
BH2-UMA

Universal Vertical Illuminator

Instruction Manual

OLYMPUS CORPORATION

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PREFACE

As this instruction manual describes the operation of the BH2-UMA Universal Vertical Illuminator attachment only, it is recommended that the user read the instruction manuals for the microscope being used as well, in order to obtain optimum performance from the integrated use of these instruments.

PRECAUTIONS

Observe the Following Points Carefully

- 1. Always handle this attachment with as much care as you would a microscope. Handle it carefully and avoid subjecting it to sudden or severe impact.**
 - 2. When replacing the bulb or the fuse, be sure to unplug the power cord first.**
 - 3. Do not use organic solvents such as xylene, ether, or alcohol to clean the microscope components. If components are heavily soiled, wipe with a cloth moistened with neutral detergent.**
 - 4. To clean the half-mirror units (e. g. reflecting surfaces of the mirrors), blow with a hand blower. If the dust cannot be removed by blowing, contact Olympus repair service or your authorized local agent.**
 - 5. Make sure that no dirt, fingerprints, etc. are left on the bulb surface. If it is stained, wipe the bulb surface clean with a small amount of an alcohol-ether mixture or benzine.**
 - 6. While the BH2-UMA and the microscope are not in use, be sure to store it under a dust cover, away from moisture and humidity.**
-

I. STANDARD CONFIGURATIONS

A. UNIVERSAL (BF/DF/POL/FLUOR/DIC) VERSION

Unit

Universal vertical illuminator	BH2-UMA
Brightfield half-mirror unit	BH2-UBF
Brightfield half-mirror unit with NDO5 filter	BH2-UBFL
Darkfield half-mirror unit	BH2-UDF
Blue fluorescence half-mirror unit	BH2-UDMB
Green fluorescence half-mirror unit	BH2-UDMG
Violet fluorescence half-mirror unit	BH2-UDMV
ND filter slider, including ND 12 filter	BH2-UND
Tint plate, including ND 12 filter	BH2-UTP 530
Polarizer	BH2-UPO
Analyzer	BH2-UAN
Light balancing daylight filter	20LBD3-W
Halogen lamp housing (with halogen collector lens)	BH2-ULSH80
Halogen bulb	12V 50W HAL
Transformer *	BH2-TGH
Fluorescence supplementary unit:	BH2-URF
Supplementary exciter slider	BH2-UFF
Fluorescence collector lens	BH2-UL
Supporting block	BH2-UA
UV protective shield	BH2-UCCV
Extension tube **	BH2-UET
Mercury lamp housing	BH2-LSRF
Mercury lamp	USH 10ZD
Power supply unit	BH2-RFL
Centering screen	BH2-SGRF
Nomarski prism attachments:	
Nomarski 5X	U-NIC5-N
Nomarski 10X	U-NIC10-N
Nomarski 20X	U-NIC20-N
Nomarski 50X	U-NIC50-N
Nomarski 100X	U-NIC100-N

Universal objectives:

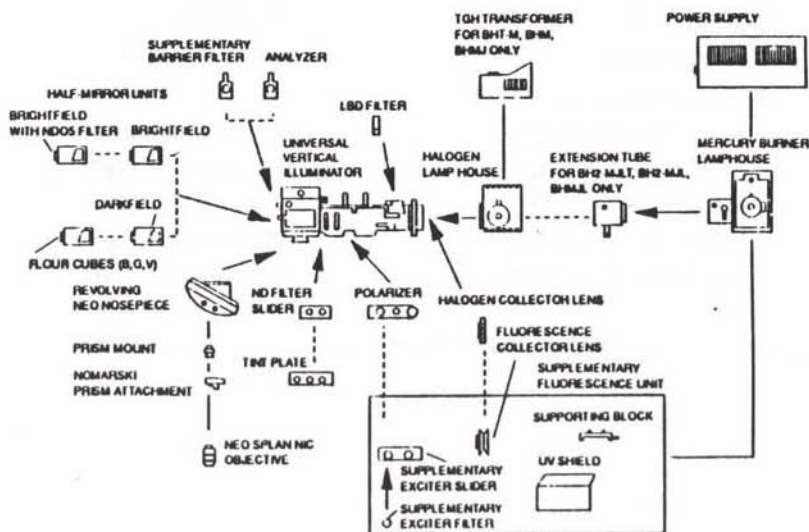
Neo S Plan 5X NIC
 Neo S Plan 10X NIC
 Neo S Plan 20X NIC
 Neo S Plan 50X NIC
 Neo S Plan 100X NIC

NEOSPL5X-NIC
 NEOSPL10X-NIC
 NEOSPL20X-NIC
 NEOSPL50X-NIC
 NEOSPL100X-NIC

*Required for BHT-M, BHM, BHMJ, only.

**For use with the BH2-MJLT, BH2-MJL, BHMJL.

**BH2-UMA UNIVERSAL VERTICAL ILLUMINATOR-
 BF/DF/POL/FLOUR/DIC Version**



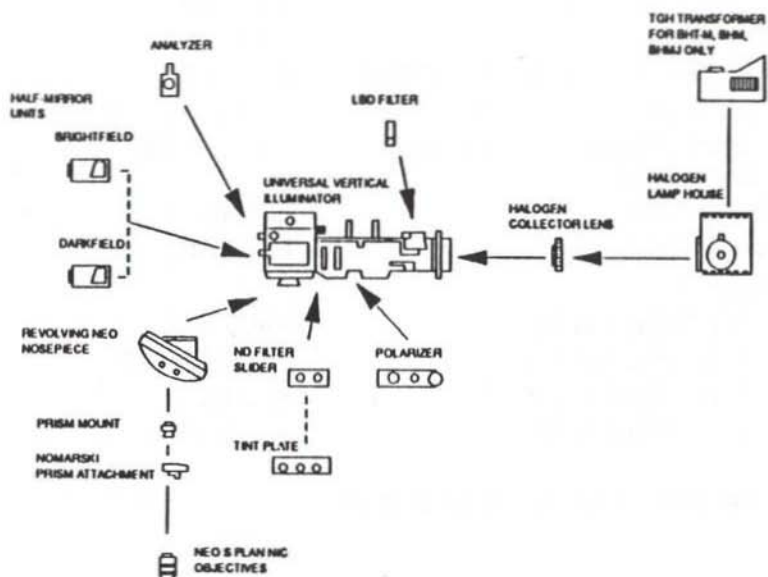
B. BRIGHTFIELD/DARKFIELD/DIC/POL VERSION

Unit

Universal vertical illuminator	BH2-UMA
Brightfield half-mirror unit	BH2-UBF
Darkfield half-mirror unit	BH2-UDF
ND filter slider, including ND 12 filter	BH2-UND
Tint plate, including ND 12 filter	BH2-UTP530
Polarizer	BH2-UPO
Analyzer	BH2-UAN
Light balancing daylight filter	20LBD3-W
Halogen lamp housing(with halogen collector lens)	BH2-ULSH80
Halogen bulb	12V 50W HAL
Transformer *	BH2-TGH
Nomarski prism attachments:	
Nomarski 5X	U-NIC5-N
Nomarski 10X	U-NIC10-N
Nomarski 20X	U-NIC20-N
Nomarski 50X	U-NIC50-N
Nomarski 100X	U-NIC100-N
Universal objectives:	
Neo S Plan 5X NIC	NEOSPL5X-NIC
Neo S Plan 10X NIC	NEOSPL10X-NIC
Neo S Plan 20X NIC	NEOSPL20X-NIC
Neo S Plan 50X NIC	NEOSPL50X-NIC
Neo S Plan 100X NIC	NEOSPL100X-NIC

*Required for BHT-M, BHM, BHMJ only.

BH2-UMA UNIVERSAL VERTICAL ILLUMINATOR BF/DF/DIC/POL Version



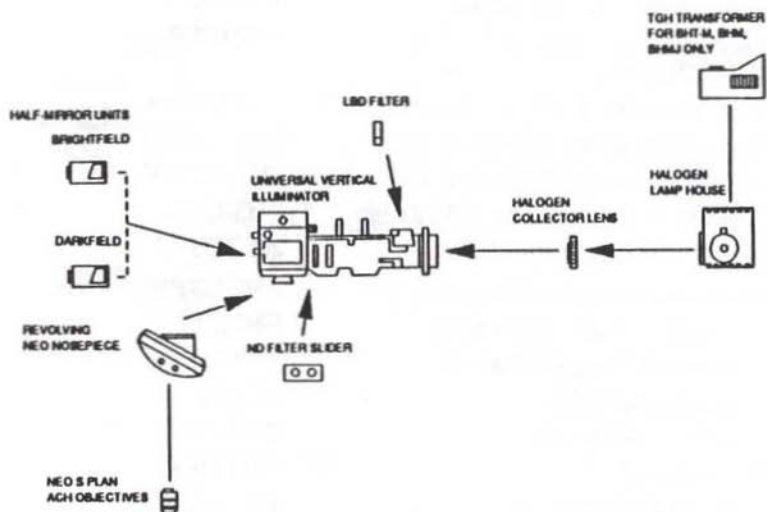
C. BRIGHTFIELD/DARKFIELD VERSION

Unit

Universal vertical illuminator	BH2-UMA
Brightfield half-mirror unit	BH2-UBF
Darkfield half-mirror unit	BH2-UDF
ND filter slider, including ND 12 filter	BH2-UND
Light balancing daylight filter	20LBD3-W
Halogen lamp housing (with halogen collector lens)	BH2-ULSH80
Halogen bulb	12V 50W HAL
Transformer *	BH2-TGH
Objectives:	
Neo S Plan Ach 5X	NEOSPL5X
Neo S Plan Ach 10X - T	NEOSPL10X-T
Neo S Plan Ach 20X - T	NEOSPL20X-T
Neo S Plan Ach 50X	NEOSPL50X

*Required for BHT-M, BHM, BHMJ only.

BH2-UMA UNIVERSAL VERTICAL ILLUMINATOR BF/DF Version



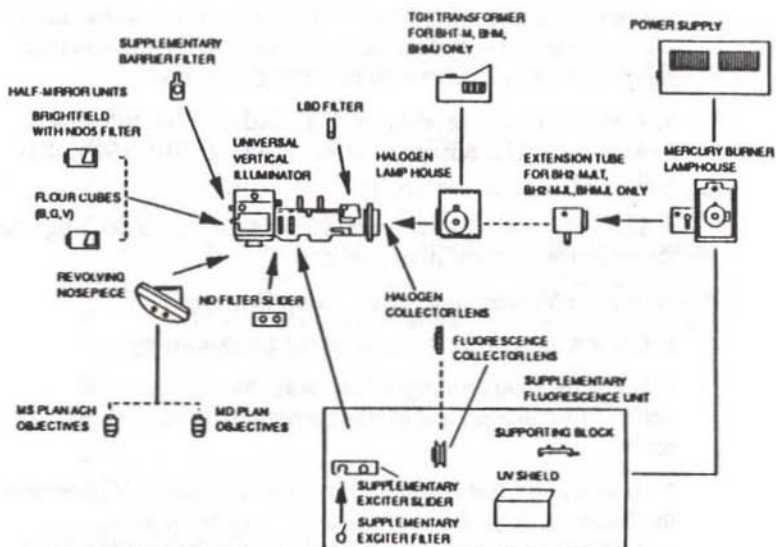
D. BRIGHTFIELD/FLUORESCENCE VERSION

Unit

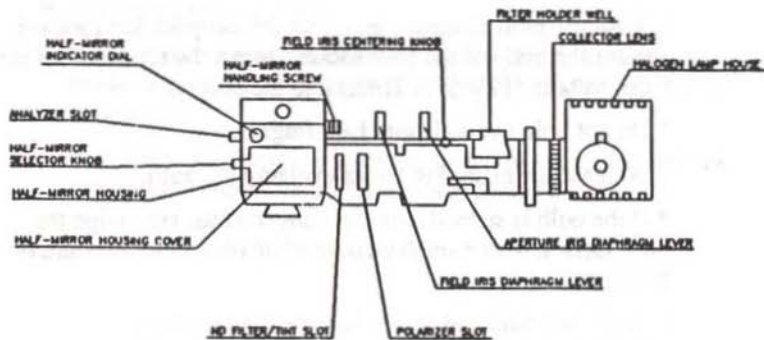
Universal vertical illuminator	BH2-UMA
Brightfield half-mirror unit with NDO5 filter	BH2-UBFL
Blue fluorescence half-mirror unit	BH2-UDMB
Green fluorescence half-mirror unit	BH2-UDMG
Violet fluorescence half-mirror unit	BH2-UDMV
ND filter slider, including ND 12 filter	BH2-UND
Light balancing daylight filter	20LBD3-W
Fluorescence supplementary unit:	BH2-URF
Supplementary exciter slider	BH2-UFF
Fluorescence collector lens	B2-ULA
Supporting block	B2-UA
UV protective shield	B2-UCCV
Extension tube *	BH2-UET
Mercury lamp housing	BH2-LSRF
Mercury lamp	USH10ZD
Power supply unit	BH2-RFL
Centering screen	BH2-SGRF
Objectives:	
MS Plan Ach 5X	MSPL5X
MS Plan Ach 10X-T	MSPL10X-T
MS Plan Ach 20X-T	MSPL20X-T
MS Plan Ach 50X	MSPL50X
MS Plan Ach 100X	MSPL100X
or,	
MD Plan Ach 5X	MDPL5X
MD Plan Ach 10X	MDPL10X
MD Plan Ach 20X	MDPL20X
MD Plan Ach 50X	MDPL50X
MD Plan Ach 80X	MDPL80X

* For use with the BH2-MJLT, BH2-MJL, BHMJL

BH2-UMA UNIVERSAL VERTICAL ILLUMINATOR BF/FLUOR Version



II. Identification of Components BH2-UMA UNIVERSAL VERTICAL ILLUMINATOR



III. ASSEMBLY

A. GENERAL

1. Mounting the Universal Vertical Illuminator

- a. Loosen the clamping screw on the microscope frame and fit the universal vertical illuminator in place on the microscope stand, and clamp firmly with the clamping screw.
- b. Turn the revolving nosepiece by hand to make sure that it moves freely. Use nosepiece motor switch on BH2-MJL, BH-MJL.
- c. Screw the collector lens supplied with the lamp housing into the universal vertical illuminator.

2. Mounting the Vertical Illuminator Lamp Housing

- a. Loosen the clamping screw on the lamp housing.
- b. Insert the lamp housing all the way into the universal vertical illuminator, and firmly clamp with the clamping screw.

* To attach the 100W mercury lamp house to the "V" groove of the fluorescence collector lens, or the extension tube, depending on the microscope used, tighten the two mounting screws on the LSRF Mercury Lamp House.

3. Mounting the Bulb

A. FOR THE HALOGEN LAMP

- a. Be sure to turn off the ON-OFF switch of the transformer.
- b. Remove the socket and cord assembly from the lamp housing.
- c. Push the bulb clamping levers on the lamp socket forward, against the body of the bulb socket. Insert the terminals of the halogen bulb (12V 50W HAL) into the socket.
* Do not hold the bulb with bare fingers.
- d. Release the clamping levers to clamp the bulb.
* If the bulb is stained with dirt, fingerprints, etc., wipe the bulb surface with a small amount of alcohol-ether mixture or benzine.
- e. Insert the bulb and socket into the halogen lamp housing and tighten the locking screw.

B. For the Mercury Burner

* Always switch off the power supply unit prior to mercury burner replacement. Replace the burner after about 200 working hours.

- a. Be sure to turn off the power supply switch.
- b. Remove the burner socket assembly from the lamp housing.
- c. Insert the burner with its lower electrode (marked "+") into the bottom terminal and tighten the clamping screws securely.

* Ascertain that no dirt, fingerprints, etc. are left on the burner surface, and when installing, be careful not to touch the quartz glass portion. If the burner is stained, wipe its surface clean with a small amount of alcohol-ether mixture or benzine.

- d. Attach the connecting wire to the top pole of the bulb and tighten the locking screws.
- e. Insert the burner and socket into the mercury lamp housing and tighten with the locking screw.

* Prior to fuse replacement in the power supply unit, disconnect the power cord from the AC outlet.

4. Mounting the Bulb Socket

A. For the Halogen Lamp

- a. Loosen the bulb socket clamping screw on the bulb socket in advance.
- b. Insert the socket, with the locating groove in the lamp housing aligned with the clamping screw.
- c. Tighten clamping screw to fix bulb socket in place.

B. For the Mercury Burner

- a. Insert the socket into the lamp housing by first setting the hooks at the base of the socket, which acts as a hinge, into the lamp house.
- b. Tighten the clamping screw at the top of the socket into the side of the lamp house to fix the bulb socket in place.

5. Connecting the Universal Illuminator Bulb Socket Cord

A. For the Halogen Lamp

a. Plug in the halogen lamp bulb socket cord into the connector on the rear of the microscope stand.

* If a separate transformer is used, plug the lamp bulb socket cord into the 12V 50W transformer and plug the transformer cord into the mains.

B. For the Mercury Burner

a. Plug in the mercury burner socket cord into the connector on the rear of the mercury power supply unit.

b. Plug the mercury burner power supply cord into the mains.

B. UNIVERSAL VERSION (BF/DF/POL/FLUOR/DIC) OR BF/DF/DIC/POL VERSION

1. Inserting the Half-Mirror Unit

a. Remove the half-mirror housing cover plates on the right and left sides of the universal illuminator.

* The covers are kept in place by magnets. Be careful not to lose them.

b. Unscrew the half-mirror unit handling screw from the universal illuminator housing and screw it into the desired half-mirror unit.

<u>Cube</u>	<u>Observation Technique</u>
Brightfield (BH2-UBF)	Brightfield, Polarized, DIC
Brightfield (BH2-UBFL)	Brightfield, (use with mercury burner)
Darkfield (BH2-UDF)	Darkfield
Blue (BH2-UDMB)	Blue Fluorescence
Green (BH2-UDMG)	Green Fluorescence
Violet (BH2-UDMV)	Violet Fluorescence

c. Holding the handling screw, carefully slide the half-mirror unit into the universal illuminator until it clicks.

* The half-mirror unit can be inserted from either side of the universal illuminator.

* At the clicking position, the half-mirror unit is flush with the side of the half-mirror housing.

d. If desired, insert a second half-mirror unit into the universal illuminator in the same manner, from the opposite side.

e. Unscrew the handling screw from the half-mirror and return it to its socket on the top of the universal illuminator.

f. Re-attach the half-mirror housing cover plates.

g. Rotate the half-mirror indicator dials to the code (BF, DF, B, G, or V) corresponding to the half-mirror units inserted.

* When the brightfield half-mirror unit is inserted on the right side, set the left indicator dial to BF, etc.

2. Inserting the Polarizer

A. For Reflected Light Nomarski DIC Observation

a. Insert the polarizer slider with the NIC mark facing forward, into the polarizer slot of the universal illuminator, from the left side, until the polarizer is in the light path.

B. For Reflected Light Simple Polarizing Observation

a. Insert the polarizer slider into the polarizer slot of the universal illuminator as above, with the "PO" mark facing forward.

3. Inserting the Analyzer

a. Insert the analyzer slider, with the inscription "A" on top, into the analyzer slot on the front of the universal illuminator.

4. Inserting the Tint Plate

a. Insert the tint plate slider into the ND filter/tint plate slot of the universal illuminator.

* Insert the tint plate slider so as to engage the empty hole in the light path.

5. Mounting the Nomarski Prism Ring Adapters

a. Loosen the prism clamping screw of the Nomarski prisms with an Allen wrench, and remove the Nomarski ring adapters from the Nomarski prism attachment.

b. With the supplied screwdriver, firmly screw the Nomarski prism mounts into the revolving nosepiece.

6. Mounting the Nomarski Prism Attachments on the Detached Nosepiece

a. Mount the Nomarski prisms by inserting them over the circular dovetail guides of the Nomarski ring adapters, one by one in ascending order of magnification, in clockwise direction, and then tighten the prism clamping screws firmly with the Allen wrench.

* To simplify the mounting of the Nomarski prisms, fully clamp the prisms only after all of the prisms have been mounted on the nosepiece.

7. Mounting the Objectives

a. Screw the objectives firmly into the threads of the Nomarski prisms, according to corresponding magnification power.

8. Mounting the Revolving Nosepiece

a. Lower the stage by turning the coarse focus adjustment knob.

b. Carefully insert the revolving nosepiece into the dovetail guideway of the microscope stand.

c. Push the nosepiece all the way in, and tighten it firmly with the nosepiece clamping screw.

C. BRIGHT/DARKFIELD/FLUORESCENCE VERSIONS (BF/DF OR BF/FLUOR ONLY)

1. Inserting the Half-Mirror Units

a. Remove the half-mirror housing cover plates on the right and left sides of the universal illuminator.

* The covers are kept in place by magnets. Be careful not to lose them.

b. Unscrew the half-mirror unit handling screw from the universal illuminator and screw it into the desired half-mirror unit.

<u>Cube</u>	<u>Observation Technique</u>
Brightfield (BH2-UBF)	Brightfield
Brightfield (BH2-UBFL)	Brightfield, (use with mercury burner)
Darkfield (BH2-UDF)	Darkfield
Blue (BH2-UDMB)	Blue Fluorescence
Green (BH2-UDMG)	Green Fluorescence
Violet (BH2-UDMV)	Violet Fluorescence

c. Holding the handling screw, carefully slide the half-mirror unit in the universal illuminator until it clicks.

* The half-mirror unit may be inserted from either side of the universal illuminator.

* At the clicking position, the half-mirror unit is flush with the side of the half-mirror housing.

d. If desired, insert a second half-mirror unit into the universal illuminator in the same manner from the opposite side.

e. Unscrew the handling screw from the half-mirror and return it to its socket on the top of the universal illuminator.

f. Re-attach the half-mirror housing cover plates.

g. Rotate the half-mirror indicator dials to the code (BF, DF, B, G, or V) corresponding to the half-mirror units inserted.

* When the brightfield half-mirror unit is inserted on the right side, set the left indicator dial to BF, etc.

2. Inserting the ND Filter Slider

a. Insert the ND filter slider into the ND filter/tint plate slot in the universal illuminator, with the inscription on the "ND" filter slider facing forward.

3. Mounting the Objectives

a. Fully lower the mechanical stage with the coarse focus adjustment knob.

b. Screw the objectives firmly into the threaded openings on the revolving nosepiece, one by one, in ascending order of magnification, in clockwise sequence.

IV. OPERATION

1. Switching the Light Source On

A. For the Halogen Lamp

- a. Set the line voltage selector switch on the transformer to conform with the local mains voltage.
- b. Set the voltage adjustment knob at the lowest voltage position, and turn on the ON-OFF switch.
- c. Turning the voltage adjustment knob clockwise increases voltage and the voltmeter LED lights up, accordingly.

B. For the Mercury Burner

- a. Make sure that the line voltage selector switch on the power supply unit is set to conform with the local mains voltage. (This switch can be turned with a screwdriver, and can be set to the following voltages: 100V / 110V / 120V or 220V / 240V).
 - b. Set the frequency selector switch to conform with the local mains frequency. (This switch can be adjusted with a screwdriver).
 - c. Ascertain that the connecting cord from the power supply unit to the lamp socket, and the mains cord are correctly connected.
 - d. Turn on the main switch of the power supply unit. The switch will light up green.
 - * The burner sometimes may not ignite the first time, due to the electrode condition, etc. If your burner does not ignite, repeat turning on the main switch several times.
 - * To protect the circuitry of your automatic photomicrographic attachments, turn them on only after the mercury burner has been ignited.
 - * 2 or 3 minutes after ignition, the arc will be stabilized.
 - * Do not switch off the burner within 15 minutes after ignition.
 - * Once the mercury burner is switched off, do not re-ignite it for 3 minutes or more in order to give it time to cool.
 - e. Turn off the main switch to switch off the power supply.
 - * At each burner replacement, zero the life meter.
-

2. Centering the Light Source

* Burner centration should be performed each time a burner is replaced.

* Be careful never to open the lamp housing while the burner is on or immediately after switching off.

A. For the Halogen Lamp

a. Remove the analyzer, polarizer, and all filters from the light path.

b. Slide the brightfield half-mirror unit into the light path.

c. Rotate the field iris diaphragm "F. S. " and the aperture iris diaphragm "A. S. " counter-clockwise to the maximum open position.

d. Swing out the objectives from the light path, and remove the dust cap from the nosepiece aperture, so that the light passes through an empty aperture of the nosepiece.

e. Screw the centering screen into the nosepiece aperture so that the image of the bulb filament can be projected onto the screen.

f. Loosen the lamp socket locking screw and, sliding the lamp socket in and out, and rotating in either direction, center the filament image.

g. Remount analyzer, polarizer, and filters in the illuminator, as applicable.

B. For the Mercury Burner

After the arc has stabilized, center the burner in the following steps:

a. Remove the analyzer, polarizer, and all filters from the light path.

b. Slide the brightfield half-mirror unit into the light path.

c. Rotate the field iris diaphragm "F. S. " and the aperture iris diaphragm "A. S. " counter-clockwise to the maximum open position.

d. Swing out the objectives from the light path, and remove the dust cap from the nosepiece aperture, so that the light passes through an empty aperture of the nosepiece.

e. Screw the centering screen into the nosepiece aperture so that the image of the burner can be projected onto the screen.

f. Bring the arc image into focus with the lamp collector

focusing knob and center the brightest spot of the arc with the centering knobs of the mercury lamp housing.

g. Remount analyzer, polarizer, and filters in the illuminator as applicable.

C. If A Centering Screen Is Not Available

The following process for centering the bulb applies to both the 12V 50W Halogen bulb (BF/DF/DIC/POL) and the 100W HBO Mercury bulb (FLUOR).

a. Remove the analyzer, polarizer, and all filters from the light path.

b. Slide the half-mirror selector knob to engage the brightfield half-mirror unit in the light path.

c. Swing the 10X objective into the light path.

d. Place a mirror or another high-reflectivity specimen on the stage, and roughly focus on it.

e. Remove one of the eyepieces, and while observing the bulb filament image in the observation tube, bring the image to the center of the objective pupil by turning the bulb centering knob and the socket clamping knob.

* A centering telescope is helpful since it enlarges the image of the filament for easy centering.

f. Remount the analyzer, polarizer, and filters in the illuminator, as applicable.

3. Centering the Field Iris Diaphragm

a. Turn the revolving nosepiece to bring the 10X objective into the light path, and approximately focus on the specimen on the stage.

b. Turn the field iris diaphragm lever on the universal vertical illuminator clockwise to fully stop down the iris diaphragm.

c. Turn the two diaphragm centering knobs on the universal illuminator and make the diaphragm image concentric with the field of view.

d. Turn the diaphragm lever counterclockwise until the image coincides with the field of view. If it is eccentric, fine tune with the centering knobs again.

e. Open the field iris diaphragm until it just disappears from the field of view.

4. Adjusting the Field Iris Diaphragm

To obtain images with improved contrast, the illumination area must be properly adjusted.

A. Reflected Light Brightfield Observation

a. Close the field iris diaphragm with the diaphragm lever of the universal vertical illuminator to barely enclose the field of view, with the respective objective lenses, to minimize stray light.

B. Reflected Light Darkfield Observation

a. Be sure to turn the field iris lever on the universal vertical illuminator counterclockwise to fully open the iris diaphragm.

5. Adjusting the Aperture Iris Diaphragm

Adjust the numerical aperture of the illumination system to optimum image resolution, contrast and field depth.

A. Reflected Light Brightfield Observation

a. Remove one of the eyepieces from the observation tube, and while looking at the exit pupil of the objective through the empty tube, adjust the opening of the aperture iris diaphragm with the diaphragm lever of the universal vertical illuminator. Clockwise rotation of the diaphragm lever reduces the diaphragm opening.

* Generally by opening the diameter of the aperture iris diaphragm to 70% to 80% of the diameter of the objective exit pupil, best image contrast will be achieved.

B. Reflected Light Darkfield Observation

a. Turn the aperture iris lever counterclockwise to fully open the aperture iris diaphragm.

* With some specimens, a slight closing gives good flarefree darkfield images. Since the aperture iris cannot be seen even when the objective is removed, make this adjustment to minimize flare while observing the image.

6. Inserting the Filters

- a. Open the filter cover, located in front of the lamp housing, on the universal illuminator.
- b. Insert desired filters into the filter well.

For specific purposes, use the following filters:

<u>Filter</u>	<u>Effect</u>
20 LBD3-W	Color temperature conversion to daylight quality.
20 IF550-W	Green illumination. Increases image contrast for observation and black and white photography.
20 ND6-W	Reduces illumination intensity (transmission 6%).
20 ND25-W	Reduces illumination intensity (transmission 25%).

* When no filter is in use, be sure to close the filter cover to prevent the entry of dust.

V. OBSERVATION

A. REFLECTED LIGHT BRIGHTFIELD/DARKFIELD OBSERVATION

Preparation

1. Selecting the Half-Mirror Units

a. Make sure that the brightfield half-mirror unit and the darkfield half-mirror unit are in the half-mirror housing, and move the desired half-mirror into the light path with the half-mirror selector knob.

2. Selecting the ND Filter Slider

a. Engage the ND filter slider with the ND filter to minimize glare by reducing the brightness difference between the darkfield and the brightfield.

* If the light intensity is insufficient in brightfield observation or when shortening the exposure time in photomicrography is desirable, move the slider with the empty opening into the light path.

Summary of Reflected Light Brightfield/Darkfield Observation Procedure

1. Move the required half-mirror into the light path with the half-mirror selector knob.
2. Remove the analyzer, polarizer, tint plate, and Nomarski prism from the light path.
3. Turn on the power switch, and light the halogen bulb.
4. Place the specimen on the stage.
5. Bring the 10X objective into the light path and focus.
6. Set interpupillary distance and diopter adjustment on the observation tube.
7. Make sure that the illumination is even.
8. Insert the desired filter into the universal vertical illuminator.
9. Bring the objective of choice into the optical path and focus.

10. Adjust the illumination intensity with the voltage adjustment knob.

11. Brightfield Observation: Adjust the field iris diaphragm and the aperture iris diaphragm.

Darkfield Observation: Fully open the field iris diaphragm and the aperture iris diaphragm.

B. REFLECTED LIGHT NOMARSKI DIFFERENTIAL INTERFERENCE CONTRAST

Preparation

1. Setting the Half-Mirror

a. Move the brightfield half-mirror unit into the light path by sliding the half-mirror selector knob.

2. Checking the Analyzer and Polarizer

a. Make sure that the analyzer slider and polarizer slider are properly placed in the light path of the universal vertical illuminator.

* Make sure that the polarizer slider is inserted with the marking "NIC" facing forward.

3. Inserting the Nomarski Prism

a. Swing the Nomarski prism into the light path by turning the prism control lever to the "IN" position.

4. Setting the Background Color

a. With the tint plate engaged, turn the polarizer ring of the polarizer to change the field of view background color until the optimum contrast for the specimen is obtained.

Background Color

Observation Effect

Black

Image similar to darkfield is obtained.

Grey

Best contrast and pseudo-relief.

Red-purple sensitive color

Very slight optical difference (refractive index, thickness) can be observed as difference in color.

* When the tint plate slider is inserted into the ND filter/tint plate slot, and set in the light path, sensitive colors appear for observation.

* The background colors can be changed continuously from 0-order black to 2nd order blue (0 to 700 nm).

5. Changing to Brightfield/Darkfield Observation

- a. Take the Nomarski prism out of the light path by moving the prism control knob to the "OUT" position.
- b. Pull the universal analyzer, polarizer and the tint plate from the light path.

Summary of Reflected Light Nomarski DIC Procedure

1. Bring the brightfield half-mirror into the light path with the half-mirror selector knob.
2. Engage the analyzer, polarizer and Nomarski prism.
3. Turn on the power switch and light the halogen bulb.
4. Place the specimen on the stage.
5. Bring the 10X objective into the light path and focus.
6. Set interpupillary distance and diopter adjustment on the observation tube.
7. Make sure that the illumination is even.
8. Insert the desired filters into the universal vertical illuminator.
9. Bring the objective of choice into the light path and focus.
10. Adjust the illumination intensity with the voltage adjustment knob.
11. Adjust field and aperture iris diaphragms.

C. REFLECTED LIGHT SIMPLE POLARIZING OBSERVATION

Preparation

1. Selecting the Half-Mirror Units
 - a. Bring the brightfield half-mirror unit into the light path with the half-mirror selector knob.
2. Checking the Analyzer and Polarizer
 - a. Make sure that the analyzer slider and the polarizer are properly engaged.

* Make sure that the polarizer slider is inserted with the marking "PO" facing forward.

3. Removing the Nomarski Prism from the Light Path
 - a. If the Nomarski prism is engaged, disengage it by moving the prism control lever to the "OUT" position.
4. Placing the Polarizer and Analyzer into Crossed Polars Position
 - a. Attain the crossed polars position by rotating the knurled dial of the polarizer slider. The field of view should appear black when there is no specimen in the light path.

Summary of Reflected Light Simple Polarizing Procedure

1. Bring the brightfield half-mirror into the light path with the half mirror selector knob.
 2. Engage the analyzer and the polarizer.
 3. Take the Nomarski prism out of the light path.
 4. Turn on the power switch and light the halogen bulb.
 5. Place the specimen on the stage.
 6. Bring the 10X objective into the light path.
 7. Set interpupillary distance and diopter adjustment on the observation tube.
 8. Make sure that the illumination is even.
 9. Insert the desired filters into the universal vertical illuminator.
 10. Turn the knurled dial of the polarizer slider to achieve crossed polars position.
 11. Bring the objective of the required magnification into the light path and focus.
 12. Adjust the illumination intensity with the voltage adjustment knob.
 13. Adjust the field iris diaphragm and the aperture iris diaphragm.
-

D. REFLECTED LIGHT FLUORESCENCE OBSERVATION

* Make it a practice to use the UV protective shade provided to protect your eyes from possible ambient UV light.

Preparation

1. Focus on the Specimen with Transmitted Light.

* On microscopes without transmitted light capabilities, proceed to step 2.

a. Using the 10X objective and transmitted light, bring the area of the specimen to be observed into the field of view and focus.

* Make sure that the brightfield with NDO5 filter (BH2-UBFL) half-mirror unit is in the light path.

* Make sure all filters, analyzer, polarizer and Nomarski prism are removed from the light path.

The Nomarski prism is removed from the light path by moving the prism control lever to the "OUT" position.

2. Positioning the Half-Mirror

a. Bring the desired fluorescence half-mirror unit into the light path by sliding the half-mirror selector knob.

* The universal illuminator is capable of housing two half-mirror units. If two fluorescence half-mirror units are required, remove the brightfield half-mirror unit from the universal illuminator and insert the two desired fluorescence units.

3. Preparing the Illumination

a. Install the Fluorescence Supplementary Unit components on the universal illuminator: extension tube adapter, supporting block, UV protective shield, supplementary exciter slider, and fluorescence collector lens.

* Prior to installing the extension tube adapter, ascertain that the halogen collector has been removed.

b. Install the 100W mercury lamp house on the universal illuminator.

* An extension tube (BH2-UET) is required between the universal illuminator and the mercury lamp house for models BH2-MJLT, BH2-MJL, BHMJL.

c. Switch on the mercury light source.

d. Switch off the transmitted light source.

e. Center the mercury burner.

Summary of Reflected Light Fluorescence Observation

1. Install the Fluorescence Supplementary Unit components.
2. Install the 100W mercury lamp house on the universal illuminator.
3. Remove all filters, analyzer, and polarizer from the light path.
4. Engage the 10X objective.
5. Remove the Nomarski prism from the light path.
6. Place the specimen on the stage.
7. Set interpupillary distance and diopter adjustment.

* Steps 8, 9 and 12 are for microscopes with transmitted light only. For microscopes without transmitted light capabilities, proceed to step 10.

8. Bring the brightfield half-mirror into the light path with the half-mirror selector knob.
9. Focus on the specimen with transmitted light.
10. Bring the desired fluorescence half-mirror unit into the light path with the half-mirror selector knob.
11. Switch on the mercury light source.
12. Switch off the transmitted light source.
13. Adjust the field iris diaphragm and the aperture iris diaphragm.
14. Bring the objective of the required magnification into the light path and focus.
15. If desired, install a supplementary exciter filter into the polarizer slot of the universal illuminator.
16. If desired, install a supplementary barrier filter into the analyzer slot of the universal illuminator..



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