

**MEIJI
TECHNO** **TM400** Series

ADVANCED EDUCATION MICROSCOPE

INSTRUCTION MANUAL



MEIJI TECHNO CO.,LTD.

JAPAN

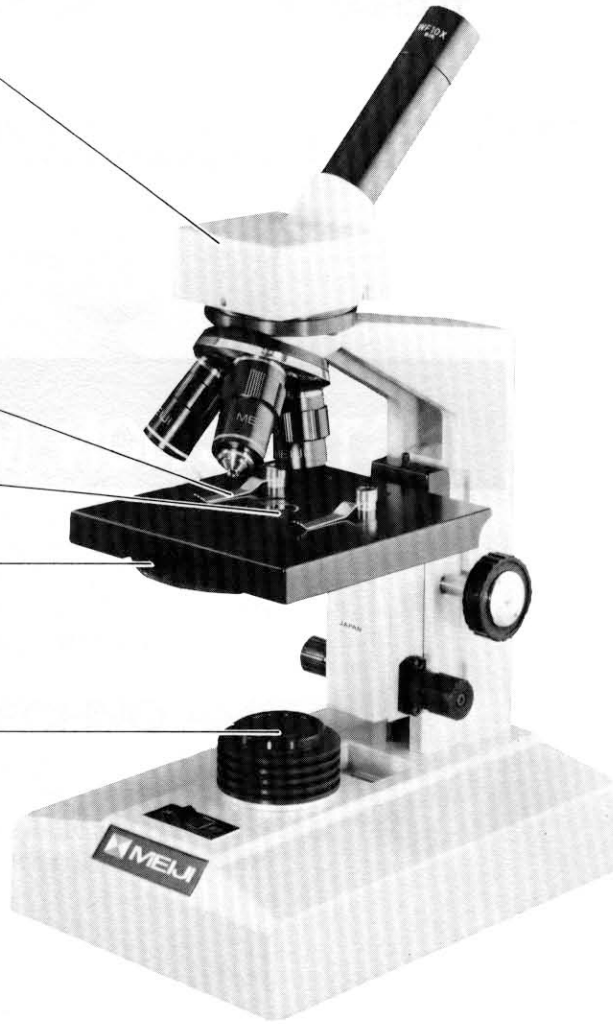
Monocular head

Stage clips

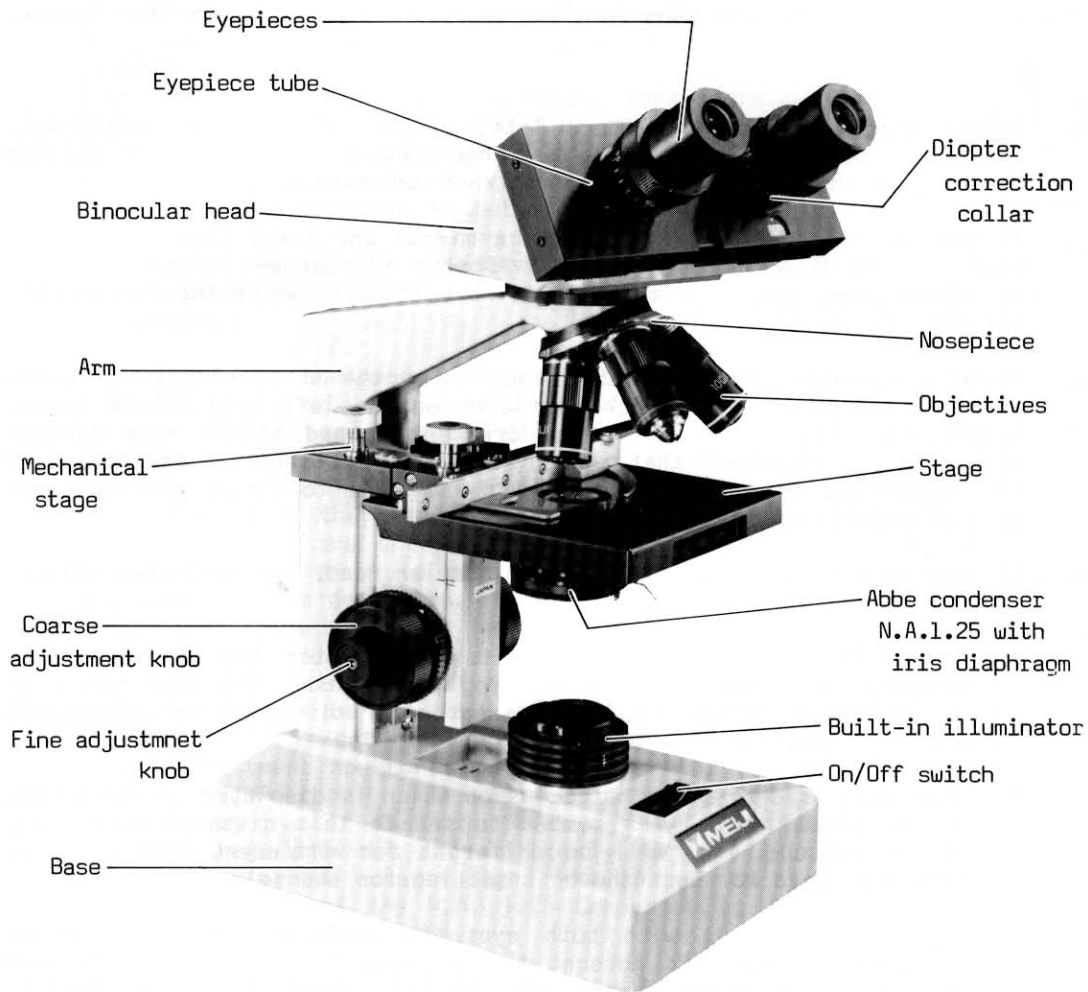
Built-in
N.A. 0.65 condenser

Disc diaphragm

Built-in illuminator



Model TM-420



Model TM-460

THE USE AND CARE OF
"MEIJI" TM400 SERIES MICROSCOPE

UNPACKING:

The microscope is supplied in a styrofoam container. The objectives, eyepiece(s), a bottle of immersion oil and a filter for TM440, TM450, TM460, and TM480P are stored in a compartment of the same container.

Remove the microscope from the container and place it on a firm flat table, install the objectives in a clockwise direction from the lowest to the highest power and insert the eyepiece(s) into the eyepiece tube(s). Care should be taken not to drop them or allow your fingers to contact the lenses.

USING:

1. Select a position to work where little light falls on the instrument. The worst position is to face a large window, because light falling directly on the slide will affect contrast and resolution.
2. If your microscope is equipped with a mirror and fork, place your bench lamp 20-25cm from the microscope. If your microscope is equipped with an illuminator, make sure that the mains voltage shown on the microscope matches your mains supply.
3. Place a specimen slide on the stage under the stage clips. If using a mechanical stage, pull back the lever on the left side of the stage, insert the slide, then bring the crescent shaped holder into contact with slide. Be certain that the coverslip of the slide is facing toward the objective, otherwise you will not be able to focus your specimen at high magnification.
4. If your microscope is equipped with Binocular Head, the following adjustment is necessary:
 - a) Adjust the position of the eye tubes to match the interpupillary distance of your eyes by pulling or pushing the eye tubes in a horizontal direction. The interocular distance is adjustable within a range of 54mm to 72mm.
 - b) When this is done note the dimension which is displayed in the window of the slider. Always remember to set to this distance when using the microscope. It will be different for different observers, so they will have to check the best setting for themselves.
 - c) To get best focus with both eyes the eyetube heights should be adjusted to take into account the interpupillary distance mentioned 4(a) and 4(b) above. First, set the Tube Length Adjustment Ring to the reading which corresponds to the dimension shown in the binocular slider window. Do this for the left hand eyepiece only. Now focus to get the sharpest possible image in the left hand eyepiece using the microscope fine adjustment. Then turn the right hand Tube Length Adjustment Ring until the image is equally sharp in the viewer's right eye. As these Rings function also for dioptric correction the dimension set may not, in this case, exactly correspond to window dimension.
5. If your microscope is equipped with a disc diaphragm, turn the diaphragm so that the number 2 or 3 opening is aligned with the instage condenser, and then adjust the diaphragm until proper specimen contrast is reached.

If your microscope is equipped with a condenser iris diaphragm, open the diaphragm fully with the lever located immediately below the condenser. The correct setting of this control is described later, but initially it is useful to have as much light as possible.

The viewing head of the EM400 Series Microscope is rotatable through 360°.

6. Rotate the nosepiece to position the lowest power objective.
7. Focus the objective on your specimen by turning the large coarse adjustment knob until the image of your specimen is bright and clear. Now bring the specimen into sharp focus by turning slightly smaller fine adjustment knobs.
With the specimen now in sharp focus, rotate the nosepiece to the other objectives and focus using the fine adjustment knob. Since the optics on TM400 microscopes are both par-focal and par-centered, only a slight turn of the fine focus knob will be necessary.
(NOTE: It is important to note that because of our built-in stop, the 4X and 10X objectives can never come into contact with your microslide. The 40X(S) and 100X(S) objectives may occasionally touch the microslide but because these lenses are in retractable mounts your slide will not be damaged.)
8. On microscopes equipped with an iris diaphragm, the diaphragm is not intended to control the brightness of the illumination but to improve contrast in the specimen by diffracting light rays. Focusing of the specimen should be done with the iris diaphragm opened to its maximum aperture. If additional contrast is required to permit accurate viewing of the specimen, the diaphragm should be slowly closed until the details of the specimen are sharply defined. Care should be taken not to use an aperture too small to gain high contrast, as then fine structure of the image will be destroyed.
Reducing the aperture does increase contrast and depth of focus, but it also reduces resolution and introduces diffraction. The aperture must be selected for each objective; i.e. the aperture for the 10X (N.A. 0.25) objective will not be the same as for 40X (N.A. 0.65), since the angle of light required is determined by the numerical aperture of the objective. Proper adjustment aperture is easily determined after a little experience with the microscope. The numerical aperture of the condenser must be equal to or greater than the N.A. of the highest power objective. The iris diaphragm provides a continuously variable increase or reduction of the diameter of the cone of light from the mirror or illuminator. Correct focusing of the N.A. 1.25 Condenser is important and is accomplished in the following way:
 - a) Raise the condenser to its upper limits and open iris diaphragm fully.
 - b) Focus the specimen with 40X objective. (The diameter of the cone of light should fill the back lens of the objective. This utilizes the full resolving power of the objective. However, most specimen react better to a cone of light approximately 3/4 the diameter of the back lens of the objective.)
 - c) Lower the condenser to achieve a cone of light approximately 3/4 the diameter of the lens.
 - d) If additional contrast is required to permit study of the specimen, the iris diaphragm may be closed slightly.

9. When you use the 100X objective, it is necessary to exclude air from the space between the cover glass over the specimen and front lens of the 100X objective. This is accomplished by placing a drop of immersion oil onto the cover glass. The controls are then manipulated to immerse the front lens of the objective into the oil. This forms an air tight connection through which the specimen may be viewed without interference from the atmosphere. Care must be taken not to come into direct contact between the lens of the objective and the cover glass since this may scratch or otherwise mar the viewing area of the lens itself. Oil immersion objectives should be cleaned immediately after each use since the oil will dry after a time and prevent satisfactory viewing thereafter. Oil should also be cleaned from the top of the cover glass.

You are now ready for microscope observation.

PHASE CONTRAST MICROSCOPY:

The MEIJI Model TM470P is equipped with a phase annulus and two specially constructed 10X Phase and 40XR Phase objectives, for simple phase contrast microscopy. The 4X scanning objective, also standard on phase contrast model, is not adapted for phase contrast.

The phase disc diaphragm is attached to the underside of the Stage Plate, and has 5 openings of increasing diameter and a cylinder mounted over the 5th aperture. The phase annulus is contained within this cylindrical mount.

1. Turn the disc diaphragm so that the phase annulus is in the optical path just beneath the stage condenser.
2. Turn the nosepiece of the microscope so that one of the two phase objectives is in the optical path.

You are now ready to experience Phase Contrast Microscopy.

This model microscope need not be confined to exclusive use of phase contrast and will function equally well as a standard brightfield microscope simply by rotating the disc diaphragm to any one of the other 4 positions.

The MEIJI Model TM480P is equipped with Par-Phase 1000 System. This system allows phase observation using the 10X, 40X, or 100X phase objectives. The substage condenser has a turret diaphragm which has five settings as follows:

"B" Setting	For standard brightfield observation with all objectives. It has a knurled knob controlled iris diaphragm to shape the cone of light entering the objectives and enhance contrast and depth of field.
"F" Setting	For use with the 4X objective only. A diffusing filter is built into this opening.
"Green" Setting	For phase contrast observation with both the 10X and 40X phase objectives.
"Red" Setting	For phase contrast observation with the 100X phase objective only. Immersion oil must be used with this objective to achieve proper resolution.
"D" Setting	For darkfield observation with the 4X, 10X and 40X objectives.

BULB REPLACEMENT:

1. Switch OFF and un-plug the line cord from the wall receptacle.
2. Remove the eyepieces from the microscope as these could fall out and be damaged when the microscope is tipped.
3. Gently tip the microscope backward so that it is supported by the arm on the surface of the table.
4. Loosen the two thumb screws holding the lamp housing cover in position and remove the cover.
5. After making certain the old bulb is cool to the touch, remove it by twisting it 1/4 turn counterclockwise by pushing it toward the socket so that the bulb will be sprung out from its socket.

Replacement Bulb:

MA361/10 Silvered Bulb 20W for 115V mains supply
MA361/20 Silvered Bulb 20W for 220/240V mains supply
MA362/10 Silvered Bulb 30W for 115V mains supply
MA362/20 Silvered Bulb 30W for 220/240V mains supply

Preventive Care and Maintenance of Your MEIJI MICROSCOPE

The **MEIJI** Microscope is a precision instrument and requires only minimum maintenance. With ordinary care, the microscope will last a lifetime. Microscopes like other precision instruments should be cleaned after each use, which prevents dust and other forms of contaminants from drying on exposed surfaces. Eyepiece and objective lenses should never be wiped while dry. Particles of dust should be removed using a soft camels hair brush or air. Lens paper folded several times and moistened with an approved lens cleaner such as alcohol should be used to clean glass surfaces. Lenses should never be disassembled except by qualified, authorized technicians. The finish of the Microscope is hard epoxy and is acid resistant. It is extremely durable and stands up well under rough use. The finish should be wiped off periodically with a soft cotton cloth.

Periodic servicing is recommended. This should be done only by qualified technicians since general servicing includes disassembly, cleaning and relubrication. Also at this time all parts are inspected for wear, and adjusted when necessary. Period of maintenance will vary depending on the use of the microscope each days. Some schools will find servicing every two years adequate, while others will require more frequent attention. A Microscope has very little value when not in proper working condition. Inquiries regarding the **MEIJI** Microscopes should be directed to your authorized **MEIJI** dealer.



MEIJI TECHNO CO.,LTD.

6, Oi-670, Oi-machi, Iruma-gun
Saitama 356, Japan
Phone: 492-67-0911
Fax: 492-69-0691, 492-69-0692
Telex: 25573 MEIJTCHN
Cable: MEIJITCHNO OI

MEIJI TECHNO AMERICA

2186 Bering Drive
San Jose, CA., 95131, USA
Phone: 408-428-9654 Fax: 408-428-0472
Toll free: 800-832-0060

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