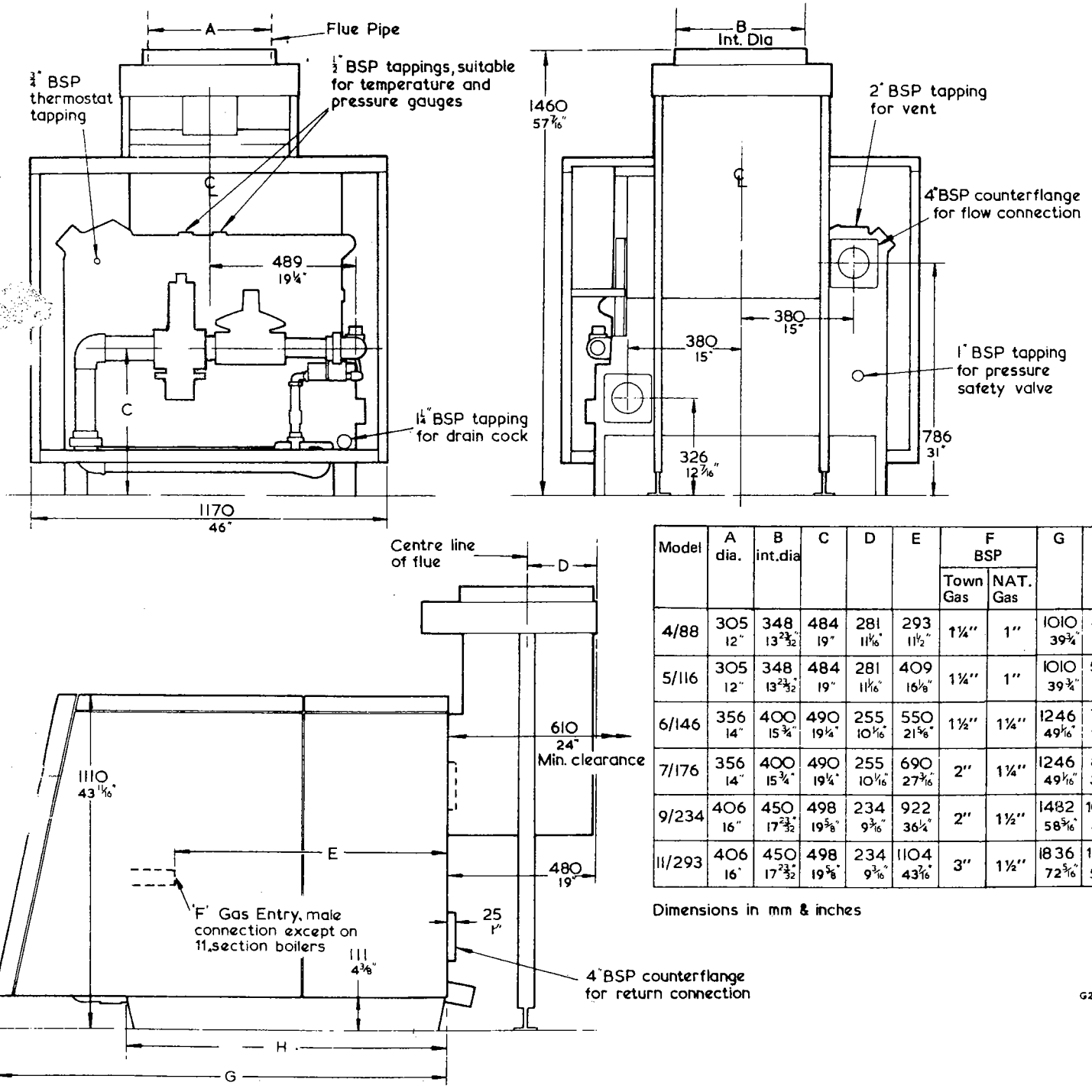
INSTALLATION AND
MAINTENANCE INSTRUCTIONS

# KENNET

## GAS-FIRED BOILER

## CONTENTS




| Model | A dia. | B int.dia | C | D | E | F BSP | | G | H |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Town Gas | NAT. Gas | | |
| 4/88 | 305 12" | 348 13 23/32" | 484 19" | 281 11 1/16" | 293 11½" | 1¼" | 1" | 1010 39¾" | 476 18¾" |
| 5/116 | 305 12" | 348 13 23/32" | 484 19" | 281 11 1/16" | 409 16⅛" | 1¼" | 1" | 1010 39¾" | 590 23¼" |
| 6/146 | 356 14" | 400 15¾" | 490 19¼" | 255 10 1/16" | 550 21⅝" | 1½" | 1¼" | 1246 49 1/16" | 704 27 11/16" |
| 7/176 | 356 14" | 400 15¾" | 490 19¼" | 255 10 1/16" | 690 27 3/16" | 2" | 1¼" | 1246 49 1/16" | 818 32 3/16" |
| 9/234 | 406 16" | 450 17 23/32" | 498 19⅝" | 234 9 3/16" | 922 36¼" | 2" | 1½" | 1482 58 5/16" | 1046 41 3/16" |
| 11/293 | 406 16" | 450 17 23/32" | 498 19⅝" | 234 9 3/16" | 1104 43 7/16" | 3" | 1½" | 1836 72 5/16" | 1274 50 3/16" |

Dimensions in mm & inches

G261A

Fig. 1 – BOILER DIMENSIONS

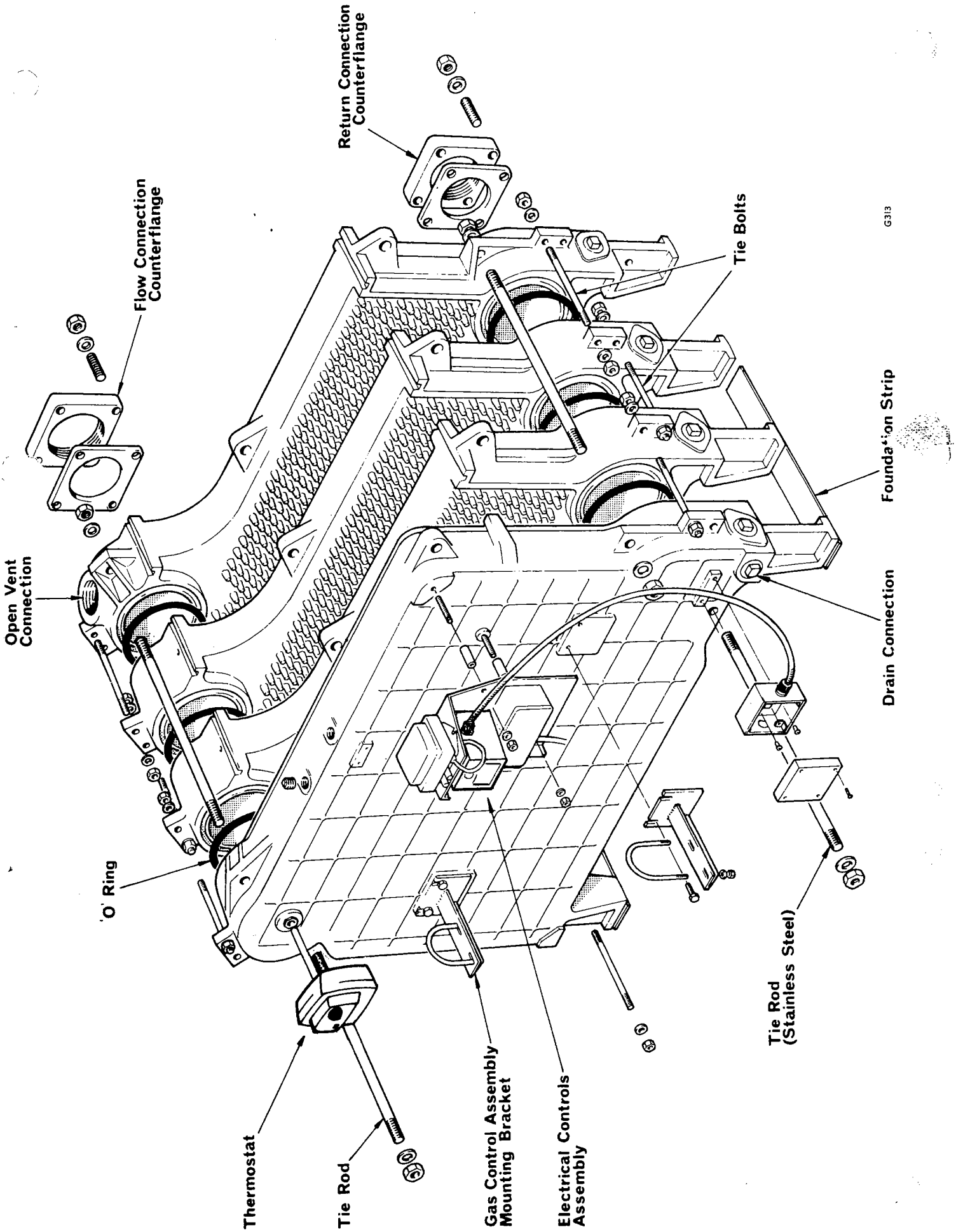
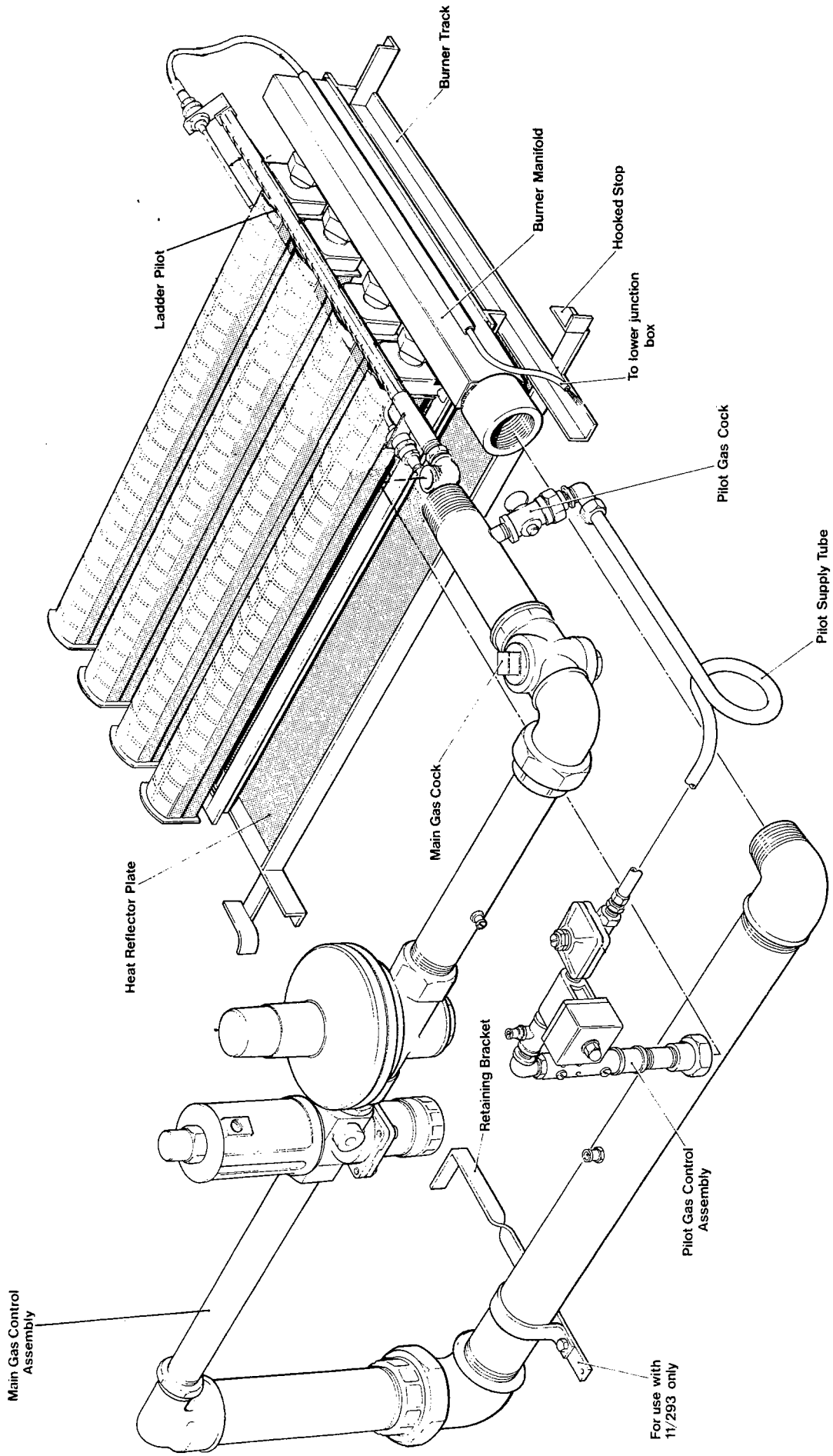



Fig. 2 – EXPLODED VIEW OF BOILER




NATURAL GAS

Fig. 4 – BURNER AND G

rings as before and assemble the section.

8. Continue until the front waterway section has been assembled, then insert the longest tie rod (Pack A) which is made of stainless steel, through the hole below the lower (return) water port face in the right-hand corner of the front waterway section and out through the hole in the bottom left-hand corner of the rear section (viewed from the rear); secure with nuts and washers (Pack A); the bolt hole in the front waterway section is located immediately above where the main gas manifold enters the boiler combustion chamber. Insert the remaining three tie rods (Pack A) through the lugs on either side of the front and rear section. Secure with M16 nuts and washers (Pack A) and tighten all rods progressively to a final torque loading of 67-74 N/m (50-55 lb/ft). The assembly bolts holding adjacent sections together should be slackened off or discarded.

## Fitting the Draught Diverter

1. Fit the baffle (crate 2) into the draught diverter, checking its size with the table below, and securing it with M6 screws and washers (Pack E), see Fig. 3.

**Draught Diverter Baffle Size Table**

| Boiler | Town Gas | Natural Gas |
|---|---|---|
| 4/88 | 203 mm (8 in.) Depth | 203 mm (8 in.) Depth |
| 5/116 | 203 mm (8 in.) Depth | 152 mm (6 in.) Depth |
| 6/146 | 102 mm (4 in.) Depth | 152 mm (6 in.) Depth |
| 7/176 | 51 mm (2 in.) Depth | 152 mm (6 in.) Depth |
| 9/234 | No draught diverter baffle required | |
| 11/293 | | |

2. Using the adhesive provided, (Pack E) stick the asbestos sealing strip (Pack E) in position around the draught diverter/fluehood joint on the diverter, then assemble the diverter to the rear waterway section.

3. Secure the diverter in position on the rear waterway section using the support angle (Pack E) and the M10 studs, bolts, washers and nuts (Pack E) see Fig. 3.

4. Fit the two support legs to the inside of the draught diverter canopy, securing them with the four M8 setscrews (Pack F).

NOTE:—For 4/88, 5/116, 6/146 and 7/176 boilers, the support legs are packed inside the casing carton. On 9/234 and 11/293 boilers, the support legs are packed in crate 2.

5. Place the draught diverter canopy and support legs over the draught diverter then secure the legs to the draught diverter with the four brackets and eight M8 setscrews (Pack F).

NOTE:—The height of the draught diverter canopy must be adjusted using the adjustable feet on the support legs, so a gap of not more than 3 mm (1/8 in.) exists between the top of the draught diverter and the underside of the canopy. Ensure that the feet sit firmly on the floor as these must take the weight of the stack. If the weight of the stack is greater than the equivalent of 1.8 m (6 ft.) of heavyweight asbestos pipe, the stack must be individually supported.

6. On 4, 5, 6 and 7 section boilers, fit the flue adaptor ring (crate 1) into the flue outlet canopy, to reduce the flue outlet diameter to the correct size.

7. Connect the main stack to the draught diverter, ensuring a suitable gas tight seal.

## Water Connections

1. There are two 1/2 in. Bsp plugged tappings on top of the front waterway section and these can be used for fitting temperature and pressure gauges.

2. Provision is also made in the front face of the front waterway section for fitting a drain cock. This tapping is at the bottom right-hand side and is sized 1.1/4 in. Bsp. If a drain cock is not to be fitted in this position, fit the 1.1/4 in. Bsp plug (Pack D).

3. The flow and return connections are located at the top right and bottom left respectively, of the rear waterway section, when viewed from the rear. These connections should be made in the normal manner using the 4 in. Bsp counterflanges, gaskets, M16 studs, nuts and washers supplied (Pack C). If the flow connection to the boiler is less than 4 in., it is recommended that an eccentric reducing fitting is used.

4. A 2 in. Bsp open vent connection is provided on top of the rear waterway section, adjacent to the flow connection. The boiler must be vented at this point in all circumstances.

5. A 1 in. Bsp tapping is provided for fitting a safety valve. This is located on the rear face of the rear waterway section, below the flow tapping. If the safety valve is to be fitted in another position, fit the 1 in. Bsp plug (Pack C).

6. The installation should now be pressure tested. Fill and vent the boiler and system and carry out a pressure test to a pressure one and a half times the working head of the installation plus 20 lb/sq. in. if the working head is above 40 lb/sq. in. and twice the working head if this is below 40 lb/sq.in. (see British Standard Code of Practice CP.341.300). The normal working head of the installation should not exceed 140 ft. w.g. (60 p.s.i.). Check for leaks and rectify if necessary.

## Fitting the Fluehood

1. Fit the M10 studs (Pack G) to the threaded holes in the top of the waterway sections to retain the fluehood. The studs must be positioned so that they will engage with the slots on the fluehood and each section is tapped for this purpose. The fluehood can be first offered up to determine the stud positions.

2. Fit the two lengths of asbestos sealing rope (Pack G) to the top of the waterway sections to seal the sides of the flue-hood. Using the adhesive supplied, stick the asbestos sealing strip (Pack E) on the top of the front section to seal the front of the fluehood.

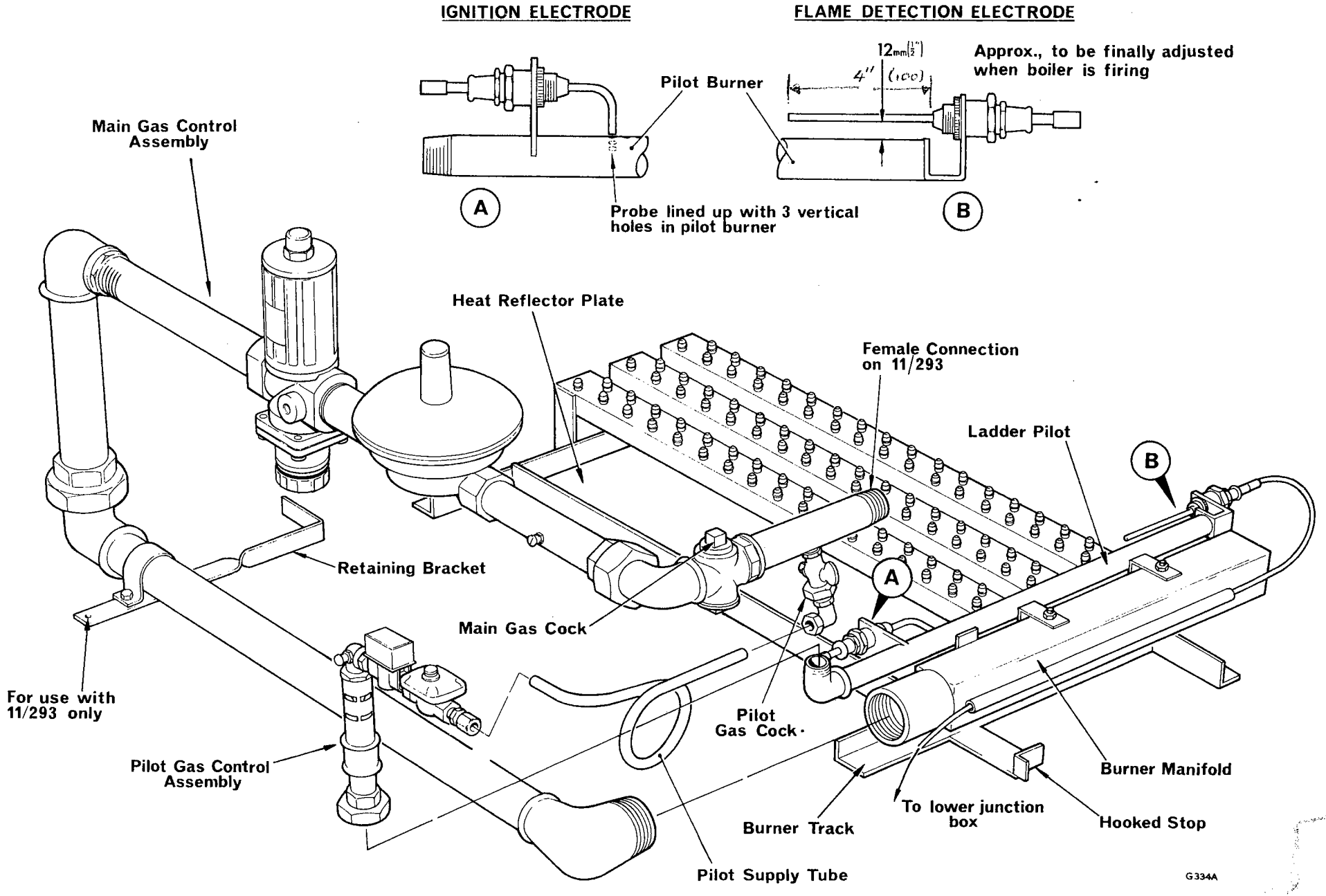
3. Using the handles on the fluehood (crate 1), lift the fluehood on the top of the waterway section, locating it to the studs previously fitted; secure with M10 nuts and washers (Pack G).

4. Fit the insulation blanket (crate 1) over the fluehood and wire it in position, using the tie wire and sleeves (Pack G), see Fig. 3.

## Fitting the burner assembly

1. Fit the burner track (crate 2) beneath the boiler, pushing it under until the hooked stops on the rails locate against the legs of the front waterway section.

2. Lay the insulation blanket on the floor inside the burner rails of the track, then place the heat reflector plate (crate 2) on top of the blanket.


IGNITION ELECTRODE
FLAME DETECTION ELECTRODE
12mm(½")
4" (100)
Approx., to be finally adjusted when boiler is firing
Pilot Burner
A
B
Probe lined up with 3 vertical holes in pilot burner
Main Gas Control Assembly
Heat Reflector Plate
Female Connection on 11/293
Ladder Pilot
B
Retaining Bracket
A
Main Gas Cock
For use with 11/293 only
Pilot Gas Cock
Pilot Gas Control Assembly
Burner Manifold
To lower junction box
Burner Track
Hooked Stop
Pilot Supply Tube
G334A

3. *Natural Gas Boilers Only*

A. The natural gas pilot burner bar is supplied already attached to the burner assembly, but it must be adjusted on site so that it touches the main burner bar air box flanges as shown in fig. 4. Once the pilot burner is correctly positioned, tighten the front and rear securing bolts.

B. Using one of the brass electrode nuts (Pack K), fit the flame detection electrode (Pack K) to the hole in its mounting bracket which is welded to the rear end of the ladder pilot bar on the burner trolley (crate 2); on natural gas boilers the electrode is 152 mm. (6 in.) long. The electrode must be parallel with the burner bar. Secure the electrode in position, see fig. 4. Using the Rajah clip supplied (Pack K) connect the covered electrical lead to the detection electrode; the lead is routed through the tube on the side of the burner and must be connected to the lower junction box on the front of the boiler, once the burner trolley assembly is in position. Do not pull tight or strain the lead.

4. *Town Gas Boilers Only*

A. Fit the town gas ladder pilot assembly to the main burner assembly using the two screws, the three nuts and two washers. The ladder pilot assembly is attached to the front and rear of the burner trolley. The nut and bolt at the front should be fully tightened first. When securing the ladder pilot to the rear of the trolley, the bolt should first be positioned and then one nut screwed on but only far enough to allow the second nut to be tightened up to it. This should leave both nuts tight, but allowing the ladder pilot bracket to move around the bolt, so allowing for expansion during operation.

B. Using one of the brass electrode nuts (Pack K), fit the flame detection electrode (Pack K) to the elongated slot in its mounting bracket which is welded to the rear end of the ladder pilot bar on the burner trolley (crate 2); on town gas boilers the electrode is 98 mm. (3.8 in.) long. The electrode must be adjusted within its slot so that the probe is parallel with the burner bar and within the ionisation field of the pilot flame, so giving a minimum probe reading of 10 micro-amps. Finally secure the electrode in position, see fig. 4. Using the Rajah clip supplied (Pack K) connect the covered electrical lead to the detection electrode; the lead is routed through the tube on the side of the burner and must be connected to the lower junction box on the front of the boiler, once the burner trolley assembly is in position. Do not pull tight or strain the lead.

NOTE:— The distance between the probe and the ladder pilot bar, to give the required reading, should be approximately 12 mm.(15/32 in.) on town gas boilers. However, further adjustment may be necessary after firing the boiler to obtain the micro-amp reading. This should be carried out after isolating the electrical supply.

5. Using the second brass electrode nut (Pack K), fit the ignition electrode (Pack K) to the elongated slot in its mounting bracket welded to the front end of the ladder pilot bar, see fig. 4. This probe must be adjusted so that a gap of 1.6mm (1/16 in.) ± 0.8mm (1/32 in.) exists between the tip of the probe and the pilot burner bar. On town gas boilers, the tip should also line up with the three vertical holes in the bar. Finally secure the electrode in position.

6. Place the pre-assembled burner arrangement on its rails, then wheel it into the boiler combustion chamber. Clamp the burner assembly in position by fitting the pipe clip (Pack N) to the retaining bracket (Pack N) around the burner manifold on the extreme left-hand side, using the two M8 nuts and setscrews (Pack N) and at the same time hooking the end of the retaining bracket behind the leg of the first boiler section.

7. Fit the two rear casing support brackets to the feet of the rear waterway section, using the four M8 screws and nuts (Pack M). Two of the screws are longer (60 mm.) than the other two and these must be fitted in the lower securing position on each bracket, see fig. 3. The left-hand bracket (when viewed from the rear) must be fitted to the rear of the section leg and the right-hand bracket to the front of the leg.

8. For town gas boilers, fit the rear closure plate (crate 2) across the bottom of the combustion chamber, securing it to the two M8 x 60mm screws (fitted in the previous operation), with washers and nuts (Pack M).

The closure plate for natural gas boilers is supplied unassembled and should be assembled on site as follows:— (see fig. 3):—

A. Fit the two brackets to the rear closure plate (crate 2) using the two M8 x 14 mm screws and nuts (Pack M).

B. Place the natural gas rear closure plate (crate 2) in position at the rear of the boiler. The two legs of the draught diverter should be located in the two channels in the closure plate. Secure the plate in position attaching the two brackets to the two M8 x 60mm screws (fitted in operation 6) with nuts and washers (Pack M).

C. Fit the top cover to the rear closure plate to seal the gap between the closure plate and the rear of the boiler. The top cover can be adjusted to fill the gap, using the slotted screw holes provided. Secure the cover using the four M6 screws and washers (Pack M).

NOTE:—When fitting the closure plate great care should be taken to ensure that the flame detection electrode is not touched by the plate.

## Fitting the Identification Badges

1. Using the hammer drive screws (Pack O), secure the boiler code badge (Pack O) and Gas Council Code badge (Pack O) to the front waterway section. Two holes are already drilled in the section to accept the drive screws and these are located on the upper, mid section of the waterway.

## Fitting the Gas Controls

1. Fit the two mounting brackets (Pack L) to the front waterway section, using M8 setscrews (Pack L).
2. Lift the pre-assembled main gas control arrangement (crate 2) on to the mounting brackets just fitted and secure it with the two U-shaped clips, M6 washers and nuts (Pack L).
3. Connect the gas control assembly to the burner pipework, tightening the union to ensure a gas tight seal.
4. Connect the main gas cock pipework assembly to the gas control assembly by connecting the union.
5. Connect up the main gas supply to the screwed tube screwed into the main gas cock.

NOTE:—A long thread and a backnut on the left-hand side of the gas control assembly pipework allows lateral adjustment to make this connection.

6. Connect the pre-assembled pilot gas control assembly to the elbow on the ladder pilot by tightening the union. Cut and form the piece of 8 mm. aluminium tube to length, then using the coupling nuts and olives supplied, connect it between the pilot governor on the pilot gas control assembly and the elbow screwed into

the pilot gas cock. The coupling nuts will be found already screwed into their connections

7. Fit the reducing bush (Pack D) to its 3/4 in. tapping in the front face of the front waterway section, then screw the thermostat pocket into the bush. Fit the thermostat phials (two) into the pocket, then fit the thermostat (Pack H).

## Electricity Supply

The electricity supply should be 220-240 volts, 50Hz, single phase and must be connected to the boiler through a suitable isolating switch and 10 amp fuse. The supply cable should be run on the right-hand side of the boiler. All isolating switches, fuses etc., must be supplied by the installer as these are not provided.

## Electrical Controls and Wiring — Natural Gas Boilers Only — See Fig. 5, 6 and 7.

All on site electrical wiring should conform to the I.E.E. Regulations for buildings and local authorities requirements.

1. Fit the control box, ignition transformer and junction box mounting plate (Pack H) to the upper, right-hand side of the front waterway section and secure it using two M8 studs, distance pieces, washers and nuts (Pack H). The two studs will first have to be fitted to the section, then the distance pieces placed over the studs to give an air gap between the mounting plate and the section. Fit the casing right-hand front tie strap (see fig. 8) beneath the upper distance piece.

NOTE:—The control box, ignition transformer and main junction box are supplied already assembled on the mounting plate. The small junction box is supplied pre-wired to the main junction box through a flexible conduit.

2. Secure the second, smaller junction box to the lower, right-hand side of the front waterway section and secure it with the M8 screws (Pack H).

3. Connect the H.T. lead (Pack H) between the output terminal of the ignition transformer and the ignition electrode using the Rajah clip supplied (Pack R).

4. Connect the detector lead from detector electrode at the rear of the boiler to the terminal in the lower junction box.

5. Connect the boiler thermostat to the terminals in the upper junction box as follows, having first connected the flexible conduit to the junction box.

ontrol thermostat terminal 1—Brown to terminal 8
ontrol thermostat terminal 3—Loop to Limit thermostat terminal 1.
Limit thermostat terminal 3—White/Yellow to terminal 7
Green/Yellow to Earth terminal

6. Connect the pilot solenoid cables to the terminals in the upper junction box as follows, having first connected the flexible conduit to the junction box.

Live, Red to terminal 6
Neutral, White to terminal 4
Earth, Green/Yellow to Earth terminal on the solenoid valve.

7. Connect the main gas valve cables (Pack H) to the terminals in the upper junction box as follows, having first connected the plastic connector to the junction box.

Brown to terminal 9
Blue to terminal 4
Green/Yellow to Earth terminal

Connect the free ends of the cables to the terminals beneath the top of the main gas valve. The top of the valve is removed by unscrewing the capnut, then lifting off the top plate. The cables should first be passed through the plastic connector on the side of the valve and the connector tightened.

Connect the wires as follows:—

Brown to terminal block
Blue to terminal block
Green/Yellow to Earth terminal

8. Check that a loop is located between terminals 5 and 7 in the upper junction box. The boiler will not operate without this loop unless other remote controls have been fitted.

9. Ensure that the mains supply is switched off before making any connections. Connect the mains electrical supply to the terminals in the upper junction box as follows:—

Live to terminal L
Neutral to terminal N
Earth to Earth terminal E

WARNING:— Incorrect polarity will result in continuous lockout.

## Electrical Controls and Wiring — Town Gas Boilers Only — See Fig. 8, 9 and 10

All on site electrical wiring should conform to the I.E.E. Regulations for buildings and local authorities requirements.

1. Fit the control box, ignition transformer and junction box mounting plate (Pack H) to the upper right-hand side of the front waterway section and secure it using two M8 studs, distance pieces, washers and nuts (Pack H). The two studs will first have to be fitted to the section, then the distance pieces placed over the studs to give an air gap between the mounting plate and the section. Fit the casing right-hand front tie strap (see fig.11) beneath the upper distance piece.

NOTE:— The control box, ignition transformer and main junction box are supplied already assembled on the mounting plate. The small junction box is supplied pre-wired to the main junction box through a flexible conduit.

2. Secure the second, smaller junction box to the lower, right-hand side of the front waterway section and secure it with the M8 screws (Pack H).

3. Connect the H.T. lead (Pack H) between the output terminal of the ignition transformer and the ignition electrode using the Rajah clip supplied (Pack R).

4. Connect the detector lead from detector electrode at the rear of the boiler to the terminal in the lower junction box.

5. Connect the boiler thermostat to the terminals in the upper junction box as follows, having first connected the flexible conduit to the junction box.

Control thermostat terminal 1—White to terminal 10
Control thermostat terminal 3—White/Yellow to terminal 9
Limit thermostat terminal 1—Brown to terminal 7
Limit thermostat terminal 3—White/Red to terminal 6
Green/Yellow to Earth terminal

6. Connect the pilot solenoid cables to the terminals in the upper junction box as follows, having first connected the flexible conduit to the junction box.

Live, Red to terminal 5
Neutral, White to terminal 3
Earth, Green/Yellow to Earth terminal on the solenoid valve.

7. Connect the main gas valve cables (Pack H) to the terminals in the upper junction box as follows, having first connected the plastic connector to the junction box.

Brown to terminal 11
Blue to terminal 3
Green/Yellow to Earth terminal

Connect the free ends of the cables to the terminals beneath the top of the main gas valve. The top of the valve is removed by unscrewing the capnut, then lifting off the top plate. The cables should first be passed through the plastic connector on the side of the valve and the connector tightened.

Connect the wires as follows:—

| | |
|---|---|
| Brown | to terminal block |
| Blue | to terminal block |
| Green/Yellow | to Earth terminal |

8. Check that loops are located between terminals 4 and 6 and 8 and 9 in the upper junction box. The boiler will not operate without these two loops unless other remote controls have been fitted.

9. Ensure that the mains supply is switched off before making any connections. Connect the mains electrical supply to the terminals in the upper junction box as follows:—

| | |
|---|---|
| Live | to terminal L |
| Neutral | to terminal N |
| Earth | to Earth terminal |

## Optional Controls

**Time Control:** Where natural gas boilers are to be time controlled, remove the loop between terminals 5 and 7 and connect a separate contact of the control for each boiler to terminals 5 and 7. For town gas boilers, terminals 4 and 6 must be used.

**Other Controls:** Any other remote control which gives temperature control of a natural gas boiler e.g. compensator, should have a single pole contact for each boiler wired in series with the time control and connected together between junction box terminals 5 and 7. To loop fitted between these two terminals must first be removed.

Any remote control which gives temperature control of a town gas boiler e.g. compensator, should have a single pole contact for each boiler which can be wired between terminals 8 and 9 of the upper junction box. The loop fitted between these two terminals must first be removed.

A method of ensuring that the pump operates after the boiler has shut down, is to wire a thermostat in parallel with the time switch contact controlling the pump, whose contact breaks circuit on a fall in temperature. This thermostat can be of the clamp-on or immersion type and should be fitted in the system flow header as close to the boiler as possible.

**Low Limit Protection:** When a time switch has been fitted it may be considered necessary that when low temperature conditions prevail the time switch should be overridden. It is a simple matter to wire a low limit thermostat in parallel with the time switch. However, the provision of low limit controls is governed to a large extent by the site location and system requirements. Therefore, individual consideration as to the operation of these controls will be necessary for each installation.

A method of low limit control is to have an out-door thermostat set at approximately 35°F (2°C) wired in parallel with the clock contact in the pump starter circuit.

**Pump:** No provision is made in the boiler control box for wiring in the pump. The wiring for the pump will depend on the particular installation and what other controls have been selected.

In cases where there is no gravity circulation, it is desirable to keep the pump running for a period of time after the boiler has been shut down; this is to dissipate any residual heat in the boiler fabric and prevent any excessive local temperature rise with possible cut-out of the limit thermostat.

When the outdoor temperature falls, the pump will start running. An immersion type thermostat sensing the water temperature in the return main, set at approximately 40°F (4°C) should be wired in parallel with the clock control in the boiler circuit. When the temperature falls, the burner will fire and both pump and burner will be operating.

**Remote Indications:** If required, a remote lockout indicator e.g. light, bell or buzzer, can be connected by the installer and provision is made for this. The live connection should be made to terminal 7 in the Satronic control box (natural gas boiler) or terminal 12 in the upper junction box (town gas boilers); the electrical rating of this connection should not exceed 1 amp at 240 volts. A remote indicator of overheat can also be connected by the installer, the live connection being made to terminal 2 of the limit thermostat; the electrical rating of this connection should not exceed 1 amp at 240 volts.

NOTE:—Neither of the above indicators will operate unless the time control, when fitted, is in an ON condition.

## LIGHTING UP PROCEDURE

Before lighting the boiler check that (a) the water system is filled (b) the burner and ladder pilot are in position and (c) that the safety shut-off valve is in the closed position and seating properly. To carry out this last check proceed as follows:—

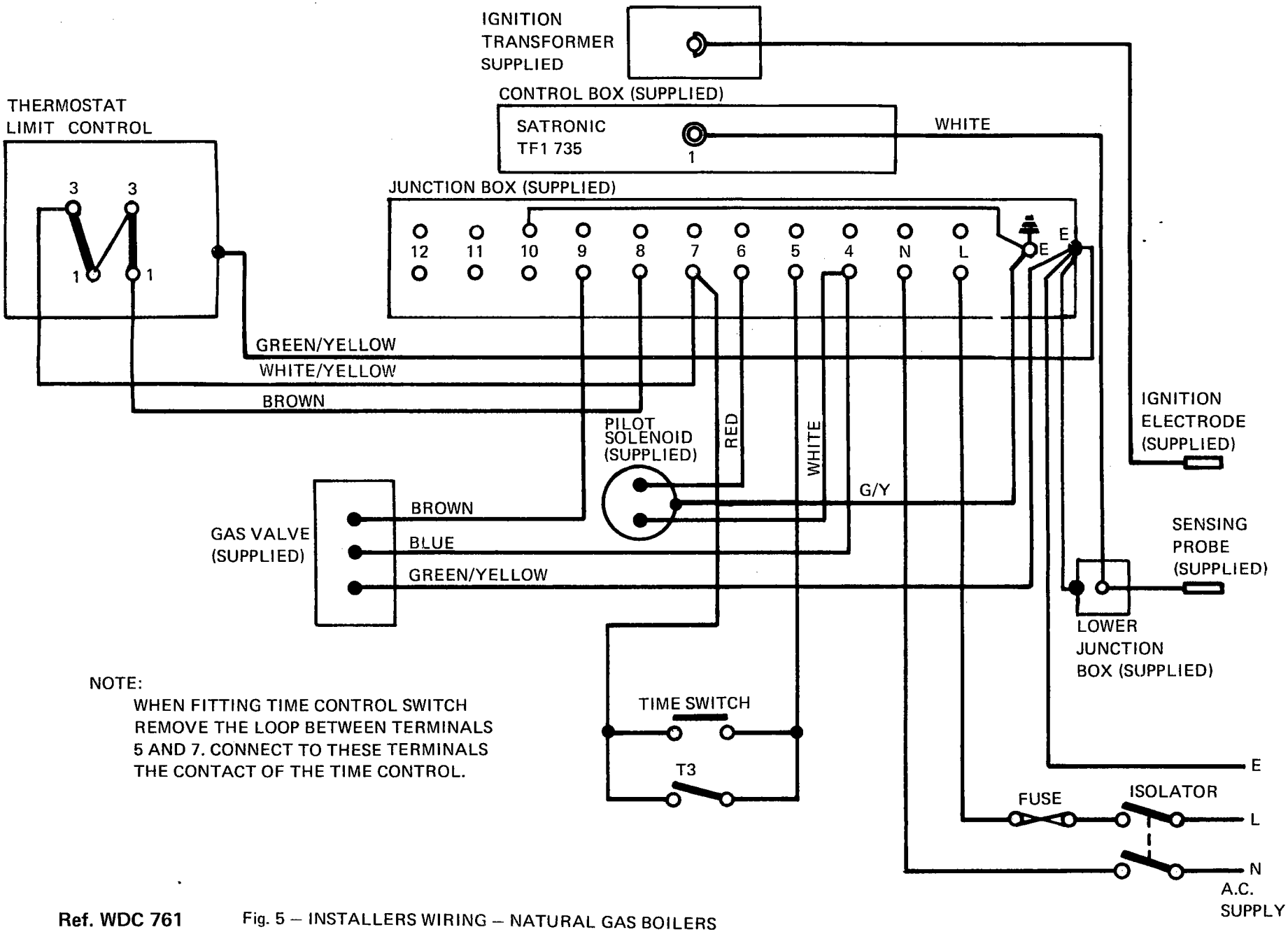
1. Shut off the main gas cock.
2. Fit a water gauge to the test point between the safety shut-off valve and the main gas cock.
3. Open the main gas cock and allow the level on the gauge to reach a steady state.
4. Close the main gas cock.
5. Note the reading on the water gauge and leave for 5 minutes. If no significant change is recorded by the gauge reading after this period, then all the joints and the valve seating can be considered sound.
6. If there is a drop in the gauge reading then check all joints and the governor between the hand valve and safety shut-off valve for gas leaks. If there are no leaks then the safety shut-off valve seating must be checked.
7. To check the safety shut-off valve seating, disconnect the electrical leads and flexible conduit from the valve. Using a suitable C-type spanner, remove the actuator complete with valve from the valve body. Examine the valve and seating, clean if necessary and replace in the valve body, checking for leaks. Re-check and if the valve still passes gas and proves to be faulty, change the valve.

Now proceed to light up as follows:—

1. Break the union at the pilot cock. Open the pilot cock and purge air from the service pipe. Shut the cock and remake the joint.
2. Fit a pressure gauge to the test nipple on the pilot supply pipe.
3. Ensure that the main burner cock is turned off.
4. Turn the pilot cock ON.
5. Ensure that any remote control is on. Push the limit thermostat reset button and the boiler control box reset button.
6. Switch the electricity supply ON. After a short delay the pilot will automatically light; reference should be made to the control timings which are given in MAINTENANCE.

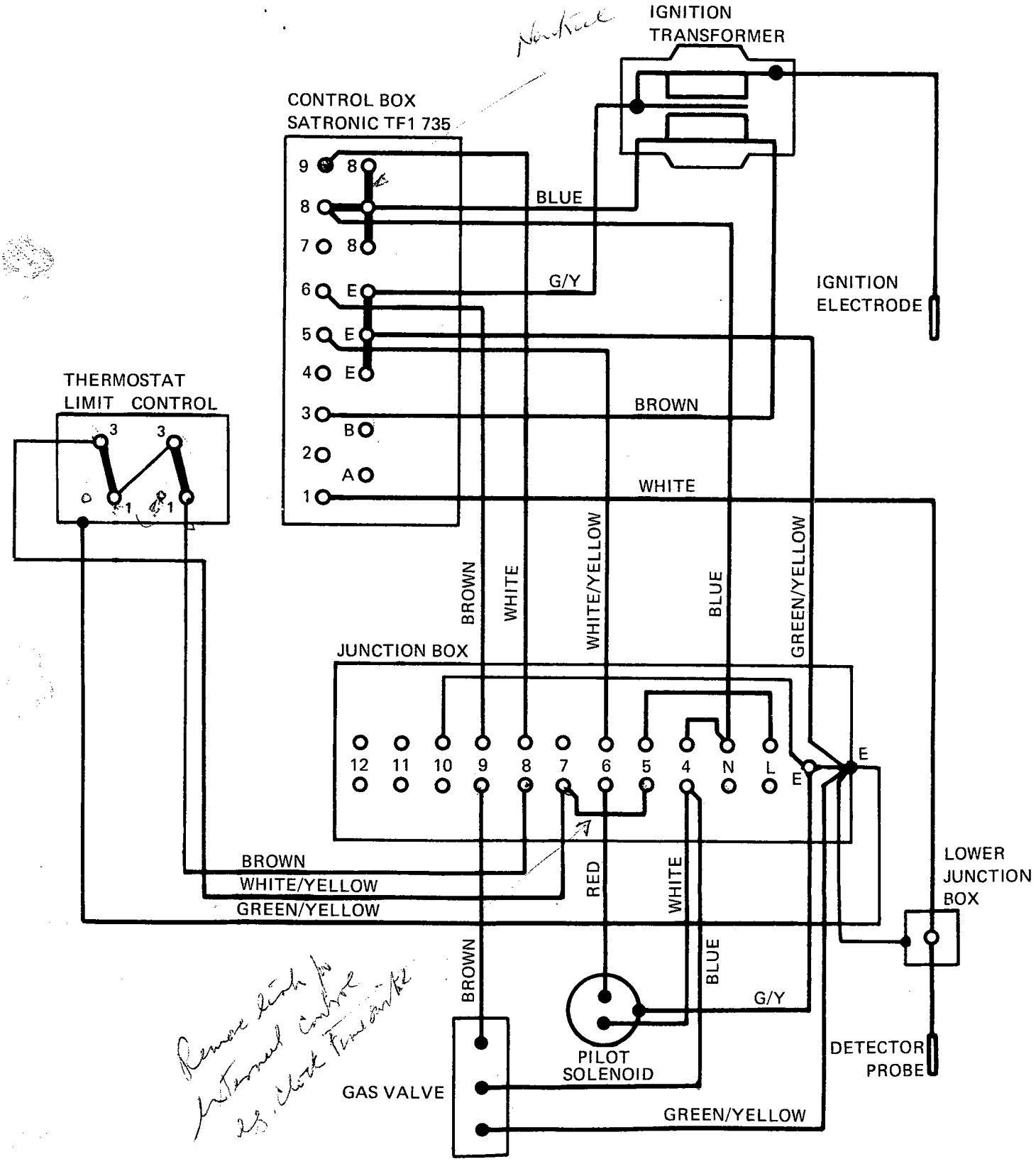
NOTE:—On initial lighting it may be necessary to press the lock-out button several times.

7. Check that the pilot pressure is as given in Table 2 or 3, adjust if necessary, at the pilot governor. After adjustment, lock the governor in position by screwing

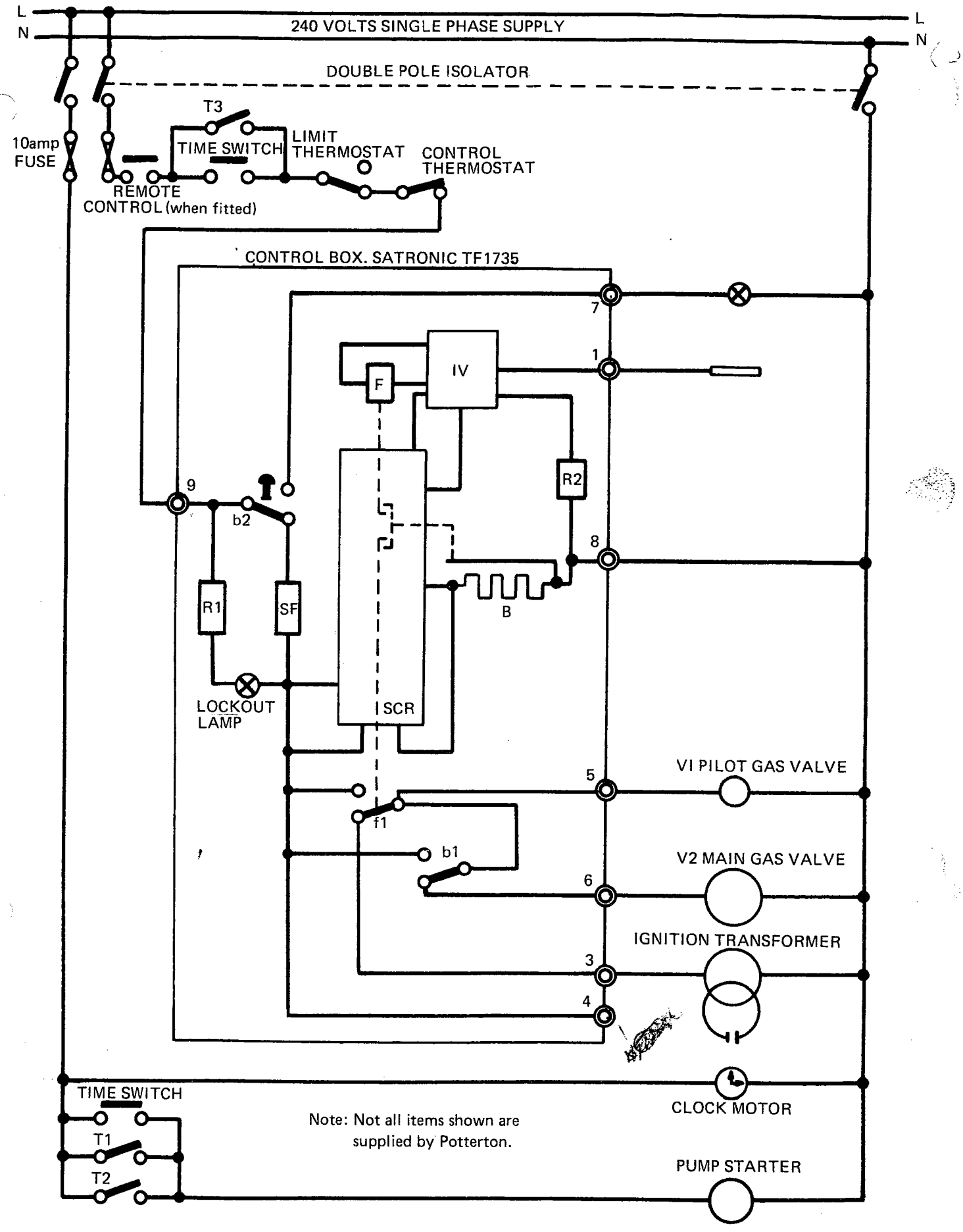



NOTE:
WHEN FITTING TIME CONTROL SWITCH REMOVE THE LOOP BETWEEN TERMINALS 5 AND 7. CONNECT TO THESE TERMINALS THE CONTACT OF THE TIME CONTROL.

**Ref. WDC 761** Fig. 5 – INSTALLERS WIRING – NATURAL GAS BOILERS




**Ref. WDC 762** Fig. 6 – BOILER WIRING – NATURAL GAS BOILERS




T1. LOW LIMIT AIR THERMOSTAT (BREAK ON RISE)
T2. PUMP DELAY THERMOSTAT (BREAK ON FALL)
T3. LOW LIMIT IMMERSION THERMOSTAT (BREAK ON RISE)
B. LOCKOUT TIMER
F. FLAME RELAY

IV. IONISATION AMPLIFIER
R1 & R2. RESISTORS
SCR. RECTIFIER
SF. SAFETY FUSE

**Ref. WDC 763** Fig. 7 – SCHEMATIC WIRING – NATURAL GAS BOILERS

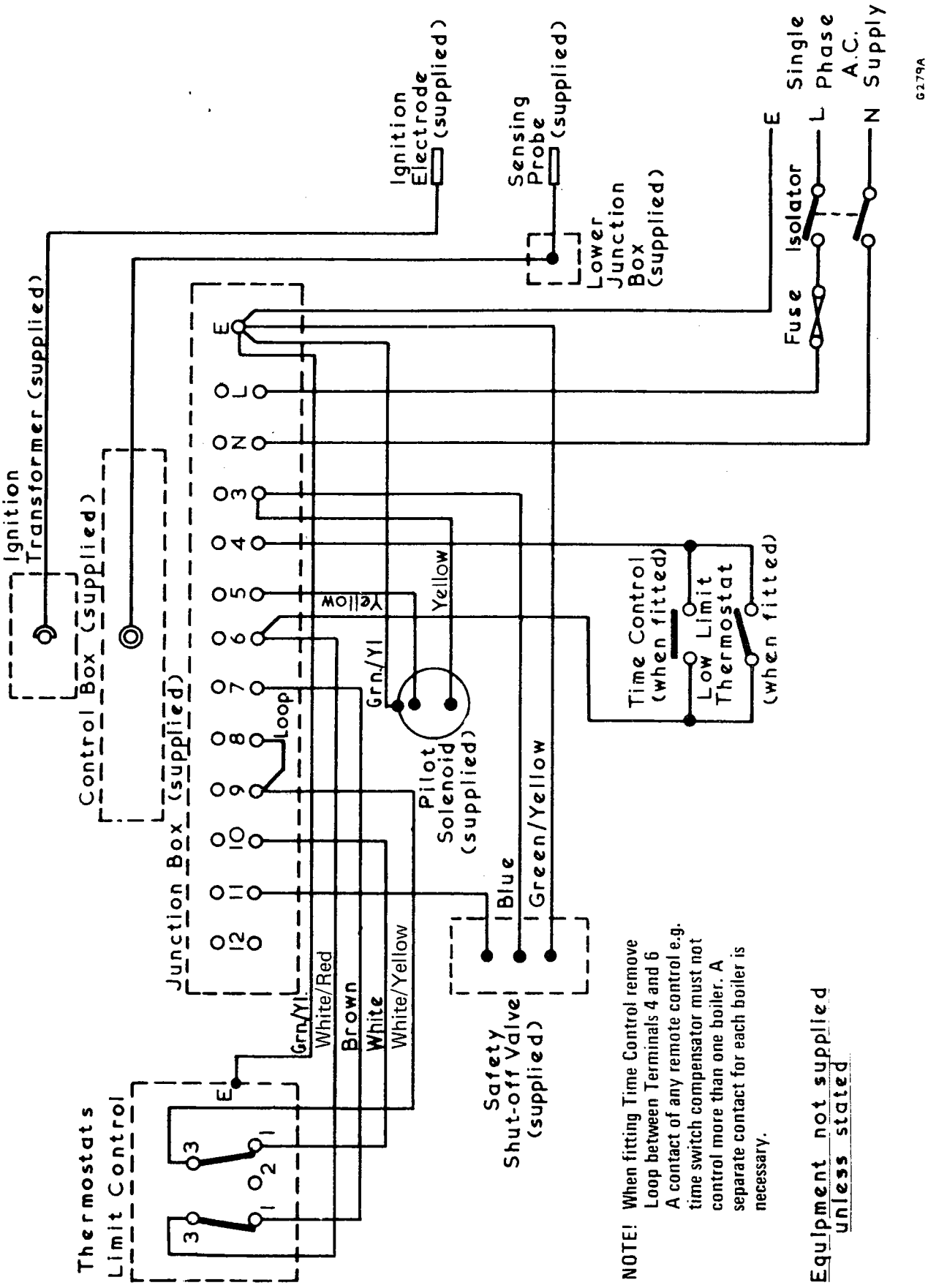



Fig.8 – INSTALLERS WIRING – TOWN GAS BOILERS

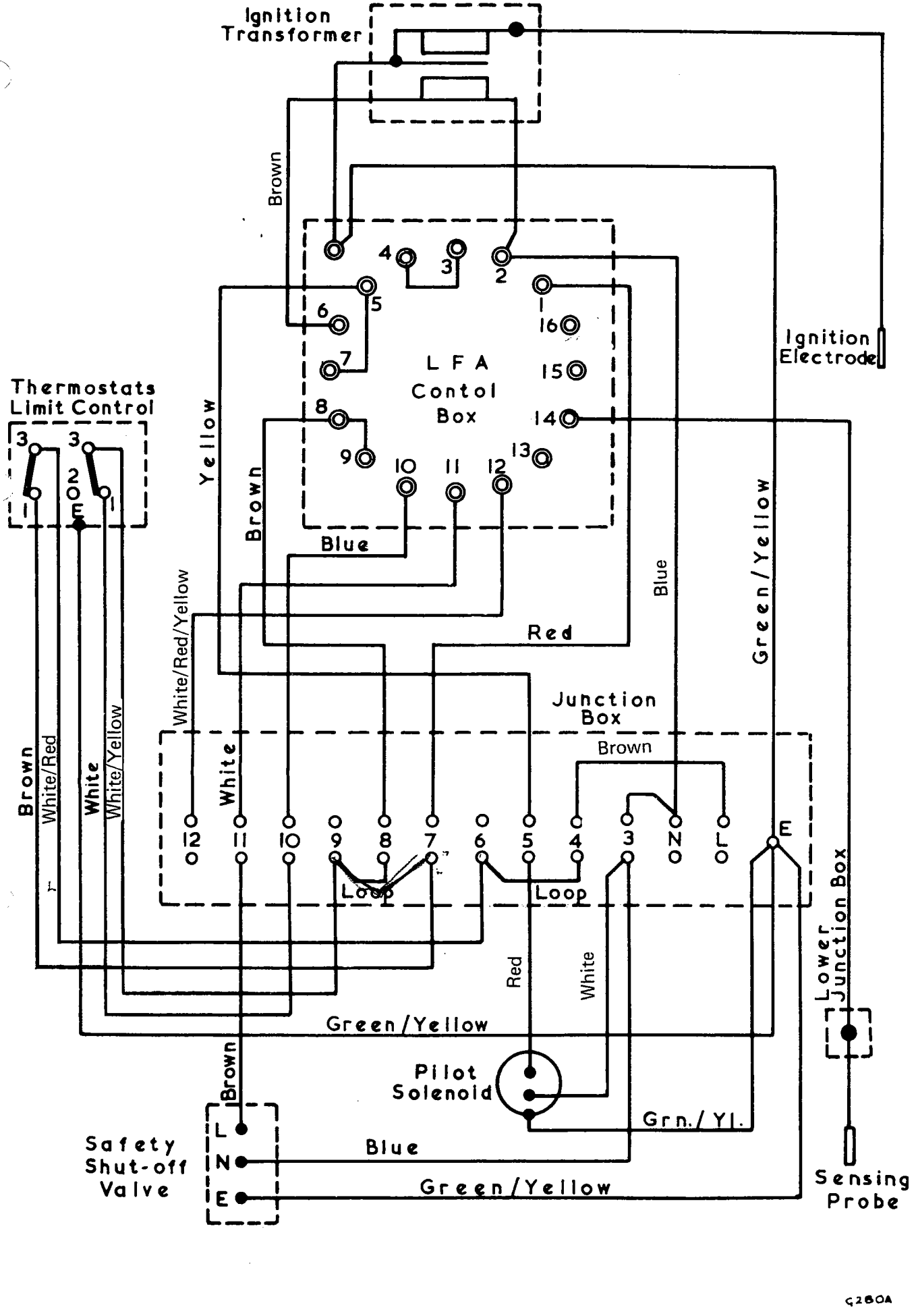
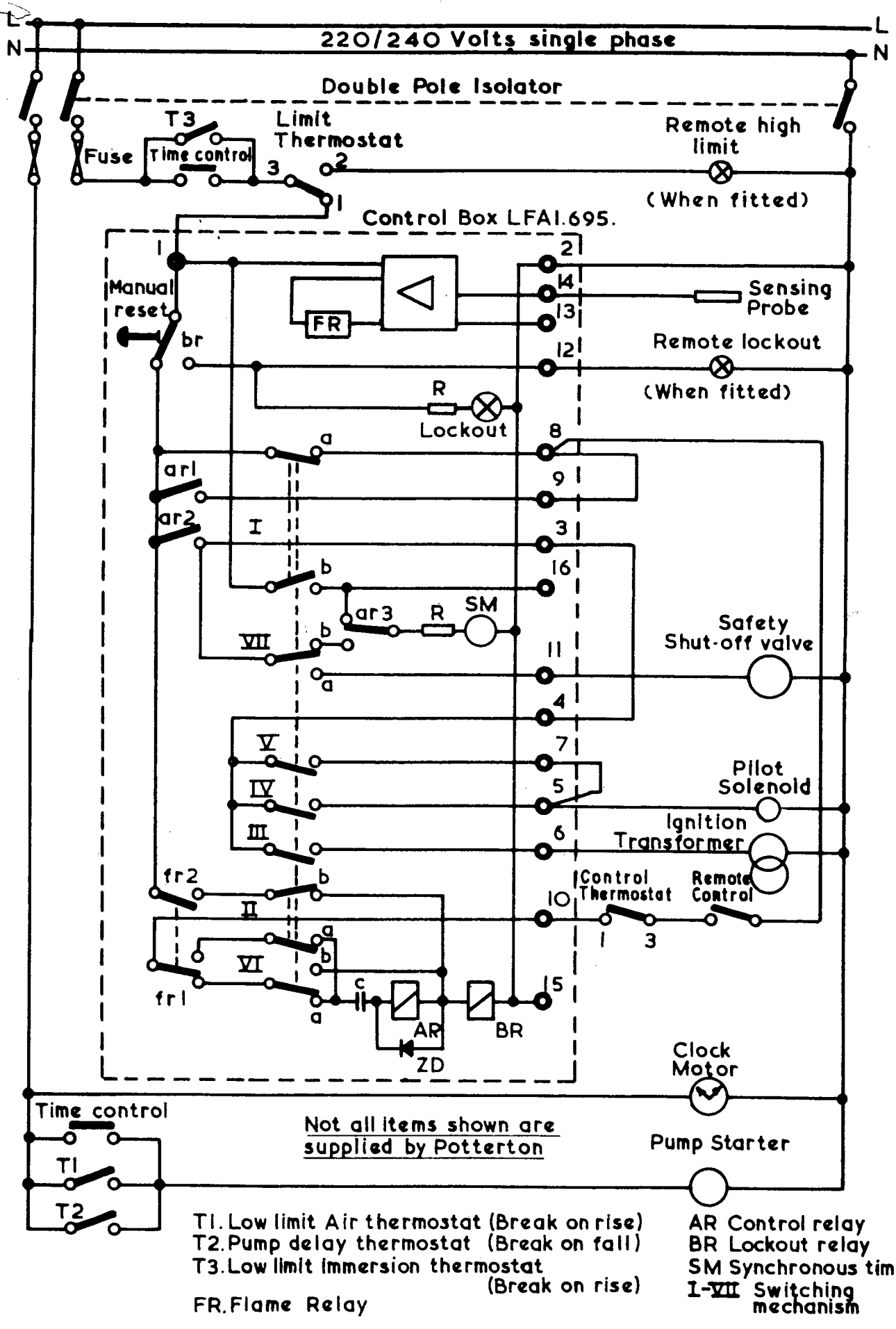



Fig.9 – BOILER WIRING – TOWN GAS BOILERS




G.261

Fig.10 — SCHEMATIC WIRING — TOWN GAS BOILERS

down the locknuts.

8. Shut off the pilot gas supply and remove the pressure gauge from the test nipple in the pilot supply line and replace the plug. The control box will go to lock-out and the lock-out reset button should be pressed before proceeding further.

9. Re-establish the pilot (see 4 and 5) and allow the safety shut-off valve to open; the complete cycle could take up to 104 seconds.

10. At this stage, purging has not been completed. To light the main burner, slowly open the main burner cock and ensure that all burners are burning steadily.

11. Connect a pressure gauge to the burner manifold. Adjust the main gas governor until the required burner pressure is obtained (see Table 2 or 3); this is an approximate method of setting the gas rate. The priority check is by timing the flow through the site meter with all other appliances turned off. Finally adjust the governor to give the correct rate.

NOTE:—When carrying out this check, ensure there is an adequate gas supply at the boiler inlet. If there are other gas appliances on the same metered supply, check the gas pressure at the inlet to the main burner with all other gas appliances operating. This is particularly important when a boiler is fitted in a factory where other appliances may be operating on boosted supplies from a common meter.

12. With the boiler in full operation, remove the front cover from the thermostat, then slowly turn down the overheat thermostat setting dial and check that the main and pilot burners go out. Push the overheat thermostat reset button, then turn the setting dial up again, and check that the burner relights. Turn down the control thermostat and again check that the burner goes out. Set the overheat setting dial to a temperature 11°C higher than the maximum boiler operating temperature, but not higher than boiling point. Refit the front cover to the thermostat and finally set the control thermostat.

13. Re-check all water joints and check for gas soundness.

## ERECTION OF THE CASING—See Fig. 11

1. Fit the two upper casing support brackets to the waterway securing bolts on the left-hand side of the waterway assembly. The positioning of the brackets will depend on the size of the boiler and the position of the bracket securing points on the casing side sheets. Offer up the casing side sheet to obtain the bracket positions.

2. Fit the two lower casing support brackets, one either side of the front waterway sections at the bottom. Secure them in position with nuts, bolts and washers.

3. Lift the casing side sheets into position on the lower support brackets, engaging the studs on the brackets through the holes in the lower edge of the sheets.

4. Secure the left-hand side sheet to the upper support brackets with nuts and washers, then fit washers and nuts to the studs on the four lower support brackets.

NOTE:—On the Kennet 9/234 and 11/293 boilers, the side sheets are supplied in two sections and have to be bolted together before fitting.

5. Secure the right-hand side sheet to the waterway assembly using the two tie straps. One strap at the rear is secured between the side sheet and one of the bolts retaining the flue outlet stiffening angle and the other strap at the front is secured between the side sheet and one of the control panel mounting studs.

6. On Kennet 9/234 and 11/293 boilers, fit the two sections of the casing top panel; the smaller panel should be located at the rear.

7. On the remaining sizes of boilers, fit the single top panel.

NOTE:— The casing top panel(s) are secured to the side sheets using spire studs and clips. These studs and clips have to be fitted during installation. The studs are secured to the panel flanges by a bolt; a spacer must be located between each stud and the panel flange with the bolt through passing the spacer. The spire clips are fitted to the panel flanges in the normal manner.

8. Fit the casing support bar across the front of the boiler, securing it to the two side sheets with screws positioned through the lower edge of the two sheets. Adjust the height of the feet on the bar to just touch the floor.

9 Fit the front panel, locating the hooks on the panel over the support bar, then engaging the spire studs on the panel with the spire clips on the side sheets.

## MAINTENANCE

Regular maintenance is essential to keep the boiler operating at maximum efficiency. This must be carried out by a qualified engineer and is usually arranged on a contract basis.

**General Procedure**

1. Remove the casing front panel.

2. Fire the boiler for a short period and make the following checks:—

   (a) Response to start up and control box operation. This should proceed without irregularities if the normal lighting sequence is followed. Such irregularities as may occur are dealt with in FAULT FINDING.

   (b) Burner and pilot flames. Any distorted, smothered or otherwise irregular flames should be noted and the jets or burners inspected when the burner is removed.

   (c) Check the burner and pilot gas pressures.

   (d) Check the operation of the thermostats for closure. With the boiler running, turn the control thermostat down below the indicated temperature. A distinct "click" indicating that the main gas valve has shut down will be heard; check that the pilot has also extinguished. Turn the thermostat up again beyond the indicated temperature. The pilot light should light again within a minimum of 69 seconds. Leave the boiler running.

   (e) Remove the front of the thermostat casing, then turn down the overheat thermostat until it is switched off. The boiler should shut down under 1 second. Reset the thermostat.

   (f) Response to pilot failure. To induce failure, close the pilot gas cock. The ladder pilot should go out and the main gas valve close in under 2 seconds.

   (g) It is a basic principle of operation that the free air inlet to the boiler room should not be reduced or restricted. Service engineers should check this point.

3. Shut down the boiler by turning off.
   (a) the main gas cock.
   (b) the pilot gas cock and
   (c) the main electricity supply.

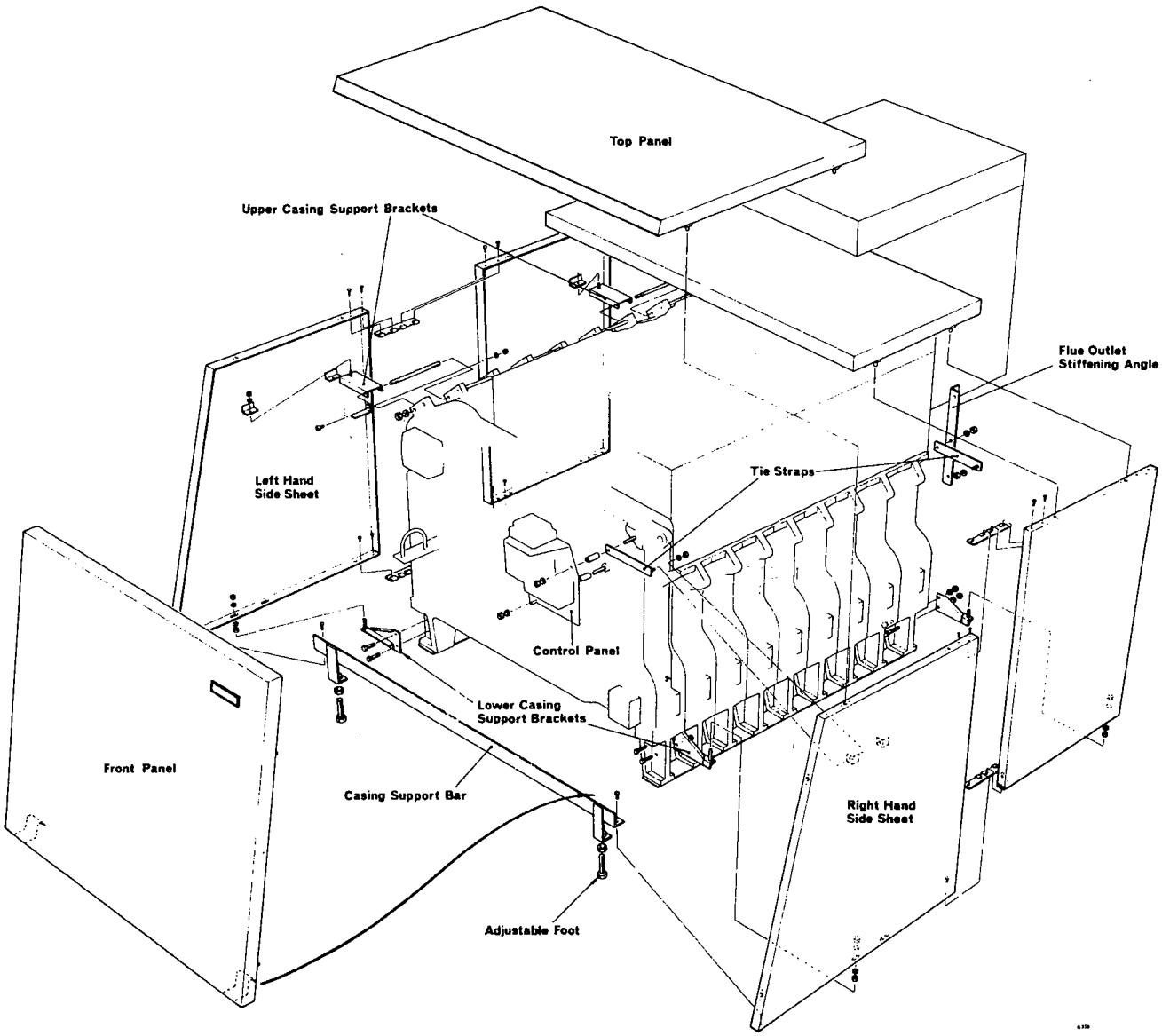



Fig. 11 – CASING ASSEMBLY

4. Remove the casing support bar from the front of the boiler.
5. Remove the burner on its trolley by
   (a) disconnecting the union on the main gas manifold on the left-hand side of the boiler, and removing the securing clamp.
   (b) disconnecting the gas supply to the pilot at the union.
   (c) unplugging the electric lead from the ladder pilot ignition electrode and moving it out of the way and disconnecting the flame detection probe lead in the lower junction box.
   (d) pull out the burner trolley. If the boiler is mounted on a plinth, the front of the trolley must be supported.
6. Remove the casing top panel(s), then remove the nuts and lift off the fluehood.
7. Clean all the flueways using the brush supplied. This is done by brushing through the boiler at an angle of approximately $60^{o}$ to thoroughly clean between the pipped mating surfaces.
8. Scraping and brushing should be carried out diagonally between the pips. Follow through in sequence, using an industrial type vacuum cleaner to finally remove all the deposits from the floor of the boiler and burner track.
9. Brush any deposits from the burner bars using a stiff brush (not wire) and taking care not to damage the jets (town gas burners). Replace any damaged jets, correctly aligning the replacements so that the jet flames are at right angles to the burner bars.
10. On natural gas boilers using Aeromatic burners, remove each burner bar in turn by unscrewing the union at the gas inlet end and removing the nut and washer securing the base of the bar to the burner trolley.
11. Remove the split pin from the shoulder of the burner air box, adjacent to the gas inlet connection, turn the box incorporating the connection a quarter of a turn to the left, then withdraw the box from the burner bar, complete with the venturi tube.
12. Clean any deposits from the venturi and also ensure that the injector is not blocked. Remove any deposits from inside the burner bar by upending the bar and then using a vacuum cleaner to finally remove any dirt etc., still adhering to the inside of the burner. Do not use a brush or a scraper inside the burner as the gauze inside can easily be damaged.
13. Re-assemble the burner bar and refit it to the burner trolley.
14. Examine the pilot burner and clean if necessary. Clean the ignition and flame detection probes with fine emery cloth and check their positions, refer to fig. 4.
15. Return the burner trolley to its original position in the combustion chamber and reconnect the main gas, and pilot gas supply. Secure the burner assembly with the clamp.
16. Reconnect the lead to the ignition electrode and the lead from the flame detection electrode in the lower junction box.
17. Replace the fluehood and the casing top panel(s).
18. Check the position of the ladder pilot. With the main burner cock off, open the pilot cock, switch on the electricity supply and observe the pilot ignition and cross lighting. Carry on to full fire through the normal lighting sequence and check that it works correctly.
19. Repeat the thermostat checks as described in 2 (d) and 2 (e).

**Control box timings – Natural Gas Boilers**

The control box is the Satronic TF1 735. Flame detection is by the well proved flame rectification principle. The sequence of operation to the nearest second is as follows:–

1. Mains supply on and control box at "START" position.
2. Thermostat calls for heat.
3. Delay of 12 secs. approx. (natural convection).
4. Ignition and pilot gas: 10 secs. max.
5. Pilot only for 25 secs. approx.
6. Pilot and main gas (burner in run condition). Total starting time 37 secs. approx.
7. Thermostat satisfied. Pilot and main burner off.
8. Delay before next reset: 10 secs. approx.

NOTES:– Flame failure on start, lockout would occur after 22 seconds of the starting cycle. Flame failure on run, response time to flame failure 1 sec. Pilot and main burner will be switched off. The control box will allow one further attempt to restart. Failure to relight the pilot will result in lockout.

If the mains electrical supply is interrupted, the boiler shuts down. When the supply is restored, the control box allows a new start with pre-purge. This is the normal pattern of events whether the failure occurs during the normal running period or during a starting sequence. If lockout occurs, the control box can only be reset after a waiting time of 60 seconds.

**Control box timings – Town Gas Boilers**

The control box is the Landis & Gyr LFA 1.695. The sequence of operation is governed by a programme disc driven by a synchronous motor. Flame detection is by the well proved flame rectification principle. The sequence of operation to the nearest second is as follows:–

1. Mains supply on and control box cycles to "START" position.
2. Thermostat call for heat.
3. Pre-purge: 66 secs. (natural convection).
4. Pre-ignition: 3 secs.
5. Ignition and pilot gas: 9 secs.
6. Pilot only for 26 secs.
7. Pilot and main gas (burner in run condition). Total starting time 104 secs.
8. Thermostat satisfied.
9. Delay before next restart: 10 secs.

NOTES:– Flame failure on start, lockout would occur after 78 seconds of the starting cycle.
Flame failure on run, immediately lockout.
Response time to flame failure 1 sec.

If the mains electrical supply is interrupted, the programme switch stops and the boiler shuts down. When the supply is restored, the control box cycles through to the start position and then follows a new start with pre-purge. This is the normal pattern of events whether the failure occurs during the normal running period or during a starting sequence.

When lockout occurs, the rest button can be pressed immediately but the control will always cycle through the correct time sequence before re-firing; this period can be between 69 secs. and 104 secs.

## TABLE 2 – GAS AND AIR DATA (TOWN GAS)

| KENNET BOILER | | 4/88 | 5/116 | 6/146 | 7/176 | 9/234 | 11/293 |
|---|---|---|---|---|---|---|---|
| Output | kW | 88 | 116 | 146 | 176 | 234 | 293 |
| | Btu/h x 1000 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Input | kW | 114 | 152 | 191 | 229 | 308 | 385 |
| | Btu/h x 1000 | 390 | 520 | 650 | 782 | 1049 | 1315 |
| Gas Rate | $m^3/h$ | 22 | 29 | 37 | 44 | 59 | 74 |
| (C.V. 500 Btu/cu. ft) | Cu/ft/h | 780 | 1040 | 1300 | 1560 | 2100 | 2630 |
| Quantity of | kg/h | 193 | 258 | 322 | 387 | 515 | 644 |
| Combustion Products | lb/h | 426 | 569 | 710 | 853 | 1136 | 1421 |
| Minimum | m.bar | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 | 7.5 |
| Gas Pressure | in.w.g. | 3 | 3 | 3 | 3 | 3 | 3 |
| Minimum | $m^3/s$ | .11 | .14 | .18 | .21 | .28 | .35 |
| Air Required | cfm @ stp | 225 | 300 | 375 | 450 | 600 | 750 |
| Free Air Inlet | $cm^2$ | 968 | 1290 | 1613 | 1935 | 2580 | 3226 |
| | $in^2$ | 150 | 200 | 250 | 300 | 400 | 500 |
| Flue Diameter | mm | 305 | 305 | 356 | 356 | 406 | 406 |
| | in | 12 | 12 | 14 | 14 | 16 | 16 |
| Number of Jets | | 99 | 132 | 165 | 198 | 264 | 330 |
| Jet Size-Bray Cat. 266 | | 7 | 7 | 7 | 7 | 7 | 7 |
| Main Burner Group 4 | m.bar | 3.24 | 3.24 | 3.24 | 3.49 | 3.75 | 3.98 |
| Pressure | in. w.g. | 1.3 | 1.3 | 1.3 | 1.4 | 1.5 | 1.6 |
| Main Burner Group 5 | m. bar | 3.75 | 3.75 | 3.75 | 4.25 | 4.25 | 4.48 |
| Pressure | in. w.g. | 1.5 | 1.5 | 1.5 | 1.7 | 1.7 | 1.8 |
| Pilot Burner Group 4 | m. bar | 4.98 | 6.47 | 5.97 | 4.98 | 5.73 | 5.73 |
| Pressure | in. w.g. | 2.0 | 2.6 | 2.4 | 2.0 | 2.3 | 2.3 |
| Pilot Burner Group 5 | m. bar | 5.73 | 7.46 | 6.96 | 5.73 | 6.72 | 6.72 |
| Pressure | in. w.g. | 2.3 | 3.0 | 2.8 | 2.3 | 2.7 | 2.7 |
| Pilot Burner Injector size-Morse | | 37 | 37 | 31 | 29 | 29 | 29 |

## TABLE 3 – GAS AND AIR DATA (NATURAL GAS)

| KENNET BOILER | | 4/88 | 5/116 | 6/146 | 7/176 | 9/234 | 11/293 |
|---|---|---|---|---|---|---|---|
| Output | kW | 88 | 116 | 146 | 176 | 234 | 293 |
| | Btu/h x 1000 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Input | kW | 114 | 152 | 191 | 231 | 305 | 385 |
| | Btu/h x 1000 | 390 | 520 | 650 | 790 | 1038 | 1315 |
| Gas Rate | $m^3/h$ | 11 | 15 | 18 | 22 | 29 | 37 |
| (C.V.1000 Btu/cu/ft) | Cu/ft/h | 390 | 520 | 650 | 790 | 1038 | 1315 |
| Quantity of | kg/h | 220 | 293 | 366 | 439 | 585 | 732 |
| Combustion Products | lb/h | 484 | 646 | 806 | 968 | 1290 | 1613 |
| Minimum Gas | m. bar | 20 | 20 | 20 | 20 | 20 | 20 |
| Pressure | in. w.g. | 8 | 8 | 8 | 8 | 8 | 8 |
| Minimum | $m^3/s$ | .11 | .14 | .18 | .21 | .28 | .35 |
| Air Required | cfm @ stp | 225 | 300 | 375 | 450 | 600 | 750 |
| Free Air Inlet | $cm^2$ | 968 | 1290 | 1613 | 1935 | 2580 | 3226 |
| | $in^2$ | 150 | 200 | 250 | 300 | 400 | 500 |
| Flue Diameter | mm | 305 | 305 | 356 | 356 | 406 | 406 |
| | in | 12 | 12 | 14 | 14 | 16 | 16 |
| Number of Burners | | 3 | 4 | 5 | 6 | 8 | 10 |
| Main Burner Injector size-Morse | | 8 | 8 | 8 | 8 | 8-6 off 14-2 off | 8-8 off 14-2 off |
| Main Burner | m. bar | 12.2 | 12.2 | 11.95 | 12.45 | 13.7 | 14.45 |
| Pressure | in. w.g. | 4.9 | 4.9 | 4.8 | 5.0 | 5.5 | 5.8 |
| Pilot Burner | m. bar | 5.0 | 7.5 | 10.0 | 10.0 | 10.0 | 12.5 |
| Pressure | in. w.g. | 2.0 | 3.0 | 4.0 | 4.0 | 4.0 | 5.0 |
| Pilot Burner Injector size | | 1.8mm | 1.8mm | 1.8mm | 1.8mm | 2.0mm | 2.0mm |

## FAULT FINDING – NATURAL GAS BOILERS

**Boiler Fails to Light**

1. Check that the 220/240 volts electricity supply is available at terminals L and N in the junction box. Check also that the main fuse has not blown.
2. Check that the time control or any other remote control (where fitted) is switched on.
3. If an electricity supply is present at L and N, check that both the control and overheat thermostats are correctly set, then press the overheat thermostat reset button.
4. Press the lockout reset button.
5. Check that the main and pilot cocks are open.
6. Check that the ladder pilot ports are not blocked. Clean if necessary.
7. Check that the pilot solenoid valve opens. Change the valve if necessary.
8. Check that a spark occurs at the ignition electrode approximately 12 seconds after pressing the lockout reset button.

**Pilot Lights but does not become established**

1. Check the flame detection circuit by disconnecting the lead from the lower junction box on the front of the boiler and connecting a D.C. micro-ammeter into the circuit with the positive terminal connected to the disconnected terminal. The current reading should be approximately 8 micro-amps, although the control box should operate at a minimum of 5 micro-amps.
2. If no current is detected, check that the flame detection probe is not damaged and is correctly positioned. Change the probe if necessary.

**Pilot Lights but main burners do not**

1. Check that the main burner cock is open.
2. Check that the main gas valve opens.
3. If the main gas valve does not open, check that an electricity supply is present at junction box terminal 9. If supply is not present, check the control box terminal 6 and change if necessary. If supply is present, check the connections to the valve. If these are in order, the valve may be faulty and should be changed.

## FAULT FINDING – TOWN GAS BOILERS

**Boiler Fails to Light**

1. Check that the 220/240 volts electricity supply is available at terminals L and N in the junction box. Check also that the main fuse has not blown.
2. Check that the time control or any other remote control (where fitted) is switched on.
3. If an electricity supply is present at L and N, check that both the control and overheat thermostats are correctly set, then press the overheat thermostat reset button.
4. Press the lockout reset button.
5. Check that the main and pilot cocks are open.
6. Check that the ladder pilot ports are not blocked. Clean if necessary.
7. Check that the pilot solenoid valve opens. Change the valve is necessary.
8. Check that a spark occurs at the ignition electrode between approximately 66 and 104 seconds after pressing the lockout reset button.

**Pilot Lights but does not become established**

1. Check the flame detection circuit by disconnecting the lead from the lower junction box on the front of the boiler and connecting a D.C. micro-ammeter into the circuit with the positive terminal connected to the disconnected terminal. The current reading should be approximately 10 micro-amps, although the control box should operate at a minimum of 7 micro-amps.
2. If no current is detected, check that the flame detection probe is not damaged and is correctly positioned. Change the probe if necessary.
3. Check that the voltage between the terminal in the lower junction box, and a bare metal surface also in the lower junction box is approximately 160 volts A.C. (No flame present). If this is not so, check for voltage between terminals 13 and 14 in the LFA control box. The voltage available should be greater than 200 volts A.C. (No flame present) and if this is so, check the wiring between the two junction boxes. If no voltage is available change the control box. The voltage between terminals 13 and 14 of the LFA control box is a maximum of 300 volts A.C. when a flame is detected.

**Pilot Lights but main burners do not**

1. Check that the main burner cock is open.
2. Check that the main gas valve opens. Opening of this valve is audible and takes approximately 15 secs.
3. If the main gas valve does not open, check that electricity supply is present at junction box terminal 11. If supply is not present, check the control box terminal and change if necessary. If supply is present, check the connections to the valve. If these are in order, the valve may be faulty and should be changed.

## CONVERSION INSTRUCTIONS

For appliances with the following Gas Council Code Numbers:—

| | | |
|---|---|---|
| 41. 595. 33 | — | Kennet 4/88 |
| 41. 595. 34 | — | Kennet 5/116 |
| 41. 595. 35 | — | Kennet 6/146 |
| 41. 595. 36 | — | Kennet 7/176 |
| 41. 595. 37 | — | Kennet 9/234 |
| 41. 595. 38 | — | Kennet 11/293 |

Before commencing to convert these appliances, ensure that the appliances and their Gas Council Code Numbers correspond to those given in these instructions. The identification badge is located on the front of the first boiler section. Check that the component parts of the conversion set are complete as listed.

| Key No. | Description | No. Off | Part No. |
|---|---|---|---|
| | Conversion set complete comprising: | 1 | 4/88 -145907<br>5/116-145908<br>6/146-145909<br>7/176-145910<br>9/234-145911<br>11/293-145912 |
| 1 | Main burner assembly comprising: | 1 | 4/88 -302439<br>5/116-302440<br>6/146-302441<br>7/176-302442<br>9/234-302443<br>11/293-302444 |
| | Aeromatic Burner-Wide | 3 | 4/88 -414068 |
| | | 4 | 5/116-414068 |
| | | 5 | 6/146-414068 |
| | | 6 | 7/176-414068 |
| | | 6 | 9/234-414068 |
| | | 8 | 11/293-414068 |
| | Aeromatic Burner-Narrow | 2 | 9/234-414069 |
| | | 2 | 11/293-414069 |
| | Nut, Hex M6 | 3 | 4/88 -635403 |
| | | 4 | 5/116-635403 |
| | | 5 | 6/146-635403 |
| | | 6 | 7/176-635403 |
| | | 8 | 9/234-635403 |
| | | 10 | 11/293-635403 |
| | Washer, Shakeproof M6 | 3 | 4/88 -617407 |
| | | 4 | 5/116-617407 |
| | | 5 | 6/146-617407 |
| | | 6 | 7/176-617407 |
| | | 8 | 9/234-617407 |
| | | 10 | 11/293-617407 |
| | Aeromatic Burner Injector-No. M8 | 3 | 4/88 -410328 |
| | | 4 | 5/116-410328 |
| | | 5 | 6/146-410328 |
| | | 6 | 7/176-410328 |
| | | 6 | 9/234-410328 |
| | | 8 | 11/293-410328 |
| | Aeromatic Burner Injector-No. M14 | 2 | 9/234-410329 |
| | | 2 | 11/293-410329 |
| | Burner trolley and Manifold assembly | 1 | 4/88 -302445<br>5/116-302446<br>6/146-302447<br>7/176-302448<br>9/234-302449<br>11/293-302450 |
| | Union 1/2 in. Bsp F&F GF 330 | 3 | 4/88 -625644 |
| | | 4 | 5/116-625644 |
| | | 5 | 6/146-625644 |
| | | 6 | 7/176-625644 |
| | | 8 | 9/234-625644 |
| | | 10 | 11/293-622564 |
| | Cable 960mm long | 1 | 4/88 -641133 |
| | Cable 1075mm long | 1 | 5/116-641133 |
| | Cable 1190mm long | 1 | 6/146-641133 |
| | Cable 1310mm long | 1 | 7/176-641133 |
| | Cable 1540mm long | 1 | 9/234-641133 |
| | Cable 1770mm long | 1 | 11/293-641133 |
| | Wheel | 2 | 4/88 -302492 |
| | | 2 | 5/116-302492 |
| | | 2 | 6/146-302492 |
| | | 2 | 7/176-302492 |
| | | 4 | 9/234-302492 |
| | | 4 | 11/293-302492 |
| | Flat Washer M16 | 2 | 4/88 -617114 |
| | | 2 | 5/116-617114 |
| | | 2 | 6/146-617114 |
| | | 2 | 7/176-617114 |
| | | 4 | 9/234-617114 |
| | | 4 | 11/293-617114 |
| | Split pin 3/32 in. dia. | 2 | 4/88 -631101 |
| | | 2 | 5/116-631101 |
| | | 2 | 6/146-631101 |
| | | 2 | 7/176-631101 |
| | | 4 | 9/234-631101 |
| | | 4 | 11/293-631101 |
| 2a | Pipework Assembly comprising: | 1 | 4/88<br>5/116<br>6/146<br>7/176<br>9/234 -302815 |
| | 2 in. Bsp. screwed tube, 767mm long | 1 | 302430 |
| | 1/8 in. Bsp. pressure tent nipple | 1 | 400988 |
| | 2 in. Bsp M&F Elbow, GF 92 | 1 | 627117 |
| 2b | Pipework Assembly comprising: | 1 | 11/293 only 302816 |

| | | | |
|---|---|---|---|
| | 2 in. Bsp screwed tube, 760mm long | 1 | 145926 |
| | 1/8 in. Bsp pressure test nipple | 1 | 400988 |
| | 2½ in. Bsp F&F Elbow, GF 90 | 1 | 626925 |
| | 2 in. Bsp screwed tube, 79mm long | 1 | 621125 |
| 3 | Ladder pilot assembly | 1 | 4/88 -302045<br>5/116-302046<br>6/146-302047<br>7/176-302048<br>9/234-302049<br>11/293-302050 |
| 4 | Electrode Lodge 1E/G18-152mm long | 1 | 407603 |
| 5 | Electrode Lodge 1E/G18-65mm long | 1 | 302437 |
| 6 | Olive-Compression elbow (Double chamfer) | 2 | 625816 |
| | Electrode Nut | 2 | 106178 |
| 8 | Push-on (Rajah) Connector | 2 | 640315 |
| 9 | Screw, Hex Hd M6 x 20mm long | 2 | 633404 |
| 10 | Nut, Hex M6 | 3 | 635403 |
| 11 | Washer, Shakeproof M6 | 2 | 617407 |
| 12 | Aeromatic Injector Orifice-49 Morse | 1 | 4/88 -410326<br>5/116-410326<br>6/146-410326<br>7/176-410326 |
| | Aeromatic Injector Orifice- 1.8mm | | 9/234-410484<br>11/293-410484 |
| | 1/4 in. Bsp set pipe | 1 | 4/88 -145927<br>5/116-145927<br>6/146-145928<br>7/176-145927<br>9/234-145928<br>11/293-145913 |
| 14 | 1/4 in. Bsp screwed tube-80mm long | 1 | 4/88 -620219<br>5/116-620219<br>6/146-620219<br>7/176-620219<br>9/234-620219 |
| | 1/4 in. Bsp screwed tube-146mm long | 1 | 11/293-620223 |
| 15 | Draught Diverter Baffle (Only required on three models listed) | 1 | 5/116-302392<br>6/146-302392<br>7/176-302392 |
| 16 | Rear closure plate | 1 | 302498 |
| 17 | Top cover | 1 | 302501 |
| 18 | Bracket | 2 | 302503 |
| 19 | Screw, Hex. Hd M6 x 12mm long | 4 | 633403 |
| 20 | Washer, M6 | 4 | 617132 |
| 21 | Screw, Hex. Hd M8 x 14mm long | 2 | 633412 |
| 22 | Nut, Hex M8 | 2 | 635407 |
| 23 | Label-Converted to Natural Gas | 1 | 550625 |
| 24 | 8mm Aluminium looped tube | 1 | 302711 |
| 25 | Reducing Bush 3/4in. x 3/8in. | 1 | 629128 |
| 26 | Air Port Shield | 1 | 302069 |

IMPORTANT:– It is essential that this appliance has been serviced regularly prior to conversion as it will not function correctly with dirty flueways. Regular servicing should be continued after conversion.

## CONVERSION PROCEDURE

### Removal of Burner Assembly

1. Switch off the main electricity supply at the isolating switch.
2. Shut off the main gas supply at the boiler main gas cock and at a second point upstream of the boiler main cock.
3. Remove the casing front panel and then the support bar from across the bottom, front of the boiler.
4. Remove the casing top panel(s) and the side panel(s) from the main gas supply pipe side (the right-hand).
5. Disconnect the electrical lead from the flame detection electrode in the lower, front junction box.
6. Remove the electrical lead (using the "push-on" connector) from the ignition electrode on the burner assembly.
7. Disconnect the union in the main gas supply pipe at the elbow on the left-hand side of the boiler.
8. Disconnect the union on the elbow at the inlet to the pilot burner.
9. Remove the burner retaining bracket from the left-hand side of the main gas supply pipe at the front of the boiler.
10. Pull the burner from the boiler combustion chamber.
11. Remove the union elbows from the ends of the main burner pipework on the old town gas burner and from the old town gas ladder pilot burner as these are needed on the natural gas assembly.

### Conversion of Pilot Burner Assembly

*Boilers with steel pilot tubing*

1. Remove the cover from the pilot solenoid valve then lift out the coil with the electrical lead still attached.
2. Disconnect the union at the pilot cock, then lift away the pilot control assembly.

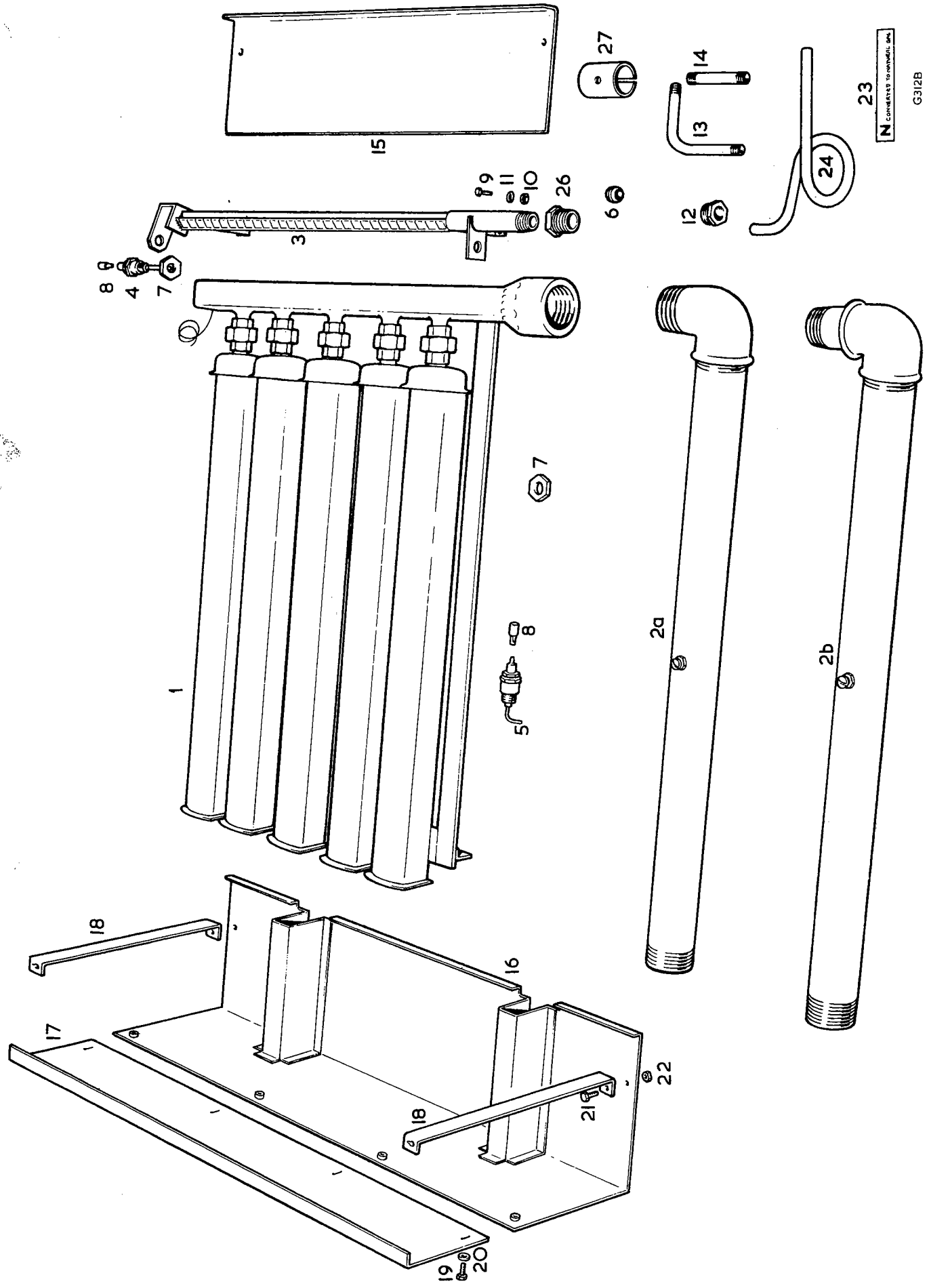



Fig. 12 – CONVERSION SET

3. Remove the two screws, then pull off the pilot aerater tube.
4. Unscrew the pilot injector orifice and replace it with the new one (Key 12).
5. Remove the screw holding the brass aerater adjustor inside the aerater tube, then fit the air port shield (Key No. 26) over the aerater tube so that it covers the lower air ports in the tube. Secure the shield by replacing the screw in its original position.
6. Refit the pilot aerater tube.
7. Remove the straight length of pipe between the pilot governor and the elbow, then replace it with the new straight length of pipe (Key 14).
8. Remove the set pipe from its connection adjacent and upstream to the main gas cock, then replace it with the new set pipe (Key 13).
9. Remove the pilot cock from the old set pipe, then screw it to the free end of the new set pipe (Key 13), then reconnect the pilot control assembly to the pilot cock.
10. Refit the coil to the pilot solenoid valve and replace the cover.
11. Fit the union elbow, previously removed from the town gas ladder pilot, to the new ladder pilot burner, interposing the reducing bush (Key 25).

*Boilers with Looped Aluminium Pilot Tube*

1. Remove the cover from the pilot solenoid valve, then lift out the coil with the electrical lead still attached.
2. Disconnect the nut at each end of the looped pilot tube and remove the pilot control assembly; discard the old looped tube, but first remove and retain the two nuts.
3. Remove the two screws, then pull off the pilot aerater tube.
4. Unscrew the pilot injector orifice and replace it with the new one (Key 12).
5. Remove the screw holding the brass aerater adjustor inside the aerater tube, then fit the air port shield (Key No. 26.) over the aerater tube so that it covers the lower air ports in the tube. Secure the shield by replacing the screw in its original position.
6. Refit the pilot aerater tube, securing it with the two screws.
7. Cut the new pilot tube (Key 24) to length reforming it as necessary, then fit it between the elbow on the pilot cock and the pilot governor. Secure the tube to the elbow using an existing nut and new double chamfer olive (Key 6) and to the governor using the other existing nut and new olive (Key 6).
8. Refit the coil to the pilot solenoid valve and replace the cover.

NOTE:—It may be found easier to carry out operations 7 and 8 after the main burner assembly has been fitted beneath the boiler.

9. Fit the union elbow, previously removed from the town gas ladder pilot, to the new ladder pilot burner, interposing the reducing bush (Key 25).

## Fitting the Natural Gas Burner to the Boiler

1. Fit the ladder pilot assembly (Key 3) to the main burner assembly (Key 1) using the two screws (Key 9) the three nuts (Key 10) and two washers (Key 11). The ladder pilot assembly is attached to the front and rear of the burner trolley. The nut and bolt at the front should be fully tightened first. When securing the ladder pilot to the rear of the trolley, the bolt should first be positioned and then one nut screwed on but only far enough to allow the second nut to be tightened up to it. This should leave both nuts tight, but allowing the ladder pilot bracket to move around the bolt, so allowing for expansion during operation. Adjust the pilot so that it touches the burner air box flanges.
2. Fit the flame detection electrode (Key 4) to the bracket on the rear of the ladder pilot (Key 3) using one of the electrode nuts (Key 7). The electrode must be adjusted within its slot so that the probe is parallel with the pilot burner and within the ionisation field of the pilot flame so giving a minimum probe reading of 10 micro-amps. Finally secure the electrode in its correct position using the brass nut, (Key 7).

NOTE:—The distance between the probe and the top of the ladder pilot bar, to give the required reading, should be approx. 20mm (25/32 in.). However, further adjustment may be necessary after firing the boiler to obtain the microamp reading and this should be carried out after isolating the electrical supply.

3. Using the push-on connector (Key 8), connect the detector electrode.
4. Using the remaining electrode nut (Key 7), secure the ignition electrode (Key 5) to its mounting bracket at the front of the ladder pilot, so that the bent probe points towards the ladder pilot bar. The electrode must be adjusted within its slot so that a gap of 1.6mm ± 0.8mm (1/16" ± 1/32") exists between the tip of the electrode and the pilot bar. Finally secure the electrode in its correct position using the brass nut (Key 7).
5. Connect the pipework assembly (Key 2a or 2b) to the main burner assembly (Key 1).
6. Fit the union elbow, previously removed from the town gas main burner assembly, to the end of the new main burner pipework assembly (Key 2a or 2b).
7. Fit the burner assembly (Key 1) into the boiler combustion chamber and secure it with the retaining bracket.
8. Connect the main gas union at the left-hand side of the boiler.
9. Connect the union in the pilot supply pipe at the inlet elbow on the pilot burner.
10. Using the "push-on" connector (Key 8) connect the ignition lead to the ignition electrode on the burner assembly.
11. Connect the lead to the flame detection electrode in the lower junction box.

## Conversion of Draught Diverter — 5/116, 6/146 and 7/176 boilers only

1. Unscrew the four retaining nuts, then lift the fluehood from the top of the boiler waterway sections.
2. Remove the two screws securing the vertical baffle plate in the flue entry to the draught diverter then remove the baffle plate and replace it with the new one (Key 15).
3. Refit and secure the boiler fluehood using the four nuts.

## Fitting and Assembly of New Rear Closure Plate

1. Remove the existing combustion chamber rear closure plate by unscrewing the two nuts.
2. Place the new rear closure plate (Key 16) in position at the rear of the boiler. The two legs of the draught diverter should be located in the two channels in the closure plate. Secure the plate in position using the two brackets (Key 18) the two screws (Key 21) and the two nuts removed in operation 1. The screws (Key 21) and nuts (Key 22) are used to secure the brackets

(Key 18) to the rear closure plate (Key 16).

3. Fit the top cover (Key 17) to the rear closure plate (Key 16) to seal the gap between the closure plate and the rear of the boiler. The top cover can be adjusted to fill the gap, using the slotted screw holes provided. Secure the cover using the four screws (Key 19) and washers (Key 20).

## INSTRUCTIONS FOR TESTING

### First Lighting

1. Ensure that the boiler main cock is turned off, then turn on the gas supply at the point upstream of the cock where it was originally switched off.
2. Break the union at the pilot cock then open the cock to purge air and town gas from the pipe. Shut the cock and remake the joint.
3. Fit a pressure gauge to the pressure test nipple in the pilot supply line.
4. Turn ON the pilot cock.
5. Switch on the electricity supply and after a short period, the pilot will automatically light.
6. Adjust the pilot governor to give the pressure quoted in the Natural Gas Data table.
7. When the correct pressure has been set, turn off the pilot cock and remove the pressure test equipment.

NOTE:—The control box will go to lockout and the reset button will have to be pressed before proceeding further.

8. Fit a pressure gauge to the pressure test nipple on the main burner assembly.
9. Re-open the pilot cock and after the pilot has lit, slowly open the main gas cock and the main burner will light.

NOTE:—If at any time the control box should go to lockout, close the main and pilot burner cocks, press the reset button and repeat the lighting sequence.

10. Adjust the main gas governor to the pressure given in the table. The rate should be checked by meter reading.
11. Remove the pressure test equipment and seal the nipple. Check all joints for leaks — DO NOT USE A NAKED FLAME. Switch off the boiler.
12. Stick the label (Key 23) over the wording "T-TOWN GAS" on the lighting instruction plate on the rear of the casing front panel.
13. Replace the casing side panel(s), then the top panel(s).
14. Refit the support bar across the front of the boiler then fit the front panel in position.

REMEMBER TO LEAVE THE BOILER AND BOILER ROOM CLEAN AND TIDY AND TO TAKE AWAY ALL DISCARDED ITEMS.

### NATURAL GAS DATA TABLE

| KENNET BOILER | | 4/88 | 5/116 | 6/146 | 7/176 | 9/234 | 11/293 |
|---|---|---|---|---|---|---|---|
| Output | kW | 88 | 116 | 146 | 176 | 234 | 293 |
| | Btu/h x 1000 | 300 | 400 | 500 | 600 | 800 | 1000 |
| Input | kW | 114 | 152 | 191 | 231 | 305 | 385 |
| | Btu/h x 1000 | 390 | 520 | 650 | 790 | 1038 | 1315 |
| Gas Rate | $m^3/h$ | 11 | 15 | 18 | 22 | 29 | 37 |
| (C.V.1000 Btu/cu.ft) | Cu/ft/h | 390 | 520 | 650 | 790 | 1038 | 1315 |
| Minimum | m.bar | 20 | 20 | 20 | 20 | 20 | 20 |
| Gas Pressure | in. w.g. | 8 | 8 | 8 | 8 | 8 | 8 |
| Number of Burners | | 3 | 4 | 5 | 6 | 8 | 10 |
| Injector Size-Morse | | 8 | 8 | 8 | 8 | 8-6 off<br>14-2 off | 8-8 off<br>14-2 off |
| Main Burner | m. bar | 12.2 | 12.2 | 11.95 | 12.45 | 13.7 | 14.45 |
| Pressure | in. w.g. | 4.9 | 4.9 | 4.8 | 5.0 | 5.5 | 5.8 |
| Pilot Burner | m. bar | 5.0 | 7.5 | 10.0 | 10.0 | 10.0 | 12.5 |
| Pressure | in. w.g. | 2.0 | 3.0 | 4.0 | 4.0 | 4.0 | 5.0 |

The above figures apply to a gas with a calorific value of 1000 Btu/cu. ft. To calculate the gas consumption at any other C.V. multiply the new rate by 1,000 and divide by the local C.V.

### SHORT PARTS LIST

**This short parts list gives the part number and description of those parts which might normally be required as spares replacements. For the full range of spares reference should be made to the Kennet spare parts catalogue, Publication No. 556193.**

| Description | Part No. | Remarks |
|---|---|---|
| Waterway section, front | 302395 | Including plugs |
| Waterway section, intermediate | 302396 | Including plugs |
| Waterway section, rear | 302397 | Including plugs |
| 'O' ring size 440 | 401617 | |

| Description | | | Part No. | Remarks |
|---|---|---|---|---|
| GAS GOVERNOR | | | | |
| Model | Type | | | |
| 4/88 - 5/116 | 1.1/4" BSP (Jeavons J48) | | 403283) | |
| 6/146 | 1.1/2" BSP (Jeavons J48) | | 403284) | TOWN GAS |
| 7/171 - 9/234 | 2" BSP (Jeavons J48) | | 403285) | |
| 11/293 | 2.1/2" BSP (Peebles Fig.98) | | 403257) | |
| 4/88 - 5/116 | 1" BSP (Jeavons J48) | | 403171) | |
| 6/146 - 7/171 | 1.1/4" BSP (Jeavons J48) | | 403283) | NATURAL GAS |
| 9/234 - 11/293 | 1.1/2" BSP (Jeavons J48 | | 403284) | |

| Description | | Part No. | Remarks |
|---|---|---|---|
| GAS VALVE | | | |
| 4/88 - 5/116 | 1.1/2" BSP Kromschroder MLA 40 | 402533) | |
| 6/146 - 7/171 | 2" BSP (Black ref 6644) | 402516) | TOWN GAS |
| 9/234 - 11/293 | 2.1/2" BSP (Black ref 6645) | 402517) | |
| 4/88 - 7/171 | 1" BSP Kromschroder MLA 25 | 402532 | NATURAL GAS |
| 9/234 - 11/293 | 1.1/2" BSP Kromschroder MLA 40 | 402533 | |
| Pilot governor | 1/4" BSP (Jeavons J10SG) | 403117 | |
| Pilot solenoid | 1/4" BSP (Black ref 5675) | 402521 | |
| PILOT INJECTOR (Aeromatic) | 3/4" BSP No. 75 | | |
| 4/88 - 5/116 | Drill 37 | 410321) | |
| 6/146 | Drill 31 | 410151) | TOWN GAS |
| 7/171 - 11/293 | Drill 29 | 410320) | |
| | 1/2" BSP | | |
| 4/88 - 7/171 | Drill 49 or 1.8 mm | 410322) 410485) | NATURAL GAS |
| 9/234 - 11/293 | 2.0 mm | 410484) | |
| Bray jets 266 No.7 | | 410107) | TOWN GAS |

| Description | | Part No. | Remarks |
|---|---|---|---|
| Injector, main burner (Aeromatic) | | | NATURAL GAS |
| Type M8 | | 410328 | 1 per wide burner |
| Only supplied with Type M14 | | 410329 | 1 per narrow burner |
| LADDER PILOT | | | |
| Model | | | |
| 4/88 | | 302290) | |
| 5/116 | | 302291) | |
| 6/146 | | 302292) | TOWN GAS |
| 7/171 | | 302293) | |
| 9/234 | | 302294) | |
| 11/293 | | 302295) | |
| 4/88 | | 413902 | |
| 5/116 | | 413903 | |
| 6/146 | | 413904 | NATURAL |
| 7/171 | | 413905 | GAS |
| 9/234 | | 413906 | |
| 11/293 | | 413907 | |
| Electrode, ignition (Lodge IEG/18) | | 302437 | |
| Electrode, flame detection (Lodge IEG/18) | | 407603 | |
| Transformer | | | |
| (Savage 5000V 23 ma) | OR | 405305 | |
| (Allanson 5000V 23 ma) | OR | 405304 | |
| (Parmeko 5000V 23 ma) | | 405301 | |
| Control box | | | |
| Satronic TFI 735 | | 408165 | NATURAL GAS |
| Landis & Gyr LFAI/695 | | 408133 | TOWN GAS |
| Thermostat (Satchwell TKD) | | 404381 | |
| Cable, ignition 50" lg | | 641155 | |

When ordering please state:
- Model number
- Town or natural gas
- Gas group or place of installation
- Boiler code No.
- Gas Council Code No.