INSTRUCTIONS

BH2-UCD

UNIVERSAL CONDENSER

WARNING

This instruction manual applies to the universal condenser to be used with Olympus microscopes. This attachment allows a switch-over between various microscopy methods simply by replacing the optical element. It is recommended that the user read the instruction manual for the microscope in use, in order to obtain optimum performance from the integrated use of these instruments.

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BEFORE USE

1 Operation

① This attachment is a precision-manufactured instrument. Always handle it with care, avoiding abrupt motions.

② Make sure that no dirt, fingerprints etc. are left on the lens surfaces.

③ Do not force any control beyond its built-in limit (stopper, click, etc.). Avoid using excessing force.

④ AFTER SWINGING OUT THE TOP LENS, ATTACH THE CONDENSER LENS TO THE MICROSCOPE BODY.

⑤ BE SURE TO CENTER THE CONDENSER BEFORE USE. At maximum decentration of the condenser, the top lens and stage holder may interfere with each other, making swing-out of the top lens impossible.

⑥ Remove the condenser lens from the microscope before attaching or removing the optical element.

⑦ Do not clamp the centering wrench of the optical element too tightly.

⑧ An intermediate tube or sliders may be necessary depending on the method of observation.

2 Care and Storage

① Lenses must always be kept clean. To clean the lens surfaces, wipe lightly with gauze. If smudged with fingerprints, grease, etc., wipe with gauze slightly moistened with a 3:7 mixture of ethanol and diethyl ether or benzene.

② Never attempt to disassemble the attachment.

③ When not in use, optical elements and index plates should be stored in the case.

CONTENTS

1 ABSTRACT

The Model BH2-UCD is a highly-versatile universal condenser that can be used for advanced research applications that require a combination of different observation methods. Simply by replacing the optical elements, this attachment permits a quick changeover between brightfield, darkfield, phase contrast, Nomarski differential interference contrast, and polarizing observations in transmitted light illumination. The attachment employs a top lens swing-out system, which enables various objectives to be used, ranging from low-magnification (2x) to high-magnification (100x). When used in conjunction with a reflected light fluorescence attachment, high-contrast images can be observed.

2 STANDARD CONFIGURATIONS

1 BH2-UCD Universal Condenser

Module		Item	BH2-UCD 1	2	3	4	5	6
	BH2 Universal Condenser Main Body (w/43IF550-W45)	BH2-UCD	○	○	○	○	○	○
Optical Elements	Phase Contrast Ring Attachment for 10x Objective	BH2-URS10				○	○	○
	Phase Contrast Ring Attachment for 20x Objective	URS20						○
	Phase Contrast Ring Attachment for 40x Objective	URS40				○		○
	Phase Contrast Ring Attachment for 100x Objective	URS100					○	○
	Nomarski Prism for SPlan 10x Objective	BH2-UNP10	○	○		○		○
	Nomarski Prism for SPlan 20x Objective	UNP20	○	○		○		○
	Nomarski Prism for SPlan 40x Objective	UNP40	○	○		○		○
	Nomarski Prism for SPlan Apo 60x (oil) Objective	UNP60oil						
	Nomarski Prism for SPlan 100x or DPlan Apo100x UV. Objective	UNP100	○	○	○	○	○	○
	Nomarski Prism for DPlan Apo 10x UV. Objective	UNPD10			○		○	
	Nomarski Prism for DPlan Apo 20x UV. Objective	UNPD20			○		○	
	Nomarski Prism for DPlan Apo 40x UV. (dry) Objective	UNPD40						
	Nomarski Prism for DPlan Apo 40x UV. (oil) or DApo 40x UV. (oil) Objective	UNPD40oil			○		○	
	Darkfield Ring Attachment	BH2-UDA						○
	Nomarski DIC Intermediate Tube (for Transmitted Light)	BH2-NA	○	○		○		○
	Analyzer (for Reflected Light Fluorescence Attachment)	BH2-ANF			○		○	
	Nomarski Slider (for Reflected Light Fluorescence Attachment)	BH2-NAF			○		○	
	Centering Telescope	CT-5				○	○	○
	Objectives	SPlan 10x, 20x, 40x SPlan 100xoil	○					

★ All the elements listed above, except those marked with "○" are optional.

★ Combination "3" in the above table is for use with a reflected light attachment.

2 Optical Elements and Compatible Objectives

Optical Element		Compatible Objectives
Phase Contrast Ring Attachment	URS10	PCSPlan10x, PCDAch10x, DPlan Apo10xUV-PL
	URS20	PCSPlan20x, PCDAch20x, LWDCDPlan20xPL, ULWDCDPlan20xPL
	URS40	PCSPlan40x, PCDAch40x, *DPlan Apo20xUV-PL, LWDCDPlan40xPL, ULWDCDPlan40xPL
	URS100	PCSPlan100x (Oil), PCDAch100x (Oil), *DPlan Apo40x/100xUV-PL (Oil) *DAPO40x/100xUV-PL (Oil), SPlan Apo60xPL (Oil)
Nomarski Prism	UNP10	SPlan10x
	UNP20	SPlan20x
	UNP40	SPlan40x
	UNP60oil	SPlan Apo60x (Oil)
	UNP100	SPlan100x (Oil), DPlan Apo100x (Oil)
	UNPD10	DPlan Apo10xUV
	UNPD20	DPlan Apo20xUV, DPlan Apo20xUV (Oil)
	UNPD40	DPlan Apo40xUV (Dry)
	UNPD40oil	DPlan Apo40xUV (Oil), DAPO40x (Oil)
Darkfield Ring Attachment	UDA	SPlan10x/20x/40x, SPlan Apo10x/20x, NCSPlan40x EDAch10x/40x, DAch10x/20x/40x, DPlan10x/20x/40x DPlan50x (Oil), DPlan Apo10x/20xUV, LWDCDPlan20x/40x, ULWDCDPlan20x/40x

Note: When using optical elements combined with objectives, the magnification number indices of the objectives marked with asterisks '*' will be different from these of the elements with which being compatible to the objectives. Ensure the table above before applying these combinations.

3 SPECIFICATIONS

Item		Description
Applicable microscope		BHS, BHT (BHSU, BHTU)*1
Type		Achromatic/aplanatic condenser, top lens swing-out type
Numerical Aperture (N.A.)		0.9 (top lens IN)/0.2 (top lens OUT)
Applicable slide thickness		0.9—1.4mm
Working distance		1.5mm (with 1.2mm slide)
Illuminating area		ϕ3mm (top lens IN)/ϕ14mm (top lens OUT)
Focal length		13.1mm (top lens IN)/229mm (top lens OUT)
Turret	Upper turret	Quintuple, optical elements may be attached
	Lower turret	Twin, aperture iris diaphragm with 360° rotatable polarizer
Aperture iris diaphragm		ϕ3.1—ϕ21mm
Mounting		Detachable circular dovetail, clamped with clamping screw
Dimensions		105 (turret ϕ) × 59 (height)mm
Weight		550g (1.21 lb)

Note: *1 When the universal condenser is combined with the BHSU or BHTU microscope, Nomarski DIC microscopy is impossible.
To perform polarizing observation, the universal condenser must be combined with the B-AN analyzer (on the BHSU microscope) and with BH2-KPA intermediate tube (on the BHTU microscope).

Applicable Objective Magnifications

Magnification power		1x	2x	4x	10x	20x	40x	60x	100x
Brightfield		—	○	○	○	○	○	△*1	△*1
		Top lens out			Top lens in				
Darkfield		—	—	—	○*2	△*3	△*3	—	—
Phase Contrast		—	—	—	○*4	○	○	○*5	○
Nomarski DIC	SPlan	—	—	—	○	○	○	○*5	○
	DPlan ApoUV	—	—	—	○	○	○	—	○
Polarizing		—	△*6	○*7	○*7	○	○	—	○

Note: 1) SPlan and SPlan APO series objectives are designed for superwidefield observation.

2) For objectives used for darkfield, phase contrast and Nomarski DIC microscopy, refer to the "Optical Elements and Compatible Objectives" table on page 3.

*1 Although the numerical aperture (N.A.) of the condenser is slightly lower, it will not cause any problem during normal observation.

*2 Although slightly reduced brightness may occur at the periphery of field of view during super-widefield observation, it will not cause any problem in photomicrography. With DPlan Apo 10x UV objectives, a red flare may occur in the field of view depending on the specimen condition.

*3 Only objectives with 0.7 or lower N.A. can be used. However, DPlan 50x (oil) objective can also be used by reducing the aperture iris diaphragm opening.

*4 During super-widefield observation, a slight flare may occur at the periphery of field of view. This, however, does not cause any problem in photomicrography.

*5 Only the SPlan Apo 60x (oil) objective can be used.

*6 When polarizing observation is conducted using an SPlan FL2x objective, the contrast of the image may be lower than when using objectives with highter magnification powers.

*7 A ring-shaped flare may occur during polarizing observation using DAch 4x/10xPO objectives.

Precautions During Observation

(1) If reflected light fluorescence microscopy in the U excitation mode is performed with 10x or 20x objectives with the condenser engaged, a flare may become prominent depending on the specimen condition. If this occurs, either lower the condenser or use the light cut slide ① provided with the reflected light fluorescence attachment. (Fig. 1)

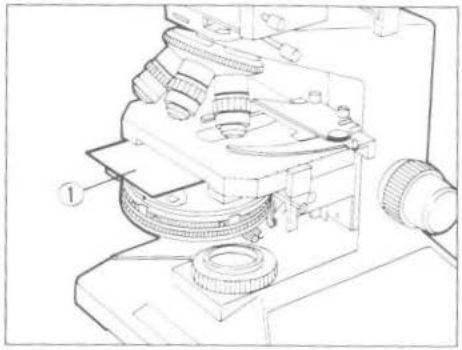


Fig. 1

(2) With the polarizer rotation knob set to the click stop (0°), the polarizer and analyzer are nearly at the "crossed Nicol" position. However, a perfect "crossed Nicol" position cannot be achieved due to errors in the mounting of the intermediate tube. With the polarizer rotation knob set to 180° (non-click) position, perform a fine adjustment.

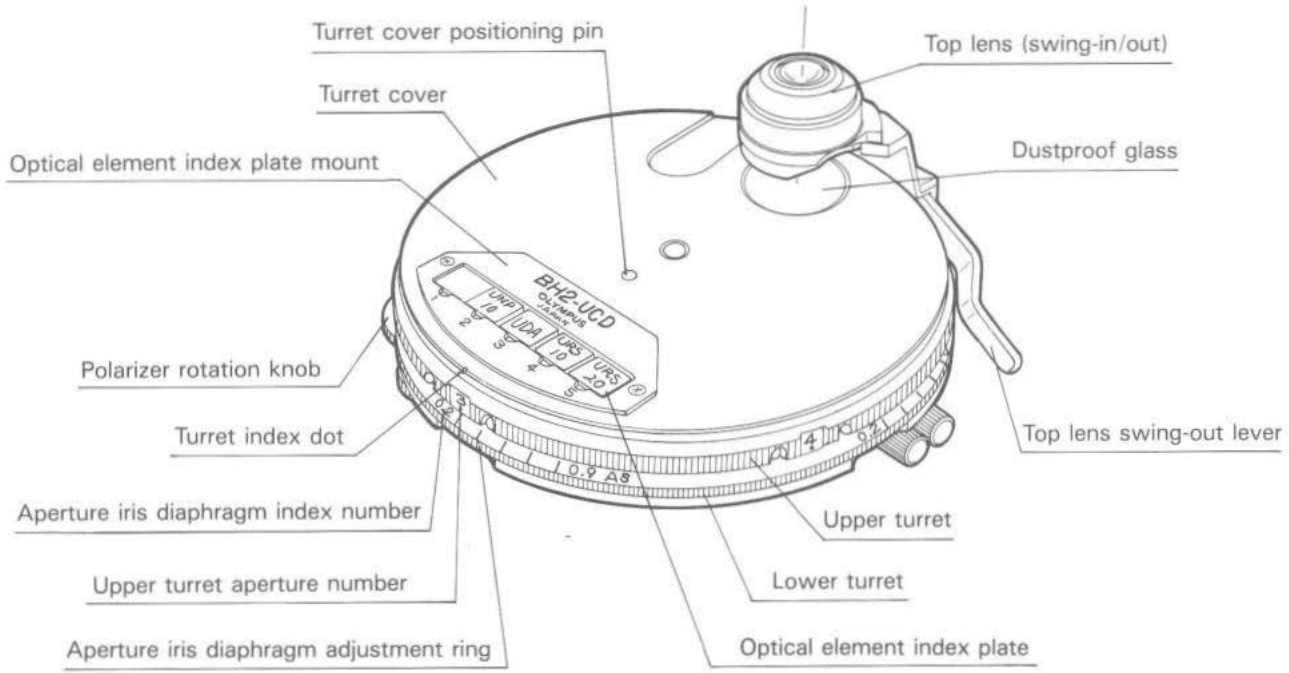
(3) When the top lens is swung out, the field of view will become obscured if the aperture iris diaphragm is stopped down.

(4) Due to its large numerical aperture (N.A.), the UNP100 Nomarski prism for 100x objectives can be used for brightfield observation. However, polarizing observation cannot be performed.

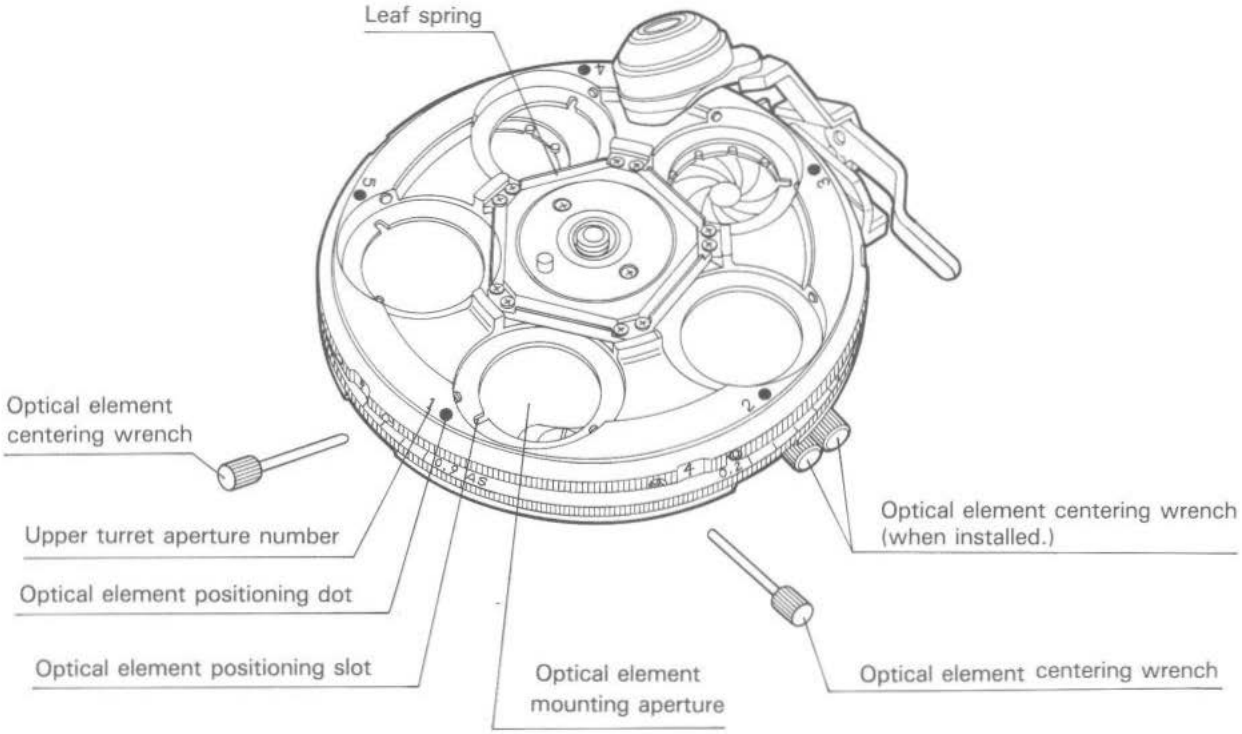
4 NOMENCLATURE

Universal Condenser Main Body

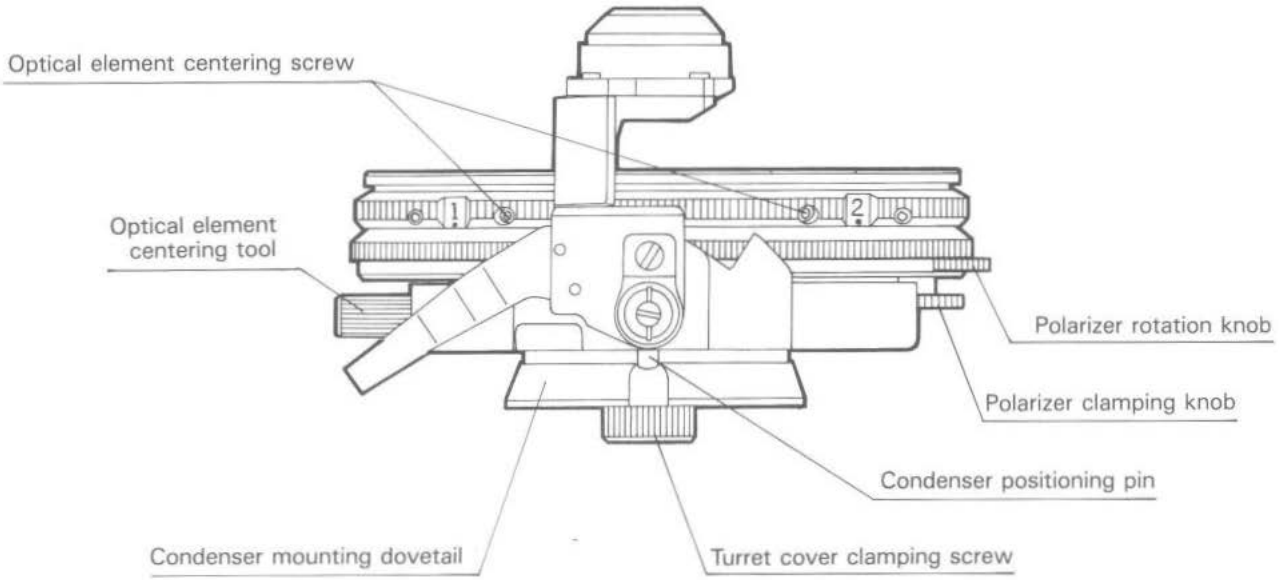
Top View (with turret cover attached)



Top View (with turret cover removed)



Side View


Optical element centering screw
Optical element centering tool
Polarizer rotation knob
Polarizer clamping knob
Condenser positioning pin
Condenser mounting dovetail
Turret cover clamping screw

Optical Elements

Darkfield Ring Attachment
(BH2-UDA)

Phase Contrast Ring Attachment
(BH2-URS100)

Nomarski Prism
(BH2-UNP100)

5 ASSEMBLY

5-1 Mounting Optical Elements

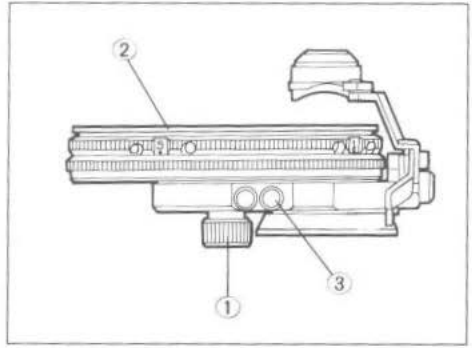


Fig. 2

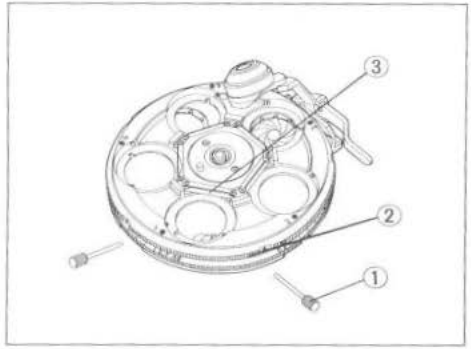


Fig. 3

1 Mounting the phase contrast ring attachment or darkfield ring attachment

(1) Loosen the turret cover clamping screw ① on the bottom of the condenser main unit and remove the turret cover ②. (Fig. 2)

★ When removing the turret cover, care should be taken to prevent damage to the top lens and the dustproof glass in the turret cover.

(2) Loosen and remove the two centering wrenches ③ from the bottom side of the condenser main unit. (Fig. 2)

(3) Use the two centering wrenches ① to loosen the two centering screws ② completely. (Fig. 3)

(4) Insert the phase contrast ring attachment or darkfield ring attachment in an aperture of the turret as far as it will go. Slightly depress the leaf spring ③ provided inside the turret with the side of ring attachment while inserting. (Figs. 3, 4)

★ Be careful not to push the ring slit plate in the frame.

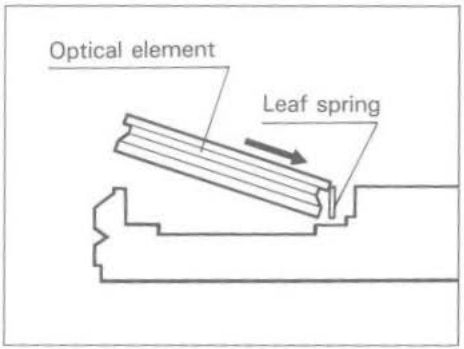


Fig. 4

(5) Tighten the centering screws slightly using the centering wrenches.
★ Do not tighten the centering wrenches excessively as this may deform the mount of the optical element.
(6) Attach the turret cover and tighten the turret cover clamping screw.

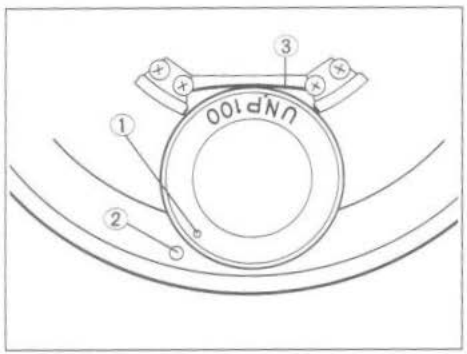


Fig. 5

2 Mounting the Nomarski Prism

(1) Follow steps (1) through (3) of section 1, above.
(2) Aligning the positioning dot ① of the Nomarski prism with the positioning dot ② of the turret aperture, insert the Nomarski prism in the turret aperture, as far as it will go, so that the positioning pin of the Nomarski prism is inserted into the pin hole correctly.
Slightly depress the leaf spring ③ inside the turret with the side of Nomarski prism, during insertion. (Figs. 4, 5)
★ Never touch the prism inside the mount.
(3) Follow steps (5) and (6) of section 1, above.

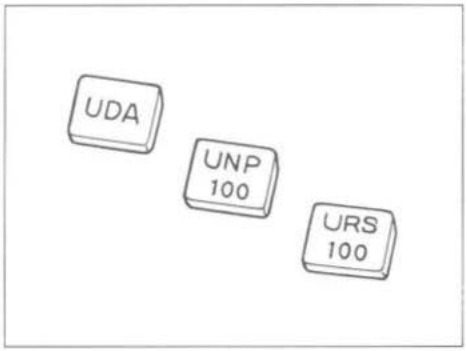


Fig. 6

3 Attaching the Optical Element Index Plate

(1) Remove the optical element index plate provided with each optical element from the case. (Fig. 6)

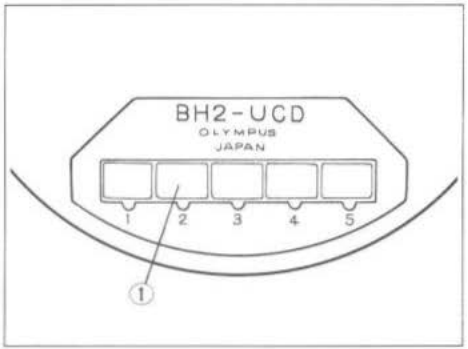


Fig. 7

(2) Attach the index plates for the optical elements into the turret below each turret aperture number on the optical element index mount ① on the top surface of the turret cover. (Fig. 7)
Attach up to 5 magnetized index plates to the spaces provided on the top surface of the turret cover.

Note: The numbers engraved on the periphery of the turret should match the contrast method and magnification powers of the specific objectives in the light path and their respective index plates.

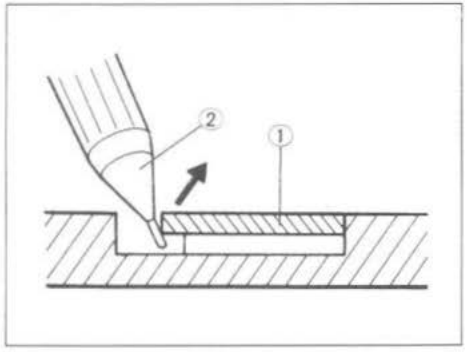


Fig. 8

(3) To remove an optical element index plate ①, use the tip of a mechanical pencil ② or other sharp-tipped tool. (Fig. 8)

5-2 Attaching the Universal Condenser

Also refer to the instruction manual for the microscope in use. Attach the universal condenser to the microscope stand in accordance with the following procedure:

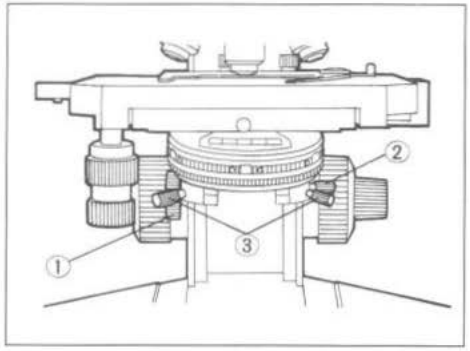


Fig. 9

(1) Lower the condenser holder all the way down by rotating the substage control knob ① on the microscope. (Fig. 9)
(2) Loosen the clamping knob ② on the right side of the condenser holder. (Fig. 9)
(3) Swing out the top lens of the condenser. (Fig. 9)
(4) Insert the condenser in the mounting dovetail of the condenser holder, and press horizontally until the positioning pin of the condenser is engaged in the positioning groove of the mounting dovetail.
(5) Tighten the clamping knob ② on the right side of the condenser holder. (Fig. 9)
(6) Raise the condenser holder by rotating the condenser control knob ①.

5-3 Centering the Universal Condenser

Also refer to the instruction manual for the microscope in use. Center the condenser in accordance with the following procedure:

(1) Rotate the upper turret until the universal condenser is in the brightfield observation mode.
(Engage any empty turret aperture or the Nomarski prism (BH2-UNP100) for SPlan 100x objectives.)
(2) Rotate the lower turret counterclockwise to disengage the polarizer from the light path.
(3) Swing the top lens into the light path.
(4) Rotate the aperture iris diaphragm adjustment ring clockwise to open the aperture iris diaphragm.
(5) Fully open the field iris diaphragm of the microscope.
(6) Place the specimen on the stage, rotate the revolving nosepiece to swing in the 10x objective, and bring the specimen into focus.
(7) Reduce the field iris diaphragm opening of the microscope stand.
(8) Looking through the eyepiece, move the condenser up and down to bring the reduced image into focus.

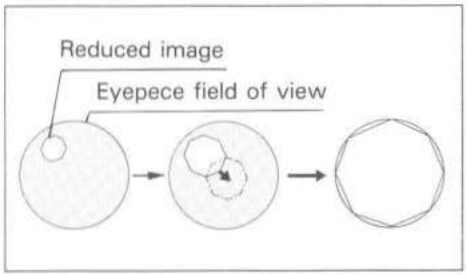


Fig. 10

(9) Gradually opening the field iris diaphragm, bring the reduced image into the center of the eyepiece field of view, by adjusting the condenser centering knobs ③ (Fig. 9) of the microscope body. (The reduced polygonal image of the diaphragm should become inscribed in the circle which indicates the field of view.) (Fig. 10)
(10) After the centering is completed, continue to open the field diaphragm slightly until its image circumscribes the field of view.

6 VARIOUS MICROSCOPY PROCEDURES

6-1 Brightfield Observation

(1) Rotate the upper turret until the universal condenser is in the brightfield observation mode.
(Engage any empty turret aperture or the Nomarski prism (BH2-UNP100) for SPlan 100x objectives.)
(2) Rotate the lower turret counterclockwise to disengage the polarizer from the light path.
(3) Mount the objective to be used in the revolving nosepiece and rotate the nosepiece to swing the objective in place.
(4) Place the specimen on the stage.
(5) Move the stage up and down to bring the specimen into focus.
(6) Reduce the field iris diaphragm opening until its image circumscribes the field of view.
(7) Adjust the aperture iris diaphragm as needed.

★ If the slide glass is thicker than 1.4mm, the image of the field diaphragm may remain fuzzy. When performing photomicrography, use a slide glass with a thickness of 0.9 through 1.2mm whenever possible.

Field iris diaphragm

● The field iris diaphragm controls the illuminated area. By stopping down the field iris diaphragm, depending on the objective in use, until its image circumscribes the field of view, stray light can be reduced, which in turn increases the definition and contrast of the image.

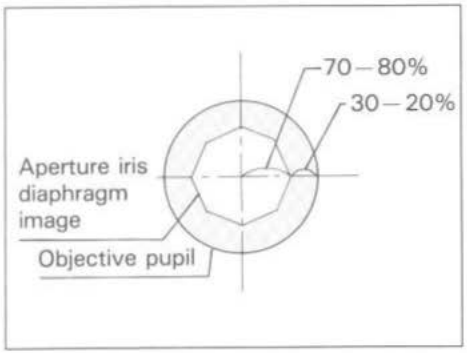


Fig. 11

Aperture iris diaphragm

- The aperture iris diaphragm controls the numerical aperture (N.A.) of the illuminator. In order to achieve the optimum objective performance, the opening of the aperture iris diaphragm should be matched with the N.A. of the objective in use. This will result in better image contrast and resolution as well as increased depth of focus.
- As microscopic specimens are usually low in contrast, reducing the diaphragm opening to 70—80% of the objective N.A. will generally provide an image of acceptable quality. After completing focus adjustment, remove one of the eyepieces from the eyepiece sleeve and look into the empty eyepiece tube. As you stop down the aperture iris diaphragm, the iris diaphragm can be seen in the objective exit pupil. (Fig. 11)

(8) When low-magnification power (2x—4x) objectives are in use, swing out the top lens from the light path. The field iris diaphragm image will not be formed. If the aperture iris diaphragm opening is reduced, the field of view may become obscured. If this is the case, rotate the aperture iris diaphragm adjustment ring clockwise to fully open the aperture iris diaphragm. The effect of reducing the aperture iris diaphragm can be attained by stopping down the field iris diaphragm of the microscope stand.

6-2 Darkfield Observation

(1) Rotate the upper turret to engage the darkfield ring attachment (BH2-UDA).
(2) Rotate the lower turret counterclockwise to disengage the polarizer from light path.
(3) Mount the objective to be used in the revolving nosepiece and rotate the revolving nosepiece to swing in the objective.
(4) Rotate the aperture iris diaphragm adjustment ring clockwise to fully open the aperture iris diaphragm.
(5) Place the specimen on the stage and move the stage up and down to bring the specimen into focus.
(6) Remove an eyepiece from the eyepiece sleeve, and look at the objective pupil. Center the darkfield ring attachment using the centering wrenches ①, as shown in Fig. 3.
(7) Insert the eyepiece into the eyepiece sleeve and look at the darkfield image. Repeat centering until the quality of darkfield image is maximized.
(8) Move the condenser up and down until a uniform darkfield illumination is attained.
(9) Open the field iris diaphragm to the extent that even brightness is attained.

★ **Keep eyes away from the eyepieces while changing the objective during darkfield observation, or changing from darkfield mode to another observation mode.**

6-3 Phase Contrast Observation

(1) Rotate the upper turret to engage the phase contrast ring attachment (BH2-URS10/20/40/100) that matches the objective in use.
(2) Rotate the lower turret counterclockwise to disengage the polarizer from the light path.
(3) Mount the phase contrast objective to be used in the revolving nosepiece and rotate the revolving nosepiece to swing in the objective.
(4) Rotate the aperture iris diaphragm adjustment ring clockwise to fully open the aperture iris diaphragm.
(5) Place the specimen on the stage and move the stage up and down to bring the specimen into focus.
(6) Remove the eyepiece from the eyepiece sleeve and replace with the centering telescope (CT).
(7) Rotate the upper section of the centering telescope (CT) and bring the bright ring (condenser ring slit) and dark ring (objective phase plate) into focus.

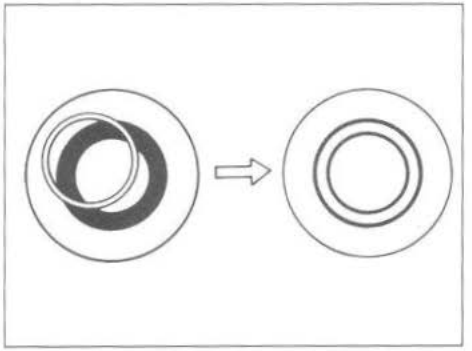


Fig. 12

(8) Use the centering wrenches ①, as shown in Fig. 3, to center the phase contrast ring attachment so that the bright ring overlaps the dark ring within the field of view. (Fig. 12)
★ **Although a multiple number of ring slit images may appear, select the brightest ring to overlap with the phase contrast plate.**
(9) Repeat steps (7) and (8), above, for each objective of different magnification.
(10) Remove the centering telescope (CT) and replace it with the eyepiece.
(11) Widen the field iris diaphragm opening until the diaphragm image circumscribes the field of view.
(12) Insert the green interference filter (45-IF550) into the filter mount at the light exit on the microscope base if increased contrast is required.

6-4 Polarized Light Observation

To perform polarized light observation, the analyzer should be inserted into the light path. Either insert the analyzer (B-AN) into the analyzer insertion port on the frame or combine the universal condenser with the intermediate tube into which the analyzer can be inserted. (BH2-KPA, BH2-PA or BH2-RFC + BH2-BF + BH2-ANF combination)

★ When the universal condenser is mounted on the BHSU microscope stand, it is only possible to combine with the analyzer (B-AN); and when mounted on the BHTU microscope stand, combination with the intermediate tube (BH2-KPA) only is possible.

Insert the analyzer into the light path, before following the steps below:

(1) Rotate the upper turret to engage the empty aperture.
(2) Rotate the lower turret clockwise to insert the polarizer into light path.
(3) Mount the objective to be used in the revolving nosepiece, and rotate the revolving nosepiece to swing in the objective.
(4) With an intermediate tube that allows the analyzer to rotate, set the analyzer rotation dial to the "0" position. (With an intermediate tube with fixed analyzer the analyzer is always set at "0".
(5) Rotate the polarizer rotation knob to achieve a black field.

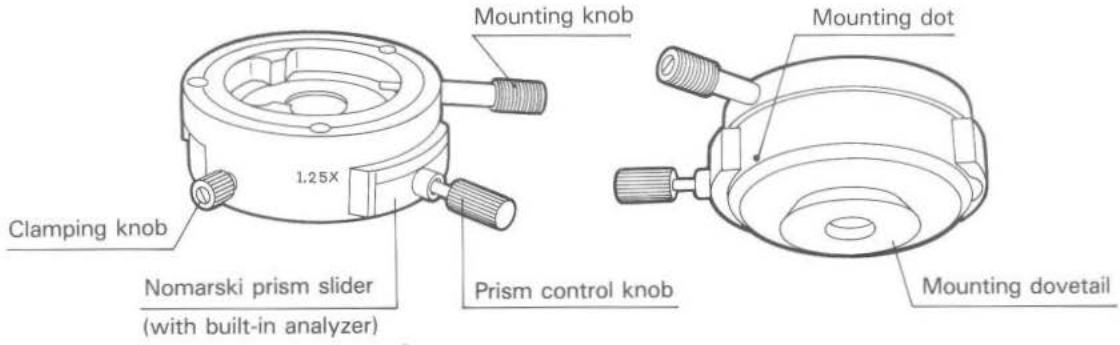
★ When the polarizer is rotated to the click stop, the perfect "crossed filter" position may not be attained due to an intermediate tube mounting error. To avoid this, a "crossed filter" position adjustment should be carried out with the polarizer rotated to a non-click position (around 180°).

(6) Place the specimen on the stage and move the stage up and down to bring the specimen into focus.
(7) Adjust the field iris diaphragm opening until it circumscribes the field of view.
(8) Stopping down the aperture iris diaphragm appropriately may increase the contrast of the image.

6-5 Nomarski Differential Interference Contrast Observation

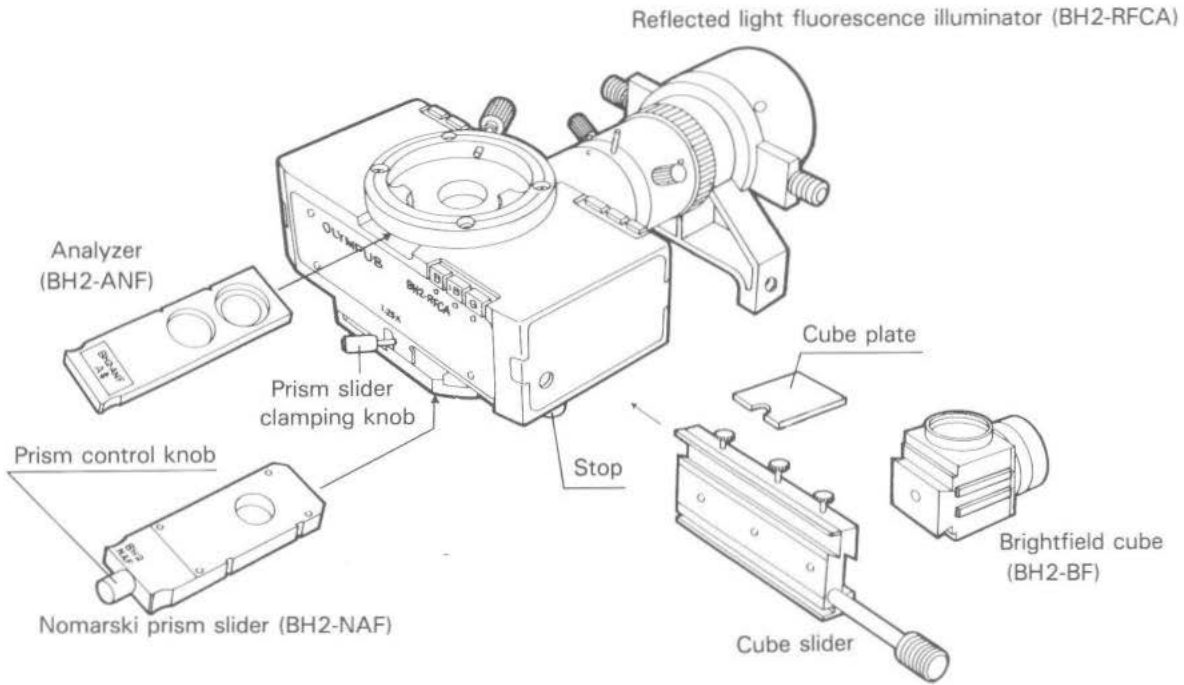
To perform Nomarski differential interference contrast observation, the Nomarski DIC intermediate tube for transmitted light (BH2-NA) is needed. In addition, to perform Nomarski DIC observation in conjunction with reflected light fluorescence observation, the reflected light fluorescence illuminator (BH2RFCA), brightfield cube (BH2-BF), Nomarski prism slider (BH2-NAF) and analyzer (BH2-ANF) are needed.
Make sure that intermediate tube (A) or (B) is mounted, and perform the steps as follows.

A. Nomarski DIC Intermediate Tube for Transmitted Light (BH2-NA)



★ Because the analyzer is combined with the Nomarski prism, it is not possible to insert the analyzer alone into light path.

B. Transmitted Light Nomarski DIC Combination and Reflected Light Fluorescence Illuminator (BH2-RFCA + BH2-BF + BH2-NAF + BH2-ANF)



★ For further details concerning the reflected light fluorescence illuminator, refer to the instruction manual provided with the BH2-RFC reflected light fluorescence attachment.

(1) Adjust the polarizer in accordance with the following procedure:

1) Move the Nomarski prism slider into the intermediate tube, and tighten the clamping knob. When the reflected light fluorescence illuminator (BH2-RFCA) is in use, insert both the Nomarski prism slider (BH2-NAF) and analyzer (BH2-ANF) into the slot.

2) Rotate the upper condenser turret and engage the empty turret aperture.

3) Rotate the prism control knob of the Nomarski prism slider clockwise as far as it will go.

4) Rotate the lower condenser turret clockwise to insert the polarizer into the light path.

5) Rotate the revolving nosepiece to swing in the 10x objective, bring the specimen into approximate focus and replace the eyepiece with the centering telescope (CT).

6) Rotate the upper section of the centering telescope (CT) and bring the objective pupil into focus.

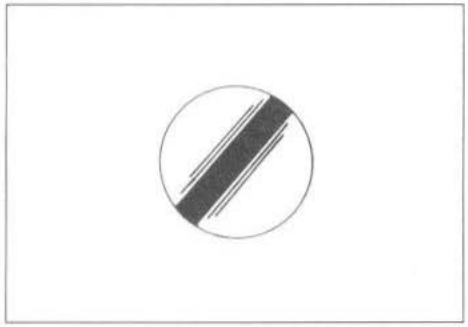


Fig. 13

7) As you rotate the polarizer rotation knob while looking at the objective pupil through the centering telescope (CT), a black fringe may appear at a certain position. The polarizer should be rotated to the position where this black fringe is best defined. (Fig. 13)

★ When the polarizer is set to the click stop, the perfect "crossed filter" position may not be attained due to an intermediate tube mounting error. To avoid this, the "crossed filter" position adjustment should be carried out with the polarizer rotated to non-click position (around 180°).

★ **If two black fringes appear, rotate the polarizer approximately 90° so that only one black fringe is visible.**

8) Once the position of the polarizer is determined, turn the clamping knob to clamp the polarizer.

(2) Rotate the upper condenser turret and engage the Nomarski prism that matches the objective in use.

(3) Rotate the revolving nosepiece to swing in the objective in use.

(4) Place the specimen on the stage and move the stage up and down to bring the specimen into focus.

(5) Adjust the field iris diaphragm until the diaphragm opening circumscribes the field of view.

(6) Stopping down the aperture iris diaphragm somewhat may increase the contrast.

(7) Rotate the prism control knob of the Nomarski prism slider to adjust the interference color of the background, and to achieve the maximum contrast depending on the specimen under observation, as discussed below:

1) Rotating the prism control knob of the slider will continuously change the interference color of the background from black to magenta (0—530nm).
   - If the background color is black, darkfield-like contrast can be made.
   - If the background color is changed from black to gray, a three-dimensional image with maximum contrast with gray sensitivity can be obtained.
   - If the background color is magenta, even a minor optical retardation can be observed as a color change.

★ **Care should be taken to keep the specimen surface clean, as even a small amounts of contamination on the surface may show up due to the exceptionally high sensitivity of the differential interference contrast method.**

2) As differential interference contrast exhibits directional sensitivity, the use of a rotatable stage is recommended.

7 TROUBLESHOOTING GUIDE

If you are unfamiliar with any aspects in the use of this model or feel that its performance is less than 100%, check the items on the following list.

Trouble	Cause	Remedy
a. Stopped down field iris diaphragm image does not appear when 10x—100x objectives are in use.	Slide glass is too thick.	Use slide glasses measuring 1.4mm or less.
	Top lens is swung out.	Swing the top lens into the light path.
b. Image glares and resolution is low under brightfield illumination.	Aperture iris diaphragm is stopped down excessively.	Open the diaphragm to proper diameter.
	Top lens is swung out.	Swing the top lens into the light path when the 10x—100x objectives are in use.
	An optical element other than the BH2-UNP100 is inserted into the light path.	Engage the BH2-UNP100 or empty aperture by rotating the upper turret.
c. Ring slit does not align with the phase plate of objective.	An incorrect optical element is inserted into the light path.	Engage the optical element that matches the objective in use by rotating the upper turret.
	An incorrect objective is inserted into the light path.	Insert the correct objective into the light path.

Trouble	Cause	Remedy
d. The darkfield contrast performance is inadequate.	Top lens is swung out.	Swing the top lens into light path.
	Aperture iris diaphragm is stopped down.	Open the aperture iris diaphragm.
	An incorrect optical element is inserted in the light path.	Engage the darkfield ring attachment.
	Incorrect objective is used.	Refer to the "Optical Elements and Compatible Objectives" Table on page 3.
	Darkfield ring attachment is not centered correctly.	Center the darkfield ring attachment correctly.
e. Polarizing light method performance is insufficient.	Polarizer is not inserted into light path.	Insert the polarizer into light path.
	Analyzer is not inserted into light path.	Insert the analyzer into light path.
	An optical element is engaged.	Engage the empty aperture by rotating the upper turret.
	Aperture iris diaphragm is opened.	Either close the aperture iris diaphragm appropriately or swing out the top lens.

Trouble	Cause	Remedy
f. No interference color appears during Nomarski DIC observation.	Polarizer is not inserted into light path.	Insert the polarizer into light path.
	Analyzer is not inserted into light path.	Insert the analyzer into light path.
	Nomarski prism is not inserted into light path.	Engage the Nomarski prism by rotating the upper turret.
	Nomarski slider is not inserted into light path.	Insert the Nomarski slider into light path.
	Polarizer and analyzer are not in "crossed filter" position.	Readjust the polarizer.
g. Interference color appears during Nomarski DIC observation but color is uneven.	Vertical positioning of the condenser is incorrect.	Slightly raise or lower the condenser.
	An incorrect optical element is inserted into light path.	Engage the optical element that matches the objective in use by rotating the upper turret.
	An incorrect objective is used.	Refer to the "Optical Elements and Compatible Objectives" Table on page 3.
	Intermediate tube is mounted incorrectly.	Mount the intermediate tube correctly.

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