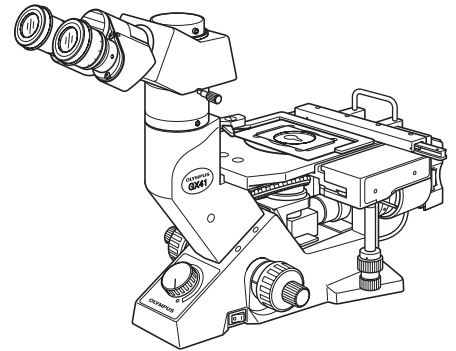


OLYMPUS®



INSTRUCTIONS

GX41

COMPACT INVERTED METALLURGICAL MICROSCOPE

Optical Microscope and Accessory

This instruction manual is for the Olympus Compact Inverted Metallurgical Microscope Model GX41. To ensure the safety, obtain optimum performance and to familiarize yourself fully with the use of this microscope, we recommend that you study this manual thoroughly before operating the microscope. Retain this instruction manual in an easily accessible place near the work desk for future reference.



A X 7 5 8 9

This product is applied with the requirements of standard IEC/EN61326-1 concerning electromagnetic compatibility.

- Immunity Applied to industrial and basic environment requirements.



In accordance with European Directive on Waste Electrical and Electronic Equipment, this symbol indicates that the product must not be disposed of as unsorted municipal waste, but should be collected separately.

Refer to your local Olympus distributor in EU for return and/or collection systems available in your country.

NOTE: This product has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the product is operated in a commercial environment. This product generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this product in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC WARNING: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the product.

For Korea only

B급 기기 (가정용 방송통신기자재)

이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

CONTENTS

Correct assembly and adjustments are indispensable for the microscope to manifest its full performance. If you want to assemble the microscope by yourself, see chapter 10, "ASSEMBLY" (pages 21 to 24) first. For the modules for which separate instruction manuals are provided, also refer to the assembly description in their manuals.

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IMPORTANT

! SAFETY PRECAUTIONS

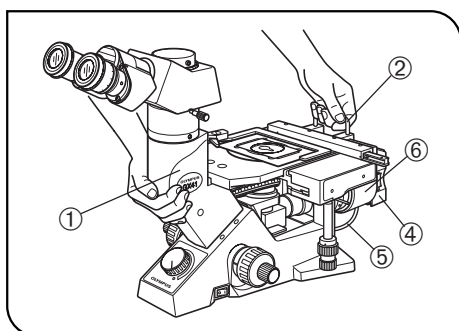


Fig. 1

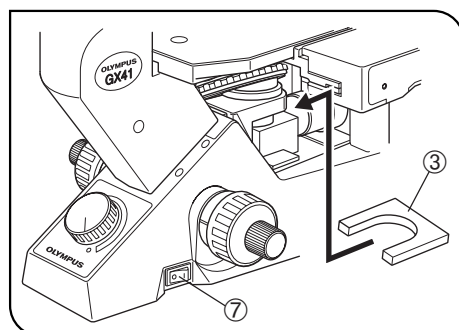


Fig. 2

1. Install the microscope on a stable, horizontal table. Make sure the table is sturdy enough to support the microscope's weight. (Weight: Approx. 10 kg)
2. When transporting the microscope, always hold the observation tube support ① and the stage handle ② using both hands. (Fig. 1)

★ If the microscope is dropped under this condition, the focusing mechanism may be damaged. To prevent this, insert the provided protection pad ③ below the revolving nosepiece and fix the pad using the coarse adjustment knob. (Fig. 2)

3. The surface of the lamp socket ④ on the illumination unit can get extremely hot. Make sure you leave a space of 10 cm or more around the lamp socket, especially above and behind it, to dissipate heat. (Fig. 1)
4. When installing the microscope, route the power cord and lamp cord ⑤ away from the lamp socket ④ and illumination unit ⑥. Otherwise, the power cord and lamp cord coverings may melt.
5. To avoid potential shock hazards and burns when replacing the bulb, make sure that the main switch ⑦ is set to "○" (OFF), the power cord is unplugged from the outlet, and that the lamp and the area around the lamp socket ④ have cooled sufficiently. (Fig. 2)

Applicable bulb	Halogen bulb: 6V30WHAL-L (Hosobuchi G4 20H CF-6) or 6V30WHAL (Phillips 5761) Halogen bulb, 6V 30WHAL (Phillips 5761)
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6. Always use the power cord provided by Olympus. If no power cord is provided, please select the power cord by referring to the section "PROPER SELECTION OF THE POWER SUPPLY CORD" at the end of this instruction manual. If the proper power cord is not used, Olympus can no longer warrant the electrical safety performance of the equipment.
7. Always ensure that the **grounding** terminal is properly grounded. If the equipment is not grounded, Olympus can no longer warrant the electrical safety performance of the equipment.
8. The standard service life of the lamp socket is 8 (eight) years of use or 20,000 hours of total power ON period, whichever is the shorter period. For details, see Inspection Sheet on page 27.

Safety Symbols

The following symbols are found on the microscope. Study the meaning of the symbols, and always use the equipment in the safest possible manner.

Symbol	Explanation
	Indicates that the surface becomes hot, and should not be touched with bare hands.
	Before use, carefully read the instruction manual. Improper use could result in personal injury and/or damage to the equipment.
	Indicates that the main switch is ON.
	Indicates that the main switch is OFF.

Warnings

Warning indications are placed where special precautions are required when handling and using the unit.

Warning indication position	Lamp socket (U-LS30-4)	
		[Warning against high temperature]



1 Getting Ready

1. A microscope is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impacts.
2. Do not use the microscope where it is subjected to direct sunlight, high temperature and humidity, dust or vibrations. (For the operating conditions, refer to chapter 8, "SPECIFICATIONS" on page 19.)

Avoid use in the following conditions.

- 1) Close to the air inlet or ventilator of an air conditioning unit.
- 2) Locations with strong vibrations and severe temperature fluctuations.
- 3) Close to equipment that generates excessive noise (including non-Olympus products).
- 4) Places exposed to direct sunlight.
- 5) Dusty places with high temperature and humidity.
- 6) Near flammable substances such as gasoline, thinner and alcohol.

3. Always use the coarse tension adjustment ring to adjust the tension of the coarse adjustment knob.

2 Maintenance and Storage

1. To clean the lenses and other glass components, simply blow dirty away using a commercially available blower and wipe gently using a piece of cleaning paper (or clean gauze).
If a lens is stained with fingerprints or oil smudges, wipe it gauze slightly moistened with commercially available absolute alcohol.

▲ Since the absolute alcohol is highly flammable, it must be handled carefully.

Be sure to keep it away from open flames or potential sources of electrical sparks — for example, electrical equipment that is being switched on or off.

Also remember to always use it only in a well-ventilated room.

2. Many parts of the exterior are made of plastic. Wipe the microscope with a clean cloth only. Do not use organic solvents to clean non-optical components. If smudges are difficult to remove, wipe them with a soft cloth slightly moistened with a diluted neutral detergent.
3. If no objectives are mounted, be sure to cover the objective mounting threaded holes on the revolving nosepiece to prevent dust and dirt from getting on the lenses inside.
4. Never disassemble any part of the microscope. Doing so could cause malfunctions or reduced performance.
5. When not using the microscope, set the main switch to "○" (OFF), wait until the lamp socket has cooled down, and keep the microscope covered with a dust cover.
6. When disposing of the microscope, check the regulations and rules of your local government and be sure to observe them.

3 Caution

If the microscope is used in a manner not specified in this manual, the safety of the user may be imperiled. In addition, the microscope may also be damaged. Always use the microscope as outlined in this instruction manual.

The following symbols are used to set off text in this instruction manual.

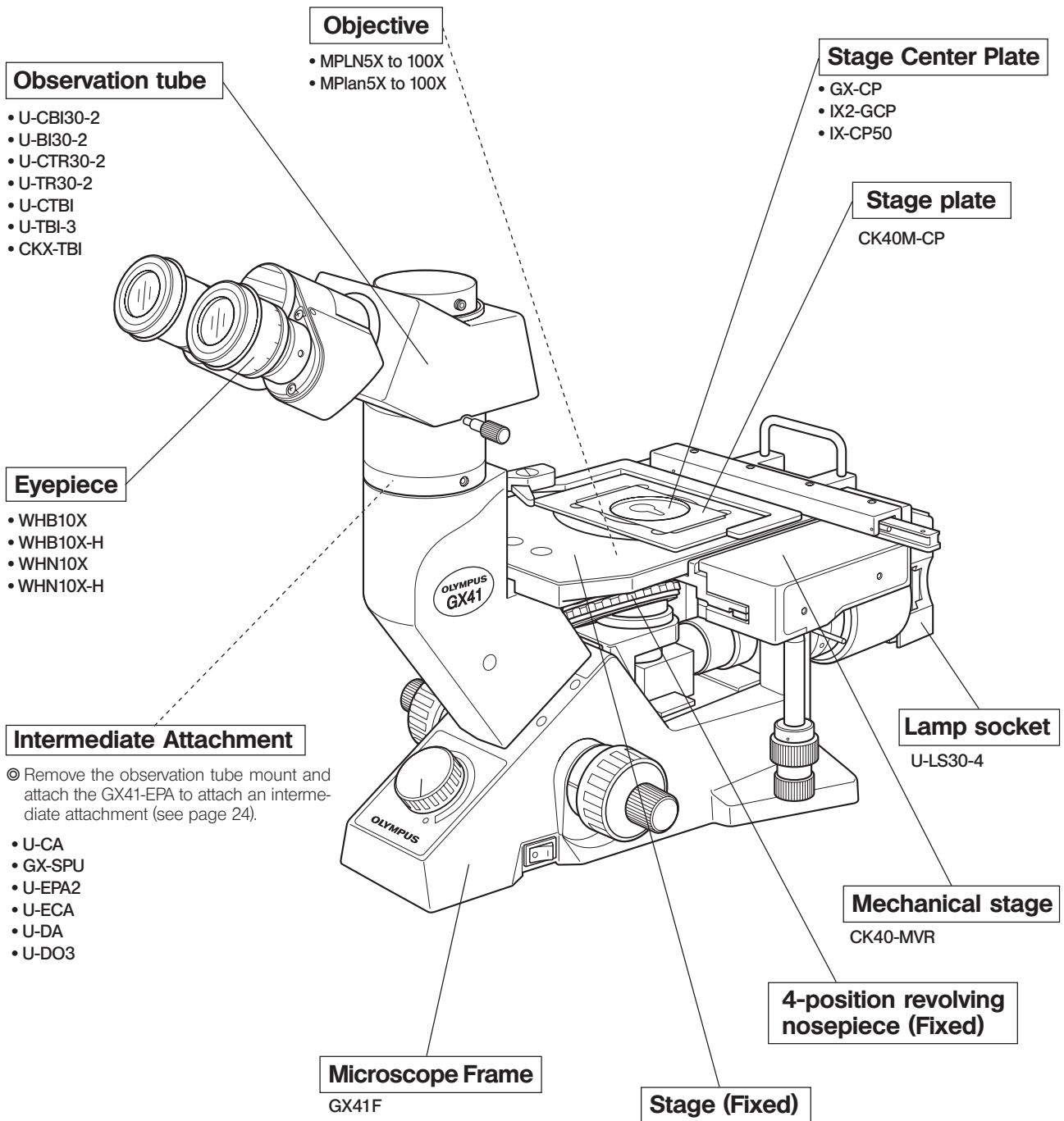
▲ : Indicates that failure to follow the instructions in the warning could result in bodily harm to the user and/or damage to equipment (including objects in the vicinity of the equipment).

★ : Indicates that failure to follow the instructions could result in damage to equipment.

◎ : Indicates commentary (for ease of operation and maintenance).

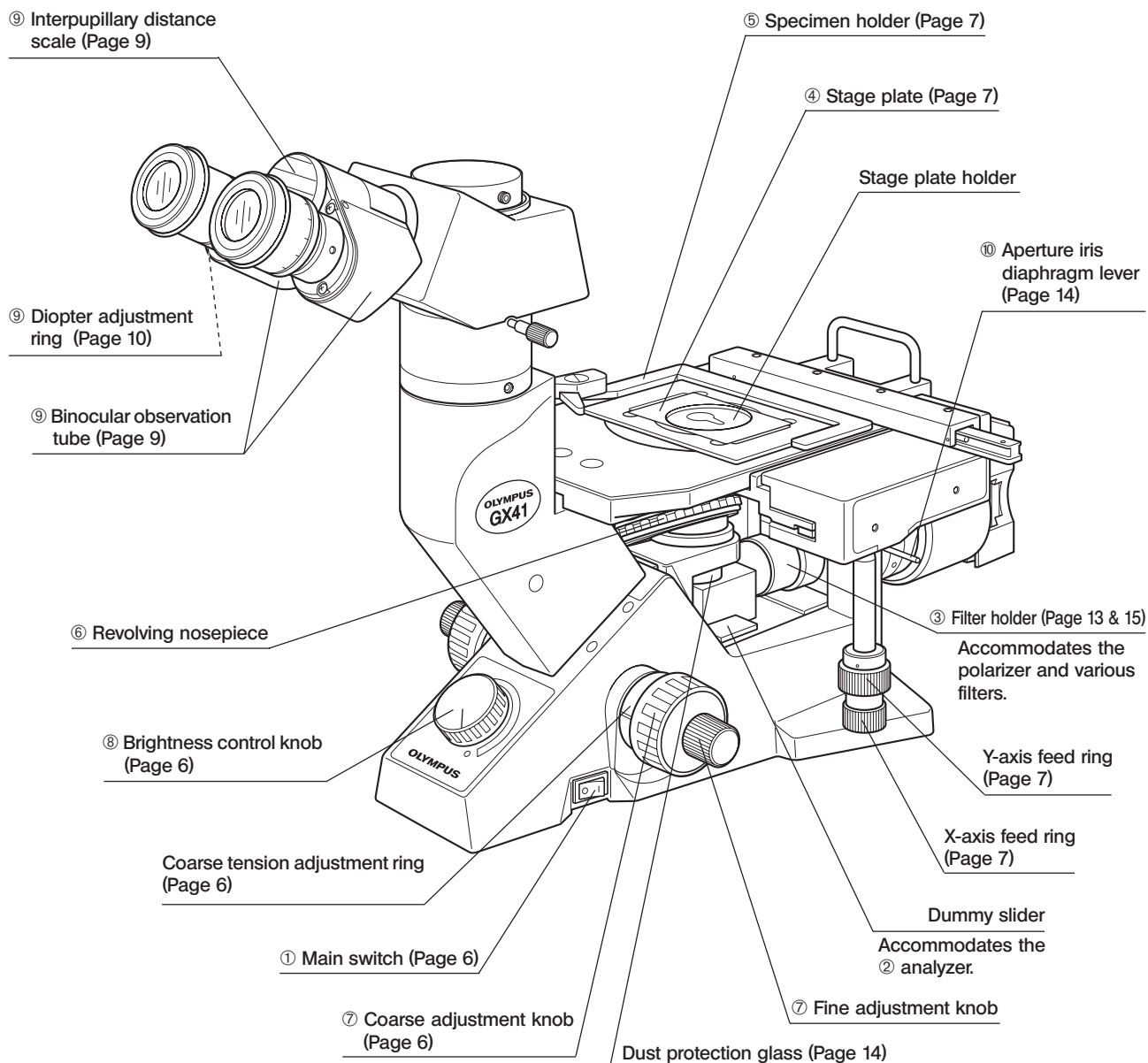
1 NOMENCLATURE

© The modules shown below are examples of those used in a typical system. Certain modules are usable even when they are not mentioned below. For these modules, refer to the latest catalogues or contact Olympus.



2 CONTROLS

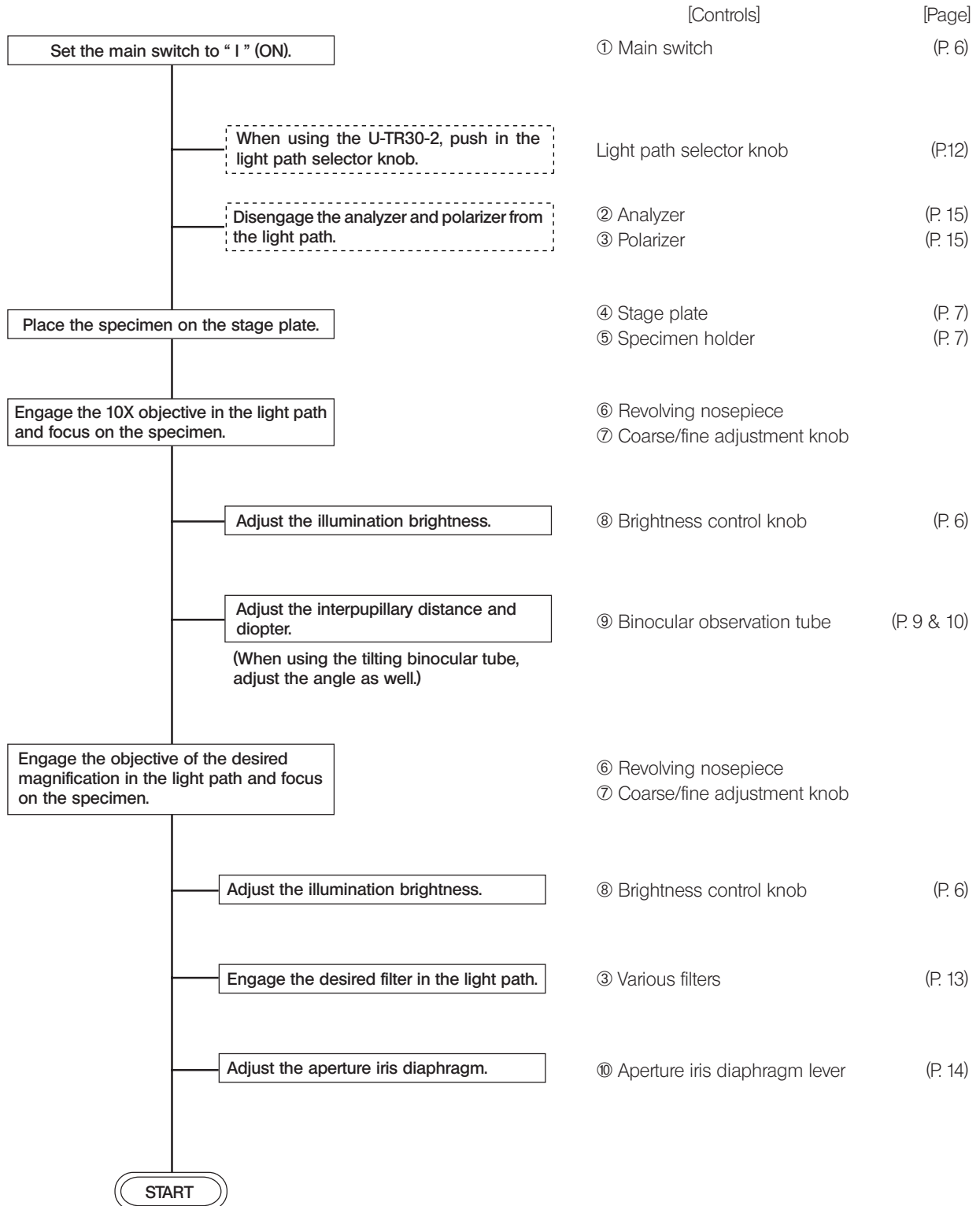
© If the microscope has not been assembled yet, see chapter 10, "ASSEMBLY" (pages 21 to 24) first.



3 SUMMARY OF OBSERVATION PROCEDURES

☉ The controls with numbers in circle are shown on the page on the left.

For the simplified polarized light observation, see the special chapter on page 15.



4 USING THE CONTROLS

4-1 Microscope Frame

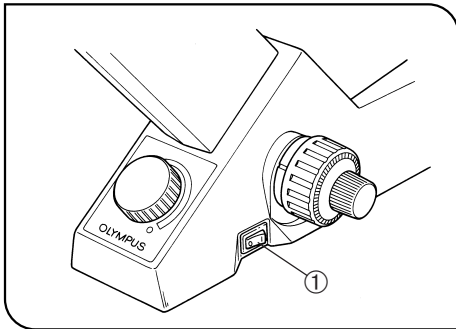


Fig. 3

1 Turning on the Light Source (Fig. 3)

Set the main switch ① on the side panel of the microscope frame to "I" (ON).

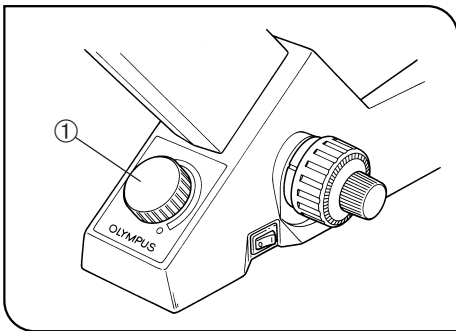


Fig. 4

2 Adjusting the Brightness Control Knob (Fig. 4)

Turn the brightness control knob ① clockwise to raise the voltage and increase the light intensity. Turn it counterclockwise to lower the voltage and decrease the light intensity.

Ⓞ The service life of the bulb can be extended by using the bulb at a lower voltage.

★ Always turn the knob gently and do not attempt to turn it past the stop positions.

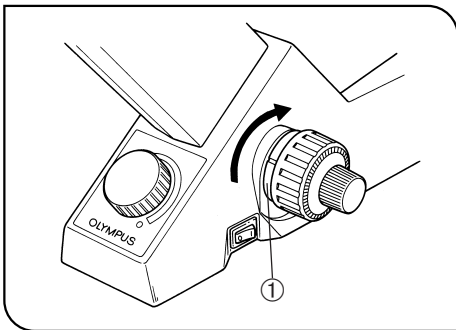


Fig. 5

3 Adjusting the Tension of the Coarse Adjustment Knob (Fig. 5)

★ Be sure to use the coarse tension adjustment ring ① to adjust the tension of the control adjustment knob.

How to adjust the tension

Turn the coarse tension adjustment ring ① with your fingers or using a flat-head screwdriver. Turning the ring in the direction of the arrow increases the tension of the coarse adjustment knob, and turning the ring in the opposite direction decreases the tension.

If the revolving nosepiece descends on its own or if the specimen gets out of focus quickly even when brought into the focus using the fine adjustment knob, it means that the tension of coarse adjustment knob is too low. Turn the ring in the direction of the arrow to increase the tension.

4-2 Stage

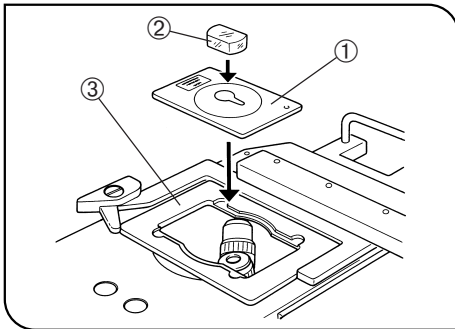


Fig. 6

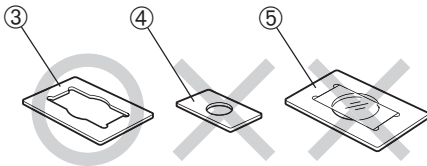


Fig. 7

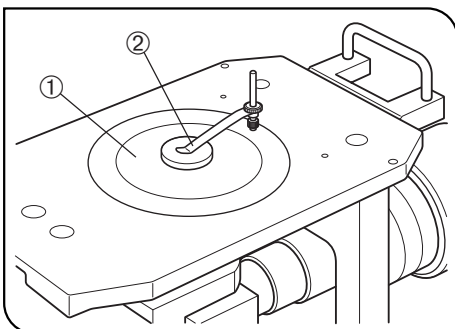


Fig. 7

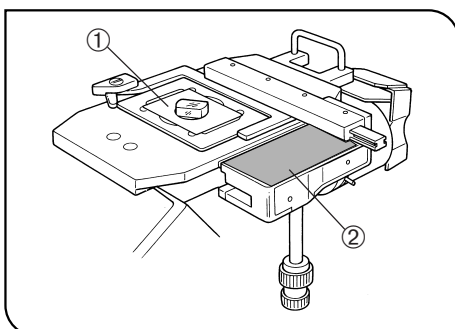


Fig. 8

1 Placing the Specimen

(Figs. 6 & 7)

When using a mechanical stage

1. Set the stage plate ①. (Fig. 6)
2. Place the specimen ② on the stage plate with the observation surface facing downward. (Fig. 6)

★ When setting the stage plate on the mechanical stage, use the stage plate holder ③ provided with the mechanical stage.

★ Do not use the $\phi 35$ mm petri dish holder ④ and slide glass holder ⑤.

When using a plain stage

1. Select the stage center plate ① according to the specimen size and place it on the hole at the center of the stage.
2. Place the specimen, with the surface to be observed facing down, gently on the stage center plate.

With the GX-CP stage center plate, hold the specimen by applying optimum weight with the specimen holder ②.

★ Do not forcefully press the specimen holder against the stage center plate for it may deform the plate.

▲ When the specimen is heavier than 1 kilogram, special care is required because the stage center plate could be deformed or the operability of the stage feed knobs may deteriorate.

◎ If the stage center plate is removed, a specimen as heavy as about 5 kilograms can be placed on the stage. Set up the microscope on a sturdy desk. In the environment susceptible to external vibration, it is recommended to use the portable anti-vibration table.

2 Moving the Specimen

(Fig. 8)

When using the plain stage, move the specimen directly by hand or manually move the stage plate on which the specimen is placed to the required position. When using the mechanical stage, turn the feed rings on it to move the specimen.

★ The maximum weight of a specimen that can be placed on the stage plate ① when using the mechanical stage is 400 grams. Specimen weighing more than 400 grams will prevent the stage plate's movement from following the rotation of the feed rings.

★ Do not place a heavy object including a specimen on the area ② directly above the feed rings of the mechanical stage. This may adversely affect the mechanical stage and could cause the specimen to drop.

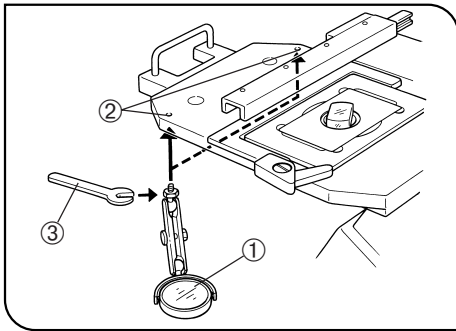


Fig. 9

3 Observation Position Confirmation Mirror (Fig. 9)

◎ To confirm the specimen observation position without looking at the specimen from below the stage, mount the optional observation position confirmation mirror ① on the stage.

1. Using the spanner ③ provided with the observation position confirmation mirror, attach the mirror to either of the tapped holes ② on the left and right remote ends of the stage.
2. Adjust the mirror angle so that the mirror reflects the observation position at the point where you remove your eyes from the eyepieces.

★ If the mirror lowers on its own, use the provided spanner ③ to tighten the nut in the middle of the arm.

4-3 Observation Tube

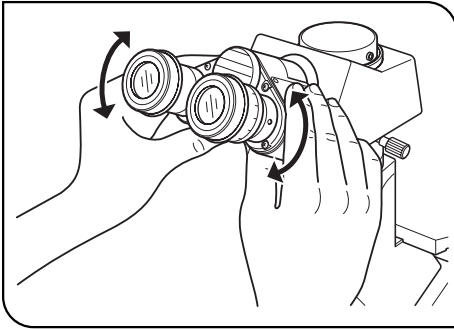


Fig. 10

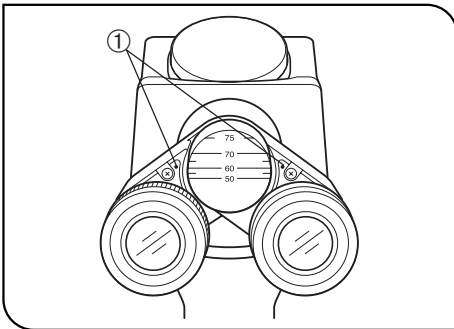


Fig. 11

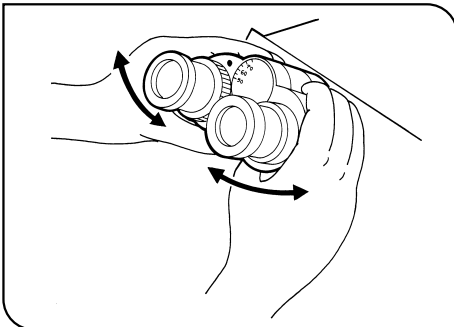


Fig. 12

1 Adjusting the Interpupillary Distance (Figs. 10 to 12)

▲ Be careful not to have your finger caught by the spaces on the binocular tube during the interpupillary distance adjustment.

When using the U-CBI30-2/CTR30-2/CTBI observation tube

While looking through the eyepieces, move both eyepieces until the left and right fields of view coincide completely.

Adjust so that the two index dots • ① are horizontal. (Fig. 11)

◎ To make the line connecting the two index dots horizontal, adjust so that the index dots come on the extension of one of the horizontality lines inscribed on the pivot.

When your interpupillary distance is other than 50, 60, 70 and 75, adjust so that the line connecting the two index dots are in parallel with the horizontality lines on the pivot. (Fig. 11)

◎ Note your interpupillary distance so that it can be quickly duplicated.

When using the U-BI30-2/TR30-2/TBI-3 & CKX-TBI observation tube

While looking through the eyepieces, move both eyepieces until the left and right fields of view coincide completely. The position of index dot • indicates the interpupillary distance.

◎ Note your interpupillary distance so that it can be quickly duplicated.

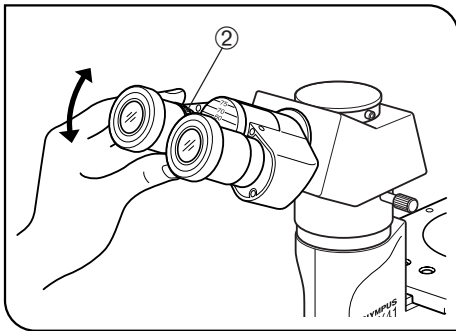


Fig. 13

2 Adjusting the Diopter (Figs. 13 & 14)

⊙ When using the U-CTBI observation tube, align the white dot “•” on the diopter adjustment scale on the right eyepiece with the index line before proceeding to the following adjustment.

1. While looking through the right eyepiece with your right eye, turn the coarse and fine adjustment knobs to bring the specimen into focus.
2. While looking through the left eyepiece with your left eye, turn only the diopter adjustment ring ② to focus on the specimen. (Fig. 13)

Tip If you switch the objectives frequently

⊙ If you switch the high- and low-power objectives frequently during observation, a focus error may be produced after switching unless the diopter is adjusted strictly.

To adjust the diopter precisely, it is required to provide the right eyepiece with helicoids.

1. Engage the high-power objective in the light path, look through the right eyepiece and focus on the specimen.
2. Engage the low-power objective in the right path and turn only the helicoids of the right eyepiece to focus on the specimen.

- ⊙ The precision can be improved by repeating steps 1 and 2 several times.
3. Look through the left eyepiece and turn only the diopter adjustment ring to focus on the specimen.

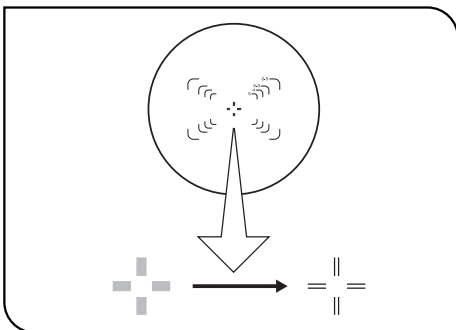


Fig. 14

Using a Finder Eyepiece (35WHN10X/PWH10X)

⊙ Insert the finder eyepiece into the right eyepiece sleeve of the U-TR30-2 trinocular tube.

1. Looking through the right eyepiece with your right eye, turn the eyepiece top ring until clearly defined double crosslines can be seen in the field of view. (Fig. 14)
2. Looking through the right eyepiece, turn the coarse and fine adjustment knobs to bring the specimen and double crosslines into simultaneous focus.
3. Looking through the left eyepiece with your left eye, turn the diopter adjustment ring to focus on the specimen.

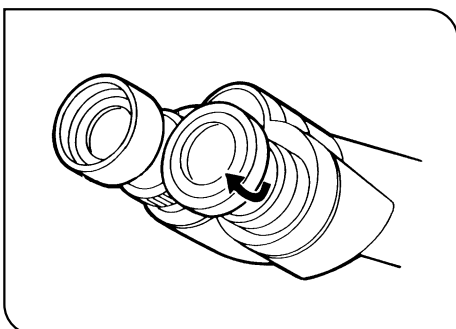


Fig. 15

3 Using the Eye Shades (Fig. 15)

When Wearing Eyeglasses

Use with the eyeshades in the normal, folded-down position. This will prevent the eyeglasses from being scratched.

When Not Wearing Eyeglasses

Extend the folded eyeshades in the direction of the arrow to prevent extraneous light from entering between the eyepieces and eyes.

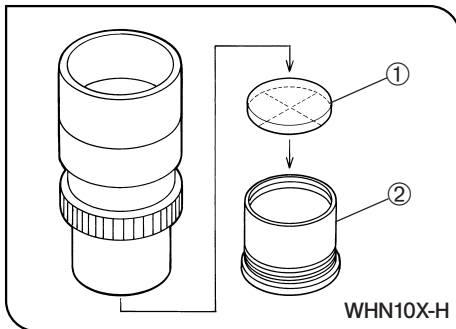


Fig. 16

4 Using the Eyepiece Micrometer Disk (Figs. 16 & 17)

⊙ When using the WHN10X-H (or WHN10X) eyepieces, an eyepiece micrometer disk can be inserted in one of them.

However, if the eyepiece does not offer the helicoidal adjustment facility, observers with poor eyesight are recommended to wear eyeglasses because they cannot focus the eye on the micrometer disk.

Use an eyepiece micrometer disk with a diameter of $\phi 24$ mm and thickness of 1.5 mm.

Following Fig. 16, unscrew the micrometer-mounting frame ② built into the eyepiece from the eyepiece and place a micrometer disk ① into the mounting frame. The engraving on the eyepiece micrometer disk should face downward in the micrometer-mounting frame.

Screw the micrometer-mounting frame back into the eyepiece.

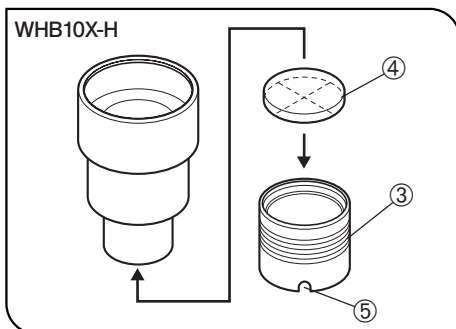


Fig. 17

⊙ When the WHB10X-H (or WHB10X) eyepieces are used, an eyepiece micrometer disk with a diameter of $\phi 20.4$ mm and thickness of 1 mm can be inserted in one of them using the 20.4RH reticle holders ③ (2-piece set). (Fig. 17)

However, if the eyepiece does not offer the helicoidal adjustment facility, observers with poor eyesight are recommended to wear eyeglasses because they cannot focus the eye on the micrometer disk.

When the reticle holders are used, the field number becomes 19.5. However, when the U-CTBI eyepieces are used, the field number does not change because the original field number of these eyepieces is 18.

1. Remove both eyepieces. (When using the U-CTBI, remove only the right eyepiece by loosening the clamping screw with a small flat-head screwdriver.)
2. Place an eyepiece micrometer disk ④ in one of the reticle holders ③ so that the engraving on the eyepiece micrometer disk faces downward.
3. Screw the reticle holder ③ containing the eyepiece micrometer disk ④ into the bottom of the eyepiece.
At the end of screwing, turn the reticle holder by hooking your nail on its notch ⑤ to screw it all the way in.
4. To provide the other eyepiece with the same field number, screw in the other reticle holder, without eyepiece micrometer disk, into the bottom of the other eyepiece.
5. Attach the eyepieces to the original positions.

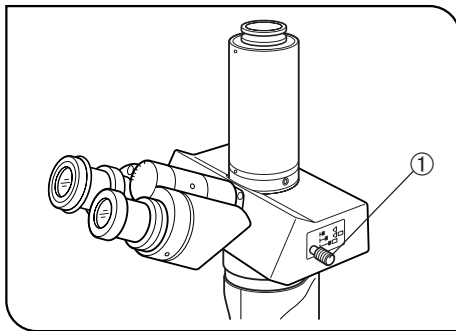


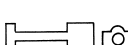


Fig. 18

5 Selecting the Light Path for the Observation Tube (U-TR30-2 trinocular tube only) (Fig. 18)

Move the light path selector knob ① to select the required light path.

Light Path Selector Knob	Symbol	Intensity Ratio	Applications
Pushed in		100% for binocular eyepieces	Observation of dark specimens
Middle position		20% for binocular eyepieces, 80% for TV/photo	Observation of bright specimens, photography, TV observation
Pulled out		100% for TV/photo	Photography, TV observation

★ When using the U-CTR30-2 trinocular tube, the light path selection is not available and the intensity ratio is fixed to 50% for binocular eyepieces and 50% for TV/photo light path.

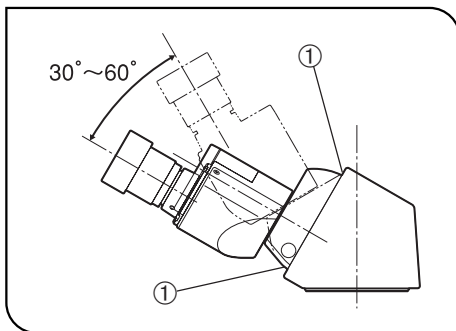


Fig. 19

6 Adjusting the Tilt (Fig. 19)

Ⓞ When using the tilting binocular tube, adjust the height and tilt of the observation tube to obtain the most comfortable viewing position.

Holding the binocular section with both hands, raise or lower it to the desired position.

- U-CTBI/CKX-TBI: 30 to 60°
- U-TBI3: 5 to 35°

★ Never attempt to force the binocular section past the upper or lower stop position. Applying excessive force could destroy the limiting mechanism.

★ Tilt adjustment is possible with specified eyepieces. Combination with any other eyepiece will result in insufficient illumination at the periphery of the field of view.

- U-CTBI/CKX-TBI: Provided eyepieces only.
- U-TBI3: WHN10X only.

▲ When adjusting the tilt of the U-CTBI, be careful not to have your fingers caught by the spaces ① between the binocular assembly and cover.

4-4 Illumination Unit

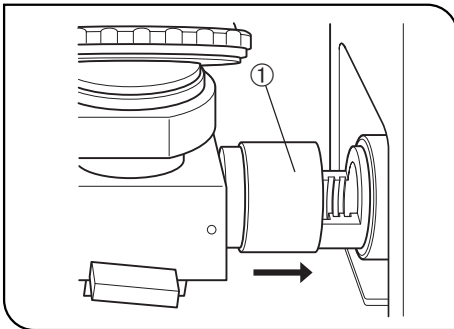


Fig. 20

1 Using the Filter

(Figs. 20 to 23)

◎ Use filters as needed to increase the accuracy of observation and photomicrography.

The 25LBD filter is especially recommended for observation and photomicrography where high light intensity is required because it achieves the most natural color reproduction when the light source voltage is set to maximum (provided that a long-life halogen bulb is used).

★ After mounting the filter or when not using the filter, slide the light shielding sleeve ① closed to prevent light from leaking from the filter holder. (Fig. 20)

How to mount

To avoid putting fingerprints on the filter, hold it at the edges with both index fingers and place it in an appropriate filter groove.

◎ The filter grooves ② are positioned obliquely to prevent flares.

First remove the stage center plate and then place a required filter while confirming the filter grooves ② and ③. (Fig. 22)

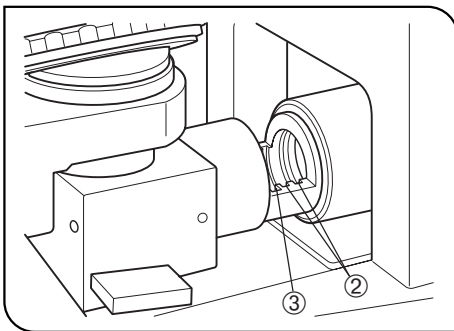


Fig. 21

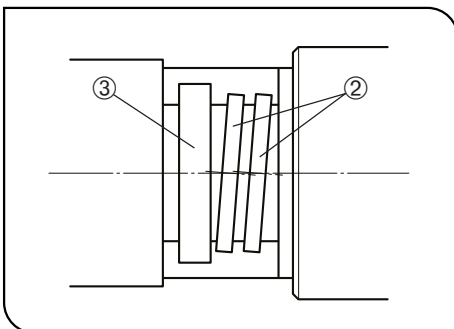


Fig. 22

Filter	Position	Purpose
25IF550	②	Monochrome contrast filter (green)
25LBD		Color temperature conversion filter (for observation/photomicrography)
25ND6 25ND25		Light intensity adjustment filter (transmittance: 6%/25%)
CK40M-PO	③	Polarizer for simple polarized light observation

How to remove

▲ The filter is very hot right after use. Wait until the filter cools down before removing it.

1. While holding the upper part of filter with your right index finger ④ and left index finger ⑤, pick up the filter to remove it. (Fig. 23)
2. If the filter is dirty (with fingerprints, grease, duct, etc.), wipe it clean with tissue paper or clean cloth.

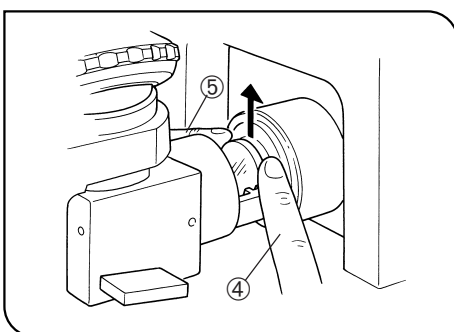


Fig. 23

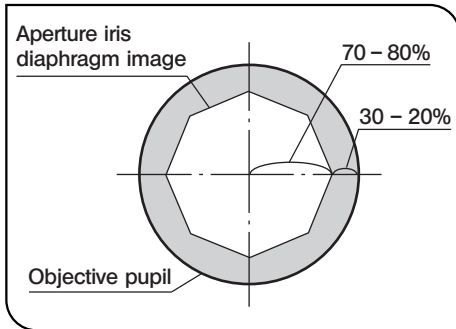


Fig. 24

2 Using the Aperture Iris Diaphragm (Fig. 24)

☉The aperture iris diaphragm determines the numerical aperture of the illumination system. It enables you to adjust the depth of focus, contrast and resolution according to your requirements.

- To confirm the aperture iris diaphragm, remove the eyepiece when necessary, and then look into the eyepiece sleeve; you will see the field of view as shown in Fig. 24. Now adjust the aperture iris diaphragm lever as required.

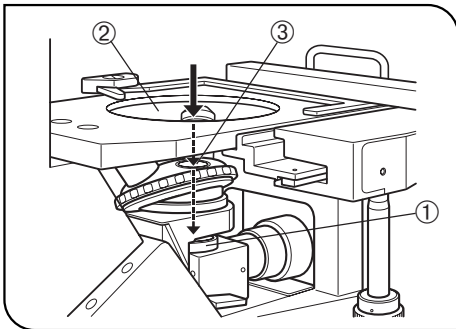


Fig. 25

3 Cleaning the Dustproof Glass (Fig. 25)

☉Clean the dustproof glass ① periodically to prevent the view from deteriorating when the dustproof glass gets dirty.

1. To prepare for blowing dirt and dust away using an air blower, raise the revolving nosepiece to the upper limit position.
2. Remove the stage center plate and one objective.
3. Through the stage center plate hole ②, blow air toward the objective mount screw hole ③ to blow dirt and dust away.
4. If the dustproof glass is still dirty, wipe using a cotton swab moistened with a cleaning fluid. (To approach the dust glass, lower the revolving nosepiece.)

5 SIMPLIFIED POLARIZED LIGHT OBSERVATION

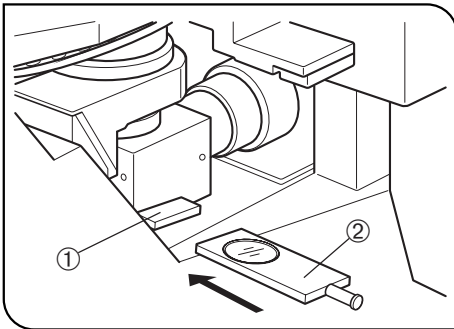


Fig. 26

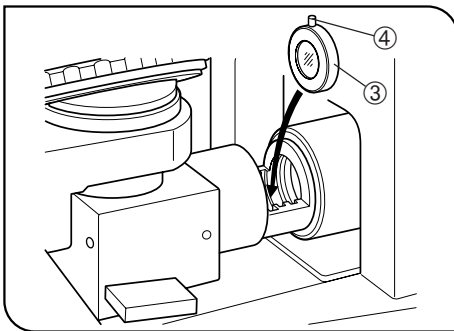


Fig. 27

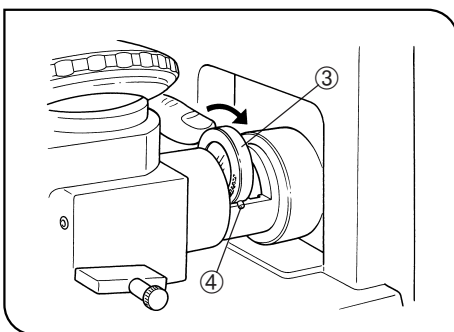


Fig. 28

⊙Engage an analyzer and polarizer only when simplified polarized light observation is to be performed. Make sure they are both disengaged in ordinary observation since significant loss of light intensity occurs. (It is also required to insert the dummy slider in the analyzer inlet for ordinary observation.)

1. Remove the dummy slider ①.

The dummy slider helps preventing penetration of dust when the analyzer is not used. Retain it carefully for use in ordinary observation.)

2. Push in the analyzer ② to bring it into the light path. (Fig. 26)

3. Fit the polarizer ③ into the nearest slot of the filter holder with the protrusion ④ pointing right above. (The direction perpendicular to the protrusion is the vibration direction of illumination.) (Fig. 27)

4. Place an object with high reflective surface and minimized polarization, like a mirror, on the stage plate.

5. Slightly rotate the polarizer ③ until the field of view is at its dimmest level so that the cross-Nicol position is obtained. (Fig. 27)

(The illumination unit is adjusted to achieve the cross-Nicol position when the protrusion points directly above.)

6. Place the specimen to be observed on the stage plate. Turn the specimen to perform polarized observation.

⊙When a stage center plate is in use, the specimen can be turned by rotating the center plate with the thick of your finger.

7. Rotate the polarizer ③ to change the vibration direction of illumination. To activate the open-Nicol position, rotate the polarizer until the protrusion points the right. (Fig. 27)

How to remove the polarizer

1. Rotate the polarizer ③ until the protrusion ④ touches the edge of the slot.

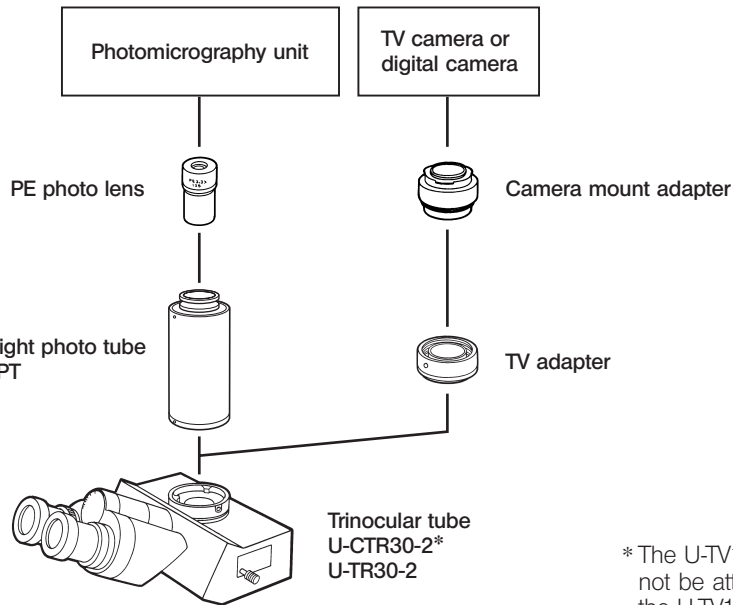
Then rotate the polarizer a little more and hold it,

2. When the polarizer is rotated and held, the side opposite the protrusion lifts, allowing you to remove the polarizer easily. (Fig. 28)

6 PHOTOMICROGRAPHY

© Use the U-CTR30-2 or U-TR30-2 trinocular tube for photomicrography, TV (video) camera observation or digital camera shooting. The trinocular tube allows the U-SPT or other TV adapter (which may also use an additional camera adapter) to be mounted on it. For details, also refer to the instruction manual for the modules used.

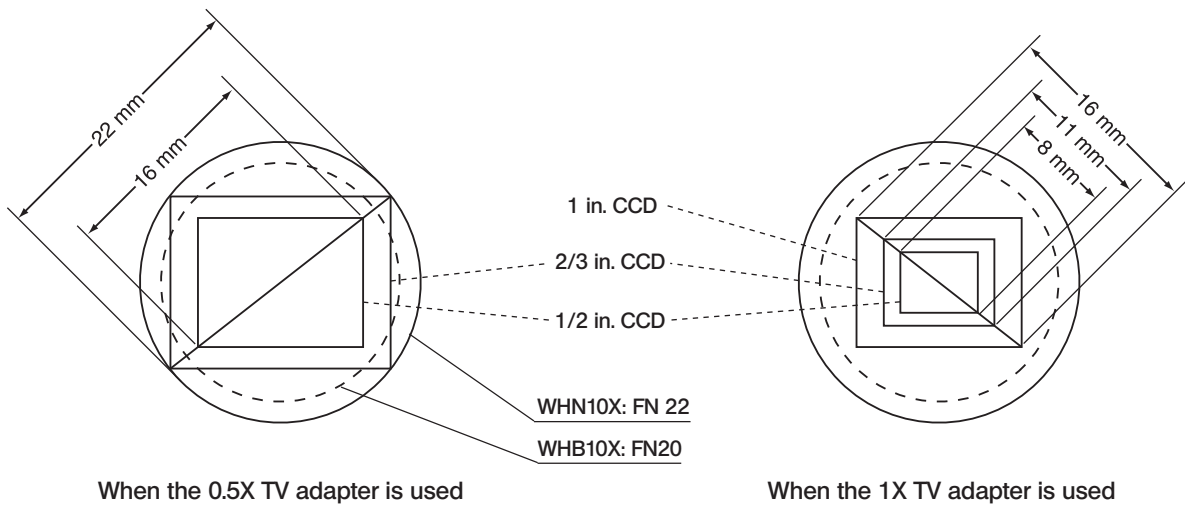
1 Photomicrography System Chart



2 Selecting the TV Adapter Magnification

The magnification of the TV adapter to be used is determined by the size of the CCD incorporated in the TV camera or digital camera.

When using the WHN10X eyepieces with a field number of 22 (or the WHB10X eyepieces with a field number of 20), the shooting range varies according to the CCD size as shown in the diagram below.



7 TROUBLESHOOTING GUIDE

Under certain conditions, performance of the microscope may be adversely affected by factors other than defects. If problems occur, please review the following list and take remedial action as needed.

If you cannot solve the problem after checking the entire list, please contact Olympus for assistance.

Trouble	Cause	Remedy	Page
1. Optical System			
a) Although the illumination is on, the field of view is dark.	The lamp socket is not pushed in securely.	Push it in all the way.	22
	The socket pin is not connected to the illumination unit.	Connect it securely.	22
	The bulb is burned out.	Replace it with a new one	22
	The brightness adjustment control is set too low.	Set it to the appropriate position.	6
	The aperture iris diaphragm is stopped down.	Open the aperture iris diaphragm.	14
	The polarizer and analyzer are engaged.	Disengage them.	15
	The mounted lamp is not the one specified.	Use the specified 6 V, 30 W halogen lamp.	22
b) The edges of the field of view are shaded, or the field of view brightness is uneven.	The revolving nosepiece is not clicked into position.	Turn the nosepiece slightly until it clicks into position.	—
	The analyzer or dummy slider is not correctly positioned.	Push it in all the way.	15
c) Dust and smudges are noticeable in the field of view.	The specimen is dirty.	Clean the specimen.	—
	The eyepiece is dirty.	Clean the eyepiece.	2
	The dustproof glass is dirty.	Clean it thoroughly.	14
d) The image appears shiny.	The aperture iris diaphragm is stopped down.	Open the aperture iris diaphragm.	14
e) Resolution problems • Images are not sharp. • Contrast is wrong.	The objective is not correctly positioned in the light path.	Turn the nosepiece slightly until it clicks into position.	—
	The aperture iris diaphragm is opened or stopped down too much.	Adjust the aperture properly.	14
	Objective, eyepiece, or specimen vessel is dirty.	Clean it.	2
	The dustproof glass is dirty.	Clean it thoroughly.	14
f) The image is partially out of focus.	The objective is not correctly positioned in the light path.	Turn the nosepiece slightly until it clicks into position.	—
	The specimen is not correctly placed on the stage plate.	Put it on the stage correctly.	7
g) The visual field is yellowish even when an LBD filter is engaged.	The ND filter is also engaged and it is accidentally parallel with the LBD filter.	Touch either filter so that the two filters are not parallel.	13

Trouble	Cause	Remedy	Page
2. Electric System			
a) The bulb flickers and the light intensity is unstable.	The line voltage fluctuates.	Use a voltage stabilizer.	—
	The bulb is almost burned out.	Replace it with a new one.	22
	The power cord is not connected securely.	Connect it securely.	24
3. Focusing			
a) The coarse adjustment knob is too difficult to turn.	The coarse tension adjustment ring is tightened too much.	Loosen it appropriately.	6
b) The image goes out of focus during observation.	The coarse tension adjustment ring is loosened too much.	Tighten it appropriately.	6
4. Observation Tube			
a) The fields of view of the left and right eyepieces do not match.	The interpupillary distance is not correctly adjusted.	Adjust it correctly.	9
	The diopter is not corrected.	Correct the diopter according to your eyesight.	10
	You are not accustomed to binocular vision.	Do not try to gaze at the specimen right after looking into the eyepieces. Instead, look at the entire field of view. Or take your eyes away from the eyepieces briefly and look at something else, then look into the eyepieces again.	—

Item		Specifications	
1. Optical system		UIS2 (UIS) (Universal Infinity System) optics	
2. Illumination system		6V30WHAL-L long-life halogen bulb. Hosobuchi G4 20H CF-6. (Average bulb life: Approx. 2000 hrs. under rated use)	6V30WHAL high-intensity halogen bulb. Philips Type 5761. (Average bulb life: Approx. 100 hrs. under rated use)
		Output rating: 6 V DC, 30 VA Input rating: 100-120/220-240 V \sim AC, 0.85/0.45 A, 50/60 Hz.	
3. Focusing mechanism		Vertical movement of revolving nosepiece (Stage is fixed.) Coarse/fine adjustment knobs (provided with tension adjustment mechanism). Stroke (from focal point on stage surface): 7 mm upward and 2 mm downward.	
4. Revolving nosepiece		Quadruple-position revolving nosepiece (Fixed)	
5. Observation tubes	Binocular tubes	U-CBI30-2: Field number 20, tube inclination 30°, interpupillary distance adjustment range 48-75 mm.	U-BI30-2: Field number 22, tube inclination 30°, interpupillary distance adjustment range 50-76 mm.
	Trinocular tubes	U-CTR30-2: Field number 20, tube inclination 30°, interpupillary distance adjustment range 48-75 mm, light intensity ratio between binocular and straight tubes fixed (at 50:50).	U-TR30-2: Field number 22, tube inclination 30°, interpupillary distance adjustment range 50-76 mm, light intensity ratio between binocular and straight tubes variable in 3 steps (100:0, 20:80, 0:100).
	Tilting tubes	U-CTBI: Field number 18, tube inclination 30-60°, interpupillary distance adjustment range 48-75 mm. 10X eyepieces are fixed and not exchangeable.	U-TBI-3: Field number 22, tube inclination 5-35°, interpupillary distance adjustment range 50-76 mm. Only WH10X eyepieces can be used.
CKX-TBI: Field number 20, tube inclination 30-60°, interpupillary distance adjustment range 50-76 mm. WHB10X eyepieces are provided and not exchangeable.			
6. Eyepieces		WHB10X, WHB10X-H: Field number 20. Eyepiece micrometer disk acceptable.	WHN10X, WHN10X-H: Field number 22. Eyepiece micrometer disk acceptable.
7. Objectives		MPlan5X/10X/20X/40X/50X/100X.	
8. Stage		Stage dimensions 160(W) x 250(D) mm	
9. Mechanical stage		Transversing area: 120(X) x 76(Y) mm. Coaxial low drive control knobs attachable on right or left side of plain stage. Provided with stage plate holder, slide glass holder and stage plate.	
10. Dimensions and weight		236(W) x 624(D) x 407(H) mm (when a binocular tube is mounted). Approx. 10 kg (22 lbs).	
11. Operating Environment		<ul style="list-style-type: none"> • Indoor use. • Altitude: Max. 2000 meters. • Ambient temperature: 5° to 40°C (41° to 104° F). • Relative humidity: 85% for temperatures up to 31°C (88°F), decreasing linearly through 70% at 34°C (93°F), 60% at 37°C (99°F) to 50% relative humidity at 40°C (104°F). • Supply voltage fluctuations: \pm10%. • Pollution degree: 2 (in accordance with IEC60664). • Installation (overvoltage) category: II (in accordance with IEC60664) 	

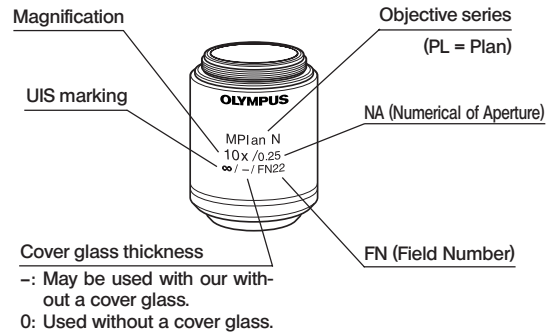
9 OPTICAL CHARACTERISTICS

- The UIS series objectives that are not mentioned below can also be mounted on this microscope. -

The table below shows the optical characteristics of different eyepiece and objective combinations. Objective specifications are marked on the objective (as shown in the diagram on the right).

NOTE

Refer to the latest catalogue or consult Olympus for the updated information on the eyepieces and objectives that can be combined with this unit.



Objective \ Eyepiece	Type	MPLN				
		5X	10X	20X	50X	100X
	Magnification	5X	10X	20X	50X	100X
	Numerical aperture	0.10	0.25	0.40	0.75	0.90
	Working distance (mm)	20.0	10.6	1.3	0.38	0.21
	Resolution (µm)	3.36	1.34	0.84	0.45	0.37
WHB10X (Field number 20)	Total magnification	50X	100X	200X	500X	1000X
	Depth of focus (µm)	98	18	6.1	1.4	0.73
	Field of view (mm)	4	2	1	0.4	0.2
WHN10X (Field number 22)	Total magnification	50X	100X	200X	500X	1000X
	Depth of focus (µm)	98	18	6.1	1.4	0.73
	Field of view (mm)	4.4	2.2	1.1	0.44	0.22

Working distance: Distance between the surface of a specimen and the tip of the objective.

Aperture number: Essential value to determine the characteristics (resolution, depth of focus and brightness) of an objective:

- Resolution Increases relative to the aperture number.
- Depth of focus Decreases relative to the aperture number.
- Brightness Changes in proportion with the square of the aperture number (the same magnification comparison).

Resolution: Represented by the interval between two points on a specimen which determine the ability of an objective to distinguish two images close to each other.

Depth of focus: The degree to which the portions of the image from front to back can be seen in focus simultaneously. The lower the aperture iris diaphragm, the greater the depth. The higher the aperture number, the shallower the depth.

Field number: The diameter of the area viewed through an eyepiece represented in millimeters.

Field of view: The diameter of the area observable on the specimen, expressed in mm.

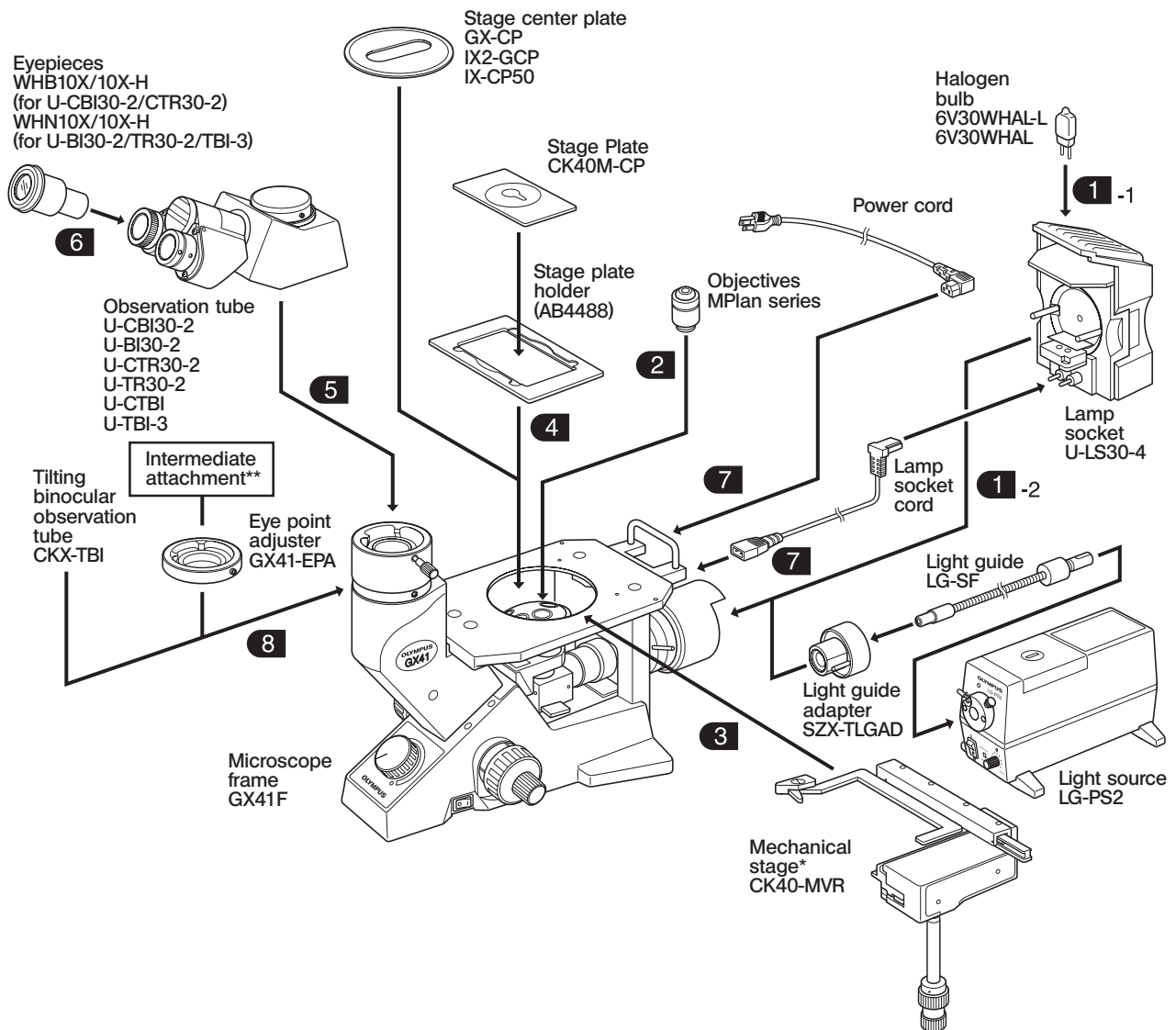
10 ASSEMBLY

10-1 Assembly Diagram

The diagram below shows the assembly sequence for various modules. The numbers in **■** indicate the order of assembly. Refer to the instructions, given according to these numbers, in the detailed assembly procedure on the subsequent pages.

★ When assembling the equipment, make sure that all parts are free of dust and dirt. Avoid scratching any parts or glass surfaces.

★ Keep the provided Allen wrench on hand. You will need it when replacing the modules.



(Note) The CKX-TBI and U-CTBI tilting tubes can use only the eyepieces provided with them. (Otherwise, the illumination at the periphery of the field of view will be insufficient.)

*The CK40-MVR mechanical stage can also be mounted on the left side. However, the feed rings will be positioned on the far side on the left.

The mechanical stage is provided with the stage plate holder, $\phi 35$ mm petri dish holder and slide glass holder.

When setting a specimen on the mechanical stage, see **1** "Placing the Specimen" on page 7.

** One of the following intermediate attachments can be mounted by dismounting the observation tube mount and attaching the GX41-EPA eye point adjuster:

Applicable intermediate attachment: U-CA, GX-SPU, U-EPA2, U-ECA, U-DA or U-DO3.

★ For the U-DA/U-DO3, see the cautions in paragraph **8**.

10-2 Detailed Assembly Procedure

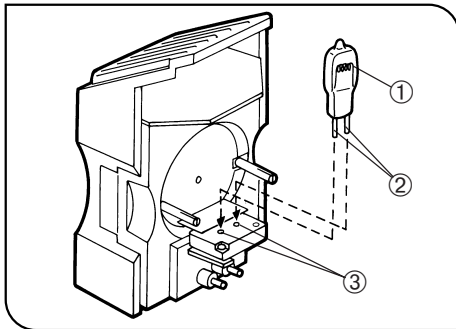


Fig. 29

1 Installing the Bulb and Lamp Socket (Figs. 29 & 30)

Use only a designated bulb, which is the 6V30WHAL-L long-life halogen bulb (approx. life 2000 hours, Hosobuchi G4 20H CF-6) or the 6V30WHAL high-intensity halogen bulb (approx. life 100 hours, Philips 5761).

1. Holding the bulb ① with a glove or a piece of gauze, insert the bulb pins ② fully into the pin holes ③. (Fig. 29)

★ To prevent reduced bulb life or cracking, do not touch the bulb with bare hands. If fingerprints are accidentally left on the bulb, wipe the bulb with a soft cloth.

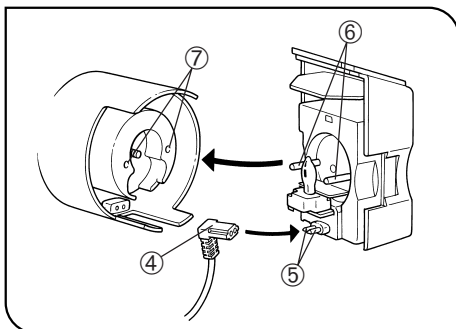
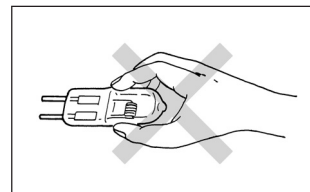


Fig. 30

2. After fitting the lamp socket cord plug ④ onto the socket pin ⑤, gently push the lamp socket into place while aligning the guide pines ⑥ with the guide pin holes ⑦.

▲ Bulb replacement during use or right after use

The bulb, lamp socket and areas near these will be extremely hot during and right after use.

After setting the main switch to "○" (OFF) and unplugging the power cord from the wall outlet, allow the old bulb and lamp socket to cool before replacing the bulb with a new one of the designated type.

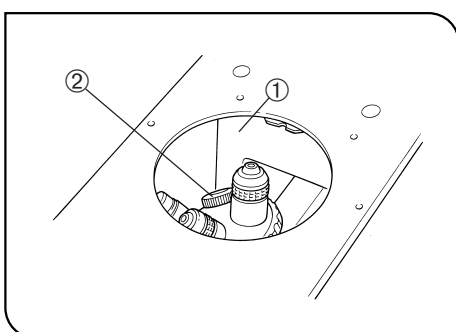


Fig. 31

2 Mounting the Objectives (Fig. 31)

★ First raise the revolving nosepiece slightly to remove the transportation pad on the nosepiece's base.

◎ Keep the transportation pad in a safe place. You will need it when the equipment is sent for repair or transported to another location.

1. Insert your hand through the stage center plate hole ① and rotate the revolving nosepiece in the clockwise direction while screwing in the objectives in the threaded holes in a sequence beginning with the lowest-magnification objective and advancing toward higher-magnification objectives.

◎ Mounting the objectives this way makes it easier to change magnification.

★ Clean the objectives periodically. The objective tips on an inverted microscope are susceptible to dust.

★ Be sure to any unused threaded holes with the objective caps ② to prevent dirt and dust from getting inside.

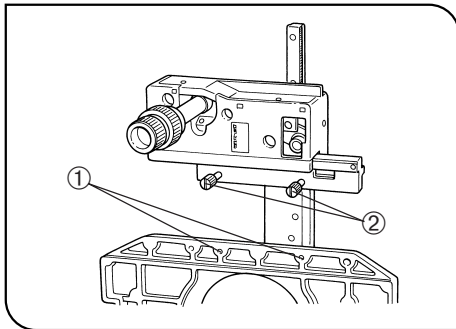


Fig. 32

3 Mounting the Mechanical Stage (Fig. 32)

Ⓞ The mechanical stage can be mounted on either the left or right side of the stage. The following instructions explain how to mount it on the right side.

1. Align the mechanical stage clamping screws ② with the two mounting holes ① on the lower part of the right side of the stage and tighten the screws to attach the mechanical stage.
2. After tightening the screws with your fingers, use a coin or screwdriver to turn the screws until the mechanical stage is securely attached.

When using as a plain stage

Ⓞ Mounting the mechanical stage is not necessary if you are going to observe a large object or if the mechanical stage might obstruct your view.

In this case, use a stage center plate matching the specimen size as required.

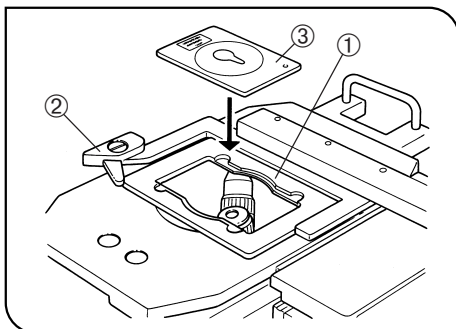


Fig. 33

4 Mounting the Stage Plate (Fig. 33)

1. Extend the specimen holder ② to retain the stage plate holder ① on which the stage plate will be placed.
2. Place the CK40M-CP stage plate ③ on the stage plate holder.

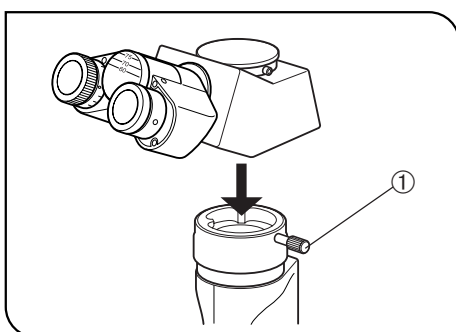


Fig. 34

5 Mounting the Observation Tube (Fig. 34)

1. Loosen the observation tube clamping knob ① till immediately before it slips out of the hole.
2. Insert the circular dovetail at the bottom of the observation tube into the mount opening on the microscope frame. Adjust the observation tube until the binocular eyepieces face directly to the front, and then tighten the clamping knob.

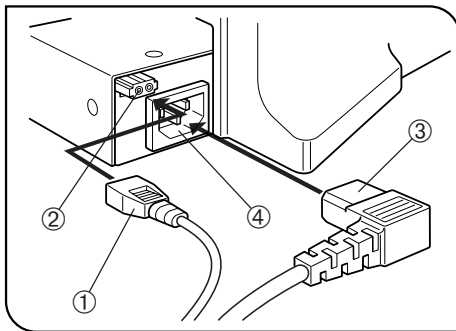


Fig. 35

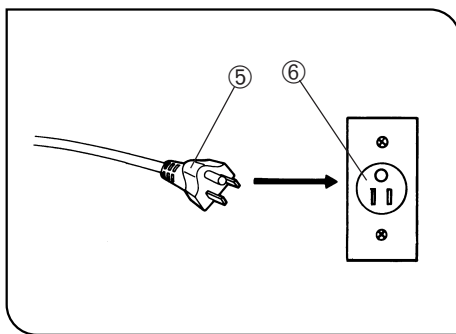


Fig. 36

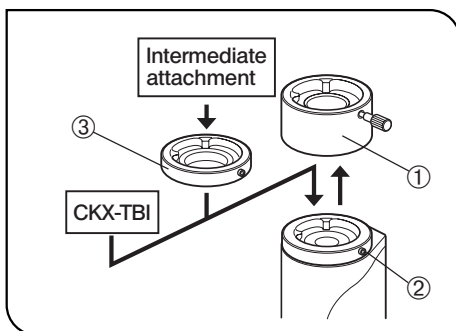


Fig. 37

7 Connecting the Cables and Power Cord (Figs. 35 & 36)

▲ Cables and cords are vulnerable when bent or twisted. Never subject them to excessive force.

▲ Make sure that the main switch of the power supply is set to “O” (OFF) before connecting cables.

1. Connect the plug ① of the lamp socket cord firmly to connector ② on the rear of the microscope. (Fig. 35)

▲ Do not connect anything other than the plug ① of the lamp socket cord to connector ②. Doing so will cause equipment failure.

▲ Always use the AC power adapter and power cord provided by Olympus. If no power cord is provided, please select the proper power cord by referring to the section “PROPER SELECTION OF THE POWER SUPPLY CORD” at the end of this instruction manual.

2. Connect the power cord connector ③ to connector ④ firmly. (Fig. 35)

3. Connect the power cord plug ⑤ to a wall outlet ⑥. (Fig. 36)

▲ Be sure to supply power from a grounded, 3-conductor power outlet using the proper power cord. If the power outlet is not grounded properly, Olympus can no longer warrant the electrical safety performance of the equipment.

▲ If the power cord or a connection cable comes in contact with the lamp socket or surrounding equipment, the cord or cable may melt and result in shock hazard. To prevent this, distribute the cords and cables apart from the lamp socket.

8 Mounting the Intermediate Attachment (Fig. 37)

1. Remove the observation tube from the microscope frame.

2. Using an Allen wrench provided with the microscope frame, loosen the clamping screw ② of the observation tube mount ①, and remove the mount.

◎ The CKX-TBI tilting binocular tube can be mounted directly after removing the observation tube mount.

3. Attach the GX41-EPA eye point adjuster ③.

4. Attach one intermediate attachment above the GX41-EPA.

5. Attach the observation tube above the intermediate attachment.

Caution on Use of the U-DA/U-DO3

• U-DA

When the U-DA is attached, the imaging magnification becomes 14X because the GX41 should come on a low position.

• U-DO3

a) Since the U-DO3 is positioned above the stage, the specimen height is limited to 80 mm or less.

b) The assistant observer should take care not to touch the lamp socket of the GX41 because it is hot. If the heat hinders observation, please use the optional heat shield plate.

c) The assistant observer should take care not to touch a projected part of the stage of the GX41 when manipulating the pointer control lever.

■ PROPER SELECTION OF THE POWER SUPPLY CORD

If no power supply cord is provided, please select the proper power supply cord for the equipment by referring to “ Specifications ” and “ Certified Cord ” below:

CAUTION: In case you use a non-approved power supply cord for Olympus products, Olympus can no longer warrant the electrical safety of the equipment.

Specifications

Voltage Rating	125V AC (for 100-120V AC area) or, 250V AC (for 220-240V AC area)
Current Rating	6A minimum
Temperature Rating	60°C minimum
Length	3.05 m maximum
Fittings Configuration	Grounding type attachment plug cap. Opposite terminates in molded-on IEC configuration appliance coupling.

Table 1 Certified Cord

A power supply cord should be certified by one of the agencies listed in Table 1 , or comprised of cordage marked with an agency marking per Table 1 or marked per Table 2. The fittings are to be marked with at least one of agencies listed in Table 1. In case you are unable to buy locally in your country the power supply cord which is approved by one of the agencies mentioned in Table 1, please use replacements approved by any other equivalent and authorized agencies in your country.




















Country	Agency	Certification Mark	Country	Agency	Certification Mark
Argentina	IRAM		Italy	IMQ	
Australia	SAA		Japan	JET, JQA, TÜV, UL-APEX / MITI	
Austria	ÖVE		Netherlands	KEMA	
Belgium	CEBEC		Norway	NEMKO	
Canada	CSA		Spain	AEE	
Denmark	DEMKO		Sweden	SEMKO	
Finland	FEI		Switzerland	SEV	
France	UTE		United Kingdom	ASTA BSI	
Germany	VDE		USA.	UL	
Ireland	NSAI				

Table 2 HAR Flexible Cord

APPROVAL ORGANIZATIONS AND CORDAGE HARMONIZATION MARKING METHODS

Approval Organization	Printed or Embossed Harmonization Marking (May be located on jacket or insulation of internal wiring)		Alternative Marking Utilizing Black-Red-Yellow Thread (Length of color section in mm)		
			Black	Red	Yellow
Comite Electrotechnique Belge (CEBEC)	CEBEC	<HAR>	10	30	10
Verband Deutscher Elektrotechniker (VDE) e.V. Prüfstelle	<VDE>	<HAR>	30	10	10
Union Technique de l'Electricite' (UTE)	USE	<HAR>	30	10	30
Instituto Italiano del Marchio di Qualita' (IMQ)	IEMMEQU	<HAR>	10	30	50
British Approvals Service for Electric Cables (BASEC)	BASEC	<HAR>	10	10	30
N.V. KEMA	KEMA-KEUR	<HAR>	10	30	30
SEMKO AB Svenska Elektriska Materielkontrollanstalter	SEMKO	<HAR>	10	10	50
Österreichischer Verband für Elektrotechnik (ÖVE)	<ÖVE>	<HAR>	30	10	50
Danmarks Elektriske Materialkontroll (DEMKO)	<DEMKO>	<HAR>	30	10	30
National Standards Authority of Ireland (NSAI)	<NSAI>	<HAR>	30	30	50
Norges Elektriske Materielkontroll (NEMKO)	NEMKO	<HAR>	10	10	70
Asociacion Electrotecnica Y Electronica Espanola (AEE)	<UNED>	<HAR>	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT	<HAR>	30	30	70
Instituto Portages da Qualidade (IPQ)	np	<HAR>	10	10	90
Schweizerischer Elektro Technischer Verein (SEV)	SEV	<HAR>	10	30	90
Elektriska Inspektoratet	SETI	<HAR>	10	30	90

Underwriters Laboratories Inc. (UL)
Canadian Standards Association (CSA)

SV, SVT, SJ or SJT, 3 X 18AWG
SV, SVT, SJ or SJT, 3 X 18AWG

11 LAMP SOCKET INSPECTION SHEET

- Study the instruction manual for the lamp socket before inspection.
- For safe use of the lamp socket, we recommend performing the following inspection periodically (every time you replace the lamp bulb and at least every 6 months).
- The table below identified the check items to be observed. Put (X) if not applicable or (✓) if applicable.
- If there is any (✓) mark noted, immediately stop use of the product, and consult Olympus for detailed inspections or replace the lamp socket.
- If you detect an abnormality other than that listed below or with other Olympus product, also stop the use of the product and contact Olympus for detailed inspections.
- Note that the service, replacement and detailed inspections are charged after expiration of the warranty period.
If you have any questions, please contact Olympus.

Check items	Check results (Date)			
	/	/	/	/
1. More than 8 years have passed since original purchase or the total power ON time exceeds 20,000 hours.				
2. Lamp does not light sometimes even though the main switch is set to on.				
3. Illumination flickers when you move the lamp cable or lamp socket.				
4. Lamp cable is unusually hot to the touch.				
5. Scorching or burning odor is produced during use.				
6. Illumination still flickers after replacement with a new lamp bulb.				
7. Deformation, backlash, or looseness, etc. when you assemble the lamp socket.				
8. Extreme discoloration of the lamp socket connection terminal or lamp socket lamp bulb mount.				
9. Discoloration, deformation or cracking of the lamp socket.				
10. Melting, crack, deformation or solidification of the lamp cable or a wiring part.				
11. Increased frequency of servicing compared to similar devices put into use at the same time as the lamp socket.				

* When the Check Result columns become insufficient, copy this sheet.

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