277
90	931

TABLE A

BOILER OPERATION SATISFACTORY (CVI = Combined Valve & Ignition) 6/12/95

SERVICING

Health and Safety Statement:

This product contains no asbestos.

Routine

To ensure continued efficient operation of the appliance it is recommended that it is checked and serviced at regular intervals. The frequency of servicing will depend upon the particular installation and usage but in general once per year should be adequate. It is law that any service work should be carried out by Corgi registered personnel.

1. Clean burner and combustion chamber.
Check pilot and burner gas supply.
Check condition of sensing probe.
2. Check boiler pipework joints for leaks.
3. Check condensate pipework for leaks.
4. Check heat exchangers, flue and air duct are clear of any obstruction, and not leaking.
5. Check and clear the condensate exit on the secondary heat exchanger by removing the Condensate Outlet and the Inspection Cover.(Fig. 12)
6. Check and clear the condensate syphon.

Follow the procedures given in *Changing Components* for parts removal in addition to the following notes.

1. Heat Exchangers

Remove the panel in front of the secondary heat exchanger to gain access to inner inspection panels on the secondary and to view the primary (the lowest inspection panel also gives a view of the primary). Also view from beneath the primary. Clean as required. If in doubt, drain the system and remove for inspection.

2. Condensate Syphon

With a suitable bowl to catch the water, unscrew the two drain-caps on the underside of the Syphon trap and drain the water. Remove any solids and replace caps. (fig 9)

CHANGING COMPONENTS

THERE ARE NO REPAIRABLE ITEMS, IF NOT WORKING AN ITEM MUST BE REPLACED.

The boiler is in two major sections, the Case, and the Electrical Tray, The Major Components Diagram shows where the items are to be found.

Behind the Electrical Tray

1. Sequence Controller.
2. Main Driver Board.
3. CVI Valve.
4. Time switch (if fitted)
5. Pressure gauge
6. Pump.
7. Diverter Valve.
8. Safety Valve.
9. Water to water heat exchanger.
10. Cold water inlet flow regulator and trainer.
11. DHW Temperature Sensor.

Behind the Case

12. Fan.
13. Air Pressure Switch.
14. Flue Thermostat.
15. Pump Over-run Thermostat.
16. Overheat Cut-off Device.
17. HT Lead.
18. Pilot Assembly.
19. Burner.
20. Main Injector.
21. Combustion Chamber Insulation.
22. Primary Heat Exchanger.
23. Secondary Heat Exchanger.
24. CH Temperature Sensor.

Servicing behind the Electrical Tray

To Remove the Electrical tray

- Disconnect the electrical supply from the boiler and system.
- Undo the two screws on the front fascia.
- Slide the Electrical Tray forward a short way, then lower.
- Remove the cover over the components.
- For complete removal ; Separate the plugs on the leads (they have a built in latch) from the Electrical Controls to the Combustion Chamber. Valve off the boiler then unscrew the pressure sensor, it may need a temporary plug to avoid leaks.

DO NOT STRAIN THE CABLES, USE THE SUPPORT PROVIDED.

1. Sequence Controller

- Remove the Electrical Tray.
- Identify the CVI valve, the red pod beside it contains the Sequence Controller.
- Prise off the three multiway connectors from the CVI Sequence Controller pod.
- Pull off the HT Lead from the Controller.
- Pull the pod away, and replace.
- Re-assembly is the reverse.

2. Main Driver Board

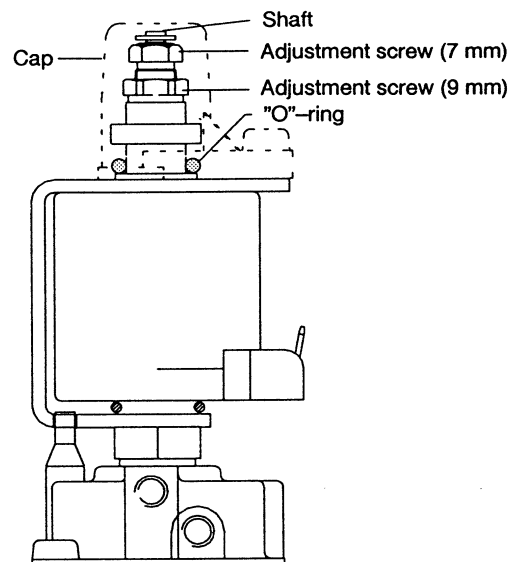
- Remove the Electrical Tray.
- Remove the screws that retain the inner cover.
- Prise off the nine multiway connectors, they only go back in their own position.
- Squeeze the pcb supports whilst lifting the pcb. Lift away.
- Re-assembly is the reverse.
- Adjust the burner pressures. See **FULL PRESSURE SETUP** in CVI Valve section below.

3. CVI Valve

- Remove the Electrical Tray.
- Turn the Gas Cock off.
- Pull off the red pod.
- Pull off the two leads from the Modureg solenoid.
- Release the pilot feed tube (8mm AF).
- Undo the two screws holding the valve lower retainer.
- Undo the gas cock.
- Undo the four shoulder bolts and remove the flange to the gas cock.
- Release the CVI outlet connector, and withdraw valve.
- Re-assembly is the reverse.

FULL PRESSURE SETUP

- Check Inlet pressure is at least 20 mbar when operating and the DHW potentiometer is set at maximum.
- Remove one of the yellow leads from the Modureg and its grey plastic cover.
- Attach a manometer to the outlet pressure tapping.
- Set to Hot Water Only, turn on a tap and check burner gas pressure is 1.8 mbar. Adjust the 9mm brass nut on the Modureg to correct.
- Replace the yellow lead and the boiler will go to high fire, 11.3 mbar. Adjust with the nylon 7mm nut on the Modureg whilst pressing down on its shaft.
- Replace the grey cover.
- Ensure the system controls are calling for CH then switch to DHW & CH the boiler will fire at low rate for 100 seconds. Adjust the small potentiometer on the Driver board to 5 mbar.
- After 100 seconds the boiler will go to high fire, adjust the large potentiometer on the driver board to the desired maximum CH output, factory setting 5.5 mbar.



4. Time Switch (when factory fitted)

- Remove the Electrical Tray.
- Tip the Electrical Tray forward to allow access to the clock's four push-on connectors.
- Note the colour positions then disconnect.
- Remove clear plastic cover.
- Turn the two slotted screws one quarter turn anti-clockwise.
- Pull out Time Switch and replace.
- Re-assembly is the reverse.

(Make certain the engagement plate fits the slot in the programmer before securing it with the two M5 screws.)

5. Pressure Gauge

- Remove the Electrical Tray.
- Remove the screws that retain the inner cover.
- Unscrew the pressure sensor, it may need a temporary plug to avoid leaks.
- Squeeze the top and bottom latches on the gauge, and push out of the panel.
- Re-assembly is the reverse.

6. Pump

- Remove the Electrical Tray.
- Close the CH Flow and CH Return valves.
- Drain the boiler through the Fill and Drain Valve.
- Disconnect the cable to the Pump.
- Undo the Pump nuts and remove the Pump.
- Re-assembly is the reverse, ensure the fibre washers are in place.

7. Diverter Valve

- Remove the Electrical Tray.
- Close the CH Flow and CH Return valves.
- Close the DHW Cold In valve and open a Hot tap to drain the pipework.
- Drain the boiler through the Fill and Drain Valve.
- Remove the circlip on the Diverter Valve to release the switching head.
- Undo the five water connections to the valve and remove.
- Replace unit with new or factory exchange unit.
- Re-assembly is the reverse, ensure the fibre washers are in place.

8. Safety Valve

- Remove the Electrical Tray.
- Close the CH Flow and CH Return valves.
- Drain the boiler through the Fill and Drain Valve.
- Remove the Pressure Gauge from the Safety Valve.
- Undo the water connections to the Safety Valve and remove.
- Re-assembly is the reverse, ensure the fibre washer is in place.

9. Water to Water Heat Exchanger

- Remove the Electrical Tray.
- Close the CH Flow and CH Return valves.
- Close the DHW Cold In valve and open a Hot tap to drain the pipework.
- Drain the boiler through the Fill and Drain Valve.
- Remove pump and pipes for easy access.
- Undo the four water connections to the heat exchanger and pull clear.
- Re-assembly is the reverse, ensure the fibre washer is in place.

10. Flow Regulator and Strainer

- Remove the Electrical Tray.
- Close the Cold Water In valve.
- Open a Hot tap to drain the pipework.
- Remove the Mains Cold In Valve.
- Carefully prise out the Flow Regulator and Strainer (boiler side).
- Clean Strainer and restrictor.
- Re-assembly is the reverse.

11. DHW Temperature Sensor

- Remove the Electrical Tray.
- Remove the electrical connection from the DHW Temperature Sensor and unclip from pipe.
- Re-assembly is the reverse.

Removing the Case

- Remove the Electrical Tray but not the inner cover, hang the tray on the support.
- Undo the two M5 screws at the base of the Case.
- Lift the Case straight up about half an inch (12mm).
- Gently pull the Case straight forward off the hidden studs at the top of the boiler. (The cover hangs on two studs in keyhole slots)
- Examine the sealing strip for damage and replace if necessary.
- Place the Case somewhere safe from damage.
- Refitting in the reverse order.

IMPORTANT: FAILURE TO CORRECTLY LOCATE THE APPLIANCE CASE COULD RESULT IN LEAKAGE OF COMBUSTION PRODUCTS INTO THE ROOM.

12. Fan Assembly

- Remove the Electrical Tray.
- Remove the Case.
- Undo the two self-tapping screws holding the Fan Protection Hoop and remove.
- Note the wire colours and positions.
- Pull the electrical connectors off the Fan.
- Gently pull the pressure tubing off the tapping on the Flue Hood.
- Remove Flue Stat.
- Undo the two screws holding the Flue Hood and lift away.
- Re-assembly is the reverse.

13. Air Pressure Switch

- Remove the Electrical Tray.
- Remove the Case.
- Pull the electrical connectors off the Air Pressure Switch.
- Gently pull the pressure tubing off the both tappings on the switch.
- Undo the two M4 screws holding the Air Pressure Switch to its bracket on to the Back Panel and lift away.

14. Flue Thermostat

- Remove the Electrical Tray.
- Remove the Case.
- Pull the electrical connectors off the Flue Thermostat.
- Re-assembly using Heat Sink Compound is in the reverse order.

15. Pump Over-run Thermostat

- Remove the Electrical Tray.
- Remove the Case.
- Note the three wire colours and positions.
- Pull the electrical connectors off the Pump Over-run Thermostat.
- Undo the two M4 screws holding the Thermostat.
- Re-assembly using Heat Sink Compound is in the reverse order.

16. Overheat Cut-off Device

- Remove the Electrical Tray.
- Remove the Case.
- Pull the two electrical connections of the Overheat Cut-off Device.
- Undo the two M4 screws holding the Thermostat.
- Re-assembly is the reverse.

17. Electrode and HT Lead

- Remove the Electrical Tray.
- Remove the Case.
- Undo the left and right screws holding the Front Burner Baffle.
- Remove the front baffle.
- Push the electrode towards the burner and pull down and clear.
- Pull off the HT Lead from the CVI valve.
- Re-assembly is the reverse.

18. Pilot Assembly

- Remove the Electrical Tray.
- Remove the Case.
- Undo the left and right screws holding the Front Burner Baffle and remove. If access is restricted also remove the right hand baffle.
- Undo the Pilot gas tube from the Pilot Assembly and gently lever downwards away from the Pilot.
- Undo the two screws retaining the Pilot Assembly.

- Re-assembly is the reverse.
NB The pilot is not adjustable.

19. Burner

- Remove the Electrical Tray.
- Remove the Case.
- Undo the left and right screws holding the Front Burner Baffle and remove.
- Undo the Pilot Assembly and gently lever downwards.
- Remove the Combustion Chamber front by releasing the four M5 screws.
- Pull the Burner forward off the two studs at the rear.
- Re-assembly is the reverse.

20. Main Injector

- Remove the Electrical Tray.
- Remove the Case.
- Remove the Burner.
- Undo the Main Injector from the manifold.
- Re-assembly is the reverse.

21. Combustion Chamber Insulation

- Remove the Electrical Tray.
- Remove the Case.
- Remove the baffles.
- Remove the Burner.
- Undo the four M5 screws in the front Insulation Panel.
- Undo the four M5 screws holding the Chamber to the Back Panel and lower downwards and away.
- Replace the Insulation Panels in the Chamber.
- Re-assembly is the reverse.

22. Primary Heat Exchanger

- Remove the Electrical Tray.
- Remove the Case.
- Remove the Front baffle.
- Remove or cover the Burner.
- Remove the Combustion Chamber.
- Remove the Overheat and Pump Over-run Thermostat.
- Close the CH Flow and CH Return valves.
- Drain the boiler through the Fill and Drain Valve.
- Undo the Flow and Return connections to the Heat Exchanger and lower away.
- Re-assembly is the reverse.

23. Secondary Heat Exchanger

- Remove the Electrical Tray.
- Remove the Case.
- Remove the Flue Thermostat.
- Remove the Fan Assembly.
- Close the CH Flow and CH Return valves.
- Drain the boiler through the Fill and Drain Valve.
- Undo the Flow and Return connections to the secondary Heat Exchanger.
- Release the Condensate connection clamping plate.
- Undo the four M5 screws holding the Secondary Heat Exchanger to the Back Panel and lift away.
- Re-assembly is the reverse.

24. CH Temperature Sensor

- Remove the Electrical Tray.
- Remove the Case
- Remove the electrical connection from the CH Temperature Sensor and unclip from pipe.
- Re-assembly is the reverse.

SPARES

Item	Part No	GC Number	Key
Burner	M0909	173065	1
Ceramic Board Set	M0905	106434	2
Flue Hood Gasket	7705	106381	3
Fan Assembly	M0910	106435	4
Sequence Controller	M0672	173066	5
Pilot Injector	M0663	381656	6
Gas Control	M0671	173067	7
DHW Clip-on Sensor (Temperature)	M3337		16
CH Clip-on Sensor (Temperature)	M3338		8
Air Pressure Switch	7712	379091	9
Main Injector (4.1 mm)	M0919	173112	10
Overheat Thermostat	M0868	173068	11
Pilot Assembly	M0662	106437	12
Flue Thermostat	7717	379308	13
Pump Overrun Stat	M0888	379308	14
HT Lead / Electrode	M0666	173076	15
On Neon (Red)	M0670	173069	20
Lockout Neon (Orange)	M0669	173073	21
Three Position Switch	M0624	173074	22
CH Potentiometer	M0900	379187	23
DHW Potentiometer	M0900	173075	24
Modureg Control Board	M0614	173072	25
Safety Valve	M0480	379831	34
Three Way Valve	M0608	173071	30
Pressure Gauge	M0448	173070	31
Plate Heat Exchanger	M0612	106436	32
Pump Grundfos 15/60	M0623	383722	33

ELECTRICAL SPARES

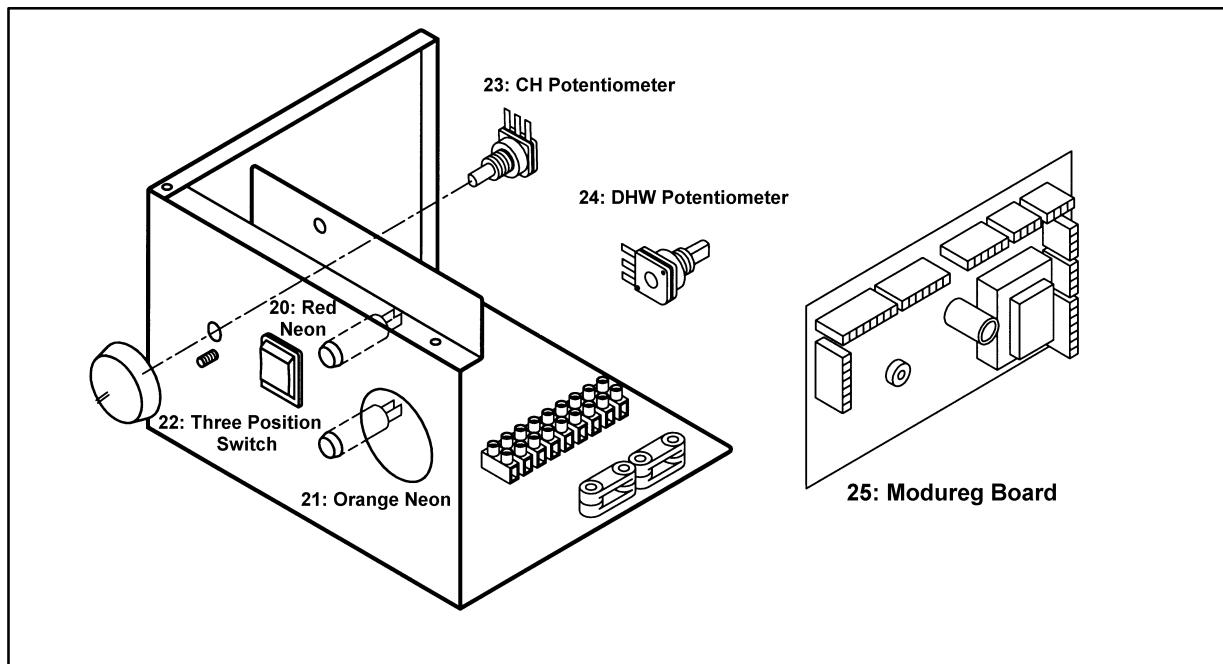


Fig. 11

MAJOR COMPONENTS

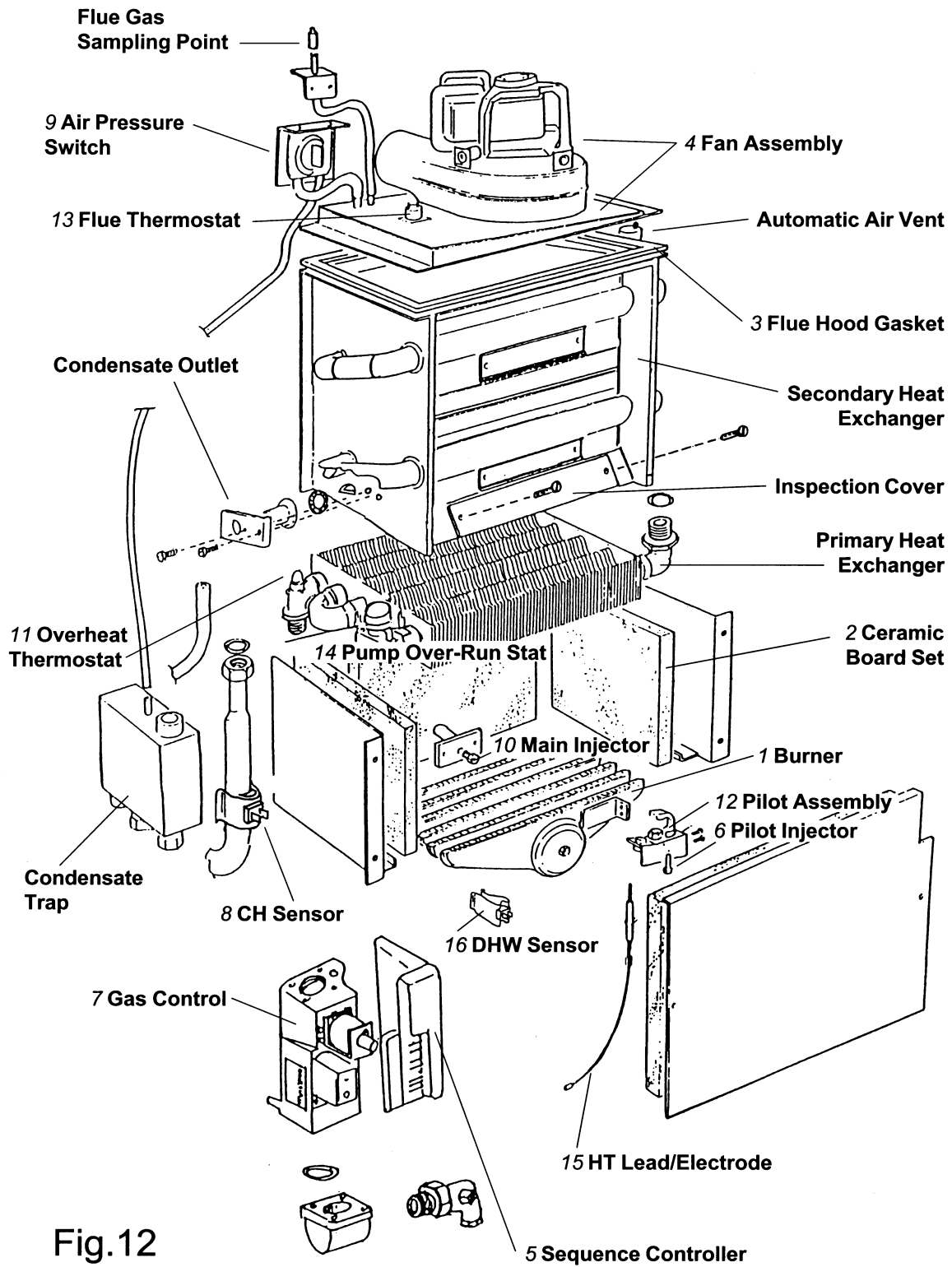


Fig.12

WATERSIDE SPARES

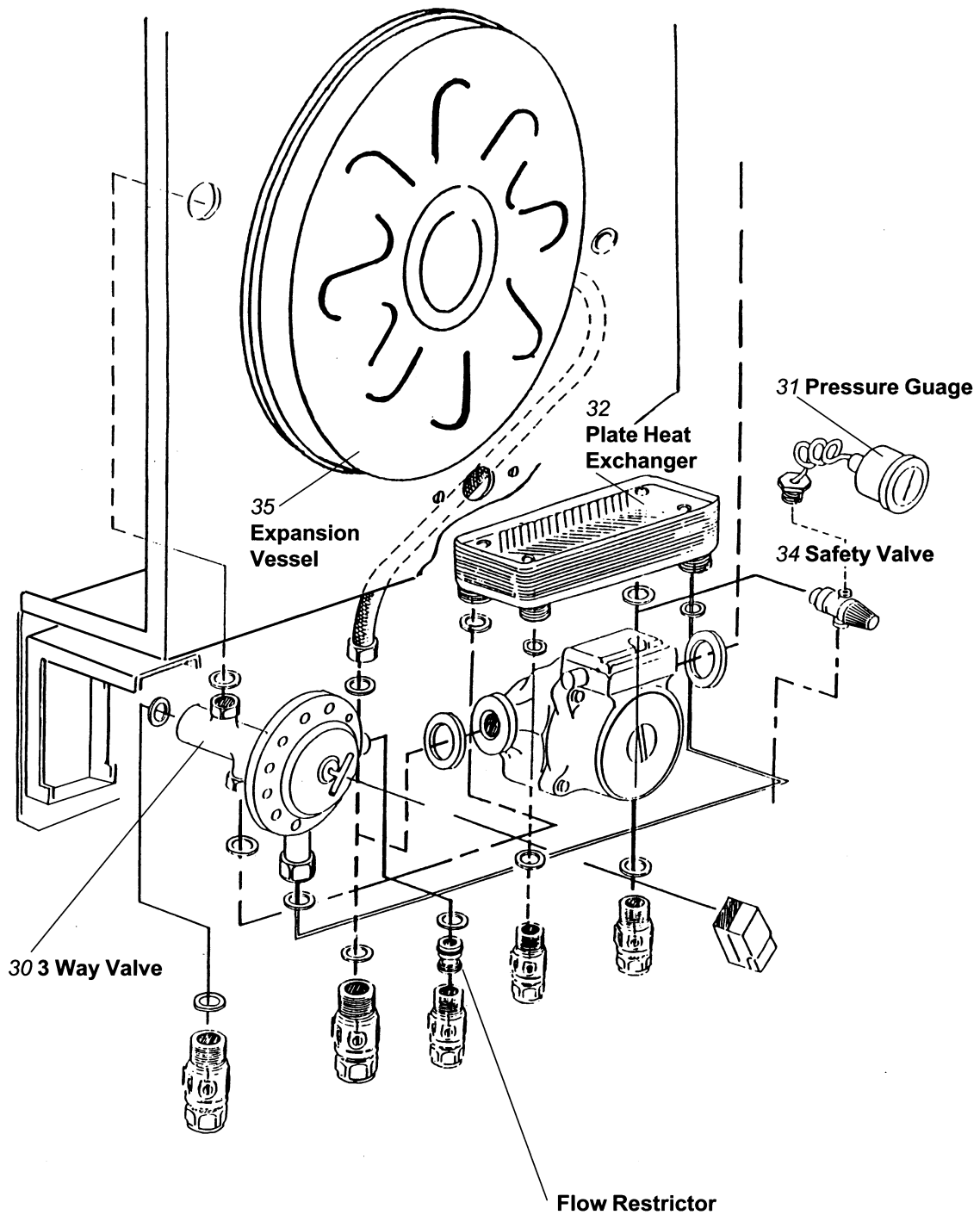


Fig.12a

INSTALLATION AND SERVICE RECORD

Installers Name and Address _____

Telephone No _____

Corgi Registration No _____

Installation date _____

Boiler serial No _____

Service Date	Action taken	Service Engineer, Contact phone number

