

Quorum Technologies

INSTRUCTION MANUAL  
FOR  
CA508E CARBON EVAPORATOR  
POWER SUPPLY

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## 1. GENERAL DESCRIPTION OF SYSTEM

The CA508E carbon power supply is an accessory to the Polaron Sputter Coaters SC500/500A and SC650, and enables the evaporation of primarily carbon films. It is also capable of evaporating other materials such as certain metals not amenable to sputtering. The evaporation process is carried out, at pressures obtainable using a rotary pump, in the vacuum chamber of your sputter coater.

As the coatings are laid down at such relatively high pressures (0.05torr), the mean free path of atoms evaporating from the source (5mm) is quite short and therefore the coatings will be applied with some omnidirectionality - a bonus for irregular SEM specimens.

In addition to carbon coatings specimens for SEM and X-ray microanalysis you may use your CA508E attachment for other EM preparation techniques.

## 2. PACKING SCHEDULE

2.1 Unpack the carton.

2.2 Check that you have received the following items:

(a) CA508E Carbon power supply with work chamber top plates incorporating electrodes as per your order.

(b) Carbon cord (1 metre; Cat No. A0816) and/or shpaerd carbon rods (10 pack; A0834)

(c) Spare fuse (5A Ceramic 1.25" mains fuse)

(d) Accessory interlock cable or plug(17)

2.3 Remove any extraneous packing materials.

2.4 Familiarise yourself with the layout and nomenclature of the system by reference to figures 1,2,3 and 4.

### 3. DESCRIPTION OF CONTROLS ON CA508E AND FUNCTIONS

Vacuum control and monitoring is provided by sputter coater.

Refer to Figure 1.

NO.	TITLE	FUNCTION
2	Head interlock	Indicates mode of coating being employed.  WARNING: If both LED's on, turn on Sputter coater mains.
3	Mains	ON/OFF Mains switch/indicator
4	Deposition	Controls current level passing between terminals: can only be activated when outgas switch is on.
5	Outgas	On/Off switch enables outgassing of the source using the deposition control.  Current can't be applied without the outgas switch on.  LED indicates status of switch.
6	Ammeter	Indicates current passing between terminals .

7 Coat By keeping this switch depressed the full output of the power supply is applied to the carbon. This switch is ineffective unless outgas LED is on.

CONNECTIONS TO CA508 (refer to Figure 2)

8 Mains Mains lead to CA508E. Fit a 5A fuse in your mains plug.

9 Fuse Fuseholder of equipment protection fuse (5A 1.25" Ceramic fuse)

10 Carbon Head LT leads to terminals on Carbon top plate.

11 Accessory interlock Interlocks safety features of CA508E and sputter coater in order to prevent accidental misuse-via lead 17.

CARBON FIBRE TOP PLATE (Refer to 5.2)

12 Shutter control Moves shutter about its arc.

13 Shutter Used to protect specimen from radiant heat damage during outgassing of source.

14 Terminals To clamp source, e.g. carbon

fibre, wire basket or boat.

CARBON ROD TOP PLATE (Refer to 5.1)

- 12a Shutter control Moves shutter about its arc.
- 13a Shutter Used to protect specimen from radiant heat damage during outgassing of source.
- 14 Terminals See section 5.1 for +loading shaped carbon rods.
- 15 Interlock socket The CA508E will not operate unless the interlock lead (16) is connected between the DIN accessory sockets on the rear panels of the Sputter Coater and CA508E. The DIN plug normally connected to the Sputter head(SC500/500A and SC650/650A)is re-connected to the relevant carbon top plate.
- 16 Interlock lead Connects the interlock socket in the carbon top plate to safety circuits, preventing LT being applied to electrodes unless chamber under vacuum.

#### 4. INSTALLATION

- 4.1 Fit the power lead (8) with a suitable plug (fused at 5A).
- 4.2 Site the CA508E power supply alongside the sputter coater.
- 4.3 Lift the Sputter Head and fit carbon coating head onto the glass workchamber.
- 4.4 Invert the Carbon Head onto the post provided and load the carbon source as described in the relevant section i.e carbon fibre or carbon rod. (Refer to Section 5.1/5.2)
- 4.5 Place a glass slide on the specimen stage.
- 4.6 Replace the top plate assembly onto the workchamber.
- 4.7 Move shutter (13) so as to protect the stage from radiant heat during the test procedure.
- 4.8 Switch on mains power to the sputter coater and carbon power supply.
- 4.9 Depress PUMP HOLD on coater to allow vacuum to improve to ultimate.
- 4.10 Depress START on coater and hold for 10 seconds for gas burst (Argon or dry nitrogen gas should be connected to the coater).
- 4.11 When the system has been evacuated to 0.05 torr or better turn on OUTGAS switch (5) and adjust DEPOSITION (4) control to give a reading of 10-12A on the meter (6). The carbon cord or rod tip becomes red hot and outgasses. Observe the vacuum

level fall to about 0.1 torr and then start to recover. Turn DEPOSITION control to zero. NOTE that if as the result of outgassing the carbon source the vacuum level falls excessively the Pirani vacuum trip (higher than 0.5 torr) will turn off the CA508E power supply until the vacuum level recovers above the trip level.

4.12 When the vacuum level recovers to 0.05 torr or better, begin evaporation of carbon.

4.13 Move shutter (13) aside using Shutter Control (12).

4.14 Avert eyes from chamber and then depress COAT (7). The carbon cord or carbon rod tip will glow white hot for an instant and then blow (like a fuse). A current reading (6) in excess of 30A will should be achieved during the carbon deposition (approx 20nm). Excessive further outgassing of the carbon source at this stage will cause the Pirani trip to operate (see 4.11)

4.15 Release COAT and switch of OUTGAS.

4.16 Depress STOP on both sputter coater and carbon power supply and hold in until chamber is vented.

4.17 Turn off mains to both sputter coater and carbon coater. Close shutter to protect specimen on sample from fragments of cord which may fall.

4.18 Remove top plate assembly from chamber.

NOTE: THE TERMINALS WILL BE HOT FOR A FEW MINUTES.

4.19 Remove glass slide and inspect uniformity of carbon film

which is typically transparent and grey in colour.

4.20 Clean terminals and lid with a toothbrush if necessary.

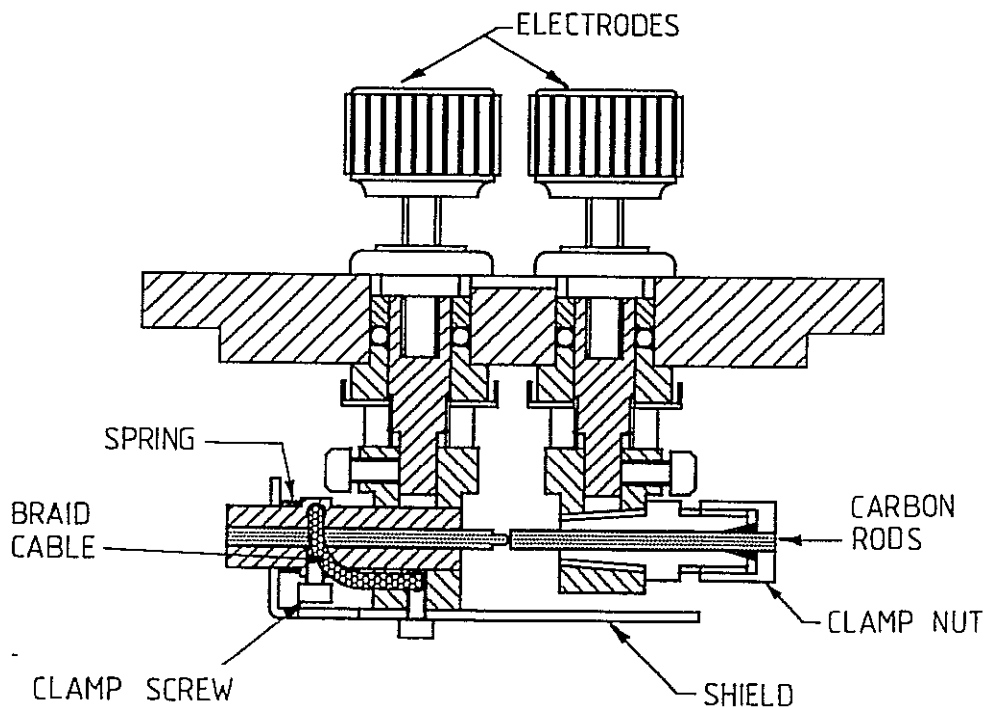
4.21 Discard fragments of carbon cord/fibre which remain and reload with carbon fibre for next run or replace carbon rods.

## 5. CARBON EVAPORATION

NOTE: FOLLOWING AN EVAPORATION THE CARBON SOURCE WILL BE EXTREMELY HOT SO TAKE PRECAUTIONS WHEN RELOADING THE HEAD WITH FRESH CARBON RODS.

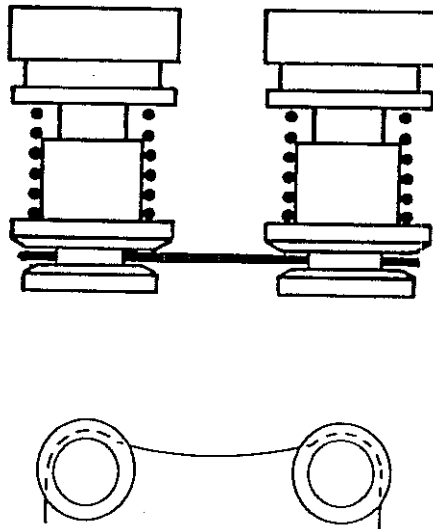
### 5.1 LOADING CARBON RODS

The carbon rods should be loaded into the source as in the diagram below. It is essential that when the rods are clamped in position the spring is under maximum tension.



## 5.2 LOADING CARBON FIBRE

Invert the Carbon fibre head and wind (approx. 100mm) of carbon fibre between the fixed and movable washers such that the fibre string pass around the posts (See diagram below). The sliding washer is sprung loaded such that the fibre is clamped but not damaged by severe compression. Do not pull tight as this will cause an early break of carbon resulting in poor coating (too thin)



Follow the instructions as in Section 4 , replacing the glass slide with the prepared specimen stubs in 4.5.

## 6. REVERTING TO SPUTTER COATING

- 6.1 Turn off sputter coater and CA508E mains.
- 6.2 Unplug head interlock lead and remove Carbon top plate assembly . Remove Carbon top plate assembly from chamber.
- 6.3 Coater can now be used for Sputtering.

## 7. EVAPORATION OF OTHER METALS

Your CA508E may be used to deposit materials which do not sputter effectively. This can be achieved by loading small amounts of the source into tungsten (or molybdenum) wire baskets. The wire basket can be fitted between the terminals replacing the carbon fibre.

NOTE: Very fine gauge wire baskets will themselves evaporate if the COAT switch is used. With heavier gauge baskets or filaments the COAT switch can be used.

## 8. USING METAL BOATS

You may use the system for cleaning apertures by resistive heating.

To accomplish this, (e.g. platinum apertures), fit a piece of platinum foil trimmed to make a boat type carrier, between the terminals of the fibre head. Take great care not to overheat the boat or evaporation will occur and the apertures will be lost. DO NOT USE THE COAT SWITCH for this procedure. Do not attempt to clean thin film apertures by this procedure.

## 9. FAULT GUIDE

9.1 Head Interlock LED,s - neither lit

CURE: Accessory interlock lead not connected

9.2 Fails to evaporate

CURE: No carbon fitted between terminals or contact on carbon cord on fibre head.

-OR- Check spring action on carbon rod head.

Chamber not under vacuum ? Mains fuse blown?

Carbon head not interlocked therefore carbon light not on?

9.3 LED's on but fails to evaporate

CURE: Check carbon cord fitted correctly on fibre head.

Check spring action on carbon rod head.

In case of difficulty, first re-read instructions, if system still fails contact Fisons service engineer .

FIG 1 FRONT PANEL

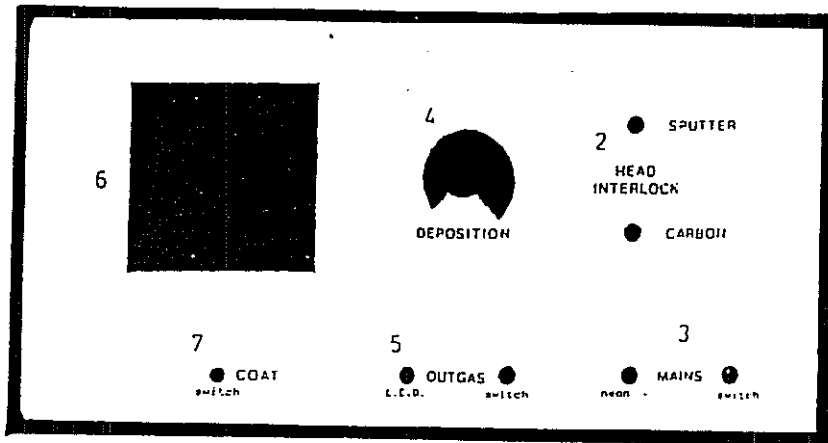


FIG 2 REAR PANEL

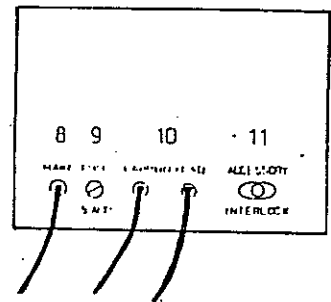


FIG 3

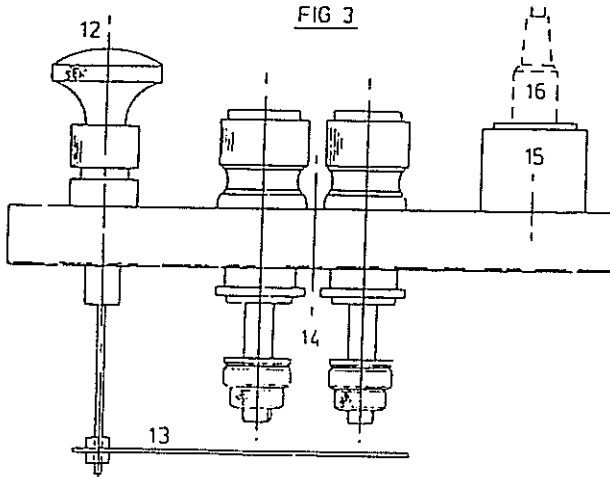
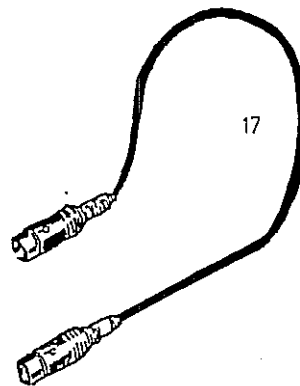


FIG 4 ACCESSORY INTERLOCK LEAD



CARBON SOURCE A0816 CORD



10. FIGURES 1-4

