



## **Maintenance Manual for maintenance engineer BX2**

Thank you for purchasing the Olympus microscope BX2.  
In order to fully utilize its performance and secure optimum condition, please read this manual before maintenance work.  
Please also keep it at hand during maintenance as well as for future reference.

**INTRODUCTION**

The purpose of this manual is to satisfy any requirements for maintenance material that maybe considered as necessary to professionals in the maintenance field, such as Maintenance engineer in Hospitals.

It is intended to be used as a tool for performing basic maintenance procedures if needed or when required as per the recommended maintenance schedule.

The sections from this manual only cover procedure pertaining maintenance 's that are considered to be easily performed. For more involved maintenance 's or repairs, it is recommended that you contact a qualified service engineer from your local Authorized Olympus dealer.

Maintenance parts, grease, and other items specified in the manual can be ordered from your Authorized Olympus dealer, and subject to change without notice.

The recommended maintenance schedule is shown below as reference. ( \* Necessary item)

Portion	Cleaning	Optical/mechanical check	Maintenance schedule
<b>Optical components</b> 1) Outer surface Eyepiece, objective, condenser lens, filter, photo eyepiece  2) Inner part Prism, built-in filter, internal lenses, mirror	*		Once in a year (If dirt is conspicuous or oil immersion objective is used, cleaning should be made after every use.)  Once in a year
<b>Appearance</b> Microscope frame, mechanical part	*		Once in a year (If dirt is conspicuous, cleaning should be made after every use.)
<b>Observation tube</b>		* Optical adjustment: 1) Optical axis (standard) 2) Left/right optical axis 3) Revolving axis 4) Parfocality	Once in a year
<b>Mechanical part</b> Focusing unit, stage, revolving nosepiece, aperture/field iris diaphragm		* Mechanical movement: Grease replacement Mechanical adjustment	Once in two to three years

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## Chapter 1. MAINTENANCE PROCEDURE

### 1. Maintenance of microscope

- 1) Fundamental handling
  - a. Read the instruction manual thoroughly, handle the microscope correctly.
  - b. Be sure to make a usual cleaning, especially after every use of microscope.
  - c. When handling the microscope, do not expose it to shock, moisture, heat and dust.
  - d. If the problem occurs, do not treat it in self-judgement.

- 2) Using and storing conditions

- a. The microscope should be used under no vibration.

If it is placed in such environment as vibration, this causes disturbance and fatigue in observation and affects the photomicrography.

- b. It should not be stored in high humidity.

Such condition causes fungus, corrosion on lens and rust on metal part.

Therefore, special caution is exercised if stored in a long period of time.

- c. Intense temperature change should be avoided.

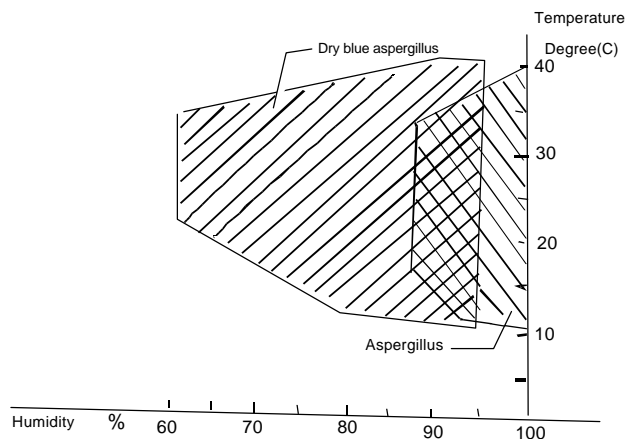
Be careful not to place the microscope near window exposed to direct sunlight and air conditioner. When bringing it into warm room from cold storage location in winter, condensation occurs on lens and metal part, it causes fungus and rust.

- d. It should be kept clean.

The microscope is required to keep away from dust that causes contamination, fungus on lens and failure of sliding part in the frame.

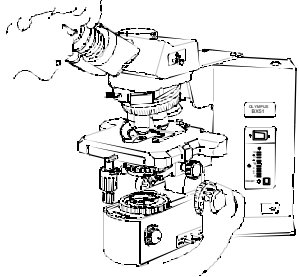
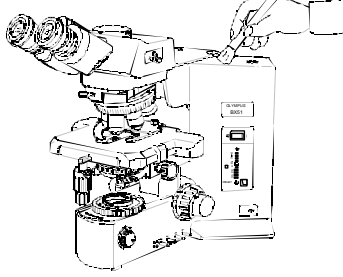
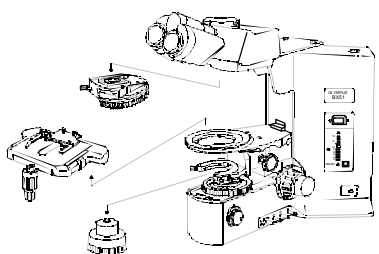
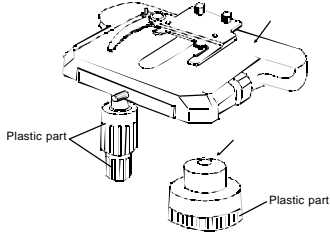
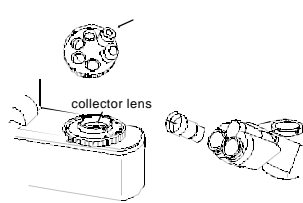
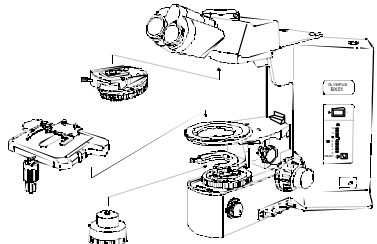
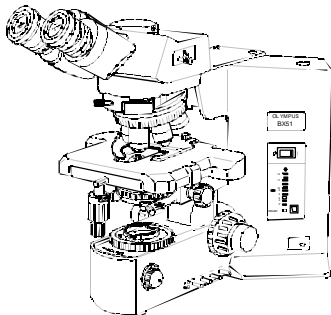
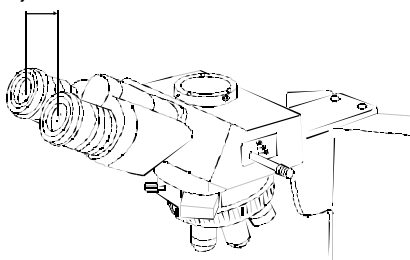
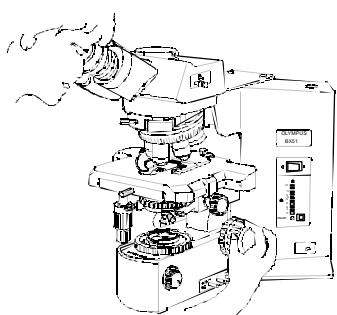
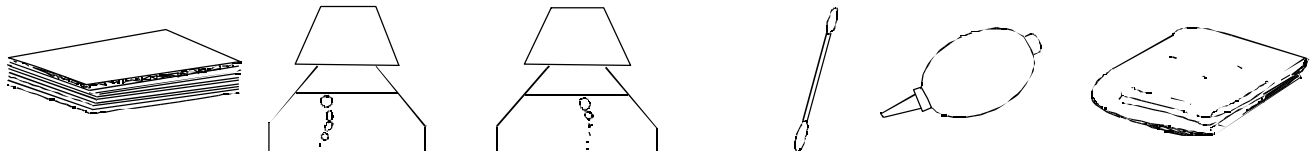
Be careful not to place it in the environment where the corrosive chemicals such as hydrogen sulfide, hydrogen fluoride and acid are handled.

< Reference > fungus: occurrence conditions



**2. Guide to maintenance**

2-1 Overview of maintenance

<p>1)</p>  <p>Set your correct interpupillary distance. Note any areas suggesting a need for mechanical and/or optical maintenance by operating it or observing a specimen.</p>	<p>2)</p>  <p>Sweep off dust on the outer surfaces with the soft brush. If there are stains on the microscope frame, clean them with neutral detergent.</p>	<p>3)</p>  <p>Remove the revolving nosepiece, stage and condenser.</p>
<p>4)</p>  <p>Wipe off any dirt spots on the surface. The plastic parts should be cleaned with neutral detergent.</p>	<p>5)</p>  <p>Clean all exposed optics such as lenses of eyepieces and objectives. (Only the BX41 collector lens should be cleaned with neutral detergent because it is made of plastic.)</p>	<p>6)</p>  <p>Mount the removed components to the microscope frame.</p>
<p>7)</p>  <p>Polish all plastic components and the frame with silicon cloth.</p>	<p>8)</p>  <p>Return the interpupillary distance to original condition and prepare for the inspection. (see page 6)</p>	<p>9)</p>  <p>Do a final check following the inspection sheet in this manual. (See page 7)</p>
<p>Tool required:</p>  <p>Lens tissue      Neutral detergent      Cleaning solution      Cotton swab      Blower      Silicon cloth              (For plastic part or frame)      (For lens or filter etc.)      or tweezers etc.      (For finishing)</p>		

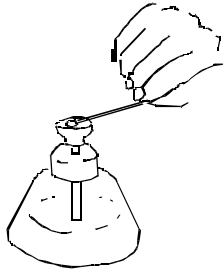
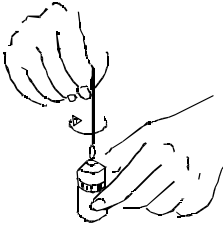
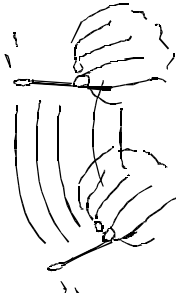
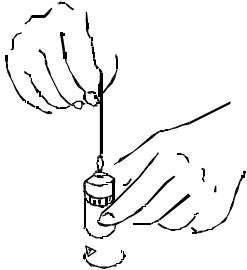
2-2 Cleaning method for the optical components

Required tools:

- 1) Lens tissue
- 2) Cotton swab or tweezers etc.
- 3) Blower
- 4) Magnifier (Eyepiece is possible to be used by turning it upside down. Refer to page 10.)
- 5) Cleaning solution: e.g. Alcohol

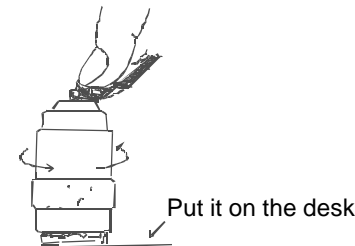
Before cleaning: Lightly brush the lens surface or blow with the blower before wiping with tissue. This removes particles that may scratch the lens surface. (to protect the lens coating)

HOW TO CLEAN THE OBJECTIVE LENS

1	2	3	4
			
<p>Moisten the tip of cotton swab with cleaning solution.</p>	<p>With a circular motion, wipe the top lens surface with the cotton swab, to thoroughly remove any oil or dirt from the lens.</p>	<p>Dip a new cotton swab in the cleaning solution and shake vigorously to remove any excess cleaning solution.</p>	<p>wipe the objective lens from the center towards the periphery, while rotating the lens.</p>

When the lens size is large and difference in level between the lens and the lens frame is small:

Fold the lens tissue several times and moisten it with cleaning solution. After that, apply the folded line edge to the center of lens, push it with index finger and turn the objective by the other hand to clean the lens while moving it from the center towards the periphery.

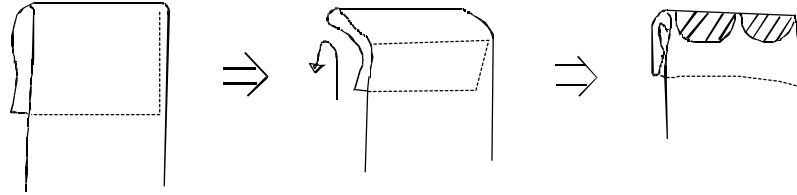


Cleaning the immersion objective:

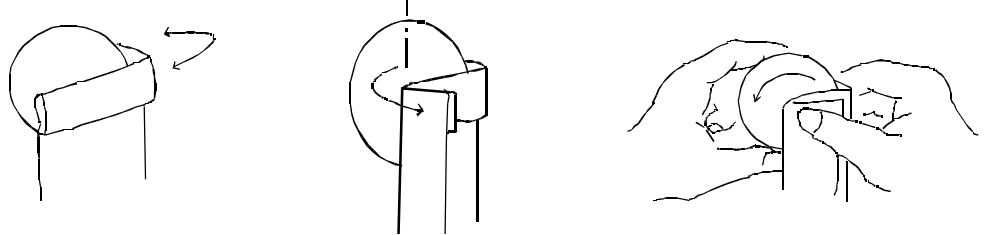
Wipe off the immersion oil while absorbing it with lens tissue that is not moistened. After that, clean the lens as the same manner mentioned on the left. When the top surface of lens frame is higher than that of lens and remained dirty potion on the periphery of lens can not be wiped off, clean the lens referring the above figures, 1 to 4.

HOW TO CLEAN THE FILTER

Fold the lens tissue into two or three layers and moisten its shaded part with cleaning solution.

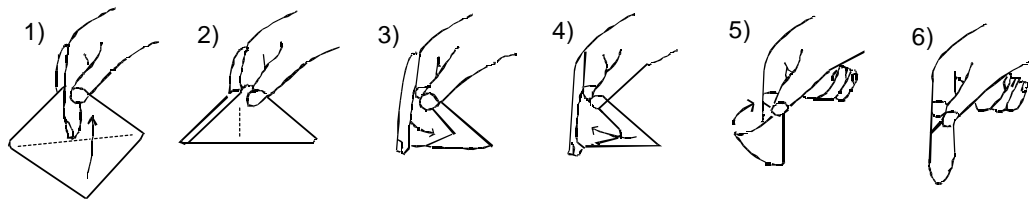


Hold the filter at its edge and fold the lens paper from the lens center to outside as illustrated. Move the lens tissue gradually to outside while turning the filter by left hand.

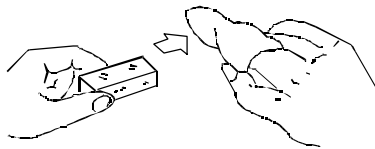


HOW TO CLEAN THE PRISM

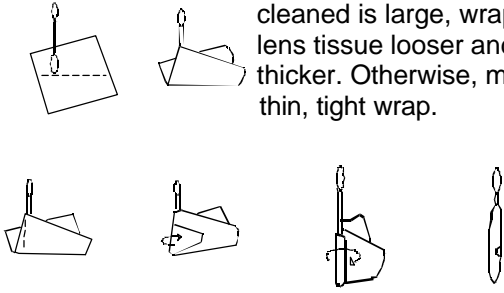
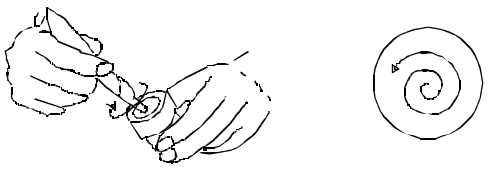
Hold a sheet of lens tissue between your middle and index fingers, then fold and wrap it around your index finger. Hold the tissue down with your thumb and moisten it with sufficient cleaning solution.



Wipe the prism surfaces from front to backward at a stroke, applying even pressure.



HOW TO CLEAN THE EYEPIECE

<p>1</p>  <p>Wrap a sheet of lens tissue around a cotton swab as illustrated. If the area to be cleaned is large, wrap the lens tissue looser and thicker. Otherwise, make a thin, tight wrap.</p>	<p>2</p>  <p>Dip the wrapped lens tissue in the cleaning solution, and wipe the eyepiece from the center towards the periphery in a circular motion.</p>
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Important notes:

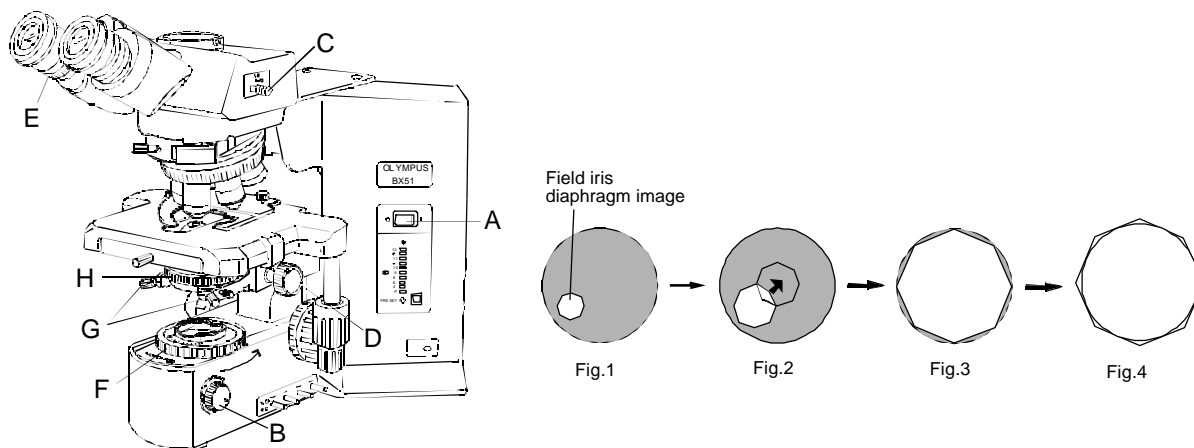
- 1) Never rub the lens surface strongly.
- 2) Do not use the same lens tissue to clean more than one lens .
- 3) Do not moisten the lens tissue with an excessive amount of cleaning solution.
- 4) When cleaning with tweezers, be careful not to protrude its tip from the lens tissue.



### 3. Preparing for inspection

#### ADJUSTMENT OF KOEHLER ILLUMINATION

- 1) Set the main switch "A" to "I" (ON) and adjust the brightness by turning the adjustment knob "B" .
  - 2) Set the light path selector knob "C" to the pushed-in position.  
(Pushed-in position: Binocular 100%, Middle position: Binocular 20% Photo/TV 80%, Pulled-out position: Photo/TV 100%)
  - 3) Place a specimen on the stage.
  - 4) Engage the 10X objective in the light path.
  - 5) Turn the condenser height adjustment knob "D" to raise the condenser to its upper limit.  
( When using the U-SC3 swing-out condenser, move the top lens into the light path.)
  - 6) Looking through the eyepiece in the right sleeve without the diopter adjustment ring, turn the coarse and fine focus adjustment knobs to bring the specimen into focus.
  - 7) Looking through the eyepiece in the left sleeve with the diopter adjustment ring, turn only the diopter adjustment ring "E" to focus on the specimen.  
(At this time, adjust the interpupillary distance so that the binocular visions on the left and right fields of view coincide completely.)
  - 8) Turn the field iris diaphragm ring "F" in the direction of the arrow so that the iris diaphragm image comes inside the field of view.
  - 9) Manipulate the condenser height adjustment knob "D" to focus on the iris diaphragm image. (See Fig.1)
  - 10) Turn the two condenser centering screws "G" to move the iris diaphragm image to the center of field of view. (See Fig. 2)
  - 11) Gradually open the field iris diaphragm. The condenser is properly centered if the iris diaphragm image is centered and inscribed in the field of view. (See Fig.3)
- (During actual use, open the field iris diaphragm slightly until its image circumscribes the field of view. See Fig.4)
- Reference: Since the contrast of microscope specimens is ordinary low, setting the condenser aperture iris diaphragm to between 70% and 80% of the N.A. of the objective in use is usually recommended. If necessary, adjust the ratio by removing the eyepiece and looking into the eyepiece sleeve while adjusting the aperture iris diaphragm ring "H".



### 4. BX2 inspection sheet

MODEL :		CHECK DATE :	
S/N :		CHECKING BY :	
CHECK POINT	CHECK CONTENTS	RESULT	REF. PAGE
1. Electrical unit	1) When the power switch is turned on, the lamp is lit and the brightness can be varied by adjustment knob.	OK / NO	18, 19, 20
	2) When the light preset switch is set ON, the previously set voltage can be obtained regardless of brightness adjustment knob position.	OK / NO	
	3) The voltage of light preset switch can be adjusted in a prescribed range.	OK / NO	
2. Coarse/fine focus adjustment knob	1) The coarse/fine focus adjustment knob is smoothly moved without tightness or unevenness.	OK / NO	17
	2) The tension of coarse focus adjustment knob can be adjusted by the adjustment ring.	OK / NO	
	3) The coarse upper limit lock is effective.	OK / NO	
3. Stage	1) The stage is fixed by the clamping screw.	OK / NO	
	2) The stage can be rotated clockwise or counterclockwise while holding the clamping screw after the screw is loosened.	OK / NO	
	3) The stage should not fall spontaneously.	OK / NO	
	4) A specimen is held securely by the specimen holder.	OK / NO	
	5) The X/Y movement is smooth without unevenness, backlash or slipping.	OK / NO	14, 15, 16
4. Observation tube	1) The interpupillary distance adjustment can be operated smoothly in working range.	OK / NO	
	2) When changing the interpupillary distance, the displacement of optical axis is not apparent.	OK / NO	
	3) The diopter adjustment ring is moved smoothly in working range.	OK / NO	
	4) The optical axis of left side coincides with that of right side.	OK / NO	11, 12, 13
	5) The light path selector knob is moved smoothly.	OK / NO	
	6) The tilting angle is easily adjusted and its angle is stable. (U-TBI / U-ETBI only)	OK / NO	
	7) When changing the tilting angle, the optical axis displacement is not apparent. (U-TBI / U-ETBI only)	OK / NO	
5. Revolving nosepiece	1) The revolving nosepiece can be rotated smoothly and stops at the click position.	OK / NO	
6. Condenser	1) The vertical movement of condenser is smooth.	OK / NO	
	2) The centering of field iris diaphragm can be adjusted in a movable range with the condenser centering knobs.	OK / NO	
7. Illumination	1) The field/aperture iris diaphragm ring is moved normally.	OK / NO	
8. Visibility (Observation)	1) Observation image is normal. Without flares /ghosts / vignetting /uneven illumination	OK / NO	
	2) When photographed, there is no unevenness or shading on the film surface.	OK / NO	
	3) Dust and dirt are not noticeable in observation or photomicrography.	OK / NO	8, 9
Remarks:			

## Chapter 2. INSPECTION PROCEDURE

### 1. Checking performance of microscope

Using the BX2 maintenance sheet (P.7), check the electrical unit, mechanical and optical performance.

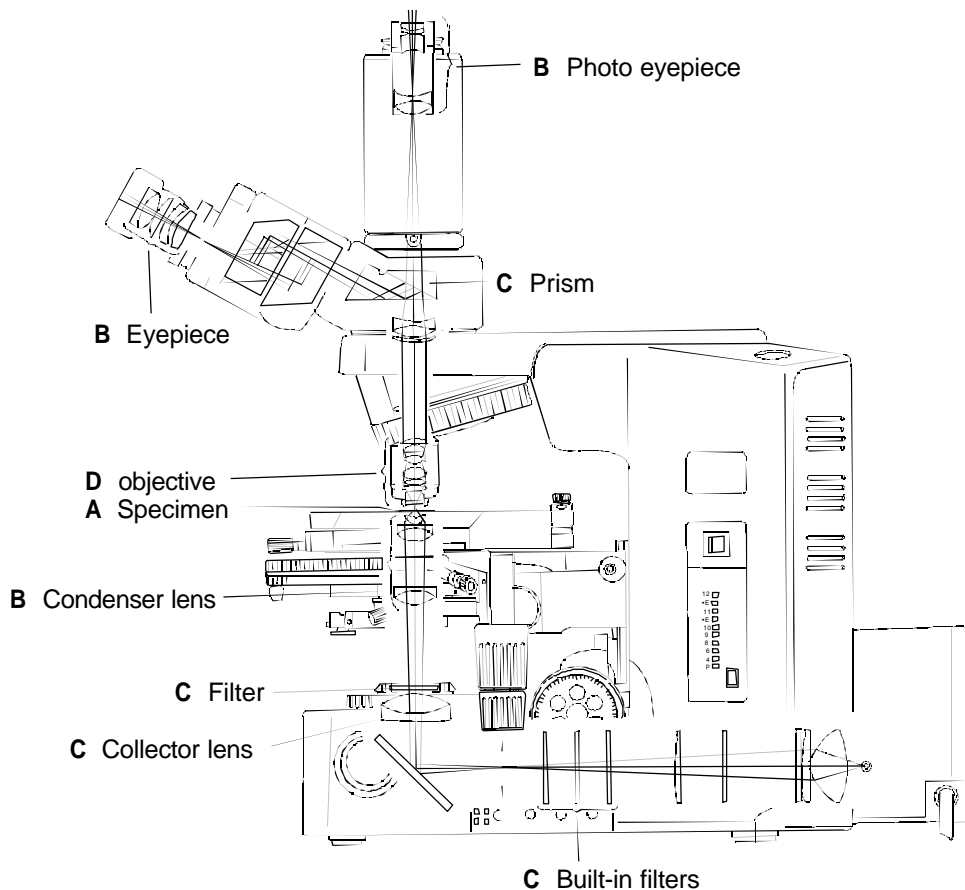
### 2. Checking dirty portion

#### 2-1 Image influence caused by dirt on each component

The following figure shows the influence of image on each optical component if stains or dust is adhered to that portion.

In general, the microscope image or photographing is largely affected by dirt adhered on the nearer portion to a specimen and image surfaces.

Therefore, the optical components should be kept clean and dust-free.



- A:** Dirt is clearly seen.
- B:** Blurred contours of dirt is seen.
- C:** Dirt is seen when the aperture iris diaphragm is stopped down.
- D:** Dirt is not directly seen, but contrast of image deteriorates.

2-2 How to find dirty portion through observation

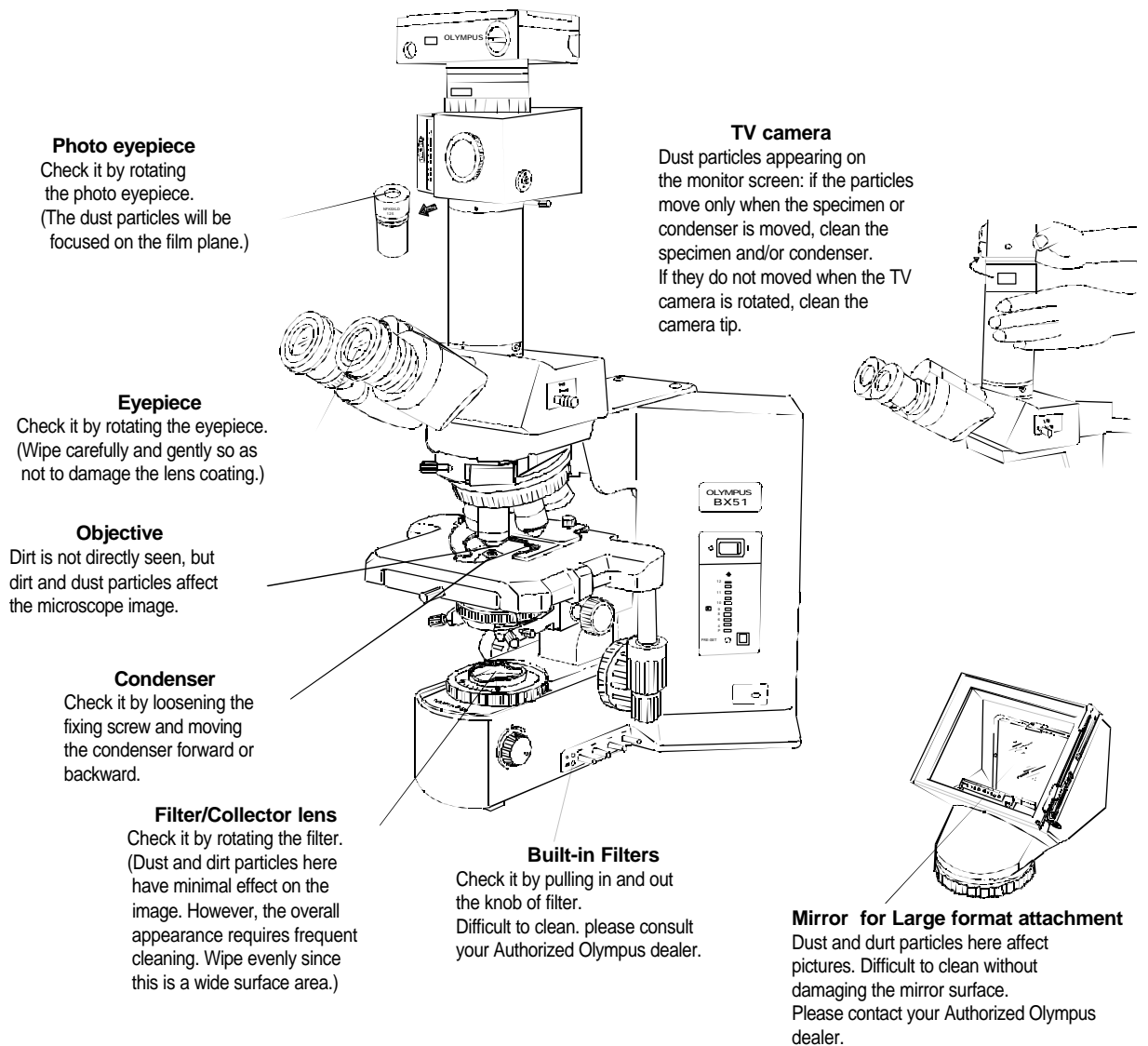
1) Stop down the aperture iris diaphragm.

(When the aperture iris diaphragm is stopped down, it facilitates finding the dirt particles because the depth of focus increases and the dirt position bring into focus. However, very small dirt particle may not be found in this method.)

2) Observe a specimen through the eyepiece.

If dirt is seen by observing it, look for the portion where stains or dust is adhered by moving the following components as well as a specimen.

For TV camera, check it by method shown below.

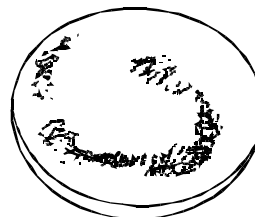
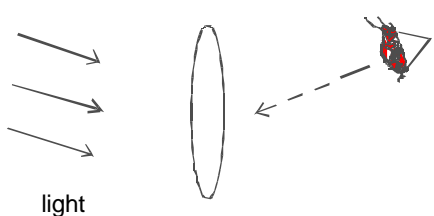


Note: If dirt particles do not move by moving the above components, it is assumed that the lens and filter inside the microscope is contaminated.

In this case, please contact your Authorized Olympus dealer.

2-3 How to check cleaning condition

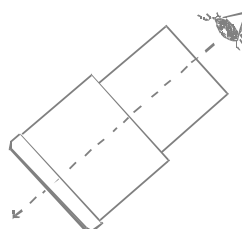
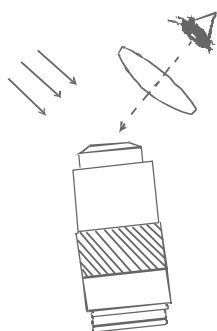
- 1) When a large lens is checked, look at the lens while putting it toward bright side or breathe on the lens and observe the condition that the haze on the whole surface of the lens disappears evenly.



Dust becomes conspicuous when looking at it with the lens inclination changed.

If there is a dirty part or a remained part that is not cleaned completely, the haze of this part will disappear slower than that of the other part.

- 2) For a small lens such as top lens of objective, check it by magnifier.



An eyepiece can be substituted for magnifier by turning the eyepiece upside down.

# Chapter 3. REPAIR PROCEDURE

## 1. Optical adjustment

<b>PREPARATION</b>	<b>Adjusting the left/right optical axis</b>
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If the left/right optical axis is remarkably displaced at checking, perform the following adjustment.

\*Insert the cross eyepiece into the right sleeve.

CROSS WH10X

Objective 4X-10X

specimen whose center is identified (Concentric circles etc.)

\*Adjust the interpupillary distance to about 62mm (See the illustration).

position of approx. 62mm

Align the specimen center with the cross center of the WH10X eyepiece by turning the control knob of the stage.

Before adjustment

Cross center of cross WH10X

specimen center

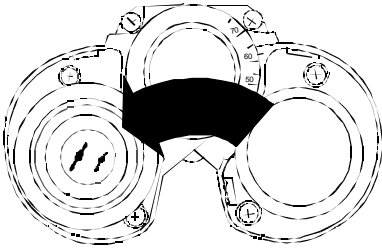
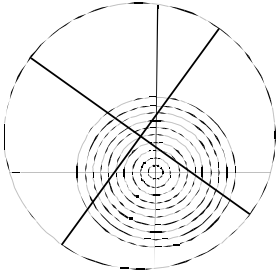
➔

After adjustment

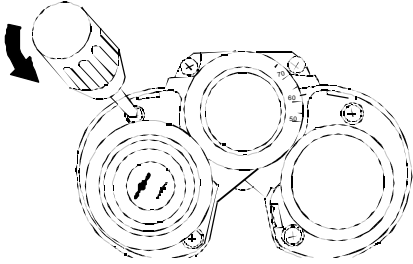
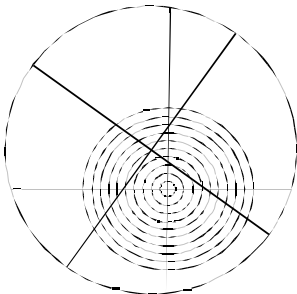
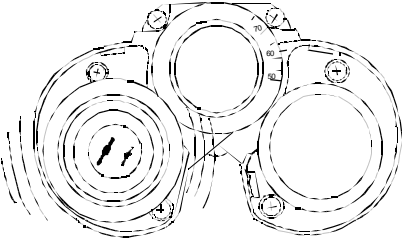
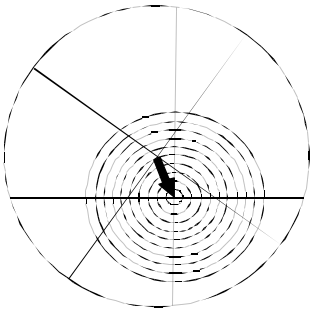
Control knob

ADJUSTMENT THE LEFT/RIGHT OPTICAL AXIS

(1) Moving the cross eyepiece to the left sleeve.

Work	Image seen through the cross eyepiece
<p>Move the cross eyepiece to the left sleeve.</p> 	<p>If the optical axis between left and right sleeve is deviated, the center of the specimen and the cross center of eyepiece are also deviated.</p> 

(2) Aligning the cross center of eyepiece with the specimen center.

Work	Image seen through the cross eyepiece
<p>1. Loosen the two screws slightly which secure the left sleeve.</p> 	<p>Image at first</p> 
<p>2. Align the center of eyepiece with the specimen center while observing through the cross WH10X. (Change the left sleeve position by hand.)</p> 	<p>The center are aligned.</p> 

3. Firmly tighten the screws which secure the left sleeve.

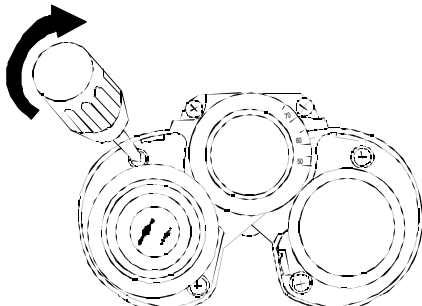
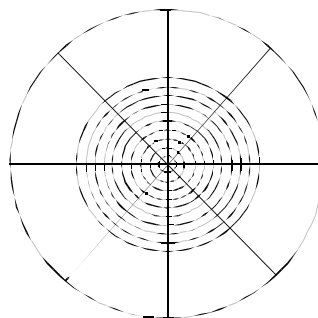


Image at the end of adjustment





## 2. Mechanical adjustment

### 2-1 Adjustment method for the tension of X/Y-wire

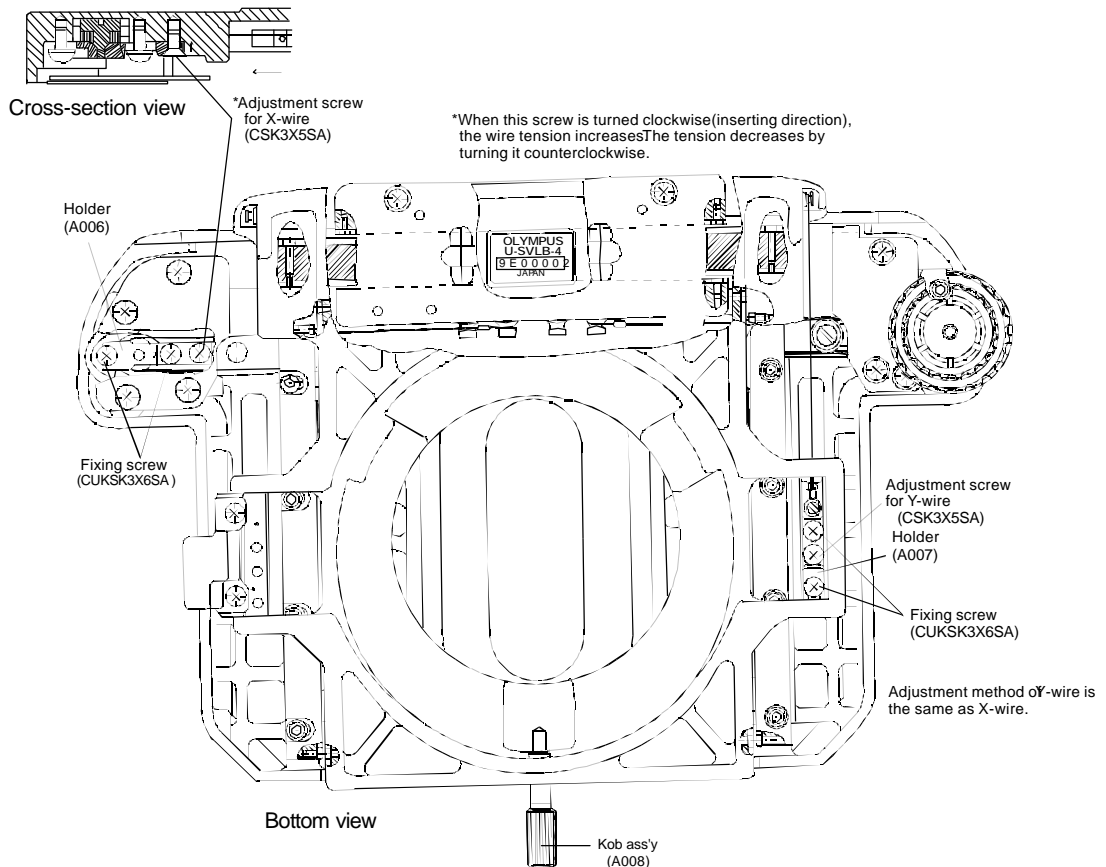
If a specimen image is moved when the stage is brought into the desired position of specimen, it is necessary to adjust the wire tension of stage.

( In case where the stage movement is heavy due to hardening of grease, please contact your Authorized Olympus dealer because disassembling the stage is required for grease replacement.)

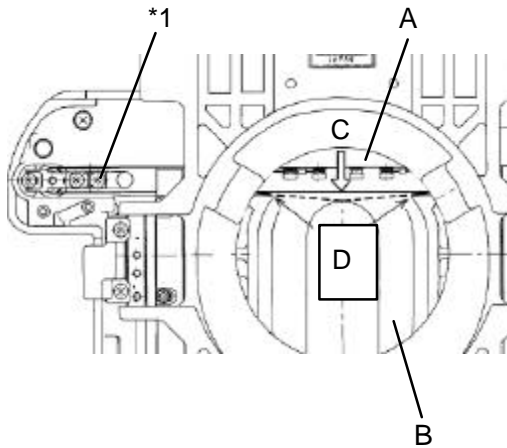
#### Adjustment method for X/Y-wire

(Refer to the figure shown below.)

- 1) Remove the stage from the frame.
- 2) Turn over the stage and loosen the two fixing screws (CUKSK3X6SA) securing the holder.
- 3) Turn the adjustment screw (CSK3X5SA) clockwise or counterclockwise to adjust the wire tension (See page 15). Tighten the two fixing screws (CUKSK3X6SA).
- 4) Mount the stage to the frame, set the microscope at observation state and check that the image is brought into the desired position without backlash (within 2 microns at the lowest torque of X/Y stage knob: see page 16).
- 5) Repeat the procedure 1) to 4) until the condition is satisfied (both X and Y wires).
- 6) After completing the adjustment , apply adhesive (OT1131) to each three screws.



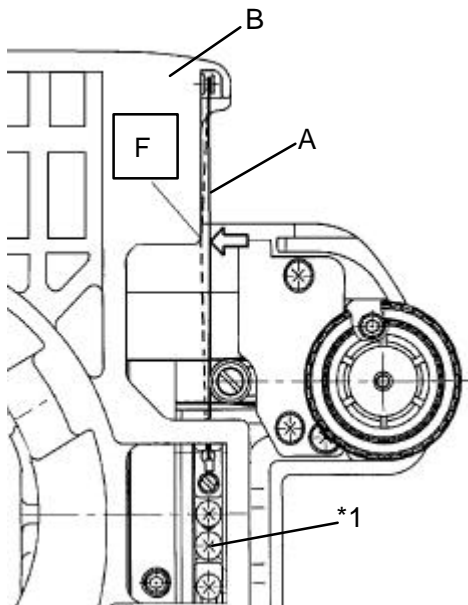
2-2 Confirmation of X-wire tension



- 1) Move the X-guide "A" to the center of the upper stage "B", press "C" of the X-wire using the fan-shaped tension gauge(OT3232). If the tension does not meet the standard, adjust the tension so as to be within the standard when the X-wire comes into contact with "D" wall by means of the CSK3X5SA(\*1) screw.

Tension standard	0.25-0.3N(25-30gf)
------------------	--------------------

2-3 Confirmation of Y-wire tension



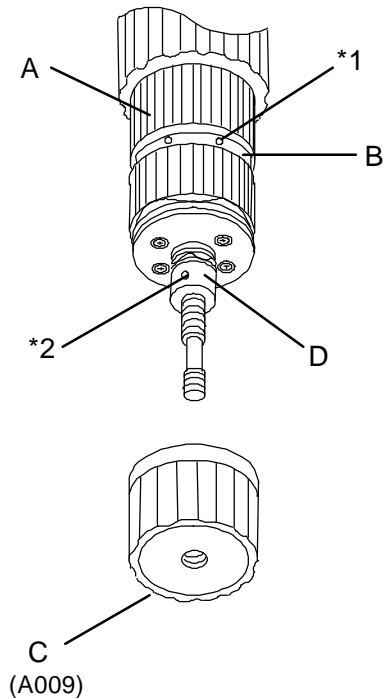
- 1) Press the upper part of Y-wire "A" indicated by the the arrow with the fan-shaped tension gauge. If the tension does not meet the standard, adjust the CSK3X5SA(\*1) scew so that the tension is within the standard when the Y-wire comes into contact with "F" part of the lower stage "B" when seen from the above.

Tension standard	0.88-0.98N(90-100gf)
------------------	----------------------

Note: If the wire is too tight, image backlash may occur.

If the tension is below the standard value, slip may occur between the knob and the wire deteriorating the image movement.

2-4 Final adjustment



(1) Image backlash adjustment

1) Set the stage on the microscope frame.

Under observation state (with 100X objective), check image backlash at the lowest knob torque. If it is over 2 microns, conduct adjustment. (The knob rotation torque is measured by turning the knob with a sting or some other suitable item adhered to it, using tension gauge.)

Tension gauge: OT3326

2) When adjusting Y-movement, loosen the two screws(\*1) and turn the Y-knob "A" to bring backlash within 2 microns. Turn the stopper ring "B" to come into contact with knob "A", and fix the stopper ring using the two AWU2X2SA(\*1) screws.

3) When adjusting X-movement, remove the X-knob "C" after loosening the two AWU3X3SA screws.

Loosen the screw(\*2). Turn the F-ring "D" to bring image backlash within 2 microns, and fix the F-ring using the HU1.7X2SA(\*2) screw.

At this time, make sure that the final knob torque at the lowest is within the following standard for both X and Y.

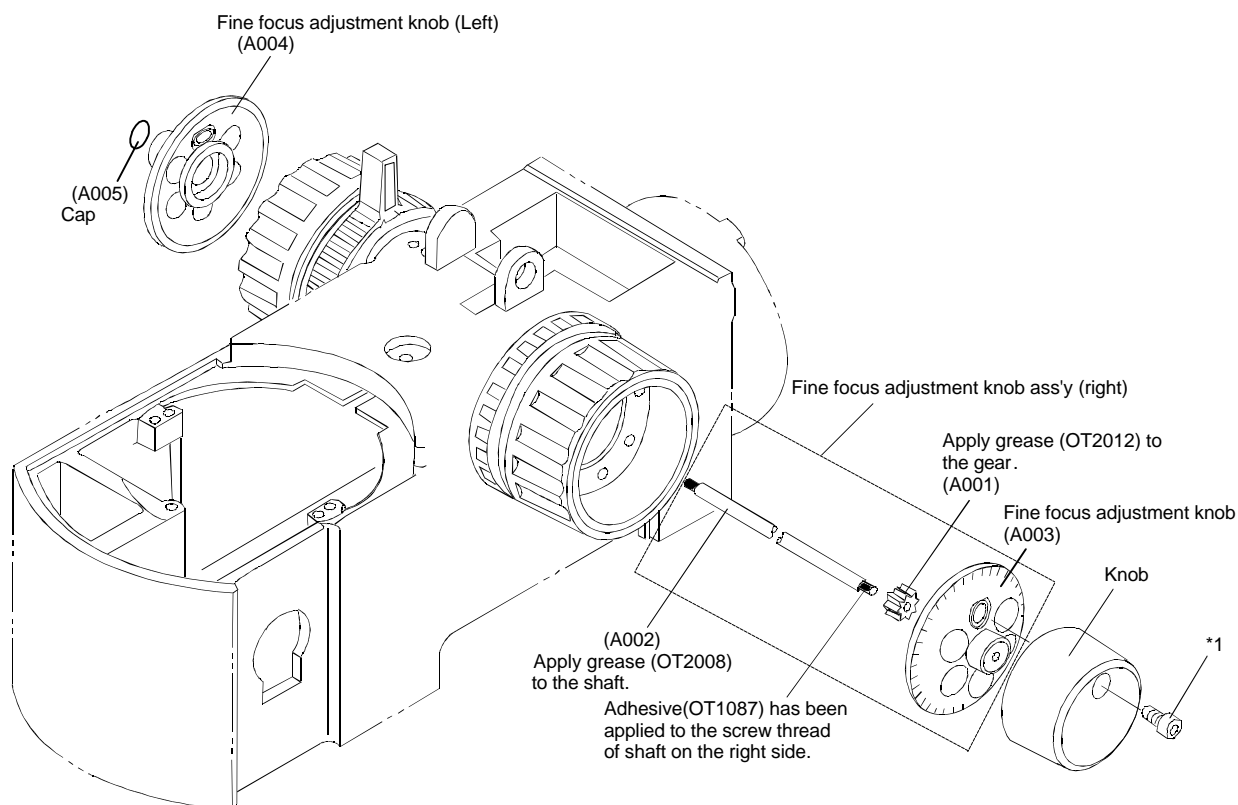
Knob torque at the lowest:
X: 0.25 - 0.35N (25 - 35gf)
Y: 0.39 - 0.59N (40 - 60gf)

### 3. Grease replacement for fine focus adjustment knob ass'y

If the adjustment knob is not turned smoothly, replace grease on the shaft and gear of fine adjustment ass'y in the following procedure.

(In case where the coarse adjustment knob ass'y is not turned evenly, please contact your Authorized Olympus dealer because it is necessary to disassemble the coarse adjustment knob ass'y and/or guide unit.)

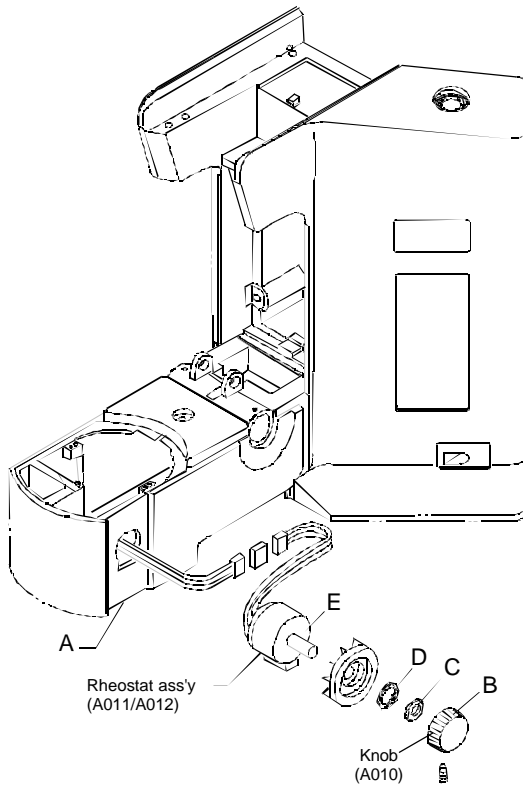
- 1) Remove the screw (AB4X10SA \*1) and take off the knob.
- 2) Hold the fine focus adjustment knob (left) and turn the fine focus adjustment knob (right) to remove them. (At this time, the fine focus adjustment knob ass'y (right) is removed as an assembly of shaft, gear and fine focus adjustment knob.)
- 3) Remove grease(OT2008) on the shaft by cleaning solution and replace it.  
For the gear, apply grease(OT2012) on it.
- 4) Assemble the components in reverse order of disassembly.



### 4. Electrical adjustment

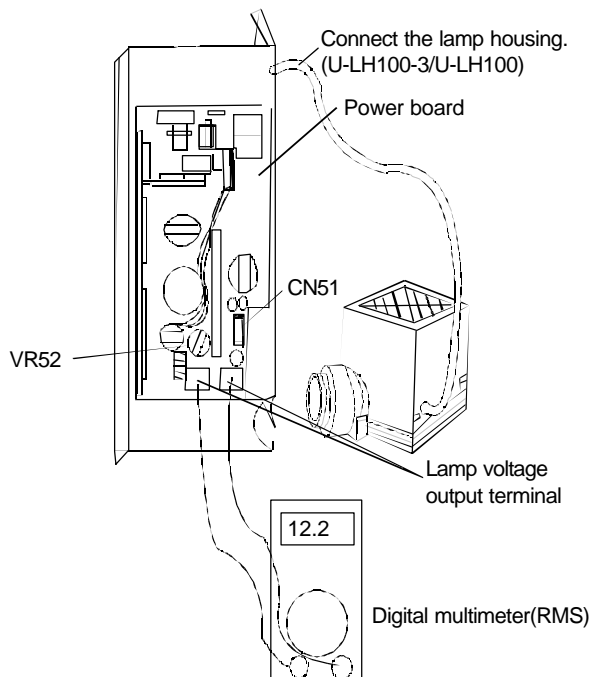
The following shows the voltage adjustment when the rheostat ass'y is replaced.

#### (1) Replacement of rheostat ass'y



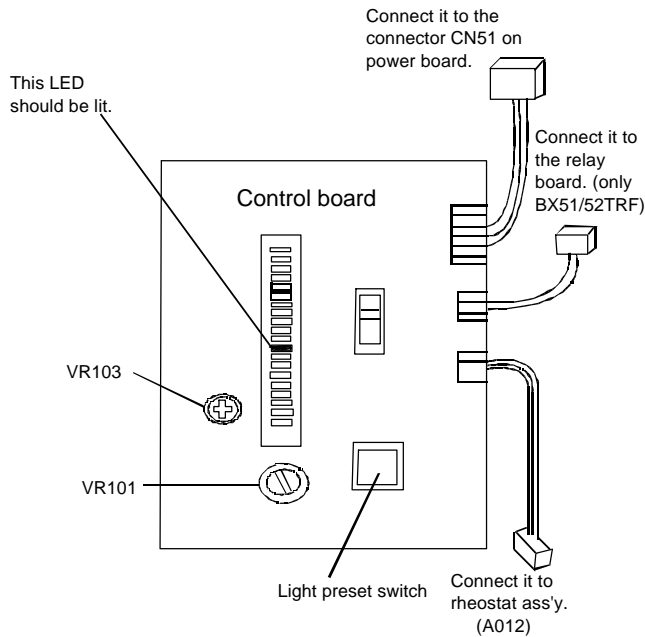
- 1) Remove the bottom cover "A" of microscope frame.
- 2) Loosen the screw of knob "B" and disassemble the parts in order of "B" to "E".  
Note: Remove the rheostat ass'y from inside of base.
- 3) Disconnect the connector of rheostat ass'y.
- 4) Reassemble them in reverse order.

#### (2) Setup for adjustment (BX51/52)



- 1) Remove the back panel of microscope frame.  
Screw: CUK3X6SA 8 pcs.
- 2) Remove the control board . (Refer to the next page.)  
Screw: CUTB3X6SA 4 pcs.
- 3) Prepare for adjustment as shown in the left figure.

(3) Adjustment procedure (BX51/52)



- 1) Turn on the power, and then turn the knob "B" (P.18) to the maximum level.
- 2) In step 1), turn the trimmer VR52 (P.18) on the power board to adjust the lamp output voltage to 12.2V, using the digital multimeter.

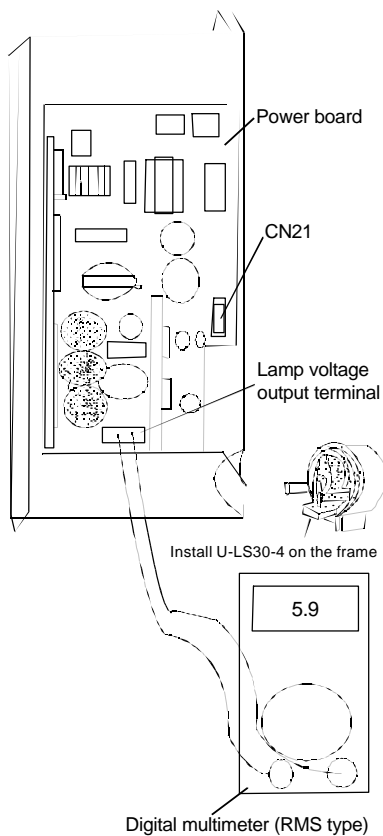
Standard	DC12.2V+/-0.1V
----------	----------------

- 3) Turn on the light preset switch.
- 4) Set the light preset voltage to 9V by turning the VR101.

Standard	DC9V+/-0.1V
----------	-------------

- 5) In step 4), turn the trimmer VR103 so that ninth LED from the bottom will light.
- 6) Apply solvent-based adhesive(OT1026) to several points around all trimmers except VR101 to avoid turning the trimmers.

(4) Setup for adjustment (BX41/45)



- 1) Remove the back panel of microscope frame.

Screw: CUKSK3X8SA 7 pcs.

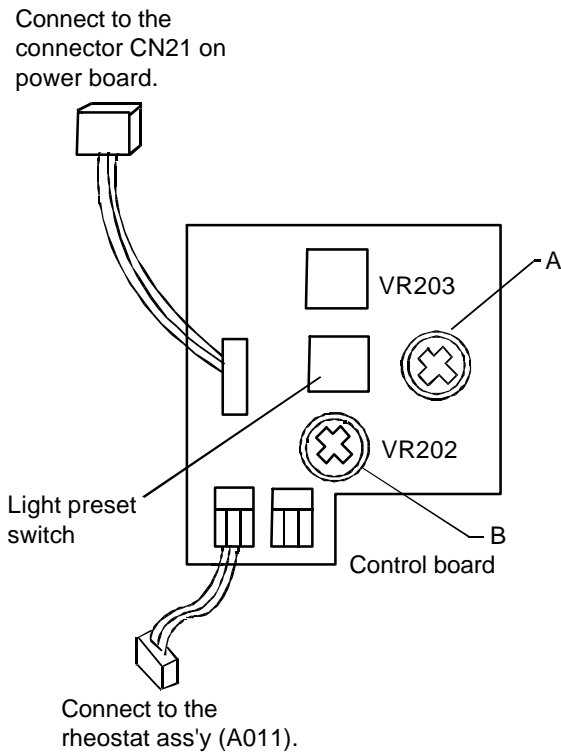
Note: In case of disassembly from the frame, after removing the screws, separate the back panel from wrench holder and take off the panel while shifting it down.

- 2) Remove the control board . (Refer to the next page.)

Screw: CUTB3X6SA 2 pcs.

- 3) Prepare for adjustment as shown in the left figure.

(5) Adjustment procedure (BX41)



- 1) Turn on the power, and then turn the knob "B" (P.18) to the maximum level.
- 2) While turning the trimmer (VR203"A") on the control board, adjust the lamp output voltage to 5.9V using the digital multimeter.

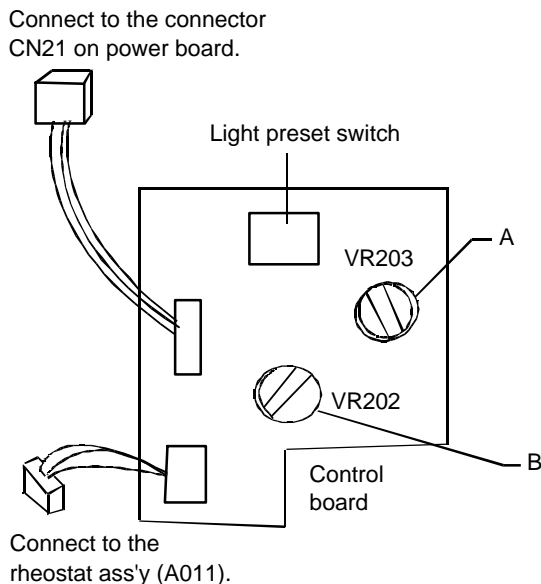
Standard	DC5.9V+/-0.1V
----------	---------------

- 3) Turn on the light preset switch.
- 4) Set the light preset voltage to 4V by turning the trimmer (VR202"B").

Standard	DC4V+/-0.1V
----------	-------------

- 5) For prevention of turning, apply solvent-based adhesive(OT1026) on the one spot of trimmer(VR203).

(6) Adjustment procedure(BX45)



- 1) Turn on the power, and then turn the knob "B" (P.18) to the maximum level.
- 2) While turning the trimmer (VR203"A") on the control board, adjust the lamp output voltage to 5.9V using the digital multimeter.

Standard	DC5.9V+/-0.1V
----------	---------------

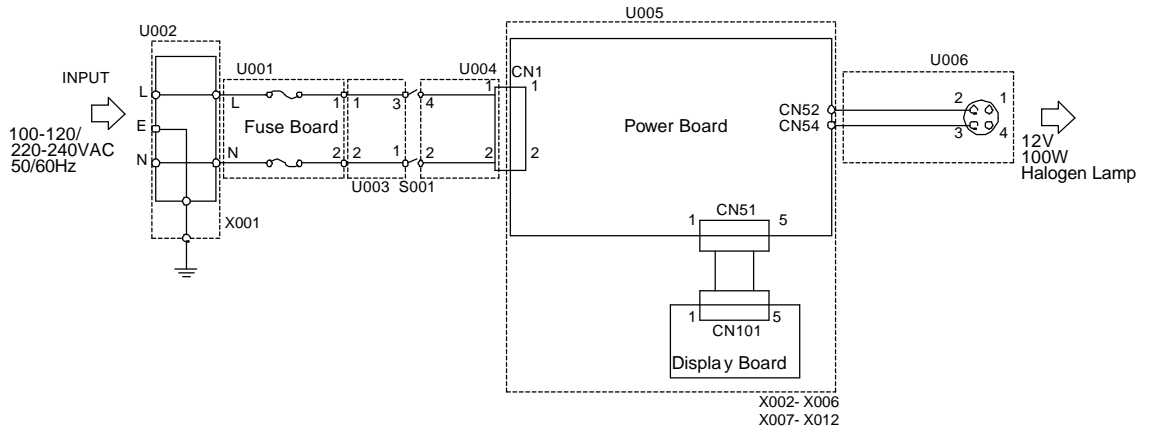
- 3) Turn on the light preset switch.
- 4) Set the light preset voltage to 4V by turning the trimmer (VR202"B").

Standard	DC4V+/-0.1V
----------	-------------

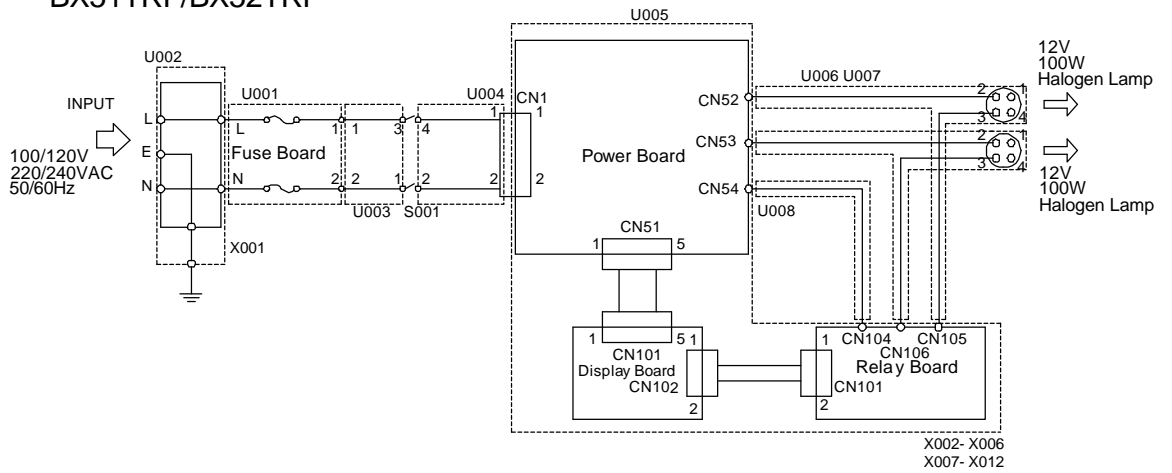
- 5) For prevention of turning, apply solvent-based adhesive(OT1026) on the spot of trimmer (VR203).

5. Connecting diagram

BX51TF/BX52TF

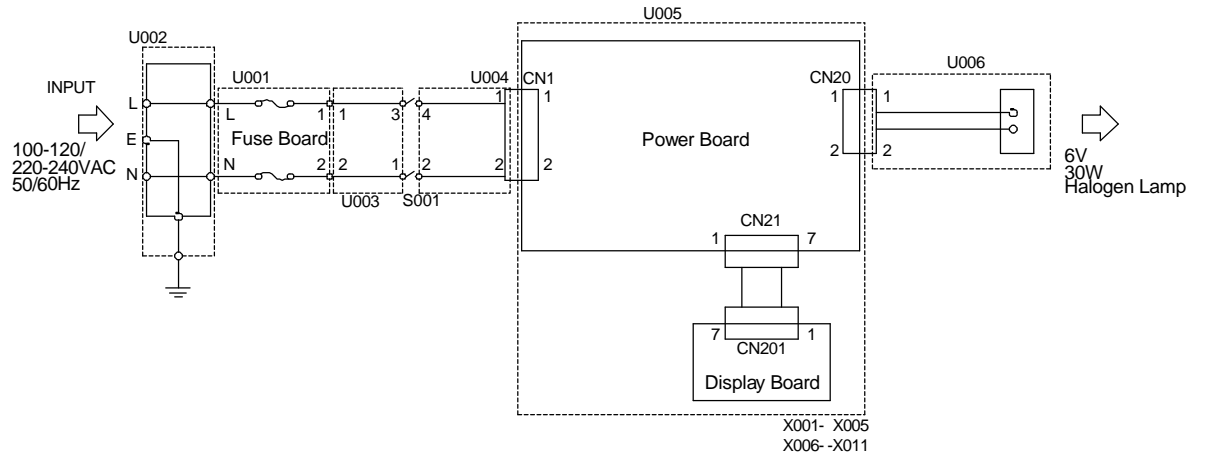


BX51TRF/BX52TRF





BX41TF/BX45TF



## Chapter 4.

# TROUBLESHOOTING

### 1. Electrical problem

BX51/52

Problem	Cause	Remedy
a) Bulb intermittently lights and goes out.	Bulb is nearly burned out.	Replace bulb.
	A connector is not properly connected.	Check all connectors.
b) Bulb burns out almost immediately.	Wrong type of bulb is being used.	Use correct bulb type.
c) Brightness does not change when you turn light intensity adjustment knob.	Light preset switch is set ON.	Preset switch to OFF.
d) All voltage indicator LEDs light and voltage cannot be varied with light intensity adjustment knob.	Bulb is not installed.	Install bulb.
	Bulb is burned out.	Replace bulb.
	Lamp socket is not connected.	Connect lamp socket correctly.
e) Lamp voltage cannot be varied with light intensity adjustment knob.	Bulb is burned out.	Replace bulb.

BX41/45

Problem	Cause	Remedy
a) Bulb intermittently lights and goes out.	Bulb is nearly burned out.	Replace bulb.
	A connector is not properly connected.	Check all connectors.
b) Bulb burns out almost immediately.	Wrong type of bulb is being used.	Use correct bulb type.
c) Brightness does not change when you turn light intensity adjustment knob.	Light preset switch is set ON.	Preset switch to OFF.
	Bulb is not installed.	Install bulb.
	Bulb is burned out.	Replace bulb.
	Lamp socket is not connected.	Connect lamp socket correctly.
d) Voltage indicator LED does not light or bulb does not light.	The voltage selector switch is set to the wrong position.	Set the switch to position matching your local line voltage(100-120V or 220-240V).

## Chapter 5. JIGS AND TOOLS / GREASES AND ADHESIVES

### 1. List of jigs and tools

No.	Description	Ref. page
OT3232	Fan-shaped tension gauge (2N)	15
OT3326	Tension gauge (1N)	16
	Cleaning tools	2, 3
3822800	Cross WH10X	11, 12, 13
	Digital multimeter	18, 19, 20
	Philips screwdriver	12, 13 14
	Allen wrench	16, 17
	Precision screwdriver	19, 20
	Dust cover	

### 2. List of greases

No.	Description	Ref. page
OT2008	Grease (medium)	17
OT2012	Mo grease	17

### 3. List of adhesives

No.	Description	Ref. page
OT1026	Solvent-based adhesive	19, 20
OT1087	Anaerobic adhesive (used when fine focus adjustment knob ass'y is disassembled)	17
OT1131	shellac	14

## Chapter 6. MAINTENANCE PARTS

### 1. List of maintenance parts

Index No.	Order No.	Description	Ref. page
	AX9870	BX41RF Instruction manual	
	AX9853	BX41TF Instruction manual	
	AX9857	BX45TF Instruction manual	
	AX9869	BX51RF Instruction manual	
	AX9855	BX51/52 Instruction manual	
A001	AB872600	Gear	17
A002	AD490000	Fine focus shaft	
A003	AD490400	Fine focus adjustment knob (right)	
A004	AD490500	Fine focus adjustment knob (left)	
A005	AD490800	Cap	
A006	AC740900	Holder (for X-wire)	14
A007	AD411200	Holder (for Y-wire)	
A008	AQ212500	Knob ass'y (for clamping stage)	
A009	AD604200	X-knob	16
A010	AD495600	Knob	18, 19, 20
A011	DZ268000	Rheostat ass'y (for BX41/45)	
A012	DZ268100	Rheostat ass'y (for BX51/52)	
		12V100W halogen bulb (for BX51/52)	21, 22, 23
		6V30W halogen bulb(for BX41/45)	

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