

# **XM-17330/27330**

## **AUTOMATIC SERIAL ANALYSIS PROGRAM**

**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.**






IXM-17330/27330-1SA (608001/608501)

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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 GENERAL

The Automatic Serial Analysis Program consists of software to carry out automatic analysis continuously by combining different analysis programs with different measurement conditions.

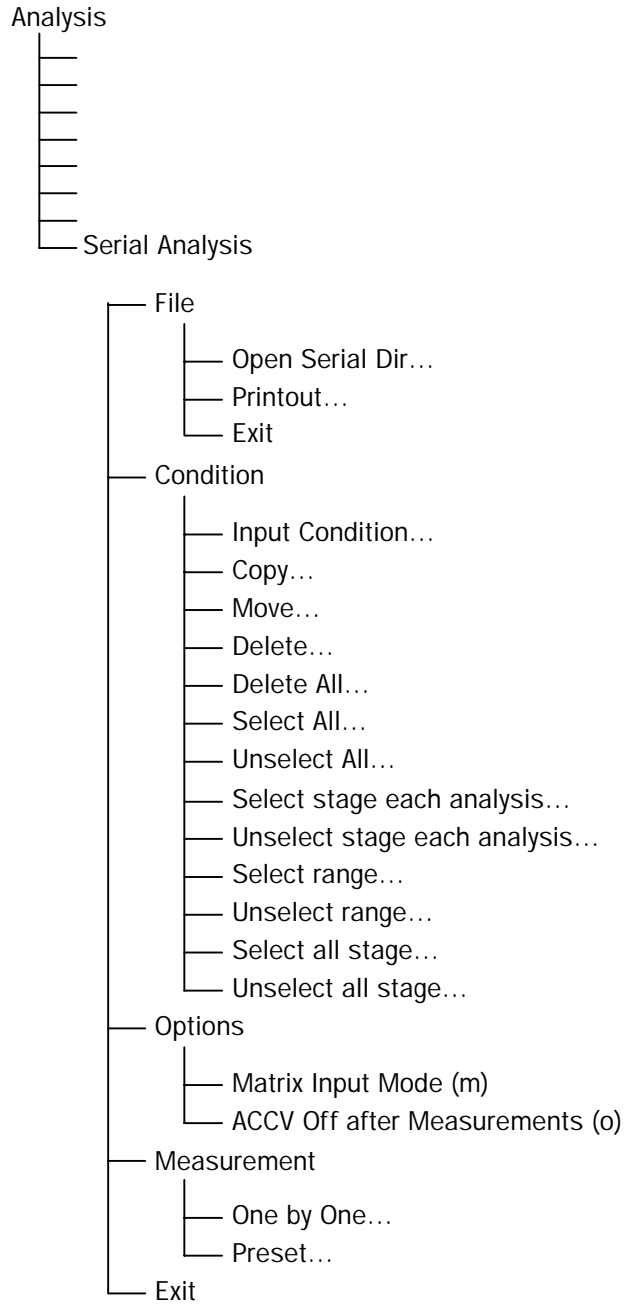
## 2 SPECIFICATIONS AND FEATURES

The following are the specifications and features of the Automatic Serial Analysis Program.

Analyses available:	WDS Qualitative Analysis Map Analysis Line Analysis Quantitative Analysis (of unknown samples) EDS Qualitative Analysis (standard sample analysis not possible) Optional Automatic Particle Analysis Program
Number of automatic serial analysis conditions:	Up to 100 sets of conditions can be stored
Automatic serial analysis conditions that can be changed:	EOS conditions EDS conditions Stage conditions (spot, line, and area) Printout conditions Selection of standard conditions for quantitative analysis
Deleting, copying and moving of automatic serial analysis conditions:	Possible
Displaying processes in progress of automatic serial analysis:	Possible
Specifying accelerating voltage on/off after measurement:	Possible
Other:	Data processing using quantitative, qualitative, map, or line analysis program is possible after measurement with automatic serial analysis program

### 3 PROGRAM COMPOSITION

The automatic serial analysis program is included in the program hierarchy (Analysis in EPMA Main Menu) shown below.

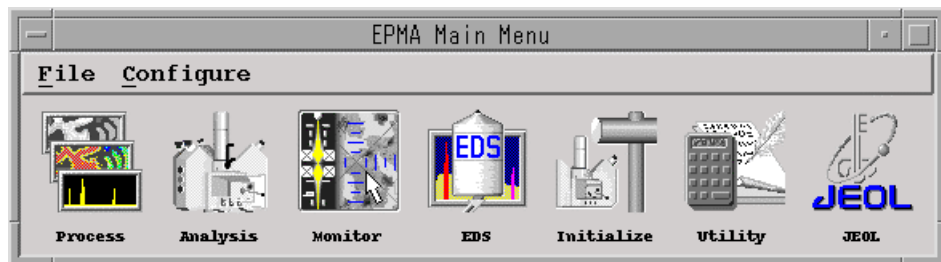


## 4 SERIAL AUTO ANALYSIS WINDOW

The Automatic Serial Analysis Program is operated in the Serial Auto Analysis main window.

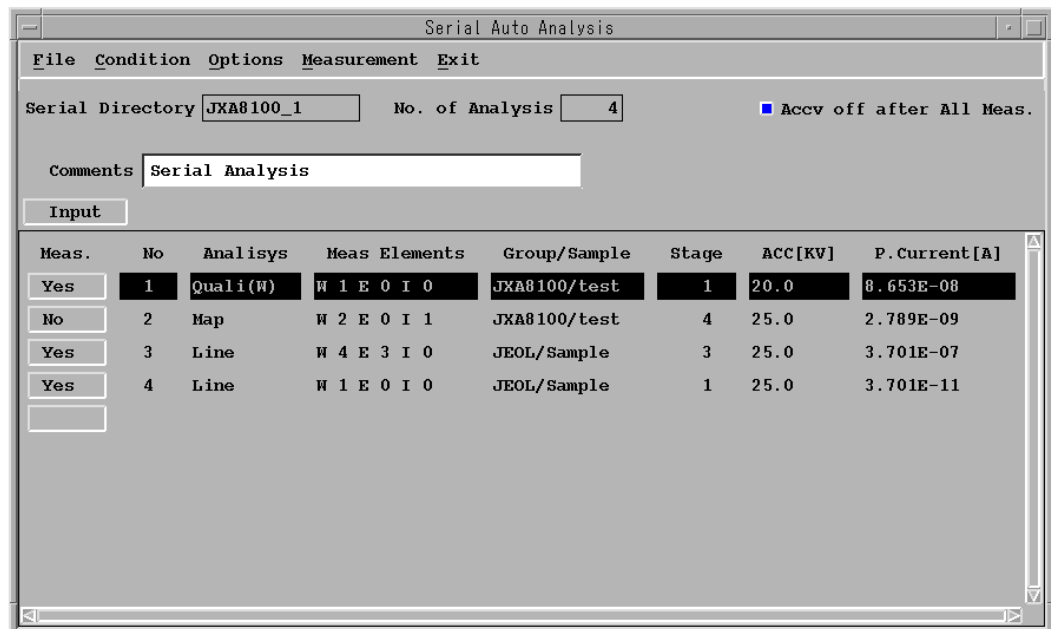
### 4.1 How to Open Serial Auto Analysis Window

1. Open the EPMA Main Menu on the computer display and then click on the **Analysis** icon to display the **Analysis** menu.  
☞ Refer to the instruction manual of the microanalyzer main unit for instructions on how to open the EPMA Main Menu.



**Fig. 1 EPMA Main Menu**


2. Select **Serial Analysis** from the **Analysis** menu.  
The Serial Auto Analysis main window opens as shown in Fig. 2.



**Fig. 2 Serial Auto Analysis main window**

In this window, you find **Serial Directory** displaying the directory name of the serial analysis that is presently selected, **No. of Analysis** that displays the number of recorded serial analyses, **Accv off after All Meas.** which, if set, turns off automatically the accelerating voltage after serial analysis measurement, the **Comments** input box in which you can enter up to 40 characters, and the list of analysis-condition files for each sample.

Up to 100 items for a serial analysis measurement can be stored. Each item can be highlighted by positioning the mouse pointer on the desired item and then clicking on it.

 In Fig. 2, Serial number 1 is highlighted.

Clicking on the **Input** button enables you to change the highlighted item or specify a new condition on the highlighted line.

## 4.2 Menu Bar

The menu bar of the Serial Auto Analysis main window of Fig. 2 has menus necessary for operation of the Automatic Serial Analysis Program. Clicking on any item displays a pull-down menu and makes the following operations available.

### 4.2.1 File

Object	Function
<b>Open Serial Dir...</b>	Displays the Serial Analysis Dir. window (refer to Fig. 3) for operating the previously set conditions in the directory of the Automatic Serial Analysis Program.
<b>Printout...</b>	Prints the present conditions for automatic serial analysis.
<b>Exit</b>	Terminates the input of conditions for automatic serial analysis.

### 4.2.2 Condition

Object	Function
<b>Input Condition...</b>	Displays the Serial Analysis Condition Input window (refer to Fig. 4) for entering and compiling automatic serial analysis conditions for the presently selected (highlighted) item. The <b>Input</b> button of the Serial Auto Analysis main window has the same function as the <b>Input Condition...</b> button.
<b>Copy...</b>	Copies automatic serial analysis conditions. Clicking on this button opens a window for copying.
<b>Move...</b>	Moves automatic serial analysis conditions.
<b>Delete...</b>	Deletes the selected automatic serial analysis conditions. Before deleting of the selected conditions is executed, a confirmation window appears.
<b>Delete All...</b>	Deletes all the automatic serial analysis conditions. Before executing, a confirmation window appears.
<b>Select All...</b>	Specifies <b>Yes</b> in the <b>Meas.</b> column for conditions of all the automatic serial analyses. Before executing, a confirmation window appears.

Object	Function
<b>Unselect All...</b>	Specifies <b>No</b> in the <b>Meas.</b> column for conditions of all the automatic serial analyses. Before executing, a confirmation window appears.
<b>Select stage each analysis...</b>	Enables you to select the stage position on entering matrix conditions. Clicking on this object opens a window for selection of the stage position.
<b>Unselect stage each analysis...</b>	Enables you to deselect the stage position on entering matrix conditions. Clicking on this object opens a window for deselecting the stage position.
<b>Select range...</b>	Enables you to select the measurement range for entering matrix conditions. Clicking on this object opens a window for selecting measurement range.
<b>Unselect range...</b>	Enables you to deselect the measurement range for entering matrix conditions. Clicking on this object opens a window for deselecting measurement range.
<b>Select all stage</b>	Selects all the stage positions for serial analysis conditions for entering matrix conditions.
<b>Unselect all stage</b>	Deselects all the stage positions for serial analysis conditions for entering matrix conditions.

### 4.2.3 Options

Object	Function
<b>Matrix Input Mode (m)</b>	Enables you to specify which analysis is to execute at each point in a matrix of stage positions. In contrast, the usual setting enables you to specify stage conditions for each analysis method. However, this does not function for the map and line analyses.
<b>ACCV Off after Measurements (o)</b>	Specifies turning the accelerating voltage off after serial analysis measurement. The <b>ACCV Off after Measurements (o)</b> item on the Options menu has the same function as the <b>Accv off after All Meas.</b> button on the Serial Auto Analysis main window.

### 4.2.4 Measurement

Object	Function
<b>One by One...</b>	Executes only the serial analysis measurements whose conditions are highlighted. Before executing, a confirmation window appears.
<b>Preset...</b>	Executes from the top the serial analysis measurements whose <b>Meas.</b> selection is <b>Yes</b> . Before executing, a confirmation window appears.

### 4.2.5 Exit

Object	Function
<b>Exit</b>	Terminates the input of conditions for automatic serial analysis.

### 4.3 Objects in the Serial Auto Analysis window

The following functions are available when you perform operations, displays, and entries for Automatic Serial Analysis.

Object	Function
<b>Serial Directory</b>	Displays the name of a directory in which the automatic serial analysis conditions presently selected are stored.
<b>No. of Analysis</b>	Displays the total number of automatic serial analysis conditions recorded in the directory being displayed.
<b>Accv off after All Meas.</b>	Specifies keeping the accelerating voltage on or turning it off after completion of automatic serial analysis.
<b>Input</b>	Selecting <b>Input</b> displays the Serial Analysis Condition Input window shown in Fig. 4, enabling you to enter serial analysis conditions.
<b>Comments</b>	Displays the comments attached to the <b>Serial Directory</b> file being displayed.
<b>Meas. Yes/No</b>	Selects <b>Yes</b> or <b>No</b> for doing measurement.
<b>No</b>	Displays the serial number for automatic serial analysis that is allocated in ascending order.
<b>Analysis</b>	Displays the following types of analysis. <b>Quali (W):</b> WDS qualitative analysis <b>Quali (E):</b> EDS qualitative analysis only for JXA-8200 <b>Line:</b> Line analysis <b>Map:</b> Map analysis <b>Quant:</b> Quantitative analysis <b>Particle:</b> Optional Automatic Particle Analysis Program
<b>Meas Elements</b>	Displays the following types of measurement signals. <b>W:</b> The number of conditions for WDS qualitative scan or elements in WDS quantitative analysis <b>E:</b> The number of conditions for elements in EDS quantitative analysis <b>I:</b> Number of IMS or CAL elements <b>COMPO:</b> Signals of COMPO (composition image of the backscatterd electron image) <b>TOPO:</b> Signals of TOPO (topographic image of the backscatterd electron image) <b>SEI:</b> Signals of SEI (secondary electron image) <b>AUX:</b> AUX (external) signals
<b>Group/Sample</b>	Names of group/sample in which measurement data are stored.
<b>Stage</b>	Displays the number of recorded stage positions.
<b>ACC [KV] P. Current [A]</b>	Displays the accelerating voltage and probe current.

## 5 OPERATIONS

This chapter describes the procedures for automatic serial analysis to be operated from the Serial Auto Analysis window.

### 5.1 Specifying the Directory of Automatic Serial Analysis Conditions

First, create a directory in which you want to save serial analysis conditions. If you have saved multiple serial analysis conditions in each directory, you can choose from them the best analysis conditions for a sample to measure.

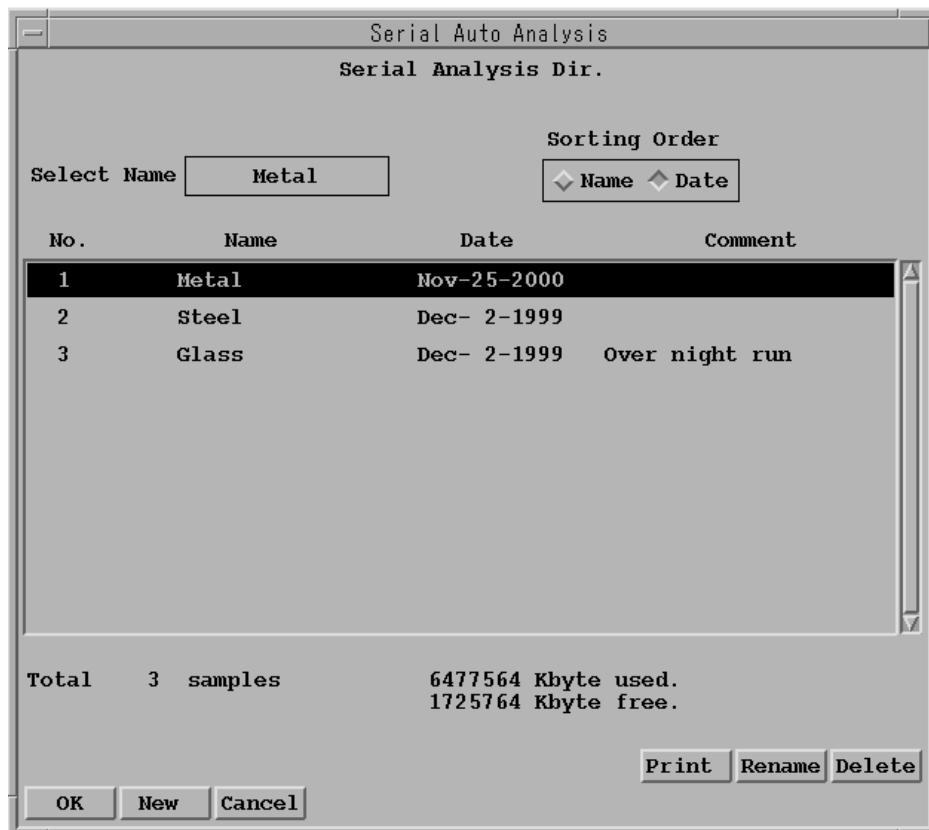
If the directory has already been created, specify it. It is possible to delete an unnecessary directory.

1. Select **File** from the menu bar shown in the Serial Auto Analysis main window (refer to Fig. 2).

The File menu opens.

2. Select **Open Serial Dir...** from the File menu.

The Serial Analysis Dir. window opens as shown in Fig. 3.



**Fig. 3 Serial Analysis Dir. window**

3. Select the desired directory, in which automatic serial analysis conditions are saved, from the directory list in the Serial Analysis Dir. window.

If you want to create a new directory, click on the **New** button. Then enter a name for the new directory in the Serial Analysis Dir. window.

If you want to delete a stored directory, click on the directory in the Serial Analysis Dir. window. It will be highlighted. Then click on the **Delete** button.

— CAUTION —

When a directory is deleted, the files saved in it will be deleted, too. If there are files you do not want to be deleted in a directory, you should move the files to a different directory before deleting the directory.

It is possible to change the name of a directory by using the **Rename** button, or to print the directory list by using the **Print** button. To do this, click on the desired directories in the Serial Analysis Dir. window, as stated above.

The amount of disk space in use and the amount of free disk space are displayed in kilobytes under the directory list.

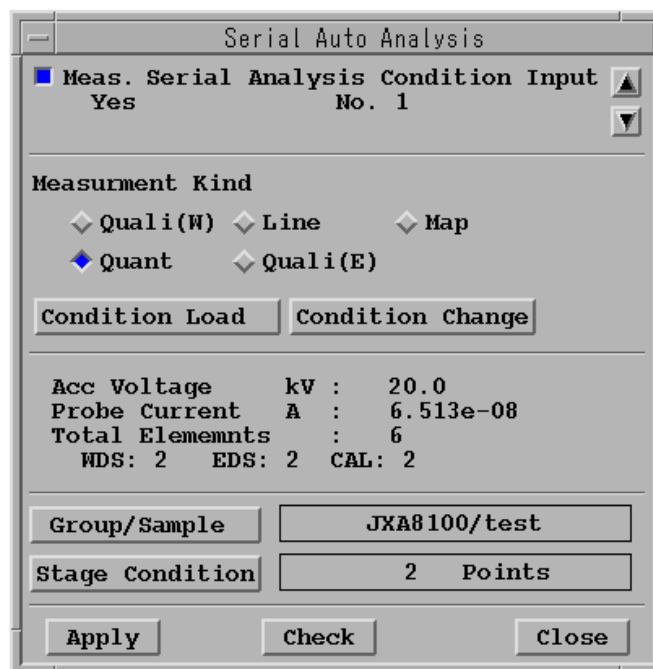
4. Click on the **OK** button.

All the automatic serial analysis condition files saved in the specified directory will be displayed in the list of analysis-condition files on the Serial Auto Analysis main window shown in Fig. 2.

## 5.2 Determining Automatic Serial Analysis Conditions

After specifying a directory of automatic serial analysis conditions, as described in the previous section, create a condition file or edit a condition file saved in the directory, specifying analysis conditions and analysis position, in accordance with the procedure below.

1. Specify an automatic serial analysis condition file in the Serial Auto Analysis main window shown in Fig. 2.
  - If you want to edit a condition file stored in the specified directory, select the desired condition file number from the condition file list in Fig. 2. The selected file number line will be highlighted.
  - If you want to create a new condition file to be stored in the specified directory, move the mouse pointer to the unrecorded file number line in the list of analysis-condition files (the fifth line in Fig. 2) and click on it. The selected file number line will be highlighted.
2. Click on the **Input** button.
  - ✎ Alternatively select **Condition-Input Condition...** from the menu bar. The Serial Analysis Condition Input window opens as shown in Fig. 4.



**Fig. 4 Serial Analysis Condition Input window**

3. Specify measurement conditions by operating the following buttons in the Serial Analysis Condition Input window.
  - **▲ and ▼ buttons**  
Clicking on these buttons in the upper right corner highlights the condition file line above or below the presently highlighted line.
  - **Measurement Kind**  
Select the desired **Measurement Kind**.

Clicking on the **Condition Load** button or **Condition Change** button loads or changes the measurement conditions, respectively.

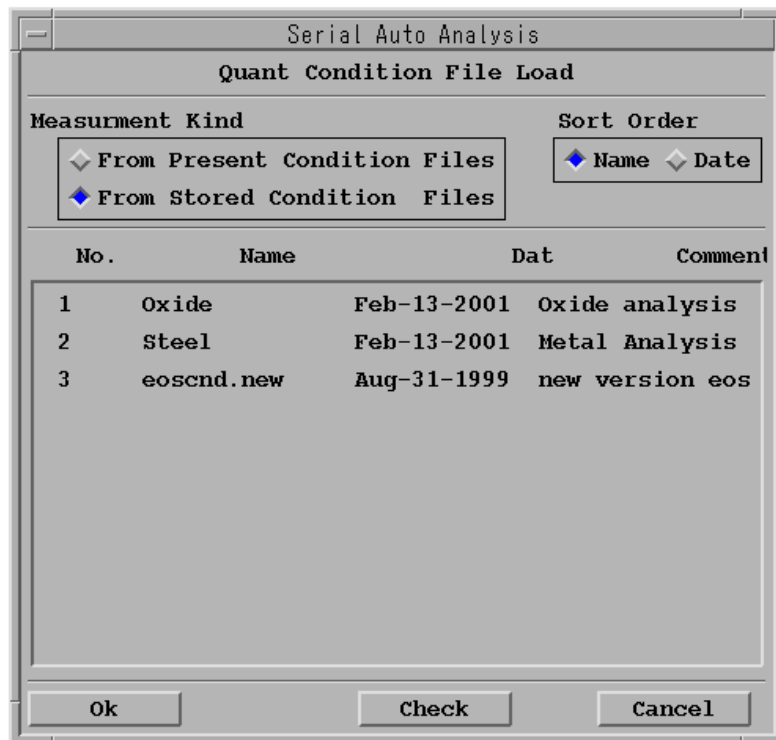
You select from the following measurement kinds.

Button	Function
<b>Quali (W)</b>	WDS Qualitative Analysis
<b>Line</b>	Line Analysis
<b>Map</b>	Map Analysis
<b>Quant</b>	Quantitative Analysis
<b>Quali (E)</b>	EDS qualitative Analysis
<b>Particle</b>	Optional Automatic Particle Analysis

- **Measurement Kind–Condition Load button**

Click on the **Condition Load** button in the Serial Analysis Condition Input window.

The Quant Condition File Load window opens as shown in Fig. 5.




**Fig. 5 Quant Condition File Load window**

Selecting **From Present Condition Files** loads the present measurement conditions. If you have changed the measurement conditions and want to use them for the serial analysis measurement, open the Condition File Load window and click on this **Condition Load** button.

Selecting **From Stored Condition Files** enables you to select a stored measurement condition file from the serial analysis condition list.

If you click on the **Check** button, you can confirm the presently selected conditions.

 The stage conditions cannot be loaded with the **Condition Load** button. They are determined either by the conditions stored under the **Group/Sample** names or by the conditions specified by using **Stage Condition** in the Serial Analysis Condition Input window of Fig. 4.

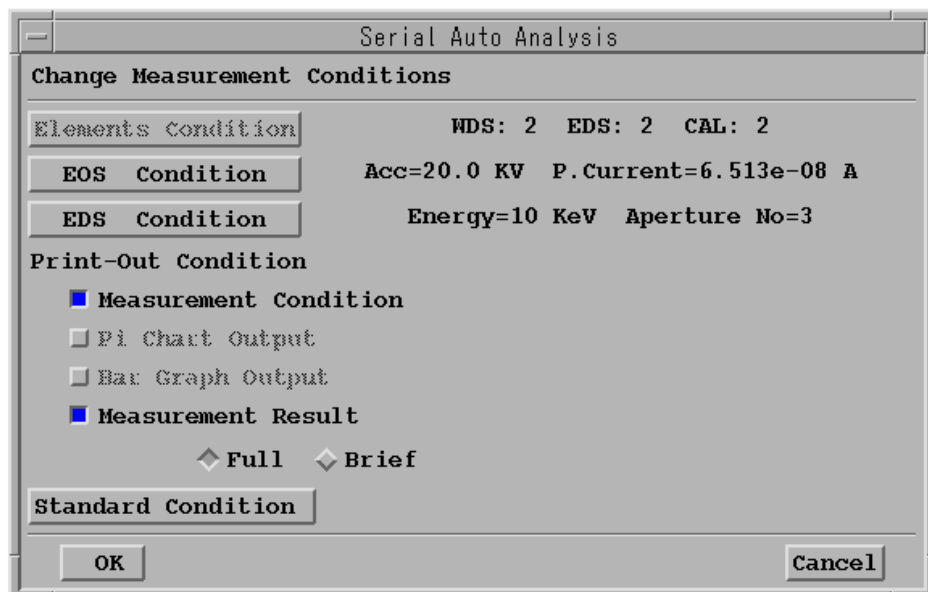
The following conditions are loaded for each measurement.

Button	Function
<b>Quali (W)</b>	WDS Qualitative Analysis WDS spectrometer conditions, EOS conditions and printout conditions
<b>Line</b>	Line Analysis Element conditions, EOS conditions, EDS conditions and printout conditions
<b>Map</b>	Map Analysis Element conditions, EOS conditions, EDS conditions and printout conditions
<b>Quant</b>	Quantitative Analysis Element (including CAI elements) conditions, correction calculation conditions, standard sample names, EOS conditions, EDS conditions, WDS-EDS measurement order and printout conditions
<b>Quali (E)</b>	EDS Qualitative Analysis EDS conditions, EOS conditions and printout conditions
<b>Particle</b>	Optional Automatic Particle Analysis Element conditions, EOS conditions, EDS conditions, particle analysis conditions and printout conditions

- **Measurement Kind-Condition Change** button

Click on the **Condition Change** button in the Serial Analysis Condition Input window.

The Change Measurement conditions window opens as shown in Fig. 6.



**Fig. 6 Change Measurement Conditions window (Quantitative Analysis)**

The following conditions can be changed for each measurement.

Button	Function
<b>Quali (W)</b>	WDS Qualitative Analysis EOS conditions and printout conditions
<b>Line</b>	Line Analysis EOS conditions, EDS conditions and printout conditions
<b>Map</b>	Map Analysis EOS conditions, EDS conditions and printout conditions
<b>Quant</b>	Quantitative Analysis EOS conditions, EDS conditions, standard sample names and printout conditions
<b>Quali (E)</b>	EDS Qualitative Analysis EOS conditions and EDS conditions
<b>Particle</b>	Optional Automatic Particle Analysis EOS conditions and EDS conditions

- **Group/Sample button**

Click on the **Group/Sample** button in the Serial Analysis Condition Input window. You can select the **Group/Sample** name.

The selected **Group/Sample** name will appear in the display box to the right of the button.

- **Stage Condition button**

Click on the **Stage Condition** button in the Serial Analysis Condition Input window. A dialog box appears. In this dialog box, you can select or edit analysis positions (stage positions).

The dialog box is the same as the Stage Condition window that is in each analysis program. Dialog boxes that are displayed differ in their contents depending on the type of analysis. Therefore, when entering information in them, refer to the description of the Stage Condition window in the instruction manual of the respective analysis program.

The number in the display box to the right of the Stage Condition button represents the number of analysis points that have been turned on in the Stage Condition window.

- **Apply button**

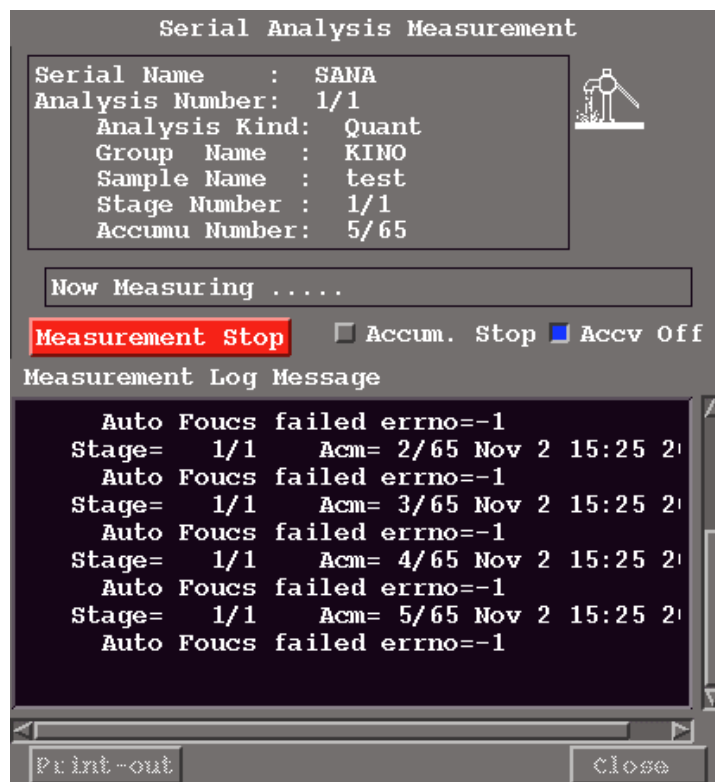
Click on the **Apply** button in the Serial Analysis Condition Input window. The selected or edited measurement conditions will be stored.

4. Select **Measurement–One-by-One...** or **–Preset...** from the menu bar in the Serial Auto Analysis main window of Fig. 2.  
A window for starting the measurement will appear.
5. Click on the **Acquire** button in the window for starting the measurement.  
Measurement starts.  
When the measurement mode of the Stage Condition window of each analysis program is **One-by-One**, only the analysis items highlighted in the Serial Auto Analysis window will be measured.

When the measurement mode is **Preset**, the analysis items whose **Meas.–Yes/No** buttons are set to **Yes** will be measured in succession.

The Serial Analysis Measurement window is displayed during measurement, as shown in Fig. 7. It tells you the progress of an automatic serial analysis such as **Analysis Kind**, **Group Name**, **Sample Name**, **Stage Number** and **Accumu** (accumulation) **Number**. If any error should happen, it will be displayed in this window.

- ✎ You cannot close the Serial Analysis Measurement window during automatic serial analysis.
- ✎ The approximate disk space that is used for storing automatic serial analysis conditions will be shown. If the disk does not have sufficient free space, a warning message will be displayed.



**Fig. 7 Serial Analysis Measurement window**

To interrupt measurement, click on the **Measurement Stop** button.

To stop accumulation, turn on the **Accum. Stop** button by clicking on it.

To turn off the accelerating voltage, select **Accv Off** by clicking on it.

6. Click on the **Print-out** button.

The information under **Measurement Log Message** will be output to the printer.

## 5.3 Determining Automatic Serial Analysis Matrix Conditions

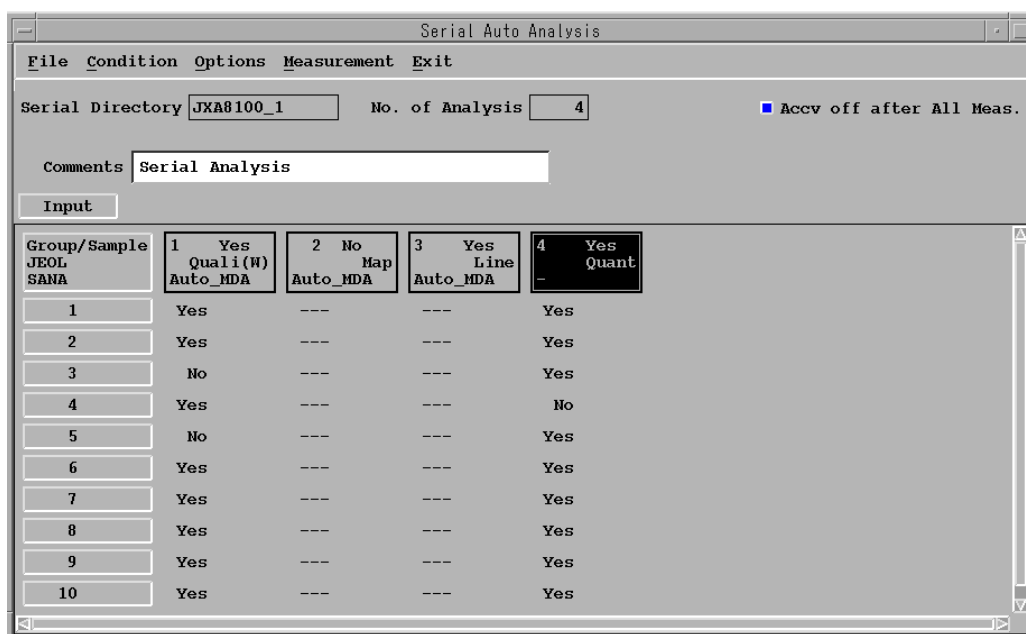
You can use matrix function in Automatic Serial Analysis. Using this function facilitates specifying different analysis methods for a sample. However, it is only possible for point analysis in WDS Qualitative and Semi-Quantitative Analysis, EDS Qualitative and Semi-Quantitative Analysis, and Quantitative Analysis. You cannot use this for Map Analysis, Line Analysis and Particle Analysis.

### 5.3.1 Opening Serial Auto Analysis matrix window

- ◆ Select **Options–Matrix Input Mode (m)** from the menu bar in the Serial Auto Analysis main window (refer to Fig. 2).

The Serial Auto Analysis matrix window appears as shown in Fig. 8.

In this window, stage numbers vary in the vertical direction, while analysis kinds and conditions vary in the horizontal direction. You can determine conditions for stage position, and analysis kind and conditions.



**Fig. 8 Serial Auto Analysis matrix window**

### 5.3.2 Storing analysis position reference

1. Click on the **Group/Sample** button at the upper left corner of the condition list in the Serial Auto Analysis matrix-specifying window.

A window appears.


2. Specify the desired group and sample whose stage-position conditions are to be used as references.

If the specified reference **Group/Sample** has stage conditions for point analysis, its recorded stage position numbers will be displayed at the left end of the list.

If the specified **Group/Sample** has no stage condition for point analysis, a stage position input window opens, and in it you store stage positions necessary for reference.

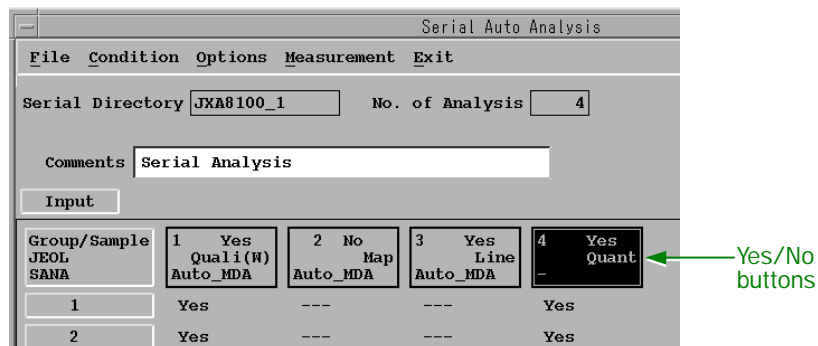
### 5.3.3 Entering analysis kind

1. Click on the **Input** button in the Serial Auto Analysis matrix window.  
The **Serial Analysis Condition Input** window opens.
2. Specify measurement kinds and analysis conditions, and the names of **Group** and **Sample** in which to save measurement data in this window.
  - If you do not specify a file in which to save measurement data, the measurement data will be saved in the **Group** and **Sample** that you specified in the analysis position reference.
  - If you want to specify a file in which to save measurement data, be sure to avoid using the same file name for measurement kinds such as qualitative analysis and quantitative analysis and analysis conditions as the file name. If the file name is the same, click on the **Store Group/Sample** button; then create another file with a different file name to save measurement data.

 Before changing a file name to save measurement data, if there are any stage conditions for point analysis in the selected file, a warning message appears, asking whether or not to overwrite.

### 5.3.4 Specifying Yes or No for measurement kinds and analysis conditions

- ◆ Select **Yes** or **No** by clicking on the **Yes/No** button for analysis execution as shown in Fig. 9.  
Measurement kinds and analysis conditions that you specified **Yes** will be executed and those that you specified **No** will not be executed.



**Fig. 9 Yes/No buttons**

### 5.3.5 Condition menu for Serial Auto Analysis matrix window

The Condition menu of the Serial Auto Analysis matrix window is as follows.

Item	Function
<b>Select stage each analysis...</b>	Selecting this allows you to set the presently selected stage for measurement kind and analysis conditions to <b>Yes</b> . Selecting this opens a dialog box. Enter the desired stage range, and then click on the <b>OK</b> button.
<b>Unselect stage each analysis...</b>	Selecting this allows you to set the presently selected stage for measurement kind and analysis conditions to <b>No</b> . Selecting this opens a dialog box. Enter the desired stage range, and then click on the <b>OK</b> button.
<b>Select range...</b>	Selecting this allows you to specify the range to select for the number of measurement kind and analysis conditions, and the stage numbers. Selecting this opens a dialog box. First specify the number of measurement kind and analysis conditions to select, next enter the range of stage to select, and then click on the <b>OK</b> button.
<b>Unselect range...</b>	Selecting this allows you to specify the range to unselect for the number of measurement kind and analysis conditions, and the number of stage. Selecting this opens a dialog box. First specify the number of measurement kind and analysis conditions to unselect, next enter the range of stage to unselect, and then click on the <b>OK</b> button.
<b>Select all stage</b>	Selecting this allows you to set all the presently displayed stages for measurement kind and analysis conditions to <b>Yes</b> . Selecting this opens a dialog box. Click on the <b>OK</b> button in it.
<b>Unselect all stage</b>	Selecting this allows you to set all the presently displayed stages for measurement kind and analysis conditions to <b>No</b> . Selecting this opens a dialog box. Click on the <b>OK</b> button in it.

## 6 CAUTIONS

### 6.1 Stage Conditions

#### 6.1.1 Specifying the same stage conditions as the stored ones

If you specify the stage number that is already used in an identical **Group/Sample** name and in an identical analysis, the later measurement data is kept and the former measurement data is deleted. However, if you do the same operation in a different analysis, no problem occurs even if you specify an identical stage number.

#### 6.1.2 Specifying stage conditions in automatic serial analysis

Only the specified stage numbers are saved as automatic serial analysis conditions. The conditions of the stage numbers are not saved. Therefore, if you change the stage conditions for the specified number using an analysis program, measurement proceeds under the changed conditions.

### 6.2 Changing Measurement Conditions during Automatic Serial Analysis

Respective measurement conditions are automatically loaded and updated during automatic serial analysis. If you change measurement conditions during measurement, the system may not operate properly. Therefore, never make such a change.

### 6.3 Changing Automatic Serial Analysis Conditions during Automatic Serial Analysis

In automatic serial analysis, measurement condition files are automatically loaded immediately before each measurement, and the system is automatically set to the loaded measurement conditions. If you change the preset automatic serial analysis conditions during automatic serial analysis, the system may not operate properly. Therefore, never make such a change.

### 6.4 When Window Does Not Close Despite Selecting Exit

If the Serial Auto Analysis main window of Fig. 2 does not close even when you click on the **Exit** button in the window, close the Serial Analysis Measurement window of Fig. 7.

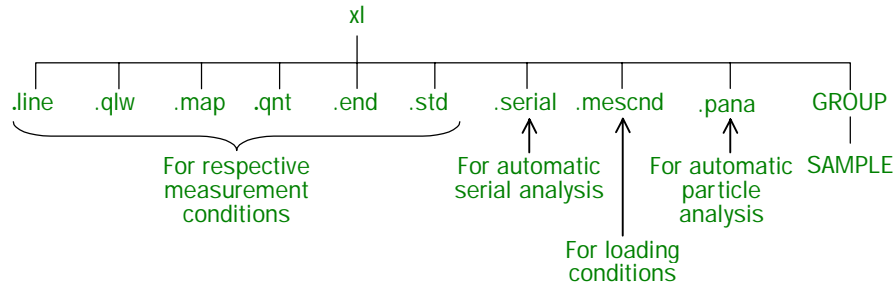
After you carry out a quantitative analysis, close the `x_text` window which displays the result of the quantitative analysis.

## 7 APPENDIX

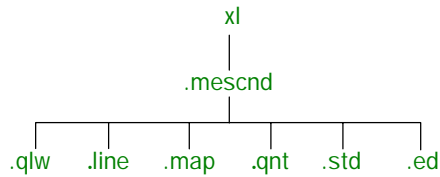
Given below is reference information for using the Automatic Serial Analysis Program.

### ■ Directory structure of software to be used in JXA-8100/8200 series electron probe microanalyzers

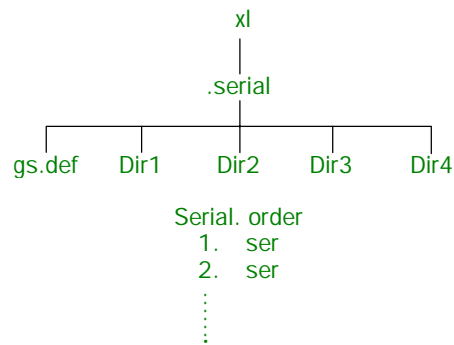
#### • Basic structure



#### • Directories for loading and saving measurement conditions



#### • Directories for loading and saving automatic serial analysis conditions



 Dir1 to Dir4 are directories for automatic serial analysis.