### **SEM Operation:**

1. Use Carbon tape or copper tap or carbon suspension located sample on specimen holder. There are two types of **specimen holder** can choose.

### 12.5mm Holder, 32mm Holder



#### Standard specimen holders for JSM-7000F



cylinder, and attach the specimen with the screws.

of the cylinder, it will cause the specimen or the instrument to be damaged. Align the surface of the specimen with the upper surface of the cylinder, referring to the good examples.



- 2. Push **VENT** button (for ~2sec., **VENT** button start to blink) venting the **specimen exchange chamber**.
- 3. **VENT** button lit on (venting complete)
- 4. Release Looking hook, open lid of specimen exchange chamber.
- 5. Put in the specimen holder on the specimen holder chuck device.

(Make sure the specimen holder on the correct direction, arrow mark on specimen holder should be parallel to the long direction of specimen holder chuck device.)



Specimen-exchange rod

6. Close the lid of specimen exchange chamber, locking on Looking hook.

(EXCH POSN indication lamp should be lit on)

- 7. Push **EVAC** button (for ~2sec., **EVAC** button start to blink), evacuation of the **specimen exchange chamber** to bring it to high vacuum.
- 8. **EVAC** button lit on (evacuation complete).
- 9. Use **Specimen exchange rod** push the **specimen holder** into the **Specimen chamber** (**HLDR** indication lamp should be lit on), move out the **Specimen exchange rod**.

(CAUTION: Specimen exchange rod is easily to damage, use it carefully)

- 10. **HLDR** indication lamp lit on means that **specimen holder** is on the position to do image observation.
- 11. On PC, operate JEOL PC-SEM 7000 program.

Tool Bar ---> product ---> open Penning Gauge window ---> 2.8X10<sup>-4</sup>Pa (need 5~10min). ---> close Penning Gauge window ---> start to do image observation

- 12. On the basic screen use Accelerating Voltage button select a suitable AV (usually 5-20kV).
- 13. Tool Bar ---> in Instrument Control window ---> choose a suitable Probe Current (usually 7-10)---> turn ON SEI Detector

Accelerating Voltage	SEI Detector	Column Mode         Focus           SEM         ECP         4         6         10         15         25         40           ALP         Image: Column Addition of the second	Scan Rotation           OFF         -45         -15         -1         0         +1         +15         +45
OL Aperture	Mode -1 0 1 2 3	Probe Current Small Medium Large	DFC OFF 0 Close

Use Vacuum Control panel open Gun Valve, use Gun Valve Close button to control Gun Valve.

Gun Valve Close lit on ---> means Gun Valve is closed

**Gun Valve Close** dim ---> means Gun Valve is opened



Fig. 3.5 VACUUM CONTROL panel

15. Use **Operation Panel** to get the image.



Fig. 3.7 OPERATION panel

- a. In low magnification find out the place you want to see.
- b. Use **Brightness/Contrast** knob to control image's brightness and contrast.
- c. Use **Focus** knob to control the focus.
- d. Use **Magnification** knob to zoom in the image and check the brightness/contrast and focus. Keep going this processes until you get the image you want.
- e. If the image have signification you need to use **Alignment X**, **Y** knob to align the astigmatism corrector X or Y.
- f. If the image still not in good condition push down ALIGN button will open the Alignment window. Then push the HT WOBB button, use Alignment X, Y knob to control the image, let it to move on original position, do not move away.

(This process will help you to correct the Beam Align)



**Gun alignment**: clicking the **Gun Alignment** button enables you to align the electron gun by using the **Alignment X** and **Y** knobs.

**Beam alignment**: clicking the **Beam Align** button enables you to align the objective lens by using the **Alignment X** and **Y** knobs.

**Stig Center X** or **Y**: clicking the **Stig Center X** or **Y** button enables you to align the astigmatism corrector X or Y by using the **Alignment X** and **Y** knobs.

**OL Stigmator**: clicking the **OL Stigmator** button enables you to correct the object lens astigmatism by using the **Alignment X** and **Y** knobs.

**CL Stigmator**: clicking the **CL Stigmator** button enables you to correct the condenser lens astigmatism by using the **Alignment X** and **Y** knobs.

Align Clear: resects the clicked alignment items. (X=0, Y=0)

Align Reset: resects the all alignment items. (X=0, Y=0)

Lens Clear: removes the hysteresis of the lenses.

After you get your image:

16. Tool Bar ---> open Image File Handling window ---> save the files.

Load/Save/Print Image Current I	Directory: C:\NCU\Caro Huang\有子	[蟲]
Directory Print Export Save and	Export Load Save Delete	4-4.bmp
File	Image Information	Preview
File Filter	Mag X50,000 WD 10.4mm	100 100 100 100 100 100 100 100 100 100
,	Vacc 10.00kV Signal SEI	
File Date Type 🔨	Column SEM SE Detector 3	and the second
4-2 2007/10/24 Bit		
4-2_e 2007/10/24 Bit	Instrument JSM-7000F Image ID 71800712	
4-3 e 2007/10/24 Bit	Disto 2007/10/24 Time F4 18:08:18	X - The All All All
4-3 t30 2007/10/24 Bit		
4-3_t30_e 2007/10/24 Bit		and the set for a
4-4 2007/10/24 Bit 🥃	Company NCU-ES	and the second second
A A ∩ 2007/10/24 B#	Comment	a start with the sea
File Type Bitmap   Refresh		MER IS STREET
Dialog Close After Saving/Loading Image	Close	J



**Specimen position indicator** 

**Observation condition indicator** 

### Title bar:

EOS 7000F -> Caro Logged in. Using Recipe: GENERAL

EOS 7000F: machine name

Caro: user's name

Using Recipe: which kind of recipe you choose

#### Menu bar:

Eile Edit Control Image Tools Stage Setup Maintenance Help

The name of various menus for condition setting are shown on the menu bar.

### **Tool bar:**

11.00 kV EMI 45 µA 👪 🗢 🔤 🗰 🖷	• 🚣 🖉 💌 🗶 💥 🎇 💷		3
------------------------------	-----------------	--	---

Buttons are shown for various operations and settings.

Buttons for electron-gun system



The accelerating voltage is on and observation is ready.



The accelerating voltage is on and observation is underway.



Display of the accelerating voltage

EMI FI

Display of selection between the emission current and filament current

45 μΑ 🛛 👪

45 μA 2.3 A Display of the emission current or filament current



The Instrument Maintenance button

	Maintenance			
	Gun/PMT/Vac Instrument Conditions Fine Tuning			
	State			
	Fil. Current	Start up		
	2.29 A	Shut down		
	Ext. Voltage			
	2.30 KV			
	Emission Current			
	PMT PMT Link ON	OFF		
	Vacuum System			
		Water		
	SIMI <b>SULLOUD</b> Pa	Gas		
	SIP-2 2.7E-007 Pa			
		SIP		
	Vacuum Code: 51FEC000	Computer		
		HV Ready		
	Close			
Buttons for display system		۰ 🎽		



The Normal Display button



The Vertical Dual Image Mode button



The Horizontal Dual Image Mode button



The Quad Image Mode button



The Spot Mode button



The Reduced Scan Mode button



The Scan Rotation On/Off button



The Image Shift button

Buttons for image-processing system



The Format Printout Page button



The Image File Handling button



The Image Contrast/Brightness/Gamma button



The Annotate/Measurement button



The Measure button

The Diagonal Measure button

The Measure X button

The Measure Y button

The Line Measure button

Buttons for setup system





The Setup Instrument Operation button



The Edit or Create Recipe button



The Instrument Control button

Accelerating Voltage	SEI Detector	Column Mode Focus	Scan Rotation
1.00 • kV	OFF ON	SEM         ECP         4         6         10         15         25         40           ALP	OFF -45 -15 -1 0 +1 +15 +45
OL Aperture	Mode _1_0	Probe Current	DFC OFF
1 2 3 4	1 2 3	Medium   Large	Close

Buttons for stage system



# The Stage Specimen Holder Exchange button





# The Stage Map and Control button



Buttons for attachments



# The **RBEI** button

![](_page_9_Picture_8.jpeg)

The **AEM** button

![](_page_9_Picture_10.jpeg)

![](_page_9_Picture_11.jpeg)

Penning Gauge			
9.63E-005 Pa			
Close			

![](_page_10_Picture_2.jpeg)

### **Specimen position:**

![](_page_10_Picture_4.jpeg)

Original position: (35, 25, 0)

In orange color: does not move with the joystick

#### **Observation condition indicator:**

![](_page_10_Figure_8.jpeg)

顯示(D)

取消

The **Scale** bar:

The magnification scale is indicated with a bar.

NCU-ES:

It can key in up to 6 alphanumeric characters from the keyboard.

### The **Image Selector** button:

	ADD AUX2 AUX1 MTOPO MCOMP MSEI TOPO COMPO			
	SEL			1mm
NCU-ES		1.00 kV	X25	WD 10mm

## The Accelerating Voltage button:

		20.00		
		15.00		
		10.00		
		5.00		
		1.00		1mm
NCU-ES	SEI		X25	WD 10mm

### The **Magnification** button:

			50000	
			15000	
			5000	
			1000	
			500	<u>1mm</u>
NCU-ES	SEI	1.00 kV		WD 10mm

## The **Working Distance** button:

![](_page_11_Figure_9.jpeg)