OLYMPUS

LABORATORY MICROSCOPE MODEL E

INSTRUCTIONS

OLYMPUS TOKYO

OLYMPUS OPTICAL CO. LTD.,
TOKYO, JAPAN

The highest reward of integrity in manufacturing is a durable reputation. The years of fine craftsmanship in the manufacture of the world's finest lenses have earned for OLYMPUS of Tokyo the respect of an entire industry. In a field where precision is paramount, Olympus' position of leadership is unchallenged.

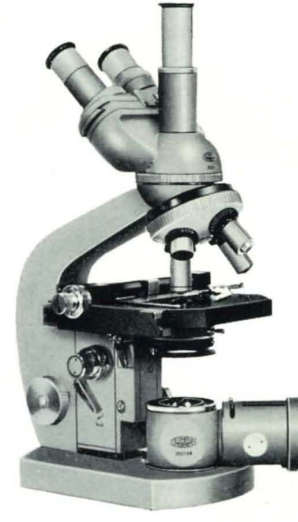
The skills, talents and equipment required to achieve so honorable a status have now been focused on the related field of precision microscopy. The habits of unyielding servitude to the most rigid standards of engineering and manufacturing perfection are now being turned to the output of superb microscopes and related accessories to meet the most challenging needs of medical and reseach scientists. Coupled with the goal of uncompromising quality, has been the urge to offer the best at moderate prices.

Olympus, now, proudly offers its distinctive line of the finest microscopes, sensibly priced.

You are cordially urged to compare — We are certain that you need not spend more, to get less than you need.

EC

ECEBi



ECETr

1. Monocular Inclined Head

Model	Eyepiece	Objective	Stage	Condenser	Magnification
E C	5×, P10×, P15×	4×, 10×, 40× 100×	Square (Co-axial)	N.A. 1.25	20×～1,500×
E F	〃	〃	Square (double co-axial)	〃	〃

2. Binocular Head

Model	Eyepiece	Objective	Stage	Condenser	Magnification
EC Bi-I	P7×, WF10×, P15× (paired)	4×, 10×, 40×, 100×	Square (co-axial)	N.A. 1.25	28×～1,500×
EF Bi-I	〃	〃	Square (double co-axial)	〃	〃
EC Bi-II	P7×, WF10×, P15× K20× (paired)	4×, 10×, F ℓ 40× F ℓ 100×	Square (co-axial)	〃	28×～2,000×
EF Bi-II	〃	〃	Square (double co-axial)	〃	〃

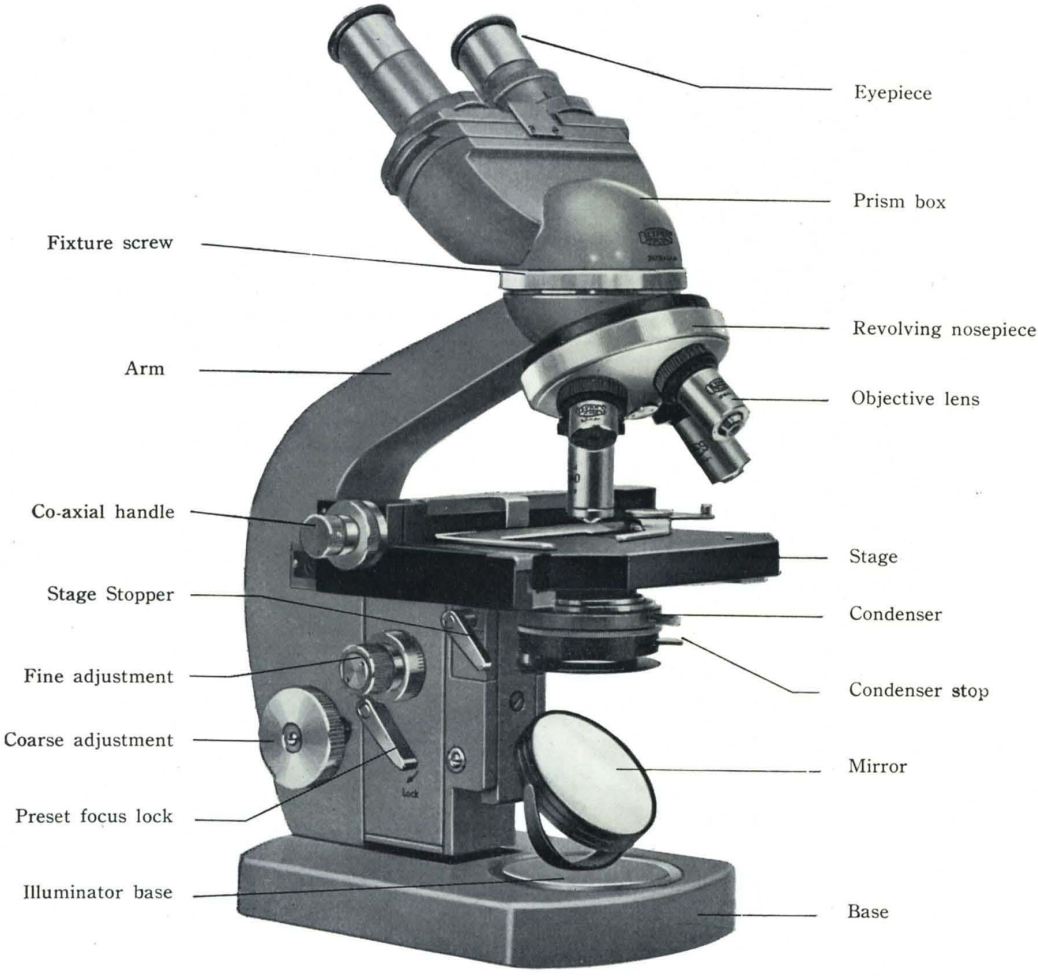
3. Binocular Head with Illuminator

Model	Eyepiece	Objective	Stage	Condenser	Magnification
ECE Bi-I	P7×, WF10×, P15× (paired)	4×, 10×, 40×, 100×	Square (co-axial)	N.A. 1.25	28×～1,500×
EFE Bi-II	〃	〃	Square (double co-axial)	〃	〃
ECE Bi-I	P7×, WF10×, P15× K20× (paired)	4×, 10×, F ℓ 40×, F ℓ 100×	Square (co-axial)	〃	28×～2,000×
EFE Bi-II	〃	×	Square (double co-axial)	〃	〃

4. Trinocular Head with Illuminator

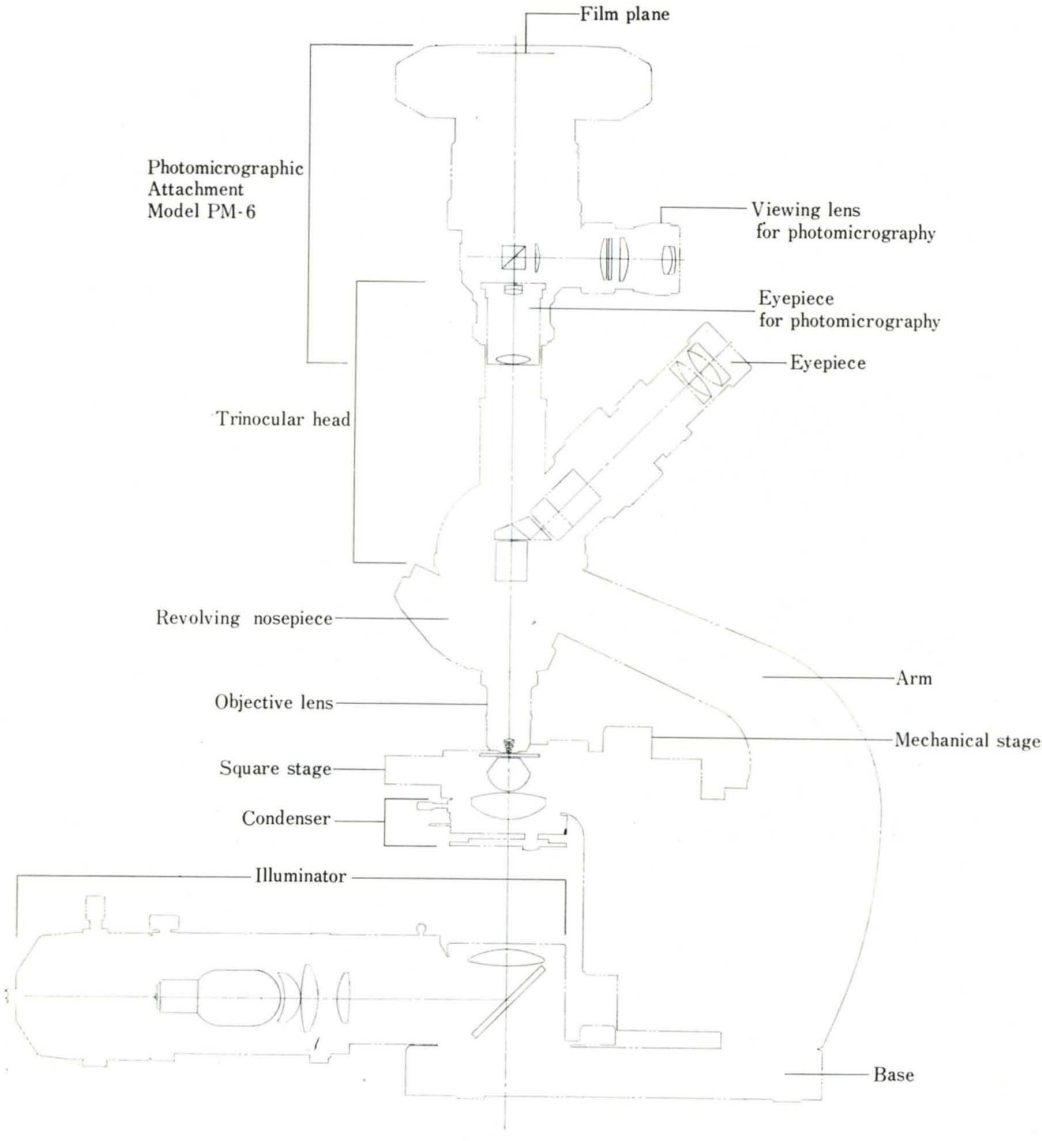
Model	Eyepiece	Objective	Stage	Condenser	Magnification
ECE Tr-I	P7×, WF10×, P15× (paired) For photomicrography P7×, P10×, P15×	4×, 10×, 40×, 100×	Square (co-axial)	N.A. 1.25	28×～1,500×
EFE Tr-II	〃	〃	Square (double co-axial)	〃	〃
ECE Tr-I	P7×, WF10×, P15× K20× (paired) For photomicrography P7×, P10×, P15×	4×, 10×, F ℓ 40× F ℓ 100×	Square (co-axial)	〃	28×～2,000×
EFE Tr-II	〃	〃	Square (double co-axial)	〃	〃

Name of parts



MODEL ECBi

OPTICAL PATH
OF
THE OLYMPUS MICROSCOPE MODEL ECETr



Olympus Laboratory Microscope Model E consists of the body, head, stage, illuminator, optical part and attachments.

A wide range of Model E series microscopes have been made available through varied combination of these basic parts.

Mechanical tube length : 160mm.

A Body

The body is the basic part of the microscope and is made up of the base, arm, focusing mechanism and revolving nosepiece.

The base and arm of Model E microscope feature a highly appealing, modernistic design.

The arm and arm drop which support the objectives and microscope head are affixed firmly to the base. The adjustment of focus therefore is accomplished through vertical movement of the stage. This feature provides high stability and prevents even the slightest advers effect when heavy photomicrographic attachments are used.

A-1 Arm

The arm is fixed securely to the base and features the revolving nosepiece and microscope head fixture screw.

The streamlined, sturdy arm of Model E microscope provides a handy grip when moving the instrument from one place to another.

Letter specifying position of different objective

A-2 Revolving nosepiece

The revolving nosepiece of model E microscope has been made much larger than that of older models. It features a ball-and-socket revolving system which permits operation with utmost smoothness and yet insures the highest durability.

By means of a large spring and groove, the objective sets into position accurately, maintaining proper optical alignment. A knurled ring is provided for sure, slip-free manipulation of the nosepiece.

Letters A, B, C and D specifying the exact positions where the different objectives should be mounted are imprinted on the upper surface of the nosepiece. This enables the microscopist to ascertain which objective is being used while conducting observation.

Revolving nosepiece with three or four objective mounts are avaible.

Ordinarily, monocular microscope with inclined head comes with a nosepiece with three objective mounts, while binocular and trinoculat microscopes feature revolving nosepiece with four objective mounts.

However, when specified, Model E series microscopes can be supplied with either of these two types of nosepiece to suit the requirements of the users.

The objectives are generally mounted in the following order : A-4×, B-10×, C-40×, D-100×

A-3 Focusing Mechanism

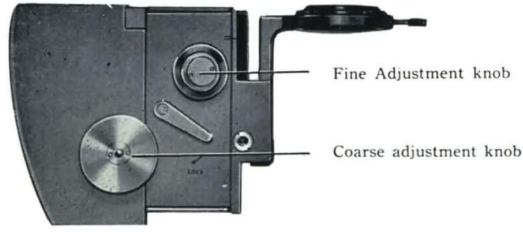
Owing to the fact that both fine and coarse adjustment knobs are placed as close to each other as possible, focus adjustment can be conducted with a minimum movement of the hand and without interrupting microscopic observation.

The coarse adjustment mechanism has a working range of 35mm.

Fine vertical movement is conducted by manipulating the fine adjustment knob. Movement of the fine adjustment knob operates the stage supporting mechanism which is turn raises or lowers the stage to alter the distance between the objective and the specimen for critical focusing.

Working range : 2mm Calibration of handle scale : 0.002mm

Sensitivity : 0.002mm



A-4 Special coarse adjustment device

To provide smooth, precision operation of the coarse and fine adjustment knobs, a special mechanism is incorporated.

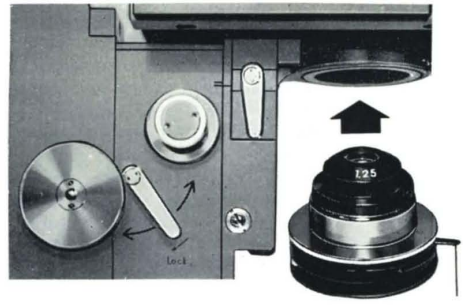
By means of the preset focus lock, the range of operation of the stage can be controlled so that the stage will not rise beyond a certain height.

By setting the preset focus lock after raising the stage to secure focus, the stage can be lowered when necessary by manipulating the coarse adjustment knob.

Manipulation of the coarse adjustment knob, however, will not raise the stage beyond the preset height. This feature serves as a safety device.

When this preset focus lock is released, the stage can again be raised or lowered freely.

Through use of this lock, the microscopist will be able to lower the stage during microscopic observation when such a necessity arises and then to raise it again to focusing height without fear of colliding the specimen against the objective.



Knob for iris-diaphragm

A-5 Condenser mount

So as to enable adjustment of the position of the condenser or to permit mounting of special condenser or attachment to suit varied specialized requirements, the condenser mount features a rack-and-pinion system providing movement within a range of 25mm.

The condenser mount features a clamp spring. By just inserting it from the bottom, the condenser sets into position without fear of slipping off. The condenser thus inserted into the mount can be fixed securely by tightening the condenser fixing screw.

B Microscope head

The microscope head of Model E microscope is inclined 45 degrees from the horizontal plane so as to enable microscopic examination in the most natural posture and with a minimum of fatigue.

As mentioned previously, the standard height of this instrument is 300mm from the desktop. This is exactly the height required for the average person to conduct microscopic examination in the most natural sitting posture. Thus, a special desk is absolutely unnecessary when this Model E microscope is used.

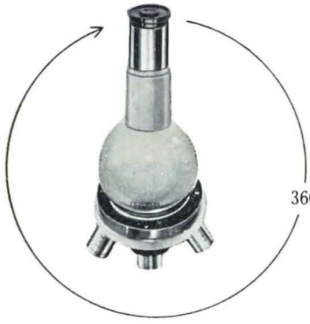
The following four types of microscope head are available :

1. Monocular inclined head
2. Binocular head (Bi)
3. Trinocular head (Tr)
4. Upright head for photomicrography

To mount the microscope head, turn the knurled ring of the microscope fixing screw. This will fix the head properly to the arm and; at the same time, secure precise optical alignment.

The head can be revolved through 360 degree and permits observation from any desired direction.

Microscope head fixing ring



Range of adjustment of direction of microscope head

Interpupillary distance scale

Dioptric adjustment

B-1 Monocular inclined head

By means of a drism, the monocular inclined head refracts the path of rays 60 or 45 degrees so as to enable microscopic observation at an angle of 45 degrees from the horizontal plane.

B-2 Binocular head

In case of binocular head, the rays after being refracted dy means of a prism pass through an image-splitter and are directed toward the two eyepieces. In consideration of the characteristic functions of the human eyes, the right and left optical axes are slanted slightly toward the center. This feature is extremely important from the standpoint of physiology of the eyes. With Model E microscope, therefore, eyen those person who found it extremely difficult to obtain a single image by observing through conventional binocular microscopes featuring parallel optical axes are able to conduct precise, strain-free examination.

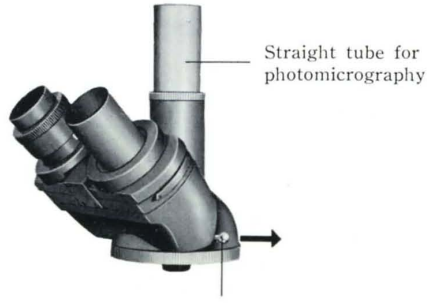
The binocular head of Model E microscope provides adjustment of interpupillary distance. The interpupillary distance thus adjusted is shown on scale located between the two eyepieces. This scale is calibrated so as to shown in millimeters the distance between the exit pupils when using BiWF 10× eyepieces.

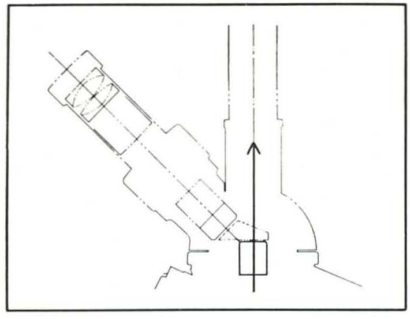
Difference in diopter of the right and left eyes can be adjusted by manipulating the dioptric adjustment ring near the left eyepiece.

The mechanical tube measures the standard length of 160mm when the interpupillary distance scale is set at 62 and dioptric adjustment ring at 0.

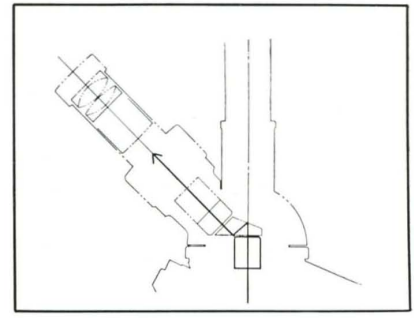
B-3 Trinocular head

The trinocular head consists of binocular head (45° inclination) and upright head for photomicrography. This trinocular head features a mechanism enabling the microscopist to direct the path of rays alternately for direct observation and photomicrographic work.





Path of rays at the time of photomicrography



Path of rays at the time of direct observation

When the prism shifting knob is pulled outward as shown in the above photo, the prism locks into position (left diagram) and the path of rays is directed to the upright head for photomicrgraphic work.

A push in of the knob almost instantly returns the prism to its original position (right diagram).

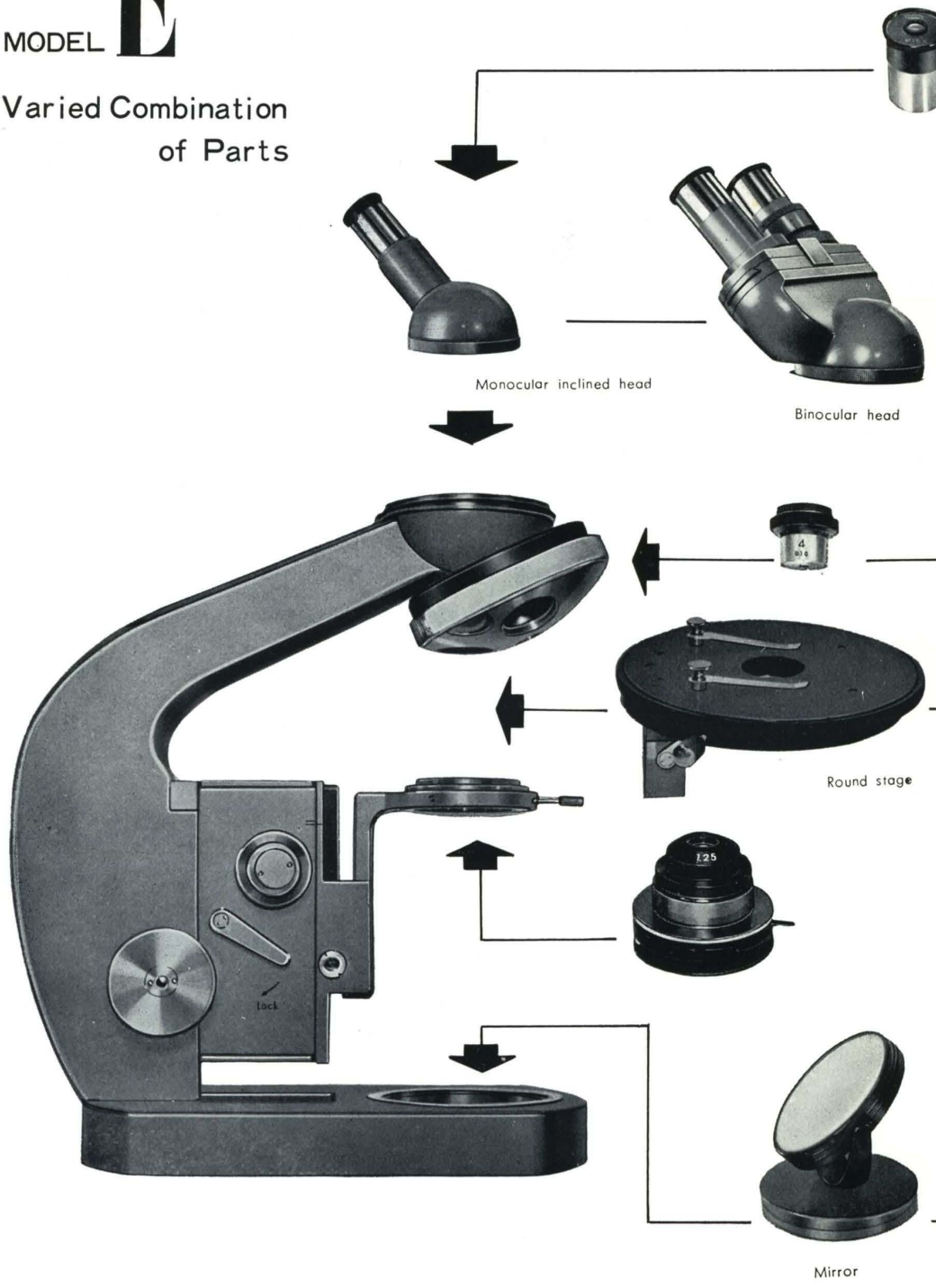
This unique mechanism (one-knob operation) permits direct observation and photomicrographic work alternately with a minimum loss of time.

B-4 Upright head for photomicrography

In case of microscopes featuring monocular inclined head or binocular head, the standard microscope head must be interchanged with an upright head when conducting photomicrographic work.
The photomicrographic apparatus must be mounted on this upright head.

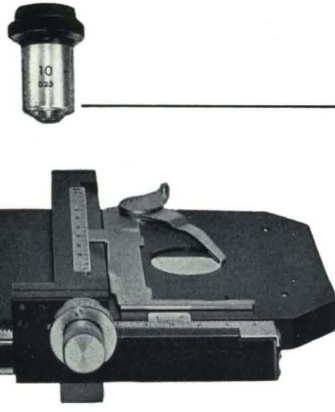
MODEL E

Varied Combination of Parts

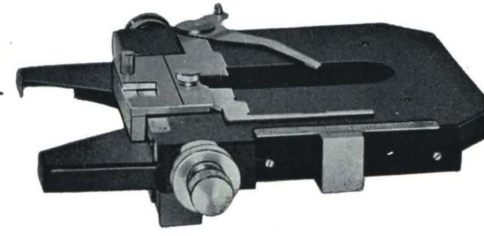


Trinocular head

Upright head



Square mechanical stage (single handle)



Square mechanical stage (double handle)

Exclusive illuminator model LSE

Simple illuminator model LSK

C Stage

Although there are many types of stages, they can be generally classified into round and square stages.

Model E microscope can be mounted with either of these two types of stage to suit the requirements of researchers in varied fields.

Available for Model E microscope are the following types of stages:

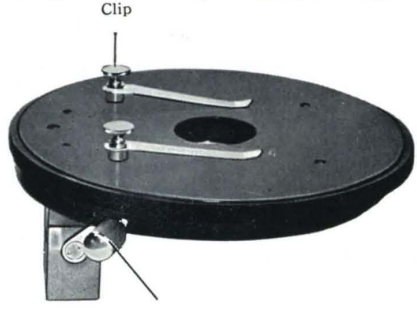
1. Round revolving stages RS
2. Square coaxial mechanical stages (single knob) CS
3. Square coaxial mechanical stages (double knob) FS

C-1 Round revolving stage RS

The round revolving stage (RS) consists of upper and lower sections. The lower section has a provision for mounting it securely on the stage support of the microscope. The upper section, however, is made so that it may revolve on a horizontal plane.

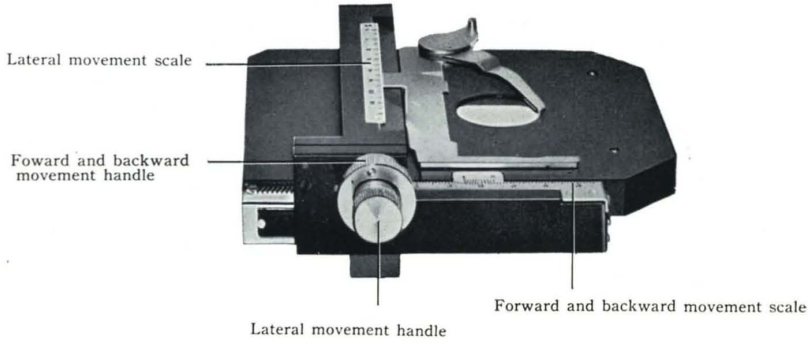
Fine movements of the stage is accomplished by manipulating the stage handles located on the right and left alternately. Furthermore, the stage can be rotated 360 degrees on the horizontal plane by catching hold of the milled ring around the upper section of the stage.

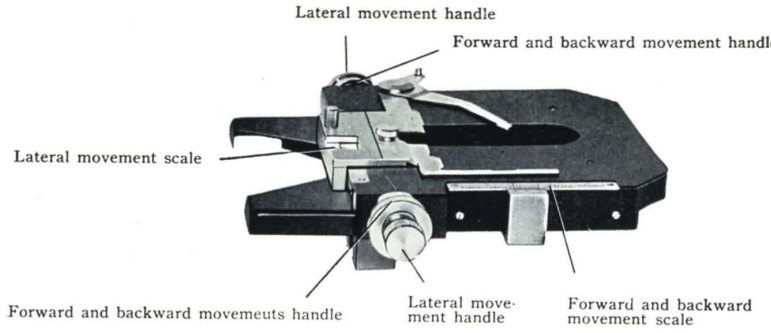
By tightening the stage stopper, the stage can be fixed to any desired position.



C-2 Square coaxial mechanical stage (single handle) CS

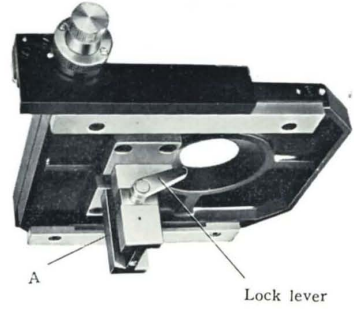
Double handle mechanical stage affords more convenient operation than that featuring a single handle. It not only permits convenient use by left-handed persons but also enables manipulation by the same hand even when the microscope head is rotated 180 degrees.





Stage fixture

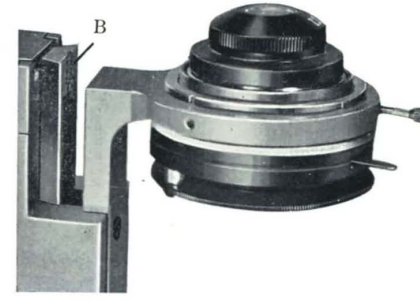
Stages for Olympus microscope Model E and Model F are designed so as to mount easily on the main body at the microscopy. Three kinds of stages, such as R stage (round), C stage (Square) and F stage (Square) are easily replaced each other.



1. Bring the substage condenser all the way up to the end.
2. Turn the coarse adjustment all the way down.
3. Shift the mechancal stage straight down to foward by turning the movement handle.
4. Release the lock lever upward and engage the guide (A) into the (B) correctly and down the stage slowly until it comes to the end.

   Caution : a) The side of the stage should be exactly parallel to the side line of the base.

   b) Do not crash the top lens of the condenser to the stage.
5. Lock firmly with the lock lever.



D Illuminator

Illumination is one of the most vital factors in microscopy. It is only with the aid of a good illuminator that perfect microscopic examination can be conducted.

With Model E microscope, a choice of either one of the following three types of illuminator is provided to fully meet the varied requirements of specialized researches:

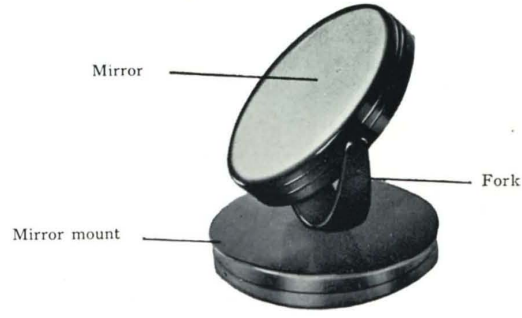
1. Mirror 2. Exclusive illuminator LSE 3. Simple illuminator LSK

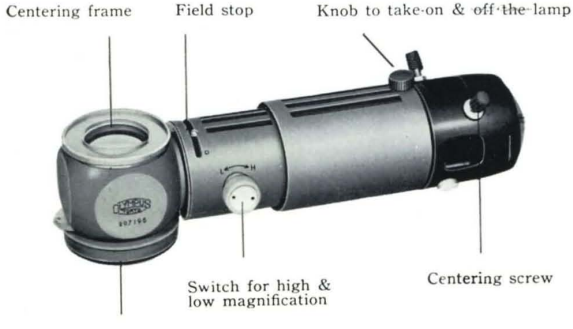
D-1 Mirror

Mirror is the most simple illuminator. Illumination necessary for microscopy is provided through reflection of natural light or artificial light from a source placed some distance away from the microscope.

The mirror is fixed to a mirror mount which fits securely into the illuminator base featured on the microscope base. It has two surfaces, one plane and the other concave, and is held in place by a metal frame. This metal frame is supported at two points by a fork which is fixed to the mount in such a way as to permit rotation on a horizontal plane. Consequently, the mirror can be set at any desired angle to reflect light coming from any direction.

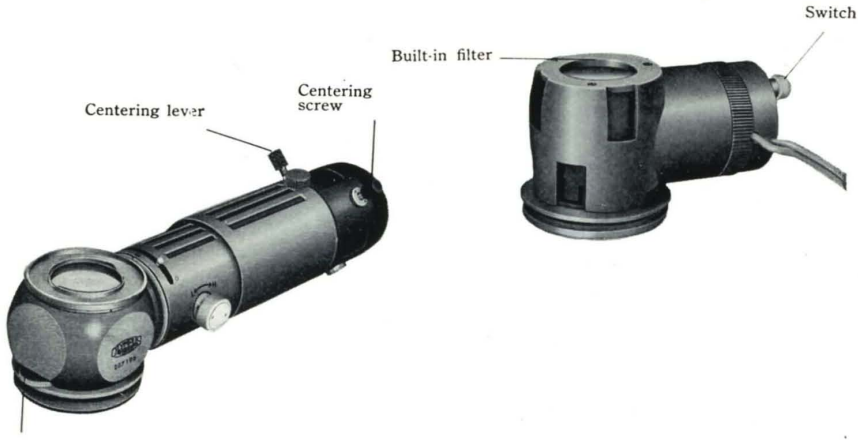
The plane surface mirror is for use when objectives of high magnification are utilized, while the concave surface mirror is employed when using objectives of low magnification.





D-2 Exclusive illuminator LSE

The exclusive illuminator LSE which performs strictly in accordance with Köhler's principle is used for either high or low magnification microscopy and produces sufficient brightness for photomicrographic work.



Lock (at 0, the illuminator can be rotated 220 degrees horizontally

Adjustment of lamp bulb is accomplished by means of two centering screws.

The lamphouse slips off from the illuminator when the lamphouse knob is loosened. This feature permits interchanging of bulb with utmost facility.

D-3 Simple illuminator LSK

Simple illuminator (LSK) utilizes a 10W lamp and can be connected directly to 100V, 110V or 220V AC house current.

Like other types of illuminators, it can be mounted or dismounted with utmost ease.

As mentioned above, it can be plugged into any wall outlet and requires no transformer.

As in the case of the mirror, the mount of this illuminator fits securely into the illuminator base, but in order to fix it to the base, the lock must be turned in a right direction toward L. This illuminator can be mounted anywhere within a horizontal angle of 220 degrees.

A turn of the knob located on the side of this illuminator adapts it for either high or low magnification microscopy. With this illuminator, it is absolutely unnecessary to remove the upper element of the condenser.

High and low magnification objectives mentioned here denote the following.

Low magnification : 4×, 10×

High maguification : 20× and above

In either of these cases, the field diaphragm image of this illuminator (LSE) appears clearly, providing simple and accurate adjustment of the height of the condenser. In other words, the condenser must be raised or lowered so that this image coincides accurately with the image of the specimen. (In this case, it is most appropriate to use an objective with a magnification of 10× or thereabouts.)

Condenser with numerical aperture of 1.2 or 1.4 may be used, but, in case of low magnification microscopy, those with a numerical aperture of 1.2 will afford more convenient examination.

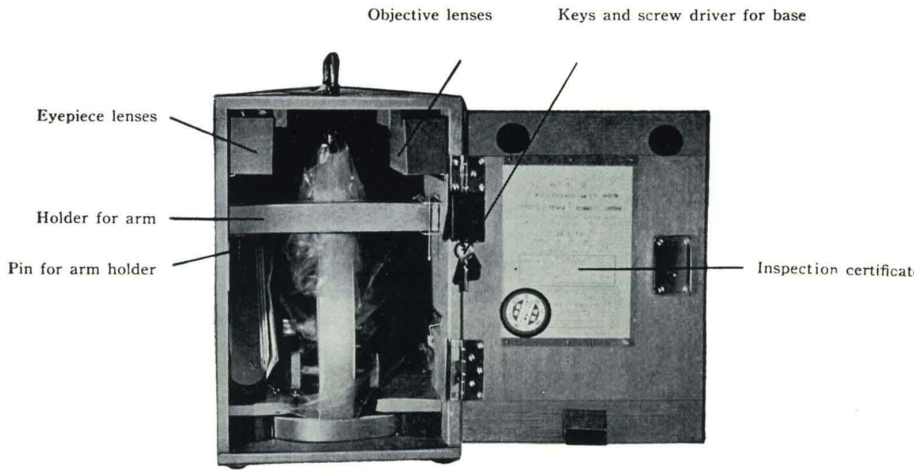
The additional feature of this illuminator is a movable centering frame equipped on the upper lens.

This centering frame can be easily manipulated by a finger to obtain the centering of the lit-field of the illumination.

Set up the microscope

Contents of the carrying case. (model EC)

1. Main body : (with cap for tube, and vinyl cover)
2. Eye-piece lenses : 5×, P10×, P15×, ceder oil and blue filter (Upper left frame)
3. Objective lenses : 4×, 10×, 40×, 100× (oil-immersion) with plastic case. (Upper right frame)
4. Certificate, etc. : Inspection certificate and instructions.
5. Others : Desiccant (silica gel.)



The main body is fixed by the screw and arm holder. Unscrew with the screw driver provided with the key, and take off the pin from the arm holder and the main body comes out.

Lift the stage slightly by turning the coarse adjustment knob and the protection frame for the fine and coarse adjustment come off.

Check the following points carefully.

Coarse adjustment knob, fine adjurtment knob, knob for substage condenser, revolving nosepiece inclined tube, preset focus lock, iris diaphragm of the substage condenser, built-in mechanical stage and mirror.

Procedure for adjusting the coarse adjustment knob

The coarse adjustment knob is purposely made so as to operate somewhat heavily. In case of Model E microscope, however, this knob can be easily adjusted so as to suit the convenience of the microscopist.

Catch hold of the knobs on both sides of the microscope and twist them in the opposite directions. This will either tighten or loosen the knob.

Method of securing effective lighting

Prior to conducting microscopy, it is of paramount importance to check carefully whether appropriate and effective lighting is directed to the microspecimen. In other words, it is necessary to determine whether or not the ray of light emitted from the illuminator or reflected by the mirror passes through the objective and toward the eyepiece on a correct path.

To check the illmination, first secure focus by utilizing a 40× or 10× objective and then peep through the microscope tube after removing the eyepiece. If the light from the light source is directed evenly and without any eccentricity throughout the surface of the lens, it means that proper, effective lighting is being rendered. In case the central area of the lens appears brighter than the rest of the area, it signifies that the condenser is not adjusted properly. In this case, therefore, raise or lower the condenser until the entire surface of the lens is illuminated evenly. Even in case the condenser is set at the right height, the central area of the lens will appear similarly brighter than the rest of the lens surface when the microscope is out of focus.

Utmost caution must be taken because even a slight touch of the illminator of mirror will deviate the path of the rays.

When the image appears to move toward the center from either direction when the fine adjustment knob is manipulated in the course of securing critical focus, it means that the path of rays is not aligned properly. In such a case, the illumination must be re-adjusted in accordance with the foregoing procedure.

Working distance and Par-focal

Model E microscope is designed so that, once focus is secured with any one of the objectives, any objective mounted on the revolving nosepiece can be used merely by manipulating the fine adjustment knob.

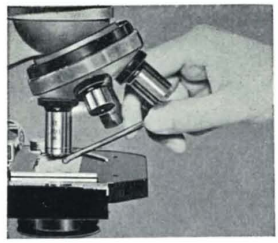
Ordinarily, the distance between the microspecimen and the tip of the objective is the greatest in case of low power objectives. This distance decreases as the magnification of the objective increases and is the least in case of oil-immersion objectives.

As mentioned above; any objective can be set to viewing position with a minimum of adjustment when once focus is secured with any of the objective mounted on the nosepiece, witout any fear of the objective colliding with the microspecimen. In other words, Model E microscope incorporates the so-called per-focal mechanism.

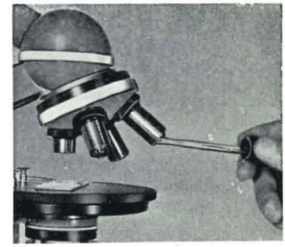
Focus at first by utilizing 4× objective. The distance between the objective and the microspecimen in this case will be approximately 35mm. Even when 100× objective is set to viewing position, it will not collide with the microspecimen. The distance will then be about 0.14mm.

Instruction for using oil-immersion objective

Before using oil-immersion objective, secure focus by utilizing low power objective. Then, place a drop of cedar oil or anisole on the microspecimen and apply cedar oil similarly to the oil-immersion objective. Turn the revolving nosepiece to set the oil-immersion objective to position. As mentioned previously, the objective in this case will not collide with the microspecimen and microscopic observation can be conducted without any loss of time by simply monipulating the fine adjustment knob.



Place a drop of ceder oil or anisole on the microspecimen



Apply ceder oil to the tip of the oil-immerson objctive

Objective \ Eyepiece			Magnification	5×	P10×	P15×
			f	49	25	17
			Numerical field of view	21	13	9.5
4×	N.A.	0.10	Total magnification	20×	40×	60×
	f	29.2	Actual field of view	5.3	3.3	2.4
	W.D.	35.0	Depth of field	234μ	140	108
10×	N.A.	0.25	Total magnification	50×	100×	150×
	f	15.8	Actual fieid of view	2.1	1.3	0.95
	W.D.	5.6	Depth of fiied	48μ	27.6	20.9
40×	N.A.	0.65	Total magnification	200×	400×	600×
	f	4.7	Actual field of view	0.53	0.33	0.24
	W.D.	0.56	Depth of field	5.36μ	3.22	0 5
100×	N.A.	1.25	Total magnification	500×	1,000×	1,500×
	f	1.8	Actual field of view	0.21	0.13	0.095
	W.D.	0.14	Depth of field	1.23	0.76	0.6

N. A. = Numerical aperture of objective.

f = Focal length in mm.

W. D. = Working distance(mm)

Numerical field of view = Size in mm of field diaphragm produced by the lens in front of it, (JIS B7132)

Total magnification = Magnification of objective multiplied by magnification of eyepiece.

Acutal field of view = Numerical field of view divided by magnification of objective used (mm)

Depth of field = The range in which the specimen appears clearly in focus (μ)

Besides the above. 20×, 60×, Fℓ40× and Fℓ100× objectives and 7×, P7× and K20× eyepiece are available.

Photomicrographic attachment

Model E microscope is designed particularly to enable photomicrographic work with utmost convenience. Since focus adjustment is conducted through vertical movement of the stage with the microscope head together with the objective remaining absolutely immobile, the weight of the photomicrographic attachment will not cause the microscope to slip out of focus. Furthermore, the arm and mechanical tube feature a design which provides the greatest stability. In other words, shock produced at the time the shutter operates will have absolutely no effect on the microspecimen or the objective. Consequently, poor result arising from kick-back of the shutter is effectively prevented.

The specially-designed illuminator provides effective, even lighting ideal for photomicrographic work.

In case of 35mm photomicrography, the use of Olympus Small-size Photomicrographic Attachment PM-6 is recommended. With PM-6 attachment, images approximately one-third of the total magnification are produced on the film plan.

In case of photomicrographic work with the aid of PM-6 attachment correct exposure can be determined by attaching Olympus Photomicrographic Exporure Meter EMM-IV on the photo cell window of the exclusive exposure metter.

Phase contrast accessories

With aid of Olympus Phase Contrast Accessories PA or PB, Model E can be used as a phase contrast microscope.

By utilizing the standard illuminator and eyepiece and simply interchanging the objective and candenser with a phase contrast objective and phase contrast turret condenser, phase contrast microscopy is provided.

PA

PB

Centering telescope

Phase contrast turret condenser

Green filter

Phase contrast objective

a) Dark field condenser DC

Brownian movement of celloid, etc. is hardly visible in bright field, but with aid of the dark field condenser, Model E microscope permits examination of such movement in a dark field.

(Use 100× oil-immersion objective with iris diaphragm with dark field condenser.)

b) Polarizing attachment POL

This is a simple polarizing attachment for organic microscope. By interchanging the standard condenser with the polarizing condenser and the eyepiece with the analysing eyepiece, polarizing microscopy can be conducted.

c) Filar micrometer eyepiece OSM

Accurate measurement of a minimum of 0.0001mm is feasible by inserting this eyepiece into the tube of Model E microcope. When mounting it on monocular inclined head, binocular head or trinocular head, first remove the auxiliary lens on the bottom section, and insert the eyepiece into the eyepiece sleeve.

CAUTION

Uumost precaution must be taken to prevent the microscope from being exposed to moisture and dust.

Many laboratories are not completely free of dust and humidity; therefore, it is advisable to return the microscope into the case after use.

In case this cannot be done, always see to it that the microscope is covered with the vinyl cover supplied when not in use.

It is recommended that the objectives and eyepieces be kept in a desiccator. Furthermore, it is advisable to keep a desiccating agent within the microscope case.

After removing the eyepiece, always see to it that the cap is placed instead.

Refrain from disassembling or repairing the mechanical parts of the microscope. In case such a necessity arises, leave it up to a specialist.

Utmost care must be taken in cleaning the microscope.

Remove dust in small nooks and grooves with a blower or soft brush.

LABORATORY MICROSCOPE MODEL

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