FAULT FINDING AND SERVICING INSTRUCTIONS

206693/5/87

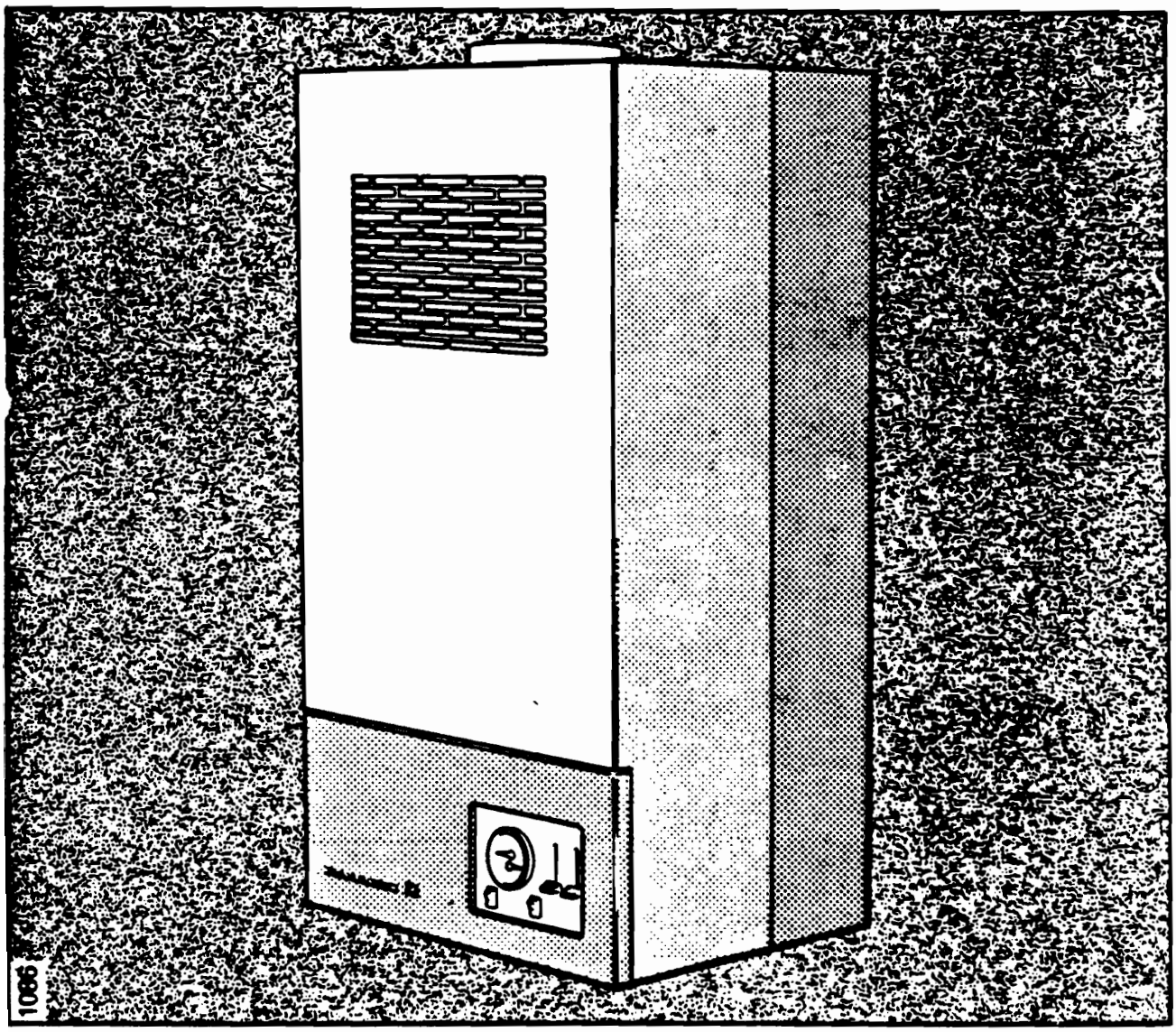
Glow-worm

To be left adjacent to the gas meter

FUELSAVER COMBINATION OPEN FLUE

Boiler and Water Heater

G.C. Number 47 313 03



Servicing and/or the replacement of parts must always be carried out by a competent person.

Any parts removed for servicing, or spare part replacements, should be fitted in the reverse order of removal unless stated otherwise.

Discard all used sealing washers and 'O' rings when exchanging components. Replace with new seals.

After completing any servicing or replacement of gas carrying components always test for gas soundness and carry out functional checks on controls.

The unit Data Badge is positioned on the inner face of the back panel, lower left hand side. Refer to section 1.2 and diagram 1.6.

1.1 ISOLATION OF UNIT

1.1.1 BEFORE COMMENCING ANY SERVICING OR REPLACING ANY PARTS, ISOLATE THE ELECTRICITY SUPPLY AT THE EXTERNAL ISOLATOR.

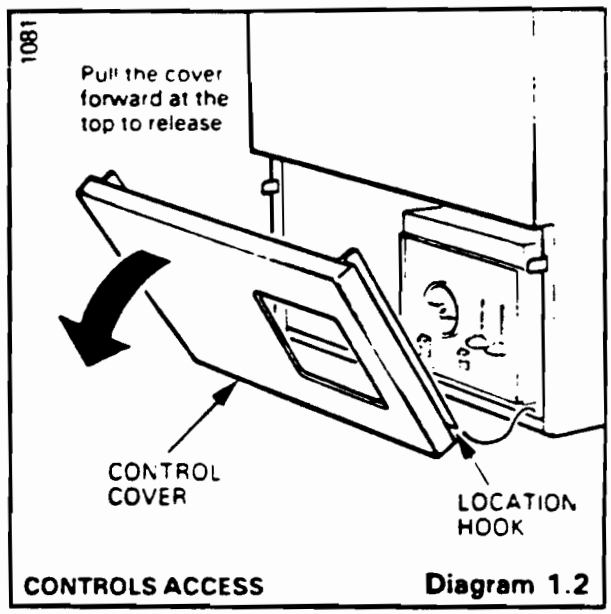
1.1.2 BEFORE COMMENCING ANY SERVICING OR DISCONNECTING ANY GAS CARRYING PART TURN OFF THE GAS AT THE SERVICE COCK, see diagram 1.1.

1.1.3 BEFORE DISCONNECTING ANY WATER CONTAINING PART, TURN OFF THE APPROPRIATE ISOLATING VALVES, see diagram 1.1. (Release the water pressure before draining the unit, refer to section 1.3).

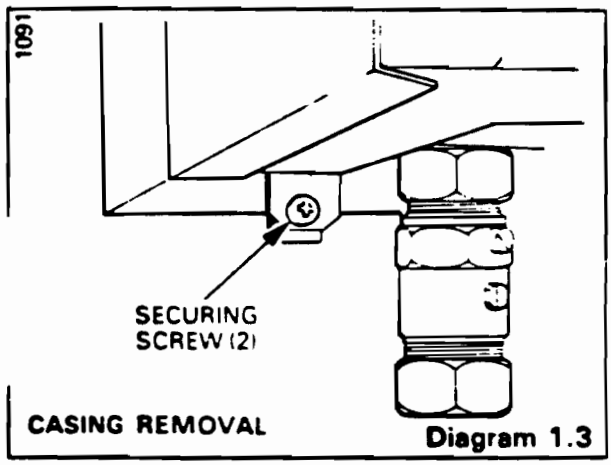
1.2 CASING REMOVAL

1.2.1 Release the lower controls cover by pulling forward at the top and remove, see diagram 1.2.

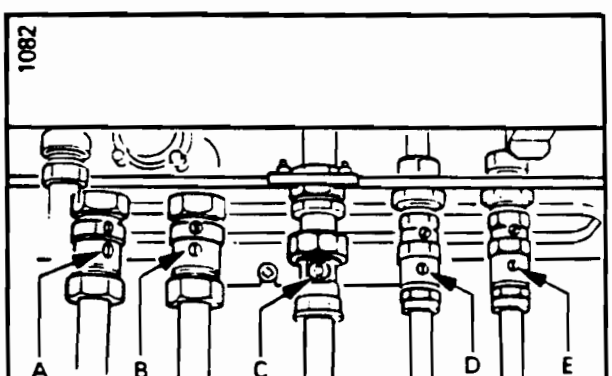
1.2.2 Remove the two casing securing screws at the base, see diagram 1.3, and unhook the casing at the top.



CONTROLS ACCESS — Diagram 1.2

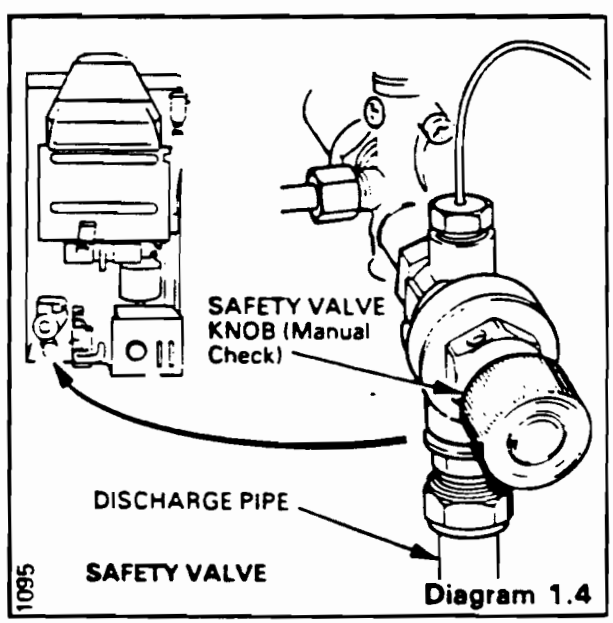


CASING REMOVAL — Diagram 1.3



A HEATING RETURN VALVE
B. HEATING FLOW VALVE
C. GAS SERVICE COCK
D. DOMESTIC HOT WATER VALVE
E. COLD WATER VALVE

UNIT ISOLATING VALVES — Diagram 1.1



SAFETY VALVE — Diagram 1.4

1.3 SYSTEM PRESSURE

1.3.1 All water containing parts on the central heating circuit, within the unit, are under system pressure. This pressure must be released by operating the safety valve (pressure relief valve) before any parts on this circuit are removed.

1.3.2 Turn the safety knob in the direction of the arrow to release the pressure, see diagram 1.4, then drain using the unit drain points, see diagram 1.5.

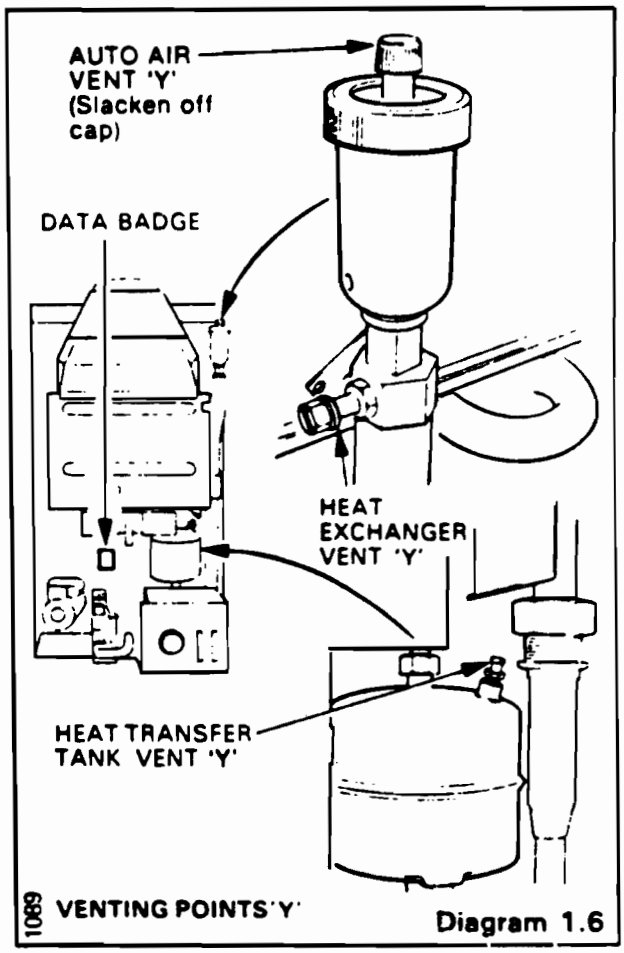
1.3.3 All water containing parts on the domestic hot water circuit are under mains pressure. Before any parts are removed on this circuit, within the unit, it must be isolated and drained using the unit drain points, see diagram 1.5.

1.3.4 After replacing any water containing part, refill or make up water loss, vent all air and pressurise the system. Refer to 'Commissioning and Testing' in the Installation Instructions.

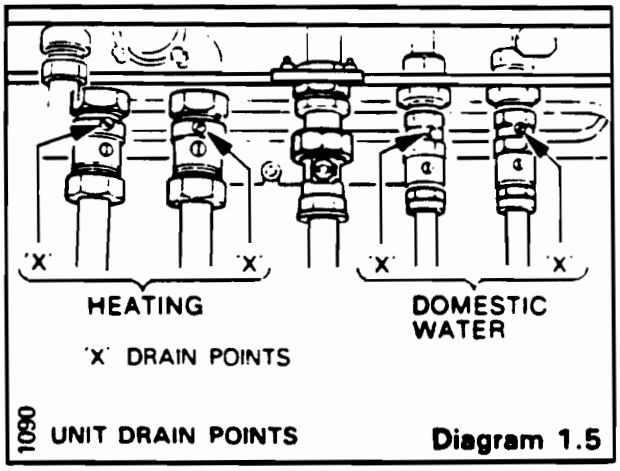
1.3.5 To gain access to vent point on heat transfer tank, see diagram 1.6, remove the heat shield as follows:

Removing wing nut securing support strap from its locating stud. Release heat shield securing screw and remove support angle securing screws. Remove support angle clear of the unit, see diagram 1.7.

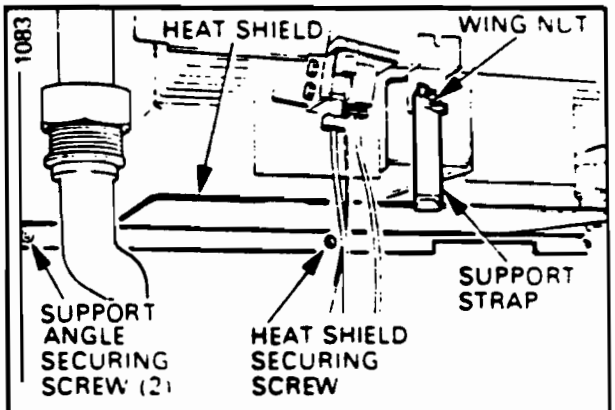
1.3.6 Check that there are no water leaks and that the safety valve reseats without leaking.



VENTING POINTS 'Y' — Diagram 1.6



UNIT DRAIN POINTS — Diagram 1.5



HEAT SHIELD AND ANGLE — Diagram 1.7

2.1 ISOLATION & ACCESS

2.1.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

2.1.2 Remove the casing, refer to section 1.2.

2.2 UNIT SERVICING

2.2.1 Slacken the wing nuts on the draught diverter, see diagram 2.1.

2.2.2 Remove the four screws and wing nut securing the combustion chamber front panel. Disengage the support strap from its locating stud and remove the panel by easing forward at the bottom and sliding down, see diagram 2.1. Take care not to damage the insulation on the inside of the panel when removing.

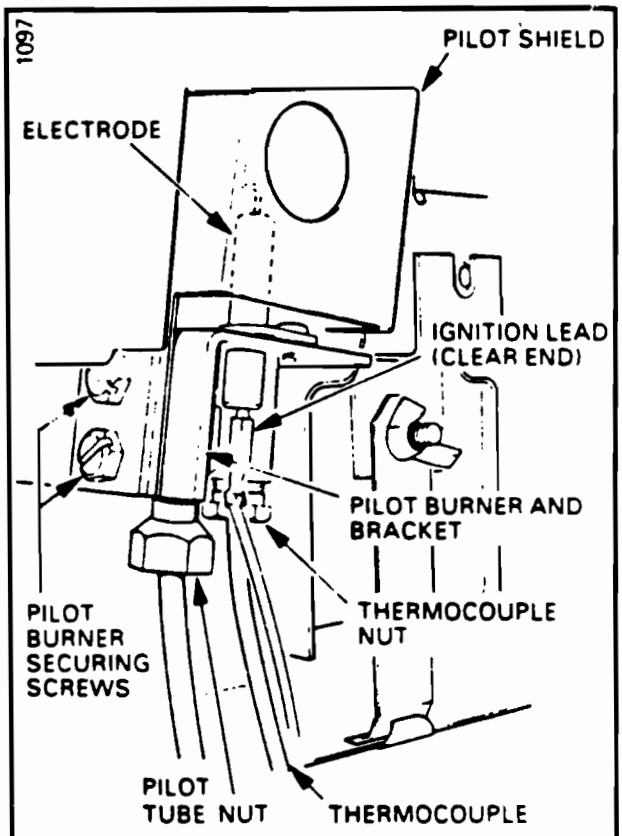
2.2.3 Remove the heat shield by releasing the securing screw. Remove the support angle by removing the two securing screws, see diagram 1.7.

2.2.4 Disconnect the ignition lead, pilot tube and thermocouple at the base of the pilot burner assembly, see diagram 2.2.

2.2.5 Free the pilot burner assembly and pilot shield by removing the two pilot burner securing screws, see diagram 2.2. Place the pilot shield to one side.

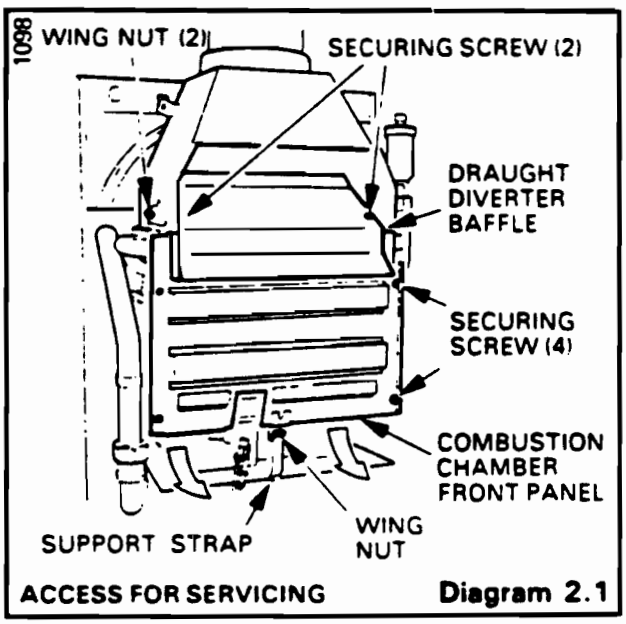
2.2.6 Pull the pilot head off the burner to reveal the pilot injector, see diagram 2.3. Inspect the pilot injector for blockage, renew or clean as necessary. Do not use any wire or sharp instruments to clean.

2.2.7 Inspect the condition of the thermocouple and ignition electrode, renew or clean as necessary.



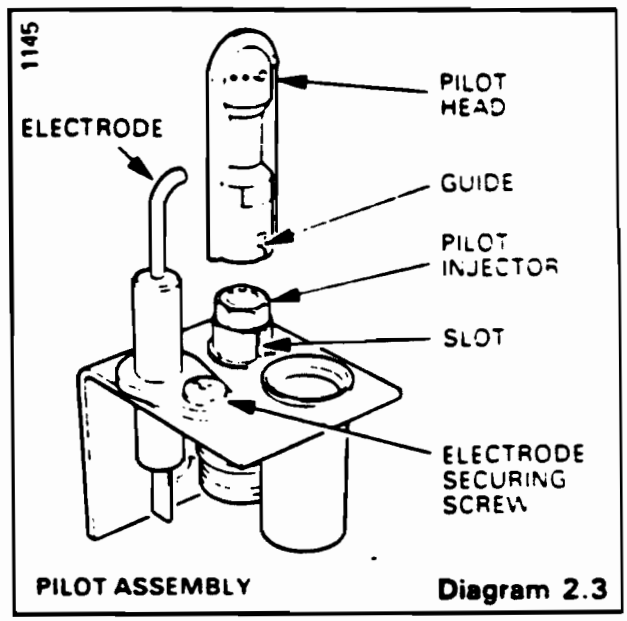
PILOT BURNER ASSEMBLY

Diagram 2.2



ACCESS FOR SERVICING

Diagram 2.1



PILOT ASSEMBLY

Diagram 2.3

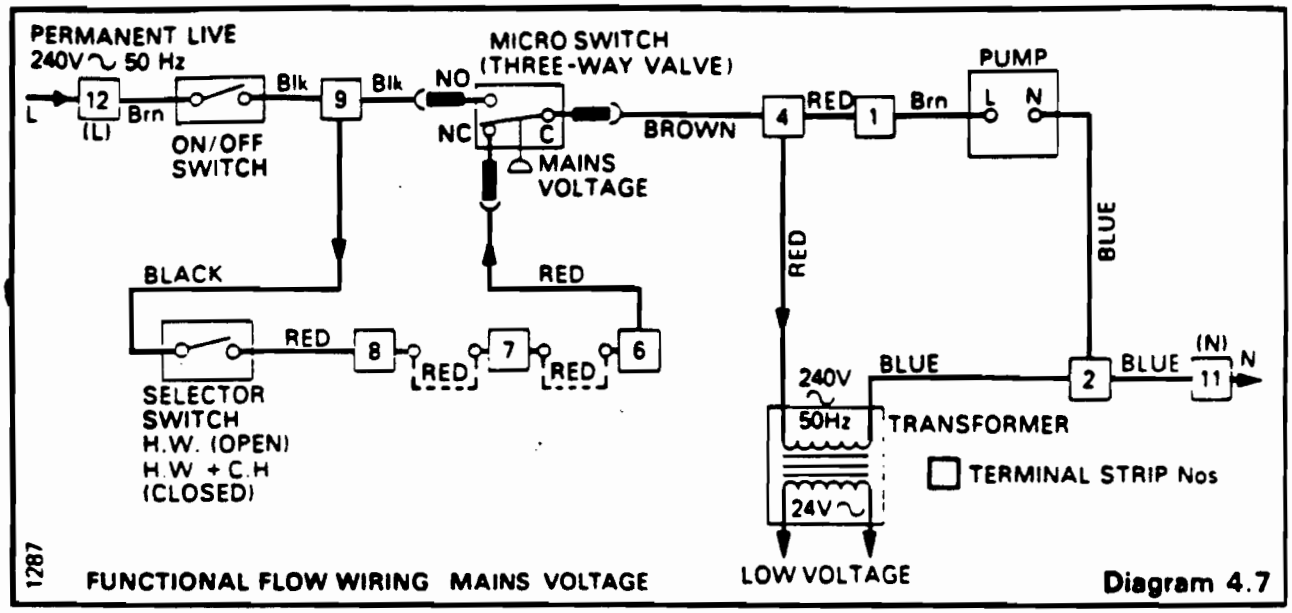


Diagram 4.7

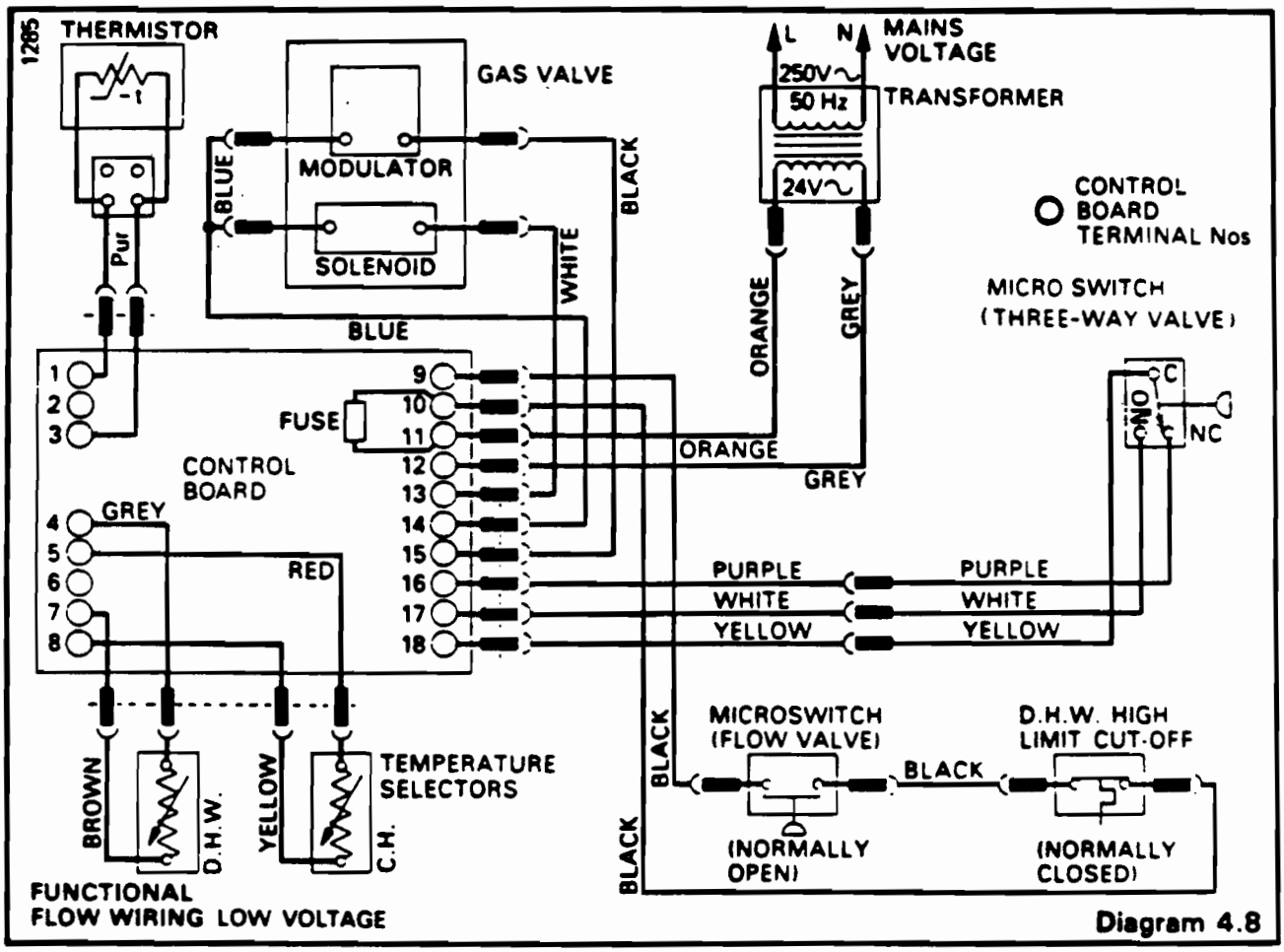


Diagram 4.8

4 FAULT FINDING

CHECK		CAUSE/REMEDY
Is the electricity supply 'ON' to the unit?	NO	Electrical supply fault. Contact an electrician.
YES		
Are the fuses in order?	NO	Unit fault. Refer to 'Fault Finding'.
YES		
Are all remote heating controls and switches calling for duty?	NO	Remote heating control fault. Test for continuity.
YES		
Is mains water supply to premises in order?	NO	Water supply fault. Contact plumber or local Water Authority.
YES		
Is water flowing from the hot water taps?	NO	Unit fault. Refer to 'Fault Finding'.
YES		
Is there gas to the unit?	NO	Gas supply fault. Contact local region of British Gas.
YES		
Has the gas supply been purged of air?	NO	Refer Installation Instructions 'Commissioning and Testing'.
YES		
Has the heating system been vented?	NO	Bleed air from radiators etc., with system off.
YES		
Has the unit been vented?	NO	Refer to Installation Instructions 'Commissioning and Testing'.
YES		

If after carrying out all the above procedures the unit still fails to operate, consult the detailed Electrical Fault Finding, section 4.4.

4.4 ELECTRICAL

4.4.1 **IMPORTANT:** The preliminary electrical system checks contained in the British Gas Multimeter Instruction Book are the first checks to be carried out during a fault finding procedure. On completion of the service/fault finding task which has required the breaking and remaking of electrical connections then checks 'A' Earth Continuity, 'C' Polarity and 'D' Resistance to Earth must be repeated.

4.4.2 Isolate the electricity supply to the unit.

4.4.3 Remove all casings, refer to 1.2.

4.4.4 Remove the electrical drawer, refer to 3.12.3 and 3.12.4.

4.4.5 Physically check all cables and connections.

4.4.6 Check the fuse on the control board, see diagram 4.8.

4.4.7 Refer to fault finding procedures, diagrams 4.4 to 4.6, in conjunction with functional flow wiring diagrams 4.7 and 4.8.

THERMOCOUPLE/OVERHEAT CUT-OFF FAULT FINDING

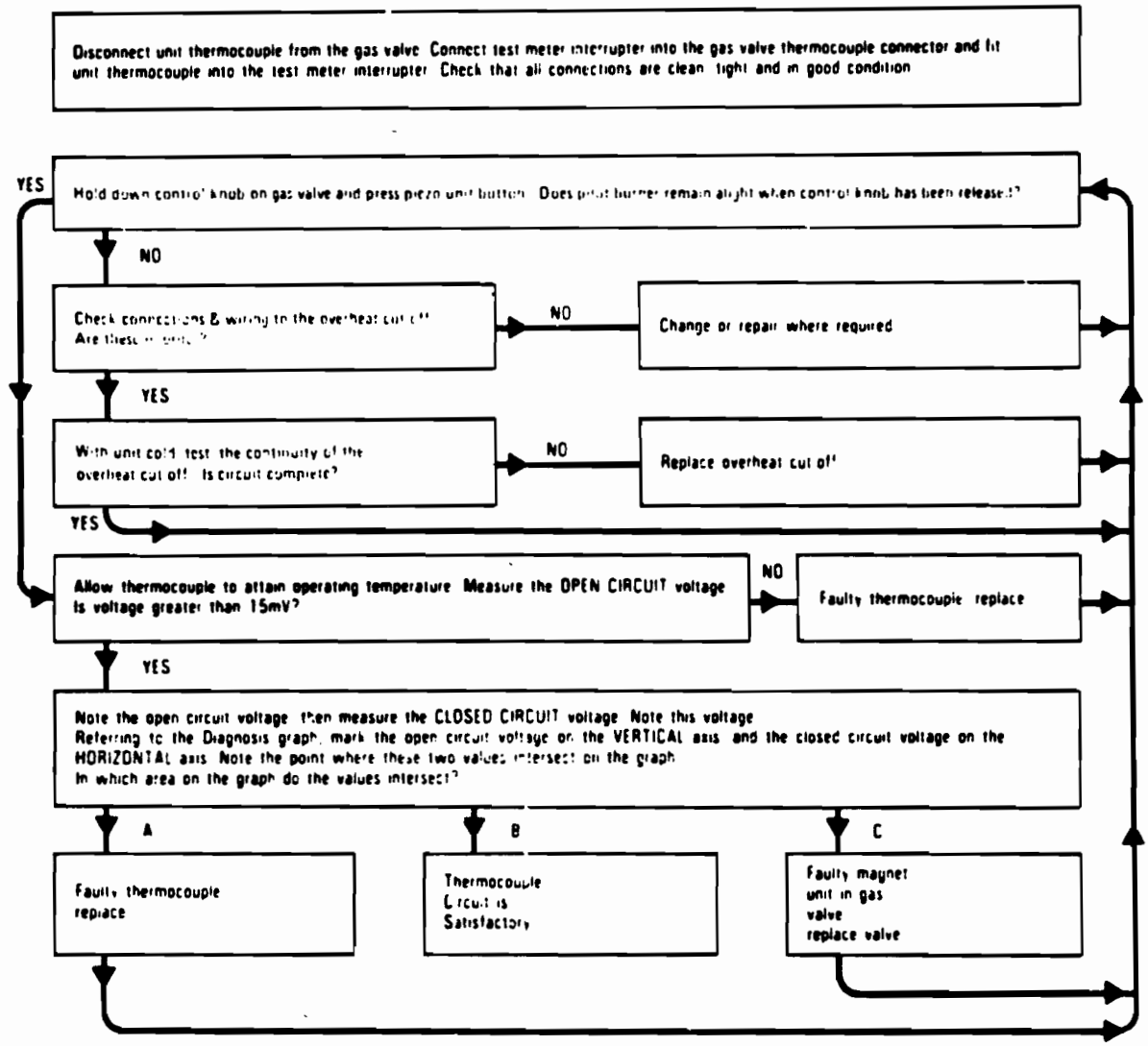


Diagram 4.1

4.1 THERMOCOUPLE/OVERHEAT CUT-OFF

4.1.1 SYMPTOM: Pilot fails to stay alight.

4.1.2 Test the thermocouple and overheat cut-off circuit using a meter with a range of 0 to 30mV, similar to the British Gas Multimeter.

4.1.3 Refer to diagram 4.1 and 4.2 when checking and testing.

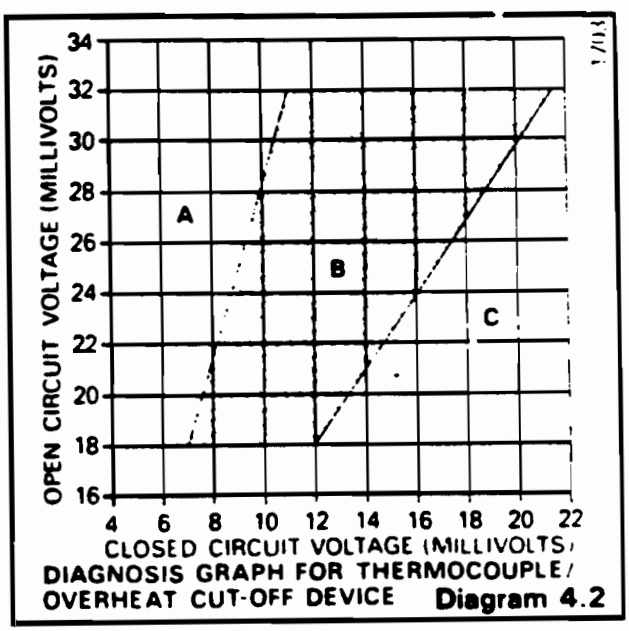
4.2 PILOT BURNER/IGNITION SYSTEM

4.2.1 SYMPTOM: Pilot will not light or stay alight.

4.2.2 Refer to the Pilot Ignition Fault Finding chart, diagram 4.3.

4.3 INITIAL FAULT FINDING

4.3.1 If the pilot is alight but the unit will not operate, proceed as this initial check list prior to any detailed fault finding.



DIAGNOSIS GRAPH FOR THERMOCOUPLE/ OVERHEAT CUT-OFF DEVICE

Diagram 4.2

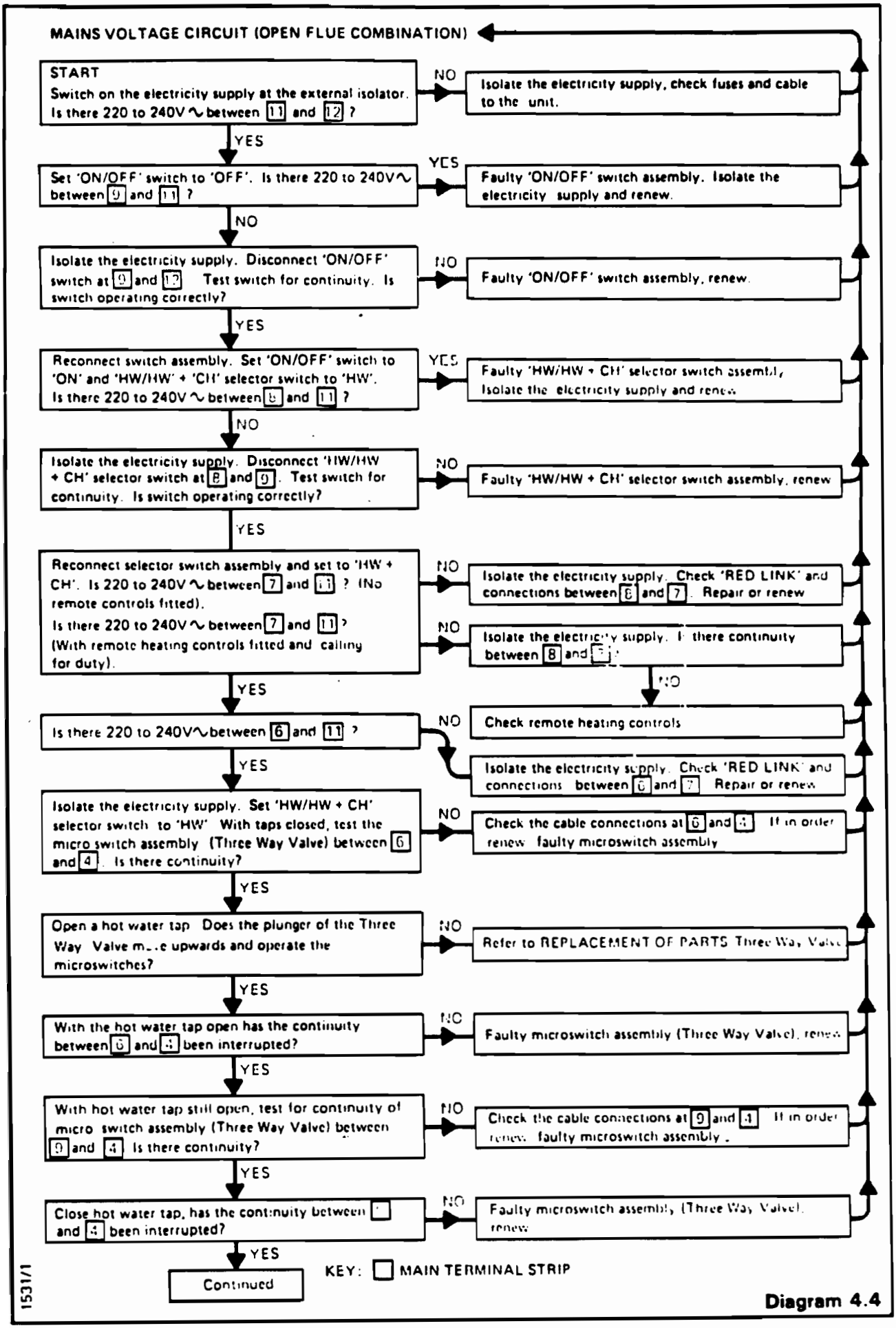

MAINS VOLTAGE CIRCUIT (OPEN FLUE COMBINATION)
START
Switch on the electricity supply at the external isolator. Is there 220 to 240V ∿ between 11 and 12 ?
NO
Isolate the electricity supply, check fuses and cable to the unit.
YES
Set 'ON/OFF' switch to 'OFF'. Is there 220 to 240V∿ between 9 and 11 ?
YES
Faulty 'ON/OFF' switch assembly. Isolate the electricity supply and renew.
NO
Isolate the electricity supply. Disconnect 'ON/OFF' switch at 9 and 12. Test switch for continuity. Is switch operating correctly?
NO
Faulty 'ON/OFF' switch assembly, renew.
YES
Reconnect switch assembly. Set 'ON/OFF' switch to 'ON' and 'HW/HW + CH' selector switch to 'HW'. Is there 220 to 240V ∿ between 5 and 11 ?
YES
Faulty 'HW/HW + CH' selector switch assembly. Isolate the electricity supply and renew.
NO
Isolate the electricity supply. Disconnect 'HW/HW + CH' selector switch at 8 and 9. Test switch for continuity. Is switch operating correctly?
NO
Faulty 'HW/HW + CH' selector switch assembly, renew
YES
Reconnect selector switch assembly and set to 'HW + CH'. Is 220 to 240V ∿ between 7 and 11 ? (No remote controls fitted).
NO
Isolate the electricity supply. Check 'RED LINK' and connections between 8 and 7. Repair or renew
Is there 220 to 240V ∿ between 7 and 11 ? (With remote heating controls fitted and calling for duty).
NO
Isolate the electricity supply. Is there continuity between 8 and 5 ?
NO
Check remote heating controls
YES
Is there 220 to 240V∿ between 6 and 11 ?
NO
Isolate the electricity supply. Check 'RED LINK' and connections between 6 and 7. Repair or renew
YES
Isolate the electricity supply. Set 'HW/HW + CH' selector switch to 'HW'. With taps closed, test the micro switch assembly (Three Way Valve) between 6 and 4. Is there continuity?
NO
Check the cable connections at 6 and 4. If in order renew faulty microswitch assembly
YES
Open a hot water tap. Does the plunger of the Three Way Valve move upwards and operate the microswitches?
NO
Refer to REPLACEMENT OF PARTS Three Way Valve
YES
With the hot water tap open has the continuity between 6 and 4 been interrupted?
NO
Faulty microswitch assembly (Three Way Valve), renew
YES
With hot water tap still open, test for continuity of micro switch assembly (Three Way Valve) between 9 and 4. Is there continuity?
NO
Check the cable connections at 9 and 4. If in order renew faulty microswitch assembly.
YES
Close hot water tap, has the continuity between 6 and 4 been interrupted?
NO
Faulty microswitch assembly, (Three Way Valve), renew
YES
Continued
KEY: MAIN TERMINAL STRIP
1531/1

Diagram 4.4

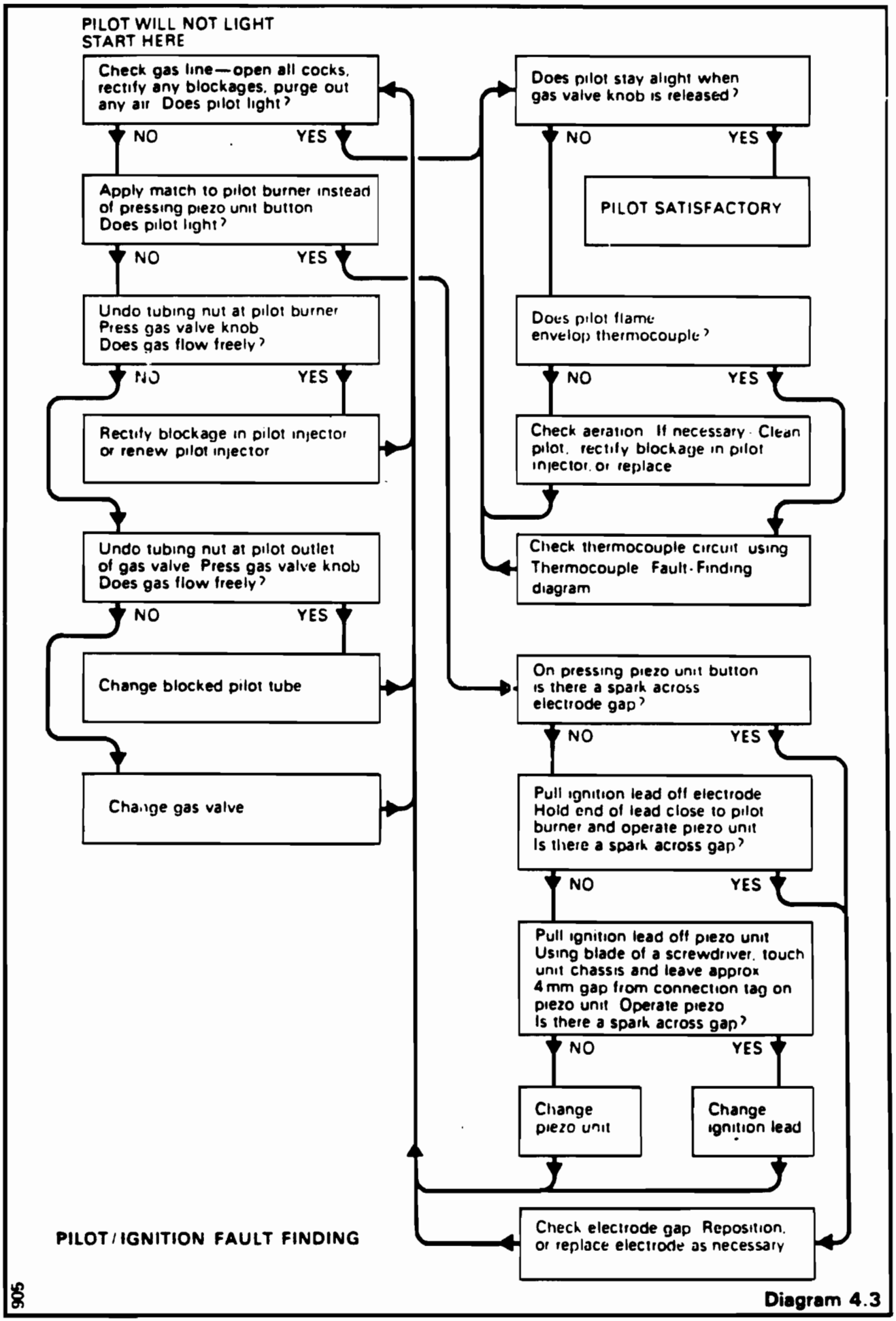

PILOT WILL NOT LIGHT
START HERE
Check gas line—open all cocks, rectify any blockages, purge out any air Does pilot light?
NO
YES
Apply match to pilot burner instead of pressing piezo unit button Does pilot light?
NO
YES
Undo tubing nut at pilot burner Press gas valve knob Does gas flow freely?
NO
YES
Rectify blockage in pilot injector or renew pilot injector
Undo tubing nut at pilot outlet of gas valve Press gas valve knob Does gas flow freely?
NO
YES
Change blocked pilot tube
Change gas valve
Does pilot stay alight when gas valve knob is released?
NO
YES
PILOT SATISFACTORY
Does pilot flame envelop thermocouple?
NO
YES
Check aeration If necessary Clean pilot, rectify blockage in pilot injector, or replace
Check thermocouple circuit using Thermocouple Fault-Finding diagram
On pressing piezo unit button is there a spark across electrode gap?
NO
YES
Pull ignition lead off electrode Hold end of lead close to pilot burner and operate piezo unit Is there a spark across gap?
NO
YES
Pull ignition lead off piezo unit Using blade of a screwdriver, touch unit chassis and leave approx 4 mm gap from connection tag on piezo unit Operate piezo Is there a spark across gap?
NO
YES
Change piezo unit
Change ignition lead
Check electrode gap Reposition, or replace electrode as necessary
PILOT/IGNITION FAULT FINDING
905

Diagram 4.3

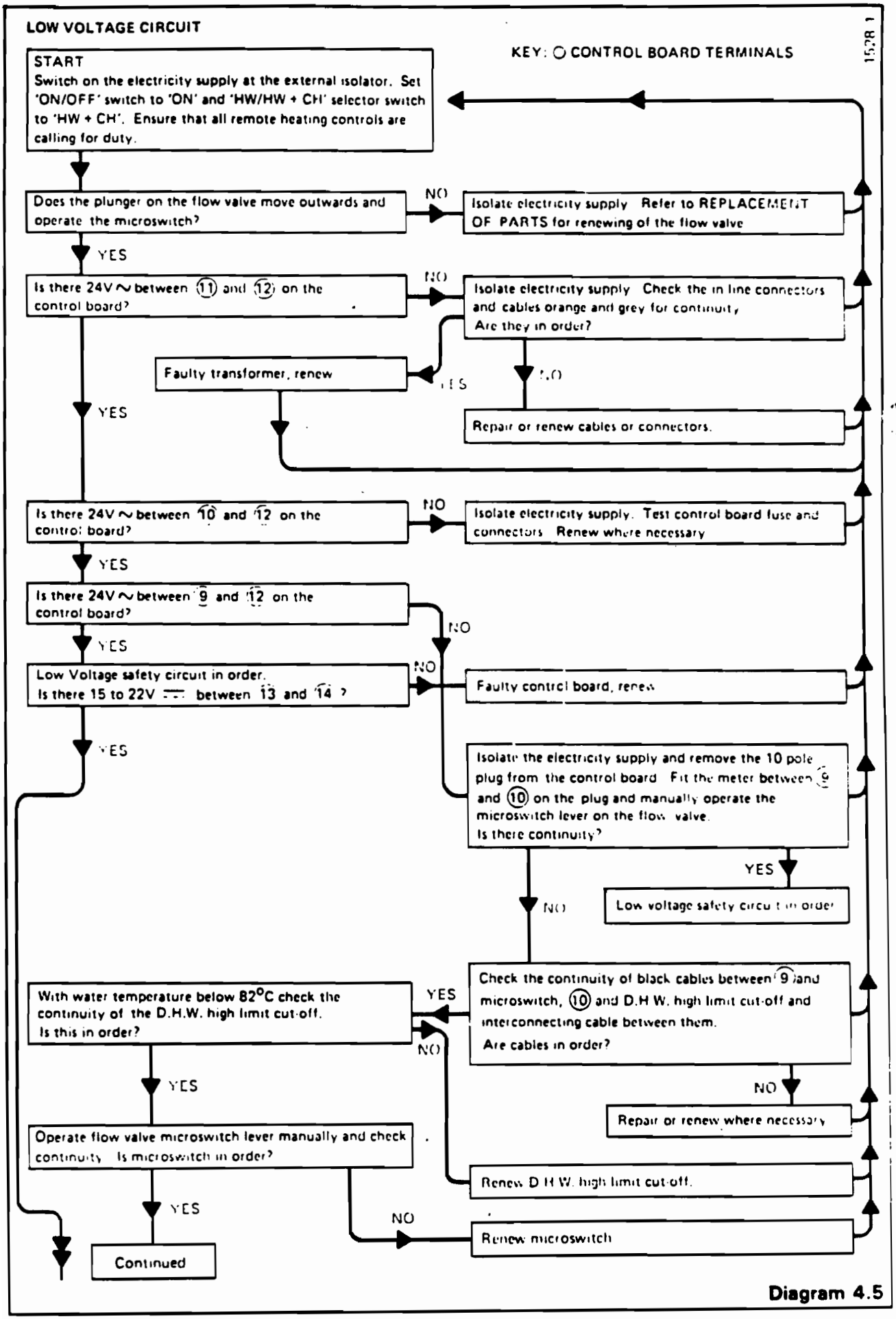

LOW VOLTAGE CIRCUIT
KEY: ○ CONTROL BOARD TERMINALS
START
Switch on the electricity supply at the external isolator. Set 'ON/OFF' switch to 'ON' and 'HW/HW + CH' selector switch to 'HW + CH'. Ensure that all remote heating controls are calling for duty.
Does the plunger on the flow valve move outwards and operate the microswitch?
NO
Isolate electricity supply. Refer to REPLACEMENT OF PARTS for renewing of the flow valve
YES
Is there 24V ~ between (11) and (12) on the control board?
NO
Isolate electricity supply. Check the in line connectors and cables orange and grey for continuity. Are they in order?
Faulty transformer, renew
YES
NO
Repair or renew cables or connectors.
YES
Is there 24V ~ between 10 and 12 on the control board?
NO
Isolate electricity supply. Test control board fuse and connectors. Renew where necessary
YES
Is there 24V ~ between 9 and 12 on the control board?
NO
YES
Low Voltage safety circuit in order. Is there 15 to 22V ⎓ between 13 and 14 ?
NO
Faulty control board, renew
YES
Isolate the electricity supply and remove the 10 pole plug from the control board. Fit the meter between (9) and (10) on the plug and manually operate the microswitch lever on the flow valve. Is there continuity?
YES
NO
Low voltage safety circuit in order
With water temperature below 82°C check the continuity of the D.H.W. high limit cut-off. Is this in order?
YES
NO
Check the continuity of black cables between (9) and microswitch, (10) and D.H.W. high limit cut-off and interconnecting cable between them. Are cables in order?
NO
Repair or renew where necessary
YES
Operate flow valve microswitch lever manually and check continuity. Is microswitch in order?
Renew D.H.W. high limit cut-off.
YES
NO
Renew microswitch
Continued

Diagram 4.5

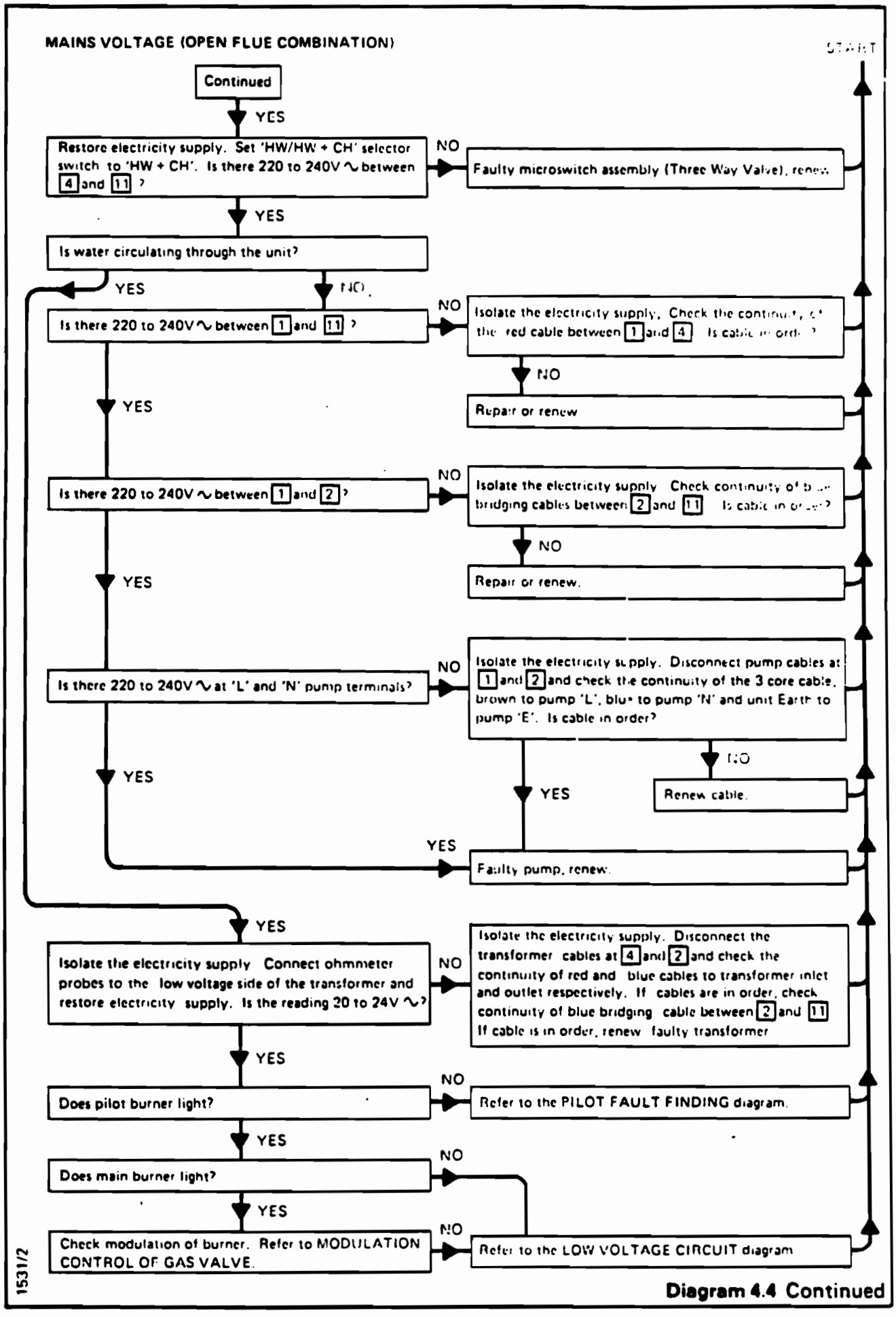


Diagram 4.4 Continued

MODULATION CONTROL OF GAS VALVE

1527 1

KEY :- ◯ CONTROL BOARD

START

Isolate electricity supply at the external isolator. Remove the casing and slide forward electrical drawer to gain access to the control board

(i) MODULATOR COIL

Disconnect cables, black and blue from the coil. Test with ohmmeter across the coil connections Is resistance 50k Ω at 20°C ambient?

NO → Faulty coil, renew gas valve.

YES

Remove 10 pole plug. Test continuity of cables black (15) blue (14). Is there continuity?

NO → Repair or renew cable connections

YES

(ii) THERMISTOR

Disconnect thermistor cable assembly from the connector. Connect ohmmeter across wires. Is the resistance 10k Ω at 15 to 20°C ambient?

NO → Faulty thermistor, renew.

YES

Reconnect thermistor cable assembly.

YES

(iii) CENTRAL HEATING TEMPERATURE SELECTOR

Disconnect the 5 pole plug from the control board. Connect ohmmeter across (8) yellow and (5) red. With selector at minimum position (bottom), is resistance 10k Ω?

NO → If connections are in order, renew faulty temperature selector.

YES

Slide temperature selector upwards. Does the resistance decrease to 5k Ω?

NO → Faulty temperature selector, renew.

YES

Temperature selector in order.

YES

(iv) HOT WATER TEMPERATURE SELECTOR

Connect ohmmeter across (7) brown and (4) grey With selector at minimum position (bottom), is resistance 10k Ω?

NO → If connections are in order, renew faulty temperature selector

Continued

Diagram 4.6

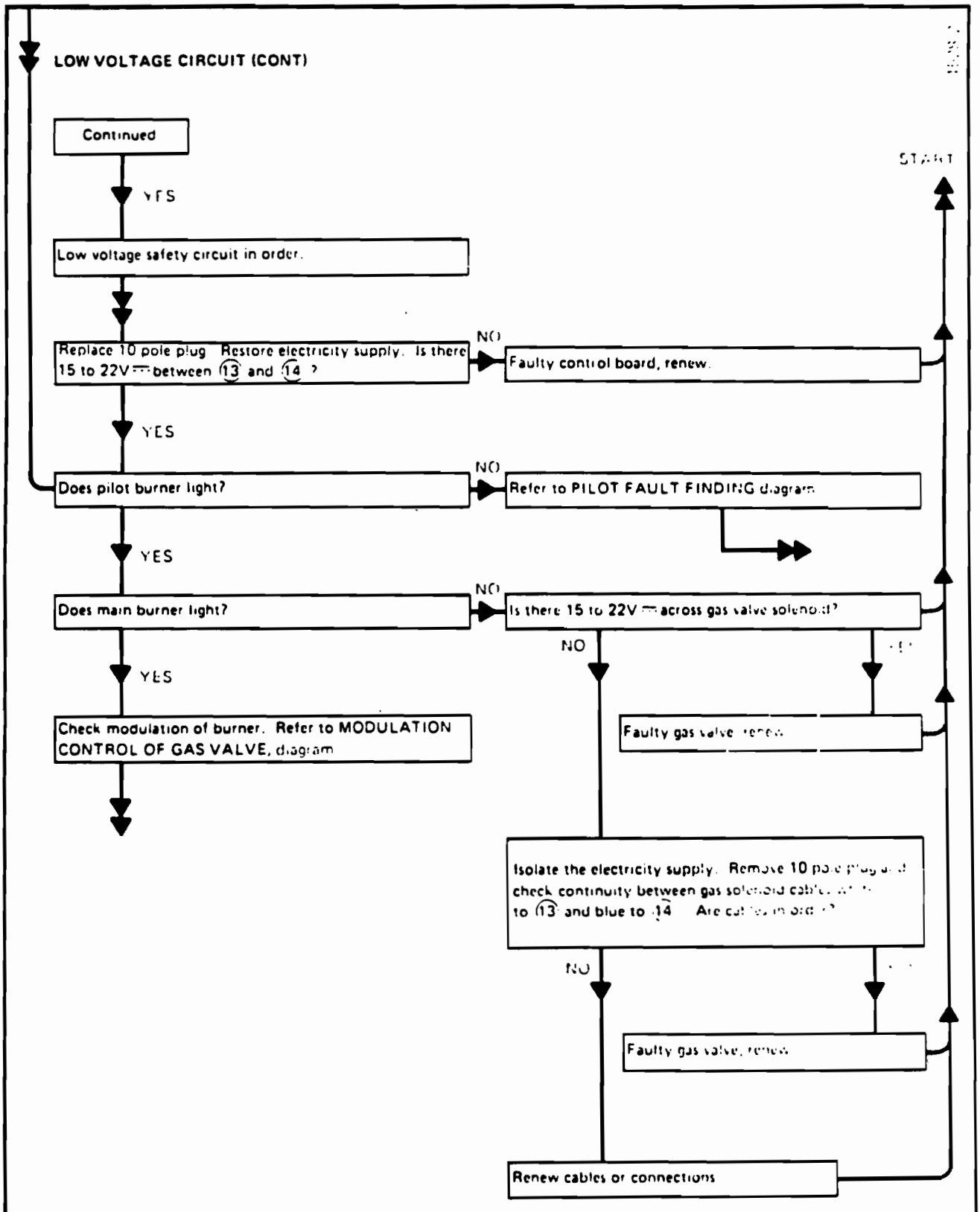


Diagram 4.5 Continued

MODULATION CONTROL OF GAS VALVE

Continued Modulation of Central Heating Mode

YES

With burner ignited and pressure adjusted, allow the system to thoroughly warm up. Does the burner pressure vary by adjusting the 'CH' temperature selector from maximum (top) to minimum (bottom)?

NO → Faulty control board, renew.

YES

Central heating modulation in order.

YES

MODULATION OF HOT WATER MODE

With all the above components in order, continue with the following procedures

Set the 'HW/HW+ CH' selector switch to 'HW' mode and open a hot water tap. With the burner ignited and the 'HW' selector at maximum (top) turn the 'HW' potentiometer clockwise using an insulated screwdriver. Does the burner pressure vary?

NO → Faulty control board, renew.

YES

Reset the 'HW' potentiometer to the correct position. For resetting of burner pressure refer to 'COMMISSIONING' section of the Installation Instruction

YES

With burner pressure adjusted and the return flow temperature at approx 60°C, does the burner pressure vary by adjusting the 'HW' selector switch from maximum (top) to minimum (bottom)?

NO → Faulty control board, renew. Close hot water tap

YES

'HW' modulation in order. Close hot water tap, remove manometer and tighten test point screw.

Diagram 4.6 Continued

MODULATION CONTROL OF GAS VALVE

1527 2

Continued - Hot Water Temperature Selector

Slide temperature selector upwards. Does the resistance decrease to 5k Ω .

NO → Faulty temperature selector, renew.

YES

Temperature selector in order. Reconnect the 5 pole plug.

(v) THREE-WAY VALVE MICRO SWITCH (LOW VOLTAGE)

Disconnect 10 pole plug from the control board. With all hot water taps closed, is there continuity across the plug terminal (16) purple and (18) yellow?

NO → Disconnect in line connector between purple cable and in line connector between yellow cable. Test for continuity between cables and control board terminals (16) and (18) respectively. Are cables in order?

YES → Renew cables and/or connectors

NO → Faulty microswitch assembly, renew. Close hot water tap and replace 10 pole plug.

YES

With the ohmmeter still connected between (16) and (18) open a hot water tap and check the operation of plunger within the three way valve i.e. that it moves to operate the microswitch. Is there continuity?

NO

Remove ohmmeter and connect between (17) white (18) yellow. Is there continuity?

YES → Disconnect in-line connector between white cable and in-line connector between yellow cable. Test for continuity between cables and control board terminals (17) and (18) respectively. Are cables in order?

YES → Renew cables and/or connectors

NO → Faulty microswitch assembly, renew. Close hot water tap and replace 10 pole plug

YES

Microswitch assembly in order. Close hot water tap and replace 10 pole plug.

MODULATION of CENTRAL HEATING MODE

With all the above components in order, continue with the following procedures.

Isolate the electricity supply at the external isolator. With all hot water taps turned off, slacken outlet pressure test point screw on the gas valve and connect a manometer. Restore the electricity supply. Operate the unit in the 'HW + CH' mode with 'CH' temperature selector switch set to maximum (top). Note the setting of 'CH' potentiometer and adjust clockwise with an insulated screwdriver. Does the burner pressure increase?

NO → Faulty control board, renew.

YES

Reset the 'CH' potentiometer to the correct position. For resetting of burner pressure refer to 'COMMISSIONING' section of the Installation Instructions.

Continued

Diagram 4.6 Continued

1.3 SYSTEM PRESSURE

1.3.1 All water containing parts on the central heating circuit, within the unit, are under system pressure. This pressure must be released by operating the safety valve (pressure relief valve) before any parts on this circuit are removed.

1.3.2 Turn the safety knob in the direction of the arrow to release the pressure, see diagram 1.4, then drain using the unit drain points, see diagram 1.5.

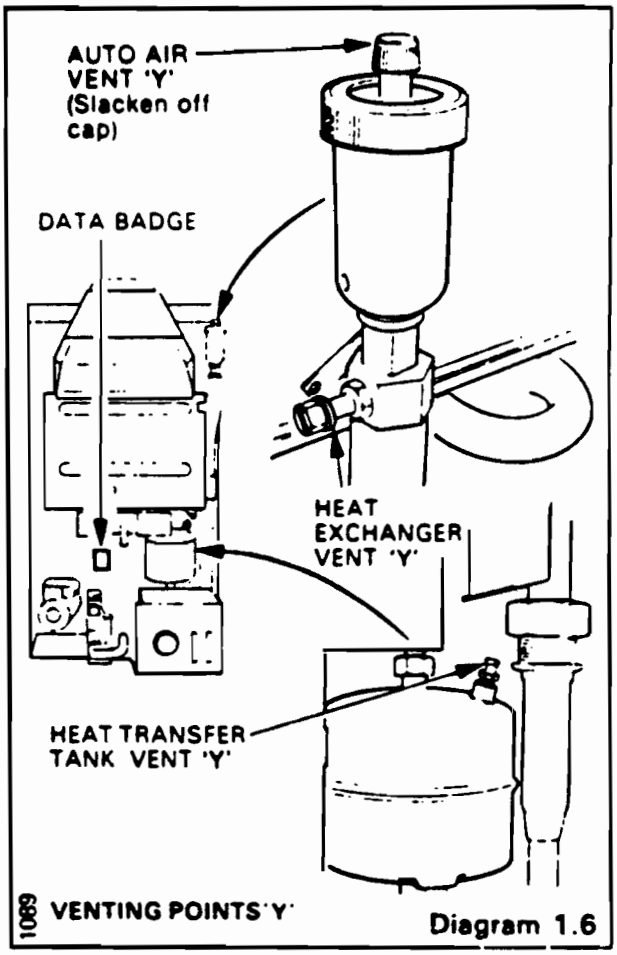
1.3.3 All water containing parts on the domestic hot water circuit are under mains pressure. Before any parts are removed on this circuit, within the unit, it must be isolated and drained using the unit drain points, see diagram 1.5.

1.3.4 After replacing any water containing part, refill or make up water loss, vent all air and pressurise the system. Refer to 'Commissioning and Testing' in the Installation Instructions.

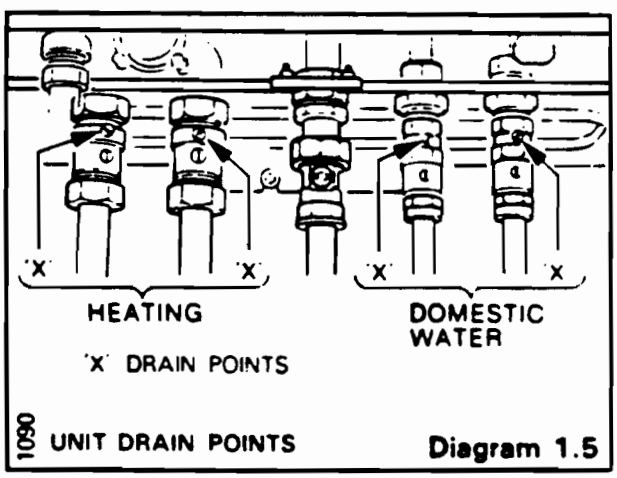
1.3.5 To gain access to vent point on heat transfer tank, see diagram 1.6, remove the heat shield as follows:

Removing wing nut securing support strap from its locating stud. Release heat shield securing screw and remove support angle securing screws. Remove support angle clear of the unit, see diagram 1.7.

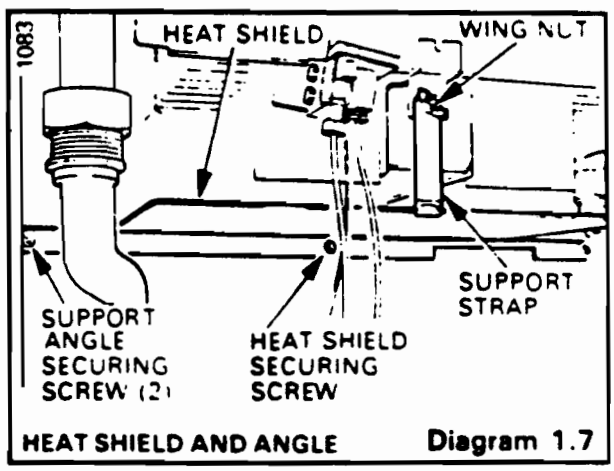
1.3.6 Check that there are no water leaks and that the safety valve reseats without leaking.



VENTING POINTS 'Y' — Diagram 1.6



UNIT DRAIN POINTS — Diagram 1.5



HEAT SHIELD AND ANGLE — Diagram 1.7

2.2.8 Support the main burner at the front and remove the two screws at the rear securing the main burner to the flange, see diagram 2.4.

2.2.9 Ease the pilot tube and thermocouple down sufficiently to allow the main burner to be disengaged and raised through the combustion chamber. Take care not to damage the combustion chamber insulation or lose the 'O' ring seal.

2.2.10 Remove any deposits from the main burner, e.g. using a suitable brush or vacuum cleaner.

NOTE: Brushes with metallic bristles must not be used.

2.2.11 Loosen the screw and remove the upper lint arrester, see diagram 2.5.

2.2.12 Remove the two screws and the lower lint arrester, see diagram 2.5.

2.2.13 Check the main burner injector for blockage or damage and clean or renew as necessary.

2.2.14 Check the upper and lower lint arresters for damage or deposits and renew or clean as necessary, e.g. using a suitable brush or vacuum cleaner.

2.2.15 Remove the two screws to release the draught diverter baffle, see diagram 2.6.

2.2.16 Cover the main burner supply pipe flange and the open end of the pilot supply pipe to prevent any deposits entering them.

2.2.17 Place a sheet of paper underneath the heat exchanger. Brush the deposits from the heat exchanger collecting them on the paper sheet.

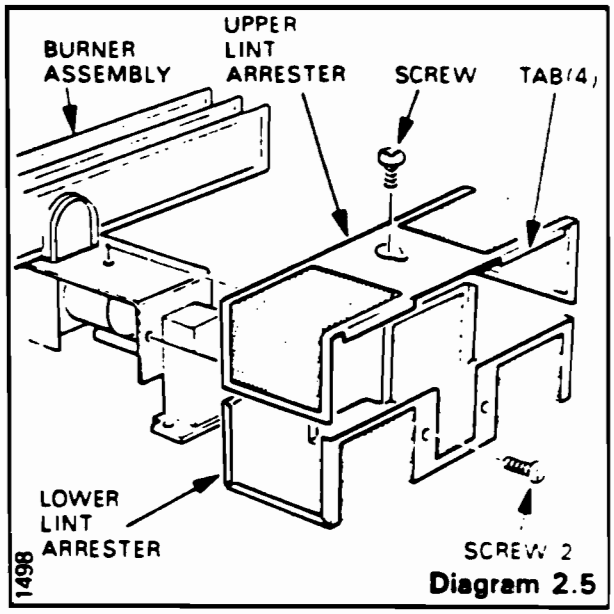
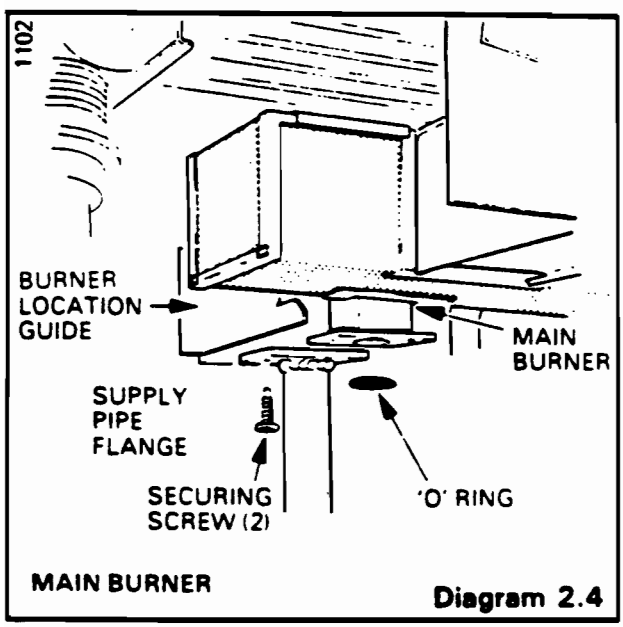
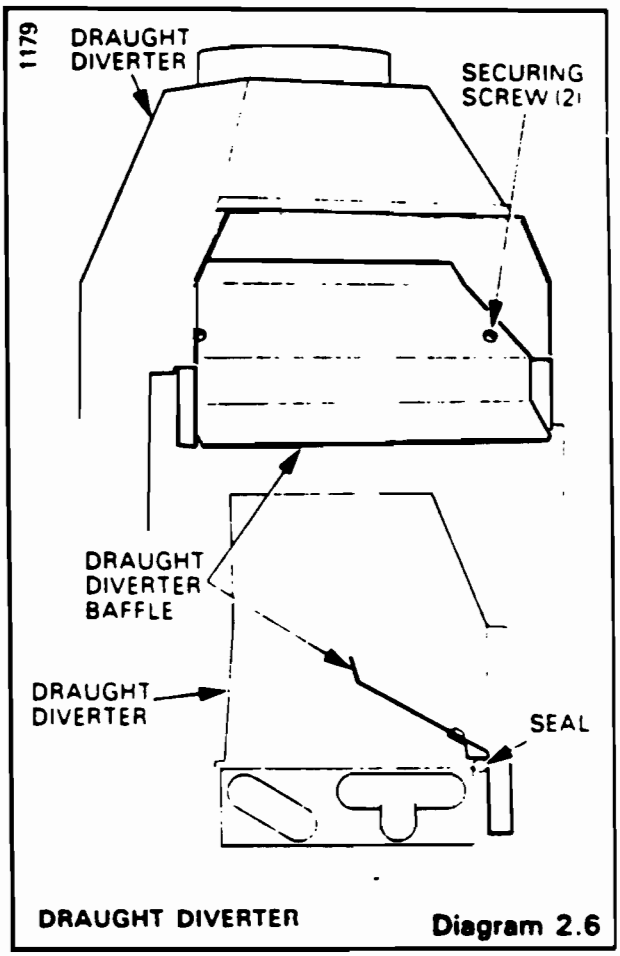


Diagram 2.5



MAIN BURNER
Diagram 2.4



DRAUGHT DIVERTER
Diagram 2.6

REASSEMBLY NOTES:

A. When replacing the injector, use a little jointing compound on the threads when replacing. Do not use wire or sharp instruments to clean. Burner injector marked 4.30.

B. When replacing pilot head, locate the guide in the slot, see diagram 2.3.

C. When replacing main burner, ensure that it is pushed fully backwards onto the location guide and correctly sealed with the 'O' ring. Renew the 'O' ring if necessary, see diagram 2.4.

D. When replacing the draught diverter baffle, ensure that it is correctly located, see diagram 2.6.

2.3. CHECKS & TESTS

A. Check the condition of the combustion chamber insulation and renew if necessary.

B. Check the seal on the draught diverter baffle, and renew if necessary.

C. Ensure that the spark gap is correct, see diagram 2.7.

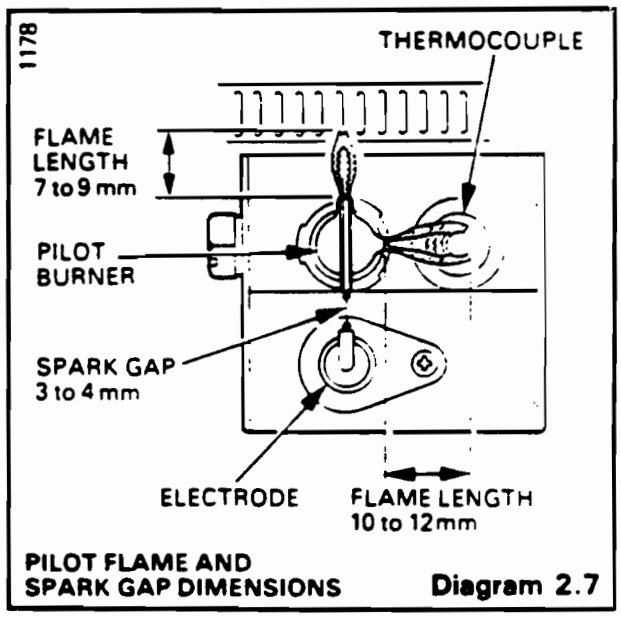
D. Check around the unit for water soundness.

E. As a manual check, turn safety valve knob in the direction of the arrow until it clicks. Check that water discharges and that the valve reseats without leaking.

2.3.1 Complete reassembly and relight the unit. Check the pilot flame lengths, see diagram 2.7.

2.3.2 Test the unit for operation, checking burner pressures and gas rates. Refer to 'Commissioning and Testing' in the Installation Instructions.

2.3.3 Test for gas soundness around gas carrying components and joints.



PILOT FLAME AND SPARK GAP DIMENSIONS **Diagram 2.7**

3.1 MAIN BURNER/BURNER INJECTOR

3.1.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.1.2 Remove the casing, refer to section 1.2.

3.1.3 Proceed as 2.2.1 to 2.2.5, 'Unit Servicing'.

3.1.4 Support the main burner at the front and remove the two screws at the rear securing the main burner to the flange, see diagram 2.4.

3.1.5 Ease the pilot tube and thermocouple down sufficiently to allow the main burner to be disengaged and raised through the combustion chamber. Take care not to damage the combustion chamber insulation or lose the 'O' ring seal.

3.1.6 To change the burner injector, remove lint arrester and unscrew the injector from the burner.

REASSEMBLY NOTE:

Use a little jointing compound on the injector thread when replacing. Ensure that the main burner is pushed fully backward onto the location guide and correctly sealed with the 'O' ring.

3.2 PILOT BURNER/INJECTOR/ELECTRODE

3.2.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.2.2 Remove the casing, refer to 1.2.

3.2.3 Proceed as 2.2.1 to 2.2.5, 'Unit Servicing'.

3.2.4 To remove pilot injector, pull the pilot head off the pilot burner to reveal the injector. Remove the injector by unscrewing it from the burner, see diagram 2.3.

3.2.5 To remove the electrode, remove the M3 securing screw and electrode from the pilot burner assembly, see diagram 2.3.

REASSEMBLY NOTE:

When replacing pilot burner assembly, take care not to damage the electrode. Ensure that the spark gap and the pilot flame lengths are as shown in diagram 2.7.

3.3 THERMOCOUPLE

3.3.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.3.2 Remove the casing, refer to section 1.2.

3.3.3 Disconnect the ignition lead from electrode, see diagram 2.2.

3.3.4 Unscrew the pilot tube nut at the base of the pilot burner, to release the pilot tube.

3.3.5 Unscrew the thermocouple nut and release the thermocouple by pulling it downward.

3.3.6 Remove the buckle clips securing the thermocouple to the pilot tube. Unscrew the thermocouple nut at the gas valve, see diagram 3.1.

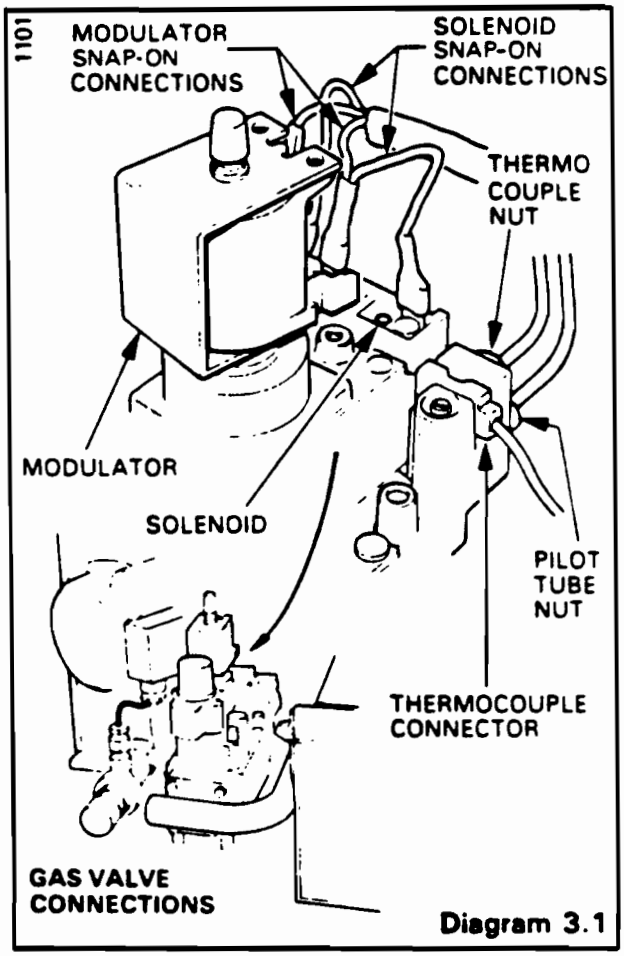


Diagram 3.1

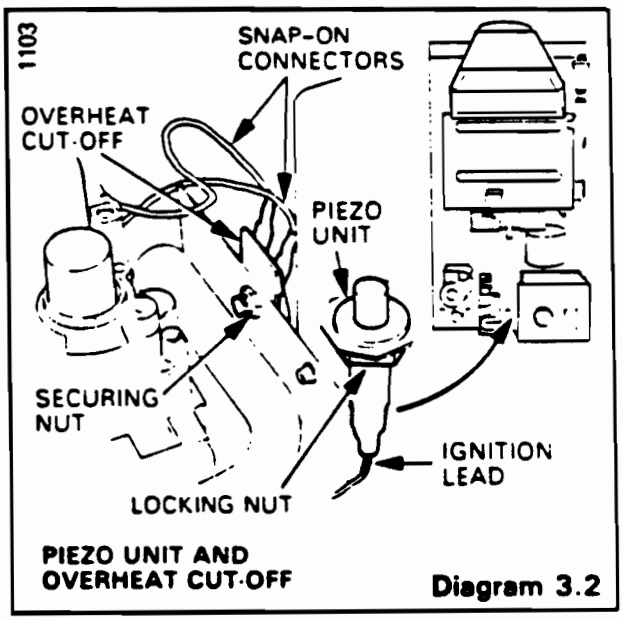


Diagram 3.2

3.3.7 Bend the replacement thermocouple to match the discarded one. No bend radius should be more than 12mm internal.

REASSEMBLY NOTE:

Fit the thermocouple connector into the slot in the gas valve and secure with the thermocouple nut. Do not tighten more than one quarter turn beyond finger tight.

3.4 IGNITION LEAD

3.4.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.4.2 Remove the casing, refer to section 1.2.

3.4.3 Remove the buckle clips securing the ignition lead to the pilot pipe. Disconnect the ignition lead from the piezo unit and the electrode. The lead can now be removed.

REASSEMBLY NOTE:

Fit the replacement lead with the clear insulated end connected to the electrode and the black end connected to the piezo unit.

3.5 PIEZO UNIT

3.5.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.5.2 Remove the casing, refer to section 1.2.

3.5.3 Disconnect the ignition lead from the piezo unit, on the left side of the control box, see diagram 3.2.

3.5.4 Unscrew the locking nut and remove piezo unit from its bracket.

3.6 BOILER OVERHEAT CUT-OFF DEVICE

3.6.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.6.2 Remove the casing, refer to section 1.2.

3.6.3 Release the lower screw on the clamp securing the coiled capillary to the right hand pipe, see diagram 3.3. Do not disturb the position of the clamp.

3.6.4 Disconnect the two electrical snap-on connectors on the cut-off device and unscrew the securing nut to remove, see diagram 3.2.

REASSEMBLY NOTES:

A. Smear heat sink compound supplied between the coiled capillary and the water pipe to ensure a good contact when replacing.

B. Do not overtighten the securing nut securing overheat cut-off device to its bracket.

3.7 DOMESTIC HOT WATER HIGH LIMIT CUT-OFF

3.7.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

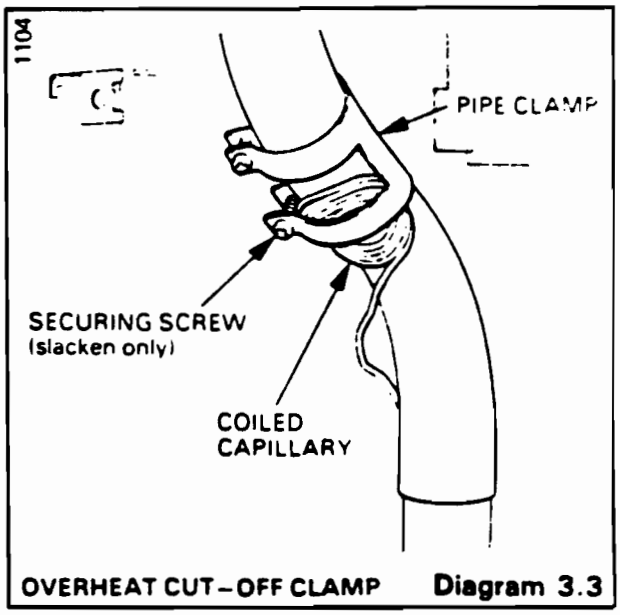
3.7.2 Remove the casing, refer to section 1.2.

3.7.3 Disconnect snap-on connectors from the D.H.W. high limit cut-off, see diagram 3.4.

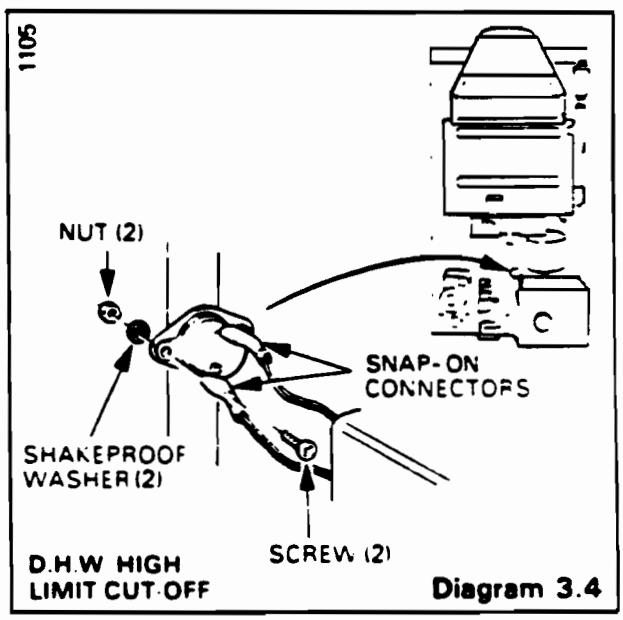
3.7.4 Remove the two screws, nuts and washers to release cut-off.

REASSEMBLY NOTE:

When replacing overheat cut-off, use a little heat sink compound between the cut-off and the pipe to ensure a good contact when reclamping.



OVERHEAT CUT–OFF CLAMP **Diagram 3.3**



D.H.W HIGH
LIMIT CUT-OFF **Diagram 3.4**

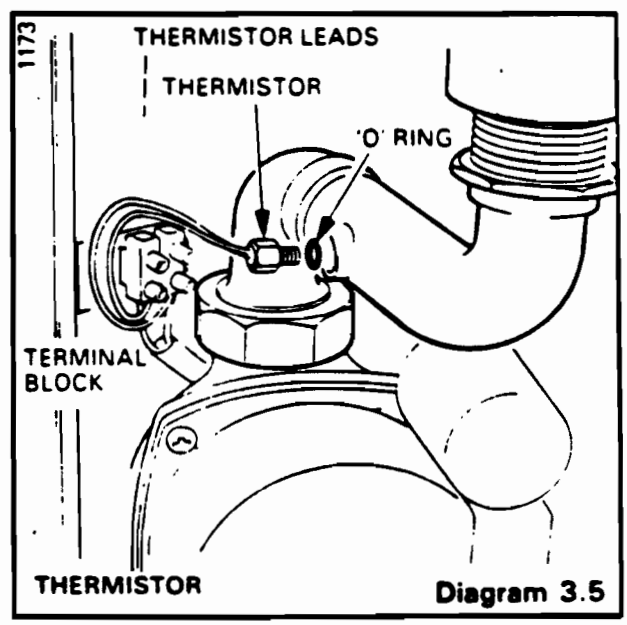


Diagram 3.5

3.8 THERMISTOR

3.8.1 Isolate the electricity supply and turn OFF the gas and water supplies to the unit. Refer to section 1.1.

3.8.2 Remove the casing, refer to section 1.2.

3.8.3 Release water pressure on the central heating circuit of the unit and drain, refer to section 1.3.

3.8.4 Disconnect the thermistor cables and the purple cables at the terminal block, see diagram 3.5.

3.8.5 Unscrew the thermistor and remove from its housing, complete with 'O' ring, see diagram 3.5.

REASSEMBLY NOTES:

A. When refitting the thermistor, fit a new 'O' ring.

B. Twin together the purple and the thermistor cables and secure into one side of the terminal block.

C. Fill and vent the unit then repressurise the system. Refer to 'Commissioning and Testing' in the Installation Instructions.

3.9 GAS VALVE

3.9.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.9.2 Remove the casing, refer to section 1.2.

3.9.3 Disconnect the thermocouple nut at the gas valve and release the thermocouple. Lift out the thermocouple connector, see diagram 3.1.

3.9.4 Disconnect pilot tube nut at the gas valve and ease the tube from the valve.

3.9.5 Disconnect the snap-on connectors from the modulator and solenoid on the gas valve, noting the colours and positions of connections.

3.9.6 Unscrew the hexagon thermocouple connector cut-off lead from underneath the gas valve, see diagram 3.6.

3.9.7 Disconnect the union nut on the gas service valve.

3.9.8 Slacken the middle locknut downward and remove the two screws and slotted plate.

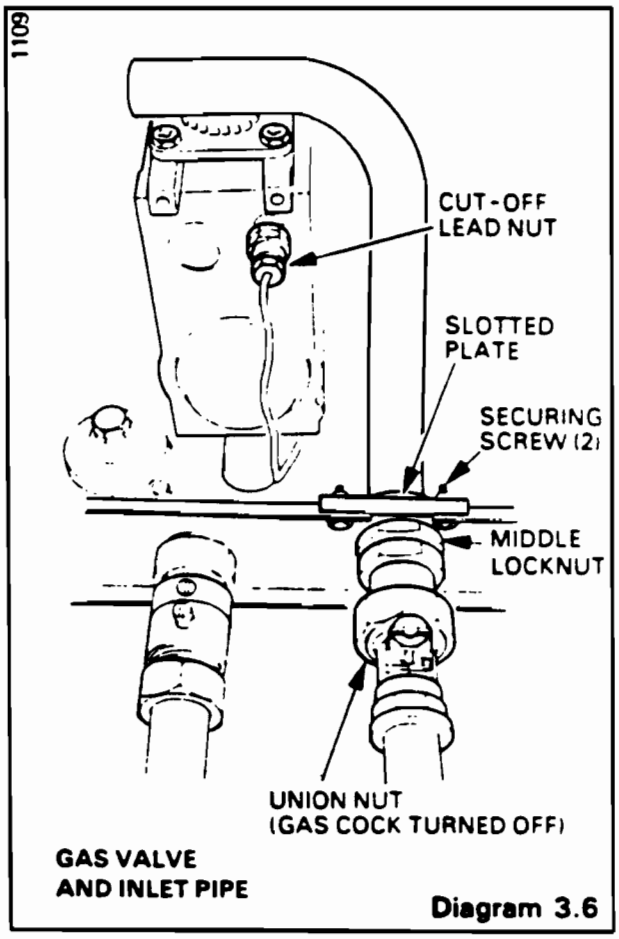
3.9.9 Support the gas valve and remove the two screws securing the burner to the flange, see diagram 2.4. Remove the gas valve with pipe assembly and burner 'O' ring.

3.9.10 Remove the four screws and release the burner supply pipe and 'O' ring from the valve, then remove the four screws and release the inlet pipe and 'O' ring, see diagram 3.7.

REASSEMBLY NOTES:

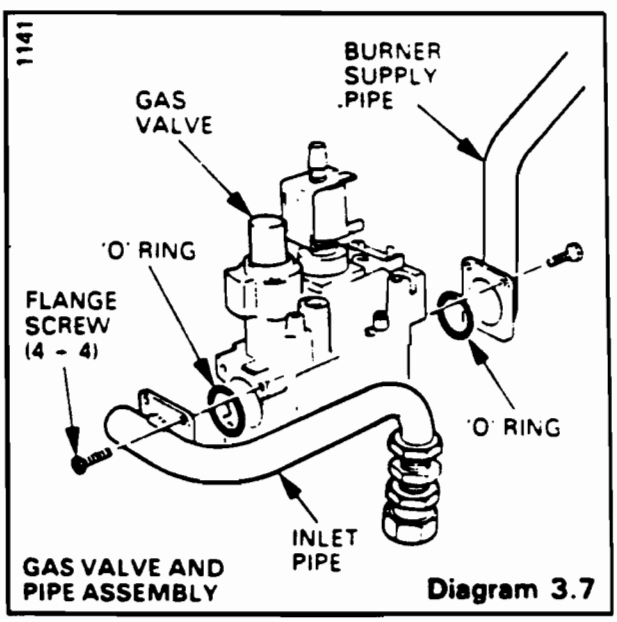
A. Refer to diagram 3.8 when reconnecting cables.

B. Ensure gas valve is correctly orientated when fitting. The direction of gas flow is indicated by an arrow on the base of the gas valve. Fit new 'O' rings as supplied with the valve.



GAS VALVE AND INLET PIPE

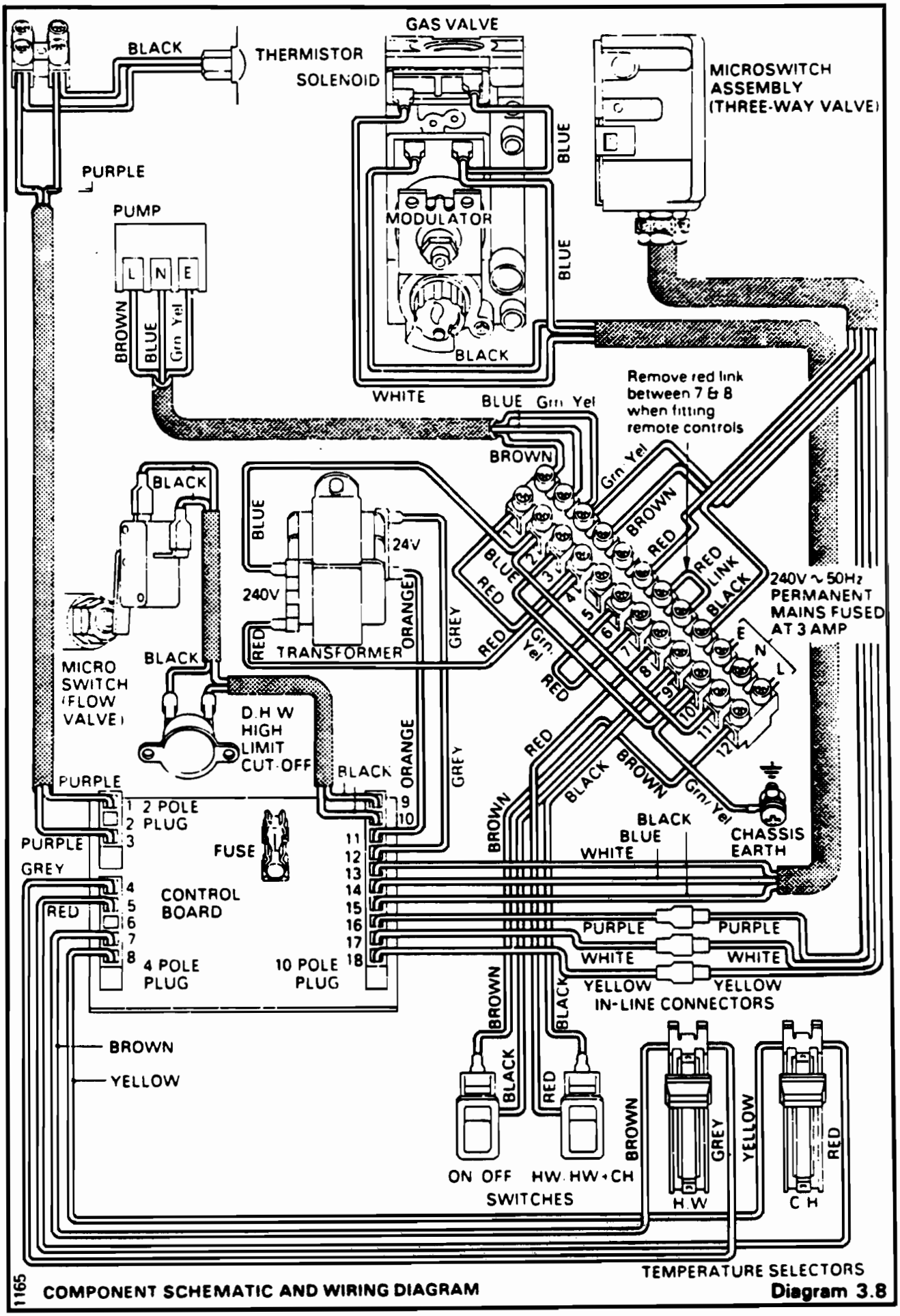
Diagram 3.6



GAS VALVE AND PIPE ASSEMBLY

Diagram 3.7

C. When the gas valve has been fitted it will be necessary to check that the pressure settings and pilot flame lengths are correct. Refer to 'Commissioning and Testing' in the Installation Instructions.



COMPONENT SCHEMATIC AND WIRING DIAGRAM

Diagram 3.8

3.10 THERMO-PRESSURE GAUGE

3.10.1 Isolate the electricity supply and turn OFF the gas and water supplies to the unit. Refer to section 1.1.

3.10.2 Remove the casing, refer to section 1.2.

3.10.3 Release water pressure and drain, refer to section 1.3.

3.10.4 Remove the two screws that secure the electrical drawer, see diagram 3.9.

3.10.5 Slide the electrical drawer forward to its stops and hinge down taking care with cables and capillaries connected to the drawer.

3.10.6 Disconnect the pressure gauge connection from the safety valve and release the pipe complete with nut and sealing washer, see diagram 3.10.

3.10.7 Remove the thermometer phial from its pocket on the pipe after removing the reusable tie-wrap.

3.10.8 Slacken the clip to release the two capillaries, see diagram 3.10.

3.10.9 Remove the securing nut, and clamping bracket at the rear of the gauge.

3.10.10 Remove the thermo-pressure gauge, complete with capillary pipes, by compressing the wedges on either side of the gauge. Remove gauge through the hole in the panel, see diagram 3.10.

REASSEMBLY NOTES:

A. When refitting, make sure that the sealing washer is in position under the pressure gauge connection, and that the capillaries are not bent tightly or will become trapped.

B. Ensure that the thermometer phial is pushed fully home in its pocket and secured with the tie-wrap. Make sure that the thermo-pressure gauge is positioned the correct way up.

C. Fill and vent the unit then repressurise the system. Refer to 'Commissioning and Testing' in the Installation Instructions.

3.11 MICROSWITCH - FLOW VALVE

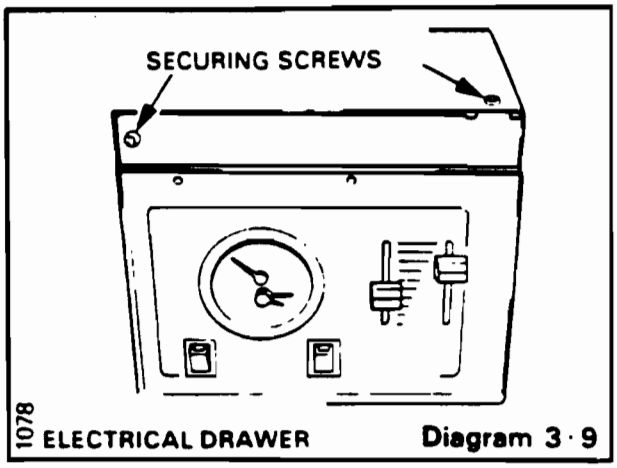
3.11.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.11.2 Remove the casing, refer to section 1.2.

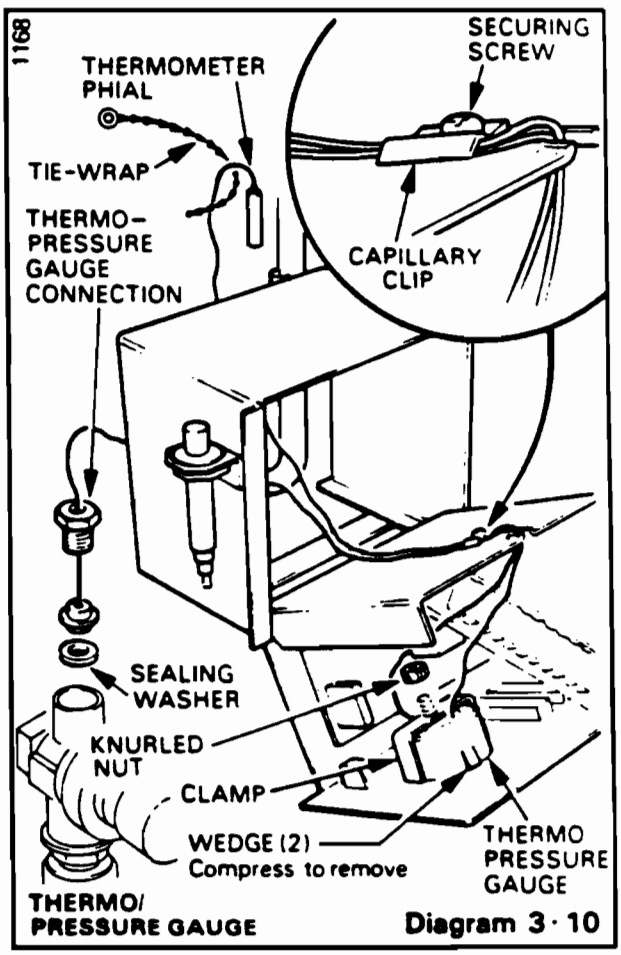
3.11.3 Remove the securing nut to release the bracket and switch, see diagram 3.11.

3.11.4 Disconnect the electrical snap-on connectors on the microswitch.

3.11.5 Remove the screws, shakeproof washers, and nuts to release switch and insulation from the bracket.



ELECTRICAL DRAWER **Diagram 3·9**



THERMO/ PRESSURE GAUGE **Diagram 3·10**

REASSEMBLY NOTE:

When fitting, make sure that the insulation is positioned between the microswitch and the bracket. The polarity of the connections is unimportant.

3.12 MICROSWITCH ASSEMBLY THREE-WAY VALVE

3.12.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.12.2 Remove the casing, refer to section 1.2.

3.12.3 Remove the two screws that secure the electrical drawer, see diagram 3.9.

3.12.4 Slide the electrical drawer forward to its stops and hinge down, taking care with cables and capillaries connected to the drawer.

3.12.5 Remove the circlip holding the microswitch assembly to the three-way valve, see diagram 3.12.

3.12.6 Slide back the insulation sleeves and disconnect the three in-line connectors (Yellow, White, Purple) inside the electrical drawer. Disconnect the four cables (Brown, Black, Red, Green/Yellow) from the terminal strip. Withdraw all the cables through the grommet in the electrical drawer.

3.12.7 Remove the reusable tie-wrap from the cables at the rear of the drawer.

3.12.8 Remove microswitch assembly from the unit.

REASSEMBLY NOTES:

A. When reconnecting cables refer to diagram 3.8.

B. When fitting new assembly, ensure that the in-line connectors are completely covered by their insulation sleeves and that the circlip is correctly located in its groove.

C. Secure all cables with reusable tie-wrap previously removed.

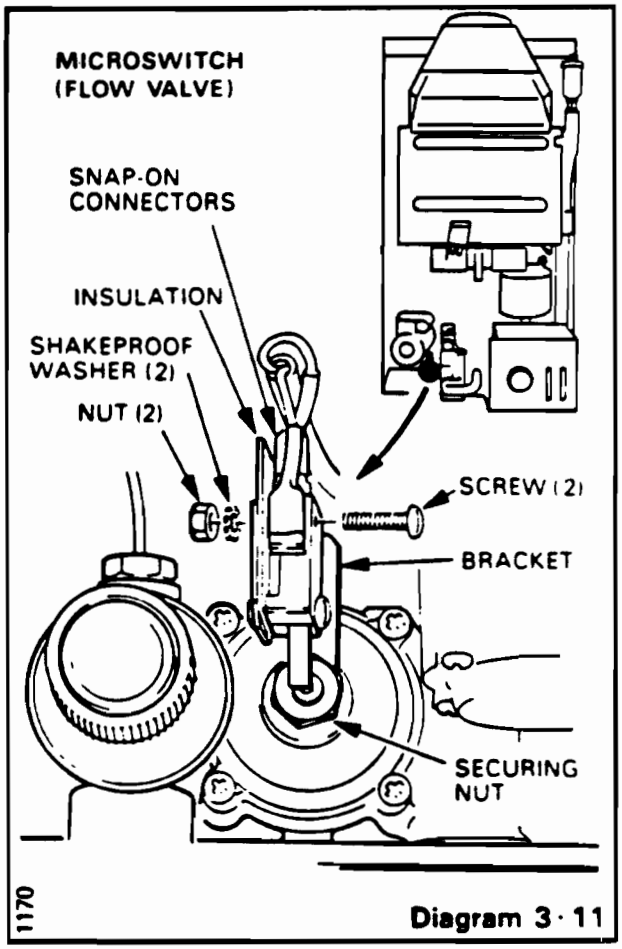


Diagram 3·11

3.13 TEMPERATURE SELECTORS

3.13.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.13.2 Remove the casing, refer to section 1.2.

3.13.3 Remove electrical drawer, refer to 3.12.3 and 3.12.4.

3.13.4 Disconnect the multi-pin plug (4 pole) from the control board, see diagram 3.1.3.

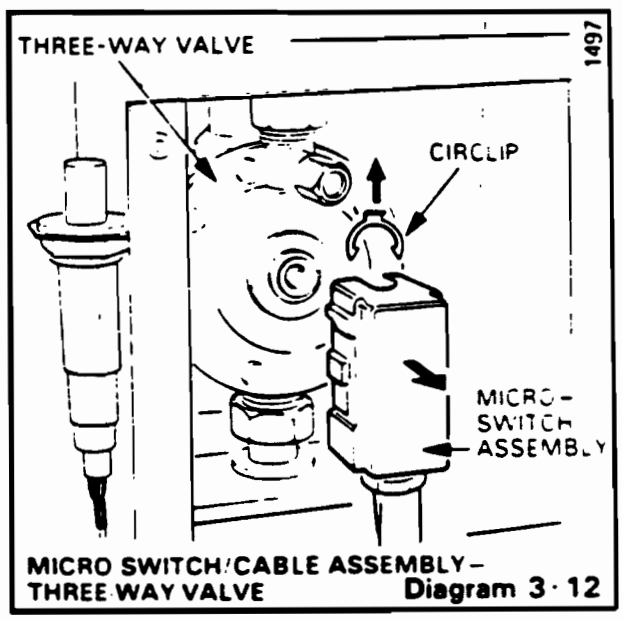
3.13.5 Pull off the two temperature selector knobs.

3.13.6 Remove the electrical drawer facia by removing the three securing screws, see diagram 3.13.

3.13.7 Remove the four securing screws to release the temperature selectors, cables and plugs as an assembly.

REASSEMBLY NOTES:

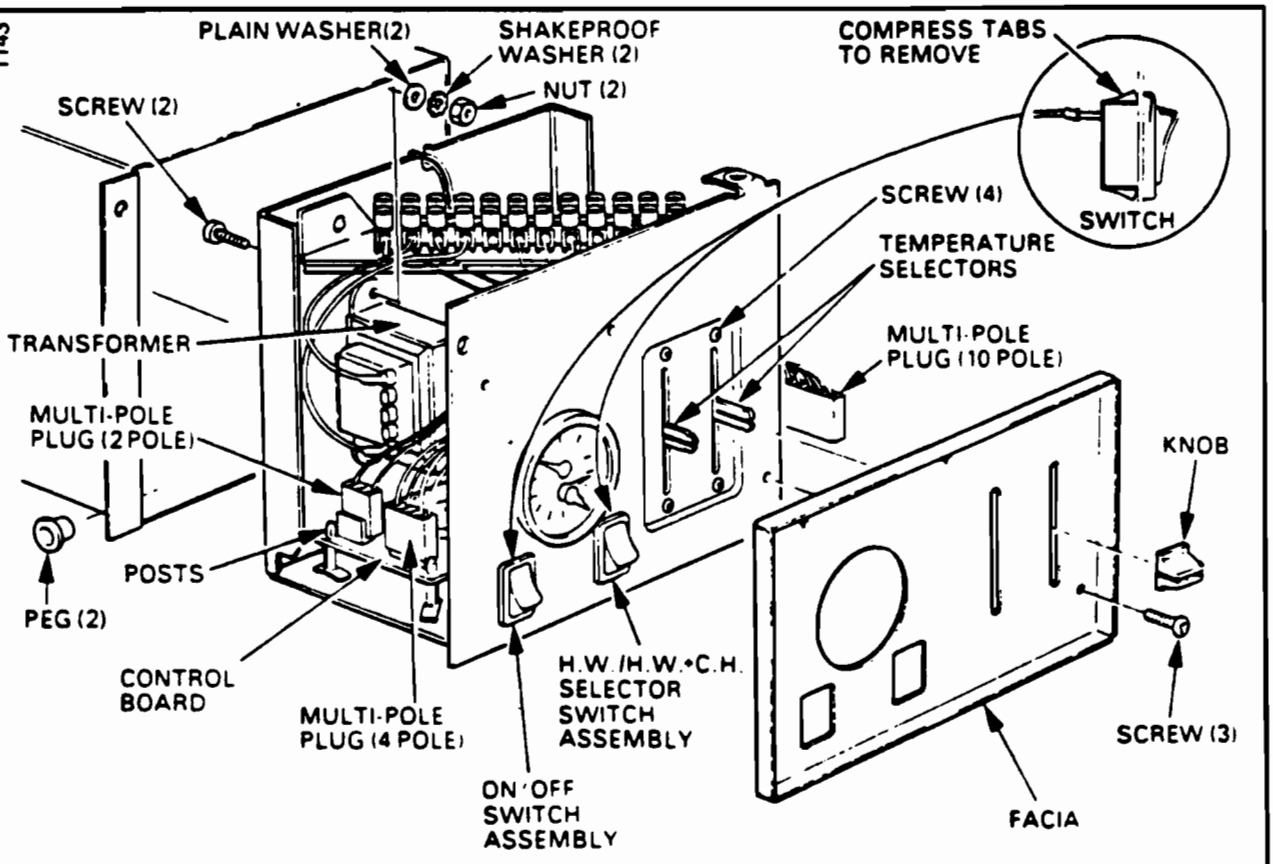
A. Refer to diagram 3.8 to position the selectors correctly; 'HW' selector at the left side and 'CH' selector at the right with the electrical connections at the top.



MICRO SWITCH/CABLE ASSEMBLY–
THREE WAY VALVE
Diagram 3·12

B. Make sure that the multi-pin plug is connected correctly, see diagram 3.8.

C. Do not overtighten the screws securing the temperature selectors.



ELECTRICAL DRAWER

Diagram 3·13

3.14 TRANSFORMER ASSEMBLY

3.14.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.14.2 Remove the casing, refer to section 1.2.

3.14.3 Remove the electrical drawer, refer to 3.12.3 and 3.12.4.

3.14.4 Disconnect the two cables from the transformer at the terminal strip, Blue at No.2 and Red at No.4. Disconnect the Orange and Grey cables at the snap-on connectors at the transformer.

3.14.5 Remove the transformer, complete with Blue and Brown cables, by removing the securing screws, nuts, and washers.

REASSEMBLY NOTE:

Refer to wiring diagram 3.8 when reconnecting cables.

3.15 CONTROL BOARD

3.15.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.15.2 Remove the casing, refer to section 1.2.

3.15.3 Remove the electrical drawer, refer to 3.12.3 and 3.12.4.

3.15.4 Disconnect all three multi-pin plugs at the controls board, see diagram 3.13.

3.15.5 Ease control board off the posts.

REASSEMBLY NOTE:

When reconnecting the multi-pin plugs make sure that they are connected correctly, see diagram 3.8.

3.16 ON/OFF & HW/HW+CH SWITCHES

3.16.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.16.2 Remove the casing, refer to section 1.2.

3.16.3 Remove the electrical drawer, refer to 3.12.3 and 3.12.4.

3.16.4 Disconnect the appropriate cables at the terminal strip, see diagram 3.8.

3.16.5 Remove the appropriate switch and cable assembly by exerting a force on the location tabs, see diagram 3.13.

REASSEMBLY NOTES:

A. Refer to diagram 3.8 when replacing and reconnecting.

B. Note that the left hand switch has Brown and Black cables and the right hand switch has Black and Red cables. Both switches must be positioned with the white marker facing upward.

3.17 SAFETY VALVE

3.17.1 Isolate the electricity supply and turn OFF the gas and water supplies to the unit. Refer to section 1.1.

3.17.2 Remove the casing, refer to section 1.2.

3.17.3 Release water pressure and drain, refer to section 1.3.

3.17.4 Disconnect the pressure gauge connection from the safety valve and release the capillary pipe complete with nut and washer, see diagram 3.14.

3.17.5 Unscrew the discharge pipe union from the safety valve, see diagram 3.14. Disconnect the pipe and remove the adaptor from the outlet of the valve complete with sealing washer.

3.17.6 Disconnect the snap-on connectors at the microswitch (flow valve). Remove the four screws retaining the flow valve cover assembly, see diagram 3.15. Remove flow valve cover complete with microswitch.

3.17.7 Unscrew the safety valve.

REASSEMBLY NOTES:

A. When fitting the safety valve, use a little jointing compound on the male threads. Make sure that the sealing washers are in position under the pressure gauge connection and the discharge pipe adaptor, see diagram 3.14.

B. Fill and vent the unit then repressurise the system. Refer to 'Commissioning and Testing' in the Installation Instructions.

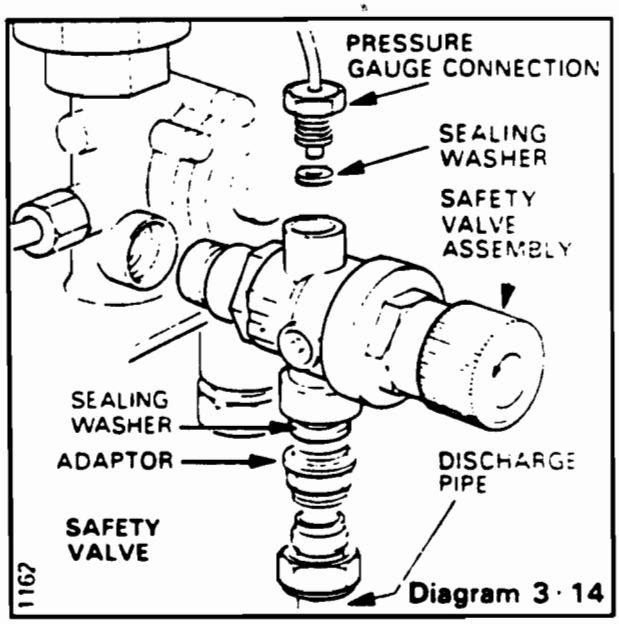


Diagram 3·14

3.18 FLOW VALVE DIAPHRAGM

3.18.1 Isolate the electricity supply and turn OFF the gas and water supplies to the unit. Refer to section 1.1.

3.18.2 Remove the casing, refer to section 1.2.

3.18.3 Release water pressure and drain, refer to section 1.3.

3.18.4 Disconnect the snap-on connectors from the microswitch (flow valve).

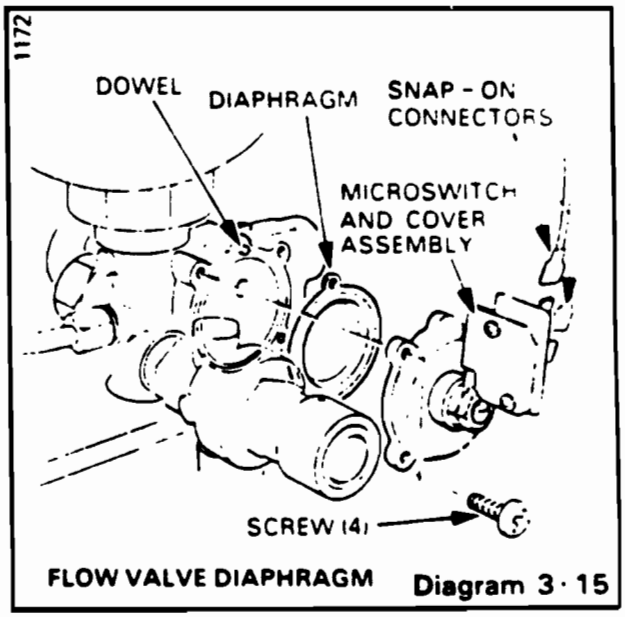
3.18.5 Remove the four screws retaining the flow valve cover and microswitch assembly, see diagram 3.15. Remove flow valve cover complete with microswitch.

3.18.6 Remove the exposed rubber diaphragm from the locating dowel on the flow valve body.

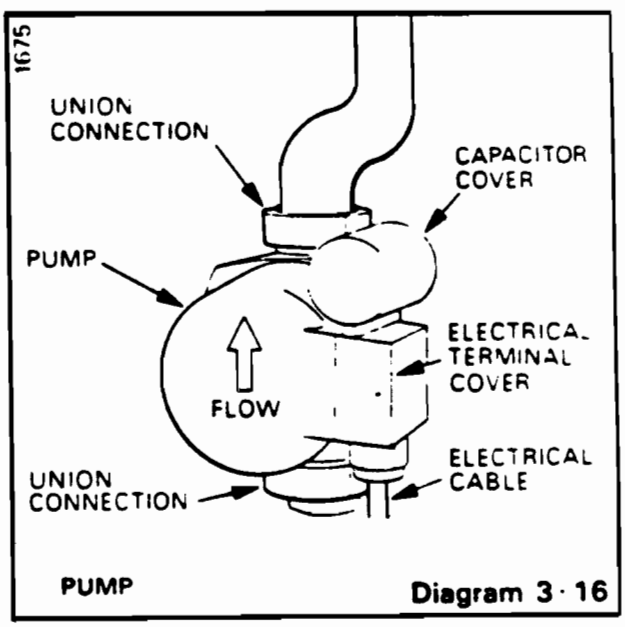
REASSEMBLY NOTES:

A. When fitting diaphragm, ensure that the moulded shape fits snugly into the body. Refit flow valve cover assembly, verifying that it also locates correctly on the dowel.

B. Fill and vent the unit then repressurise the system. Refer to 'Commissioning and Testing' in the Installation Instructions.



FLOW VALVE DIAPHRAGM Diagram 3·15



PUMP Diagram 3·16

3.19 PUMP

3.19.1 Isolate the electricity supply and turn OFF the gas and water supplies to the unit. Refer to section 1.1.

3.19.2 Remove the casing, refer to section 1.2.

3.19.3 Release the water pressure and drain, refer to section 1.3.

3.19.4 Remove pressure gauge connection and flow valve cover assembly, refer to 3.17.4 and 3.18.4 to 3.18.5.

3.19.5 Remove electrical terminal cover from the pump and disconnect the electrical cable, see diagram 3.16.

3.19.6 Break union connections at top and bottom of the pump. Remove pump clear of the unit. Take care not to damage the thermistor or thermistor cables.

REASSEMBLY NOTES:

A. Connect electrical cable to the new pump. Refit capacitor cover and terminal cover before fitting the pump, see diagram 3.16.

B. Fit new pump with flow directional arrow pointing up, fit new washers.

C. Fill and vent the unit then repressurise the system. Refer to 'Commissioning and Testing' in the Installation Instructions.

3.20 HEAT TRANSFER TANK

3.20.1 Isolate the electricity supply and turn OFF the gas and water supplies to the unit. Refer to section 1.1.

3.20.2 Remove the casing, refer to section 1.2.

3.20.3 Release water pressure and drain, refer to section 1.3.

3.20.4 Remove the heat shield by removing wing nut securing the support strap from its locating stud. Release heat shield securing screw and support angle securing screws, see diagram 1.7.

3.20.5 Disconnect the four unions to the tank and slacken the domestic hot water supply connection to the D.H.W. isolation valve to ease removal of tank, see diagram 3.17.

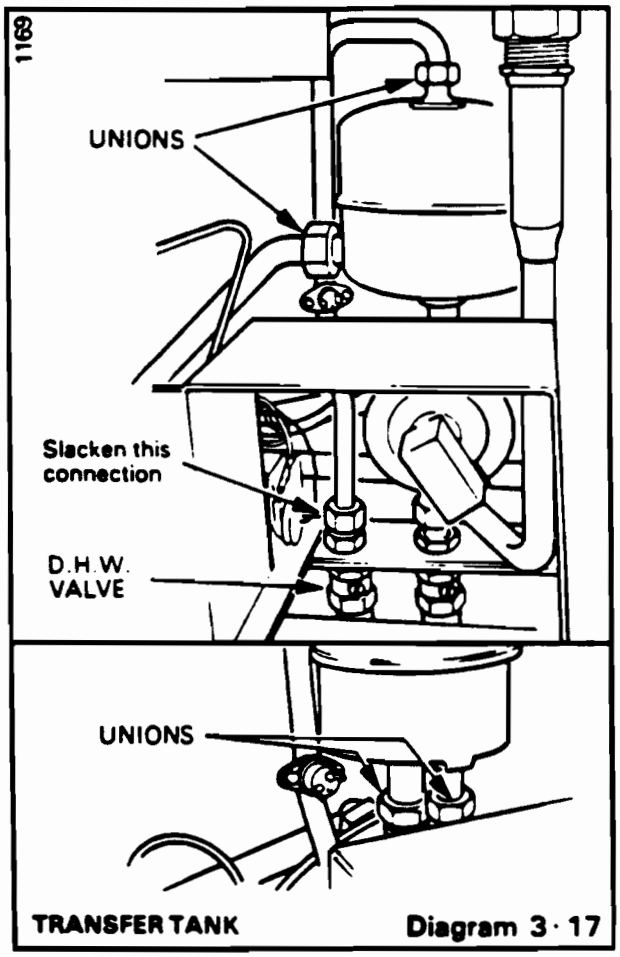
3.20.6 Carefully remove tank complete with washers.

REASSEMBLY NOTES:

A. When fitting the new heat transfer tank, fit new washers supplied. Ensure washers are correctly placed within the unions.

B. Fill and vent the transfer tank then repressurise the system. Refer to 'Commissioning and Testing' in the Installation Instructions.

C. If the tank is not to be renewed, only cleared of water scale, it should be carried out by a specialist contractor.



TRANSFER TANK Diagram 3·17

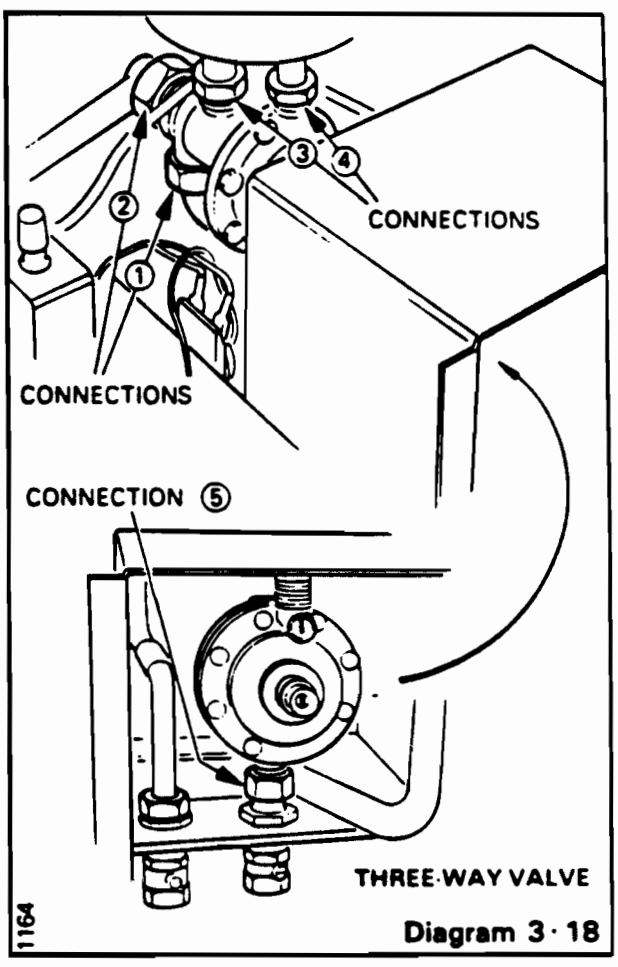


Diagram 3·18

3.21 THREE WAY VALVE

3.21.1 Isolate the electricity supply and turn OFF the gas and water supplies to the unit. Refer to section 1.1.

3.21.2 Remove the casing, refer to section 1.2.

3.21.3 Release water pressure and drain, refer to section 1.3.

3.21.4 Remove circlip securing microswitch assembly to the three-way valve, see diagram 3.12.

3.21.5 Lift microswitch assembly away from three-way valve, do not allow the cables to be strained.

3.21.6 Disconnect the five unions to the three-way valve in the numerical order shown on diagram 3.18. Lift valve and remove through the controls cover.

REASSEMBLY NOTES:

A. When fitting the three-way valve, make sure that the new sealing washers are correctly placed within the unions.

B. Ensure the circlip securing the microswitch assembly is correctly located in its groove.

C. Adjust the water throttle screw on the three-way valve as necessary. Refer to 'Commissioning and Testing' in the Installation Instructions.

D. Fill and vent the heat transfer tank then repressurise the system. Refer to 'Commissioning and Testing' in the Installation Instructions.

3.22 HEAT EXCHANGER

3.22.1 Isolate the electricity supply and turn OFF the gas and water supplies to the unit. Refer to section 1.1.

3.22.2 Remove the casing, refer to section 1.2.

3.22.3 Release water pressure and drain, see section 1.3.

3.22.4 Proceed as 2.2.1 to 2.2.5 to remove combustion chamber front panel, heat shield and pilot burner assembly, and 2.2.8 to 2.2.9 to remove main burner.

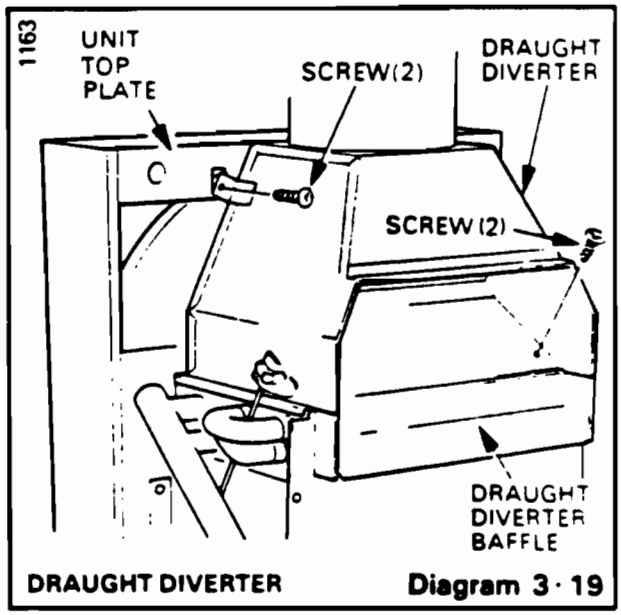
3.22.5 Remove overheat coiled capillary from r.h. down pipe of heat exchanger by releasing the bottom clamp screw, see diagram 3.3.

3.22.6 Remove the two screws securing the draught diverter baffle. Remove baffle clear of the unit, see diagram 3.19.

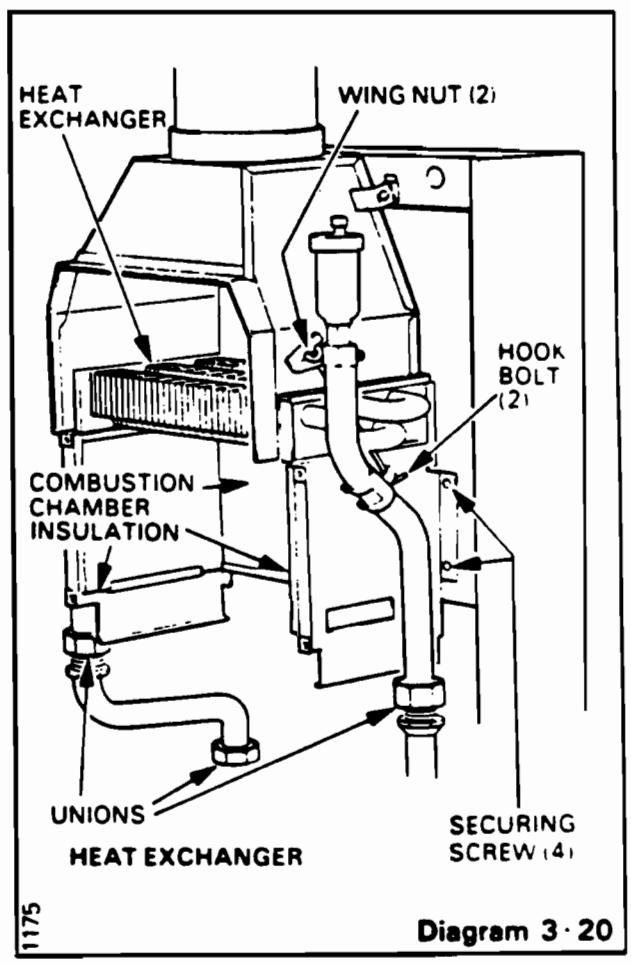
3.22.7 Remove the wing nuts from the hook bolts securing draught diverter to combustion chamber assembly, see diagram 3.20.

3.22.8 Release the four screws securing the combustion chamber assembly to the unit back plate, see diagram 3.20.

3.22.9 Disconnect thermistor cables from terminal block, see diagram 3.5.



DRAUGHT DIVERTER **Diagram 3·19**



HEAT EXCHANGER **Diagram 3·20**

3.22.10 Disconnect union on return pipe and slacken pump union to enable pipe section to be moved into the centre of the unit, see diagram 3.20.

3.22.11 Disconnect the union on the flow pipe.

3.22.12 Disengage the flow pipe and slide the heat exchanger forward out of the unit, lifting it slightly to ride over the small tabs on the combustion chamber sides.

REASSEMBLY NOTES:

A. When fitting heat exchanger, ensure that the tabs on the combustion chamber sides locate into the slots on the side panels of the heat exchanger.

B. Before refitting the draught diverter baffle check the gasket is in good condition. Renew if necessary.

C. Fill and vent the unit, vent the heat transfer tank, then repressurise the system. Refer to 'Commissioning and Testing' in the Installation Instructions.

3.23 COMBUSTION CHAMBER INSULATION

FRONT/SIDE/REAR

3.23.1 Isolate the electricity supply and turn OFF the gas supply to the unit. Refer to section 1.1.

3.23.2 Remove the casing, refer to section 1.2.

3.23.3 Remove the combustion chamber front panel by removing the four screws and wing nut. Disengage the support strap from its locating stud and remove the panel by easing forward at the bottom and sliding down, see diagram 2.1. Take care not to damage the insulation on the inside of the panel when removing.

3.23.4 To remove front insulation, remove the securing screw and slide out the insulation panel, see diagram 3.21.

3.23.5 To remove the side insulation, slide forward, clear of the unit, see diagram 3.20.

3.23.6 To remove rear insulation, remove heat shield and pilot burner assembly as described in 2.2.3 to 2.2.5 and main burner as described in 2.2.8 to 2.2.9.

3.23.7 Remove the two wing nuts and hook bolts from the draught diverter and remove the four screws securing the combustion chamber to the unit backplate, see diagram 3.20. Lower and remove the combustion chamber from the unit.

3.23.8 Remove the rear insulation.

REASSEMBLY NOTE:

Replacement of all combustion chamber insulation is by reversal of the above procedures.

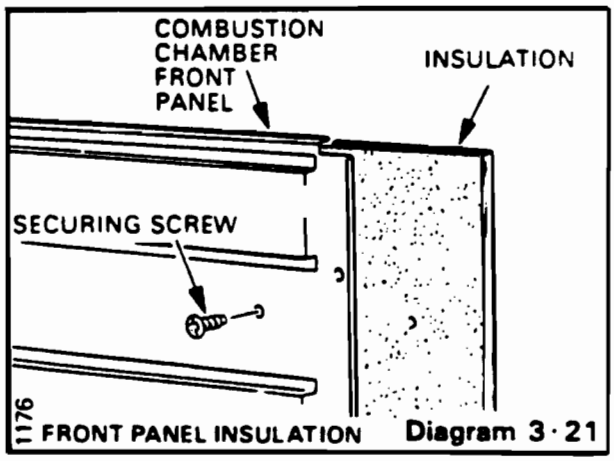
3.24 EXPANSION VESSEL (WITHOUT SPLIT FLUE COLLAR)

3.24.1 Isolate the electricity supply and turn OFF the gas and water supplies to the unit. Refer to section 1.1.

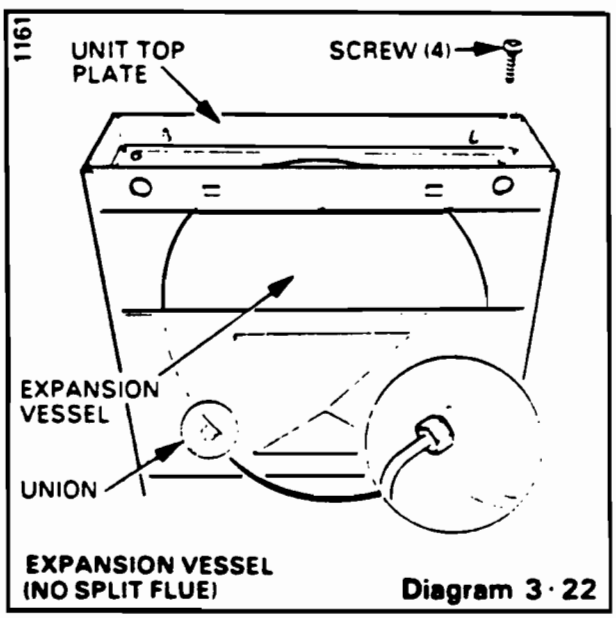
3.24.2 Remove the casing, refer to section 1.2.

3.24.3 Release water pressure and drain, refer to section 1.3.

3.24.4 Proceed as 2.2.1 to 2.2.5 to remove combustion chamber front panel, heat shield and pilot burner assembly and 2.2.8 to 2.2.9 to remove main burner.



FRONT PANEL INSULATION **Diagram 3·21**



EXPANSION VESSEL (NO SPLIT FLUE) **Diagram 3·22**

3.24.5 Proceed as 3.22.5 to 3.22.12.

3.24.6 Remove the two screws securing the draught diverter to the unit top plate, see diagram 3.19. Remove the draught diverter clear of the unit.

3.24.7 Remove the four screws securing the unit top plate, see diagram 3.22. Lift top plate clear of the unit.

3.24.8 Disconnect union at the expansion vessel behind unit backplate, see diagram 3.22.

3.24.9 Lift out expansion vessel and remove through space vacated by the draught diverter.

REASSEMBLY NOTE:

Fill and vent the unit, vent the heat transfer tank, then repressurise the system. Refer to 'Commissioning and Testing' in the Installation Instructions.

3.25 EXPANSION VESSEL (SPLIT FLUE COLLAR)

3.25.1 Isolate the electricity supply and turn OFF the gas and water supplies to the unit. Refer to section 1.1.

3.25.2 Remove the casing, refer to section 1.2.

3.25.3 Release water pressure and drain, refer to section 1.3.

3.25.4 Remove screws and nuts from split flue collar. Disengage collar as manufacturers instructions.

3.25.5 Remove hook bolts and wing nuts from draught diverter, see diagram 3.20.

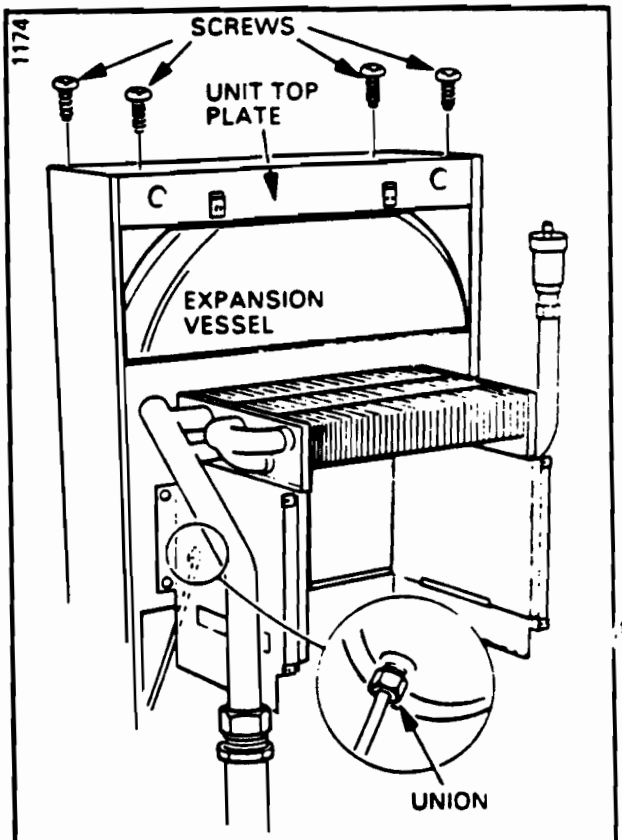
3.25.6 Remove the four screws securing the unit top plate, see diagram 3.23. Lift top plate clear of the unit.

3.25.7 Disconnect union at the expansion vessel behind unit backplate, see diagram 3.23.

3.25.8 Lift out expansion vessel and remove through space vacated by the draught diverter and split flue collar.

REASSEMBLY NOTE:

Fill and vent the unit, vent the heat transfer tank, then repressurise the system. Refer to 'Commissioning and Testing' in the Installation Instructions.



EXPANSION VESSEL (SPLIT FLUE COLLAR)

Diagram 3.23

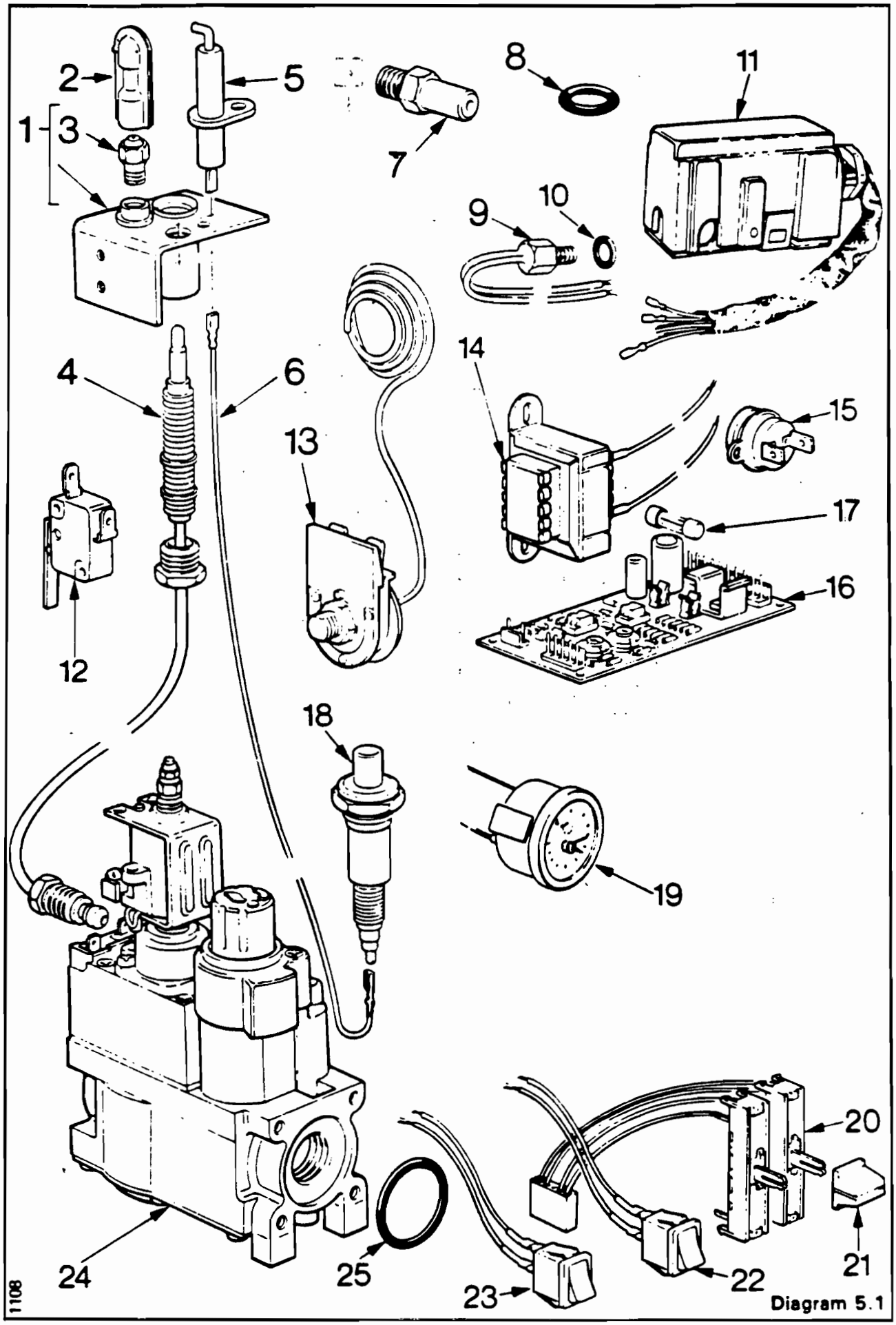


Diagram 5.1

5 SPARE PARTS

5.1 PART IDENTIFICATION

The key number in the first column of the list will help identify each part in diagram 5.1.

5.2 ORDERING

5.2.1 When ordering spare parts, quote the part number and description, stating the model and serial number off the Data Badge, see diagram 1.6.

5.2.2 Gas Regions will also require the G.C. unit number off the Data Badge and the required spare part G.C. number from the list.

No.	Description	Glow-worm Part No.	G.C. No.
1	Pilot burner assembly (incl. 3)	203412	360 212
2	Pilot head	203405	
3	Injector - pilot	203506	399 114
4	Thermocouple	412854	391 720
5	Electrode	202604	360 210
6	Ignition lead	[illegible]4614	360 211
7	Injector - main	203034	394 185
8	'O' ring - main burner	208069	
9	Thermistor	202512	
10	'O' ring - thermistor	204209	281 331
11	Microswitch assembly (Three-way valve)	422192	
12	Microswitch (flow valve)	202014	360 188
13	Boiler overheat cut-off assembly	422183	360 176
14	Transformer assembly	422179	360 215
15	Domestic hot water cut-off assembly	422184	360 175
16	Control board (incl. 17)	202013	360 088
17	Fuse - 1A	202015	334 750
18	Piezo unit	202702	382 585
19	Thermo-pressure gauge	204502	392 881
20	Temperature selector assembly	422167	360 216
21	Knob - temperature selector	204612	360 090
22	On/Off switch assembly	422173	360 217
23	HW/HW+CH switch assembly	422172	
24	Gas valve assembly (incl. 25)	422185	360 196
25	'O' ring - gas valve	208068	334 658