

JXA-8100/8200

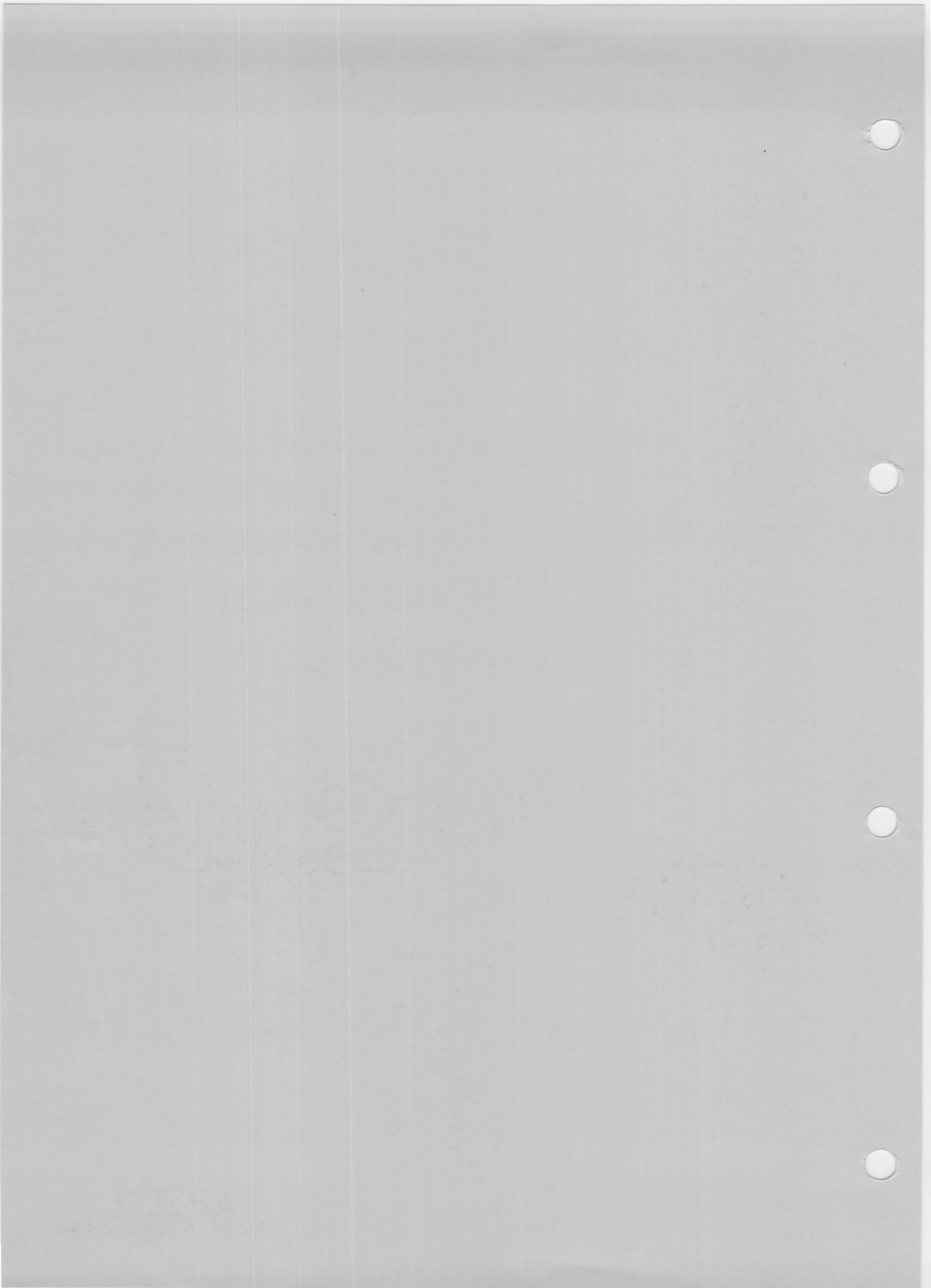
**ELECTRON PROBE
MICROANALYZER/
WD/ED COMBINED
MICROANALYZER**

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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JEOL

Serving Advanced Technology



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- (1) Any breach on your part of any of the provisions hereof,
- (2) Occurrence of seizure or provisional seizure or provisional injunction on your property; auctioning of your property; bankruptcy, corporate liquidation, and filing for corporate reorganization on your part; or proceedings taken against you for collection of tax delinquency.

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Article 12. (Discussion in Good Faith)

Matters not stipulated herein shall be discussed in good faith and settled between you and JEOL.

Notes on Disposal for Business Users

Attention:

Your product is marked with this symbol. It means that used electrical and electronic products should not be mixed with general household waste. There is a separate collection system for these products.



■ In the European Union

This symbol means that electrical and electronic equipment, at the end of its life, should be disposed of correctly.

In the European Union there is a separate collection system for used electrical and electronic products. Please help us to conserve the environment we live in!

Electrical and electronic appliances and machines often contain materials which, if handled or disposed of incorrectly, are potentially hazardous to human health and to the environment. They are, however, essential for the correct functioning of your appliance or machine. Therefore, please do not dispose of your old machine or appliance together with your household waste.




Your JEOL product is designed and manufactured with high-quality materials and components which can be recycled and reused. If the product is used for business purposes and you want to discard it, please contact your JEOL dealer, who will advise you about the end-of-life disposal arrangements.

■ Outside the European Union

If you wish to discard this product, please contact your local authorities and ask for the correct method of disposal.

NOTATIONAL CONVENTIONS AND GLOSSARY

■ General notations

- CAUTION - :** Points requiring great care and attention when operating the device to avoid damage to the device itself.
- : Additional points to remember 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, commands, or parameters displayed on the screen are enclosed in double quotation marks.
- "File" - "Exit" :** Selecting a menu item from a pulldown menu is denoted by linking the menu and the item with a dash (-).
For example, "File" - "Exit" means selecting Exit from the File menu.

■ Mouse terminology

- Mouse pointer:** A mark, displayed on the screen, which moves following 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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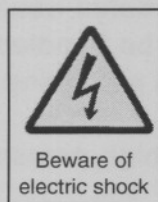
SAFETY PRECAUTIONS

For the proper use of the instrument, be sure to read the following safety precautions prior to starting operation or maintenance. They contain important information related to safety. Contact your JEOL service office whenever you are unclear about any operation or maintenance.

The signs for safety precautions and their meanings used in this instruction manual are as follows:

-  **DANGER:** An imminent hazardous situation which, if not avoided, will result in death or serious injury.
-  **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 or moderate injury. Also could mean a potentially hazardous situation which could result in serious damage to facilities and acquired data.

Parts of this instrument where safety precautions are required are labeled with illustration signs as shown below. Do not touch the parts labeled with these signs:



We request that you use the instrument in a proper manner and in the scope of the purposes and usage described in the brochures and operation manuals. Never make modifications such as removing protective parts, exchanging component parts and defeating safety measures.

The safety precautions for the optional attachments of this instrument are given in the individual instruction manuals as required.



WARNINGS

■ General warnings

- Never expose shielded parts, remove component parts and modify them, or needlessly dismantle them. To do so would expose you to a thermal, electrical or radiation hazard. Never remove the grounding wire from a part that is liable to cause an electric shock or connect it to an unspecified location.
- Never stand on the frame of the equipment, or the operation console table or chair when carrying out routine operations, maintenance or checks.
- Switch off the power before carrying out maintenance or checks on a live part of the equipment or in the vicinity thereof, due to the risk of an electric shock.
- If it is necessary to re-install the equipment in a different location, carry out a detailed survey of the location to which the equipment is to be moved, then consult JEOL's service center.

■ Warnings concerning nitrogen gas or P-10 gas contained in a high pressure gas cylinder

- Dry nitrogen gas and P-10 gas for a flow proportional counter is contained in a high-pressure gas cylinder, and must be handled very carefully. Be sure to observe the rules and precautions pertaining to the handling of high-pressure P-10 gas.

Carry out the following checks when installing a high pressure gas cylinder.

- (1) There is no oven or a heating appliance in the vicinity of the gas cylinder.
- (2) There is no electrical wiring in the vicinity of the gas cylinder.
- (3) The gas cylinder is installed on a dedicated stand in such a way that it cannot topple over, or attached to a wall with a chain.
- (4) The temperature in the place where the gas cylinder is installed does not exceed 40 °C.

Take great care to protect the gas cylinder from impacts when installing it. After installing the gas cylinder, be sure to install the cylinder valve open/close handwheel to enable the flow of gas to be cut off in an emergency.

When replacing a gas cylinder, check the expiration date indicated on the replacement cylinder, and use a cylinder that has passed the pressure withstand test.

- To avoid possible injury in the event that the pressure gauge or the pressure-reducing valve breaks and fragments fly about, do not stand in front of the pressure gauge when opening the cylinder valve open/close handwheel, operating the pressure control handwheel to adjust the pressure, or reading the pressure gauge. Be sure to stand obliquely in front of it.

- **Do not abruptly open the cylinder valve or abruptly apply pressure to the pressure-reducing valve or the pressure gauge. Slowly turn the cylinder valve open/close handwheel about one half a turn; verify that the primary pressure rises; then open the cylinder valve fully.**
- **When handling even a small amount of dry nitrogen gas or P-10 gas in a room, leave the windows and doors open to ensure adequate ventilation.**
 - (1) Although nitrogen gas is inert and harmless, if a large amount of nitrogen gas leaks into a sealed room, an oxygen deficiency will occur, resulting in the risk of death by suffocation.
 - (2) P-10 gas is argon gas that contains about 10% of methane (which is flammable), so handle it according to the ordinances and rules existing at the installation site. Also, do not use a gas other than P-10 as the detection gas for a gas flow counter.

■ **Warnings concerning the magnetic field in the vicinity of the ion pump**

- **A person who wears a pacemaker or other medical appliance can be affected by the magnetic field generated by the ion pump magnet, so ensure that persons wearing such appliances keep well away from equipment on which an ion pump is installed.**



CAUTIONS

■ General Cautions

- If an abnormality occurs in the equipment, stop the equipment immediately, then contact your nearest JEOL service center.
- In the event of a sudden power failure, the equipment will stop operating. Also, if the supply of water is cut off while the equipment is operating, the entire equipment apart from the computer will stop automatically. Once the electric power and water supply are restored, restart the equipment after turning off the switches. If the procedure seems unclear, contact your nearest JEOL service center.
- The electron optical column is mounted on the column mount frame via a vibration-isolation device. When you operate a knob, the electron optical column sways a little, resulting in a clearance occurring between the vibration-isolation device and the frame. Be careful not to get your fingers caught in this clearance.
- Take care not to touch the drive motor of the wavelength dispersive X-ray spectrometer (WDS) while the WDS is being driven.
- To prevent an accident or a breakdown of the equipment, take care not to touch any protrusions on the OM television camera at the front of the basic unit or the EDS detector at the top left of the front panel of the basic unit. Always leave the covers of the main panel closed except when you operate the controls on these panels. Also, always remove the specimen exchange rod from the specimen chamber when not performing specimen exchange.
- To prevent an accident or a breakdown of the equipment, be careful not to trip over or step on a cable or hose when you walk behind the basic unit, operation and display panel, or similar location.
- Before replacing the specimen, the WDS slit, one of the various lamps, or other components carefully read the following and also the precautions accompanying the descriptions of the various operation methods in the instruction manual.
- This equipment does not produce noise or vibration that is harmful to the human body. However, if you detect an abnormality when using the equipment, contact your local JEOL service center.

■ Caution concerning cleaning

- For cleaning the components of the equipment, use a cleaning liquid that has excellent cleaning power, contains few impurities, is incombustible and highly volatile, and does not harm the human body even when highly concentrated. When using even a small quantity of cleaning liquid indoors, provide adequate ventilation by leaving the windows and doors open.
When handling cleaning liquid, be sure to wear gloves that are resistant to the cleaning liquid used.

■ Caution concerning bringing the Column to Atmospheric Pressure

- When venting has already started after either the GUN VENT button or the SPEC VENT button was pressed, never press the other VENT button additionally. If you do so, the chamber corresponding to the VENT button you pressed later will start venting abruptly, causing trouble to take place.
When you wish to vent the entire column after you happened to press the GUN VENT button or the SPEC VENT button and venting started, press the button again to change the present venting mode to the evacuation mode, perform the evacuation (refer to Sect. 1.2), make sure that the color of the HV button on the observation display changes to blue (i.e., the evacuation is complete) and press both the VENT buttons at the same time.

■ Cautions concerning electron gun and high-voltage cable

- Never remove the high-voltage cable from the electron gun. Never move the safety switch of the electron gun. It is possible that these operations could cause serious electrical shock.
- Never pull the high voltage cable. Pulling the cable will cause a loss of electrical contact or damage the cable.

■ Cautions concerning filament replacement

- When using a footstool while replacing the filament, use a stable footstool.
- Wait for about 1 minute after pressing the GUN VENT button before opening the electron gun chamber, because it takes about 30 seconds for the voltage of the electron gun to fall to 1/1000 after the accelerating voltage is switched off.
- If the filament is burnt out, the Wehnelt unit and cap will be hot immediately afterward, so do not touch these parts. If you do, you may receive a burn. Before replacing the filament, leave the Wehnelt unit at atmospheric pressure for at least 30 minutes to allow it to cool, and confirm that it has cooled adequately.

■ Cautions concerning replacement of the OM/OMT lamp

- Before replacing the lamp, wait for about 10 minutes. If the lamp goes open circuit, both the lamp itself and other parts in the vicinity will be considerably hot immediately afterward.
- To prevent burning yourself, wear thick gloves when adjusting the position of the lamp.

■ Caution concerning removal of the WDS cover

- When removing the spectrometer cover, take care to prevent the cover from dropping. Place the removed spectrometer cover on a level surface in a place where there is no danger of it dropping. The spectrometer cover weighs about 7 kg.

■ Caution concerning replacement of the WDS slit

- Before replacing the slit, switch off the high voltage of the X-ray detector to ensure that you do not receive an electric shock.

■ Caution concerning the xenon-filled proportional counter

- Be very careful when handling the xenon-filled proportional counter (XPC) or H-type xenon-filled proportional counter (XPCH) that uses a beryllium film for the window because beryllium dust or vapor is toxic.

■ Caution concerning replacement of gas flow proportional window film

- Never touch the window film of a new window film base. When inserting the new window film base into the proportional counter, take great care so that the window film faces the proportional counter window side to avoid damage to it. When you need to rotate the window film base for positioning the slit parallel with the window, do this after you detach it from the proportional counter window.

■ Caution concerning TAP analyzing crystals

- The compound TAP (Thallium Acid Phthalate), used as the analyzing crystals, is toxic, so do not touch it for any reason.

■ Cautions concerning replacement of the WDS illumination lamp

- After setting the OPE PWR/OFF switch to OPE PWR, never touch the interior of the X-ray spectrometer as there is a risk of electric shock.
- Allow the lamp to cool down adequately before removing it.

■ Cautions concerning replacement of the illumination lamp in the specimen chamber

- When withdrawing the specimen stage, pull it out gently and slowly. When pushing in the specimen stage, take care not to get your fingers caught between the specimen stage and the specimen chamber.
- Allow the lamp to cool down adequately before removing it.

■ Cautions concerning specimen holder

- The Cd standard sample, which is part of the standard specimen holder, is toxic, so do not touch it directly when handling or polishing.
- Care should be taken in mounting a 100 mm square specimen on the holder.
If the specimen is set with a portion protruding beyond the range of the analysis area scale plate, the part of the protruding specimen may contact the inner wall of the specimen chamber and damage the specimen stage, when the stage is driven.

■ Cautions concerning replacement of the specimen

- To avoid any electrical accidents, be sure to turn off the accelerating voltage before carrying out this job.
- Install the specimen holder securely on the specimen-exchange rod to prevent it from dropping off the specimen-exchange rod.
- When withdrawing or pushing in the specimen stage at replacement of the specimen by draw out method, take care not to get your fingers caught between the specimen stage and the specimen chamber.
- When the specimen exchange is complete, be sure to remove the specimen exchange rod to avoid unexpected accidents and attach the cap (for GS no cap is provided).

■ Caution concerning the liquid nitrogen trap (LNT) and the liquid nitrogen baffle (LNB)

- When replenishing the liquid nitrogen in the LNT or LNB tank, or discharging it from one of these tanks, take care that liquid nitrogen does not get on your skin or splash about.

■ Cautions concerning the EDS detector

- If it is necessary to install or remove the EDS detector, contact JEOL's service center. Do not attempt to carry out this work yourself.
- When using a footstool while replenishing liquid nitrogen in the EDS detector tank, use a stable footstool. When filling the tank with liquid nitrogen, take care that liquid nitrogen does not get on your skin.

- Be very careful when handling an EDS detector that uses a beryllium film for the window because beryllium dust or vapor is toxic.

■ Cautions concerning replacement of objective lens aperture foil

- The objective lens aperture foil is connected to the probe-current stabilization circuit. Before replacing the aperture foil, be sure to turn off the OPE PWR/OFF switch to avoid electric shock and damage to the circuit.
- When mounting the aperture foil, use care not to deform or damage it. Make certain that the aperture foil is free from any contamination.

■ Cautions concerning the objective-lens cooling oil and high-voltage tank insulating oil

- The objective-lens cooling oil and the high-voltage tank insulating oil are the same oil. This oil has the following properties, so obtain an understanding of these properties before using the oil.

Chemical name:	Petroleum-based hydrocarbon
Composition:	100% lubricating base oil
Flash point:	142 °C
Volatility:	None
Spontaneous ignition (spontaneous ignition, reaction with water):	None
Carcinogenicity:	None

When disposing of this oil, contact JEOL's service center and use a suitable disposal method.

■ Cautions concerning oil rotary pump

- Never pull out the rubber hose of the oil rotary pump while the pump is operating. If you do so, the oil in the oil diffusion pump will flow in the reverse direction and enter the electron optical column, resulting in a major breakdown.
- If you leave the oil rotary pump running with insufficient oil in it, the pump may be irreparably damaged. You can operate the pump normally until the oil level falls to the lower limit of the oil level indicator, but be sure that the oil level does not fall below this level.

■ Caution concerning Polaroid film

- Read the instructions provided with the Polaroid film for the precautions concerning the Polaroid film developing liquid, coating material and roller-cleaning liquid.

PRECAUTIONS CONCERNING INSTALLATION AND MAINTENANCE**■ Optional equipment to be procured locally**

The equipment and parts to be procured locally must bear the CE mark indicating that they conform to the EU specifications.

■ Installing and adjusting the equipment

The installation and adjustment of the equipment are performed by JEOL's service engineers.

■ Installing and adjusting attachments

The installation and adjustment of attachments are performed by JEOL's service engineers.

- ① Attachments made by JEOL: A service engineer is dispatched from JEOL's service center to perform installation and adjustment.
- ② Equipment purchased from a manufacturer other than JEOL: ordinarily, a service engineer from JEOL's service center and also a service engineer from the manufacturer are dispatched to the customer's premises to carry out installation and adjustment.

■ Room in which the equipment is to be installed

- ① Install a suitable electrical distribution board, ventilation equipment, water supply and drainage facilities, and lighting equipment in the room where the equipment is to be installed.
- ② Observe the specifications concerning the allowable environment (temperature, humidity, vibration, stray magnetic fields, and other conditions) in the room in which the equipment is to be installed.

■ Treating waste materials and equipment

Before disposing of the following materials and equipment, contact JEOL's service center, and treat the materials and equipment using a suitable method.

- ① Basic unit and various auxiliary equipment
- ② High-voltage tank insulating oil and objective-lens cooling oil
- ③ Vacuum pump oil

■ Maintaining and inspecting the equipment

In order to maintain the performance of the equipment, it is recommended that you have JEOL's service engineer carry out maintenance and inspection.

- ① If you maintain and inspect the equipment, record and keep the results.

- ② Maintenance that can be done by the customer is limited to the following. When carrying out maintenance on the optional attachments, refer to the respective instruction manuals.

Before carrying out this maintenance, however, undertake a training course given by the service engineer, then carry out maintenance in accordance with the relevant items in the instruction manual. Have work other than that listed below done by JEOL's service center.

Replacement of the electron gun filament, electron optical system axis alignment, replacement of the objective lens aperture, lubrication of the oil rotary pump and inspection of the V belt, inspection of the vacuum rubber hose, replacement of the nitrogen gas cylinder, replacement of the specimen chamber illumination lamp, replacement of the window foil of the gas flow proportional counter, replacement of the P-10 gas cylinder, replacement of the spectrometer illumination lamp, replacement of the OM illumination lamp, maintenance of the computer section (the range indicated in the instruction manuals of the computer and peripheral equipment).

- ③ Tubes for cooling water or cooling oil last not more than five years in an ordinary installation room and not more than three years in a clean room. If the tubes are used longer than the lifetime specified above, a liquid might leak out from cracks in the tubes, thus causing adverse effects on the installation environment. Be sure to contact your local JEOL service center and have its service engineer replace the tubes within the specified lifetime.

PRECAUTIONS FOR USE

Important precautions, which, if not followed, may result in damage to the device itself, are described below.

- When venting has already started after either the GUN VENT button or the SPEC VENT button was pressed, never press the other VENT button additionally. If you do so, the chamber corresponding to the VENT button you pressed later will start venting abruptly, causing trouble to take place.

When you wish to vent the entire column after you happened to press the GUN VENT button or the SPEC VENT button and venting started, press the button again to change the present venting mode to the evacuation mode, perform the evacuation (☞ Sect. 1.2), make sure that the color of the HV button on the observation display changes to blue (i.e., the evacuation is complete) and press both the VENT buttons at the same time.

- After the accelerating voltage is turned off, it takes about 30 seconds for the voltage of the electron gun to fall to 1/1000 of the previous value. Therefore, wait for about one minute after pressing the GUN VENT button before opening the electron gun chamber.
- Be sure to wear polyethylene film gloves when handling cleaning liquid.
- Never touch the tip of the filament. Use care not to bend the filament.
- The objective lens aperture foil is connected to the probe-current stabilization circuit. Before replacing the aperture foil, be sure to turn off the OPE PWR/OFF switch to avoid electric shock and damage to the circuit.
- When mounting the aperture foil, use care not to deform or damage it. Make certain that the aperture foil is free from any contamination.
- Never remove any of the rubber hoses of the oil rotary pump while the instrument is in operation. If you remove one during operation by mistake, oil in the oil diffusion pump will stream back into the microscope column, causing serious trouble.
- The oil rotary pump may be operated until the oil level reaches the lower limit of the level indicator. Do not let the oil level fall below the lower limit. Running the pump with the oil level below the lower limit will damage the pump.
- Prior to removing the gas-flow proportional counter, memorize how the high-tension lead, gas tubes, and grounding wire are presently arranged (☞ Figs. 8.3 and 8.4). When replacing the proportional counter, arrange the lead, gas tubes and wire in the same way as before. Take care not to apply excessive force to the entire X-ray detector part when removing or re-installing the proportional counter.

- Make sure that the arrangement of the high tension lead, grounding wire, and gas tubes is the same as before removing the proportional counter (☞ Fig. 8.4 “Good” for X-ray spectrometers other than H-type and Fig. 8.3b for H-type X-ray spectrometer). If they are laid “incorrectly” (differently), the X-ray detector will not drive smoothly.
- Never touch the window film of a new window film base. When inserting the new window film base into the proportional counter, take great care so that the window film faces the proportional counter window side to avoid damage to it. When you need to rotate the window film base for positioning the slit parallel with the window, do this after you detach it from the proportional counter window.