

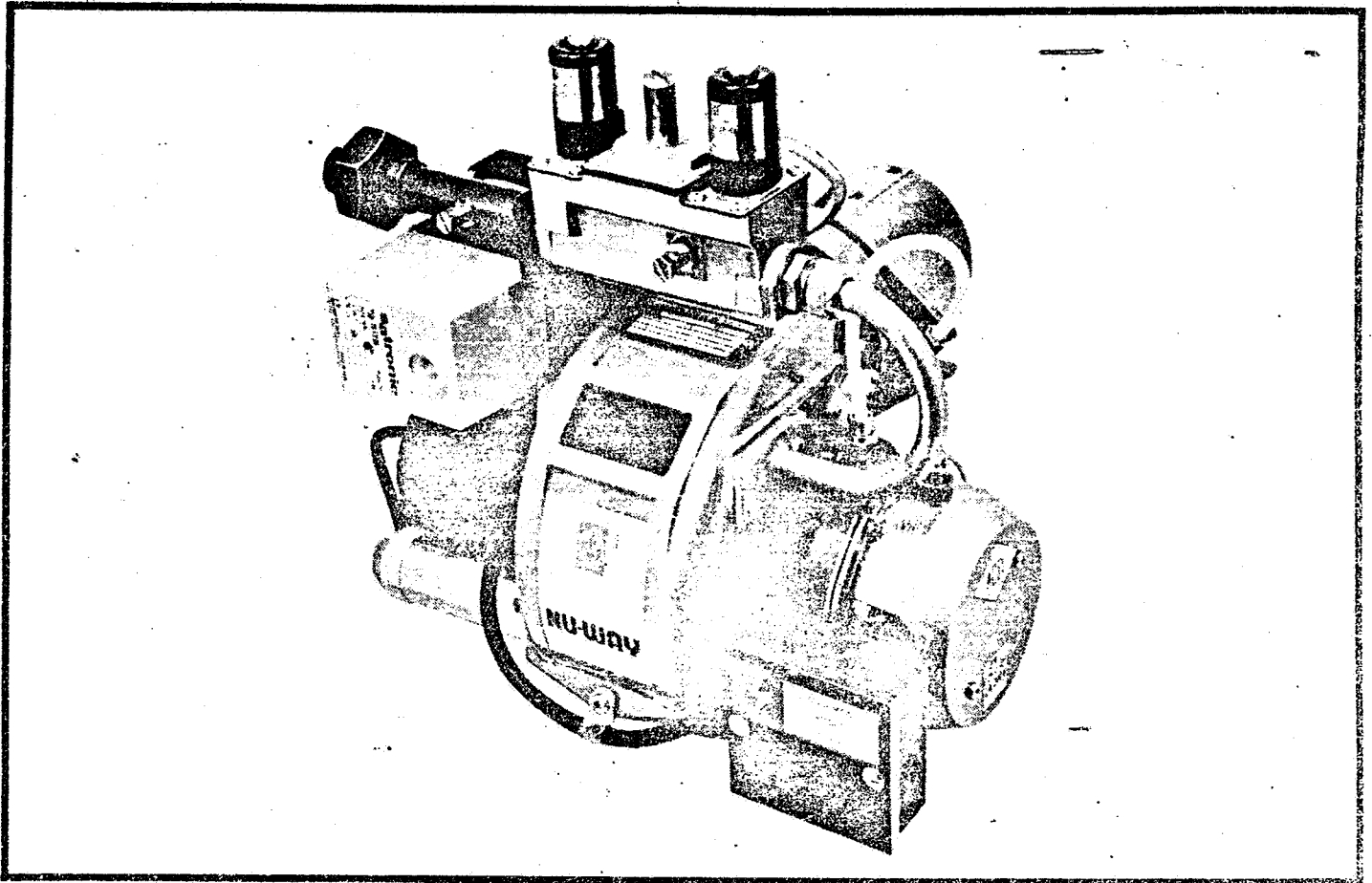
# NU-WAY



# Technical data

## automatic gas burners

MODEL  
**CG1**



The Nu-way CG1 blown gas burner is a small, compact, fully automatic unit designed to meet the requirements of all international markets. The burner is available with capacities of 27-60 kW (23,000-51,000 kcal/h; 90,000-204,000 Btu/h) against balanced draught conditions. Available for on/off operations only, with direct spark ignition and low flame start.

### FUEL

Available in versions to burn both natural and LPG (Liquid Petroleum Gas). An arrangement for manufactured gas is available for export; details upon request.

### FUEL SYSTEM

The gas line includes a one-piece unit, which comprises a low gas flame start valve, a gas governor and a high flame gas valve. A  $\frac{1}{2}$  turn stop valve is supplied, loose, as a main shut-off valve.

### CONSTRUCTION

A monobloc metric design, using fastenings to ISO standards, suitable for flange mounting. The burner is fixed to the mounting flange by a single screw, this enables the burner to be easily removed for servicing. The fan and inner assembly are accessible by removing the cover plate.

### CONTROLS

Flame supervision by ionization probe with sequence controller. The CG1 burner may be controlled by suitable thermostats, time switches, frost-stats, etc. A factory set air differential switch (with an air probe fitted either in the boiler front plate, or in the base of the stack), gives protection if combustion air is, or becomes, insufficient.

*Note:* the differential switch is an optional extra on export models.

### APPROX WEIGHT

11 kg.

### ELECTRICAL DATA

Mains supply (V) 230+10%—15%  
1 ph 50 Hz

Burner motor (W) 75  
(hp) 1/10

2700 rev/min, capacitor start.

Burner start current (A) 1.0

Burner run current (A) 0.6

Ignition by direct spark from double-wound and suppressed transformer secondary 5kV-18mA, earth return.



# NU-WAY

## BURNER SELECTION

Burner model	Burner Capacities				Main gas governor settings.		
	therm/h	kW	kcal/h x 10 <sup>3</sup>	Btu/h x 10 <sup>3</sup>	Nat. gas		
					kPa	mm wg	" wg
CG1A	0.91	27	23	91	0.7	71	2.8
CG1B	1.13	33	28	113	0.5	53	2.1
CG1C	1.37	40	35	137	0.7	74	2.9
CG1E	1.70	50	43	170	1.1	114	4.5
CG1F	2.04	60	51	204	0.9	89	3.5

## ORDERING INFORMATION

When ordering a Nu-way model CG1 burner please provide the following information to expedite your order.

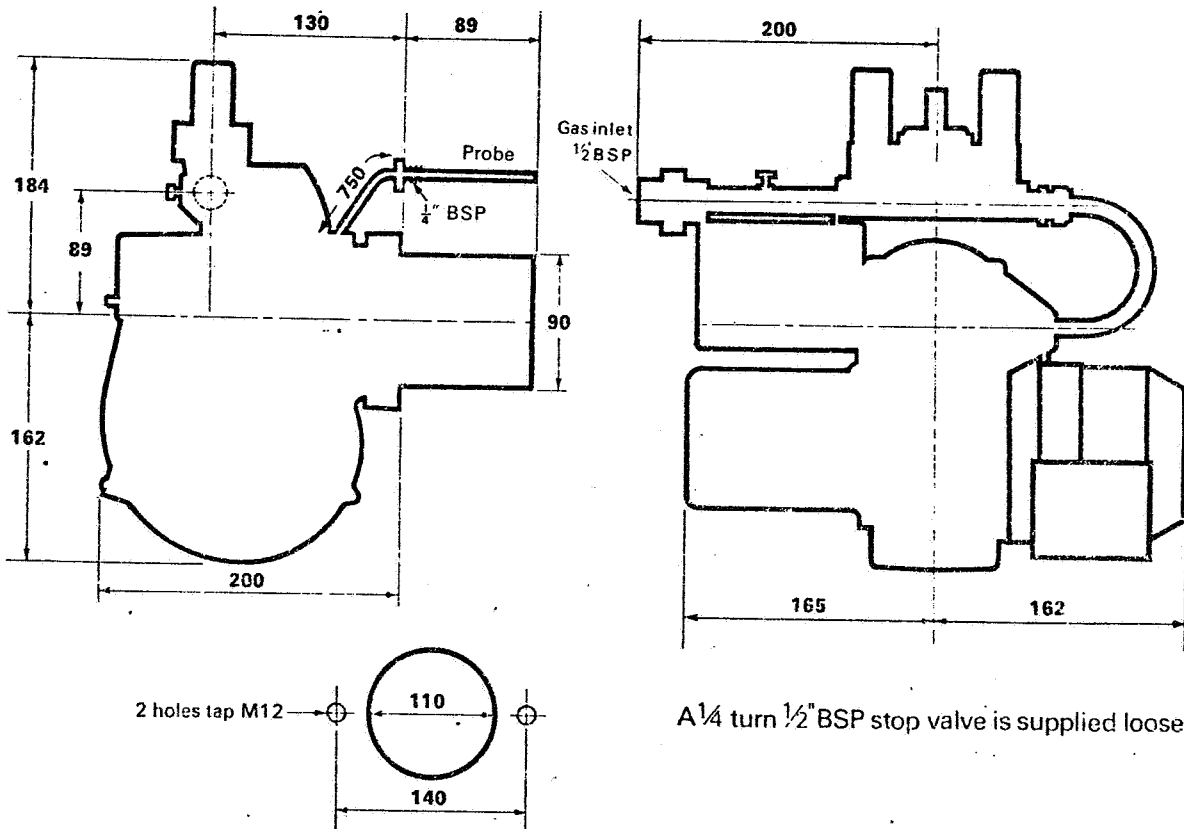
Type of appliance with which the burner is to be used.

Appliance rating.

Specification of electrical supply locally available, i.e. voltage and frequency.

Type of gas, and pressure available.

## DIMENSIONS



**Nu-way Heating Plants Limited**  
**Droitwich, WR9 8NA, England**

Telephone: Droitwich (09057) 2331 & 2527  
 Telex: 338551. Cables: JASNU DROITWICH

*Nu-way policy is one of continuous improvement. The right to change prices and specifications without notice is reserved.*



Nu-way  
Handbook  
automatic gas burners  
CG1

The Nu-way CG1 blown gas burner is designed for automatic operation against balanced draught conditions. (For burner capacities, see chart over).

Available for on/off operation only, with direct spark ignition and low flame start.

FUEL

Available in versions to burn both natural gas and LPG (Liquid Petroleum Gas).

A town's gas version is available (not suitable for the U.K.). Maximum capacity 100 000 Btu/h (29kW; 28 500 kcal/h).

GAS SUPPLY SYSTEM

The gas line includes a Black Series 33 one piece control unit, which comprises a low flame start magnetic gas valve, a gas governor and a high flame magnetic gas valve. A quarter-turn stop valve is supplied loose, for use as a main, manual shut-off valve.

CONSTRUCTION

Amonobloc metric design, using fastenings to ISO standards, suitable for flange mounting. The burner is fixed to a mounting flange by a single screw; this enables the burner to be easily removed for maintenance. The fan and inner assembly are accessible by removing a cover plate.

AIR REGULATION

Fixed setting burners - None (Compulsory for the U.K.)

Adjustable setting burners - By air strap (not available in the U.K.)

CONTROLS

Flame supervision is by ionization probe with sequence controller. The CG1 burner may be controlled by suitable thermostats, time switches, frost-stats, etc.

Fixed setting burners have a factory set and sealed differential air pressure switch (compulsory in the UK) using a sampling tube (probe) fitted either in the boiler front plate, or in the base of the stack to give protection if combustion air is, or becomes, insufficient. Adjustable setting burners may be fitted with an adjustable air pressure switch, as an optional extra.

WEIGHT

10 kg 22 lb.

ELECTRICAL DATA

Mains supply (V) 230 + 10% - 15%  
1ph 50 Hz

Burner motor (W) 75  
(hp) 1/10  
2700 rev/min, capacitor start

Burner start current (A) 1.0  
Burner run current (A) 0.6

Ignition by direct spark from double-wound and suppressed transformer secondary  
5kV - 18mA, earth return.

UNPACKING

After unpacking the burner, it is necessary to tighten the pipe coupling at the downstream end of the Black 33 double magnetic valve and governor unit - so that the magnetic coils are in the vertical, or upright position. Two spanners should be used to avoid straining the pipework.

Fit boiler probe (see Page 3).

Attach the stop valve ( $\frac{1}{2}$ " BSP) to the gas supply, with the mating half of the "Navy" type union on the downstream side of it.

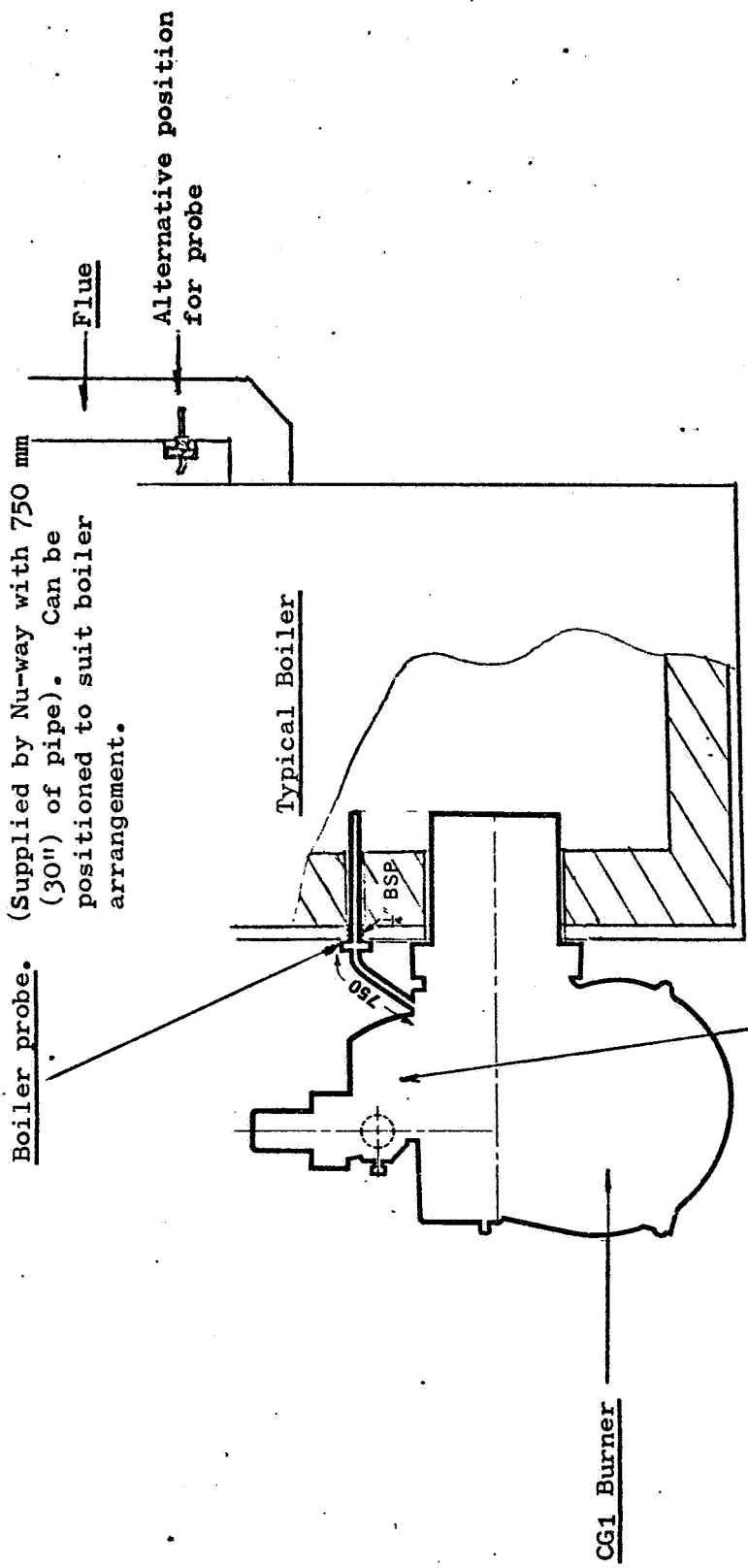
Boiler probe arrangement.

If your burner is fitted with a differential pressure switch (compulsory in the UK ) the probe should be positioned as shown above.

The probe (standard length of tube to probe 750mm), must pass into the combustion space. Care should be taken not to block the tube end during fitting, otherwise the safe operation of the appliance will be affected. This applies particularly when the frontplate is protected by fibrous insulating material. A  $\frac{1}{8}$ " BSP tapped hole is required, in a suitable position, in the frontplate and a 7/16 in (4,5mm) clearance hole through the refractory material.

Should the boiler be of the water cooled front design, then the probe can be inserted into the base of the stack.

Boiler Probe Arrangement for CG1



Boiler probe. (Supplied by Nu-way with 750 mm (30") of pipe). Can be positioned to suit boiler arrangement.

Flue

Alternative position for probe

Typical Boiler

1" BSP

750

CG1 Burner

Differential pressure switch (fitted on to burner).

BURNER MODEL	BURNER CAPACITY		APPLIANCE OUTPUT						SWIRLER CONE	G A S NOZZLE HOLES	GOVERNOR SETTING	G A S NOZZLE HOLES	GOVERNOR SETTING	G A S NOZZLE HOLES	GOVERNOR SETTING							
	BTU/H X 10	KW	EFFICIENCY - 75%		EFFICIENCY - 80%		BTU/H X 10	KW								BTU/H X 10	KW	NATURAL	M.M.	L P G	M.M.	W G
			BTU/H X 10	KW	KCAL/H X 10	KCAL/H X 10																
Fixed Setting Burners*																						
CG1A	90	27	67.5	20	17	72	21	18	74.2	1.95	2.8	71	3.8	96.5	3.0							
CG1B	113	33	84.8	25	21.3	90	26	22.6	75.6	2.5	2.1	53	3.6	91.5	3.0							
CG1C	137	40	102.8	30	25.8	109	32	27.4	77.0	2.5	2.9	74	3.8	96.5	3.0							
CG1D	150	44	118.5	33	28.3	120	35	30.2	77.5	2.5	3.5	89	4.1	104	3.0							
CG1E	170.6	50	128.0	37.5	32	136.5	40	34.1	79.9	2.5	4.5	114	3.9	99	3.0							
CG1F	204.7	60	153.5	45	38.4	163.5	48	40.8	79.9	3.0	3.5	89	3.0	76	3.0							
Adjustable Setting Burners†																						
CG1	MIN90	27	67.5	20	17	72	21	18	78	2.25	1.9	48	3.8	96.5	3.2							
	113	33	84.8	25	21.3	90	26	22.6	78	2.25	2.9	74	3.6	91.5	3.0							
	137	40	102.8	30	25.8	109	32	27.4	78	2.25	4.2	107	3.8	96.5	3.0							
	150	44	112.5	33	28.3	120	35	30.2	78	2.25	5.0	127	4.1	104	3.0							
	170.6	50	128.0	37.5	32	136.5	40	34.1	78	2.25	6.5	165	3.9	99	3.0							
	MAX204.7	60	153.5	45	38.4	163.5	48	40.8	78	2.5	6.5	165	3.0	76	3.0							

\* The burner can only be operated at the above ratings. Burner must not be de-rated or uprated otherwise combustion will be adversely affected.

† These figures are for British Natural Gas of 1330 Wobbe No. (1020 Btu/ft<sup>3</sup> and 0.583 s.o.). For other types of Natural Gas the no. and/or gas pressure may need adjustment to suit local conditions.

The 27 KW to 50 KW burners are fitted with a diffuser with 2.0 mm dia hole, the 60 KW version will have 2.5 mm dia holes. Performance of burners based on supply pressures of 4.0" wg Towns: 8" wg Natural and 8" wg L.P.G.

MGW/MC: 1.2.76.

## INSTALLATION

If the burner is being applied to an existing appliance, the stack, flue passage-ways and heat transfer surfaces must be cleaned.

Prepare boiler front plate to receive burner. (See page 1).

The end of the draught tube must be flush with, or protruding from, the forward face of the quarl or boiler frontplate protection.

Flue and Ventilator requirements. The top of the flue should be above all roofs within a radius of 10m (30 ft). If a cowl is fitted it should be removed. The height of the flue from the boiler outlet, should be 4.6-12.2m (15'-40').

The corresponding draught over the burner, when firing, should be between 0.5 and 8.0 mm (0.02" and 0.30") wg.

A fresh air ventilator is required for the room housing the appliance. The minimum area should be calculated on the basis of 0.16 sq ft (142 sq cm)/100 000 Btu/h. Further ventilation may be required should the temperature in the boilerhouse exceed (45°C) 110°F.

The gas supply lines. Sized to British Gas recommendations, and made up in accordance with BS1937; or to local gas installation standards.

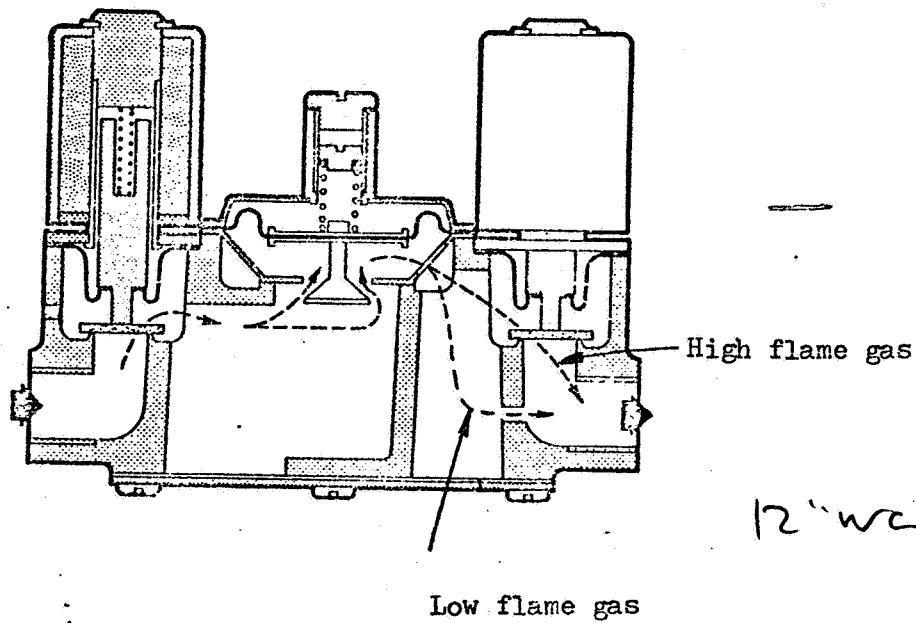
The manual gas shut-off valve, followed by the "Navy" type union, should be fitted upstream of the burner to permit burner maintenance.

Purge air from the gas supply main, using the gas test nipple upstream of the Black 33 unit

Electrical supply. Connect the electrical supply, thermostats, time switches, etc., as appropriate (see page 4).



4a



Black series 33 double magnetic valve and governor control unit.

Gas Pressure Setting. To set the gas pressure at the burner to that shown in the above table, it is necessary to use a manometer (mm or inches wg). The hose is connected to the pressure test nipple on the twin magnetic valve Black 33 unit and the pressure adjusted with a screwdriver, as shown.

#### OPERATION

To start the burner turn the gas supply valve, the main electrical isolating switch, and where fitted, the separate burner switch, to ON.

The burner can be stopped in an emergency by opening either of the electrical switches, or by turning off the gas supply.

When the burner is first started there is a pre-purge period of 10 - 12 seconds. Ignition is then switched on and the upstream magnetic valve opened, thus allowing the burner to start on "low flame".

As soon as the flame is established, the flame relay, inside the control box, is energised by the flame detection circuit and the ignition is switched off. After a further 15 seconds the second magnetic valve opens and the burner moves to "high flame".

The burner continues to run until switched off by :

- a) The control thermostat contacts opening, upon the room or water temperature being reached.
- or b) Safety, limit thermostat and time switch contacts opening,
- or c) The burner being switched off manually.

If the flame fails to be established, the lock-out safety circuit causes the burner to be shut-down and the lock-out lamp, situated behind the manual reset button, to be lit. However, the burner fan will continue to run.

This reset button should not be operated until at least 60 seconds after the burner has "locked-out".

If, during normal burner operation the flame is extinguished, the flame detection circuit reacts within one second, shutting both magnetic valves (the fan continues to run). After a delay of 10 - 12 seconds the low flame magnetic gas valve is opened and the ignition switched on, in an attempt to re-establish a flame by the normal start-up sequence. If this is unsuccessful the control box goes to "lock-out" (the fan continues to run. Do not reset for 60 seconds).

#### FAULT FINDING

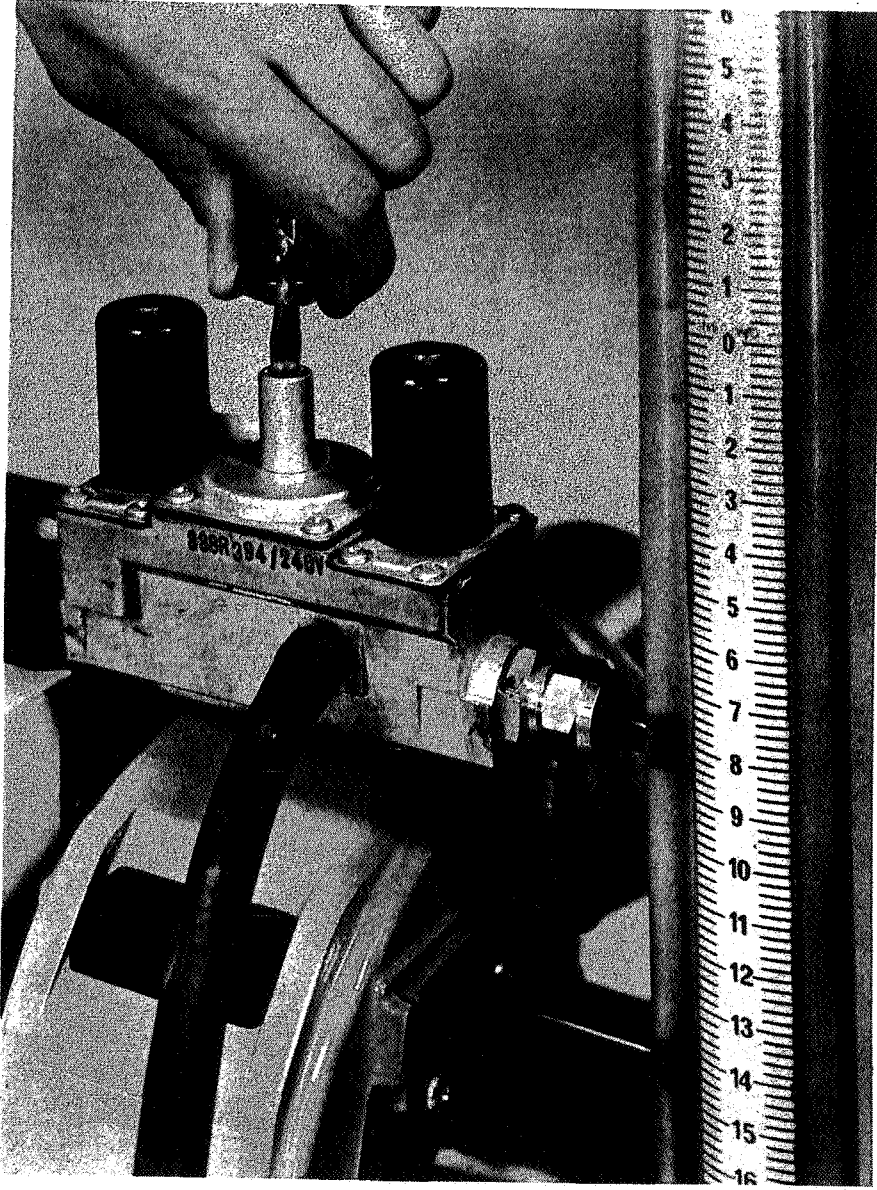
Motor fails to start. Check that power is available and that the burner has been correctly wired. Check all fuses in the supply to the burner. Check that the contacts of the time clock and of both control and safety limit thermostats on the appliance or in the room are closed, and therefore "calling for heat". If these thermostat contacts are not closed check thermostat settings.

If a pressure switch is fitted, check that the contacts are in the "burner start" position. On fixed setting burners the switch will be faulty and should be replaced. On adjustable setting burners check that the setting of the switch is correct.

Fan starts but burner fails to light. Check for flue blockage.

Check that the control box is not in the "lockout" position. (The signal lamp, which is behind the button, may be faulty).

Fixed setting burners only. If the fan runs continuously the air pressure switch may be stuck in the "burner start", position. If the fan "cycles" the pressure switch check relay may have failed.



Setting gas governor pressure.

Fan starts but burner goes to 'lockout'. If the flame fails to be established, the lockout safety circuit causes the burner to be shut down and the lock-out lamp, situated behind the manual reset button, to be lit (the fan continues to run).

This reset button should not be operated until at least 60 seconds after the burner has "locked-out". If the 'lock-out' condition cannot be reset, replace the control box.

Check for partial flue blockage.

Ascertain that gas is reaching the appliance, also that the two magnetic valves are in working order.

Check electrode and probe settings<sup>and</sup>/correct if necessary; also ensure that the electrode is not short circuited. Check that the insulators are not cracked.

Check operation of transformer, and high tension leads for continuity.

Check that the mains live and neutral connections are correct and that there is a good earth to the burner.

Adjustable burners only. Check that the air (and gas, if fitted) pressure switch has changed over to the "burner run" position.

Flame unstable, burner stops. Check that the <sup>burner gas</sup>governor has been set at the correct pressure.

Check for blockage in the nozzle and diffuser drillings.

Burner stops after satisfactory running period. If, during normal burner operation the flame is extinguished the flame probe reacts within one second, shutting down both magnetic valves (the fan continues to run). After a delay of 10 - 12 seconds the low flame magnetic gas valve is opened and the ignition switched on, in an attempt to re-establish a flame by the normal start-up sequence. If this is unsuccessful the control box goes to "lock-out" (do not reset for 60 seconds).

Check gas supply and pressure.

Check air entry for blockages.

Check for blocked flue.

Check that the probe is correctly set and that its insulator is not cracked.

Smell of gas. Check all pipeline joints with a soap solution, and tightness of the gas valves.

Combustion. If there is excessive combustion noise or the flame appears more yellow than usual, contact your installer or service engineer.

#### MAINTENANCE

Before carrying out any work on the burner, ensure that the electricity and gas supplies are OFF.

No maintenance is required on the pressure switch, control box or Black 33 double magnetic valve or governor unit, apart from checking the cable connections.

The motor bearings are lubricated for life.

The leads for electrical components - motor, pressure switch or Black 33 - are colour coded to ease correct connection, should the component be removed or replaced.

Burner maintenance is shown overleaf.

If the fan is damaged or becomes loose on the motor shaft, the motor must be removed (4 screws) from the burner casing. Correct position of the fan is with a 9.5mm ( $\frac{3}{8}$ " ) gap between the motor spigot and the back of the fan.

Maintenance (Captions to photos or drawings).

- 1) General view of burner showing single, socket head, grub screw which (photo) secures burner to mounting bracket: the latter is bolted to the boiler frontplate. The sequence control box, to the left of burner, is secured by a single screw situated to the left of the reset button.
- 6) To remove burner, complete with Black 33 unit, from boiler, disconnect the <sup>1/8" tube nut from</sup> the boiler probe <sup>if fitted,</sup> and main electrical lead, unscrew "Navy" type union and loosen socket head grub screw. The Black 33 unit may then be removed by disconnecting electrical leads to the magnetic valves, in the base of the control box, removing the screw securing the bracket to the control box mounting plate and unscrewing the pipe coupling.
- 2) Remove lid - unscrew single Phillips screw under name plate. Clean fan (photo) runner using stiff brush, avoiding any damage to fan blades. Check that the air inlet into the fan is clean.
- 3) Unplug electrode lead. Disconnect probe lead - one nut. Unscrew the two (photo) Phillips head screws which retain the end of the inner assembly.

Withdraw inner assembly.

4) Clean the air diffuser, probe and electrode using a stiff brush.

(photo) Take care not to block the small gas ports in the nozzle.

5) Adjust electrode gap, if necessary, using a hexagon socket key. (5mm)

(photo)

7) The draught tube may be removed by unscrewing two Phillips head

(photo)

screws.

8) Clean swirler using a stiff brush.

(photo)

9) Reassemble burner, using the reverse sequence, to above. It is important

(drg) that the relationship of the diffuser to the swirler is as shown. This must be maintained otherwise combustion will be adversely affected.

Before refitting burners to appliance, check that the probe gap is 6 mm.

( $\frac{1}{4}$ " ). Use pliers to bend end of probe, if necessary.

Take care, when refitting the burner to the appliance, not to disturb

the alignment of the draught tube.

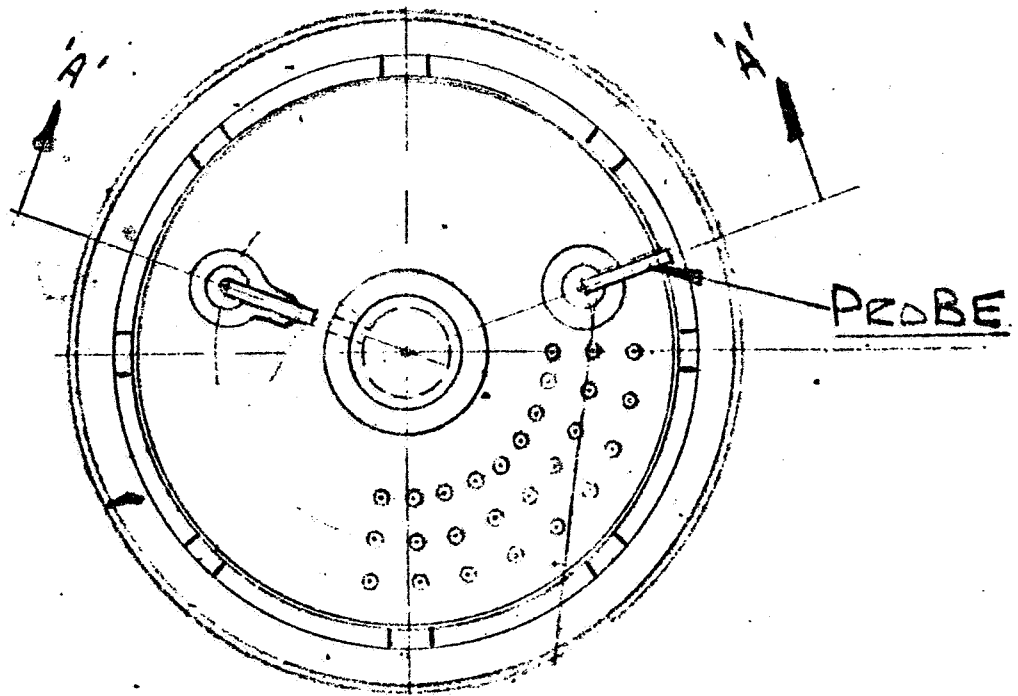
10) Check gas pressure at the Black 33 unit. (See page 2). Adjust air strap,  
(photo) if fitted, to give sufficient air for combustion, using a flue gas sampling kit to detect the fuel/air ratio.

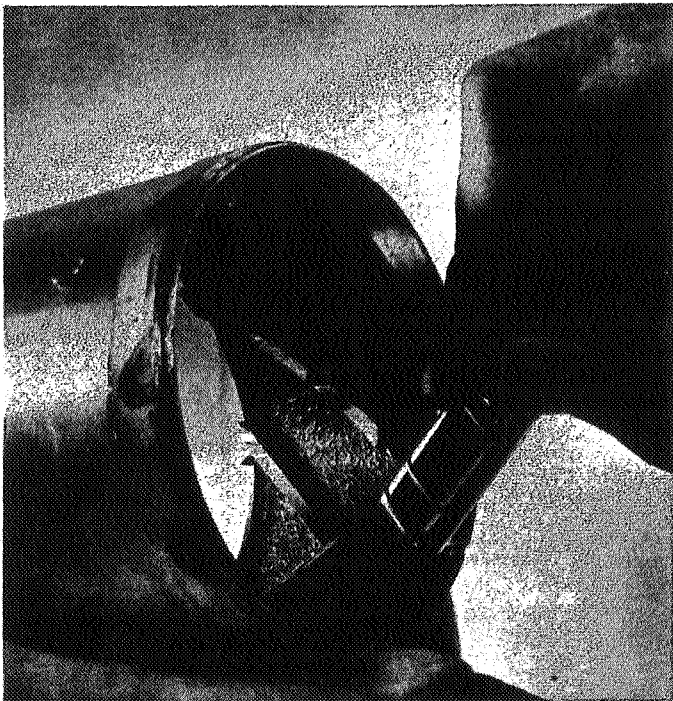
The burner is now ready for firing.

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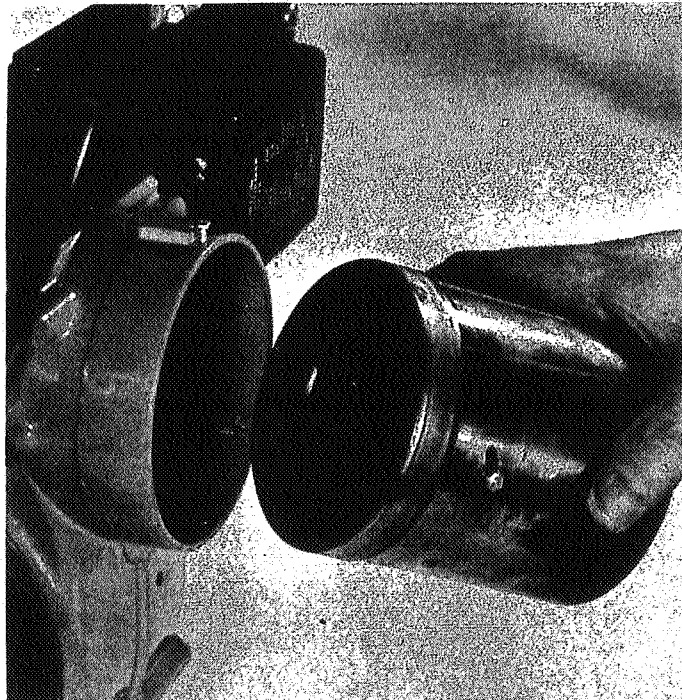
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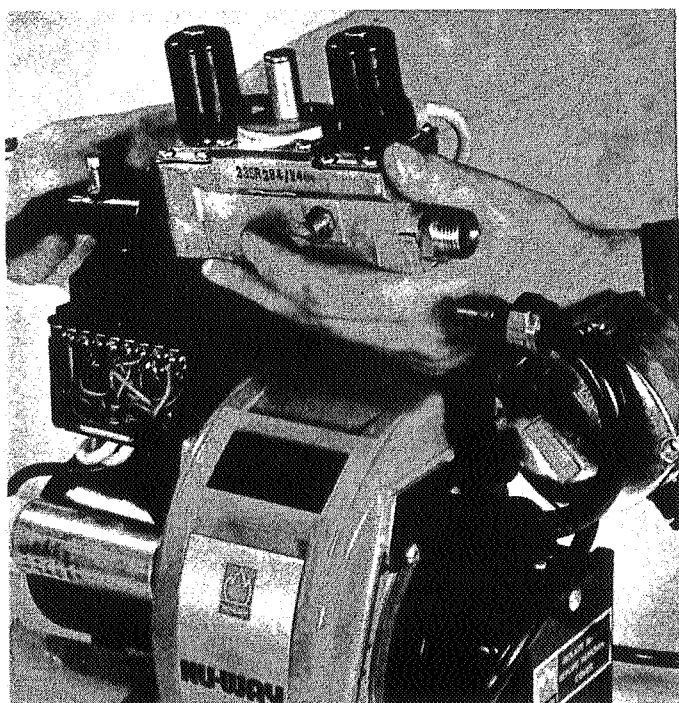




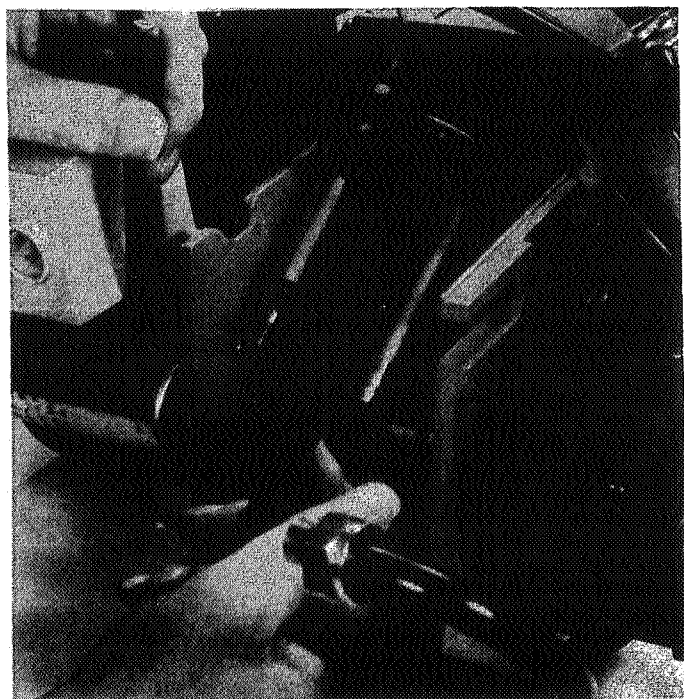
Clean swirler using a stiff brush.



The draught tube may be removed by unscrewing two Phillips head screws.



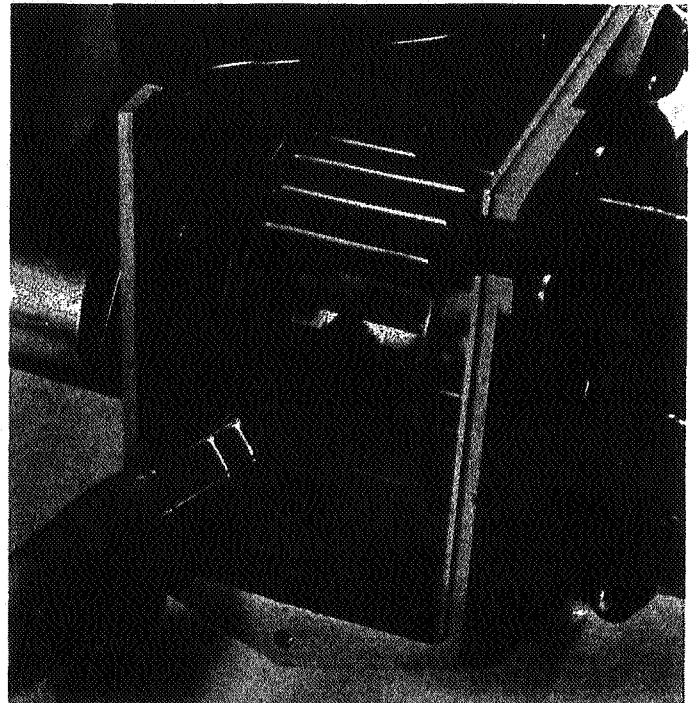
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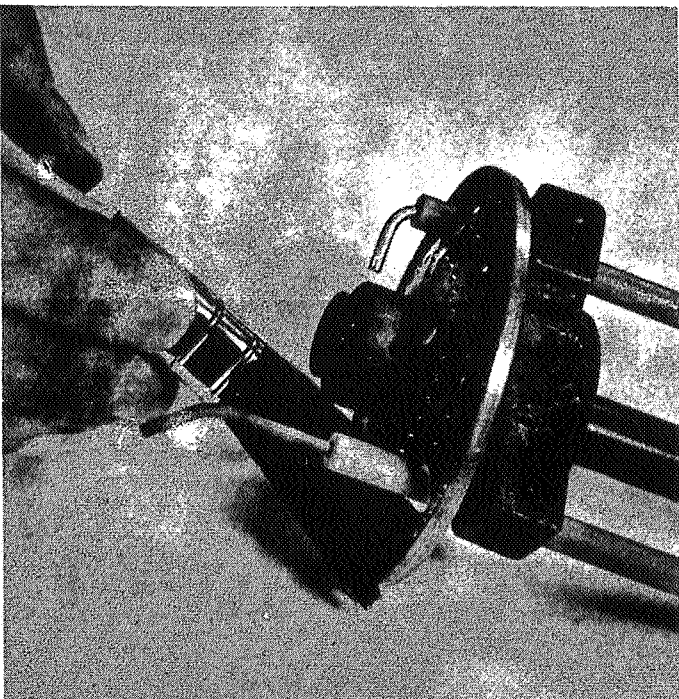
Unplug electrode lead. Disconnect probe lead — one nut. Unscrew the two Phillips head screws which retain the end of the inner assembly. Withdraw inner assembly.



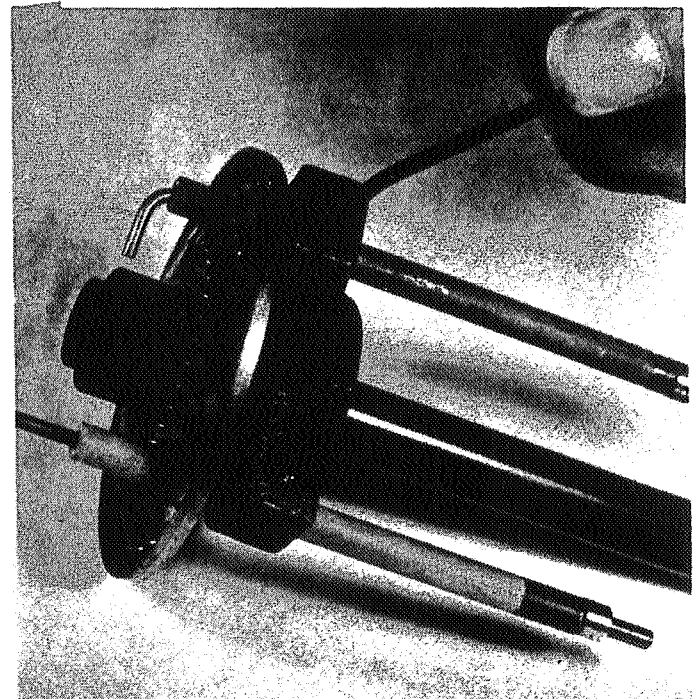
General view of burner showing single, socket head, grub screw which secures burner to mounting bracket: the latter is bolted to the boiler front-plate. The sequence control box, to the left of burner, is secured by a single screw situated to the left of the reset button.



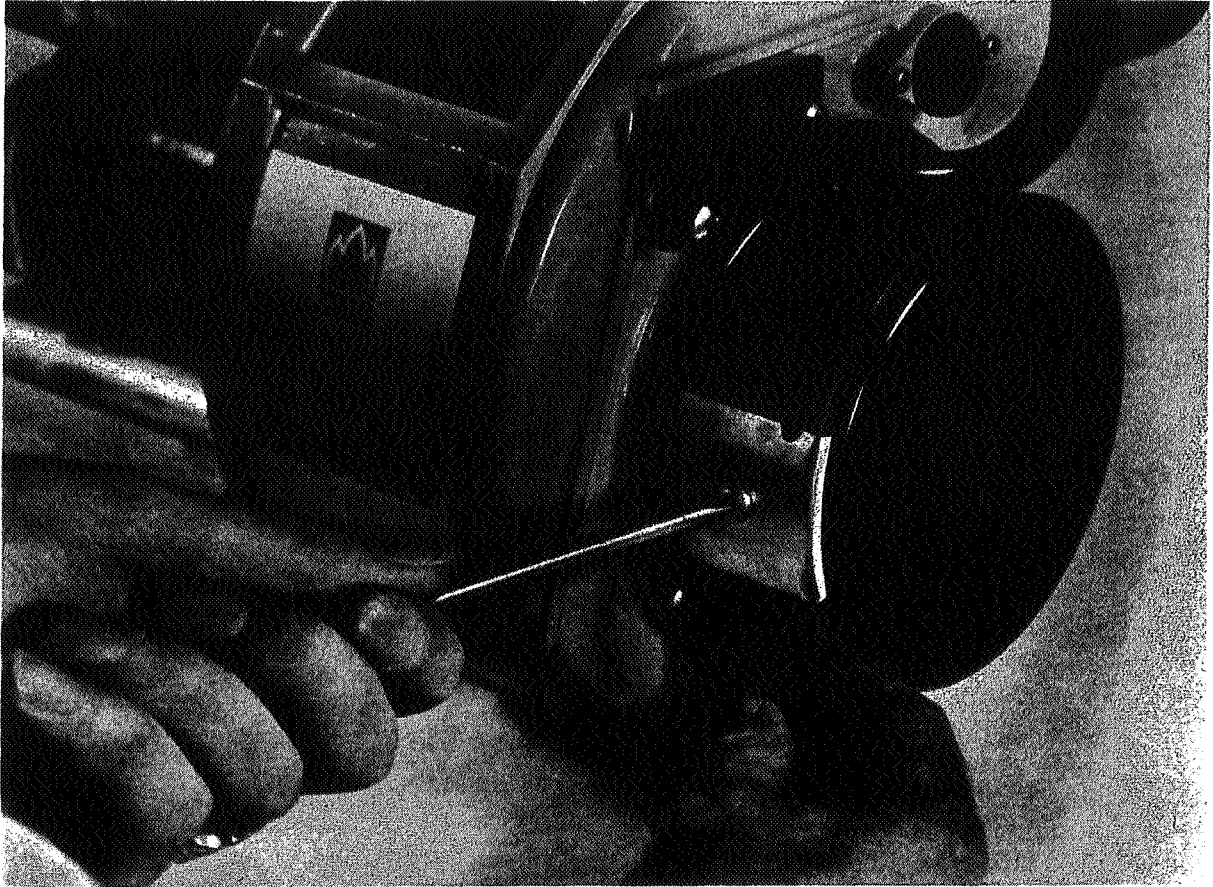
Remove lid — unscrew single Phillips screw under name plate. Clean fan runner using stiff brush, avoiding any damage to fan blades. Check that the air inlet into the fan is clean.



Clean the air diffuser, probe and electrode using a stiff brush. Take care not to block the small gas ports in the nozzle.



Adjust electrode gap, if necessary, using a hexagon socket key. (5mm)



Check gas pressure at the Black 33 unit. (See page 2). Adjust air strap, if fitted, to give sufficient air for combustion, using a flue gas sampling kit to detect the fuel/air ratio. The burner is now ready for firing.