

**Burner
Supplement**

**“Do business in the
right atmosphere”**

**Models PC/GS9 & PC/GS13
PC/GS fully automatic gas burners**

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PC/GS9 & 13 ISSUE 2 2/96

powrmatic

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Principal Components of the PC/GS9-13

Firing Head Assembly

Commissioning Sheet

The details below are to be completed by the Commissioning Engineer.

Installers Name: _____

Address: _____

Site Address: _____

Appliance: Type _____ Size _____ Serial No. _____

Burner: Type _____ Size _____ Serial No. _____

Commissioning Date: _____

Guarantee Expiry Date: _____

Gas Type: _____

Gas Pressure upstream of main Gas governor:-

a) Standing _____ mbar b) Running _____ mbar

Gas pressure at burner head _____ mbar _____ in.w.g.

Gas rate _____ m³ _____ ft³/h

Heat input _____ MJ/h _____ Btu/h

CO _____ % _____ %

CO₂ _____ % _____ %

Gross Flue Gas Temperature _____ °C _____ °F

Ambient Temperature _____ °C _____ °F

Nett Flue Gas Temperature _____ °C _____ °F

Efficiency _____ % _____ %

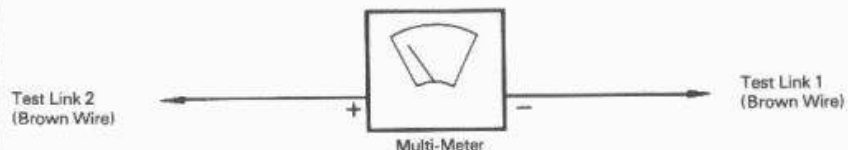
Fault Finding

Symptom	Check that:-
Burner will not start	<ul style="list-style-type: none"> - External controls are calling for heat. - Limit thermostat has not tripped. - Burner is not at lockout. - Electrical supply fuse is intact. - Burner fan motor is operative. - Air pressure switches are operative.
Burner goes through pre-purge period, but fails to establish flame	<ul style="list-style-type: none"> - Gas supply is present. - Live and neutral leads are not inverted. - Earth connection is sound. - The air pressure switches are operative. - The ignition spark is present at the required time.

Symptom	Check that:-
Burner goes through pre-purge period, but start gas fails to establish	<ul style="list-style-type: none"> - Electrodes are in good condition. - Flame signal is present (see below) - The burner head is correctly set.

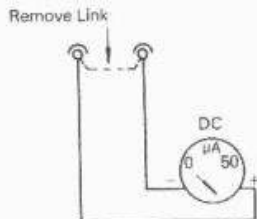
To check the Flame Current:

1. Remove the terminal box lid via the two positive screws.
2. Remove flame signal link.
3. Fit multi-meter into Test Link terminals.
4. Set the meter to d.c. micro-amps.
5. Start the burner and read the flame current obtained. A value of $1\mu\text{A}$ or over is sufficient to energise the control box.
6. Remove the meter, working in reverse order to that above and replace terminal box.



All Current ratings relate to 230v. All main fuses must be to BS.88

Minimum Flame Signal: $1\mu\text{A}$
 Typical Signal: Probe $10\mu\text{A}$
 U.V. $25\mu\text{A}$



Detector Current Measuring Circuits

Introduction

PC/GS 9 & 13

The Powmatic PC/GS 9 & 13 fully automatic draught burners with ON/OFF gas control. The burners are supplied complete with a gas control assembly to the latest specification which provides for control of both the start gas and main gas supply through a main gas governor and safety shut-off valve. The start gas expands to the main gas rate after the start gas flame is established.

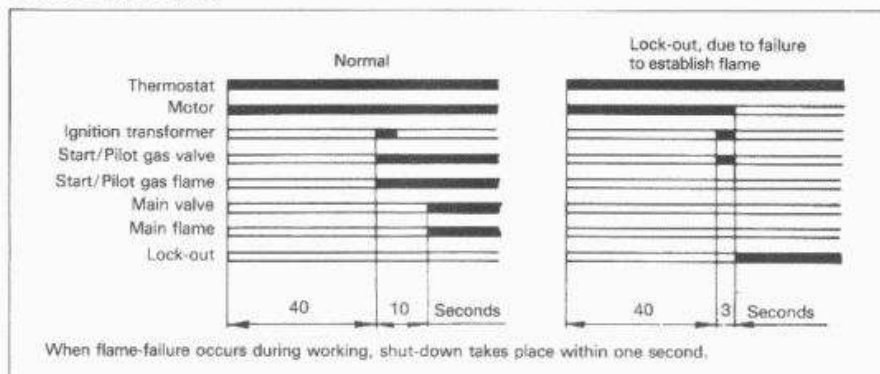
Flame safeguard, based on a rectification system, is provided by the integral full-sequence control box:- in the event of flame failure the safety shut-off valves are de-energised and the gas supply is cut-off within one second.

The burners as supplied by Powmatic will perform the following functions:

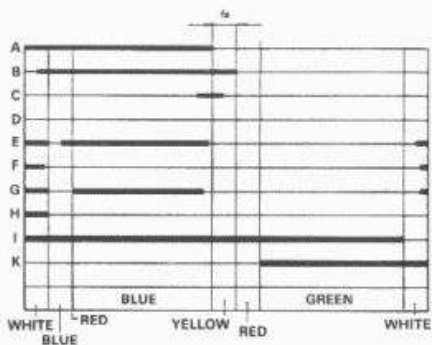
- Providing that the air-pressure switch is proved in the 'no-air' position prior to start-up, the combustion air fan will run.
- Providing that adequate air flow is proved there will be a pre-purge period
- At the end of this time;

The ignition transformer and start-gas valves will be simultaneously energised and the start-gas flame established. Providing that the start-gas flame presence is proved within seconds the main gas safety shut-off valve will be energised and the main gas flame will be established. Failure to establish a flame, loss of flame signal thereafter will result in the burner going to lockout. This state requires a manual reset to once again initiate the start sequence.

Burner Start-up Cycle



Control Box Cam Function



Coloured Programme Indicator

CAM SWITCHES

- A Initial fuel release, start of ignition safety time
- B Air proving period, and termination on safety time
- C Ignition
- E Start of flame simulation, whilst 'B' is on
- F Contact position proving at start of programme
- G Lockout, during pre-purge
- H Programme "start"
- I Programme "stop"
- K Main Gas Valve V2

Note: 1. Cam switches are shown on the diagram in their relaxed position, indicated by the thin line on cam development sketch above.

2. Relay contacts are shown in the de-energised position.

COLOURED PROGRAMME INDICATOR

A coloured programme indicator is incorporated on the cam assembly, and the approximate colour positions indicate the following steps in the sequence.

- Blue line on White — Start position
- Start of Blue sector — Start of pre-purge
- Line in Blue sector — Air supply proved.
- Blue sector — Pre-purge
- End of Blue/start of Orange — End of pre-purge
- End of Orange/Start of Yellow — Start of ignition safety time, and initial fuel release
- End of Yellow/Start of Red — Lockout position, due to ignition or detection failure
- Red sector — Start flame proving period
- End of Red/Start of Green — Main flame stage
- End of Green/Start of White — "Run" position

N.B. On MM1 810 Mod 43 the orange sector is omitted, because this model does not have a pre-ignition period.

Mounting the Burner

NOTE: The following procedures only apply when the burner has not been fitted to the appliance in the factory.

Burner with fitted gas controls assembly

1. Remove the nuts and washers from the burner mounting studs on the appliance.
2. Offer the complete burner and gas controls assembly

up to the appliance and locate the blast tube in the burner port at the same time engaging the burner flange over the studs.

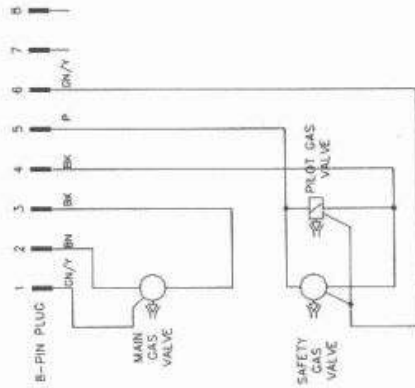
3. Push fully home and secure with the nuts and washers.

Parts List



Wiring Diagram

GAS TRAIN



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
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 DRAWING No.

Technical Data/Components

Burner

Operation	PC/GS9S PC/GS13S	
Single Stage, On/Off		
Two Stage, High/Low	PC/GS9T PC/GS13T	
Modulating	PC/GS9M PC/GS13M	
For High/Low and Modulating Burners, refer to relevant handbook supplement.		
Type Burner	PC/GS9	PC/GS13
Output Range kW Btu/h		
Voltage	230V	230V
Phase	1	1
Frequency	50Hz	50Hz
Current Consumption		
- Motor	1.14A	1.14A
- Ignition Transformer	1.1A	1.1A

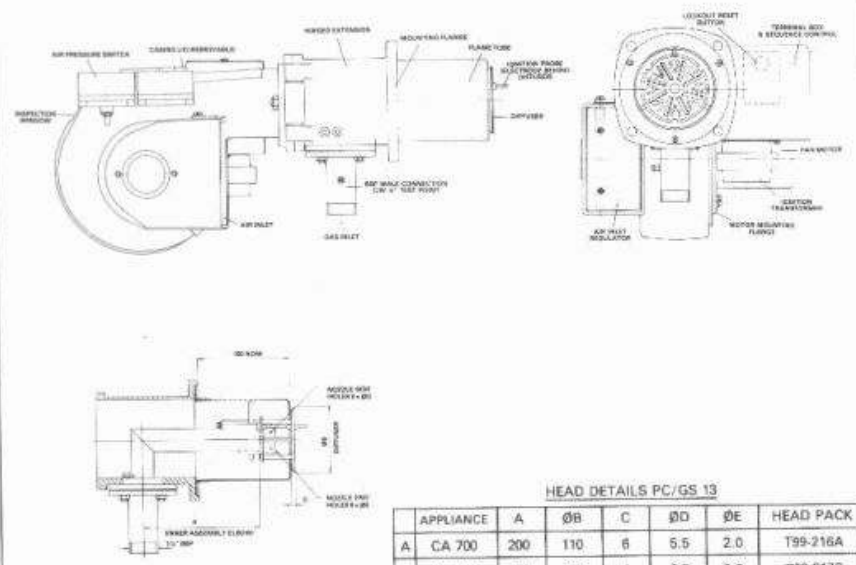
PC/GS13 (Complete Assemblies)	
CA/CP/EA 800 Heaters	141376345
CA/CP/EA 1000 Heaters	141376367

Control Box

Type	Satronic MMI 810 mod 43
Electrical Consumption	10 va
Pre-purge Time	40 secs
Pre-ignition time	Nil
Start Gas Safety Time	3 secs
Total Start-up Cycle	50 secs
Minimum Normal Ionisation Current	1.0 µA
External Fuse	10A (rapid) 6A(slow)

Gas Controls Assembly - 1 1/2" B.S.P.

Fig. 1 Principal Components of the PC/GS9 & PC/GS13 Burners



HEAD DETAILS PC/GS 13

APPLIANCE	A	ØB	C	ØD	ØE	HEAD PACK
A CA 700	200	110	6	5.5	2.0	T99-216A
A CA 800	198	100	4	6.8	2.0	T99-217B
A CA 1000	198	100	4	6.8	2.0	T99-217B
A CP800 CP1000	73	100	123 (Back)	8.0	-	U50-458L

Electrical Connections

The electrical connection to the burner (ie. positive, neutral and earth) is wired direct to the burner terminal strip as shown on wiring diagram.

Handing Over To The User

Refer to Appliance Installation, Commissioning and Servicing Instructions.

Burner Servicing

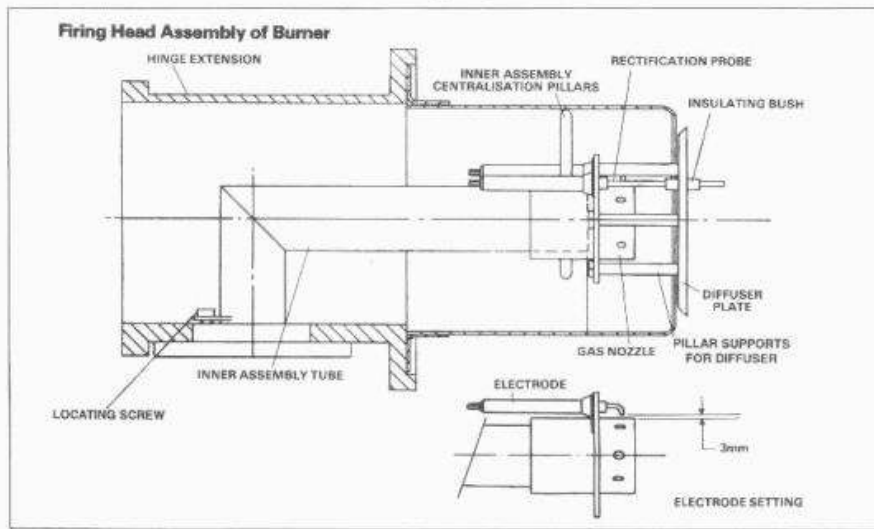
WARNING: ALWAYS switch off and disconnect electricity supply and close the gas service valve before carrying out any servicing work or replacement of failed components.

General

Full maintenance should be undertaken not less than once per year. After any servicing work has been completed or any component replaced the burner must be fully commissioned and tested for soundness as described.

Burner Fan and Motor

1. Release and remove the single fastening screw and remove the cover plate from the top of the burner casing.
2. Clean the fan blades (as required) with a brush to remove any accumulated deposits.
3. Check that the impeller is rigidly fixed to the motor shaft and that the assembly turns freely.
4. Check that the air pressure switch impulse pipe (situated immediately above the impeller) is not blocked.
5. Re-assemble in reverse order remembering to re-connect the electrode leads before closing the burner body onto the burner tube.



Firing Head Assembly

1. Using a 16mm spanner release the nuts securing the burner body to the burner hinge extension so that the burner body may be swung aside to reveal the electrode connections and firing head assembly.
 2. Disconnect electrode leads and with a 6mm allen key remove the locating screw of the burner tube at the gas entry point. The firing head assembly can now be withdrawn.
 3. Using a stiff brush clean-off any accumulated deposits from the firing head, paying particular attention to the nozzle ports.
 4. Before the firing head is re-assembled into the burner tube check that the electrodes are not damaged, eroded or dirty. If either electrode requires replacing slacken the 3mm clamping screw and slide out the electrode. Replace with the new electrode ensuring that it is repositioned correctly.
- NOTE:** The rectification electrode has a flanged insulating bush where it passes through the diffuser plate. When replacing the rectification electrode ensure that the insulating bush locates in the diffuser plate from the burner port side.
5. Re-assemble in reverse order.

Note

Please refer to the following for setting pressure switches:-

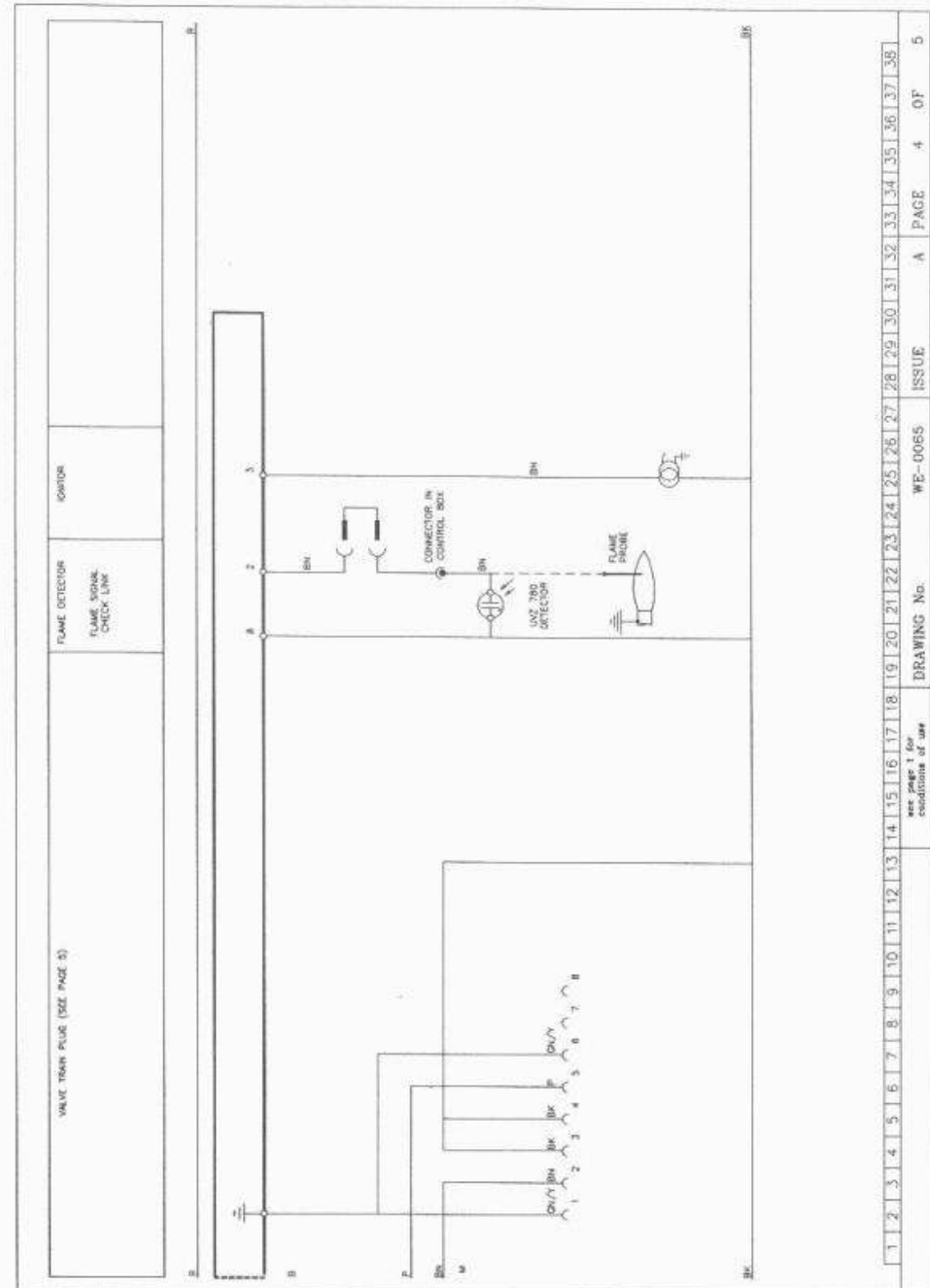
Combustion Air Pressure Switch (GW3 A4 0.4 - 3.0mbar)

The combustion air pressure switch is set after all other adjustments have been made. Set the dial to 0.4mbar and then with the burner working at the minimum rated output of the heater adjust the dial clockwise increasing its value until the burner locks out. Now reduce the value by one set point turning the dial anti-clockwise. Re-start burner, if burner does not light reduce the value by a further set point and repeat.

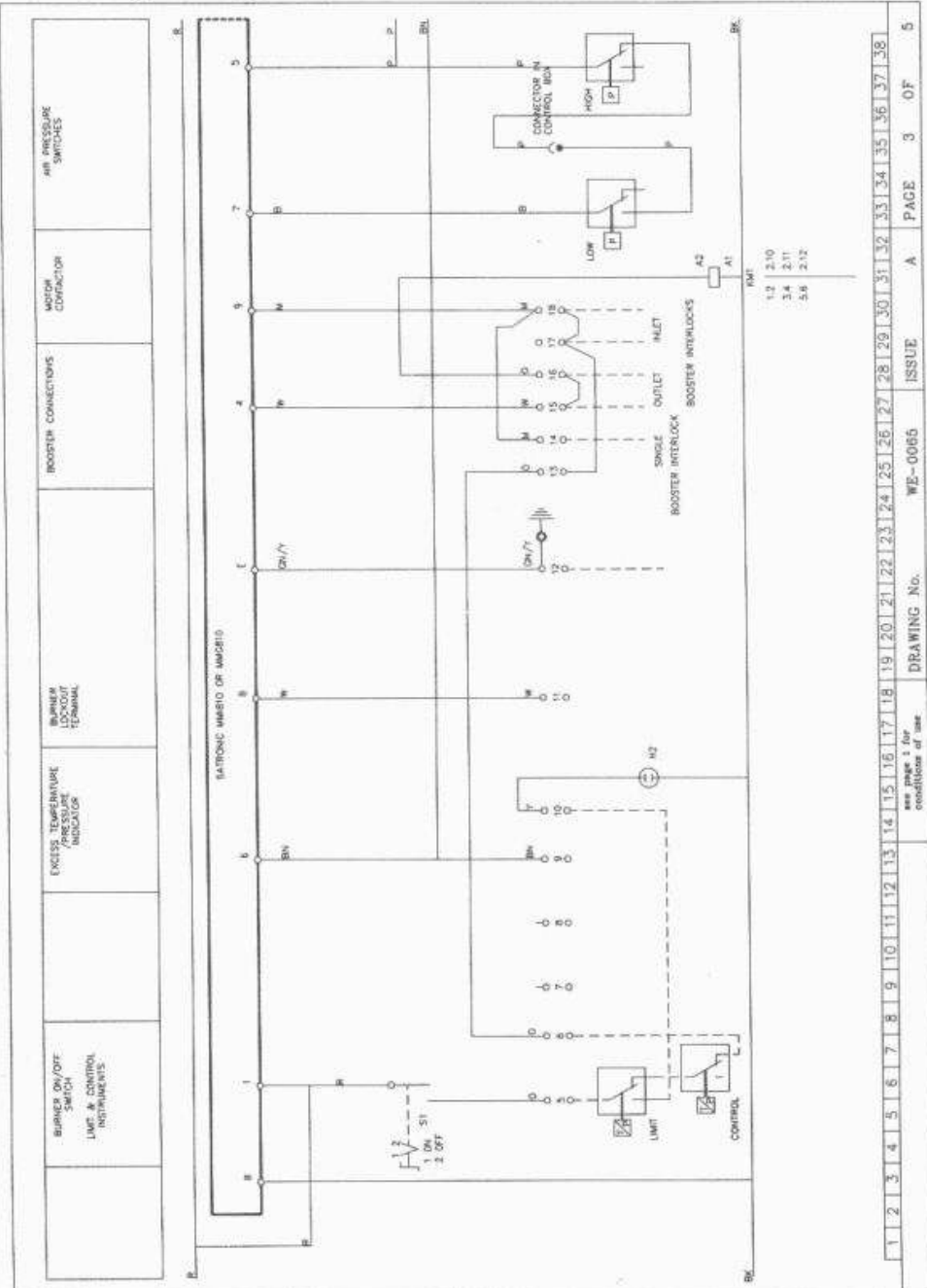
Over Pressure Switch (GW10A4 1.0 - 10.0mbar)

The over pressure switch is set after the combustion air pressure switch. Its purpose is to shut down the burner if the combustion chamber pressure increases significantly. Turn the dial to 10.0mbar and then with the burner working at the maximum rated output of the heater adjust the dial anti-clockwise decreasing its value until the burner locks out. Increase value by 1 point and restart the burner. If the burner shuts down due to the slight pressure surge in the combustion chamber during burner ignition increase the value on the over pressure switch by a further set point and repeat.

Wiring Diagram



Wiring Diagram



Replacement of Faulty Components

WARNING: Inadvertent substitution or replacement of similar components particularly those with plug-in bases, could cause a hazard.

Firing Head

1. Remove the firing head as described.
2. Slacken the clamping screw(s) and slide-out the electrodes.
3. Release the pozidrive screws on the end of the assembly and remove the diffuser plate.
4. With a 3mm allen key remove the grub screws on the gas nozzle thus releasing firing head assembly from the inner assembly tube.
NOTE:- Mark inner assembly tube before removal of nozzle to ensure same is re-fitted in correct position.
5. Take the replacement firing head and re-attach the diffuser plate and electrodes taking care to align them correctly.

NOTE: The rectification probe has a flanged insulating bush where it passes through the diffuser plate. When replacing the rectification electrode ensure that the insulating bush locates in the diffuser plate from the burner port side.

6. Re-position firing head assembly inside the burner tube, hold in position with locating screw and re-assemble in reverse order. Remembering to secure earth connection under inner assembly fixing screw.

Electrodes

The ignition and/or rectification electrode can be replaced by following appropriate steps, listed under firing head.

Control Box

1. Slacken the single securing screw and pull-off the faulty control box.
2. Push on new control box and re-tighten securing screw.

Burner Fan

1. Using pozidrive screw driver slacken single screw holding control pack to bracket. Lift off complete control pack (do not electrically disconnect). Support on top of burner casing.
2. Slacken off and remove the two motor fixing screws to allow fan to be removed with motor.
3. To remove fan from motor insert 4mm allen key through appropriate fan blade and remove fan.
4. Replace fan and re-assemble in reverse order.

Burner Fan Motor

1. Release the two pozidrive screws to remove terminal box cover plate, also remove control box.
2. Disconnect the motor wiring from the control box terminals and the earthing block. Pull motor wiring sheath from control box and terminal box.
3. Remove motor fan assembly from burner.
4. Replace motor, refit fan impeller before re-assembling in reverse order.

Capacitor (Single phase motors only)

NOTE: A soldering iron is required for the replacement of the capacitor. If this is available at the location of the burner then proceed as below: - if not, remove the motor/fan assembly to the workbench and proceed as below.

1. Pull end cap off of capacitor to reveal wiring connections.
2. Snip through wiring connections.
3. Release securing nut on opposite end to wiring and remove faulty capacitor.
4. Replace capacitor, resecure with nut and resolder wiring connections before refitting end cap.

Air pressure switches

1. Slacken the screws securing the pressure switch covers and remove. Release the wiring from the switches terminals, noting orientation.
2. Slacken the cable clamping nut on side of pressure switch and pull out cable.
3. Remove burner cover plate. Release and remove elbow union securing switch to burner casing then lift off switches (note position of elbow air pick-up point).
4. Replace pressure switches re-connect elbow union and wiring, refit cover.
5. Re-set Air Pressure Switches as described under Burner Servicing.

Ignition Transformer

1. Remove the cover plate and control box.
2. Open burner body and remove electrode lead.
3. Disconnect the transformer wiring from the control box terminals and the earthing block. Pull transformer wiring sheath nut from control box and burner body.
4. Using a 10mm spanner release the two nuts securing the transformer to the control package and remove transformer.
5. Replace transformer passing the ignition lead through respective opening in the burner body side and re-assemble in reverse order.

Safety Shut-Off Valves

NOTE: Plugs have been used to facilitate electrical connection of the safety shut-off valves to the burner.

1. Remove all plugs from coils of safety shut-off valves.
2. Undo the union of the gas service valve.
3. Undo the union situated at the junction of the gas train with the burner blast tube and remove gas control assembly complete.
4. Disconnect pipework as appropriate to allow exchange of the faulty valve noting the orientation of fittings and components.
5. Fit replacement valve and re-assemble in reverse order.

Wiring Diagram

REVISIONS		CONDITIONS OF USE			
REF	DATE	READ FROM LEFT TO RIGHT ALL WIRING '16/'20 UNLESS OTHERWISE STATED.			
		PANEL WIRING _____ EXTERNAL WIRING - - - - -			
		MODEL	MOTOR KW	OVERLOAD	CABLE SIZE
		PC/GS7	0.25		1.00mm
		PC/GS8	0.25		1.00mm
		PC/GS9	0.25		1.00mm
		PC/GS13	0.25		1.00mm
		FUSE REF	AMPAGE	PROTECTING CONTROL CIRCUIT	
		F1	3		
		NOTES	1. ANY INTERLOCK DESIGNED TO SWITCH OR CONTROL BURNER SUCH AS TIME-SWITCH, DAMPER OR I.D. FAN INTERLOCK ETC. TO BE WIRED IN SERIES WITH CONTROL AND LIMIT INSTRUMENTS. 2. IF BURNER IS USED ON STEAM BOILER, WATER LEVEL INTERLOCKS SHOULD BE WIRED BETWEEN 13 & 17 (REMOVE LINK) IF AOTC PANEL IS USED (SEE WAS-7095 FOR STANDARD ARRANGEMENT) TERMINALS 82 & 83 REFER. 3. ON BOOSTED GAS SUPPLY WIRE INLET GAS PRESSURE INTERLOCK TO TERMINALS 17 & 18 AND OUTLET GAS PRESSURE INTERLOCK TO TERMINALS 15 & 16. IF NO BOOSTER IS USED LINK TERMINALS 15 - 16 AND 17 - 18. 4. REMOTE 'BURNER RUN' INDICATION FROM TERMINAL 9. 5. REMOTE 'EXCESS TEMPERATURE OR PRESSURE' ALARM FROM TERMINAL 10. 6. REMOTE 'BURNER LOCKOUT' ALARM FROM TERMINAL 11.		
		DRAWN BY N.LASHFORD CHECKED BY _____ DATE 17.11.95 DATE _____	CONNS. FOR PC/GS7,8,9 & 13 ON OFF SATRONIC MM1810 OR MMGB10 SINGLE PHASE DOUBLE PRESSURE SWITCH POWRMATIC		
		DRAWING No. WE-0065	ISSUE	A	PAGE 1 OF 5

Wiring Diagram

