



Industry Inspection Microscope

Model Number

BS-4000A/B

Instruction Manual



This manual is written for Industry Inspecting Microscope of BS-4000A/B. For safety and for exerting the best performance, making you familiar with the instrument entirely, it is strongly recommended that you read this manual carefully before using the microscope.

	User Notices	3
1	Name of Components	4
2	Installation	5
	2-1 Installing steps	5
3	Adjustment & Operation	10
	3-1 Adjustment Set Diagram	10
	3-2 Operation	11
	3-3 Microscope Video	15
	3-4 Microscope Photography	16
4	Technical Specifications	17
5	Trouble Shooting	18

I. Safety note

! Make sure that the input voltage is consistent with the power supply voltage, or it will bring a serious damage to the instrument.

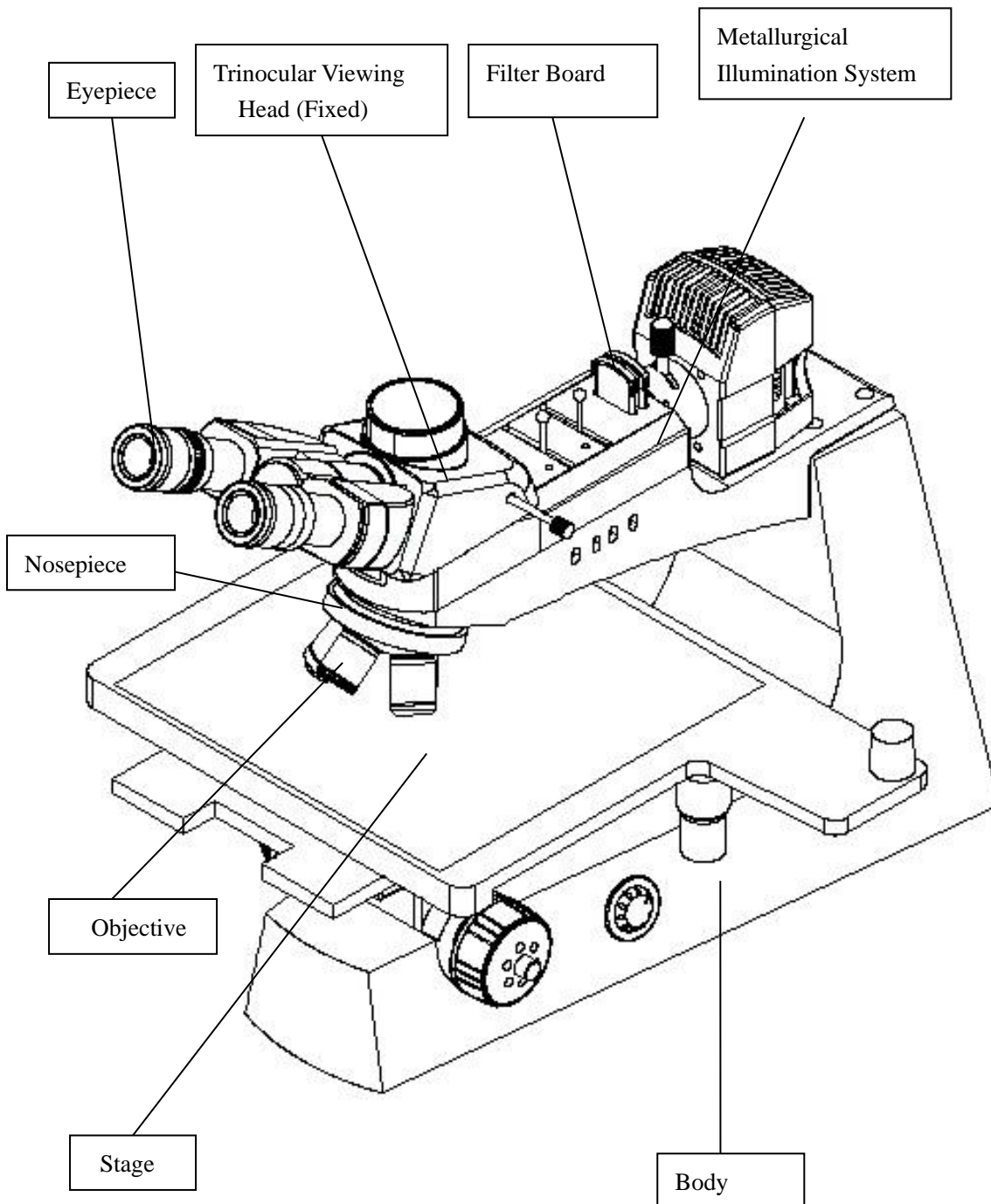
1. Carefully open the box, avoid the accessories, like lens, dropping to ground and being damaged.
2. Do keep the instrument out of direct sunlight, high temperature or humidity, dusty and easy shaking environment. Make sure the stage is smooth, horizontal and firm enough.
3. When moving the instrument, grip two sides of the bottom of the microscope with your two hands.
4. When running, the lamp house and nearby parts will be very hot. Please ensure there is enough cooling room for them.
5. Make sure the instrument is earthed, to avoid lighting strike.
6. For safety, be sure the main switch is in "O"(off) state before replace the halogen lamp or the fuse, then cut off the power, and do the operation after the lamp bulb and the lamp house completely cool.**(Designated bulb: 6V/20W Halogen Lamp)**
7. Check the input voltage: be sure the input voltage which signed in the back of the microscope is consistent with the power supply voltage, or it will bring a serious damage to the instrument.

II. Maintenance

1. All the lenses have been well checked and adjusted. It is forbidden to disassemble them yourself.
2. The nosepiece and coarse/fine focus unit have compact and precise frame, please don't disassemble them as possible as you can.
3. Keep the instrument clean, wipe dust regularly, and be attention to avoid contaminating the optical elements especially.
4. The contaminations on the prism, as finger mark and oil, could be gently wiped with a piece of soft cloth or tissue paper, gauze which has been immersed in pure alcohol or ether. **(Note that the alcohol and the ether are all burned easily, do not let them near the fire, and use them in a drafty room as possible as you can.)**
5. Don't use organic solvent to wipe the non-optical elements, when you need to clean, use the soft detergent, please.
6. When using, if the microscope is splash by liquid, cut off the power at once, and wipe up the moisture.
7. Do not disassemble any parts of the microscope. That will affect the function or decline the performance of the microscope.
8. Place the instrument in a cool, dry position. After using the microscope, remember to cover it with dust helmet. Do wait for the lamp house cooling completely before cover.

1. Name of Components

BS-4000A/B



2. Installation

BS-4000A/B

2.1 Installing Steps

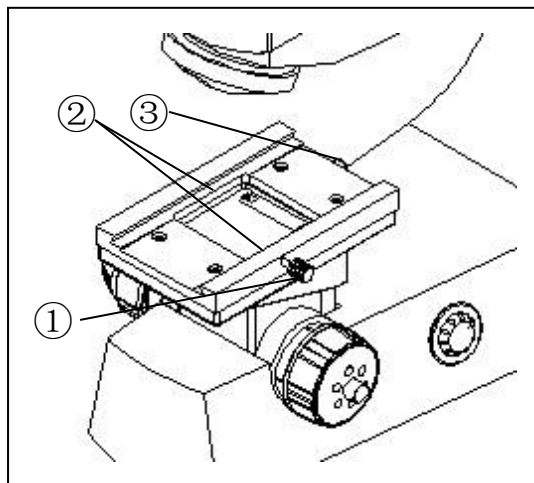


Fig.1

2.1.1 Installing the Stage (Fig.1-2)

1. Loosen the setscrew①.
2. Push the stage into the holddown groove ②and make the stage touch the retainer③.
3. Tighten the setscrew① until the stage is installed firmly.
4. Place glass stage in the center of the mechanical plain stage.
5. Fig.2 shows the station after Installing the Stage.

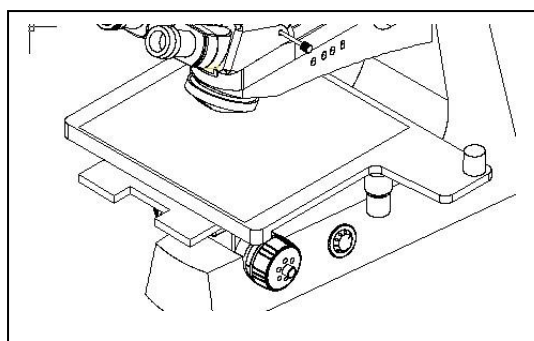


Fig.2

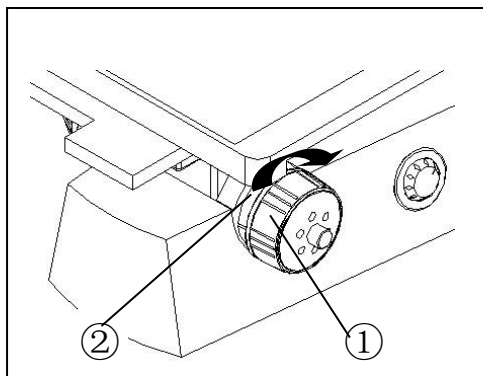


Fig.3

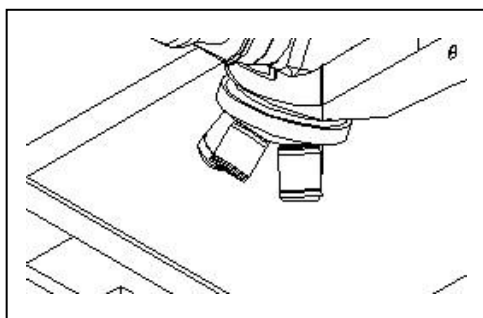


Fig.4

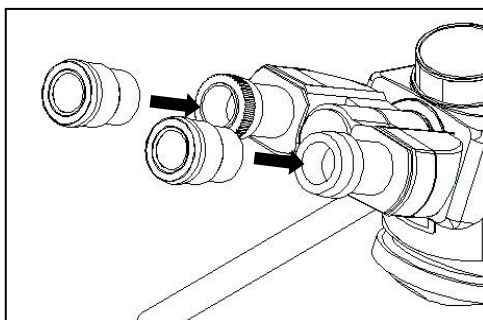


Fig.5

2.1.2 Installing the Objective (Fig.3-4)

1. Adjust the coarse focus knob ①, till the mechanical stage to the low limited place.

★ For ensuring the safety of the instrument during transportation, the nosepiece is located in the lowest position and the tension adjustment collar ② is adjusted to an appropriate tension while leaving the factory.

2. Remove the dust cap of the nosepiece.

3. Screw down the objective to nosepiece from left or right side, low magnification objective first. Install all the objective form low to high magnification following the clock hand.

According to this way to install the objective will make it easier to change magnification in operation.

★ Clean the objective frequently.

★ At first, use the 10X objective to looking for image, then change another one.

★ Turn the objective till hear the “Kai. Kai” sound, make sure the objective enter the objective center.

2.1.3 Installing the Eyepiece (Fig.5)

1. Remove the cap of the eyepiece tube.

2. Insert the eyepiece into eyepiece tube until they are against each other.

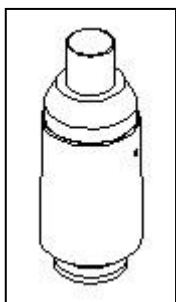


Fig.6

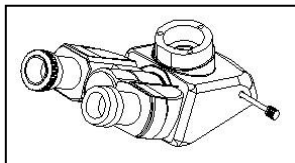


Fig.7

2.1.4 Mounting the video (photography) adapter (Fig.6-8)

Insert the video (photography) adapter tube (Fig.6) into the trinocular viewing head (Fig.7), and screw down the bolt to fix it, as shown in Fig.8.

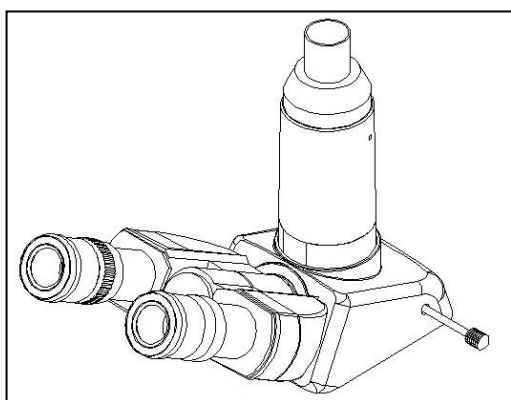


Fig.8

2.1.5 Mounting Filters and Polarizer (Fig.9-10)

Insert the filter into the corresponding jack, as shown in Fig.10.

For polarization observation, insert the polarizer into the right jack.

★ Standard filters include blue, yellow and green filters.

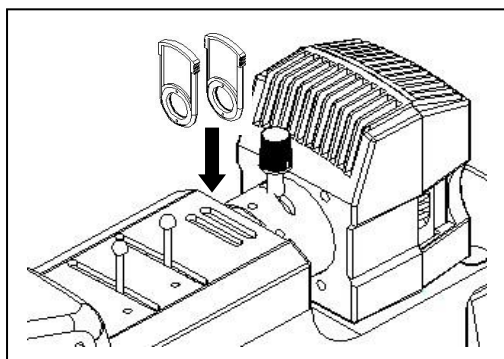


Fig.9

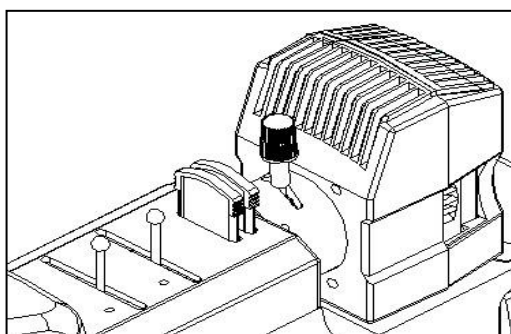


Fig. 10

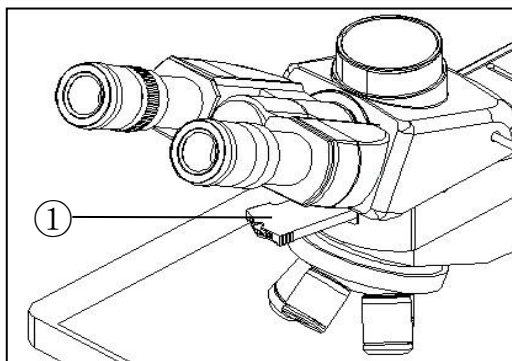


Fig.11

2.1.6 Mounting Analyzer (Fig.11)

Insert the analyzer ① into the jack under the trinocular viewing head if necessary, as shown in Fig.11.

★ Analyzer can be used alone or matched with the polarizer.

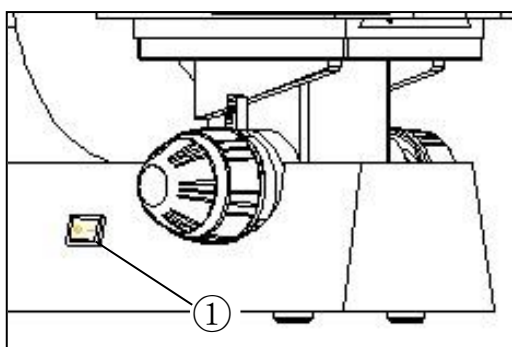


Fig.12

2.1.7 Connecting the Power Cord (Fig.12-14)

★ Do not force on the Power Cord. The cable and wire are easier to be damaged when bended or wrapped.

1. Before connecting the power cord, switch the main On-Off ① to "O"(off).
2. Plug the power cord into the socket ② on microscope safely. Make sure be connected.
3. Plug the power cord ④ into the power source socket ⑤ safely. Make sure be connected.

★ Do use the supplied power cord all the time. If lost or damaged, select the same standard cord, please.

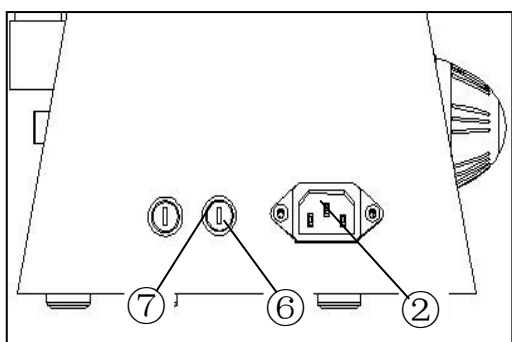


Fig.13

2.1.8 Replacing the fuse (Fig.12-13)

Do remember to turn the main switch ① on the state of "O" (off) before replacing the fuse, and unplug the power cord. Rotate the fuse kits ⑥ out of the holder ⑦ by the "--" type screwdriver, replace a new fuse, then rotate back to the holder again.

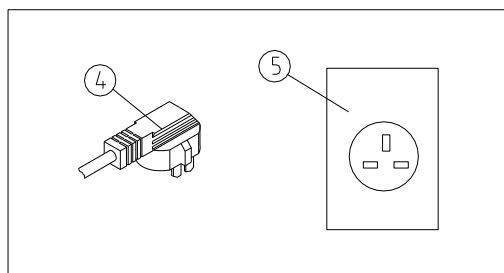


Fig.14

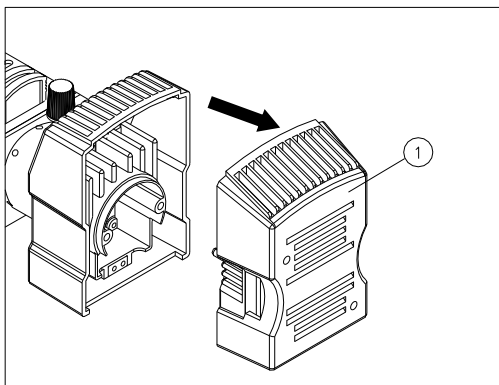


Fig.15

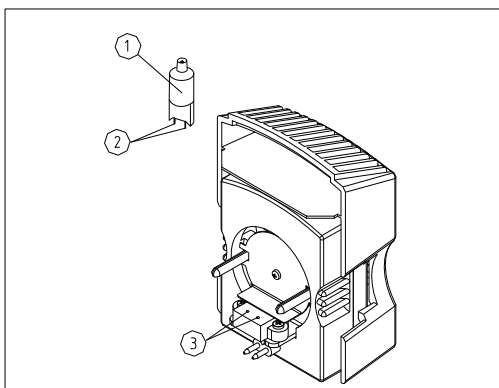


Fig.16

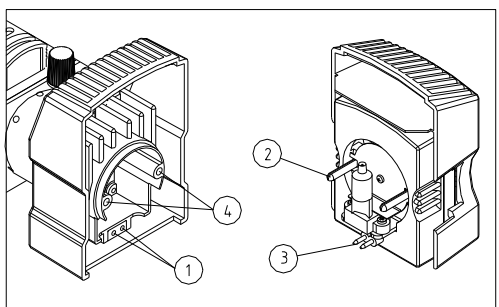
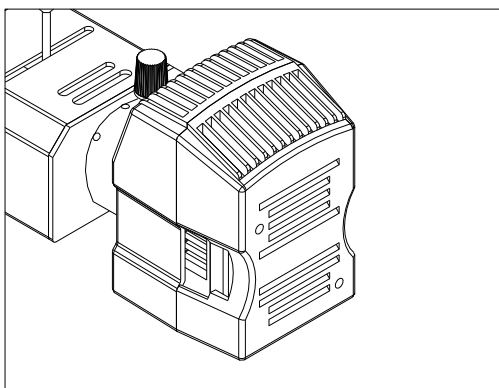


Fig.17



2.1.9 Installing and replacing the lamp (Fig.15-18)

★ Please use the specified halogen Lamp 6V20W.

1. Pull out the lamp-house ① as the picture show (Fig.15).
2. Hold to the bulb ① after you wrap it with gauze or other protection materials, then depress the plugs ② fully into the jack ③ on the lamp house as the picture show. (Fig.16)
3. Replacing the lamp when using or soon after

When using, or soon after it is turned off, the lamp, the lamp house and nearby parts will be very hot and will cause serious burns. Please turn the main switch on “O” (off), pull up power plug, and make sure the bulb, the lamp house and periphery are all cool. Then, you can do your replacing.

★ Please insert the lamp gently, or it will be damaged by excessive extrusion.

★ Do not touch the Halogen bulb with your hands. It will shorten the service life or cause it to burst. If you leave fingerprints on the surface carelessly, clean it with a dry soft cloth.

4. Align the socket ① and pins ③ and align the bolt ② and the jack ④. Then push the lamp-house into the Illumination Set until covered. (Fig.17-18)

3. Adjustment & Operation

BS-4000A/B

3.1 Adjustment Set Diagram (Fig.19)

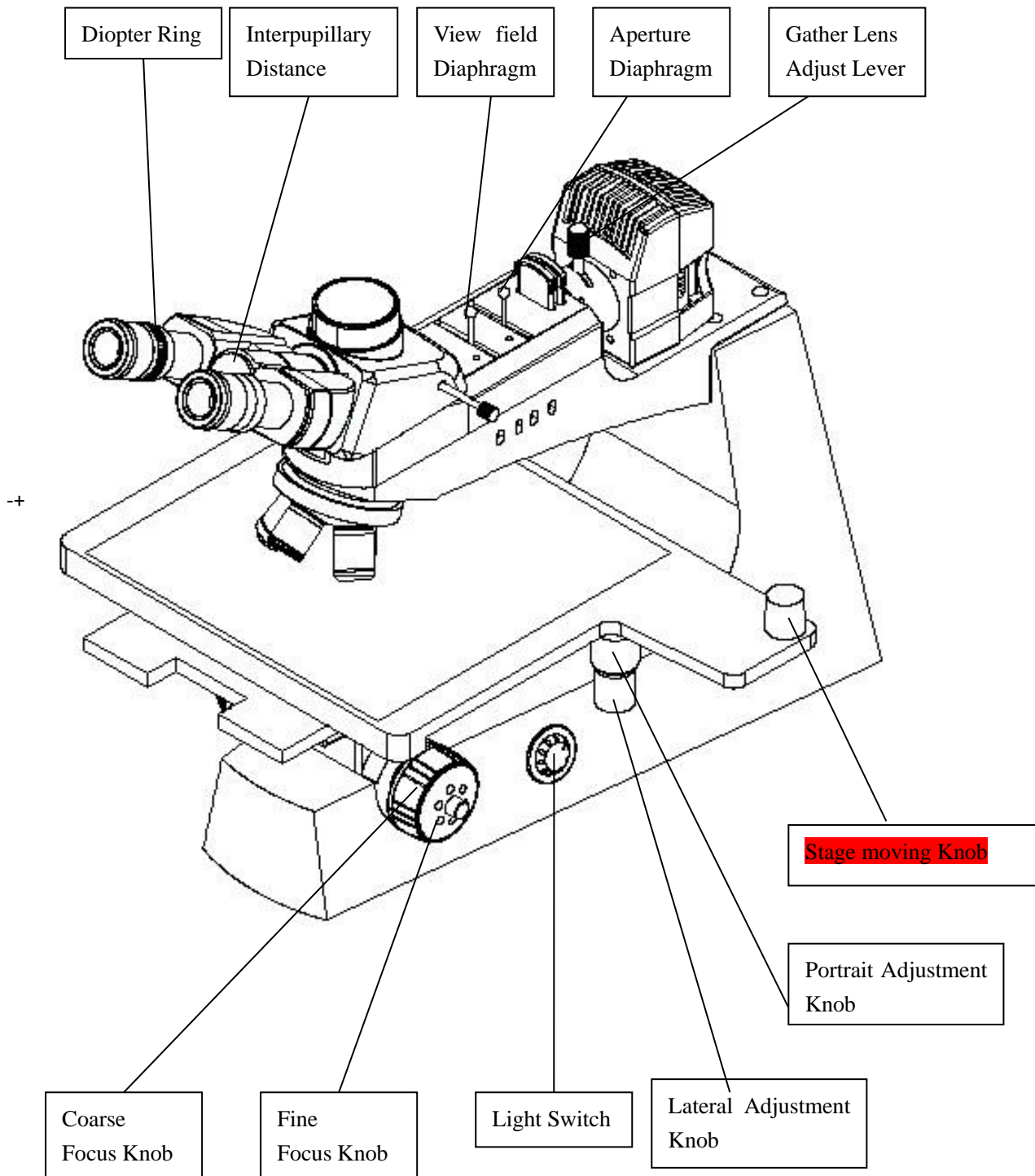


Fig.19

3.2 Operation

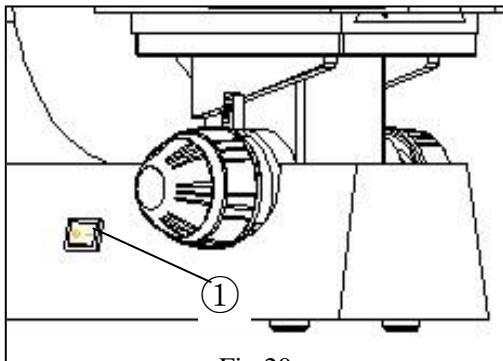


Fig.20

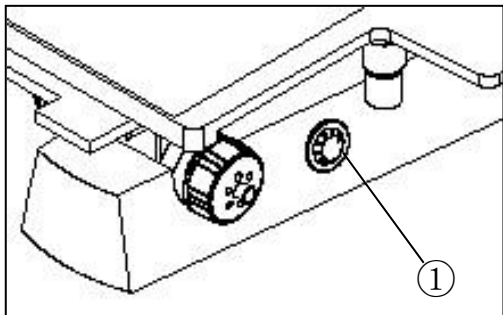


Fig.21

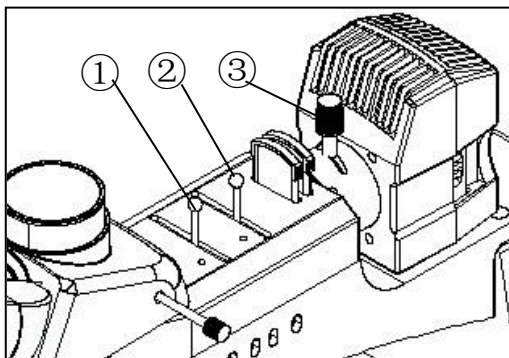


Fig.22

3.2.1 Open Lamp-House (Fig.20)

Connect the power, turn on the main switch ① (Fig.20) to “-”(on).

3.2.2 Adjusting the Brightness (Fig.21)

Turning the brightness adjustment knob ① anti-clockwise, the voltage raise, and the brightness strengthen. Turning it clockwise, the voltage decline, and the brightness weaken.

★ Using the lamp in a low voltage condition, will prolong the use life.

3.2.3 Adjusting the Illumination Set (Fig.22)

1. Make sure the ray brightness in view field is even, have no filament shadow. If there is filament shadow, please adjust the Condenser Knob ③ to proper position. Insert the Ground Glass into the corresponding jack when using the 4×objective.
2. Adjust the View field Diaphragm ① and Aperture Diaphragm ② until the two Diaphragm open size is properly. Then you can get clear image. When in using, you need to adjust and observe at the same time until in best state.

★ **Aperture Diaphragm:** The aperture diaphragm (iris diaphragm) is designed for matching the objective's numerical aperture, not use for adjusting brightness. When the objective is adjusted full of light, the Aperture Diaphragm is in best state and the image is clear. What to be notice is that when switch objective, the Aperture Diaphragm size should change along with the adjusting.

★ **View field Diaphragm:** Used to control view field size, to reduce Anti- cast light and Dazzled light. When the objective is adjusted full of light, the image is clear and in high-point state.

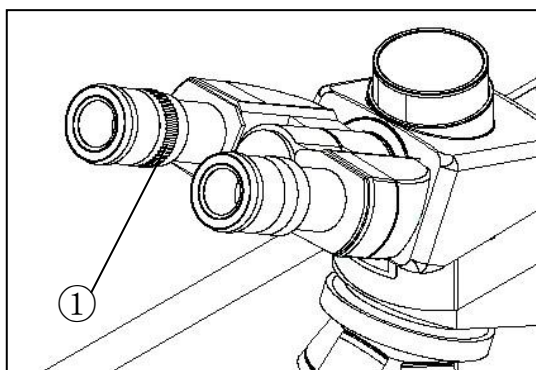


Fig.23

3.2.4 Adjusting the Diopter (Fig.23)

1. Observe the right ocular tube with your right eye. Turn the Coarse & Fine Focus Knob to focus the specimen.
2. Observe the left ocular tube with your left eye. If not in focus just adjust the Diopter Ring① to make it in focus.

★ the range of Diopter Ring is ± 5 , as the value align the reticle of the ring.

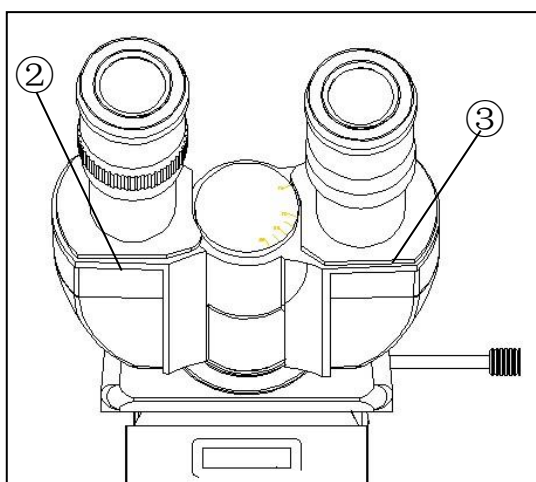


Fig.24

3.2.5 Adjusting the Interpupillar Distance (Fig.24)

When observing with two eyes, hold on the left and right prism holder②、③, turn around the axis, adjust the interpupillar distance until the left and right fields of view coincide completely.

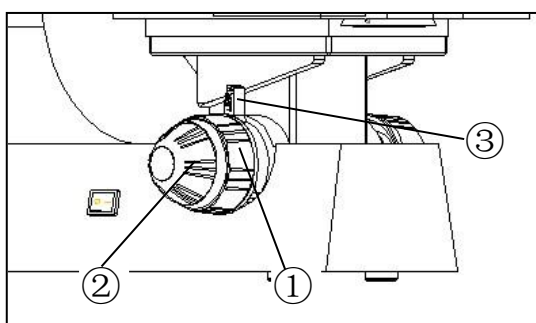


Fig.25

3.2.6 Focusing (Fig.25)

1. Use the 10×objective focus, to avoid the objective touch with the specimen, you should raise the mechanical stage at first, let the specimen close to the objective, then slowly separating them to focus.

The operator can converse turn the coarse focus knob① to get the specimen down ,and search images in the 10×ocular simultaneously, then use the fine knob② to focus. At this moment, you can replace other magnification objectives safely, and focus without the risk of destroying the specimen.

★ If you need to fix the stage on a vertical position to make the observation become more convenience, take use of the locking set③.

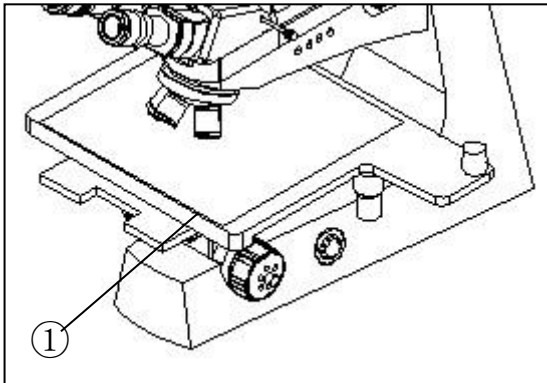


Fig.26

3.2.7 Placing Specimen (Fig.26-27)

1. Place the slide on the center of the mechanical stage ①.
2. Turn the lateral ② and portrait ③ adjustment knob of the mechanical ruler or the mechanical stage moving knob ④ to make the specimen onto the required position.

★ **Be careful when changing the objective. If you finish the observation with the short working distance objective, and want to change another one, be careful of not letting the objective touch the specimen.**

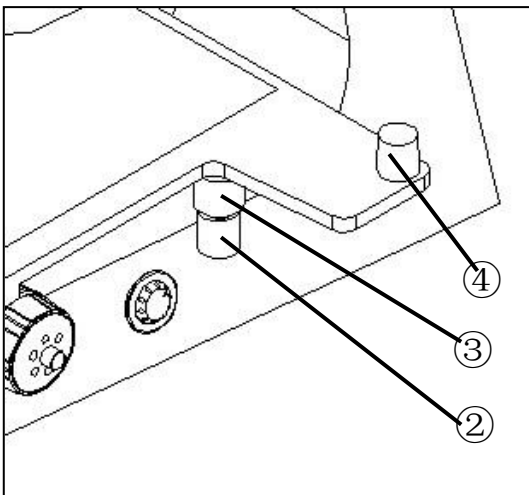


Fig.27

3.2.8 Adjusting the Tension Adjustment Collar (Fig.28)

The tightness of the tension adjustment collar has adjusted before leaving factory, if finding it's losing (the mechanical stage drop itself because of deadweight), please turning the tension adjustment collar ① until the tightness is in order. Turn it along the direction show in the picture, the Coarse Focus Knob ② will become tighter. Turn anti-direction will become loosen.

If the mechanical stage drop itself, or even lose focus just after adjusting the fine focus knob ③. Mean the tightness of the Coarse Focus Knob ② is too low. You should turn the tension adjustment collar along the direction show in the picture to make it tighter.

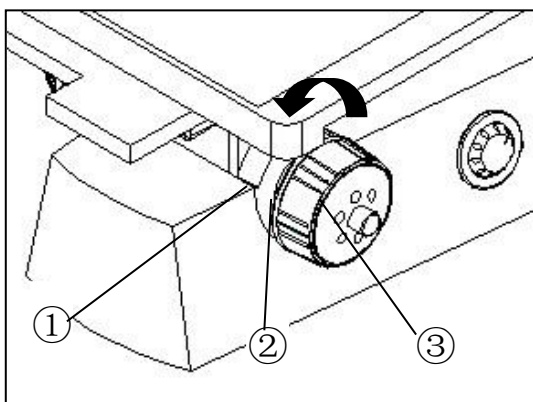


Fig.28

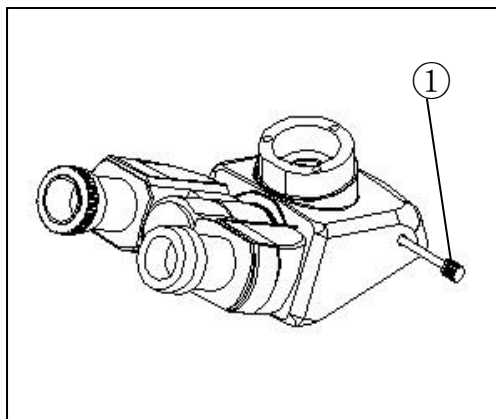


Fig.29

3.2.9 Switching the Light Path (Fig.29)

- ◎ Slide the light path selector lever ① by your thumb to select the light path you need.
- ◎ For the binocular observation, push in the lever until you hear “clicked” .while for video or photography, pull out the lever until it reaches the “clicked” position.

Light Path Selecting Lever	Brightness Proportion	Application
Pushed in	100% used for binocular observation	Binocular observation
Pulled out	20% used for binocular observation, and 80% used for video or photography	Binocular observation and television \micrography \ video can be performed simultaneously.

3.2.10 Polarization Observation

1. Mounting the polarizer and analyzer, the detail is available in section 2.1.5, 2.1.6.
2. The analyzer hand wheel can be rolled from 0°to 90°. When the field of view becomes the darkest, the orthogonal polarization position is reached and polarization observation can be performed.

3.3 Microscope Video

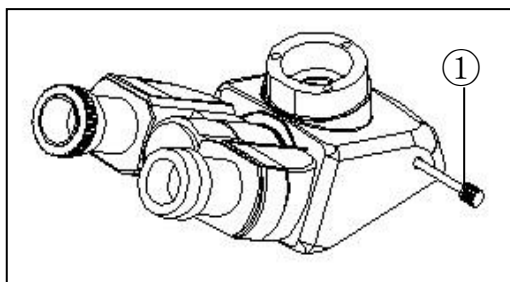


Fig.30

3.3.1 Selecting the Light Path (Fig.30)

- ★ **Just used in the trinocular viewing tube.**
Pull out the light path selecting lever, until you hear the “clicked”.
- ★ **For the observation of dark specimen, you can focus it through the binocular at first, then change the light path.**

3.3.2 Installing the Video Set (Fig.31)

1. Loosen the locking bolt (1) on the trinocular viewing tube, and take out the dust cap (2).
2. Remove the dust cover on the both ends of the video accessories (3), and revolve the CCD/CMOS set into the screw thread end---the video adapter with C mount.
3. Install the video accessories (3) into the tri-through port and screw down the bolt (1).

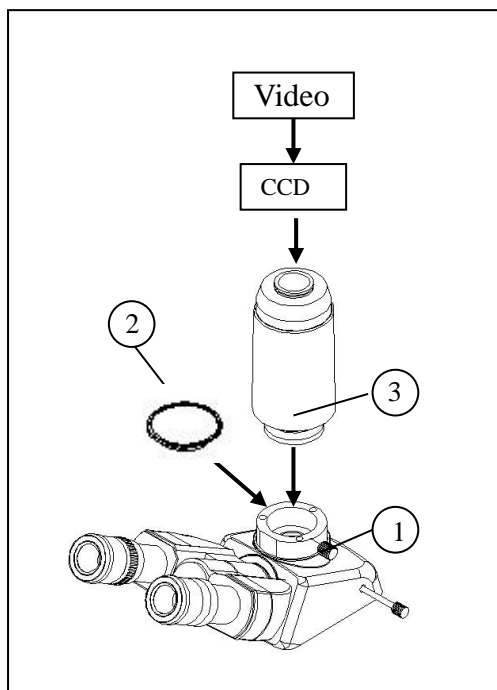


Fig.31

3.3.3 Focus (Fig.31)

Looking through binocular, focus the specimen to get a sharp image, and then check the image on the TV or the computer which is connected with the microscope video set. If it is not clear, please revolve video adapter (3) until the image is sharp enough.

3.4 Microscope Photography

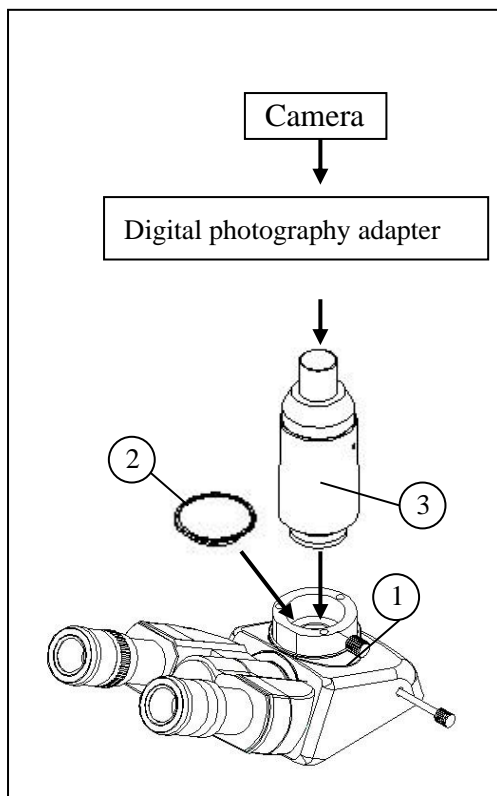


Fig.32

3.4.1 Selecting the Light Path

★ Just used in the trinocular viewing tube.

The detail is available in section 3.3.1.

3.4.2 Installing the Photography Set (Fig.32)

1. Loosen the locking bolt (1) on the trinocular viewing tube, and take out the dust cap (2).
2. Install the photography accessories (3) into the tri-through port, and screw down the locking bolts (1).
3. Couple the digital photography adapter with the camera set and insert the adapter into the accessories (3).

- Before connecting the camera set with the digital photography adapter, please remove the camera gun firstly. Pay attention to the camera port type, please.
- To avoid disturbing from the binocular, please place the viewfinder toward the side of the microscope when installing the camera set.
- The magnification of photomicrograph = magnification of objective × magnification of photography adapter.

★ When shooting the micrograph, the shutter release will bring some impact. In order to weaken the impact and obtain a clear image, you could select a longer time of exposure or decrease the brightness to have some compensation.

★ This explanation is used for NiKon single-lens reflex digital camera.

3.4.3 Focus

Do the binocular observation and focus the specimen firstly. When in microscope photography, do use the camera viewfinder to focus the specimen. Please refer to the user manual of the photo attachment to obtain the details.

3.4.4 Adjusting the Color Temperature

◎ When shooting the chromo photograph with the sunlight film:

1. Mount the blue filter into the filter bracket.
2. Turn the brightness adjustment knob to the maximal limit and you can obtain a sunlight illumination.

4. Technical Specifications

BS-4000A/B

1. Main specifications

Optical System	Infinite Optical System
Viewing Head	Compensation Free Trinocular Head, Inclined at 30
Eyepiece	Extra Wide Field Eyepiece EW 10X/22
Nosepiece	Quadruple Nosepiece
Objective	Infinite plan Achromatic: 4x, 10x, 20x, 40x
Focusing System	Coaxial Coarse and Fine Focusing System, with a distance of 24mm
Stage	area: 300x268mm, movement range: 250x250mm
Lamp-House	Halogen Lamp 6V20W, Intensity Continuously Adjustable
Color Filter	Blue, Yellow, Green and Ground Glass

2. Objectives Specification

Magnification	Numerical Value Aperture Diaphragm (N.A)	Working Distance (mm)
4X	0.10	17.3
5X (optional)	0.12	15.5
10X	0.25	10.0
20X	0.40	5.8
40X	0.60	2.9
50X (optional)	0.75	0.32
100X (optional)	0.80	2.0

5. Trouble shooting

BS-4000A/B

PROBLEMS	REASON FOR PROBLEMS	SOLUTION
I. Optical Part:		
1. Illumination is opening, but the field of view is dark.	The poor contact exists in the lamp house and the illumination system.	Ensure the contact pin and the lamp holder pin work well
	The objective is not in the center of the light path.	Turn the nosepiece to the located position
	The lamp bulb spoils	Change a new bulb
	The brightness adjustment knob is set too dark	Adjust the knob in a proper position
	No use the appointed lamp bulb	Use the specified halogen Lamp 6V20W
2. The edge of the field of view has shadow or the brightness is asymmetry	The nosepiece is not in the located position	Adjust it into the located position
	The surface of the lamp become black	Change a new lamp bulb
	The filament shadow not clean up	Move in Condenser adjust knob front and back to change the focus position to clean up the filament shadow.
	The surface of the lens is moldy or has contaminant	Clean the lens
3. Find dust and stain in the field of view	There are stains on the specimen	Change the specimen
	There are stains on the eyepiece	Clean the eyepiece
4. The image is defocus, low-resolution	The objective damage	Mend and correct the objective (send to factory for overhauling)
	The lens of the objective and eyepiece is moldy or have contaminant	Do cleaning
	The opening of Aperture diaphragm and field diaphragm is not proper, and too much astigmatism.	Change the opening of the aperture diaphragm and field diaphragm
	Fine focus system is broken	Examine and repair the fine focus system(send to factory for overhauling)
	The objective is not in the center of the light path	Turn the nosepiece to the located position
5. The image focus surface incline(one side is clear and the other side is faint)	The illumination light incline serious	Adjust the filament position ,let the light distributing of the field of view become symmetrical and bright
	The specimen is not placed in required position	Put the specimen on the right position
	The nosepiece is not in the located position	Turn the nosepiece in the required position
6. The eyes are uncomfortable, the left and right fields of view is not coincided.	The interpupillar distance is not correct	Adjust the interpupillary distance correctly
	The diopter is not right	Adjust the diopter according your sight
	Can't adapt to binocular observation	When look into the objective, do not stare at the specimen but at the whole field of view, or move the eyes away to see other things, then back into the objective

II. Mechanical Part:		
1. The coarse focus knob is hard to run	The tension adjustment collar is too tight	Loose properly
2. The image can't stay on the focal plane in the process of the observation	The tension adjustment collar is too loose	Tighten properly
III. Electric Part:		
1. The lamp can't light	No power supply	Check the power cord, and connect them exactly
	The installation of the bulb is wrong	Install the bulb correctly
	The bulb burn out	Change a new bulb
2. The bulb burn out in a high frequency	Not use the specified lamp	Use the required lamp
3. The height of the brightness is not enough	Not use a appointed lamp	Use a appointed lamp
	The brightness adjustment knob is used wrong	Adjust the brightness adjustment knob in a correct way
4. The light glimpse	The plugboard burn out	Change a new plugboard(send to factory for overhauling)
	The power cord have a poor contact	Check the power cord, and connect them exactly