

VERTICAL FLUORESCENCE ILLUMINATOR

fot model VANOX

model **A-RFL**

INSTRUCTION MANUAL



**OLYMPUS**

# VERTICAL FLUORESCENCE ILLUMINATOR

for model VANOX

model A-RFL

This instruction manual is made for use of the Vertical Fluorescence Illuminator Model A-RFL for fluorescence microscopy in conjunction with the Universal Research Microscope Model VANOX. It is recommended to read the instruction manual for the Model VANOX together with this manual before use.

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## I. STANDARD EQUIPMENT

Vertical Fluorescence Illuminator with Revolving Nosepiece	-----	1
UV Protective Shade	-----	1
Fluorescent Light Source	-----	1
Auxiliary Collector Lens	-----	1
Filters: Exciter Filters with mount UG-1, UG-5, IF-405, BG-12	-----	1 each
Barrier Filters with mount L-420, L-435, Y-455, Y-475, Y-495 O-515, O-530, O-570, O-590, R-610	-----	1 each
Objectives: Non-fluorescent Plan 10X	-----	1
Plan Apo 20X	-----	1
GI Apo 40X	-----	1
GI SFL 100X	-----	1
Super Pressure Mercury Burners	-----	2
Power Supply Unit	-----	1
Burner Centering Mirror	-----	1
Applicator Bottle	-----	1
Accessory Case	-----	1
Certificate	-----	1

## II. SPECIFICATIONS

### Vertical Fluorescence Illuminator with revolving nosepiece:

- Quintuple revolving nosepiece, on ball bearings, coded A to E to facilitate objective insertion, with positive click stops.
- Exciter filters built-in the rotatable turret are tabulated below.  
Two additional empty filter holders are provided, permitting insertion of exciter filters with mount, and a slot for insertion of barrier filter with mount.
- Dichroic mirrors with built-in barrier filters.

Code	Exciter Filter	Code	Dichroic mirror	Filter built-in
U	UG-1	U	DM400	L-410
V	BG-3	V	DM455	Y-455
B	BG-12	B	DM500	O-515
C	IF-545+BG-36	G	DM580	O-590

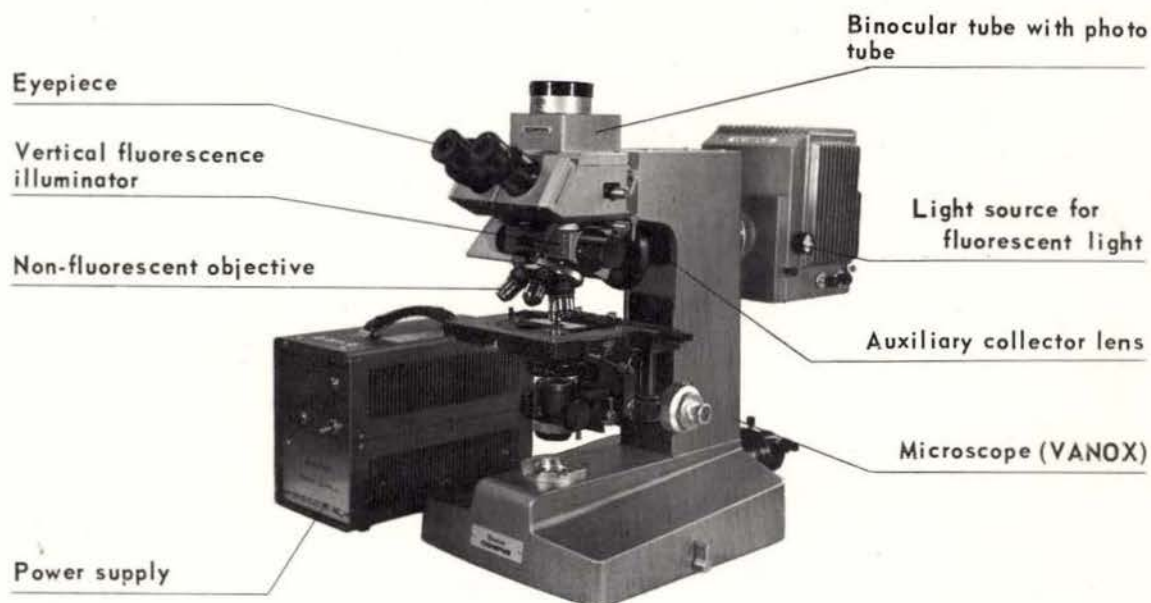
### Light Source:

Type USH-202A super pressure mercury burner, 200W  
(manufactured by Ushio Electric Inc.) or Osram Type HBO  
200/4 mercury burner.

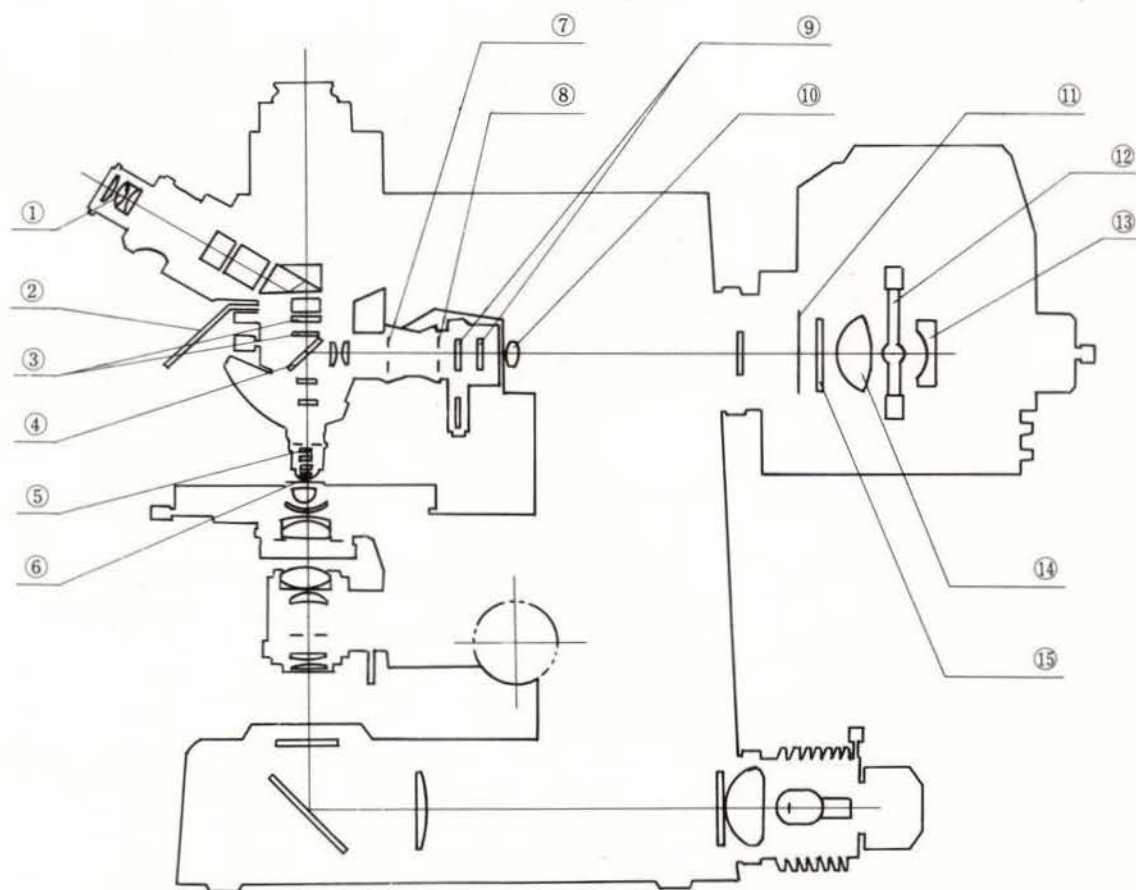
<b>Power Supply Unit:</b>	HBA-200A (for the 200W super pressure mercury burner, manufactured by Ushio Electric Inc.); input 100V, 110V, 120V, 220V or 240V AC, 50 or 60Hz.
<b>Filters with Mount:</b>	Exciter filters UG-1, UG-5, IF-405, BG-12 Barrier filters L-420, L-435, Y-455, Y-475, Y-495, O-515, O-530, O-570, O-590, R-610
<b>Objectives:</b>	Non-fluorescent Plan 10X, Plan Apo 20X, GI Apo 40X, GI SFL 100X
<b>Magnification Factor:</b>	1.2X

### III. IDENTIFICATION OF VARIOUS COMPONENTS

Vertical fluorescence illuminator Model A-RFL mounted on the Model VANOX -



#### IV. LIGHT PATH DIAGRAM



① Eyepiece

② UV protective shade

③ Barrier filters

④ Dichroic mirror

⑤ Objective

⑥ Specimen

⑦ Field iris diaphragm

⑧ Aperture iris diaphragm

⑨ Exciter filter

⑩ Auxiliary collector lens

⑪ Shutter

⑫ Super pressure mercury burner

⑬ Concave mirror

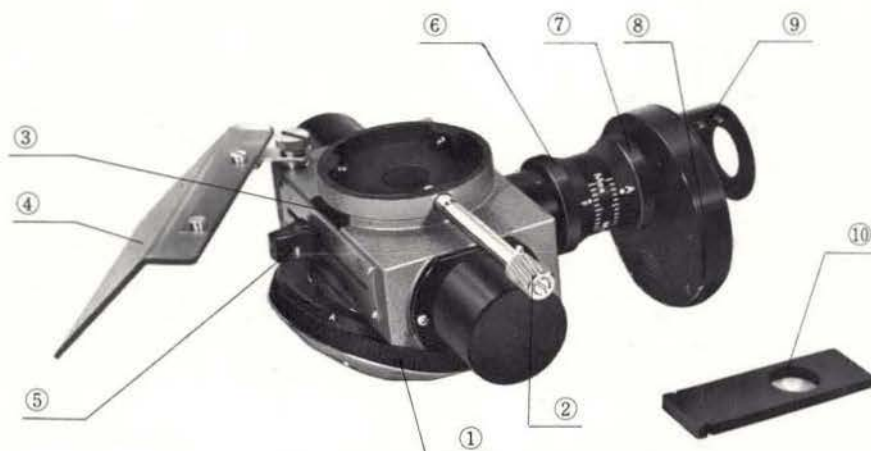
⑭ Collector lens

⑮ Heat absorbing filter



## V. DESCRIPTION OF AVRIOUS COMPONENTS

### A. Vertical Fluorescence Illuminator with Revolving Nosepiece



① **Revolving Nosepiece:**

Five threaded apertures for objectives.

② **Clamping Screw:**

Fastens the vertical illuminator to the observation tube.

③ **Slot:**

For insertion of barrier filter with mount. When no filter is inserted, fill the opening with the insert plate ⑩.

④ **UV Protective Shade:**

This swing-out shade is used to protect the observer's eyes from UV rays. It can be flipped aside when inserting the barrier filter with mount or operating the dichroic mirror selector lever.

⑤ **Dichroic Mirror Selector Lever:**

Dichroic mirrors\* with built-in barrier filters are selected by means of this lever, according to observation purposes.

⑥ **Knurled Ring "F":**

To adjust the field iris diaphragm.

⑦ **Knurled Ring "A":**

To adjust the aperture iris diaphragm.

⑧ **Exciter Filter Turret:**

Engravings	Filters
O	None
U	UG-1 (for UV excitation)
V	BG-3 (for violet excitation)
B	BG-12 (for blue violet excitation)
G	IF-545+BG-36 (for green excitation)

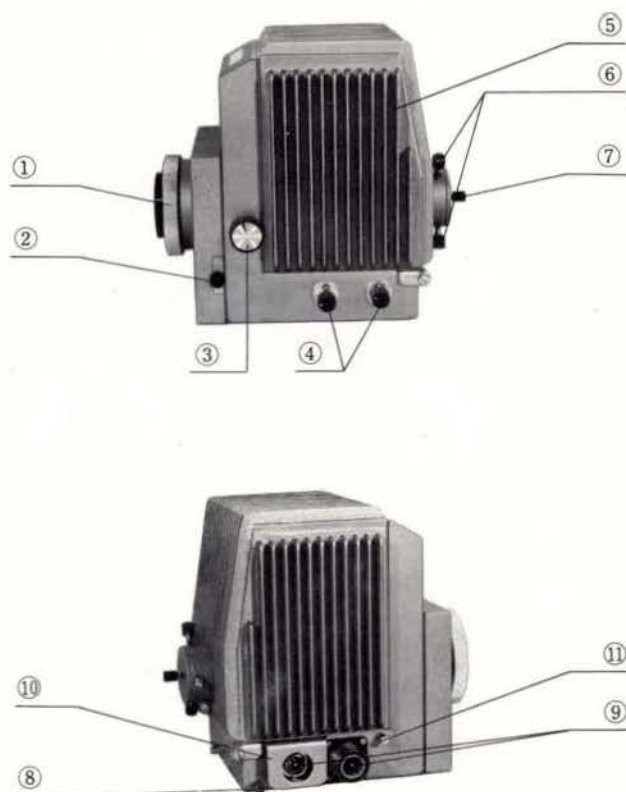
⑨ **Mounts:**

For insertion of exciter filters with mounts (2).

⑩ **Insert Plate**

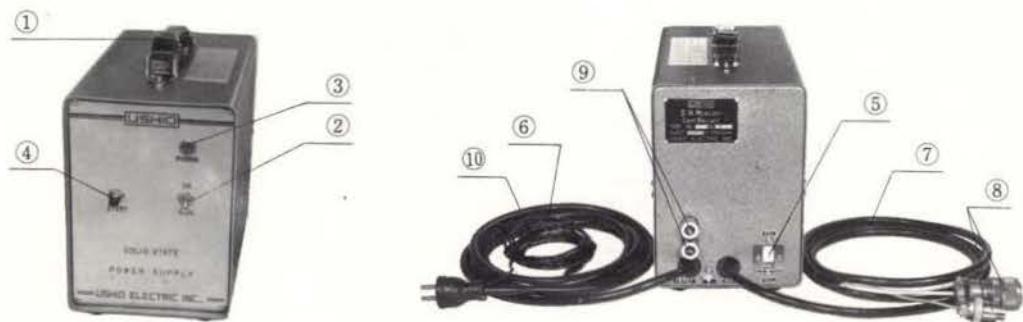
\* The dichroic mirrors are designed to reflect short wavelength rays towards the objective to illuminate the specimen, while passing away long wavelength rays.

## B. Light Source



- |                                   |  |
|-----------------------------------|--|
| ① Knurled Ring:                   | Clamps the light source to the limb of the Model VANOX.  |
| ② Shutter Knob:                   | As the knob is pulled out all the way, the shutter enters the light path to block the light.   |
| ③ Collector Lens Adjustment Knob: | Manipulate the knob to move the collector lens back and forth into focus.  |
| ④ Burner Centering Knobs:         | The left knob adjusts the east-west deviations of the burner, and the right knob for the north-south deviations.                           |
| ⑤ Lamp House Cover:               | The cover can be flipped up backward when installing or changing the burner.   |
| ⑥ Concave Mirror Centering Knobs: | For centration of the concave mirror.  |
| ⑦ Concave Mirror Focusing Knob:   | Manipulate the knob to move the mirror back and forth into focus.  |
| ⑧ Ground Terminal:                | Connect one end of clip of the ground wire to the ground terminal and the other end clip to proper grounding such as a service water pipe. |
| ⑨ Connector Terminals:            | Accept the plugs of the power supply unit.   |
| ⑩ Safety Device:                  | Prevents opening of the cover if connector cables are still plugged in.  |
| ⑪ Cover Clamping Screw:           | Loosen the screw to open the cover.  |

## C. Power Supply Unit



① Carrying Handle

② Main Switch

③ Pilot Lamp:

When main switch is turned on, it will light up.

④ Start Button:

After turning on the main switch, press this button to light the lamp.

⑤ Frequency Selector Switch:

Make sure that selector is set for the proper frequency of the supply (50 or 60Hz). Usually sealed with transparent cover.

⑥ Power Cord:

Connects to AC outlet.

⑦ Output Cord

⑧ Plug:

Connects to terminal on lamp house.

⑨ Fuses

⑩ Ground Terminal

## D. Auxiliary Collector Lens



## E. Exciter Filters with mount (4 pcs.)



## F. Barrier Filters with mount (10 pcs.) G. Burner Centering Mirror





## VI. ASSEMBLY

Prior to assembly, remove dust caps and be careful not to touch the optical elements with your fingers.

### 1. Attach the light source. (Fig. 1)

Insert the light source into the flange of the opening provided on the microscope limb, with positioning groove aligned with positioning pin, and lock by turning the knurled clamping ring.

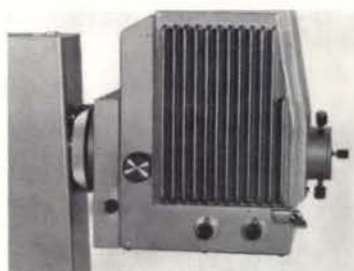


Fig. 1

### 2. Mount the auxiliary collector lens. (Fig. 2)

Insert the lens into the front of the opening on the microscope limb.



Fig. 2

### 3. Attach the observation tube.

- 1) Check that the two clamping levers on the right hand side of the dovetail mount are unclamped (levers pointing upwards).
- 2) Remove the binocular observation tube from the microscope.
- 3) Turn the selector turret on top of the microscope stand to position "M.P.". (Fig. 3)
- 4) Re-insert the tube dovetail slide into the dovetail mount on the microscope stand and lower the tube as far as possible.
- 5) Firmly lock the tube with the upper clamping lever.



Fig. 3

### 4. Attach the vertical fluorescence illuminator. (Fig. 4)

- 1) Attach the UV protective shade ① to the upper end of the illuminator with set screw ②. (Fig. 4)
- 2) Clamp the illuminator to the observation tube in the same manner as the standard revolving nosepiece.

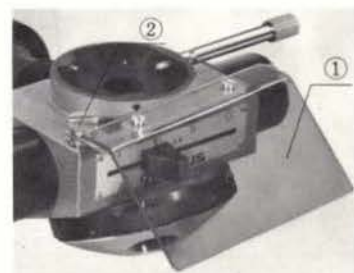


Fig. 4

### 5. Attach the objectives and eyepieces.

Mount the objectives to the revolving nosepiece, and insert the eyepieces into the eyepiece tubes.

### 6. Install the light source.

Prior to use of the mercury burner, wipe the surface of the burner clean with an alcohol-ether mixture, benzine, etc.

Use great care to make sure that no dirt, fingerprints, etc. are left on the bulb surface, and when installing, be careful not to touch the bulb portion.

- 1) Loosen the clamping screw holding the lamp house cover in place and flip the cover backward. (Fig. 5)

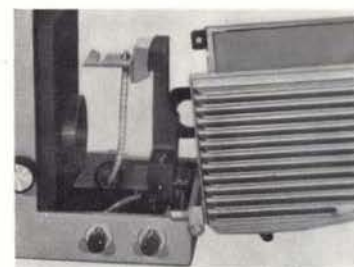


Fig. 5

- 2) Removing the bottom clamping nut ① of the burner, insert the lower electrode (marked “+”) into the bottom terminal and tighten the clamping nut ① securely. (Fig. 6) (The burner with the electrode marked “UP” points upward.)

At this time, pay attention to the following:

- Turn the pearl on the burner envelope 90° away from the optical axis. (Di g. 2)
  - Allow enough slack in the connection wire to avoid stress.
  - Keep the burner from contact with metal parts.
  - When locking the nut, do not twist the quartz envelope with force.
- 3) Remove the top clamping nut ② of the burner, insert the upper electrode into the slot of the burner mounting plate (Fig. 7), and lock with the clamping nut. (Diag. 1)
  - 4) Close the lamp house and tighten the clamping screw.

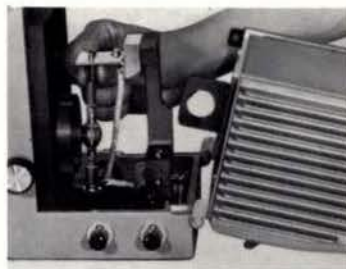


Fig. 6

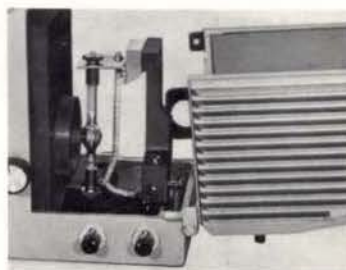
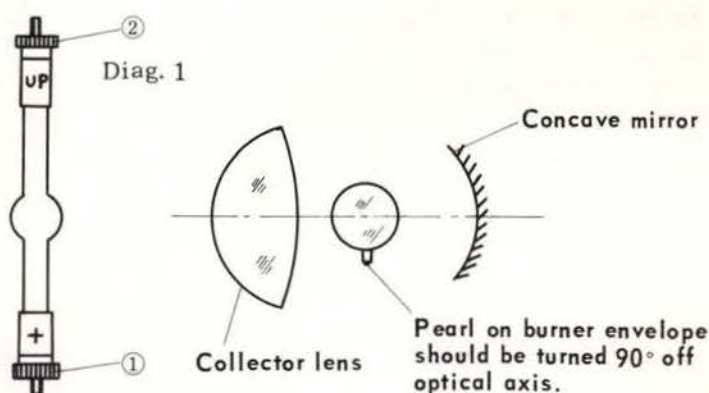


Fig. 7



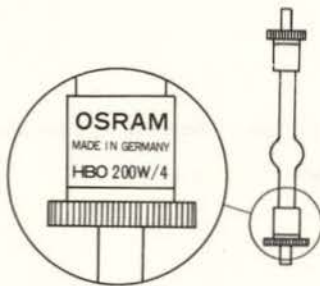
Diag. 2

#### Tips for Burner Replacement:

- When replacing the burner, be sure to open the lamp house only after more than five minutes have elapsed after turning off the lamp.
- Replace the burner only after it has cooled sufficiently to permit manipulation.

## ALTERATION OF MERCURY BURNER FOR MODELS A-FL, FLM &amp; A-RFL

The Super Pressure Mercury Burner USH-202A, manufactured by USHIO/JAPAN has been changed with the **HBO 200W/4**, manufactured by OSRAM/GERMANY for Models A-FL, FLM & A-RFL.



The new mercury burner HBO 200W/4 can be installed in the lamp house in the same manner as the USH-202A, with the exception below :

The burner should be positioned with the lower electrode engraved with "OSRAM", coming to the bottom terminal. The engraving can read as shown left.

**NOTE :** For ignition, press the START button, and the burner will light.

The new HBO 200W/4 burner sometimes lights without pressing the START button.

This is not any defect.

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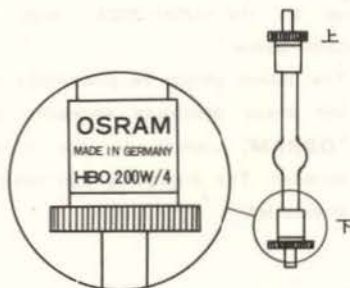
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## 蛍光顕微鏡用水銀ランプの変更について

model A-FL, FLM, A-RFL

蛍光顕微鏡 A-RFL、FLM、A-RFL に使用されています、ウシオ電気製 USH-202A 型水銀ランプ 200W を、オスラム社製 HBO 200W/4 型に変更致します。

取付け方は全く同じですが、上下方向の決め方が以下ようになります。



ランプの上下方向は「OSRAM」の文字が正立となる（左図）ようにします。

◎ランプを点灯させる場合には、点灯装置のスタートボタン（START）を押す訳ですが、オスラム社製のランプには、スタートボタンを押さなくても点灯するものがありますが故障ではありません。



## VII. OPERATION

### 1. Electric Connection

Familiarize yourself with the instructions printed on the power supply unit.

- (1) Ascertain if the frequency selector switch of the power supply unit corresponds with the frequency of the mains supply.

\* If you should find that they do not correspond, remove the clear cover by loosening the screws and change accordingly.

- (2) Connect to the power supply unit.

- a. Two supply cords coming from the power supply unit are connected to the two terminals at the fluorescence lamp house. Push the cord with the plastic plug firmly into its corresponding terminal and lock the other cord with the union nut after inserting it in its corresponding terminal. The two plugs are shaped differently so that they cannot be inadvertently connected the wrong way. Electrical connections should only be made with the lamp house cover closed. A mechanical lock prevents the cover from being opened while the two supply cords are connected.
- b. Connect the primary cord of the power supply unit to the mains source. Make sure that your line outlet is grounded.



Fig. 8

### 2. Ignition

- 1) Turn on the main switch of the power supply unit. At the same time, the pilot lamp will light up.
- 2) Next, press the "START" button. The burner will ignite instantly. Do not press this button longer than 10 seconds at a time. (In the U.S.A. where a DC power supply is used, do not press the start button longer than 1 second.)
- 3) In about 3 to 5 minutes after ignition the arc will have stabilized and the burner can be centered.

**NOTE:** Once the mercury burner is switched off, do not re-start it for about five minutes, in order to give it time to cool.

#### Fuse Replacement:

To replace a fuse in the power supply unit, remove the fuse holder (bayonet type) and replace the fuse. Two fuses are incorporated. Fuses should be replaced only after disconnecting the primary cord from the line outlet.

### 3. Centering the Burner

Center the burner after the arc has stabilized, in the following sequence:

- 1) Open the shutter by pushing the shutter knob all the way.
- 2) Rotate the exciter filter turret until the turret click stops at engraving "G".
- 3) Rotate the knurled rings "F" (for the field iris diaphragm ①) and "A" (for the aperture iris diaphragm ②) to the MAX. position. (Fig. 9)
- 4) Flip the UV protective shade to the left.



Fig. 9

5) Objectives 40X and 100X are used in glycerine immersion.

- a) The objectives 40X and 100X are provided with iris diaphragm. It is recommended to stop down the iris diaphragm properly to increase contrast and image definition.
  - b) Use high-grade glycerine or fluorescence-free immersion oil as immersion medium.
  - c) After use, carefully wipe off the immersion oil deposited on the lens surfaces with gauze moistened with xylene. Never leave oil on the lens surfaces after use as oil remnants will seriously impair the performance of the lens system.
- 6) When fluorescence observation is to be interrupted briefly, it is good practice to cut off the beam of light by means of the opaque shutter rather than to turn off the mercury burner. Repeated switching off and on ignition considerably shortens the useful life of the mercury burner.

## 5. Use of Filters

*Excitation Region	Exciter filter			Mirror selector knob code	Barrier filter with mount
	Spectral range	Exciter filter turret code	Exciter filter with mount		
Ultraviolet	Wide	U (UG-1)	None	U (DM400+L410)	L420 and up
	Narrow	U (UG-1)	UG-1		
Violet	Wide	V (BG-3)	UG-5	V (DM400+Y455)	Y475 and up
	Narrow	V (BG-3)	IF405		
Blue	Wide	B (BG-12)	BG-12	B (DM500+0-515)	0-530 and up
	Narrow	None	.. FITC		
Green	Narrow	G (IF545+BG-36)	None	G (DM580+0-590)	R610

### ★ Application of Excitation Region

- **Ultraviolet:** (the line spectrum at bright lines 334nm and 365nm.)
  - Fluorescence antibody method
  - Congo red test
- **Violet:** (the line spectrum at bright lines 405nm and 435nm.)
  - Catecholamine
- **Blue:** (the line spectrum at bright lines 405nm and 435nm, and continuous spectrum at 490nm.)
  - Fluorescence antibody method (FITC)
  - Acridine yellow and acridine orange
  - Auramine
  - Tetracycline



- **Green:** (the line spectrum at bright line 546nm)
  - Fluorescence antibody (TRITC)
  - Feulgen
  - Rhodamine B
  - Fuchsin

\*\* Interference filter FITC (fluorescein isothiocyanate) is optionally available. In case the specific secondary fluorescence lacks contrast against auto-fluorescence (primary) emitted from other parts of specimen, the use of an ultraviolet filter (UVC) with the FITC filter cuts off wavelengths less than 450nm, so that the non-specific fluorescence will be eliminated. This in turn will render the background dark enough to enhance specific secondary fluorescence.

## VIII. HANDLING CARE

### 1. Prior to ignition

Familiarize yourself with the instructions provided to the power supply unit.

Prior to use of the mercury burner, wipe the surfaces of the burner clean with an alcohol-ether mixture, benzine, etc. Use great care to make sure that no dirt, fingerprints, etc. are left on the bulb surface, and when installing, be careful not touch the bulb portion.

Make sure to insert the lower electrode (marked "++") into the bottom terminal and tighten the clamping nut securely. At the same time, allow enough slack in the connection wire to avoid stress and keep the burner from contact with metal parts

### 2. Ignition

Do not press the "START" button longer than 10 seconds at a time. (When the DC power supply is used in the U.S.A., do not press this button longer than 1 second.)

### 3. Burner Replacement

When replacing the burner, be sure to open the lamp house only after more than 5 minutes have elapsed after turning off the burner.

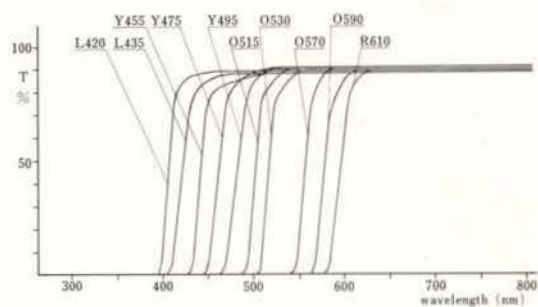
Replace the burner only after it has cooled sufficiently to permit manipulation.

### 4. Other

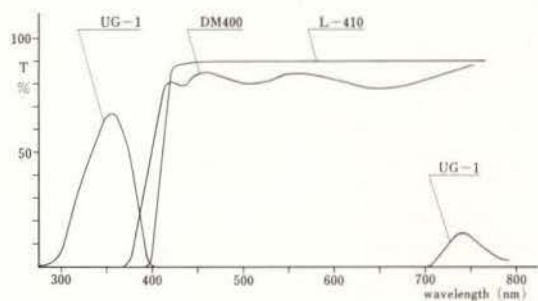
When fluorescence observation is to be interrupted briefly, it is good practice to cut off the beam of light by introducing the shutter rather than to turn off the mercury burner. Repeated switching off and on ignition considerably shortens the useful life of the mercury burner.

## IX. TRANSMITTANCE CHARACTERISTICS OF FILTERS

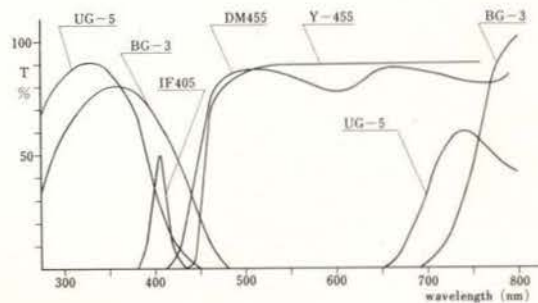
### 1. Barrier filters with mount



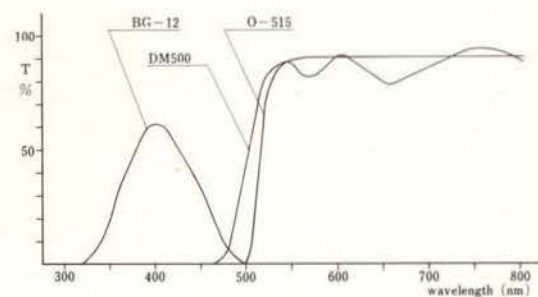
### 2. Ultraviolet exciter filters



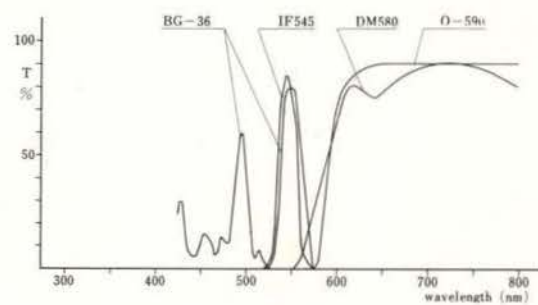
### 3. Violet exciter filters



### 4. Blue exciter filters



### 5. Green exciter filters



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