

**JXA-8100/JXA-8200**

**ELECTRON PROBE  
MICROANALYZER/  
WD/ED COMBINED  
MICROANALYZER**

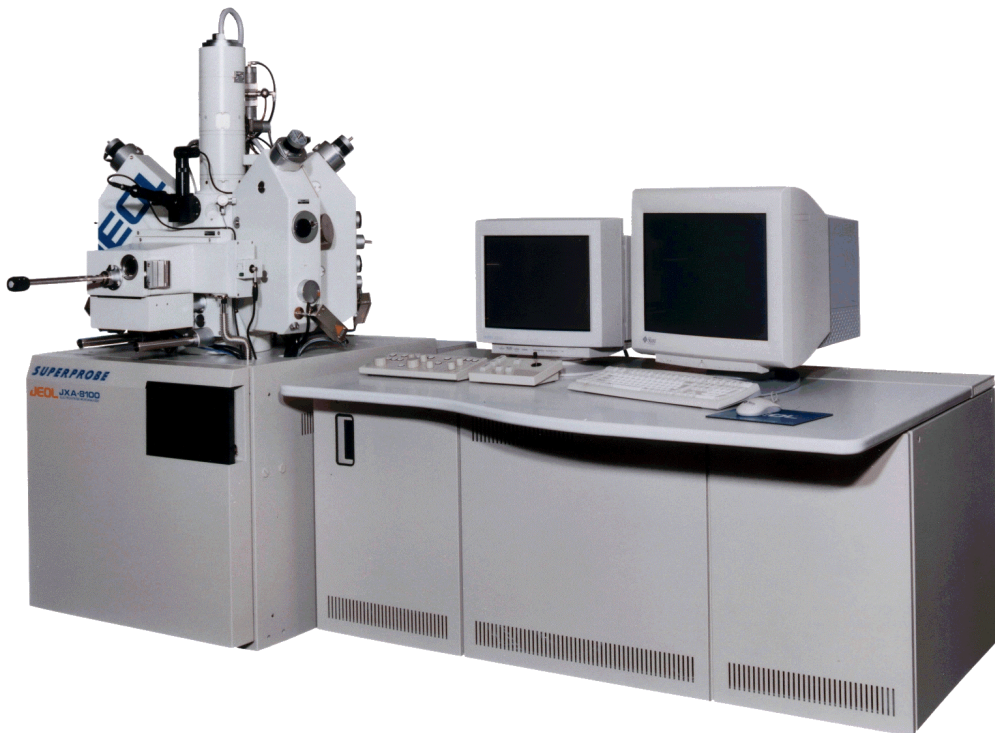
**CONTROL AND DISPLAY  
SYSTEM**

For the proper use of the instrument, be sure to read this instruction manual. Even after you read it, please keep the manual on hand so that you can consult it whenever necessary.

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MICROANALYZER/  
WD/ED COMBINED  
MICROANALYZER

CONTROL AND DISPLAY  
SYSTEM



JXA-8100

## NOTICE

- This instrument generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to the environment, especially radio communications.
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Kindly note that while the instrument can be used in combination with various attachments to serve a number of purposes, this special feature of the instrument is only briefly described in this manual, which chiefly provides information on basic operations.
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# NOTATIONAL CONVENTIONS AND GLOSSARY

## ■ General notations

-  **WARNING** : A potentially hazardous situation which, if not avoided, could result in death or serious injury.
-  **CAUTION** : A potentially hazardous situation which, if not avoided, could result in minor injury or material damage. Material damage includes, but is not limited to, damage to related devices and facilities, and acquired data.
- CAUTION –** : Points where great care and attention is required when operating the device to avoid damage to the device itself.
-  : Additional points to be remembered regarding the operation.
-  : A reference to another section, chapter or manual.
- 1, 2, 3** : Numbers indicate a series of operations that achieve a task.
-  : A diamond indicates a single operation that achieves a task.
- File:** The names of menus, or commands displayed on the screen, and those of buttons of the instrument, are denoted with **bold** letters.
- File–Exit** : A command to be executed from a pulldown menu is denoted by linking the menu name and the command name with a dash (–). For example, **File–Exit** means to execute the **Exit** command by selecting it from the **File** menu.

## ■ Mouse operation

- Mouse pointer:** An arrow-shaped mark displayed on the screen, which moves with the movement of the mouse. It is used to specify a menu item, command, parameter value, and other items. Its shape changes according to the situation.
- Click:** To press and release the left mouse button.
- Right-click:** To press and release the right mouse button.
- Double-click:** To press and release the left mouse button twice quickly.
- Drag:** To hold down the left mouse button while moving the mouse.

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# 1 BASIC SCREEN

The basic screen of this system is shown below.



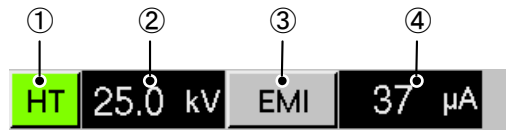
At the top of the basic screen is the menu bar, used for setting various conditions, and at the bottom are the observation conditions.

The menu bar is broadly divided into the following three control groups.

- Electron gun control:** Displays and sets items related to electron gun control.
- Menu buttons:** Enable you to set items related to the electron optical system, observation conditions, images and maintenance.
- Icons:** Enable you to control and operate the instrument by clicking on these icons.

The observation-condition display shows the photo label (the default is JEOL), image selection, accelerating voltage, magnification, micron bar, and working distance (WD). You can also set numerical values for certain items.

## 2 ELECTRON GUN CONTROL



- ① **HT button**  
Accelerating voltage on/off button.  
To switch it on or off, click on the **HT** button. This button indicates the state of application of the accelerating voltage by the background color.  
**Black background:** The accelerating voltage is off, but cannot be switched on.  
**Blue background:** The accelerating voltage is off, and can be switched on.  
**Green background:** The accelerating voltage is on.
- ② **Accelerating voltage display and control**  
Use this button to display and set the accelerating voltage. When you click on the button, a pull-down menu that has five preset accelerating voltages appears, enabling you to select the desired accelerating voltage.
- ③ **EMI/FIL button**  
Button that switches the display ④ between the emission current and filament current.  
**EMI** corresponds to the emission current, and **FIL** to the filament current.
- ④ **Emission current or filament current display**  
This button displays the current of the item selected in ③.

### 3 COLUMN MENU

You can set the column conditions, align the electron optical system, and carry out similar operations using the Column menu.



- ◆ Click on **Column**.  
The following pull-down menu appears.

Control	← EOS (electron optical system) condition setting
Cont. / Bright.	← Live image brightness adjustment
Alignment	← Alignment of the EOS
Image Shift	← Image shift operation
ESR	← Optional specimen rotation operation
EST	← Optional specimen tilt operation
MDA	← Probe current/absorbed current display

#### 3.1 Control

You can set the conditions of the electron optical system (EOS).

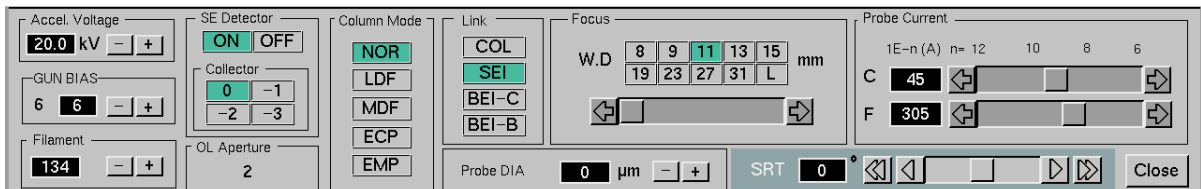
- ◆ Select **Column–Control**.

The Control window below appears under the menu bar.

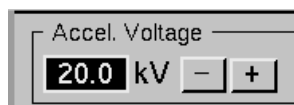
✎ Clicking on the Control Window icon  also opens the Control window.

You can set the accelerating voltage, focusing conditions, probe current, and other parameters.

✎ When the instrument is activated, all the conditions are set for secondary-electron image observation.

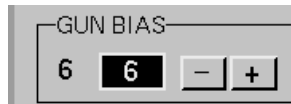


**Accel. Voltage:** Sets the accelerating voltage.



When you want to enter a value using the keyboard, highlight the input box by clicking on it, and then type the desired value. To increase or decrease the accelerating voltage using the mouse, click on the + button to increase the value by one step, or click on the - button to decrease the value by one step. One step is 0.1 kV.

**GUN BIAS:** Sets the electron gun bias (gun bias number of each accelerating voltage for bias-voltage setting).



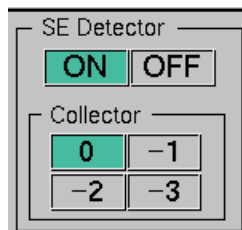
When you want to enter a value using the keyboard, highlight the input box by clicking on it, and then type the desired value. To increase or decrease the value of the electron gun bias voltage using the mouse, click on the + button to increase the value by one, or click on the - button to decrease the value by one. The higher the number, the greater the bias resistance (the greater the bias), and so the emission current decreases. The bias setting is recorded for each accelerating voltage. When you change the accelerating voltage, the previously set conditions are applied to the new accelerating voltage. The number at the left of the input box is the standard setting and is only for display; in normal use, set the bias to this number.

**Filament:** Sets the filament heating code number that determines the filament current.



When you want to enter a value using the keyboard, highlight the input box by clicking, and then type the desired value. To increase or decrease the value using the mouse, click on the + button to increase the value by one, or click on the - button to decrease the value by one.

**SE Detector:** Sets the secondary-electron detector.



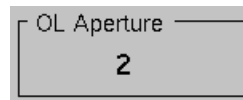
**ON:** Turns the high voltage of the scintillator and photomultiplier of the secondary-electron detector on; then observation of the secondary-electron image becomes possible.

**OFF:** Turns the secondary-electron detector off. When you increase the probe current for reasons such as X-ray analysis, you turn the secondary-electron detector off to protect it. Furthermore, when you have turned the accelerating voltage off, have set the electron beam to spot in the analysis mode, and have turned probe scan off, the detector will turn off automatically.

**Collector:** Displays and sets the collector voltage of the secondary-electron detector. If you have selected **COL** in the **Link** section, the collector voltage will change automatically when you change the probe current. If you have not selected **COL**, set the collector voltage as follows:

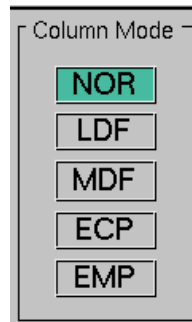
Collector voltage	Probe current
<b>0</b>	$10^{-8}$ A or less
<b>-1</b>	$10^{-8}$ to $10^{-7}$ A
<b>-2</b>	$10^{-7}$ to $10^{-6}$ A
<b>-3</b>	$10^{-6}$ A or more

**OL Aperture:** Displays the recommended OL aperture number.

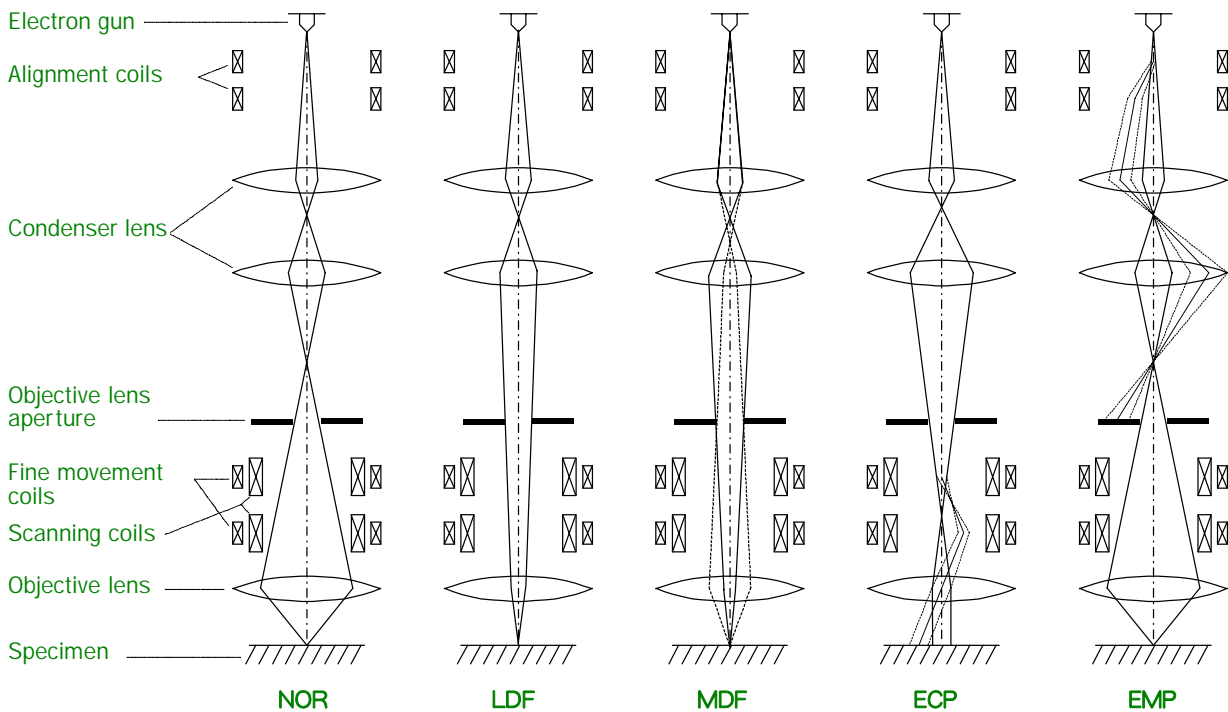


The number of the optimum OL aperture is displayed under the current EOS conditions. Set the selection knob of the OL aperture selector to this number in normal use. However, when you set the probe diameter to a value other than  $0\ \mu\text{m}$ , set the selection knob to 1. When the resolution and image quality are not good because of the kind of specimen, tilt and other conditions, or when **Column Mode** is **LDF**, **MDF**, or **ECP**, select any convenient aperture number.

**Column Mode:** Selects the column mode.



- NOR:** Normal mode. Use this mode when you want to observe a normal image.
- LDF:** Deep focus mode. Use this mode when you want to observe rough specimens.
- MDF:** Deepest focus mode. Use this mode when you want to observe specimens rougher than those for LDF mode.
- ECP:** Use this mode when you want to observe the electron channeling patterns.
- EMP:** Emission pattern mode. Use this mode when you want to align the EOS.



**Link:** Turns on and off linkage of each set item.



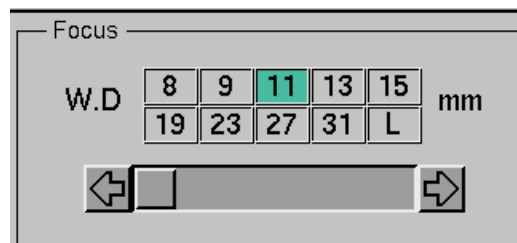
**COL:** Selects whether to link the collector voltage of the secondary-electron detector to the accelerating voltage and the probe current.

**SEI:** Selects whether to link the gain of the secondary-electron detector to the accelerating voltage and the probe current.

**BEI-C:** Selects whether to link the gain of the backscattered electron detector to the accelerating voltage and the probe current.

**BEI-B:** Selects whether to deduct the amount of light of the optical microscope lamp from the brightness of the backscattered electron detector. Before you use this, you have to measure the amount of light from the optical microscope lamp using the Contrast/Brightness window.

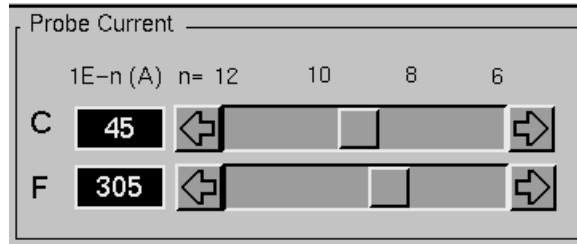
**Focus:** Adjusts the focus.



**W.D.:** Set the focus (by setting the excitation current of the objective lens) to the working distance (WD) at which you are observing. Since the analysis position is 11 mm, set it to 11 mm in normal use.

**Scroll bar:** Adjusts the focus, centered near the focal position that corresponds to the selected WD. To perform fine adjustment, use the Control Panel.

**Probe Current:** Sets the probe current.



**C (Coarse):** Sets the probe current (by setting the excitation current of the condenser lens). Set the probe current, referring to the approximate position of the scroll bar in the above figure. To set it precisely, use the optional probe current detector.

**F (Fine):** Performs fine adjustment of the probe current (by setting the excitation current of the condenser lens).

**Probe DIA:** Sets the probe diameter.



When you want to enter a value using the keyboard, highlight the input box by clicking on it, and then type the desired value. To set the probe diameter using the mouse, click on the + button to increase the value by one step, or click on the - button to decrease the value by one step.

The amount of change of one step is 1  $\mu\text{m}$  from 0 to 10  $\mu\text{m}$ , and 5  $\mu\text{m}$  from 10 to 300  $\mu\text{m}$ . You can set the probe diameter up to 300  $\mu\text{m}$ .

**SRT:** Sets the scan rotation (image rotation).



The value in the left input box is the rotation angle (in degrees). The three o'clock direction is 0 degrees, and the rotation is counterclockwise. When you set the value by using mouse, set it using the scroll bar. When you want to enter a value using the keyboard, highlight the input box by clicking on it, and then type the desired value. The minimum step is one degree.

The scroll bar has the following functions.

◀ ▶ : 45° rotation

◁ ▷ : 15° rotation

Spaces: 1° rotation

**Close:** Closes the Control window.

✂ Clicking on the Control Window Display icon  also closes this window.

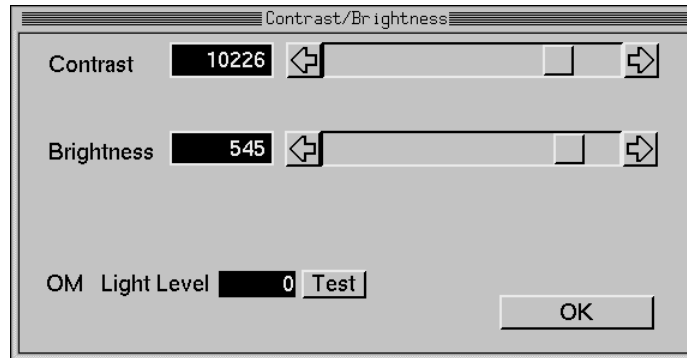
## 3.2 Cont./Bright.

The Contrast/Brightness window enables you to adjust the contrast and brightness of the observation image. It has the same effects as the **CONTRAST** and **BRIGHTNESS** knobs on the Control Panel.

 The **Image Cont./Bright.** on the **Image** menu has a function different from this.

◆ Select **Column-Cont./Bright.**

The Contrast/Brightness window appears.



**Contrast:** Adjusts the contrast of the observation image.



When you want to enter a value using the keyboard, highlight the input box by clicking on it, and then type the desired value.

Moving the scroll bar to the right increases the contrast, and moving it to the left decreases it.


**Brightness:** Adjusts the brightness of the observation image.



When you want to enter a value using the keyboard, highlight the input box by clicking on it, and then type the desired value.

Moving the scroll bar to the right increases the brightness, and moving it to the left decreases it.

**OM Light Level:** Measures the amount of light from the optical microscope lamp to allow you to deduct it from the brightness of the backscattered electron detector. To measure it, turn on the lamp of the optical microscope, keeping the optional PCD (probe current detector) in, then click on the **TEST** button. After you finish the measurement, if you select **Link-BEI-B** from the Control window, you can observe the backscattered electron image even while the optical microscope lamp is on.

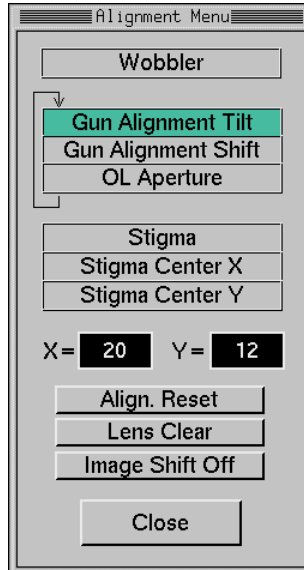
 If the optional Low Magnification Optical Microscope (OML) is installed in your instrument, the value for OML light level will also be displayed. You can measure the amount of light of the OML lamp in the same way as for the optical microscope lamp.

**OK:** Closes the Contrast/Brightness window, after recording the values on this window.

### 3.3 Alignment

Alignment Menu window allows you to align the axis of the electron optical system prior to observing images.

- ◆ Select **Column–Alignment**.  
The Alignment Menu window appears.




**Gun Alignment Tilt:** Clicking on this button enables you to align the electron beam, that is, to return a tilted beam to the optical axis, by using the **ALIGNMENT–X** and **Y** knobs on the Control Panel. When you align it, observe the emission pattern and adjust it so that it comes to the center of the screen.

**Gun Alignment Shift:** Clicking on this button enables you to align the electron beam, that is, to return a horizontally shifted beam to the optical axis, by using the **ALIGNMENT–X** and **Y** knobs on the Control Panel. When you align it, observe the secondary-electron image and adjust it so that it does not move when you change the probe current.

**OL Aperture:** Clicking on this button enables you to align the OL aperture electrically. Normally, you align the OL aperture mechanically by using the OL aperture device. However, the electrical alignment is useful as a supplementary alignment at low accelerating voltages. Adjust the image by using the **ALIGNMENT–X** and **Y** knobs on the Control Panel so that the image does not move when you press the **WOBB** button on the Operation Panel to change the focus.

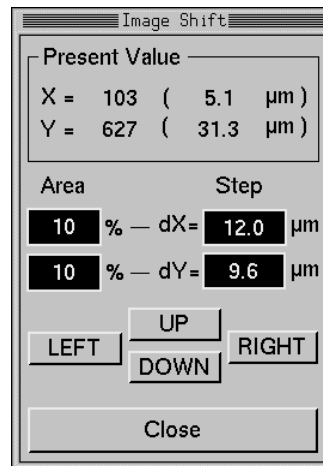
**Stigma:** Clicking on this button enables you to perform the astigmatism correction. Observe and adjust the electron image by using the **ALIGNMENT–X** and **Y** knobs on the Control Panel until you have eliminated astigmatism.

<b>Stigma Center X:</b>	Adjust the image by using the <b>ALIGNMENT-X</b> and <b>Y</b> knobs on the Control Panel so that the image does not move when you press the <b>WOBB</b> button on the Control Panel to change the astigmatism.
<b>Stigma Center Y:</b>	Adjust the image by using the <b>ALIGNMENT-X</b> and <b>Y</b> knobs on the Control Panel so that the image does not move when you press the <b>WOBB</b> button on the Control Panel to change the astigmatism.
<b>X=, Y=:</b>	The <b>X</b> and <b>Y</b> values of the alignment item that you have selected by clicking are displayed.
<b>Align. Reset:</b>	Resets the selected alignment items to <b>X=0, Y=0</b> .
<b>Lens Clear:</b>	Removes the hysteresis of the lenses.
<b>Image Shift Off:</b>	Sets the values of the image shift ( <b>X, Y</b> ) to <b>(0, 0)</b> .
<b>Close:</b>	Closes the Alignment Menu window.  Pressing the <b>Alignment-STIG</b> button on the Control Panel also closes the window.

### 3.4 Image Shift

You can set the image shift.

- ◆ Select **Column-Image Shift**.  
The Image Shift window appears.



**Present Value X, Y:**

Display the present amount of the Image Shift as code numbers and distances on the specimen.

**Area, Step:**

Set the amount of the Image Shift that you obtain when you press the UP, DOWN, LEFT, or RIGHT button.

For Area, input the values of sample movement to a percentage of the screen size at the current observation magnification.

For Step, input the values of distance on the specimen.

**UP, DOWN:**

Move the field of view by the preset amount upward and downward.

**LEFT, RIGHT:**

Move the field of view by the preset amount to the left and right.

**Close:**

Closes the Image Shift window.

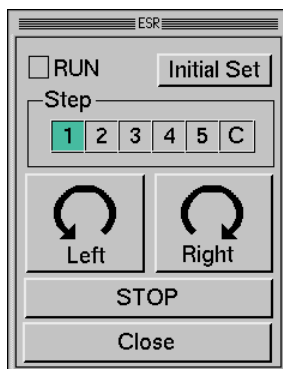
## 3.5 ESR

The ESR window allows you to control the rotation of the optional specimen rotation holder.

◆ Select **Column–ESR**.

The ESR window appears.

✍ You can open this window when the optional specimen rotation holder is mounted in the instrument.



**RUN:** While rotation is taking place, the lamp is lit in green.

**Initial Set:** Moves the rotation holder to the initial position.

**Step:** Sets the drive period of the motor for rotation.

Step setting	Drive period (ms)
<b>1</b>	<b>3</b>
<b>2</b>	<b>6</b>
<b>3</b>	<b>20</b>
<b>4</b>	<b>60</b>
<b>5</b>	<b>200</b>
<b>C</b>	<b>Continuous</b>

**Left:** Rotates the stage counterclockwise.

**Right:** Rotates the stage clockwise.

**STOP:** Stops the rotation of the stage during continuous drive.


**Close:** Closes the ESR window.

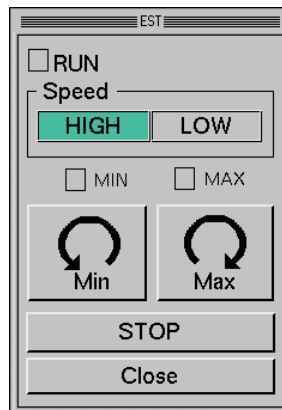
## 3.6 EST

The EST window allows you to control the tilt of the optional specimen tilt holder.

◆ Select **Column-EST**.

The EST window appears.

 You can open this window when the optional specimen tilt holder is mounted in the instrument.



**RUN:** While tilt is taking place, the lamp is lit in green.

**Speed-HIGH/LOW:**

Sets the driving speed of the tilt. **HIGH** is twice as fast as **LOW**.

**MIN-Min:**

Drives the tilt to lower angle. When the stage arrives at the lower limit of the angle, the **MIN** box becomes green; then the tilt stops.

**MAX-Max:**

Drives the tilt to higher angle. When the stage arrives at the upper limit of the angle, the **MAX** box becomes green; then the tilt stops.

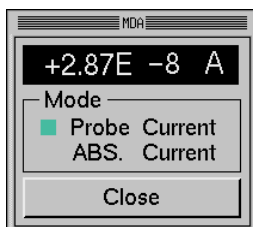
**STOP:** Stops the tilt motor.

**Close:** Closes the EST window.

### 3.7 MDA

You can display the probe current that was detected by the optional probe current detector (PCD), or the absorbed current that was absorbed into the sample.

- ◆ Select **Column-MDA**.  
The MDA window appears.

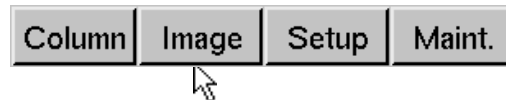


- +□.□□ E-□A:** Displays the probe current or the absorbed current.
- Mode:** The **Probe Current** box becomes green and the probe current is displayed when the PCD is inserted in the optical axis. The **ABS. Current** box becomes green and the absorbed current is displayed when the PCD is withdrawn from the optical column.
- Close:** Closes the MDA window.

## 4 IMAGE MENU

The Image menu allows you to perform operations such as image processing and image data saving.

The image processing can be applied only to still-frame images, that is, to both frozen images and loaded images.



- ◆ Click on **Image**.  
The following pull-down menu appears.

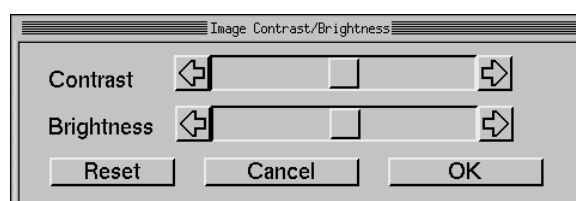
Image Cont. / Bright.	← Changes the contrast and brightness in the image memory.
Gamma	← $\gamma$ correction that includes linearity correction of the gray level on the display, multi-level coding, and pseudo-color processing.
Binary	← Binary processing that displays the observation image in black and white, according to the brightness.
Overlap	← Displays multiple overlapping images.
Clip Board	← Saves images up to 16 (images per page) $\times$ 8 (pages).
Network Load	← Loads images that are stored in the host computer.
Network Save	← Transfers images to the host computer to save them.
Network Clip	← Transfers and loads the images stored in the clipboard by batch processing.

### 4.1 Image Cont./Bright.

You can change the contrast and brightness by processing data in the image memory. Use this window when you wish to change the contrast and brightness of the images that you have already obtained.

- ✍ The **Cont./Bright.** item on the **Column** menu has a function different from this item.

- ◆ Select **Image-Image Cont./Bright.**  
The Image Contrast/Brightness window appears.



**Contrast:** Adjusts the contrast of the observation image.



Moving the scroll bar to the right increases the contrast, and moving it to the left decreases it.

**Brightness:** Adjusts the brightness of the observation image.



Moving the scroll bar to the right increases the brightness, and moving it to the left decreases it.

**Reset:** Returns the contrast and brightness to their initial values.

**Cancel:** Closes the Image Contrast/Brightness window without entering the changes.

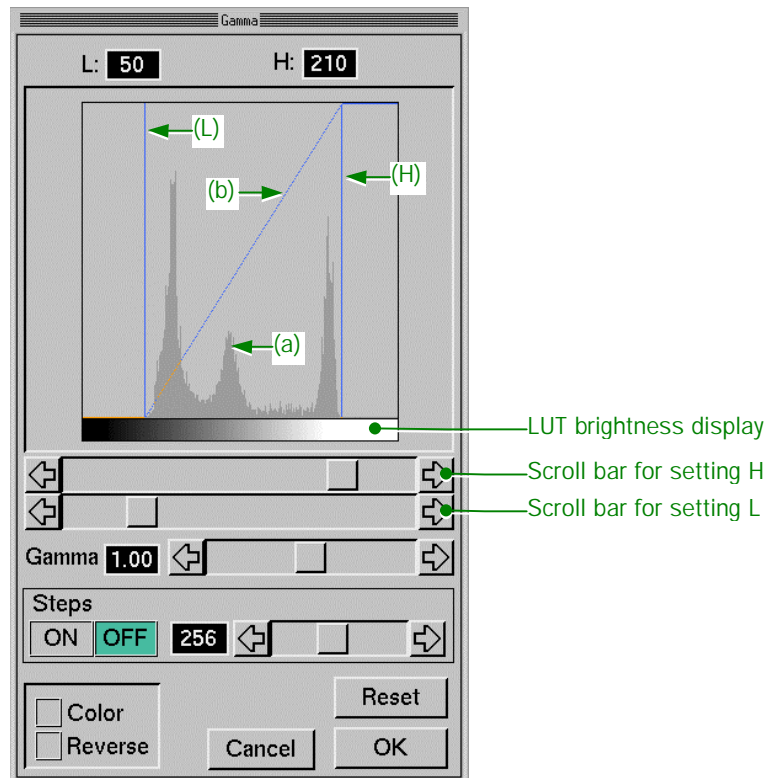
**OK:** Closes the Image Contrast/Brightness window after entering the changes.

## 4.2 Gamma

The Gamma window allows you to perform basic correction ( $\gamma$  correction) of brightness (gray level) on the observation display. The standard  $\gamma$  correction value is set to 1.0. Change  $\gamma$  according to the appearance of the sample that you are observing.

- ◆ Select Image–Gamma.

The Gamma window appears.



**L:** Displays the minimum brightness to which  $\gamma$  correction is to be performed.

**H:** Displays the maximum brightness to which  $\gamma$  correction is to be performed.

**(a):** Displays histogram.

**(b):** Displays  $\gamma$  correction value graphically.

**(L):** Displays minimum brightness setting (black level)

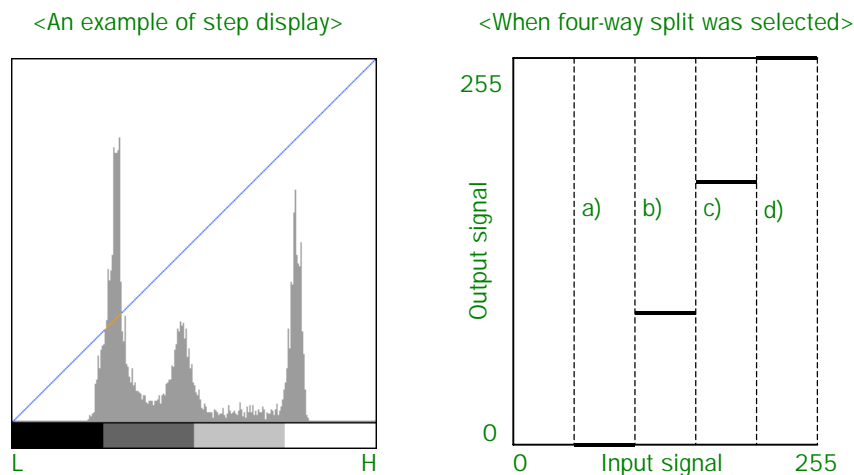
**(H):** Displays maximum brightness setting (white level)

**LUT brightness display:**

Displays the brightness (LUT) corresponding to Step in the gray scale (color scale for color display).

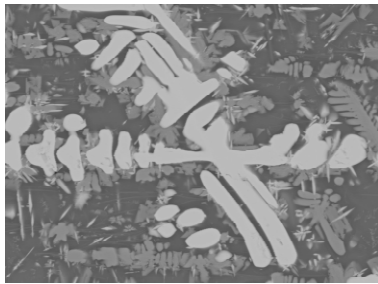
~~✍~~ “LUT” is an abbreviation for “look-up table”.

- Scroll bars:** Set the maximum value (H) by using the upper scroll bar, and also the minimum value (L) by using the lower scroll bar. When you want to set a  $\gamma$  correction curve, set the minimum value (black) of the input signal by using the lower scroll bar, and set the maximum value (white) by using the upper scroll bar.
- Gamma:** Sets  $\gamma$  (initial value: 1.00).  
Set  $\gamma$  of the LUT brightness display by typing a value in the **Gamma** input box or by using the scroll bar.
- Steps:** Turns the gray level step on or off and also sets the step value.  
**OFF:** The number of gray level steps is set to 256 steps (tones).  
**ON:** The image is displayed with the set number (n) of gray levels. Set the number of steps to 4 to 32 (tones) by typing a value in the input box or by using the scroll bar. The number of steps, n, is a power of two.

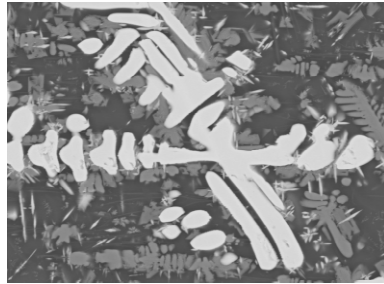


- Color/Reverse:** Select the method of displaying the LUT. These selections affect the brightness display of the LUT.  
**Color:** Pseudo color display  
**Reverse:** Monochrome reverse display
- Reset:** Returns  $\gamma$  to 1.00.
- Cancel:** Closes the Gamma window without storing the values that you changed in the window.
- OK:** Stores the values that you changed in the Gamma window, then closes it.

A histogram of the image brightness on the viewing display is shown at (a) in the Gamma window. The horizontal axis of this histogram is the gray level (brightness), and the vertical axis is the number of pixels. Set  $\gamma$  based on this histogram. In the  $\gamma$  correction curve (b), the vertical axis represents the input value (Gray level: 0 (black) to 255 (white)), and the vertical axis represents the output value (Gray level: 0 (black) to 255 (white)).



$\gamma$  correction value = 0.7



$\gamma$  correction value = 1.0



$\gamma$  correction value = 1.3

### ■ Procedure for setting $\gamma$ correction value

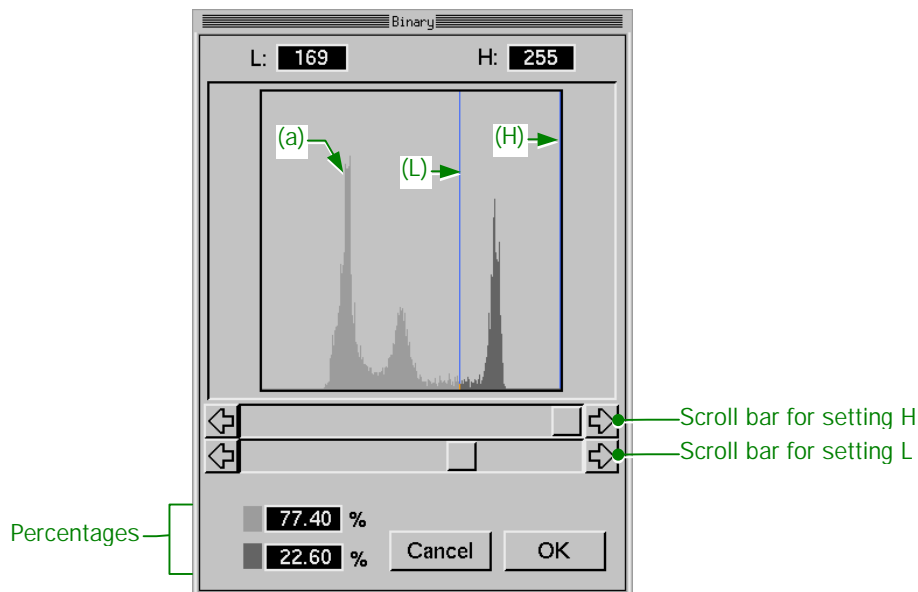
1. Display an image on the viewing display.
2. Select **Image–Gamma** from the menu bar.  
**The Gamma window opens.**
3. Refer to the histogram of the observation image, and then move the scroll bars to enter the minimum value (black) in the **L** input box and the maximum value (white) in the **H** input box.  
**Usually, set (L) to the left end of the display range of the histogram, and (H) to the right end. This sets the overall input signal after dividing it into gray levels.**
4. Change Gamma ( $\gamma$ ) to a value that facilitates image observation by typing a value in the input box or by using the scroll bar.  
 **$\gamma$  coefficient**
  - Small** → The change on the white side increases with respect to the input signal.
  - Large** → The change on the black side increases with respect to the input signal.
5. After entering the  $\gamma$  coefficient that you selected, click on the **OK** button to finalize the setting.

## 4.3 Binary

The Binary window allows you to binarize an image. Binarizing is a kind of processing in which two thresholds (the two boundaries that separate from the black and white parts respectively) are set in a normal image (with 256 gray level tones) in order to obtain a binarized monochrome image. The features in the range between (H) and (L) are displayed in white in a binarized image.

◆ **Select Image–Binary.**

The Binary window appears.

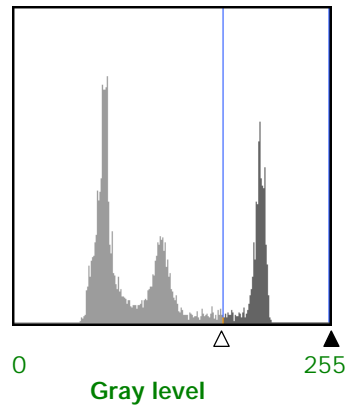


- L:** Displays the lower threshold value. Data having levels L will be displayed in black.
- H:** Displays the upper threshold value. Data having levels H will also be displayed in black.
- (a):** Histogram display
- (L):** Displays lower threshold.
- (H):** Displays upper threshold.
- Scroll bars:** Set the lower threshold (L) by using the lower scroll bar, and also the upper threshold (H) by using the upper scroll bar.  
When you want to set binarization, set the lower threshold of the input signal by using the lower scroll bar, and set the upper threshold by using the upper scroll bar.
- Percentages:** These are the percentages of pixel data.  
Upper box: This is the percentage of pixels corresponding to black that are outside the two thresholds.  
Lower box: This is the percentage of pixels corresponding to white that are between the two thresholds.
- Cancel:** Closes the Binary window without setting the values that you changed in the window.
- OK:** Sets the values that you changed in the Binary window, then closes it.

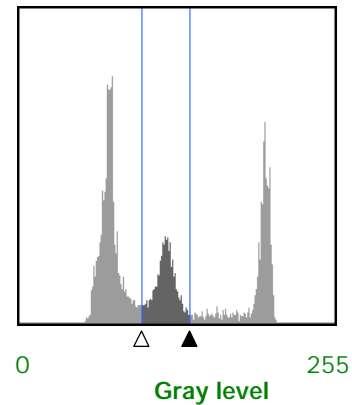
A histogram of the image on the viewing display is displayed in (a) of the Binary window. The horizontal axis of this histogram is the gray level (brightness), and the vertical axis is the number of pixels. Set the thresholds for binarization based on this histogram. The thresholds can be specified at any gray level from 0 (black) to 255 (white) on the horizontal axis.

### ■ Examples of binarized display

When the threshold value  $H$  is 255



When the threshold value  $H$  is less than 255



### ■ Procedure for displaying a binarized image

1. Display an image on the viewing display.
  2. Select **Image–Binary** from the menu bar.  
The Binary window appears. While you are setting the thresholds, the part of the image that will become white will be displayed in green.
  3. Referring to the histogram of the observation image, enter the minimum value in the **L** input box and the maximum value in the **H** input box by using the scroll bars.  
The initial values are set at  $L = 0$  and  $H = 255$ .
  4. After you have selected the threshold values, click on the **OK** button to finalize the setting.  
The Binary window closes and the part that was displayed in green becomes white, and so you obtain a black and white binarized image.
- ✍ If the original image is dark, first increase the image brightness by using the gamma-correction function. Then execute **Binary**.

## 4.4 Overlap

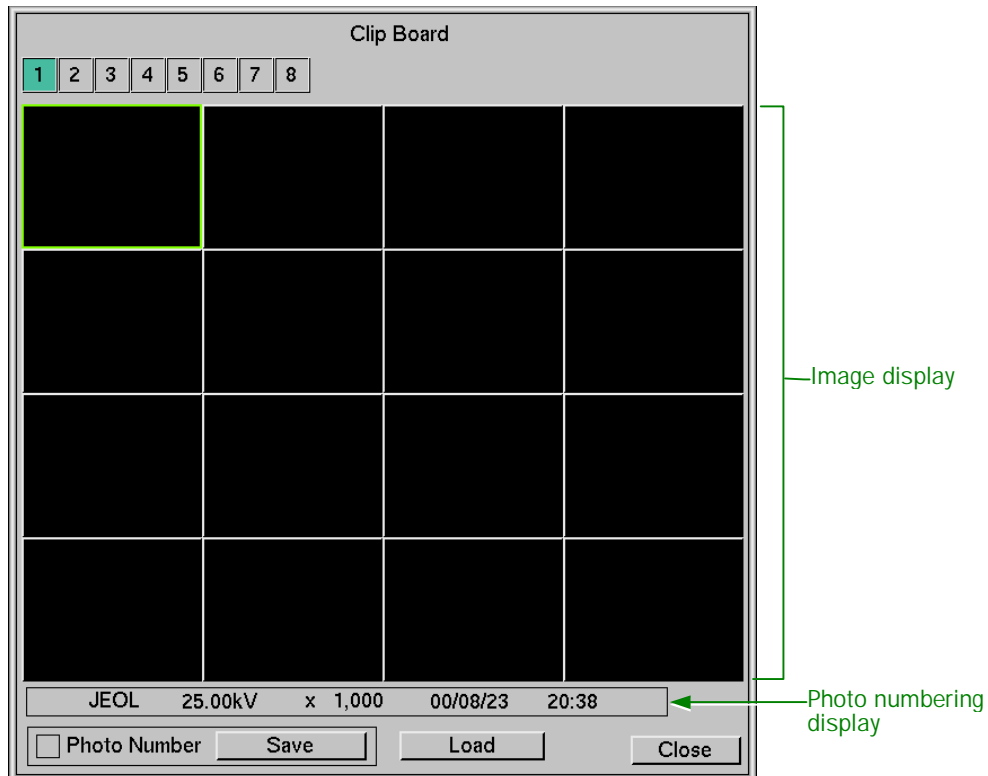
You can display two overlapping images, one in green and one in red, by using this function. Displaying in two colors is effective for detecting defect points and also for acquiring a stereo image.

### ■ How to overlap two images

1. Display the first image.
2. Select **Image–Overlap** from the menu bar.  
The displayed image changes to green, and the Clip Board window appears on the first image.
3. Select the second image from the Clip Board window, and then click on the **Load** button.  
The second image that you selected from the Clip Board window changes to red, and it is displayed on the first image.

## 4.5 Clip Board

You can save up to 128 images on the clipboard.  
The Clip Board window allows you to display the saved images.



**Image display:** Up to 16 of the images saved on the clipboard are displayed here.  
You can **Save** and **Load** the image that is in the green square.

**Photo numbering display:**

The photo numbering data are displayed here for the image in the green square.

**Photo Number:** Before you save an image, select whether or not the observation conditions displayed on the screen are also to be saved in the image.

: The observation conditions are not to be written in the image.

: The observation conditions are to be written in the image and saved together with it.

**Save:** Copies the image on the viewing display onto the clipboard.

To copy the image, select a square on the Clip Board window; it will be framed in green. Click on the **Save** button, and the image will be saved. If there is a previous image in the frame, it will be overwritten by the new image.

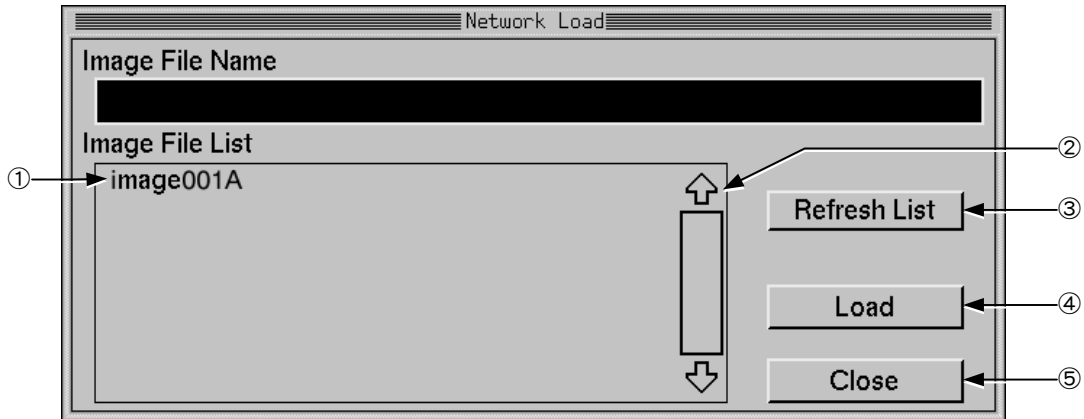
**Load:** Copies the selected image in the square onto the viewing display.

**Close:** Closes the Clip Board window.

## 4.6 Network Load

You can load and display the image files stored in the network host computer by using the Network Load window.

- ◆ Select **Image–Network Load**.  
The Network Load window opens.

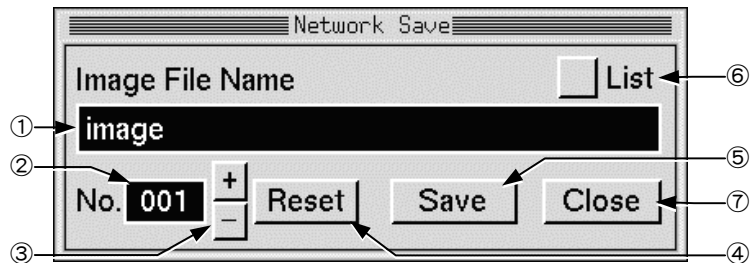


- ① List of file names  
Displays the list of the image files stored on the hard disk of the host computer.  
Up to 200 names of images are listed.
- ② Scroll bar  
Scrolls the list of the image file names.
- ③ Refresh List button  
Displays again the latest list of the image file names stored in the host computer.
- ④ Load button  
Reads and displays the images that you selected from the ones stored in the host computer.
- ⑤ Close button  
Closes the Network Load window.

## 4.7 Network Save

You can transfer images to the network host computer in which you can save them.

- ◆ Select **Image–Network Save**.  
The **Network Save** window opens.



- ① **Image File Name**  
You can input a name for the image file for the displayed image, using up to 31 characters.  
With an MS-DOS compatible PC, up to four characters can be input.
- ② **No.** (serial number)  
Displays the serial number corresponding to image name.  
Each time an image is transferred, the number increases by one.
- ③ **+/-** buttons  
Clicking on these buttons increases or decreases the serial number respectively.  
A single click on the + button increases the number by one and on the – button decreases it by one.
- ④ **Reset** button  
Resets the serial number to 001.
- ⑤ **Save** button  
Transfers the combined data consisting of images (BMP files) and measurement conditions (TXT files) to the host computer.
- ⑥ **List** button  
Clicking on this button opens the Network Load window in which you can see the list of image files stored in the host computer.
- ⑦ **Close** button  
Closes the Network Save window.

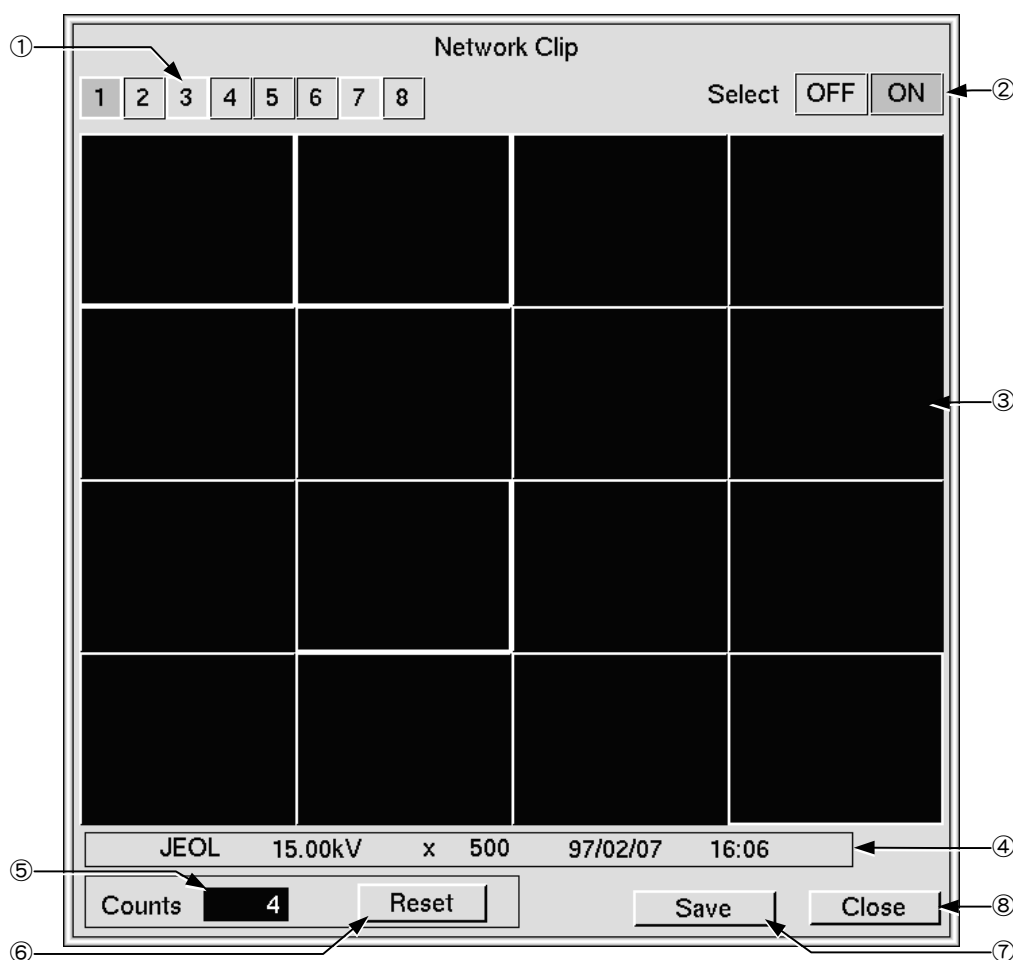
## 4.8 Network Clip

You can transfer the image files that are on the clipboard to the network host computer in which you can save them, by using the Network Clip function. Batch transfer of multiple images is possible.

◆ Select **Image–Network Clip**.

The Network Clip window opens.

Select the images to be transferred and click on the **Save** button; then the images will be transferred to the host computer.



① Page buttons

Used to change pages. Page numbers range from 1 to 8. The background of the selected page button becomes green when **Select** is **OFF**, and it becomes yellow when **Select** is **ON**.

② **Select–ON/OFF** buttons

Selects whether or not to transfer the displayed page of images.

When you want to mark the displayed page for transfer, click on the **ON** button; the background of the selected page button becomes yellow. To deselect the page, click on the **OFF** button; the background of the selected page button becomes yellow.

- ③ Display of stored images and selection of images to be transferred  
**Sixteen stored images are displayed. If you select an image by clicking on it, the square of the selected image will become green.**
- ④ Image data information display  
**Image data information is displayed here for the selected image.**
- ⑤ Counts box  
**The number of images to be transferred is displayed in this box.**
- ⑥ **Reset** button  
**Deselects images.**
- ⑦ **Save** button  
**Starts image transfer to the host computer.**
- ⑧ **Close** button  
**Closes the Network Clip window.**

## 4.9 Transferring Images by Using PHOTO Button

- ◆ Press the **PHOTO** button on the Control Panel.

The image is transferred.

- To transfer a live image, press the **PHOTO** button, and then the image will be grabbed at the preset speed, and will be transferred.
- To transfer a frozen image, select the desired condition from **FREEZE** of the Operation window, and then the image will be transferred.
- The filenames that were set in the Network Save window will be used, and the transfer will be executed to the host computer that you have specified in the Network Setting window. The counter value for each transfer will be stored in separate files.

☞ Refer to Section 5.5 “Network Setting” of this instruction manual.

## 4.10 File Transmit Dialog Box

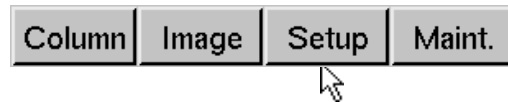
- ◆ The File transmit dialog box is displayed during an image transfer to show the message that data are being transferred.  
It will disappear upon completion of the image transfer.



- ① **Close** button  
Closes the File transmit dialog box.

## 5 SETUP MENU

The **Setup** menu allows you to set the conditions necessary for observing images.



- ◆ Click on **Setup**.

The following pull-down menu appears.

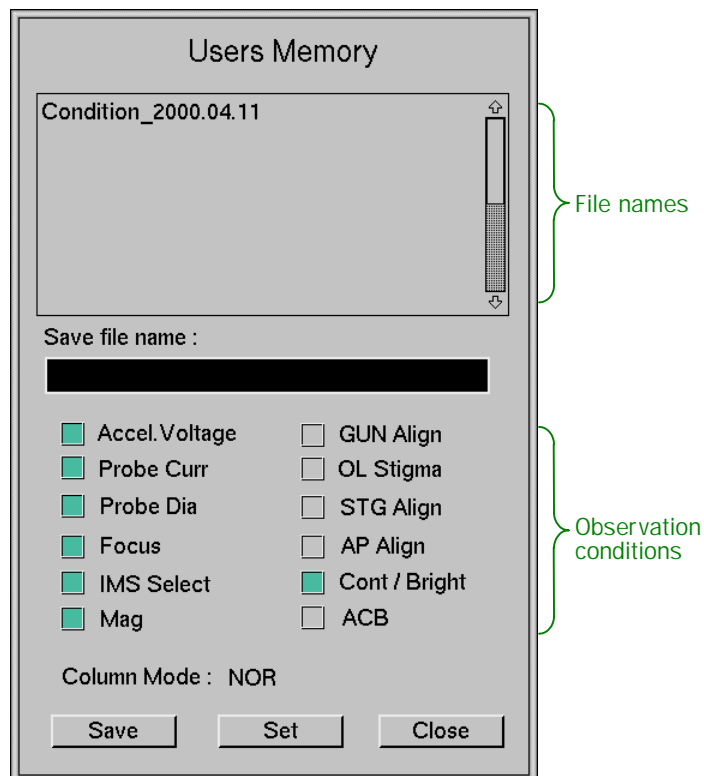
User's Memory	← Saving and setting the observation conditions for the electron optical system
Operation	← Setting the operation conditions for observation, and defining names
Add Image	← Setting the conditions for added images
Photo LUT	← Setting the look-up table for photographing
Network Set	← Setting the image transfer conditions for the Ethernet connection


### 5.1 User's Memory

You can save up to 20 files of observation conditions that match various purposes of use.

- ◆ Select **Setup–User's Memory**

The Users Memory window appears.



- File names:** The file names of the files in the user's memory that contain the various observation conditions appear on the viewing display. You can create up to 20 files in the user's memory. When you select a file name by clicking on it, the instrument is set to the observation conditions that were saved in advance.
- Save file name:** This function allows you to create a file in the user's memory. Type the desired file name (using up to 20 characters) for the file in which you want to save the observation conditions.
- Observation conditions:**  
Select the conditions that you want to save in the user's memory.  
 (selected): Save.  
 (not selected) : Do not save.
- Column Mode:** Displays the preset **Column Mode** when you save observation conditions. If you selected a file name, the **Column Mode** that was saved in the selected file appears.
- Save:** Saves the selected observation conditions.  
 When you want to save observation conditions, if you select the displayed filename, they will be overwritten. To create a new file, enter a filename (up to 20 characters) in the **Save file name** box using the keyboard, and then press the **[Return]** key.
- Set:** Sets the instrument to the conditions specified in the selected file.
- Close:** Closes the Users Memory window.

## 5.2 Operation

You can preset the operating conditions, and also specify the necessary items in this Operation window.

- ◆ Select **Setup-Operation**.  
The Operation window appears.


**PHOTO:** Sets the items related to the **PHOTO** button on the Control Panel.

**Speed:** Sets the scanning speed for photographing.  
Select 80, 120, 240 or 360 seconds as the photo speed for acquiring one image when **Output** is set to **Photo 1** or **Network 1**.  
Select 320, 480, 960 or 1440 seconds as the photo speed for acquiring one image when **Output** is set to **Photo 2** or **Network 2**.

**Output:** Sets output conditions.  
**Photo 1:** Photographs a 1280×1024 pixel image.  
**Photo 2:** Photographs a 2048×2048 pixel image.  
**Printer:** Grabs an image, and displays and freezes it.  
**Network 1:** Creates a file of a 1280×1024 pixel image and transfers it to a network computer.  
**Network 2:** Creates a file of a 2048×2048 pixel image and transfers it to a network computer.

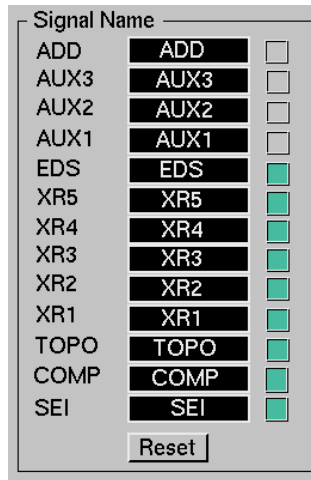
**Recording Data:** Selects the data to be recorded on a photograph. The selected items are recorded on the photograph. The items that have not been selected are not recorded on the photograph; then the background of the corresponding items in the observation condition display becomes green.

**Photo Number:** Photo numbering display  
**Accel. Voltage:** Accelerating voltage display  
**Magnification:** Magnification display  
**Micron bar:** Display of the micron bar (including the micron bar numerical value)  
**W.D.:** Display of the working distance  
**Image Signal:** Display of the observation image signal  
**Masking:** Selection or non-selection of masking of the Recording Data background  
When **Masking** is selected, the Recording Data line is entirely masked.

 The items you set by selecting from Recording Data also affect the observation screen. The items other than **Masking** turn green unless selected. **Masking** is displayed according to whether or not masking is specified.

**Sharpness:** Improves the S/N ratio of an image by smoothing.  
**Off:** Smoothing is not executed.  
**1:** The S/N ratio of the image is improved the most, but the image becomes rather blurry.  
**2:** The S/N ratio of the image is improved to an extent between settings **1** and **3**.  
**3:** The S/N ratio of the image is improved a little, but the image quality is almost the same as that of the original image.

**Signal Name:** Sets the signal names to be displayed in the observation condition display at the bottom right of the observation screen.




**Signal name display/Setting:**

Normally, standard names are set at the factory, but you can change the names if you want to.

The names shown in the above figure are the initial defaults.

If you want to change the names, select the desired name, then type a new name of up to 5 characters.

 Be sure to press the **Return** key after inputting a name.

**Selection buttons:**


To select the signal names to appear in the observation condition display at the bottom right of the observation screen, click on the box of each item that you want to select.

**Reset:**

Returns the signal names to their initial values.

**Scanning Speed:** Performs settings related to the **SCANNING MODE** buttons on the Control Panel. Here, set the scanning speed and the number of integrations.

The recursive filtering takes place in the image integration. In this integration method, since scanning is performed, the older the image is, the smaller is its effect on the integrated image, and the image is updated continuously. The newer the image is, the greater is its effect on the integrated image. Therefore, it is possible to obtain integrated images that can be readily observed even if the observation conditions such as the focusing change, or if the position of the specimen moves.

 Image integration by the recursive filtering method

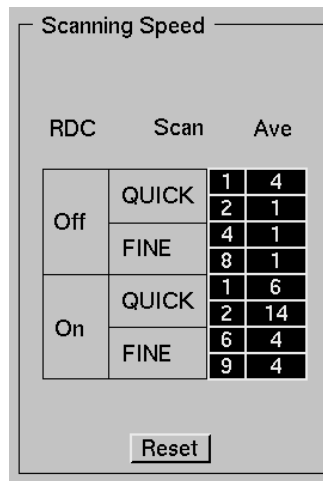
$$X_n = \alpha \times P_n + (1 - \alpha) \times X_{n-1}$$

$P_n$ : Data resulting from the  $n^{\text{th}}$  scan

$X_n$ :  $n^{\text{th}}$  output of filter

$\alpha$ : Weighted constant

$n$ : Number of integrations



**RDC/Scan/Ave:**

Sets the selected field/scanning speed/number of integrations. Specify the desired scanning speed that you want to change by clicking on it, and then type the new numbers. Refer to the Table below for the relation between the number and the scanning speed.

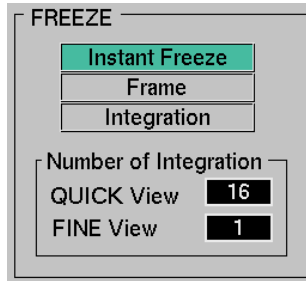
**Scanning speed number and scanning speed**

The numbers in parentheses ( ) are for 60 Hz.

Scanning speed number	Scanning speed (seconds/screen)
1	0.28
2	0.5
3	0.9
4	1.8
5	3.5
6	6.9
7	19 (16)
8	38 (31)
9	79 (66)
10	121 (100)
11	241 (200)
12	362 (303)

**Reset:** Returns the scanning speed and integration time to their initial values.

**FREEZE:** Enables you to specify the image-freezing method that the system will use when you click on the **FREEZE** button on the Control Panel. Select one of these three freezing methods.



**Instant Freeze:**

Stops overwriting the image and freezes it immediately. The number of integrations depends upon the setting made for the image observation.

**Frame:**

Stops overwriting the image and freezes it after the frame image currently being scanned has been acquired. The number of integrations depends upon the setting made for the image observation.

**Integration:**


Integrates according to the number set in **Number of Integration**. Simple image integration takes place, and the image freezes after the integration.

**Number of integration:**

Sets the number of integrations.

Select the desired input box by clicking on it, type the desired value, and then press the **Return** key to enter the value.

The simple addition filtering takes place in the image integration. This method of image integration is different from that of the recursive filtering used for image observation in that, all of the images corresponding to the number of images integrated are weighted equally. Consequently, with this image integration, you can obtain images with higher quality than those resulting from the recursive filtering.

 Image integration by the simple addition filtering method

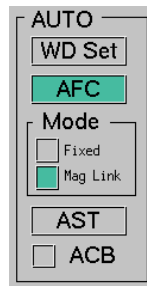
$$X_n = (1/n) \times P_n + ((n-1) / n) \times X_{n-1}; X_0 = 0$$

$P_n$ : Data resulting from the  $n^{\text{th}}$  scan

$X_n$ :  $n^{\text{th}}$  output of filter

$n$ : Number of integrations

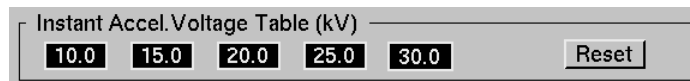
**AUTO:** Performs the settings related to the **AUTO** button on the Operation Panel.



- WD SET:** Sets the instrument to focus at the WD position.
- AFC:** Sets the **AUTO** button on the Control Panel to auto-focus.
- Mode–Fixed:** Locks the search range.
- Mag Link:** Links the search range to magnification.
- AST:** Sets the **AUTO** button on the Control Panel to automatic astigmatism correction.
- ACB:** Select **ACB** when you want to combine the **ACB** (Automatic Contrast and Brightness) function with any of the **AUTO** functions.

**Instant Accel. Voltage Table (kV):**

Enables you to select one of the five accelerating voltages that you have preset in this Table by clicking on the display and control of the accelerating voltage on the upper left of the basic screen. Up to five values can be preset.



Setting the accelerating voltage

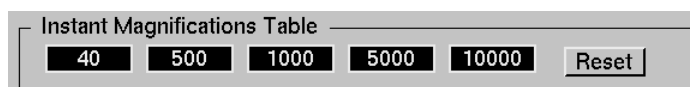
**Setting the accelerating voltage:**

Click on the desired input box, and type the desired value; then press the **[Return]** key to set the value.

**Reset:** Returns the accelerating voltages to their initial values.

**Instant Magnification Table:**

Enables you to select one of the five magnifications that you have preset in this Table by clicking on the magnification in the observation condition display on the bottom right of the basic screen. Up to five values can be preset.



Magnification setting

**Magnification setting:**

Click on the desired input box, and type the desired value; then press the **Return** key to set the value.

**Reset:** Returns the magnifications to their initial values.

**ACB:** Performs the settings related to the **ACB** (Automatic Contrast and Brightness) button on the Operation Panel.



**Contrast, Brightness:**

Displays the present settings of the **ACB** contrast and brightness.

If you want to change one of these settings, click on the desired input box, and type the desired value; then press the **Return** key to finalize the value.

By using the **Memory** button to memorize the desired values in advance, you can set the desired contrast and brightness the next time you use the instrument.

**Dark/Standard/Bright:**

Sets the contrast and brightness for the **ACB**. You can select the desired brightness according to the specimen to be observed.

**Dark:** Sets the brightness on the dark side.

**Standard:** Sets the brightness to the standard value.

**Bright:** Sets the brightness on the bright side.

 You cannot change these values.

**Memory:**

Memorizes the brightness of the image on the observation screen so that when you subsequently press the **ACB** button on the Control Panel, images will be displayed at the memorized brightness.

This button differs from the **Dark/Standard/Bright** buttons in that it enables you to set the brightness that you want to.

• Memorizing method

1. Display the image to be observed on the screen.
2. By using the **CONTRAST** and **BRIGHTNESS** knobs on the Control Panel, adjust the brightness as desired for ease of observation.
3. Select **Operation** from the **Setup** menu.
4. Click on the **Memory** button.

The setting of the brightness on the observation screen is automatically memorized.

**Cancel:** Closes the Operation window without saving any settings.

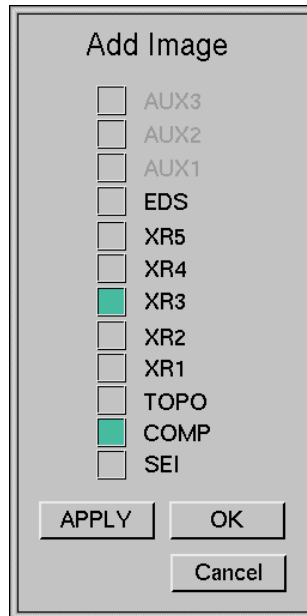
**OK:** Saves all the settings and closes the Operation window.

## 5.3 Add Image

You can select and record the signals to add using the Add Image window.

1. Select **Setup–Add Image**.

The Add Image window appears.




2. Select two or more signals.
3. Click on the APPLY and OK buttons.

The selected image signals to be added will be memorized.

**APPLY:** Changes the setting, but does not close the Add Image window.

**OK:** Changes the setting, and then closes the Add Image window.

**Cancel:** Closes the Add Image window without changing the current setting.

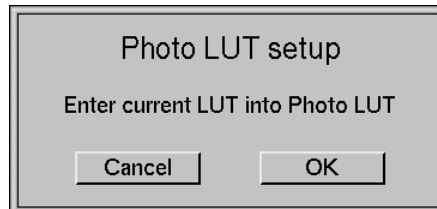
 When you select **ADD** from the Image selector in the observation condition display, which is at the bottom right of the basic screen, you will display the image that results from adding the signals that you selected in the Add Image window.

## 5.4 Photo LUT

The **Photo LUT** setup window enables you to set the LUT (look-up table) for image photographing.

◆ Select **Setup-Photo LUT**.

The Photo LUT setup window appears.



**Cancel:**

Closes the Photo LUT setup window without setting the Photo LUT.

**OK:**

Copies the LUT that is being used for the image presently being displayed into the LUT that will be used for photographing images.

## 5.5 Network Setting

The Network Setting window enables you to set the IP address for the control and display system of the instrument (SEM's IP address), as well as the host name, IP address, user name, password, and directory of the host computer to which files are to be transferred.

- ◆ Select **Setup–Network Set**.

The Network Setting window appears.

Network Setting

host list

default\_host  
jxa1  
hostname3  
hostname4  
hostname5  
hostname6  
hostname7  
hostname8  
hostname9  
hostname10

Regist jxa1

host name jxa1

IP address 192.168.76.1

user name jx1

password \*\*\*\*\*

directory ./Images

Text File Transfer

Cancel OK

IP address Setting

SEM's IP address 192.168.76.3

Subnet Mask 255.255.255.0

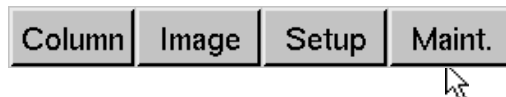
GateWay's IP address 192.168.76.1

Edit Cancel IP\_Set

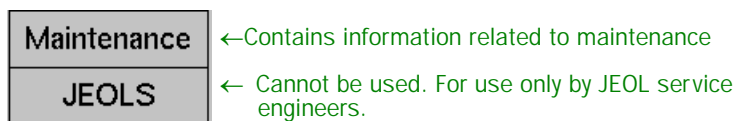
- host list:** Displays the list of stored host names.
- Regist:** Records the preset host settings as the host to which data are to be transferred.
- host name:** Sets the name of host to which data are to be transferred.
- IP address:** Sets IP address to which data are to be transferred.
- user name:** Sets log-in name of host to which data are to be transferred.
- password:** Sets password of host to which data are to be transferred.
- directory:** Sets directory of host to which data are to be transferred.
- Text File Transfer:** Enables you to select whether to transfer TXT files or not.
- Cancel:** Cancels the settings and closes the Network Setting window.
- OK:** Finalizes the settings of the host and closes the Network Setting window.
- IP address Setting:** Sets the IP address for the control and display system of the instrument, as well as subnet mask and gateway.
- Edit Cancel:** Cancels editing of IP address, and closes the window.
- IP\_Set:** Finalizes editing of IP address, and closes the window.

## 6 MAINT. MENU

The Maint. menu is related to maintenance. Selecting **Maintenance** from this menu displays the state of the instrument.



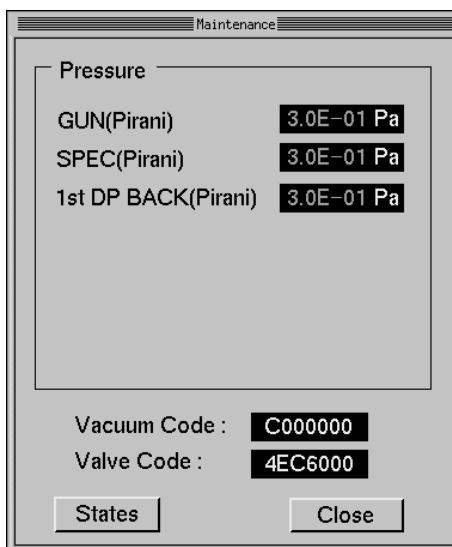
- ◆ Click on **Maint.**.  
The following pull-down menu appears.



### ■ Maintenance

Selecting this displays the Maintenance window .

- ◆ Select **Maint.–Maintenance**.  
The Maintenance window appears.



#### Pressure:

Displays the pressure of some systems of the instrument.

You can see the pressure measured with the Pirani gauges, the pressure measured with the optional Penning gauge, and the pressure converted from the pump current of the ion pump for the optional LaB<sub>6</sub> electron gun. When the pressure is over the limit of measurement, the displayed characters will be half-toned.

✍ Please note that both the pressure measured with the Pirani gauge and the pressure converted from the pump current of the ion pump are not exact, and so use them only for your reference.

**Vacuum Code/Valve Code:**

If trouble should occur in the system, use this code to check the operation of the vacuum system. The conversion shown below takes place based on the code display, enabling you to check problems in the vacuum system, determine whether each valve is open or off, and also find out whether each vacuum pump is on or off. The code displayed is a 7-digit hexadecimal number.

Each item has the following meaning.

ON, OK, CLOSE: 1

OFF, NG, OPEN: 0

The method of calculation is as follows.

No.	Operation	Binary	Hexadecimal
0	OK	1 × 8 = 8	
1	ON	1 × 4 = 4	
2	OFF	0 × 2 = 0	→ Sum = 12 → C
3	OFF	0 × 1 = 0	

The results of this calculation are displayed in the Vacuum Code table.

**Vacuum Code Table**

Code	No.	Item	Operation	Binary (ON/OFF setting)	Hexadecimal (TOTAL)	
①	0	HV Ready	OK	1	8	C
	1	HT ON	ON	1	4	
	2	Not set	OFF	0	2	
	3	Not set	OFF	0	1	
②	4	Not set	OFF	0	8	0
	5	Not set	OFF	0	4	
	6	Not set	OFF	0	2	
	7	Not set	OFF	0	1	
③	8	Not set	OFF	0	8	0
	9	Not set	OFF	0	4	
	10	Not set	OFF	0	2	
	11	Not set	OFF	0	1	
④	12	Not set	OFF	0	8	0
	13	Not set	OFF	0	4	
	14	Not set	OFF	0	2	
	15	Not set	OFF	0	1	
⑤	16	Oil Flow NG	OFF	0	8	0
	17	Oil Level NG	OFF	0	4	
	18	RP NG	OFF	0	2	
	19	Emission NG	OFF	0	1	

Code	No.	Item	Operation	Binary (ON/OFF setting)	Hexadecimal (TOTAL)	
⑥	20	Not set	OFF	0	8	0
	21	Air NG	OFF	0	4	
	22	PIG Broken	OFF	0	2	
	23	Not set	OFF	0	1	
⑦	24	Not set	OFF	0	8	0
	25	Water NG	OFF	0	4	
	26	Not set	OFF	0	2	
	27	Not set	OFF	0	1	


### Explanation for Vacuum Code items

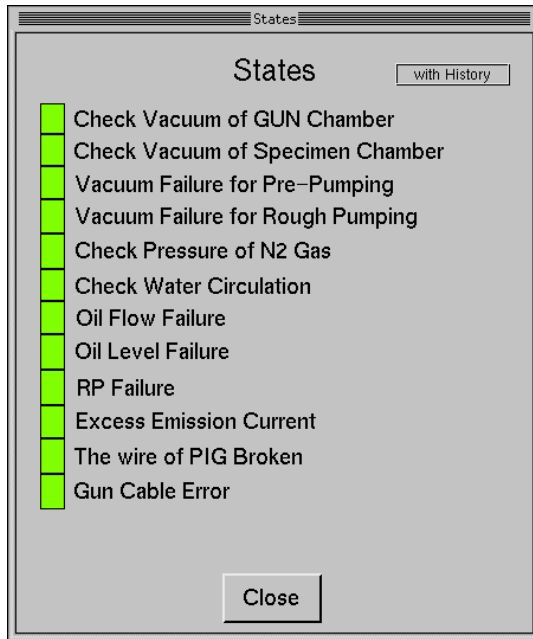
No.	Item	Description
0	HV Ready	Confirmation of whether the pressure in the vacuum system is appropriate for applying high voltage.
1	HT ON	State of application of high voltage.
16	Oil Flow NG	Insufficient flow rate of the cooling oil for OL.
17	Oil Level NG	Not enough cooling oil for OL.
18	RP NG	Rotary pump malfunction.
19	Emission NG	Emission current overload.
21	Air NG	Insufficient nitrogen gas pressure.
22	PIG Broken	Pirani gauge malfunction.
25	Water NG	DP overheated due to shortage of cooling water.

### Valve Code Table

Code	No.	Item	Operation	Binary (ON/OFF setting)	Hexadecimal (TOTAL)	
①	0	V1	CLOSE	1	8	F
	1	V2	CLOSE	1	4	
	2	V3A	CLOSE	1	2	
	3	V3B	CLOSE	1	1	
②	4	V4	CLOSE	1	8	F
	5	V5	CLOSE	1	4	
	6	V6	CLOSE	1	2	
	7	V7	CLOSE	1	1	

Code	No.	Item	Operation	Binary (ON/OFF setting)	Hexadecimal (TOTAL)	
③	8	AV1	CLOSE	1	8	C
④	12	Not set	OFF	0	8	7
	13	RP	ON	1	4	
	14	DP	ON	1	2	
	15	SIP	ON	1	1	
⑤	16	Not set	OFF	0	8	0
	17	Not set	OFF	0	4	
	18	Not set	OFF	0	2	
	19	Not set	OFF	0	1	
⑥	20	Not set	OFF	0	8	0
	21	Not set	OFF	0	4	
	22	Not set	OFF	0	2	
	23	Not set	OFF	0	1	
⑦	24	Not set	OFF	0	8	0
	25	Not set	OFF	0	4	
	26	Not set	OFF	0	2	
	27	Not set	OFF	0	1	

**States:** If you click on the **States** button, the States window opens.  
This window indicates the operating conditions of the system.  
The boxes at the left indicate the operating conditions of the instrument. The color of the box has the following meaning.  
When the box is green: Operating normally.  
When the box is orange: Warns that an abnormality is occurring.  
When the box is dark green:  
Warns that an abnormality has occurred.  
 This indication occurs only after you click on the **with History** button.



**Close:** Closes the States window.

## 7 ICONS

The icons are broadly divided into the following three groups.



### Icons

#### 7.1 Instrument Control Icons

The following icons are used for instrument control.



#### **Image Shift icon**

Resets the image shift to (0, 0).

While the values are (0, 0), the icon is green.



#### **Stage Movement icon**

Sets the instrument to stage movement mode.

While the stage movement mode is on, the icon is green, and clicking on the image enables you to perform the stage movement in place of the image-shift movement.



#### **Scan Rotation On/Off icon**

Allows you to switch Scan Rotation on and off alternately.

While the icon is on, it is green.



#### **Control Window Display icon**

Displays the Control window. Same as selecting Control from the Column menu.



#### **PCD icon**

Allows you to switch the Probe Current Detector (PCD) on and off alternately.

While the icon is on, it is orange.

## 7.2 Mode Selection Icons

Clicking on one of the mode selection icons displays the icons that correspond to the selected mode.



### Standard Screen icon

Clicking on this icon activates the standard screen mode, and displays the standard screen, in which the icons shown in the figure below appear. Normally, perform image observations in this standard screen mode. This standard screen mode is the basic mode from which the other modes are activated.



### Standard screen mode



#### Standard Screen icon

Clicking on this icon returns from the present mode to the standard screen mode.



#### Image Comparison icon

Clicking on this icon changes from the present mode to the image comparison mode.



#### Analysis icon

Clicking on this icon changes from the present mode to the analysis mode.



#### Scaler icon

Clicking on this icon changes from the present mode to the scaler mode.



### Image Comparison icon

Clicking on this icon activates the image comparison mode, and displays the previous screen that was used for the image comparison mode, in which the icons shown in the figure below appear. In this image comparison mode, four kinds of image comparison display are possible.



### Image comparison screen mode



#### Standard Screen icon

Clicking on this icon returns from the present mode to the standard screen mode.



#### Side-by-Side Split Screen icon

Clicking on this icon changes from the present mode to the side-by-side split screen mode.

**Top-and-Bottom Split Screen icon**

Clicking on this icon changes from the present mode to the top-and-bottom split screen mode.

**Four-Way Split Screen icon**

Clicking on this icon changes from the present mode to the four-way split screen mode.

**Differently Enlarged Image Comparison icon**

Clicking on this icon changes from the present mode to the differently enlarged image comparison mode.

**Analysis icon**

Clicking on this icon activates the analysis mode, in which the icons shown in the figure below appear. This analysis mode enables you to change the scanning method of the electron beam.

**Analysis mode****Standard Screen icon**

Clicking on this icon returns from the present mode to the standard screen mode.

**Spot icon**

Clicking on this icon changes from the present mode to the spot mode; the scanning of the electron beam stops and a spot is formed.

**Line Profile icon**

Clicking on this icon changes the present mode to the line profile mode, and forms a line profile.

**Selected Area icon**

Clicking on this icon activates the selected area mode, in which the range of the electron beam scan is selected.

**Scaler icon**

Clicking on this icon activates the scaler mode, in which the icons shown in the figure below appear. This scaler mode enables you to measure the dimensions of the image on the observation screen.

**Scaler mode****Standard Screen icon**

Clicking on this icon returns from the present mode to the standard screen mode.



**X-Direction Measurement icon**

Clicking on this icon performs measurement in the X (horizontal) direction.



**Y-Direction Measurement icon**

Clicking on this icon performs measurement in the Y (vertical) direction.



**Diagonal Measurement icon**

Clicking on this icon performs measurement in the diagonal direction.



**Calibration icon**

Clicking on this icon enables you to calibrate the measured values in the Calibration window. It enables you to set the dimensional accuracy to another instrument, or to your own reference dimension.

### 7.3 Screen Control Icons



**Standard screen mode**



**Text icon**

Clicking on this icon activates the text mode that enables you to enter text on the image.



**Gray Scale icon**

Clicking on this icon displays a gray scale to allow you to adjust the brightness of an image. The gray scale is displayed on the right of the image.



**Clipboard icon**

Clicking on this icon displays the clipboard.

## 8 OBSERVATION-CONDITION DISPLAY

The observation-condition display allows you to display and set the accelerating voltage, image selector, magnification, micron bar and working distance (WD).

You can enter numeric values in the places enclosed by frames on the observation-condition display.



### Observation condition display

**JEOL**

Photo label


When you are preparing to photograph an image, you can enter a number or a comment by typing up to alphanumeric characters in this box.

If you enter a number alone, the number automatically increases by 1 each time you take a photograph. If you enter alphanumeric characters as well, the label remains the same for all photographs.

**SEI**

Image selector

If you click on **SEI**, the image selector menu appears. Set the image signal by clicking on the item that you want to select.

 The image selector menu displays the signal names that you preset in the Operation window that is opened by clicking on **Setup-Operation**.

**25.0 kV**


Accelerating voltage

Displays the accelerating voltage. You cannot change the accelerating voltage here.

**x 1,000**

Magnification

If you click on **x 1,000**, a menu of five magnification values appears. Set the magnification by clicking on the item that you want to select.

 The magnifications that you preset in the Operation window that is opened by clicking on **Setup-Operation** appear here.

**10 μm**

Micron bar

Displays the micron bar corresponding to the magnification. You cannot change the micron bar.

**WD 11mm**

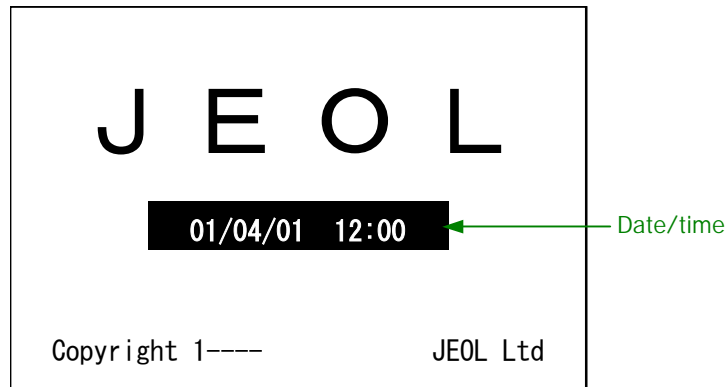
Working distance


Displays the current working distance converted from the excitation of the objective lens.

## 9 DATE AND TIME DISPLAY

The control and display system includes a clock that displays the date and time. Here, you will see how to change the date and time of the clock on the viewing display.

1. Turn on the **OPE PWR** switch.  
 If the **OPE PWR** switch is already on, press the **Reset** switch.  
The **Copyright** window appears on the observation screen.



2. Select the field that you want to change by clicking on it; it will be highlighted.
3. Type the correct value.
4. Press the **Return** key on the keyboard to finalize the change.  
 **The date and time can be changed and set only in the Copyright window that has appeared immediately after you have turned on the OPE PWR switch or you have pressed the Reset switch. If the window has disappeared, start the system once again by turning on the OPE PWR switch.**