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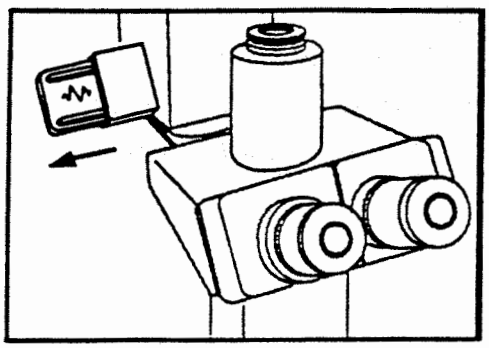
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Find the *Spectra-Tech Reflachromat* at our website: ***Click HERE***

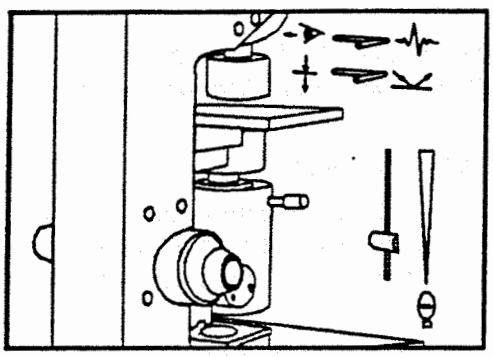
USING THE MICROSCOPE

Performing a Standard Reflectance Experiment



Place Microscope In IR Position

Slide the Upper View/IR Selector to the *IR* position.

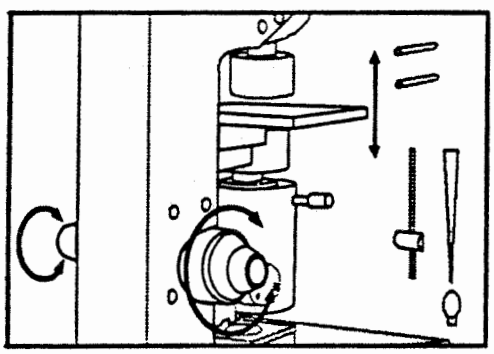


Place Microscope In IR/Refl Position

Slide the Lower View/IR Selector to the *IR* position.

Slide the Transmission/Reflectance Selector to the *Reflectance* (REFL) position.

Collect a sample spectrum for two minutes (number of scans required may vary).



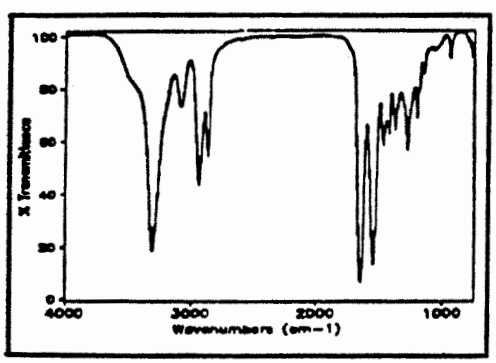
Place Microscope InView/View Position

Slide the Upper View/IR Selector to the *view* position.

Slide the Lower View/IR Selector to the *view* position.

All sampling parameters need to be maintained in sample and background acquisition. **Do not change or adjust the aperture.** Using the stage X,Y controls move the gold mirror until the light emanating from the reflecting objective strikes the mirror surface.

Look thru the viewer and adjust the focus knob so the mirror is in sharp focus.



Collect Background Spectrum

Slide the Upper View/IR Selector to the *IR* position.

Slide the Lower View/IR Selector to the *IR* position.

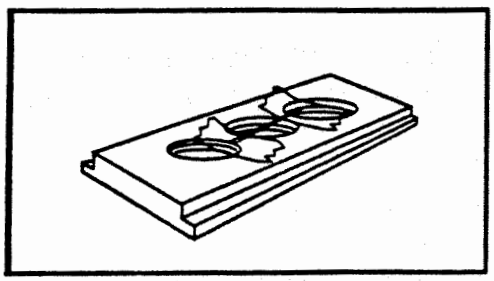
Collect a background spectrum (number of scans required may vary).

The ratioed spectrum should resemble the one shown here (to the left).

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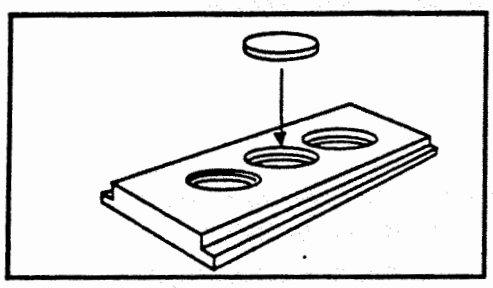
USING THE MICROSCOPE

Performing a standard transmission experiment



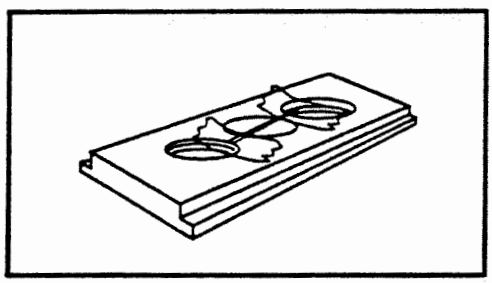
If the condenser has been corrected for air

Stretch a single fiber (the thinner the fiber, the better) across one of the openings of the sample slide, and secure it with cellophane tape. Place the sample slide onto the stage clip.



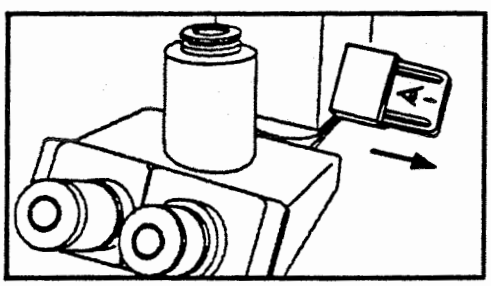
If the condenser has been corrected for an infrared-transmitting window

Place an infrared-transmitting window in one of the openings of the sample slide.



Place a Fiber on the Window

Stretch a single fiber across the infrared window, and secure it with cellophane tape. Place the sample slide onto the stage clip. Slide the Upper View/IR Selector to the View position.

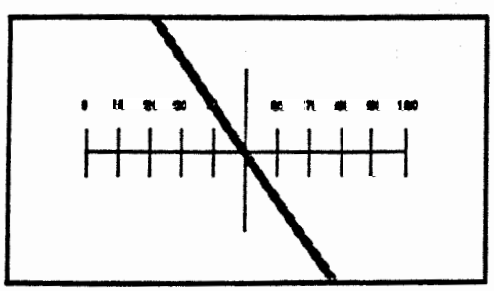


Select Reflectance View Mode

Slide the Upper View/IR Selector to the *view* position.

Slide the Lower View/IR Selector to the *view* position.

Slide the Transmission/Reflectance Selector to the Reflectance (REFL) position.



Focus on the Fiber

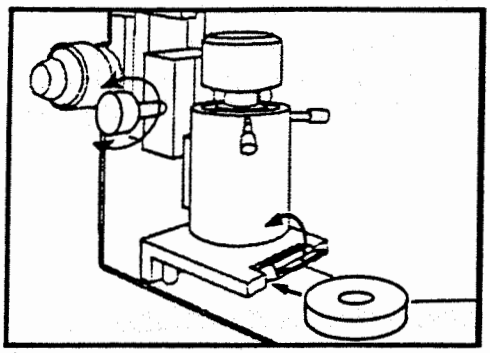
Using the X,Y stage controls and the fine and coarse-Focus-Adjustment Knobs, bring the fiber into the field of view and focus. The fiber should intersect the crosshairs.

Note: The infrared energy has been optimized at the center of the crosshairs.

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USING THE MICROSCOPE

Performing a Standard Reflectance Experiment



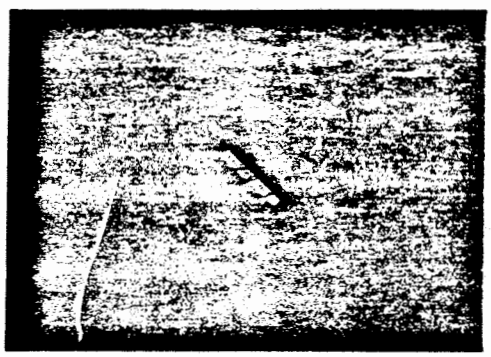
Install a Rectangular Variable Aperture into Lower Mount

Adjust the lower variable aperture rectangular aperture so that the knife blades form a 1mm x 1mm box.

Install the lower aperture.

Verify that the aperture clamp is properly closed and holding the aperture securely in position.

Using the condenser focus knob, adjust the condenser so that a sharp image of the lower aperture is obtained.

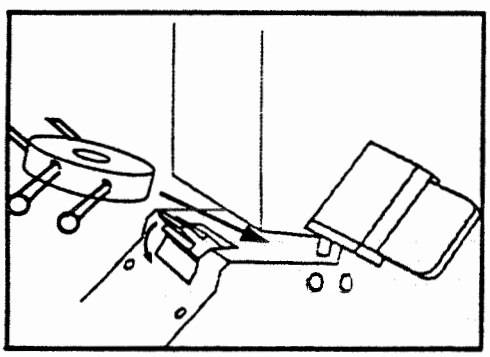


Adjust Aperture Blades

Rotate and adjust the blades of the lower aperture to define a 20 x 100 µm (5 x 25 divisions) section of the fiber.

Install a rectangular variable aperture into the targeting (upper) aperture mount.

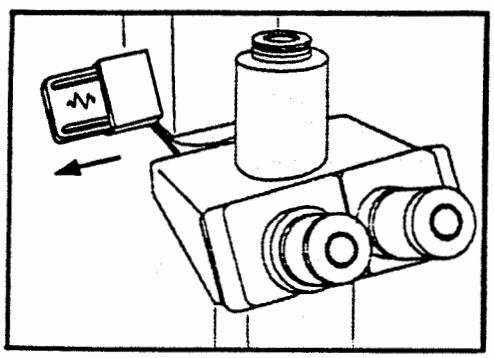
Rotate and adjust the blades of the upper aperture to match.



Install Upper Aperture

Install a rectangular variable aperture into the Targeting (upper) aperture mount.

The aperture can be rotated and the blades are adjustable. This permits the user to adjust the aperture to conform to the sample's geometry, required aperture area and dimensions.



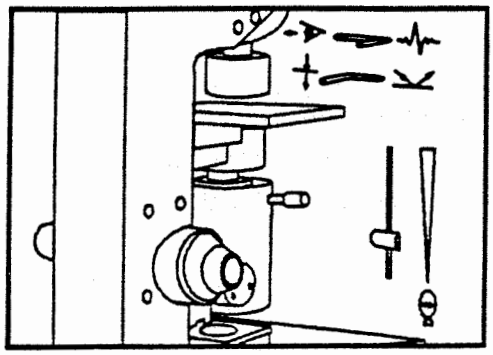
Put Microscope Into IR Position

Slide the Upper View/IR Selector to the IR position.

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USING THE MICROSCOPE

Performing a Standard Transmission Experiment

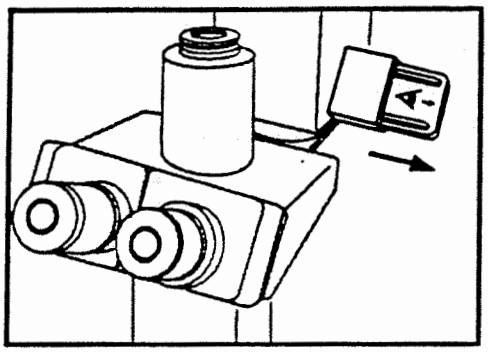


Put the Microscope into the IR/TRANS Mode

Slide the Lower View/IR Selector to the IR position.

Slide the Transmission/Reflectance Selector to the Transmission (TRANS) position.

Collect a sample spectrum for two minutes (the number of scans required may vary).

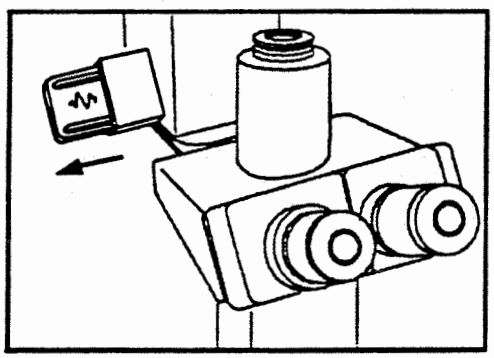


Put the Microscope into the View/View Mode

Slide the Upper View/IR Selector to the View position.

Slide the View/IR Selector to the View position.

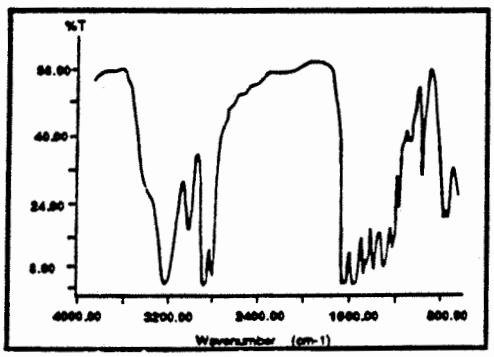
Do not change or adjust the aperture. Using the X,Y stage controls, move the fiber out of the apertured area.



Put the Microscope into the IR/IR Mode

Slide the Upper View/IR Selector to the IR position.

Slide the Lower View/IR Selector to the IR position.



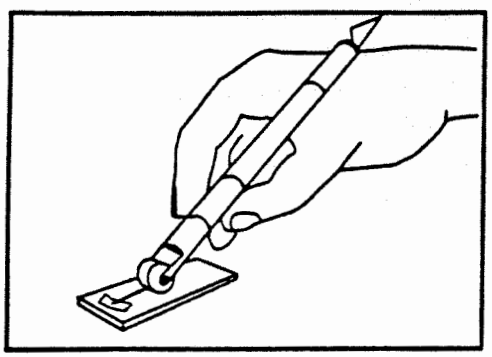
Collect a Background Spectrum

Collect a background spectrum for two minutes (the number of scans required may vary). The ratioed spectrum should resemble the one shown here (to the left). In this case, Nylon 66 was used; obviously, different types of fibers will yield different spectra. Note that some of the bands have bottomed out, indicating that the sample is too thick. Also, the highest % T value is about 56%, indicating scattered light losses and possibly a lensing effect (created by the fiber).

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USING THE MICROSCOPE

Performing a Standard Transmission Experiment

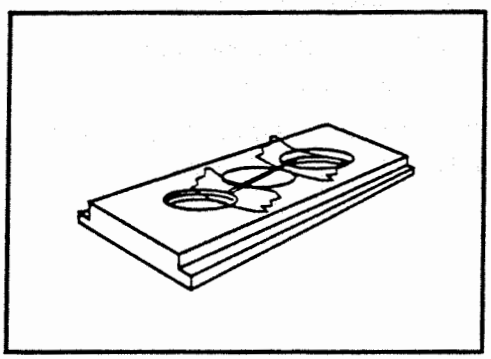


Use the Roller Knife to Flatten the Sample

One way to solve the problem of sample thickness is to use the roller knife (supplied in the tool kit).

Tape the fiber down on a standard glass microscope slide.

Use the roller end of the roller knife to flatten the fiber.

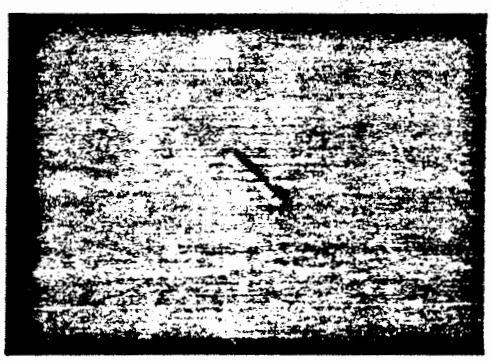


Tape the Fiber to a Slide

Remove the fiber from the microscope slide.

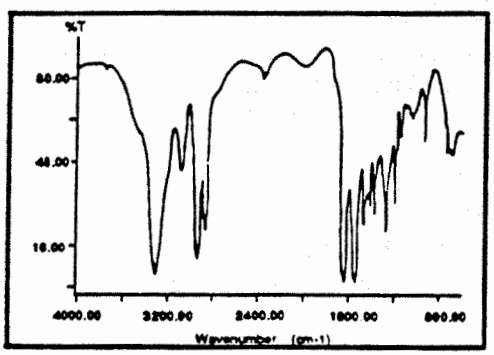
Stretch the fiber across the opening of a sample slide.

Tape the fiber down.



Aperture the Sample

The procedure to aperture and scan is the same as for the previous experiment (using the unrolled fiber). The notable difference is that, since the fiber has been flattened, it is wider and permits an aperture size of 35 x 100 µm. This results in shorter scan intervals for the same-quality spectrum.



Collect a Sample Spectrum

The result obtained from flattening is that the bands do not bottom out.

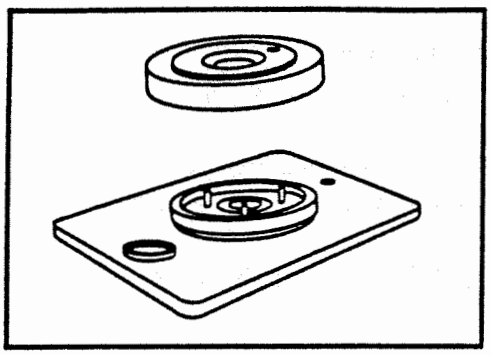
Note: Without the lensing effect, the energy is at about 90%; scatter (reflection) losses account for the remainder.

Special Note Fringing effects: These are caused by the thickness of the fiber being close to the wavelengths used (8 - 15 µm).

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Performing a Standard Transmission Experiment

Using the Optional Micro Compression Cell

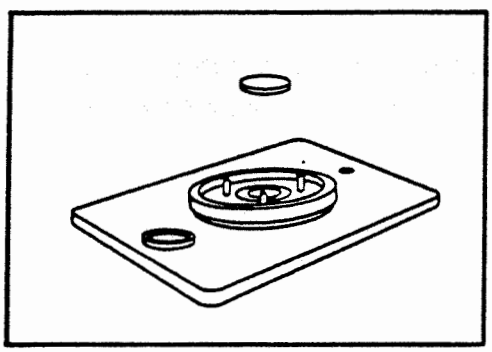


Unscrew the Cap of the Micro Compression Cell

To eliminate fringing, use an optional Micro Compression Cell (part number 0042-434).

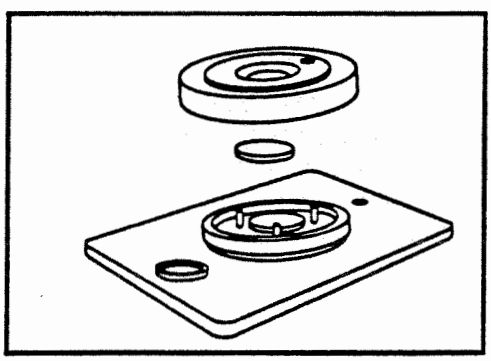
Unscrew the top cap and remove the base.

Note: To use the Micro Compression Cell, your microscope must be equipped with an objective and condenser that correct for 2-mm-thick windows* or with a Reflachromat® objective and condenser (Advanced Analytical option).



Place a Window on the Micro Compression Cell

Place one 13 x 2 mm window on the base unit, centering it between the pins.



Place the Sample on the Micro Compression Cell

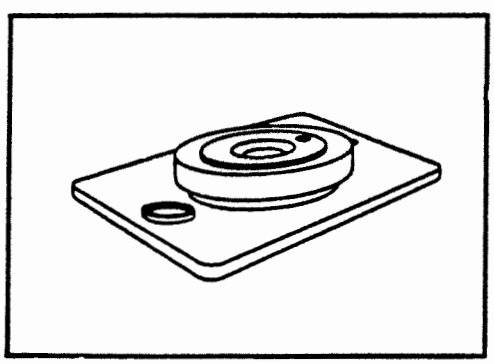
Place a small section of rolled fiber on the center of the window.

Using a probe, place a small piece of KBr powder near the fiber.

Place a second 13 x 2 mm window directly on top of the first window (and the fiber)

Replace the top cap.

Note: Both the top cap and the base unit have red dots, which must be in line with each other to assemble the cell properly.



Tighten the Top Cap of the Micro Compression Cell

While viewing the cell under a stereo microscope, tighten the top cap until the sample makes complete optical contact with the windows.

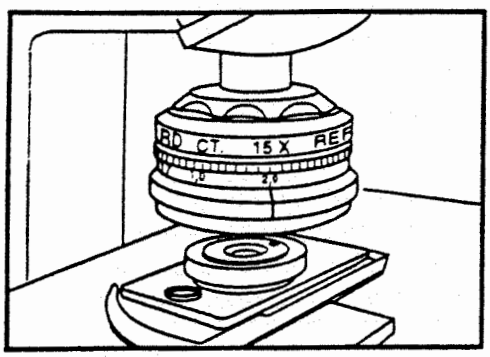
The cell is now ready to be placed onto the microscope stage.

**You can tell if your objective and condenser correct for the windows. Look on the exterior of both for a 160/2; this means that the optic is corrected for a 2-mm-thick window. A 160/0 means that the optic is corrected for air only.*

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USING THE MICROSCOPE

Performing a Standard Transmission Experiment

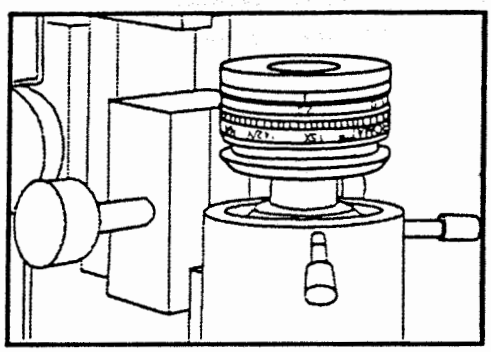


Adjust the Objective for 2mm Window Compensation

Here, the 15X Reflachromat objective is shown with the red mark at 2.

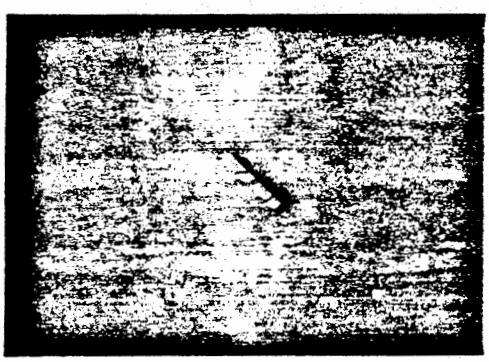
In this case, there is a 2-mm window (the top window in the Micro Compression Cell) between the sample and the objective.

First, turn the knurled ring to 2, then bring the sample into focus.



Adjust the Condenser for 2mm Window Compensation

Turn the knurled ring to 2 for use with the Micro Compression Cell (2-mm bottom window).

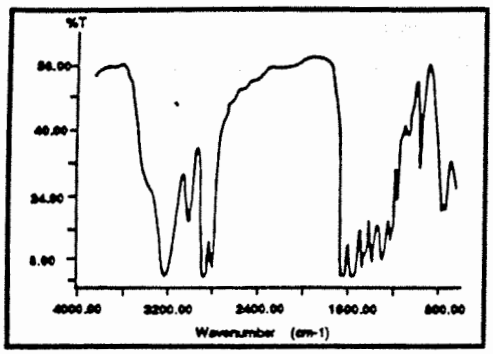


Aperture the Sample

The procedure to aperture and scan is the same as for the previous experiment (using the unrolled fiber). The notable difference is that, since the fiber has been flattened, it is wider and permits an aperture size of 35 x 100 µm. This results in shorter scan intervals for the same-quality spectrum.

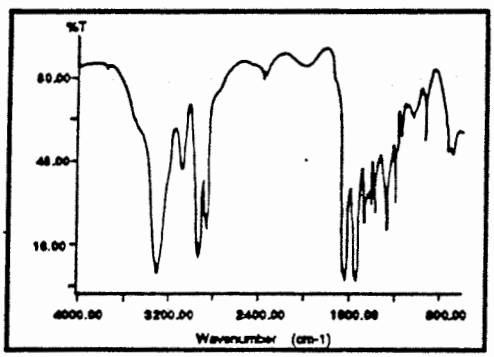
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Performing a Standard Transmission Experiment



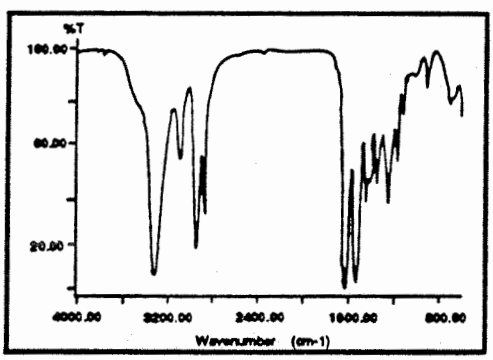
Unflattened (unrolled) Nylon 66 Fiber in Air.

This is the spectrum of the unflattened (unrolled) Nylon 66 fiber in air.



Flattened Nylon 66 Fiber in Air.

This is the spectrum of the flattened Nylon 66 fiber in air.



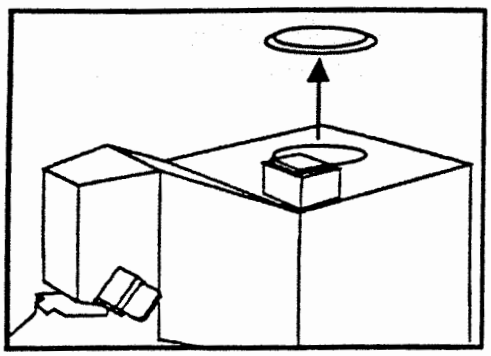
Flattened Nylon 66 Fiber in the Micro Compression Cell

This is the spectrum of the flattened Nylon 66 fiber in the Micro Compression Cell with a crushed piece of KBr powder as the background.

Note: The fringing effect is gone, the transmittance is very close to 100%, and the bands do not bottom out.

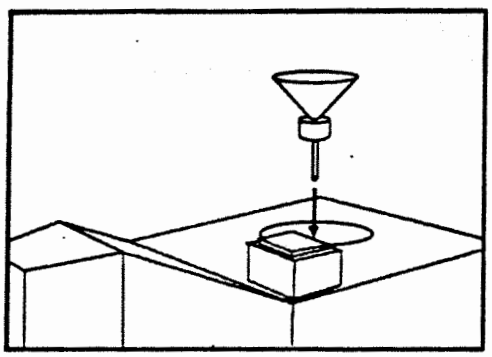
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Filling the detector



Remove the Protective Plastic Cap

Remove the protective plastic cap that covers the MCT detector area.



Fill the MCT Detector

Using a funnel, fill the MCT detector with liquid nitrogen.
Caution:

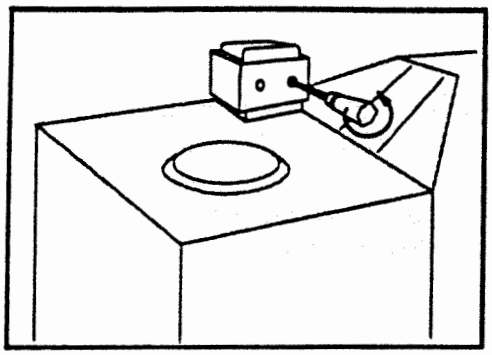
Do not overfill the detector.

Checklist

- Is the spectrometer running according to its manufacturer's specifications?
- Is the infrared beam directed to the microscope (flipper mirror), and has the microscope's detector been selected?
- Have the spectrometer's parameters been set for use with the microscope (i.e., mirror velocity, gain, resolution, and aperture size?).
- Is electrical power being supplied to the microscope?
- Is the illuminator source working?
- Is the illuminating aperture's diaphragm open?
- Is purge (if it is to be used) on (i.e., flowing)?

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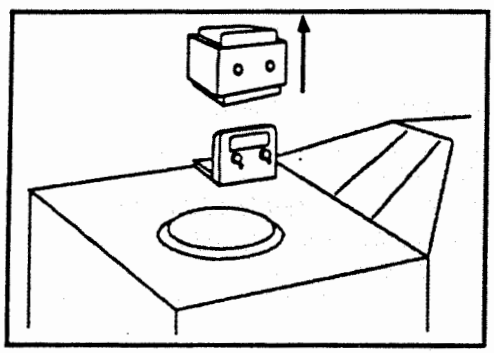
Replacing the Illuminator Source



Remove the Two 4-40 Buttonhead Screws

Using the 1/16 ball-end hexagonal screwdriver, remove the two 4-40 buttonhead screws located at the rear of the illuminator-source housing.

CAUTION : The illuminator source housing may be hot. Allow adequate time for it to cool before changing the bulb.



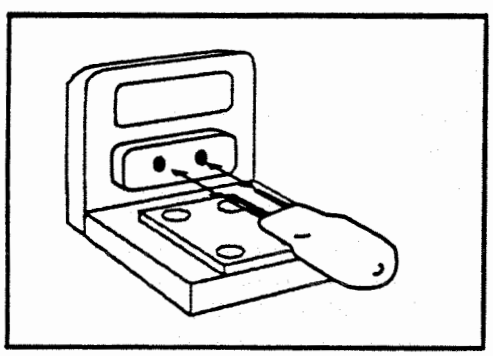
Remove the Housing

CAUTION : Do not touch the bulb until it has been determined that it needs to be replaced.

Remove the housing by lifting it straight up.

Visually inspect the bulb for damage. If the bulb needs to be removed for inspection, lens tissue (or something similar) should be used. Direct contact of the bulb with skin will damage the bulb for future use.

CAUTION : The illuminator source housing may be hot.

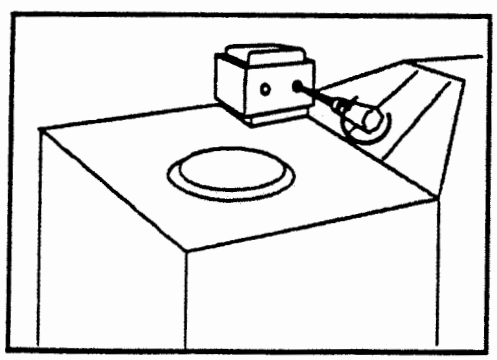


Replace the Bulb

Remove the old bulb and replace it.

CAUTION : Do not handle the new bulb directly with the fingertips.

Cut away the bottom of the plastic bag in which the new bulb is packaged. Handle/manipulate the bulb using the top of the bag. The new bulb should go all the way into the mount and should be square and perpendicular.



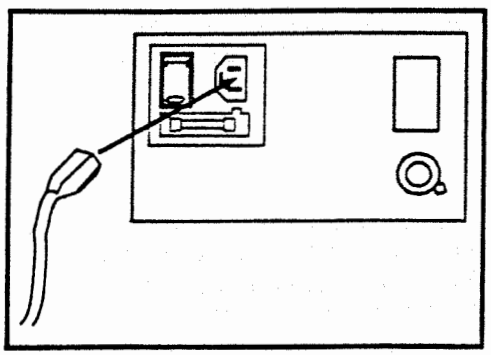
Replace the Housing

Replace the housing and screws.

Tighten the screws.

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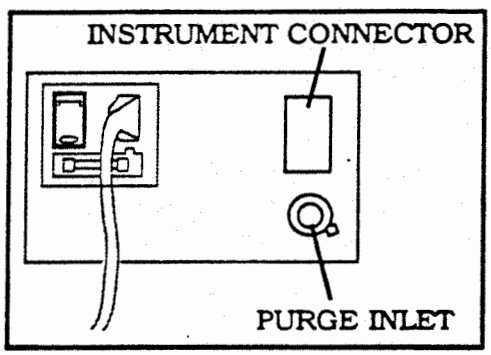
Back Panel Connections and Controls



Power Cord

The power cord is connected in the back of the microscope. The power-supply voltage is 100 or 220 V, and the frequency is 50 or 60 Hz.

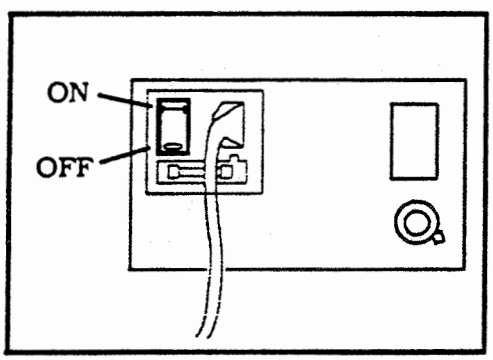
The microscope may be plugged into either a wall socket or an accessory outlet on the spectrometer.



Purge Line

The purge line is attached to the fitting shown.

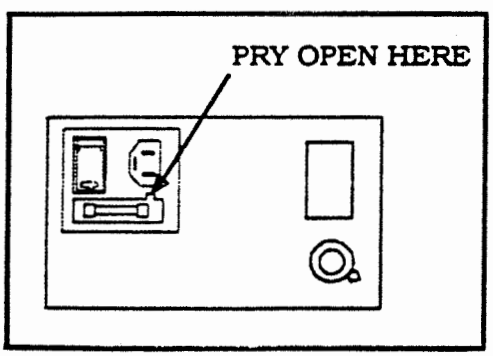
Note: The detector signal's output (i.e., the instrument connector) should be connected by a qualified service engineer at the time of installation and according to the spectrometer manufacturer's instructions.



Power on/off Rocker Switch

The microscope illuminator's power is turned on and off by the rocker (toggle) switch shown.

Note: This switch does not turn the detector on or off. It is recommended that, when not collecting data, the infrared energy to the detector be blocked (i.e., in view mode). This is especially important when using an MCT detector without liquid nitrogen (e.g., when leaving the detector on overnight).



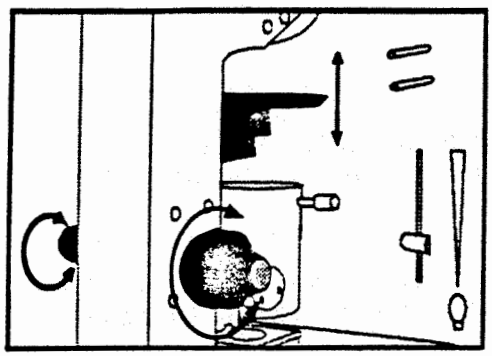
Accessing the Fuse

The fuse is accessed by prying the fuse box (shown) with a common screwdriver.

Once the door is opened, the fuse may be inspected and/or replaced (if necessary).

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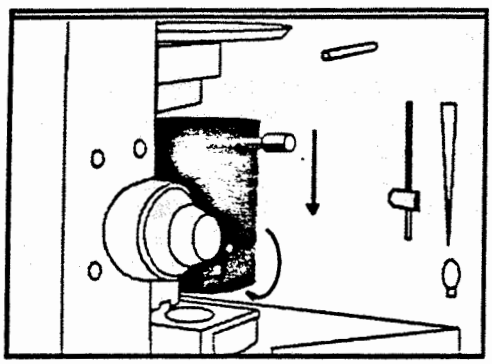
Changing the Condenser



Raise the Dovetail-Ring Mount

Using the focussing knob(s), adjust the microscope stage's dovetail-ring mount upward until it is all the way up (toward the nosepiece).

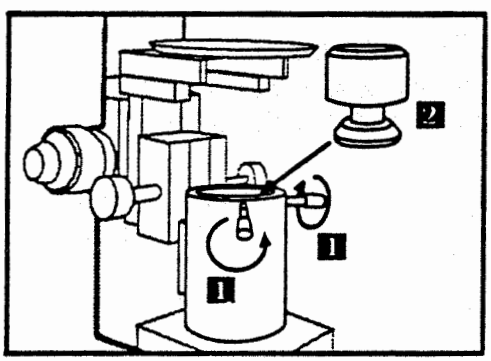
Note: This procedure is the same for a Reflachromat® condenser.



Lower the Sub-stage

Turn the sub-stage focussing knob (i.e., the condenser focussing knob, located on both sides of the microscope condenser's sub-assembly) until the sub-stage is at its lowest position.

CAUTION: Do not place fingers or any other foreign objects into the objective. Care must be taken so that no foreign objects fall into the condenser.

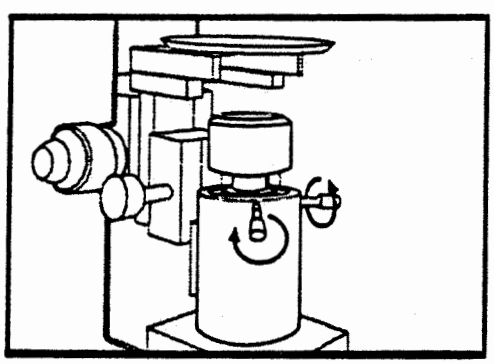


Remove the Condenser

Loosen the condenser-centering adjustment screws, located on the sub-stage (1)

Note: Do not loosen the spring plunger, located at the front (user's side) of the sub-stage.

Remove the existing condenser and place the desired condenser into the sub-stage as shown (2).



Turn Adjustment Screws

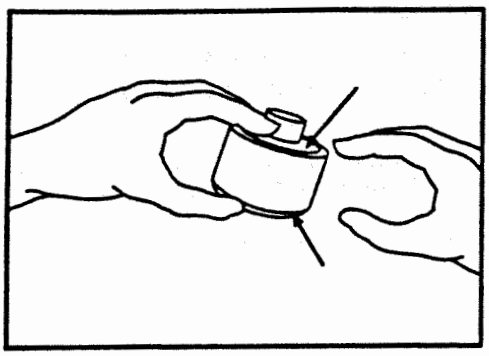
Turn the condenser-centering adjustment screws so that they make contact with the condenser's dovetail ring.

Continue to turn the screws until the spring mechanism (i.e., the spring plunger) provides resistance against the centering screws.

This allows orthogonal (X,Y) movement of the condenser as the adjustment screws are turned.

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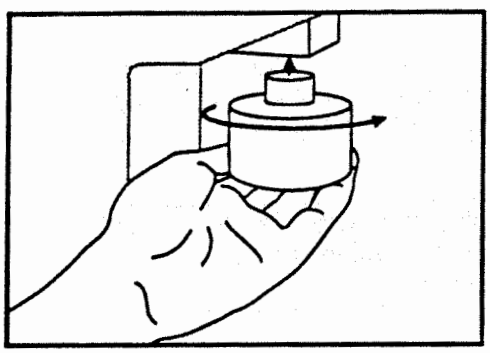
Changing the Objective



Single-Place Nosepiece

CAUTION: Do not force or over-tighten the objective on the nosepiece. This will cause misalignment of the objective. Place thumbs on the bottom corner (i.e., the beveled edge) of the objective.

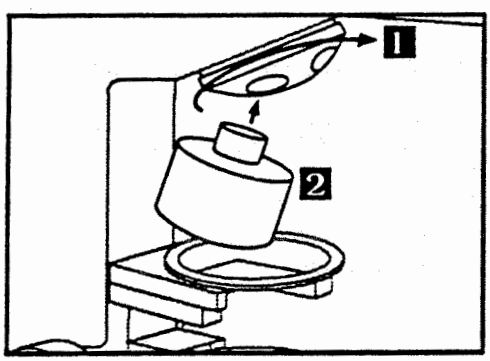
Place fingers on the top part of the objective. (The arrows shown indicate the areas where the objective should be handled.)



Single-Place Nosepiece

To remove or install an objective, support the objective from underneath with one hand (as shown) while carefully turning the objective with the other hand.

CAUTION: Do not place fingers or any other foreign objects into the objective.

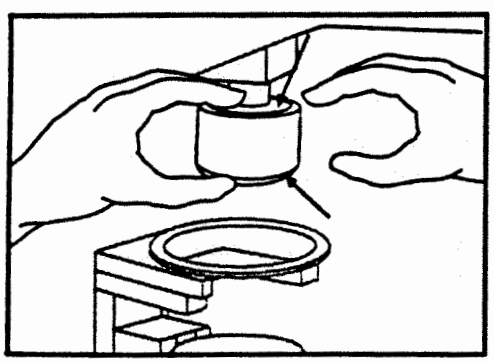


4-Place Nosepiece with One Objective

Rotate the nosepiece so that the desired hole (i.e., the desired objective) is accessible from the side of the microscope's frame (1).

When starting to thread the objective into the desired hole (2), support the objective from underneath (as shown in the single-nosepiece illustration).

CAUTION: Do not place fingers or any other foreign objects into the objective.



4-Place Nosepiece with One Objective

Place thumbs on the bottom corner (i.e., the beveled edge) of the objective.

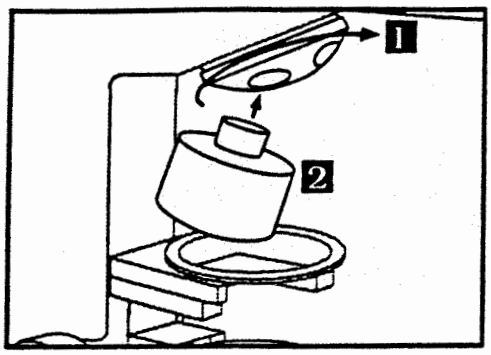
Place fingers on the top part of the objective. (The arrows shown indicate the areas where the objective should be handled.)

Thread the objective until it is snug.

CAUTION: Do not force or over-tighten the objective, as this will cause its misalignment.

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Changing the Objective

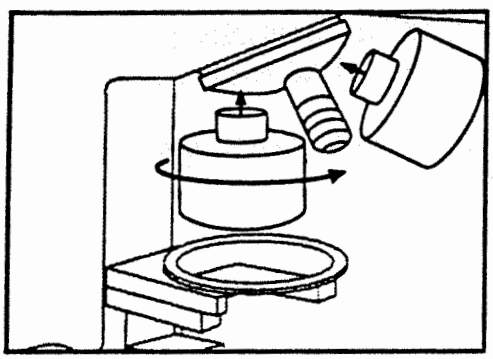


4-Place Nosepiece with One Refracting (glass) Objective and One Reflecting Objective

Mount the glass objective onto the 18-mm spacer.

Mount the reflecting (infrared-capable) objective into the hole directly (180°) opposite the 18-mm spacer.

Note: To mount the reflecting objective, follow the procedure given in 4-place nosepiece with one objective.

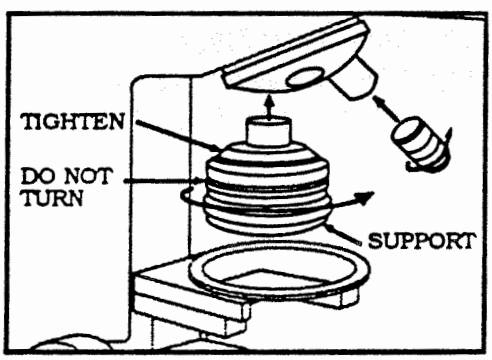


4-Place Nosepiece with One or Two Refracting (glass) Objective and Two Reflecting Objective

Mount the glass objective(s) onto the 18-mm spacer(s).

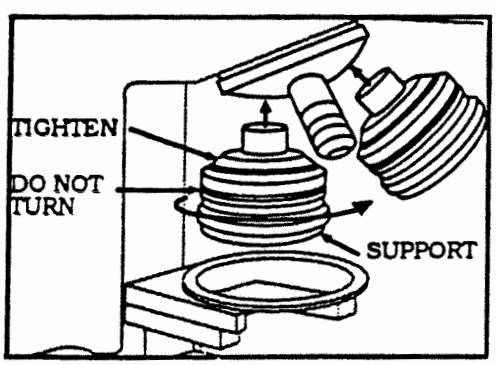
Mount the reflecting (infrared-capable) objectives into the holes alongside the 18-mm spacer.

Note: To mount the reflecting objective, follow the procedure given in 4-place nosepiece with one objective.



4-Place Nosepiece with One Refracting (glass) Objective and One reflachromat Objective

Mount the glass objective onto the 18-mm spacer. Mount the Reflachromat objective into the hole directly (180°) opposite the 18-mm spacer. Rotate the nosepiece so that the desired hole is accessible from the side of the microscope's frame. When starting to thread the objective into the desired hole, support the objective from underneath. Tighten the Reflachromat by the section shown until it is snug. Do not turn the sample-compensating ring.



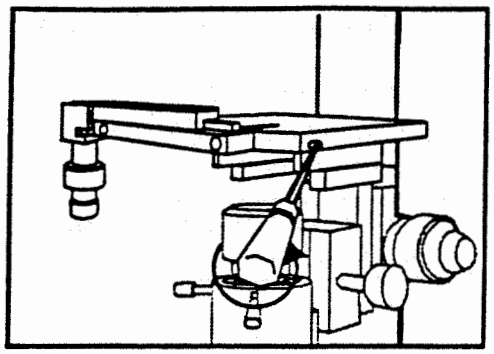
4-Place Nosepiece with One Refracting (glass) Objective and One reflachromat Objective

Mount the glass objective onto the 18-mm spacer.

When two glass objectives are used, mount the Reflachromat objectives into the holes alongside the 18-mm spacers.

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Changing the Stage

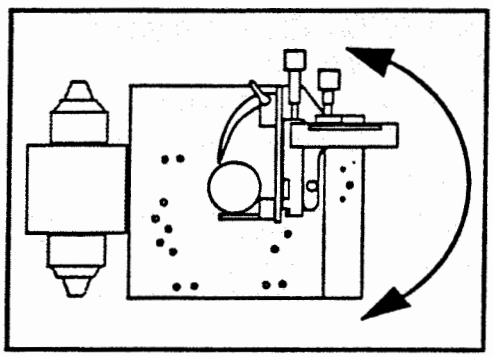


To Remove the Standard 2 x 3 Inch Travel Stage

Using a 3/32 inch allen key, loosen the locking screw in the left-hand corner of the stage platform.

Note: Do not loosen the spring plungers located on the front (user's side) or the screw located in the right-hand corner of the stage platform

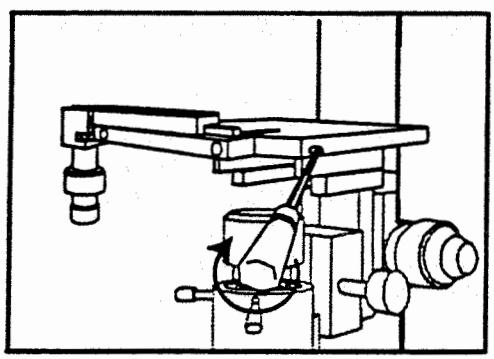
Lift the stage up off the dovetail ring.



To Install the Standard 2 x 3 Inch Travel Stage

Place the stage platform on the dovetail ring that supports the stage assembly.

Rotate the stage platform so that it is at right angles to the microscope's optical axis.

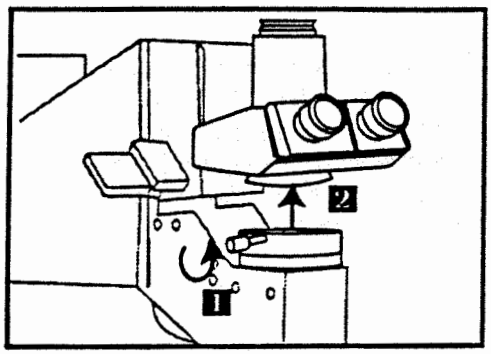


To Install the Standard 2 x 3 Inch Travel Stage

Using the 3/32 inch allen key, tighten the locking screw (located in the left-hand corner) such that the stage platform is held firmly in place.

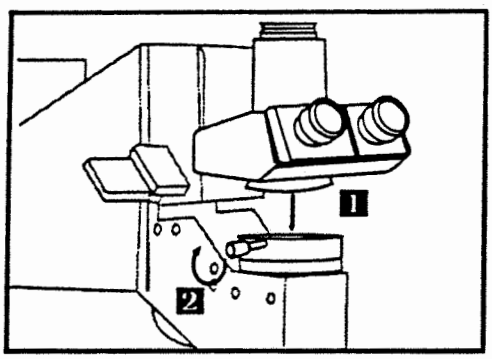
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Changing the Viewer, Installing a Photo Eyepiece



Remove the Viewer

Carefully loosen the clamping screw on the viewer collar mount (1), and remove the viewer (2).

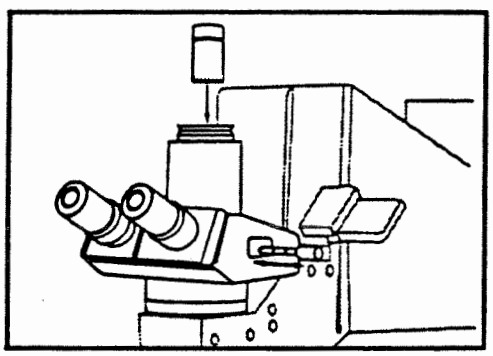


Install the Viewer

Place the binocular or trinocular viewer assembly on top of the upper optical assembly (1

Tighten the clamping screw (2).

Note: The procedure for mounting the viewing tube (viewer) is the same for the standard binocular (part number 0047-407) and for the optional viewers: binocular (4004-513), trinocular (4004-514), and tilting trinocular (4004-515).



Adjust the Light Path Selector

The trinocular viewer is equipped with a light-path selector knob. It is marked View (V), View/Camera (VC), and Camera (C). The light direction is as follows:

V Position: 100% of the light is directed to the eyepieces

VC Position: 20% is directed to the eyepieces, 80% to the camera tube

C Position: 100% is directed to the camera tube.

Note: In order to view through the eyepieces, the knob must be in either the V or VC position.

Place the appropriate photo eyepiece into the photo tube.

Note: In order to view through the eyepieces, the knob must be in either the C or VC position.

Each camera option will come with specific instructions.

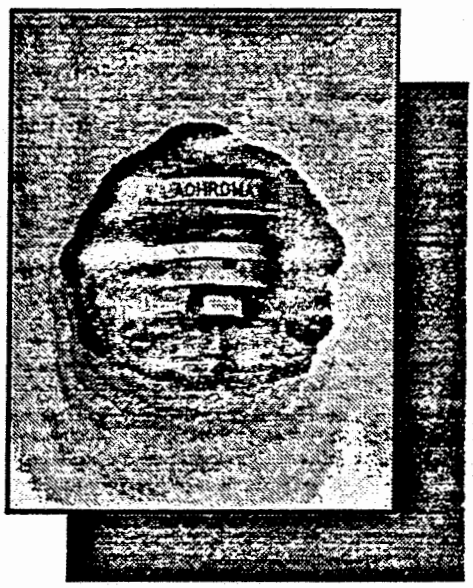
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SLIDE-ON ATR ATTACHMENT

Product Description

The Slide-On™ ATR Attachment for use with the 15X Reflachromat Objective extends the capability of this objective to include micro-ATR measurements while still permitting the 15X Objective to be used for transmission and external reflection measurements. The high refractive indices of the germanium (4.0) and silicon (3.4) crystals are ideal for micro ATR analysis of carbon-filled polymers, silicon wafers (Ge), paints, coatings and glass materials.

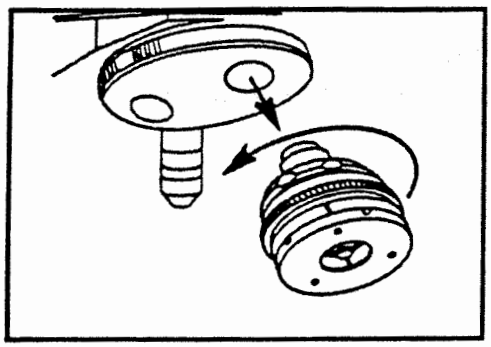
The Slide-On ATR Attachment has two modes of operation: View and Infrared (IR). First, the View mode is selected and the sample is positioned in the center of the field of view. Next, the IR mode is selected and the stage raised to establish contact between the sample and the crystal.



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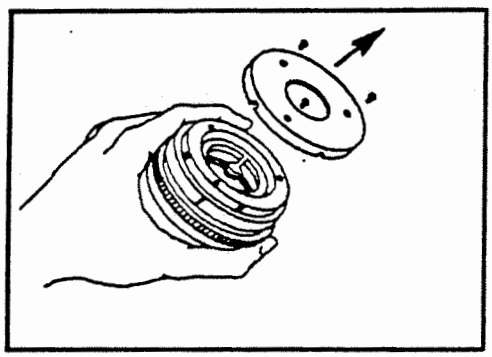
SLIDE-ON ATR ATTACHMENT

Installation & Alignment



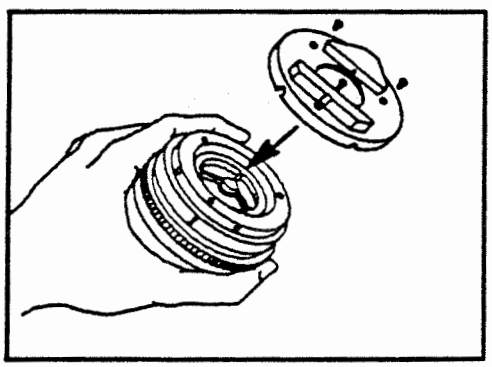
Remove the 15X Reflachromat

Remove the 15X Reflachromat from the nosepiece by rotating it as shown.



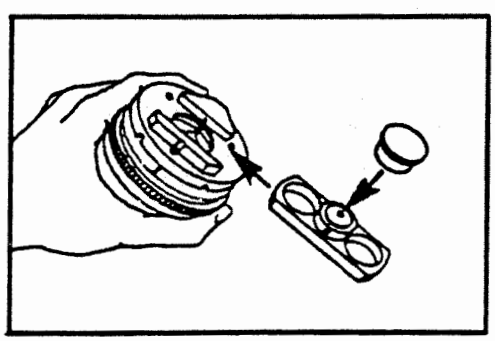
Remove the Black Purge Baffle

Using the 0.035 balldriver provided remove the Black Purge Baffle from the 15X Reflachromat Objective by backing out the three screws securing it to the objective. Retain the ring and screws for future use. Note: There are two different types of Black Purge Baffles.



Install Ring Mount

Install the Ring Mount by securing it to the 15X objective with the three screws provided (use the 0.035 balldriver). Align the two slots on the Ring Mount so that there is one slot on each side of the "15X" which is printed on the Reflachromat Objective.



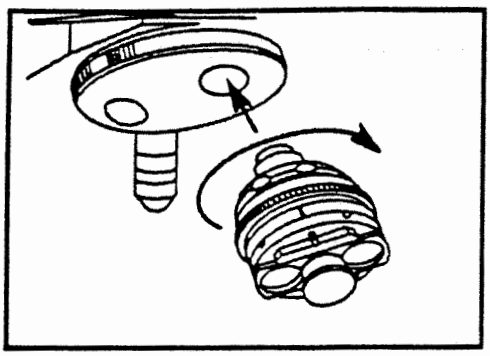
Insert Crystal Slider

Insert the Crystal Slider into the Ring Mount so that the three detents on the Slider are toward the triangular shaped portion of the Ring Mount. Place the protective cap over the ATR crystal.

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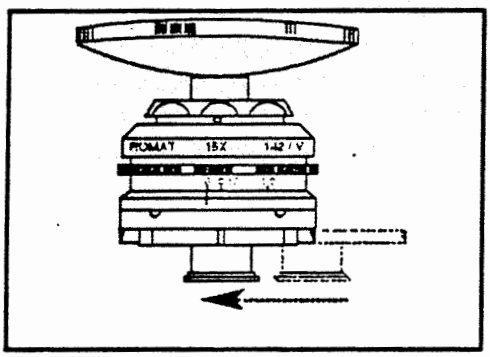
SLIDE-ON ATR ATTACHMENT

Installation & Alignment



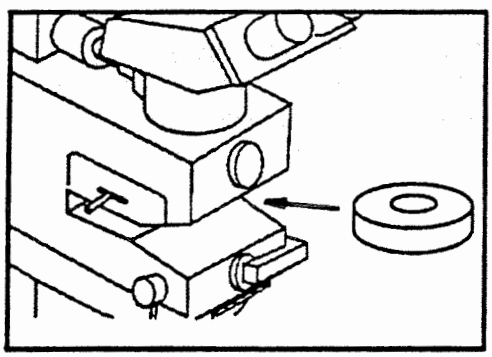
Install the 15X Reflachromat

Install the 15X Reflachromat onto the nosepiece by rotating it as shown.



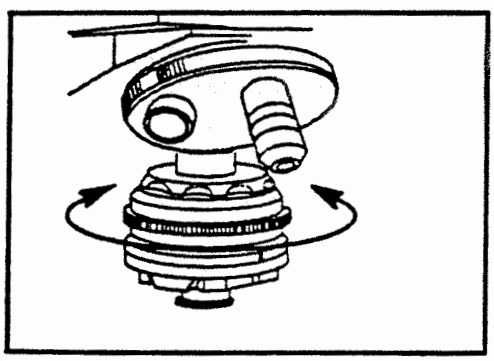
Select ATR Mode

Select the ATR Mode by moving the Crystal Slider to the middle position.



Install upper aperture

Install 1.5mm aperture into upper aperture position.



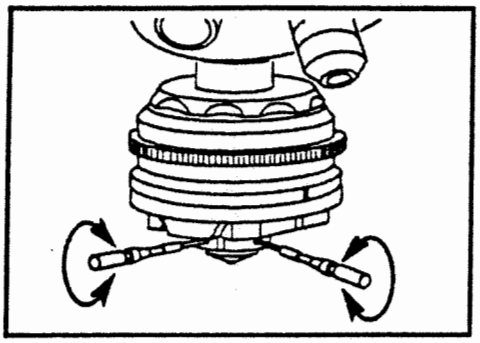
Adjust Compensation Ring

Rotate the compensation ring on the Reflachromat objective while monitoring the energy throughput in the infrared reflectance mode. Adjust the compensation ring to obtain maximum energy throughput.

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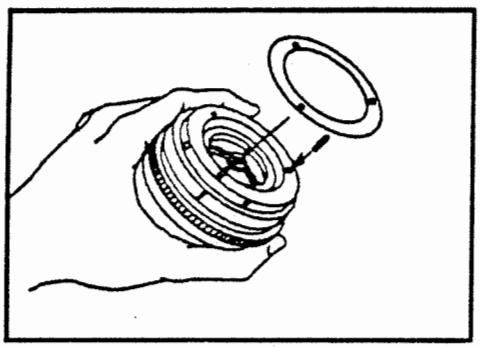
SLIDE-ON ATR ATTACHMENT

Installation & Alignment



Center crystal

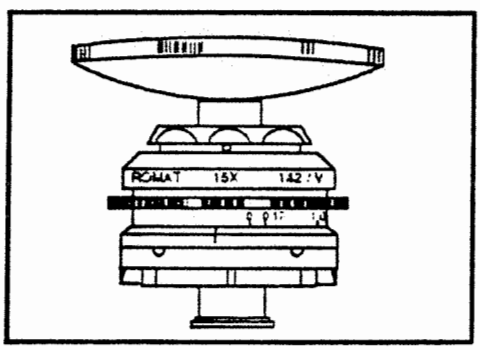
Remove the protective cap from the crystal. Using the three 0.050 hextools provided, center the crystal while monitoring the energy throughput in the infrared reflectance mode. Adjust the crystal for maximum energy throughput by loosening one screw and then tightening another.



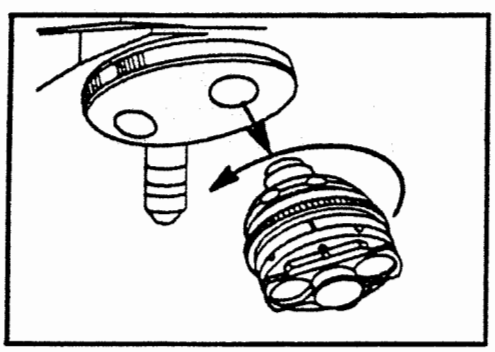
Select appropriate shim

To achieve optimum visual and infrared performance a shim may need to be installed. If the compensation ring is not at or close to zero when maximum throughput is obtained with the Slide-On Attachment, a shim is required. Make note of how far from zero the compensation ring is and consult the table on page 42 for the appropriate shim(s).

Note: If the compensation ring is set at or close to zero when the Slide-On Attachment is at maximum throughput go to the page 13, *Collect Gold Reference*.



New style 15X Reflachromats



Remove 15X Reflachromat

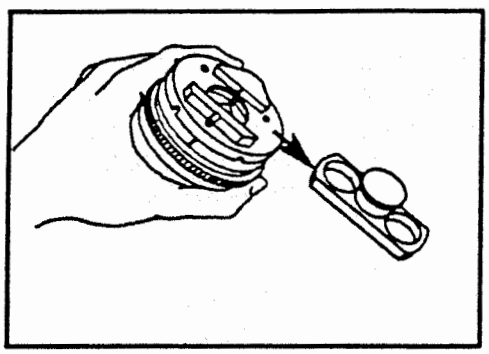
Remove the 15X Reflachromat objective from the nosepiece by rotating it as shown.

Note: The crystal protective cap should be in place.

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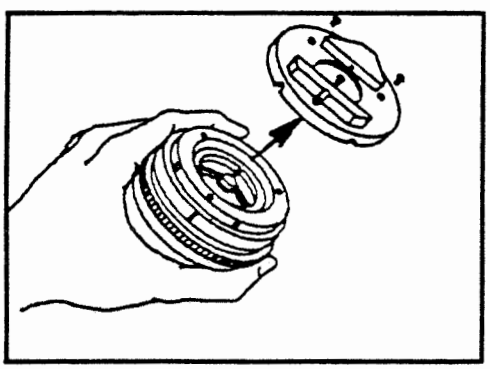
SLIDE-ON ATR ATTACHMENT

Compensation Setting at Maximum Throughput	
New Style 15X Objective	**Required Shims**
-0.5	1 Blue
-1.0	1 Brown
-1.5	1 Brown & 1 Blue
-2.0	2 Brown
-2.5	2 Brown & 1 Blue
-3.0	2 Brown & 2 Blue.



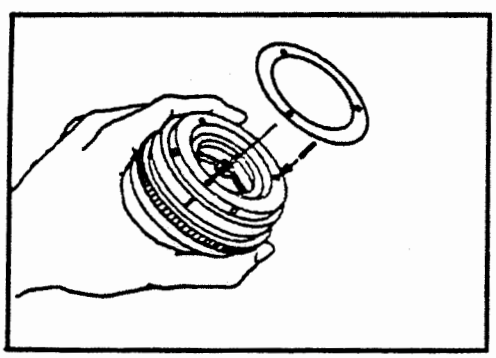
Remove Crystal Slider

Remove the Crystal Slider from the Ring Mount.



Remove Ring Mount

Remove the Ring Mount by unscrewing the three screws securing it to the 15X Reflachromat (use the 0.035 balldriver).



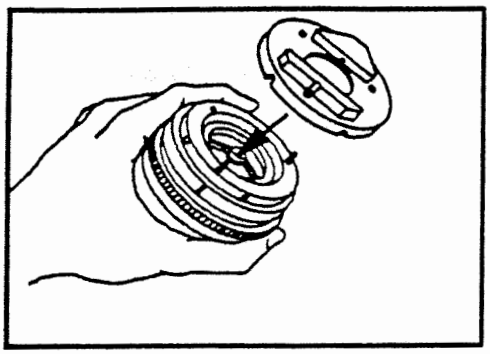
Install Shims

Place two of the 3mm long metal dowels into two of the holes on the 15X Reflachromat. Place the shims onto the Reflachromat Objective using the dowels for alignment.

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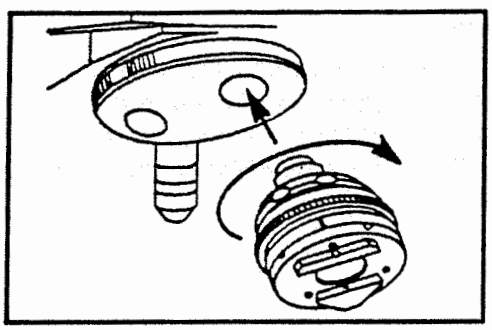
SLIDE-ON ATR ATTACHMENT

Installation & Alignment



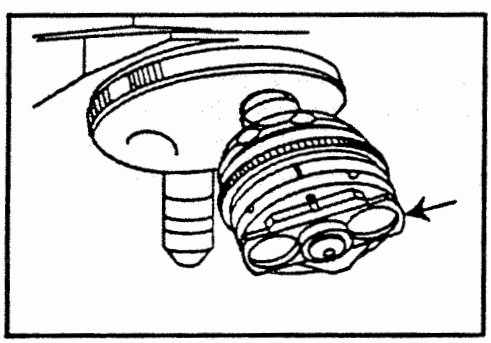
Install Slide-On Ring Mount

Align the holes on the Slide-On Ring Mount to the two metal dowels installed above and mate the two units. Secure the ring mount to the objective with the three screws provided (use the 0.035 balldriver). The two slots on the Ring mount should be aligned so that one is on each side of the *15X.* (printed on the Reflachromat Objective).



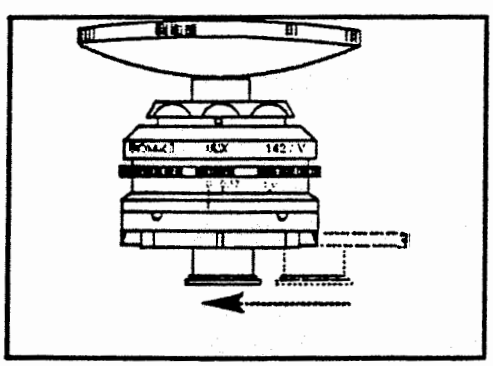
Install the 15X Reflachromat

Install the 15X Reflachromat onto the nosepeiece by rotating it as shown.



Insert Crystal Slider

Insert the Crystal Slider into the Ring Mount so that the three detents on the Slider are toward the triangular shaped portion of the Ring Mount. Place the protective cap over the ATR crystal.



Select ATR Mode

Select the ATR Mode by moving the Crystal Slider to the middle position.

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