

JSM 840A

Operator's Guide



1 Introduction

This is a reminder of the instructions for using the 840A and is not a definitive guide; it is intended to supplement any training received.

2 Getting started

Check that the vacuum is ok (i.e. the light behind the emission current meter is lit).

Check and sign in the log book before you begin.

3 Sample insertion

Always think about where your specimen is relative to the detectors and the pole piece.

Check that the EBSD detector has been withdrawn.

The EDX detector is left wound in and is level with the bottom of the pole piece.

- Check that the stage controls are all at the exchange position (noted on stage controls).
X=25.0, Y=35.0, fineZ=2 or 3, Tilt=000, Rotation=000 and WD=39.

The normal Z exchange position is Z=39.

There is another holder for larger specimens but be sure to seek advice when inserting large specimens, as the exchange conditions are different and it is possible to do a great deal of damage!

Wear gloves whilst handling anything that will go into the microscope vacuum.

- Screw the specimen rod into the lower hole of the specimen holder.
- Insert the specimen into the airlock and whilst holding the window against the o-ring seal press the red button to evacuate.
When the red light on the button goes out it is safe to open the airlock door.
- Rotate the airlock door knob 90 degrees anti clockwise, pull out until it engages. Gently push the specimen change rod into the microscope and check that the dovetail of the specimen holder has engaged onto the stage.
Look inside the microscope to see what is happening – it is possible to lose the specimen holder in the chamber. The microscope then has to be vented in order to retrieve the specimen!
- Unscrew the rod from the specimen holder and pull the rod until the clip at the end locks it in place.

- Rotate the airlock door knob 90 degrees counter clockwise, push in and turn 90 degrees clockwise back to the original position to close the airlock door.
- Press the red button to allow air into the airlock and place the rod back on the holder.

4 Obtaining an image

- Before proceeding check the vacuum is ready (the light behind the emission current reading is on).
- Turn up the CRT brightness and contrast controls to the left of the screen.
- Check
 - the probe current (10^{-9}A will give a moderately large spot size), but a smaller value will be required for higher resolution.
 - that a suitable final lens aperture is in place. Aperture 3 is almost always used – this gives a good x-ray signal.
 - that a low magnification is selected
 - the scanning mode is set at normal (to the left of the screen).
 - the focus control is such that the working distance of the objective lens matches the specimen height.
 - that the tilt correction and scan rotation are off.
- Choose a suitable operating voltage for the work you are undertaking. Switch the high voltage on.
- Turn the filament up **SLOWLY**. The filament emission current should read 40 – 60 μA at saturation. DO NOT turn the knob beyond the stop.

If no image appears check that the PCD is out and that the switch on the TSL box is in the INCA position.

Turn up the brightness and contrast controls to the left of the screen.

5 Adjusting the working distance

The working distance can be adjusted for the optimum imaging. There is a fine Z control on the stage under the stage Y control.

BEWARE if your specimen protrudes above the top of the specimen holder – the working distance indicated will not correspond to the position of your sample within the microscope and if you raise the stage too far you can do a great deal of damage by hitting the pole piece.

Remember when tilting it is also possible to hit the lens – check the tilting chart on the microscope to see if you are within the limits for the diameter of specimen and the working distance you wish to use.

The optimum working distance for EDX is 20mm.

6 Alignment

Gun alignment (Not usually required on this microscope)

Use the gun tilt controls to maximise the signal watching the brightness lights in the centre of the main console. Do not change the guns shift controls.

Aperture alignment

Switch on aperture alignment wobbler and use the aperture centring controls to adjust for minimum image shift, increasing the magnification as necessary.

Astigmatism correction

Use a fairly high magnification. Find the optimum focus position (when image is blurred but not streaked). Use the stigmators to sharpen the image. Repeat at higher magnification as required.

7 Image capture

Images are captured from the microscope using Oxford Instruments INCA system.

The microscope conditions such as magnification and voltage must be manually entered.

8 Shutting down the instrument

Turn down the filament **slowly**.

Turn off the HT.

If the **EBS**D detector has been used **withdraw it BEFORE moving the stage**.

Return the stage controls to the exchange position.

Remove the specimen.

- Insert the specimen rod into the airlock and whilst holding the disc against the o-ring seal press the red button to evacuate. When the light on the button goes out it is safe to open the airlock door. Rotate the knob 90 degrees anti clockwise, pull out as far as it will go and rotate 90 degrees clockwise back
Screw the rod into the specimen holder until it stops.
Look inside the microscope to see what is happening
Gently pull the rod and specimen out until the clip at the end locks it in place.
Rotate the knob 90 degrees counter clockwise, push in and turn 90 degrees clockwise back to the original position to close the airlock door.
Press the red button to allow air to enter the airlock.

The microscope should be left in the following standard conditions:

Turn down the brightness and contrast of the viewing screen to minimum.

Magnification 5000x

Beam current 1×10^{-9} or 3×10^{-9} A

Aperture 3

HV OFF - but set to 20kV

Before leaving the microscope check that the vacuum recovers and that you have made an entry in the log book.

If you have problems

If you have any problems please seek advice from Gabriella Chapman, Chris Salter, Fay Chicken or a member of the TSG.

If you have a problem and cannot contact a member of staff please leave a note in the log book and send an e-mail to em-faults@maillist.ox.ac.uk with details.