OLYMPUS®

INSTRUCTIONS
CH-RFL
REFLECTED LIGHT FLUORESCENCE ATTACHMENT

This instruction manual is for the Olympus Reflected Light Fluorescence Attachment Model CH-RFL for use with the CH30/CH40 microscope frames. To ensure the safety, obtain optimum performance, and to familiarize yourself fully with the use of this attachment, we recommend that you study this manual thoroughly together with the instruction manual for the CH30/CH40 microscope frames before operating the equipment. Retain this instruction manual in an easily accessible place near the work desk for future reference.

IMPORTANT

This unit employs an LB (finite-corrected system) optical design, and should only be used with CH30, CH40 microscope frames and LB eyepieces, objectives, condensers, etc. Less than optimum performance may result if inappropriate accessories are used.

⚠ SAFETY PRECAUTIONS

1. Always press the main switch to "**O**" (OFF) before connecting/disconnecting the power cord to/from the wall outlet.
2. The power supply unit contains high voltage components. To avoid a potential shock hazard, never attempt to disassemble the unit.
3. To avoid a potential shock hazard, be sure to ground the equipment. If the equipment is not grounded, Olympus can no longer warrant the electrical safety and performance of the equipment.
4. The high pressure mercury burner (mercury arc lamp) should be an HBO50W/AC burner (mfd. by OSRAM) or a CS50W4 burner (mfd. by PHILIPS).
5. Before opening the lamp housing for replacement of the burner or other internal parts, press the main switch to "**O**" (OFF) and unplug the lamp housing connecting cord plug from the output connector on the power supply unit. Allow 10 minutes or more for the burner and lamp housing to cool before touching.
6. Do not open the lamp housing while the burner is turned on or for at least 10 minutes after it is turned off. Lamp housing parts will be extremely hot and will cause burns if touched. (See page 5.)
7. Do not reverse the upside/downside of the lamp housing or mount it in a tilted position. The surfaces of the lamp housing will become extremely hot during operation. When installing the microscope, make sure to allow ample free space around and in particular above and below the lamp housing.
8. Always follow national and local laws when discarding a mercury burner.
9. The attachment should only be covered with the dust cover after the lamp housing has cooled down and the power cord has been disconnected from the wall outlet.
10. Always use the 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. If the proper power cord is not used, Olympus can no longer warrant the electrical safety and performance of the equipment.
11. The power supply's built-in lithium battery (for the burner life time hour counter) should be replaced by your Olympus representative. When disposing of the power supply, always follow national and local laws and guidelines for disposal of equipment with built-in lithium batteries.

Safety Symbols

The following symbols are found on the attachment. 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 handling could result in injury to the user and/or damage to the equipment.
	Indicates a potential fire hazard; when replacing fuses, be sure replacement fuse is of the specified rating.
	Indicates that the main switch is ON.
	Indicates that the main switch is OFF.

Warning Labels

Warning labels are affixed at positions where special precaution is required when handling and using the attachment. Always heed the warnings.

Warning Indication Position	Light Lamp Housing	[Warning Against High Temperature]

1 Getting Ready

1. The attachment is a precision instrument. Handle it with care and avoid subjecting it to sudden or severe impact.
2. Do not use the attachment where it is subjected to direct sunlight, high temperature and humidity, dust or vibrations. (For operating environment conditions, refer to and adhere to the conditions specified in Section 7, SPECIFICATIONS on page 15.)
3. Make certain that the burner is installed correctly and that all cords are correctly connected.
4. Do not attempt to force any control beyond its built-in limit (stopper, click-stop, etc.). Avoid using excessive force.

2 Maintenance and Storage

1. Clean all glass components by wiping gently with gauze. To remove fingerprints or oil smudges, wipe with gauze slightly moistened with a mixture of ether (70%) and alcohol (30%) or EE System Cleaner (Olympus EE-6310).

   ⚠ **Since solvents such as ether, alcohol and EE-6310 are highly flammable, they must be handled carefully. Be sure to keep these chemicals 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 these chemicals only in a well-ventilated room.**

2. The mercury burner has a service life of approx. 100 hours. When the hour counter on the power supply unit indicates 100 hours, replace the burner with a new one. (See pages 4, 5.)

3. If a dichroic mirror cube is not going to be used for a while, place it in its container and store it in a safe place.

3 Caution

If the attachment is used in a manner not specified by this manual, the safety of the user may be imperiled. In addition, the equipment may also be damaged. Always use the equipment 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).

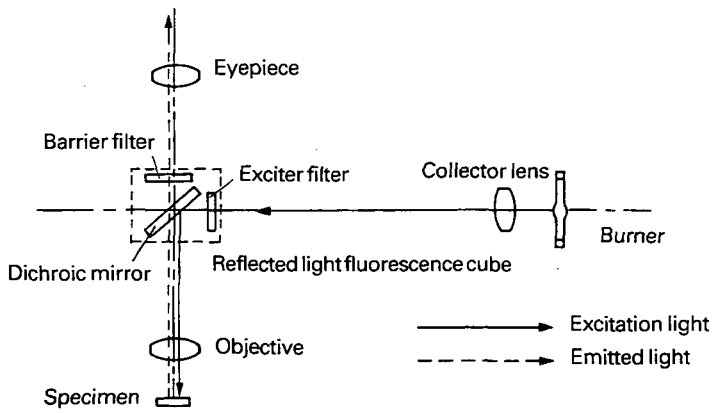
★ : Indicates that failure to follow the instructions could result in damage to equipment.

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

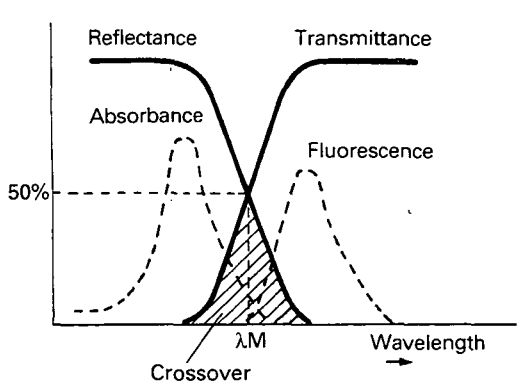
CONTENTS

1 PRINCIPLE

The design of the reflected light fluorescence microscope features a dichroic mirror* which directs the excitation light through the objective to illuminate the specimen and provide efficient fluorescence observation.



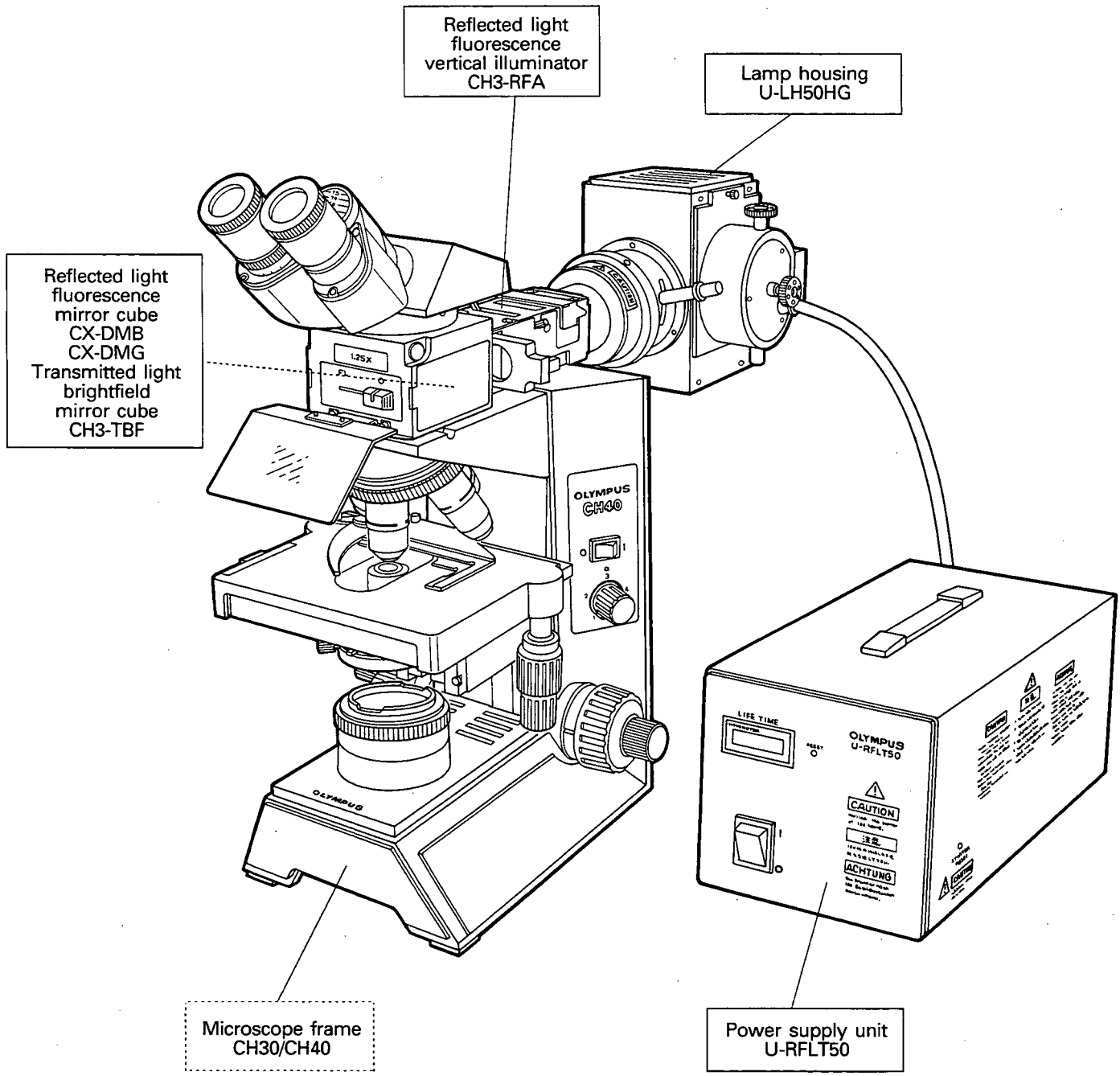
*The dichroic mirror reflects short wavelength light and passes long wavelength light. Utilizing the characteristics of the mirror enables effective fluorescence observation.



The spectral characteristics of the dichroic mirror when it is positioned at an inclination of 45° to the optical axis of incident light is shown in the figure on the left. Because a crossover exists between transmittance and reflectance, it is necessary to employ an appropriate combination of exciter and barrier filters in conjunction with the dichroic mirror to obtain an image with good contrast.

When the dichroic mirror is inclined at 45° to the optical axis of the incident excitation light, the excitation light is reflected towards the objective and other unwanted wavelengths are practically all passed through the mirror. When the specimen is irradiated by the excitation wavelength, it emits a visible, longer wavelength in accordance with Stoke's law. The dichroic mirror passes almost all of this light to the eyepiece. The barrier filter mounted between the dichroic mirror and the eyepiece blocks out unwanted wavelengths to provide a black background.

2 NOMENCLATURE OF MODULES

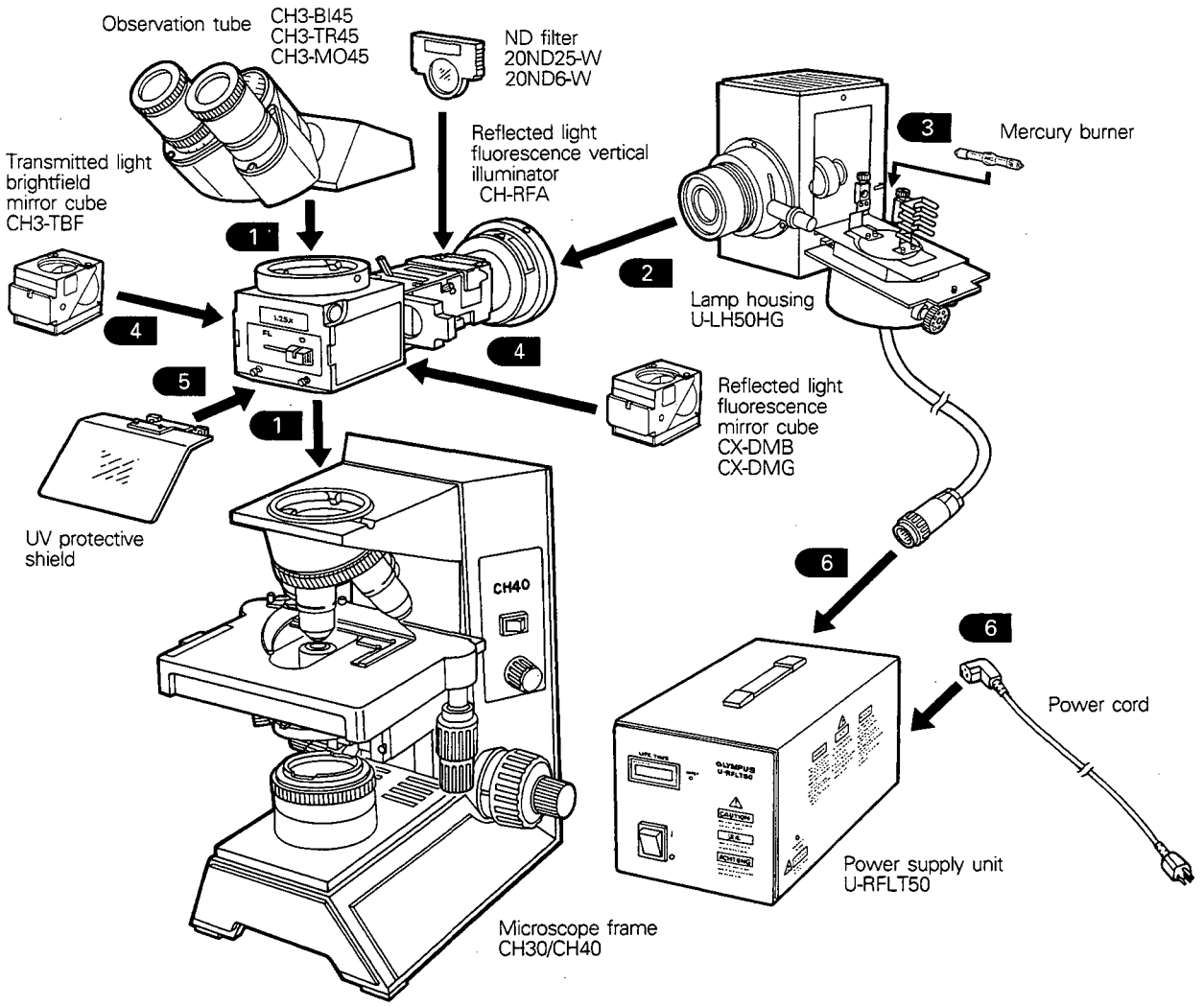


3 ASSEMBLY

3-1 Assembly Diagram

The diagram below shows how to assemble the various components of the CH-RFL attachment. The numbers indicate the order of assembly.

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



Tool to Be Used

Allen wrench

Use the wrench provided with the vertical illuminator or the microscope frame.

3-2 Detailed Assembly Procedure

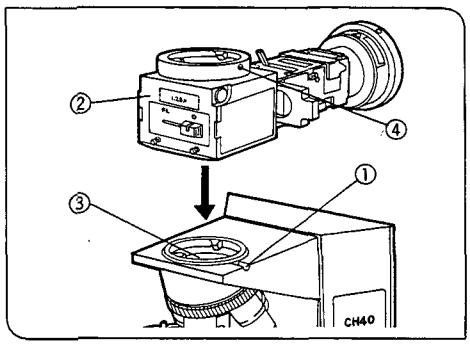


Fig. 1

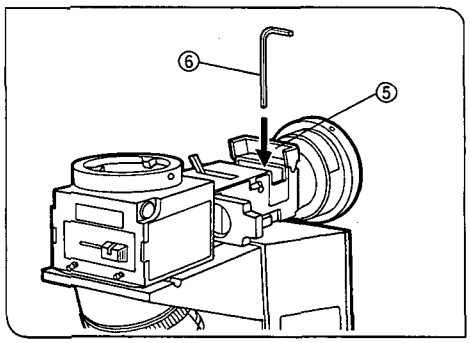


Fig. 2

1 Mounting the Reflected Light Fluorescence Vertical Illuminator CH3-RFA (Figs. 1,2)

◎ Remove the two plugs from the mounts on the top and at the underside of the vertical illuminator.

1. Using the provided Allen wrench, loosen the observation tube clamping screw ① on the CH30 or CH40 microscope frame and remove the observation tube if mounted.
2. Insert the circular dovetail mount at the bottom of the vertical illuminator ② into the opening ③ on the microscope frame, positioning the vertical illuminator parallel to the microscope arm. Clamp the vertical illuminator by tightening the clamping screw ① with the Allen wrench.
3. Open the filter holder cover ⑤ and turn the screw inside the filter holder clockwise using the Allen wrench ⑥ until the screw lightly contacts the upper surface of the microscope arm. (Fig. 2)
   ★ **Do not tighten too strongly. The vertical illuminator could bend resulting in reduced optical performance.**
4. Insert the circular dovetail mount at the bottom of the observation tube into the opening on the vertical illuminator, positioning the observation tube to point the binocular eyepieces towards the front. Clamp the observation tube by tightening the clamping screw ④. (Fig. 1)

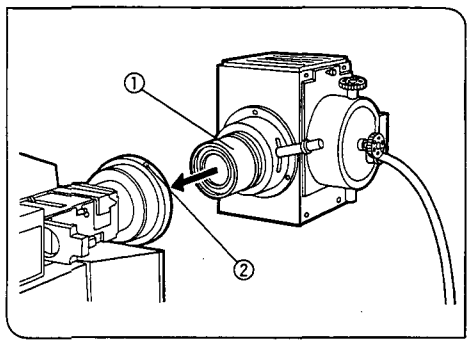


Fig. 3

2 Mounting the Lamp Housing U-LH50HG (Fig. 3)

1. Slide the collector lens section ① of the lamp housing into the vertical illuminator until it clicks into place.
2. After adjusting the lamp housing for tilt, tighten the clamping screw ② on the vertical illuminator using the Allen wrench.

⚠ **The surfaces of the lamp housing will become extremely hot during operation. When installing the microscope, make sure to allow ample free space around and in particular above and below the lamp housing.**

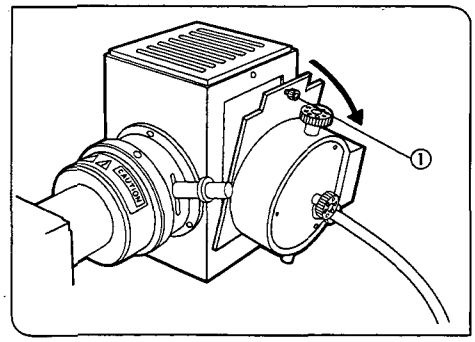


Fig. 4

3 Mounting the Mercury Burner (Figs. 4–7)

《 Applicable Burner 》
HBO50W/AC (OSRAM)
CS50W4 (PHILIPS)

◎ The type of burner should be registered in the power supply unit. Accordingly, check the burner's container or the burner socket indication to see whether the burner is an L_1 or L_2 type burner.

1. Using the Allen wrench, loosen the burner socket clamping screw ①. Then gently open the socket approximately 90° in the direction of the arrow. (Fig. 4)

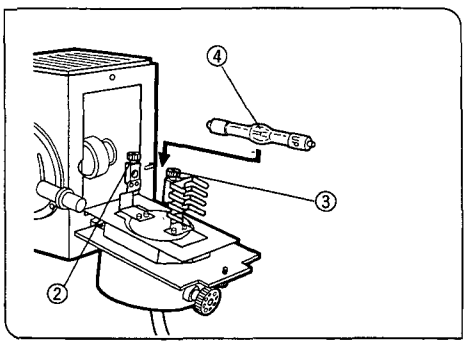


Fig. 5

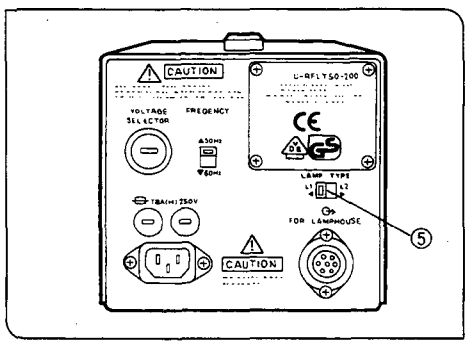


Fig. 6

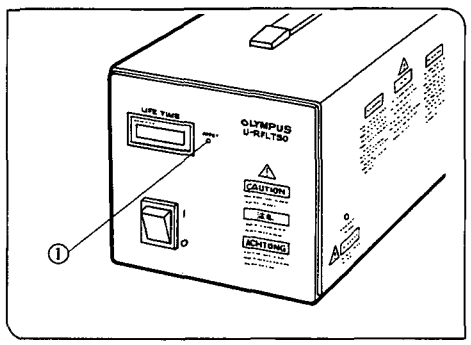


Fig. 7

2. Loosen the burner clamping screws ② and ③ and remove the transport post.

◎ For burner replacement, remove the used burner.

3. Insert the side of the mercury burner ④ with no UP engraving into the bottom terminal and tighten the clamping screw ② loosely. Then loosely tighten the clamping screw ③ holding the UP side of the burner.

★ **If the terminals of the mercury burner are reversed, optimum illumination performance will not be obtainable. The burner life time may also be reduced.**

★ **Avoid leaving fingerprints or dirt on the mercury burner. Dust or other contaminants left on the burner surface may lead to the appearance of dark spots in the field of view. If contaminated, clean by wiping gently with gauze slightly moistened with xylene or a mixture of ether (70%) and alcohol (30%).**

4. Return the burner socket with the mounted burner to its original position and tighten the socket clamping screw ①. (Fig. 4 on page 4)

◎ A click will be heard when the socket clamping screw ① is tightened. This sound indicates that the safety interlock switch is functioning correctly.

5. Set the burner type selector ⑤ on the rear panel of the power supply unit to the position corresponding to the mounted burner type (L_1 or L_2).

★ **If the socket clamping screw ① is accidentally loosened while the burner is ON, the safety interlock function will automatically turn OFF the burner. To turn ON the burner again, press the power supply unit's main switch to "O" (OFF) and wait approximately 10 minutes*. Then tighten the socket clamping screw firmly and press the main switch to "|" (ON).**

***Approximately 10 minutes are required for the mercury vapor inside the mercury burner to cool and condense to a liquid.**

⚠ **Caution When Replacing the Burner During or Immediately After Observation**

The surfaces of the lamp housing will be extremely hot during and immediately after operation. Whenever you replace the burner during use or right after use, first press the main switch on the power supply unit to "O" (OFF) and wait for the lamp housing and parts near the burner to cool before touching.

6. Press the reset button ① on the power supply unit's front panel to reset the burner life indicator to "0.00".

◎ The counter shows elapsed time in hours. In order not to impair the safety of the equipment, replace the burner when the counter indicates "100.00" hours.

★ **Make sure that the indicator is properly reset to "0.00". The burner may not start if the indicator is not properly reset.**

⚠ **To allow heat to escape, leave at least 10 cm free space around the power supply unit.**

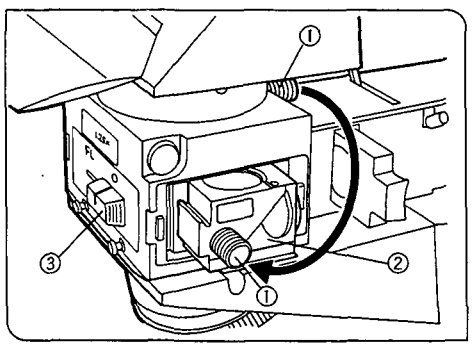


Fig. 8

4 Mounting the Reflected Light Fluorescence Mirror Cube (Fig. 8)

◎ Depending on the mounted cube combination, this attachment allows 2-wavelength observation with B excitation and G excitation or 1-wavelength excitation plus transmitted light brightfield observation. Select the cube combination in accordance with the purpose of the observation.

1. Insert a finger into the notch of the cover plate (held in place by a magnet) on the right hand side of the vertical illuminator and lift the cover plate upward to remove it.
2. Remove the mounting auxiliary knob ① placed on the rear panel of the vertical illuminator and screw it into the fluorescence cube ② to be used.
3. Move the cube selector knob ③ to the right. While holding the mounting auxiliary knob ①, carefully insert the cube by sliding it along the mounting dovetail inside the cube compartment until it is at the click-stop.
4. Detach the mounting auxiliary knob ① and return the cover plate to its original position.
5. Then remove the cover on the left hand side and mount the brightfield cube or fluorescence cube on the left in the same manner as when mounting the cube on the right.

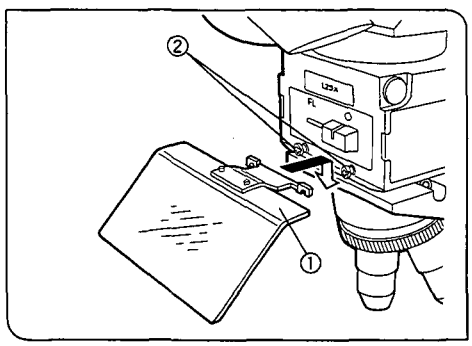


Fig. 9

5 Mounting the UV Protective Shield (Fig. 9)

Hook the UV protective shield ① onto the mounting pins ② on the vertical illuminator.

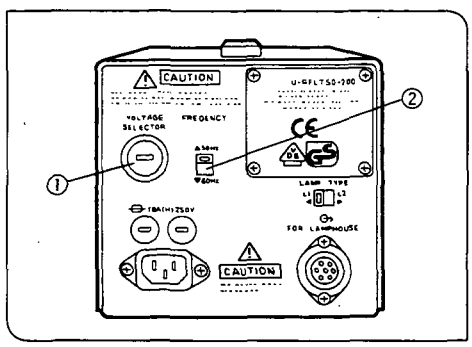


Fig. 10

6 Setting the Voltage Selector Switch (Fig. 10)

1. Make sure that the voltage selector switch ① located on the rear panel of the power supply unit is set to conform with the local AC mains voltage. Use a flat-bladed screwdriver to move the switch if required.
2. Slide the frequency selector switch ② to the position conforming to the local frequency.

★ **Improper setting of the selector switches may result in reduced burner performance and/or cause it to crack.**

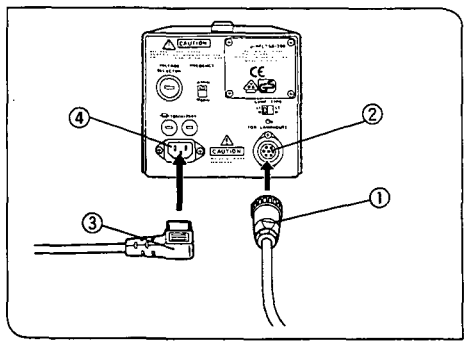


Fig. 11

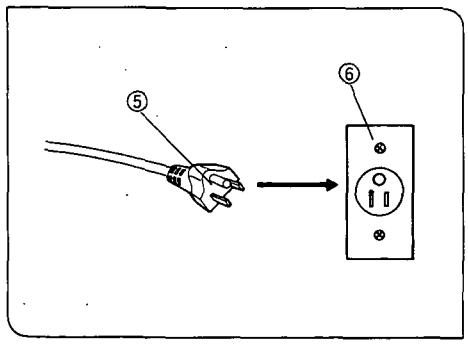


Fig. 12

7 Connecting Cords and Cables (Figs. 11,12)

⚠ Cables and cords are vulnerable when bent or twisted. Never subject them to excessive force as this may result in short-circuit.

⚠ Make sure the power supply unit's main switch is on "O" (OFF) before connecting cords and cables.

1. Plug the burner socket connecting cord plug ① firmly into the output socket ② on the power supply unit. (Fig. 11)

⚠ Only use for U-LH50HG.

⚠ Always use the 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 plug ③ to the AC receptacle ④ on the power supply unit. (Fig. 11)
3. Plug the power cord plug ⑤ into a wall outlet ⑥. (Fig. 12)

⚠ Connect the power cord correctly and ensure that the ground terminal of the power supply and that of the wall outlet are properly connected. If the equipment is not grounded, Olympus can no longer warrant the electrical safety and performance of the equipment.

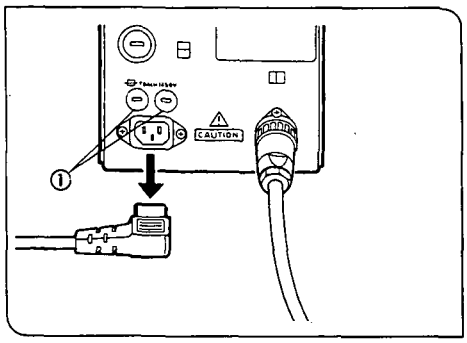


Fig. 13

Replacing the Fuses (Fig. 13)

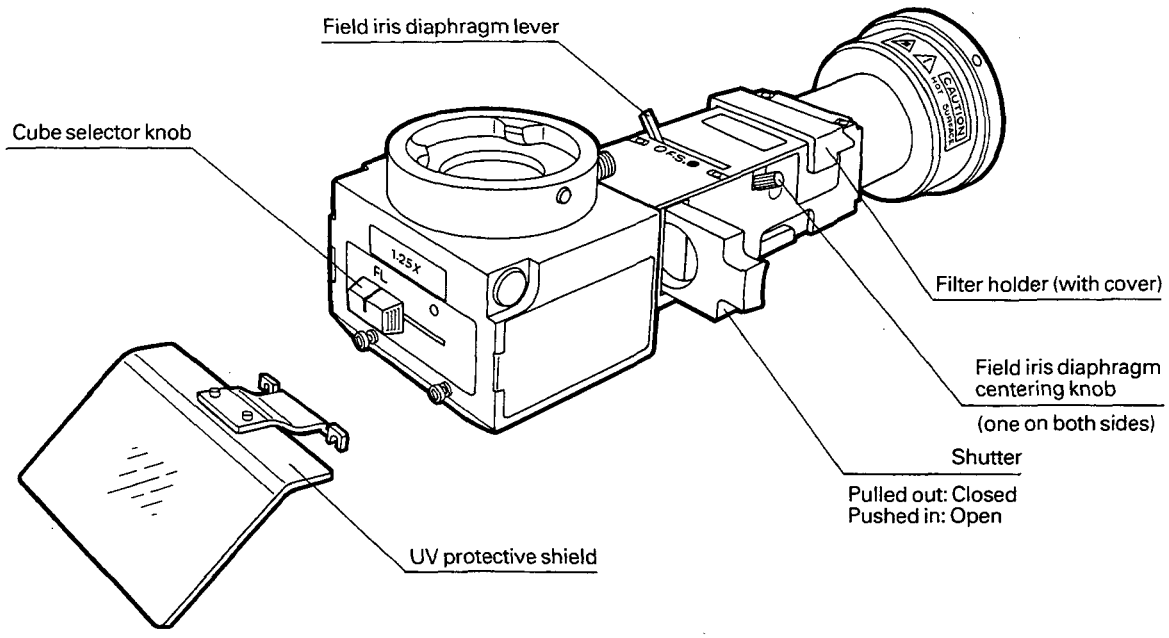
★ Always press the main switch to "O" (OFF) and disconnect the power cord from the wall outlet before replacing the fuses.

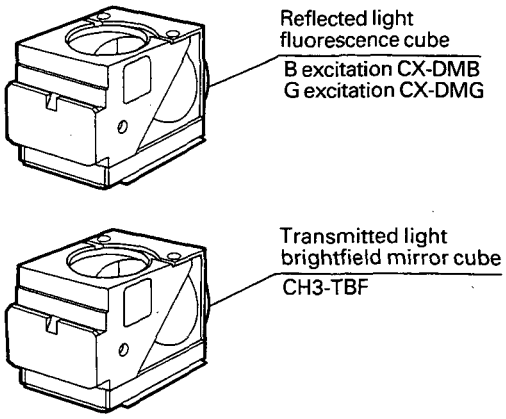
1. Using a flat-bladed screwdriver, turn each fuse holder ① counterclockwise and pull it out.
2. Replace the two fuses with new ones.
   ★ Use only specified fuses. Other fuse types may result in a fire.

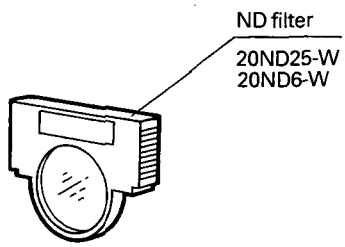
Applicable fuse:
U-RFLT50-100
⊟ T4A(H)250V (LITTELFUSE 215004) Two fuses
U-RFLT50-200
⊟ T2.5A(H)250V (LITTELFUSE 21502.5) Two fuses

4 CONTROLS

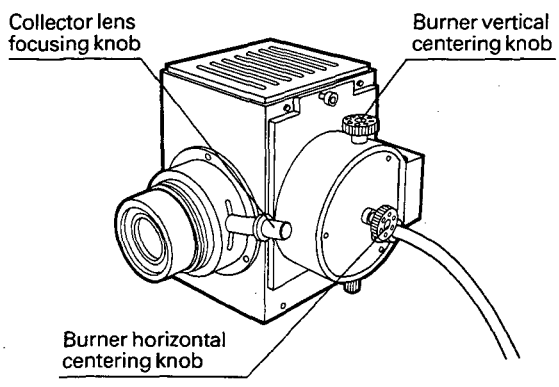
Reflected Light Fluorescence Vertical Illuminator CH3-RFA



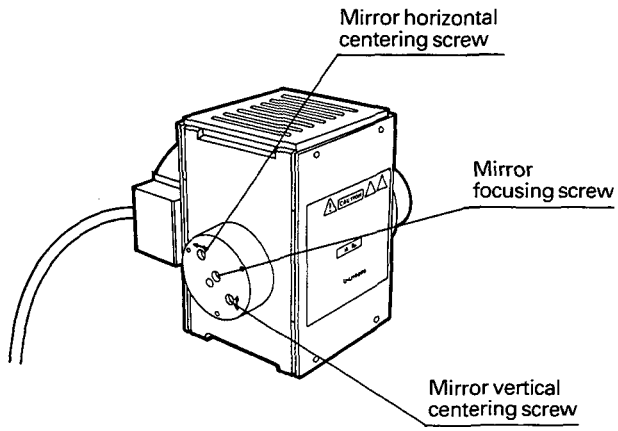




Lamp Housing U-LH50HG

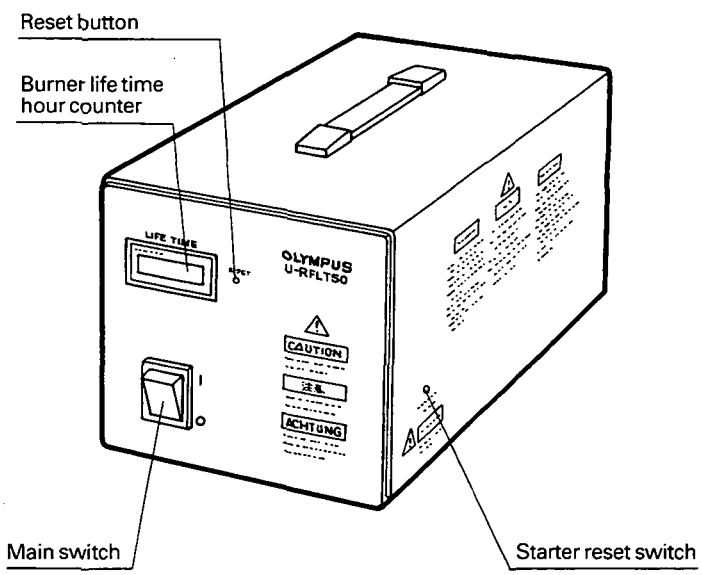


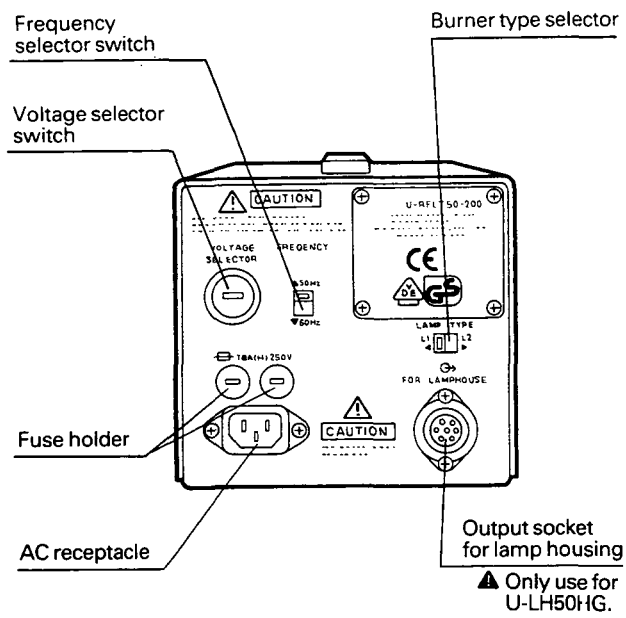
Rear panel



Power Supply Unit U-RFLT50

★ The depth dimensions of the 100V and 200V models differ.





5 PREPARATION FOR OBSERVATION

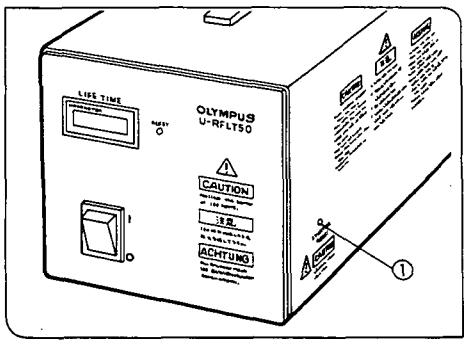


Fig. 14

1 Turning ON the Mercury Burner

★ Confirm that the power supply voltage setting, frequency setting, and burner type setting are correct. Improper settings may reduce the burner life time considerably.

Press the power supply unit's main switch to "**|**" (ON). Between 5 to 10 minutes are required for the arc to stabilize after the burner is ignited.

★ Some mercury burners may not ignite the first time the power is turned ON. If the burner does not ignite, the power supply unit's starter safety device will activate and should be reset. Press the main switch to "**O**" (OFF) once. Then insert the tip of a mechanical pencil, etc. into the starter reset switch hole ① on the right hand side of the power supply unit and press the switch inside. Then press the main switch to "**|**" (ON) again. (Fig. 14)

★ To avoid shortening the life of the burner, do not turn the burner off within 15 minutes of ignition. Use the shutter function to block light if required.

★ After turning the burner off, it cannot be re-ignited before the mercury vapor cools and condenses to a liquid. Wait for about 10 minutes before restarting the burner.

★ The power supply unit has a limited operation life. Avoid burner ignition switch operation when no burner is installed and do not repeatedly turn on/off the burner with short intervals.

⚠ If the lamp housing is accidentally opened while the burner is ignited, the safety interlock will activate and switch off the power automatically. In this case press the main switch to "**O**" (OFF) and wait at least 10 minutes before turning the burner ON again. Always leave to cool before opening the lamp housing.

⚠ Make sure that the burner life time hour counter is properly reset to "0.00" when a new burner is installed. In order not to impair the safety of the equipment, replace the burner when the counter shows "100.00". First press the main switch to "**O**" (OFF) and then wait for at least 10 minutes until the lamp housing has cooled down. The mercury burner contains high-pressured gas and the burner may explode if used beyond the specified life time.

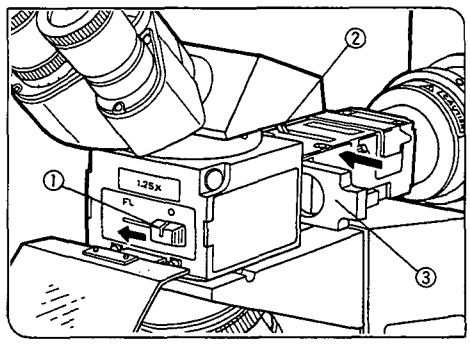


Fig. 15

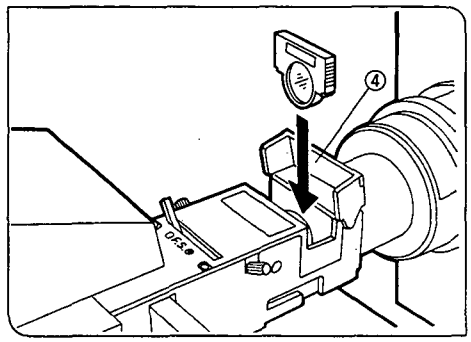


Fig. 16

2 Centering the Mercury Burner (Figs. 15-19)

◎ Before attempting to center the burner, wait for the arc to stabilize. A glare effect will occur during centering of the arc images. Observe through the UV protective shield.

1. Remove a dust plug or an objective from the revolving nosepiece and engage the empty aperture into the light path.
2. Move the vertical illuminator's cube selector knob ① to the "FL" position.
3. Turn the field iris diaphragm lever ② in the O direction to open the diaphragm.
4. Place a white sheet of paper on the stage. Push in the shutter ③ to project the arc image onto the paper.

★ Engage an ND filter if the arc image is too bright. (Fig. 16)

To mount the ND filter, open the filter cover ④ and insert the ND filter.

★ If the ND filter is excessively tilted, mercury burner centration may shift.

20ND6-W transmission ratio: 6%
20ND25-W transmission ratio: 25%

★ Use only the specified ND filters.

◎ When the filter cover is open, excitation light will be emitted but the ultraviolet light blocking filter built into the light source eliminates any danger from this light emission.

★ Stop down the field iris diaphragm if the position where the arc image is in focus is difficult to determine.

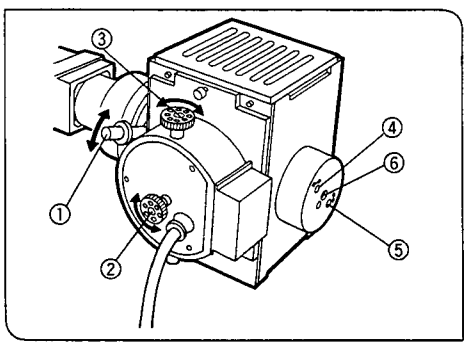


Fig. 17

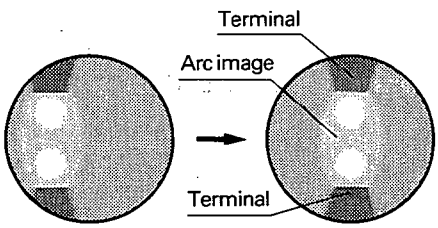


Fig. 18

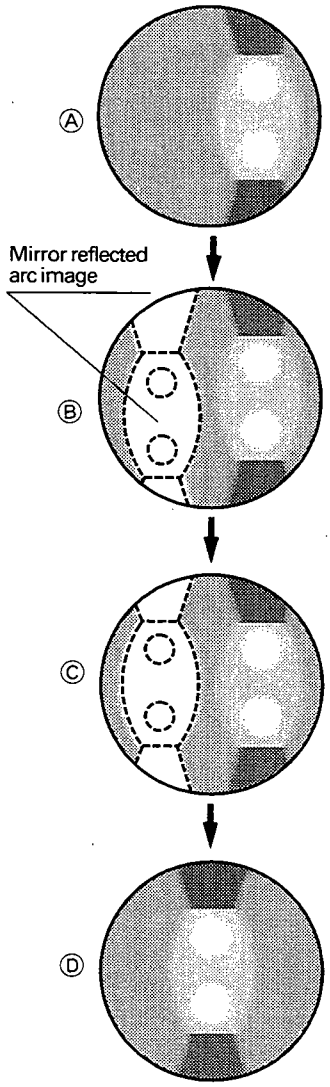


Fig. 19

5. Operate the lamp housing's collector lens focusing knob ①, burner horizontal centering knob ② and burner vertical centering knob ③ to bring the primary arc image projected onto the white paper to the center of the field of view and make it appear sharp.
   ★ **The arc image projected onto the white paper may sometimes be the secondary arc image reflected from the mirror. The reflected arc image will move when the mirror horizontal centering screw ④ or the mirror vertical centering screw ⑤ is operated. If the projected image is the reflected arc image, move it outside the field of view and perform the procedure described in step 5 above.**
6. Turn the burner horizontal centering knob ② slightly to move the arc image to the right (or left) side. (Fig. 19 Ⓐ)
7. Using the Allen wrench provided with the vertical illuminator, turn the mirror focusing screw ⑥, mirror horizontal centering screw ④ and the mirror vertical centering screw ⑤ to project the secondary arc image reflected from the mirror onto the white paper. (Fig. 19 Ⓑ)
8. Using the mirror centering screws ④ and ⑤, adjust so that the two images are seen as shown in Fig. 19 Ⓒ. Turn the mirror focusing screw ⑥ to adjust the sizes of the two arc images so that they will be almost identical. (Fig. 19 Ⓒ)
9. Turning the burner horizontal centering screw ②, superimpose the two arc images. (Fig. 19 Ⓓ)
10. Engage the 10X objective and set the cube selector knob to "FL".
11. Place a specimen on the stage and bring it into approximate focus.
12. While looking through the eyepieces, move the collector lens focusing knob ① to adjust so that the field of view will be as bright and uniformly illuminated as possible. Then rotate the collector lens focusing knob clockwise to tighten.

◎ Maintain these adjustments until the burner is replaced.

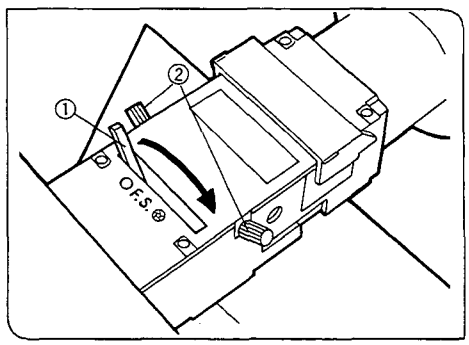
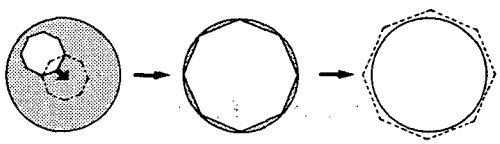


Fig. 20



3 Centering the Field Iris Diaphragm (Fig. 20)

1. Engage the 10X objective. Set the cube selector knob to "FL" and push in the shutter knob.
2. Place the specimen on the stage and bring it into approximate focus.
3. Move the field iris diaphragm lever ① in the O direction to stop down the diaphragm.
4. Manipulate the two field iris diaphragm centering knobs ② to adjust so that the image of the diaphragm is centered in the field of view.
5. To check centration, open the field iris diaphragm until the diaphragm image touches the periphery of the field of view. If the image is not centered precisely, center it again until so.
6. Further enlarge the field iris diaphragm diameter to a size where the diaphragm image size just circumscribes the field of view.

Utilizing the Field Iris Diaphragm

The field iris diaphragm restricts the diameter of the beam of light entering the objective and thus excludes extraneous light, improving image contrast. The diaphragm also prevents fluorescence fading at positions outside the position under observation.

Using the field iris diaphragm lever, the diameter of the field iris should be adjusted for objective power to the extent that it just circumscribes the field of view.

4 Selecting a Reflected Light Fluorescence Mirror Cube

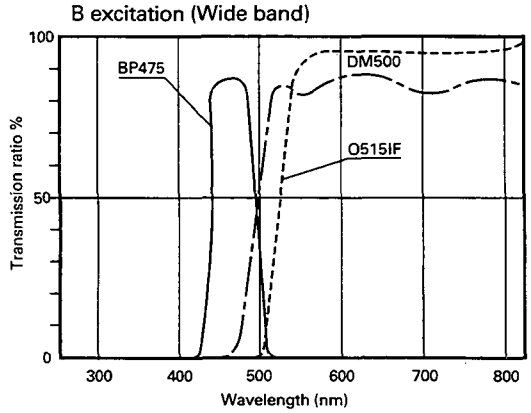
◎ Select the reflected light fluorescence mirror cube which matches the fluorochrome in use.

Cube Dichroic Mirror/Filter Combinations

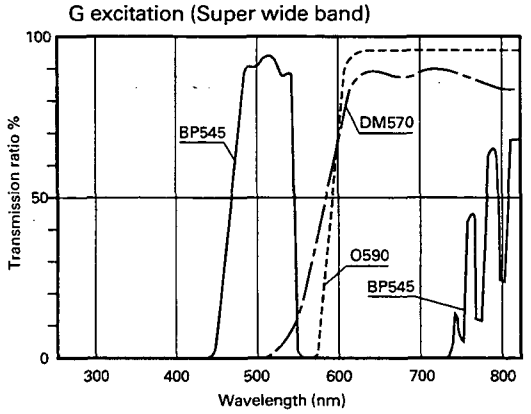
Excitation	Mirror cube	Dichroic mirror	Exciter filter	Barrier filter	Application
B	CX-DMB	DM500	BP475	O515IF	FITC staining: fluorescence antibody Acridine orange staining: DNA, RNA Auramine staining: tuberculosis germ
G	CX-DMG	DM570	BP545	O590	RB200 staining: fluorescence antibody TRITC staining: fluorescence antibody Feulgen staining: DNA

Transmission Curves of Filters

B excitation (Wide band)



G excitation (Super wide band)



6 OBSERVATION

1. Move the cube selector knob to the "O" position and use transmitted light while bringing the specimen detail to be observed into the field of view.

◎ If the specimen is difficult to observe in transmitted light, stop down the condenser's aperture iris diaphragm.

2. Turn off the transmitted light, move the cube selector knob to the "FL" position and push in the shutter for fluorescence light observation.

- Adjust the lamp housing's collector lens focusing knob to where brightness and evenness of illumination in the field of view are at maximum.
- The field iris diaphragm should be stopped down to the extent that it just circumscribes the field of view.
- To pause for a short time during observation, use the shutter and do not turn the burner off. Repeatedly turning ON/OFF the burner will shorten the life of the burner.
- A glare effect may occur when switching the cube selector knob but the ultraviolet light blocking filter built into the lamp housing eliminates any danger from this light emission.

Precautions for Fluorescence Observation

This unit provides maximum excitation intensity to enable image observation even for specimens with low fluorescence. Therefore, during observation with a high-power objective, fading may occur resulting in loss of image brightness and contrast.

To prevent this, reduce the intensity of the excitation light to some extent to reduce the speed of fading. It is advisable to reduce the intensity of the excitation light using an ND filter whenever applicable.

Also, use the shutter so that the specimen will not be exposed to excitation light for longer than necessary. By using a commercially available anti-fading agent (e.g. DABCO), fading of the specimen can be slowed. For observation at high magnification, in particular, it is recommended to use an anti-fading agent.

★ Note that anti-fading agents are not applicable to some kinds of specimens.

7 SPECIFICATIONS

Module	Specifications
Reflected Light Fluorescence Vertical Illuminator CH3-RFA	Illumination system: Dichroic mirror cube selector system for reflected light fluorescence. Field number: 20 (18 when using NCWHK10X) Magnification of intermediate tube: 1.25X Built-in field iris diaphragm (with centering mechanism) Built-in slider type shutter Detachable UV protection shield Possible simultaneous observation modes: Two selected from B excitation, G excitation, transmitted.
Lamp Housing U-LH50HG	Burner centering: Vertical and horizontal centering Mirror centering: Vertical and horizontal centering Burner focusing: Collector lens focusing knob, mirror focusing screw Safety device: Interlock mechanism, built-in ultraviolet light blocking filter Applicable burner: HBO50W/AC (OSRAM) CS50W4 (PHILIPS)
Power Supply Unit U-RFLT50-100 (100V configuration)	Ignition system: Auto ignition Life time hour counter: Displays accumulated hours of operation Input ratings: Input voltage selector provided 100/110/120V ∿ 2.5/2.3/2.0A 50/60Hz Dimensions: 150 (W) x 322 (D) x 150 (H) mm Weight: 12 kg (26.4 lb)
Power Supply Unit U-RFLT50-200 (200V configuration)	Ignition system: Auto ignition Life time hour counter: Displays accumulated hours of operation Input ratings: Input voltage selector provided 220/230/240V ∿ 1.7A 50/60Hz Dimensions: 150 (W) x 210 (D) x 150 (H) mm Weight: 7 kg (15.4 lb)
Operating Environment	Indoor use Altitude: Max. 2000 m Ambient temperature: 5° to 40°C (41° to 104°F) Maximum relative humidity 80% 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) Main supply voltage fluctuations not to exceed ±10% of the nominal voltage. Pollution Degree 2 (in accordance with IEC 664) Installation/Overvoltage Category II (in accordance with IEC 664)

8 TROUBLESHOOTING GUIDE

Under certain conditions, performance of this unit 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 your local Olympus representative for assistance.

Problem	Cause	Remedy
1. Optical System		
1. Burner lights, but field of view remains dark.	ND filter is engaged.	Remove the ND filter from the filter holder.
	The mirror cube is not correctly engaged in the light path.	Engage the mirror cube correctly.
	The shutter is engaged.	Adjust the shutter so that the empty aperture is in the light path.
	The brightfield cube is not engaged.	Engage the brightfield cube into the light path.
	The field iris diaphragm is not sufficiently opened.	The field iris diaphragm should be opened to the extent that the diaphragm image circumscribes the field of view.
2. Image is unclear, blurred or has insufficient contrast.	Objectives and/or filters are dirty.	Clean.
	The field iris diaphragm is not sufficiently opened.	The field iris diaphragm should be opened to the extent that the diaphragm image circumscribes the field of view.
3. Field of view is obscured, or field of view is not evenly illuminated.	The objective is not correctly engaged in the light path.	Make sure that the revolving nosepiece clicks into place correctly.
	The mirror cube is not correctly engaged in the light path.	Engage the mirror cube correctly.
	The field iris diaphragm is stopped down too far.	The field iris diaphragm should be opened to the extent that the diaphragm image circumscribes the field of view.
	The shutter is stopped midway in the light path.	Adjust the shutter so that the empty aperture is in the light path.
	ND filter is not correctly placed in the light path.	Place the ND filter correctly.
	Improper centration or focusing of the mercury burner.	Center or focus the mercury burner correctly.
	The collector lens' focus position has shifted.	Readjust.

Problem	Cause	Remedy
2. Electrical System		
1. The main switch indicator does not light up.	Improper connection of the power cord.	Connect the power cord correctly.
	Fuses are blown.	Replace fuses.
2. Main switch indicator lights, but the mercury burner does not ignite.	Improperly connected connectors.	Connect correctly.
	The burner is not installed.	Install the burner.
	The lamp housing interlock mechanism is activated.	Tighten the burner socket clamping screw.
	Auto ignition is malfunctioning.	Turn OFF the main switch on the power supply unit. Turn ON again. (Repeat as necessary.)
3. The burner flickers or is dark.	The auto ignition interlock mechanism is activated.	Press the switch inside the starter reset hole on the right side of the power supply unit, and then press the main switch to "I" (ON) again.
	Insufficient time has elapsed since the burner was turned on.	Wait for at least 10 minutes after igniting the burner.
	The voltage selector switch and/or frequency selector switch is set incorrectly.	Set switches to conform with the local AC mains.
	The burner life has expired.	Replace the mercury burner when the burner life time hour counter reading exceeds 100 hours. (Burner service life is 100 hours.)
	The input voltage selector switch is set incorrectly.	Set to conform with the local AC mains.
4. The burner life is exceptionally short.	The input voltage selector switch is set incorrectly.	Set to conform with the local AC mains.

This device complies with the requirements of both directive 89/336/EEC concerning electromagnetic compatibility and directive 73/23/EEC concerning low voltage. The CE marking indicates compliance with the above directives.

■ 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
Australia	SAA		Italy	IMQ	
Austria	ÖVE		Japan	MITI	
Belgium	CEBEC		Netherlands	KEMA	
Canada	CSA		Norway	NEMKO	
Denmark	DEMKO		Spain	AEE	
Finland	FEI		Sweden	SEMKO	
France	UTE		Switzerland	SEV	
Germany	VDE		United Kingdom	ASTA BSI	
Ireland	NSAI		U.S.A.	UL	

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)	CEVEC <HAR>	10	30	10
Verband Deutscher Elektrotechniker (VDE) e.V. Prüfstelle	<VDE> <HAR>	30	10	10
Union Technique de d'Electricite' (UTE)	USE <HAR>	30	30	10
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 (ÖVK)	<ÖVE> <HAR>	30	10	50
Danmarks Elektriske Materielkontrol (DEMKO)	<DEMKO> <HAR>	30	10	30
National Standards Authority of Ireland (NSAI)	<NSAI> <HAR>	30	30	50
Norges Elektriske Materiellkontroll (NEMKO)	NEMKO <HAR>	10	10	70
Asociacion Electrotecnica Y Electronica Espanola (AEE)	<UNDE> <HAR>	30	10	70
Hellenic Organization for Standardization (ELOT)	ELOT <HAR>	30	30	70
Instituto Portugues 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 Lavoratories Inc. (UL)	SV, SVT, SJ or SJT, 3 X 18AWG
Canadian Standards Association (CSA)	SV, SVT, SJ or SJT, 3 X 18AWG

OLYMPUS

OLYMPUS OPTICAL CO., LTD.
43-2, Hatagaya 2-chome, Shibuya-ku, Tokyo Japan

OLYMPUS OPTICAL CO. (EUROPA) GMBH
(Premises/Goods delivery) Wendenstrasse 14-16, D-20097 Hamburg, Germany
(Letters) Postfach 10 49 08, 20034 Hamburg, Germany

OLYMPUS AMERICA INC.
2 Corporate Center Drive, Melville, N.Y. 11747-3157, U.S.A.

OLYMPUS OPTICAL CO. (U.K.) LTD.
2-8 Honduras Street, London EC1Y OTX, United Kingdom

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