

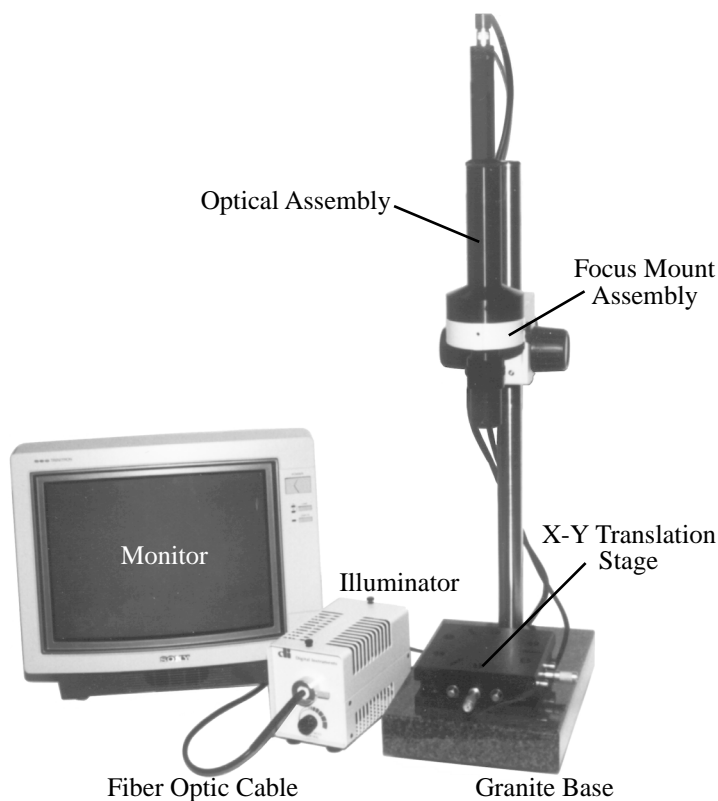
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## *NanoScope® Optical Viewing System*

*Models OMV-NTSC; OMV-PAL*

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Digital Instruments offers the NanoScope optical viewing system as an aid for aligning “TopView” AFM, “TipView” STM and MultiMode™ scanning probe microscopes (SPMs). The optical viewing system consists of a camera, which is mounted vertically over the head of the SPM to view both sample surface and tip.



**Figure 213-1 Complete NanoScope® Optical Viewing System.**  
**(NOTE: monitor not included with Mod. OMV-PAL.)**

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### *213.1 Components*

The optical viewing system includes the following:

- **Granite Base**— The twenty pound granite slab is supported on four isolation pads to dampen vibration for general scanning. An X-Y translation stage is bolted to the granite for convenient lateral positioning of the SPM. For extremely high magnification scans, the optical viewing system should be set atop a vibration isolation table within an acoustic isolation chamber.
- **Support Pole**— The stainless steel pole is screwed onto the granite base to support the combined focus mounting and optical assemblies.
- **Bolt, Washer and Allen Wrench**— Secure the support pole to the granite base.
- **Optical Assembly**— Consists of camera, objective and microscope body.
- **Focus Mount Assembly**— Supports the optical assembly and permits vertical motion for focusing.
- **Split Collar**— Clamps to the support pole to rest the focus mount assembly. This may be positioned anywhere along the length of the support pole.
- **Delrin Washer**— Fits over the pole, between the focus mount assembly and the split collar. Allows low-friction rotation of the focus mount assembly.
- **Illuminator**— Provides light for the optical viewing system, relayed via fiber optic cable to the optical assembly.
- **Fiber Optic Cable**— Connects the illuminator to the optical assembly.
- **Camera Power Supply**— Connects the optical viewing system camera to the monitor using a BNC connector cable and provides power to the camera.
- **Monitor (Optional)**— Displays the video image.
- *Support Note 213, NanoScope Optical Viewing System*— (This document.)

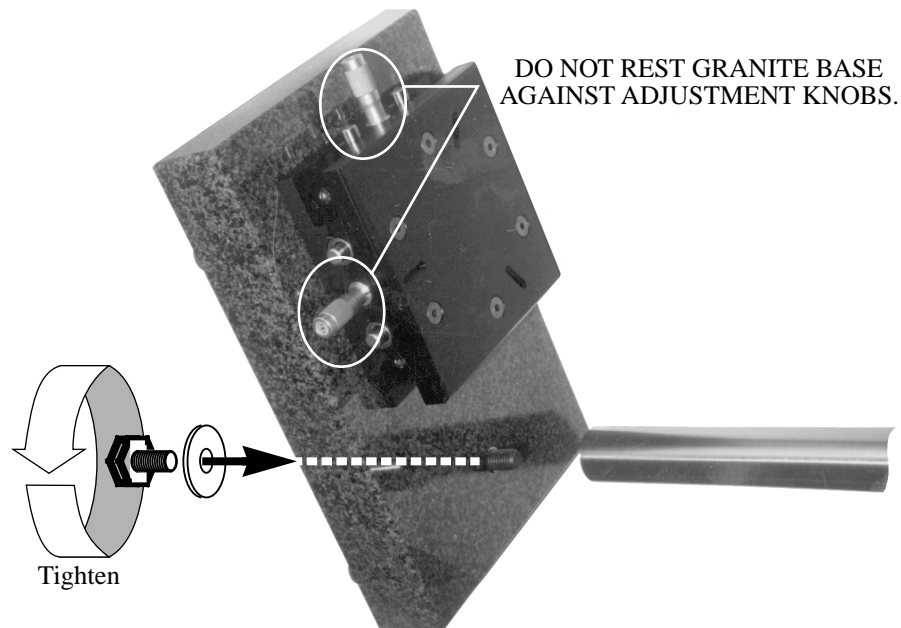
## 213.2 Assembly of Optical Viewing System

### 213.2.1 Remove Contents from Packing Box

Carefully unpack all components from the packing box and check against the list supplied in this document. If components are damaged or missing, contact Digital Instruments immediately.

### 213.2.2 Screw Support Pole to Granite Base

Set the granite base on its side, with the counterbored side of the hole accessible, and both X-Y translation stage adjustment knobs projecting into free space. **DO NOT REST THE GRANITE BASE ON EITHER OF THE TWO X-Y TRANSLATION ADJUSTMENT KNOBS—THEY MAY BE DAMAGED.**



**Figure 213-2 Granite Base Positioning for Insertion of Socket Head Bolt**

Insert the 1/2-13 socket head bolt and 1.5" OD washer from the underside of the granite base through the hole. Screw the bolt into the support pole until snug, then tighten the socket head bolt using the allen wrench supplied. Carefully set the base and support pole in an upright position on a stable surface.

**213.2.3 Mount Split Collar and Delrin Washer**

Orient the split collar with its grooved side upward, then slide it over the support pole and position half way down the pole. Tighten the split collar's knob until the collar is firmly secured. Slide the delrin washer over the pole and rest atop the split collar.

**213.2.4 Install Focus Mount Assembly**

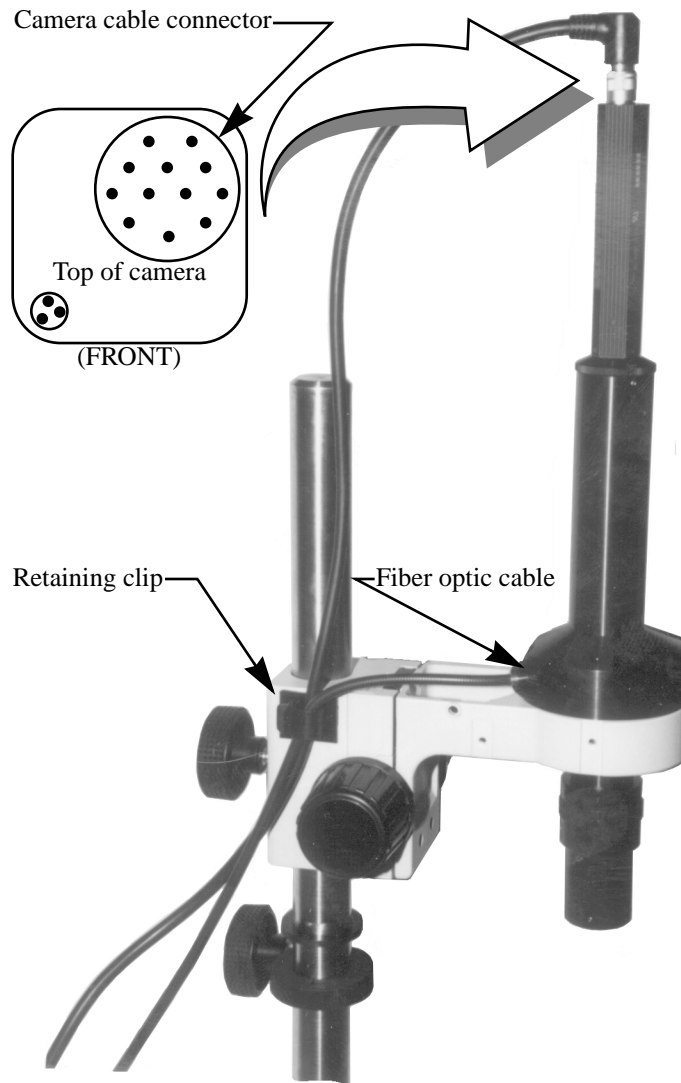
Slide the focus mount assembly down the support pole until it rests atop the delrin washer and split collar. The focus mount assembly should be oriented with its mounting ring (and serial number tag) up. Tighten the focus mount assembly until firmly secured.

**213.2.5 Mount the Optical Assembly**

Fit the optical assembly into the focus mount assembly, then rotate the optical assembly until the fiber optic cable is oriented as shown in Figure 213-3. Insert and tighten a thumbscrew through the mounting ring to secure the optical assembly.

**213.2.6 Attach Camera and Fiber Optic Cables**

Attach the camera cable to the top of the camera using the elbow connector provided. The connector is keyed so that it plugs onto the camera's connector in the proper orientation. Push the connector down until the outside ring snaps into place, locking the cable connector to the camera. Route the cable through the retaining clip on the left side of the focus mount assembly.



**Figure 213-3 Mounted optical assembly.  
Orient camera body as shown (inset)**

### **213.2.7 Connect Camera Power Supply, Monitor & Illuminator**

Connect the other end of the camera cable to the monitor's VIDEO IN connector. Connect the fiber optic cable to the illuminator. Plug the camera power supply, monitor and illuminator power cords into a power strip.

Locate the LINE A/B button on the front of the monitor (provided with Mod. OMV-NTSC), then verify that LINE A is switched ON.

### **213.2.8 Power the Optical Viewing System**

Recheck that all cables are properly connected. Plug the power strip into a power receptacle, then switch it to the ON position. *If the system behaves unusually, switch it OFF immediately!*

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## *213.3 Adjustment of Optical Viewing System*

### **213.3.1 Mount the SPM and Adjust Camera Height**

Using the focus mount assembly's adjustment knob, raise the optical viewing system to a height sufficient to clear the SPM to be used with the optical viewing system. Set the SPM atop the X-Y translation stage on the granite base.

**NOTE:** Slots are provided on the X-Y translation stage to accommodate all "Top-View" AFM, "TipView" STM and MultiMode scanning probe microscopes. These microscopes feature precision balls on their bases and will mate kinematically with the stage. The SPM should be oriented to face forward.

Using the split collar and focus mount assembly adjustment knob, carefully position the camera objective until it is aligned with the SPM head's viewing aperture. The camera objective should be positioned approximately 13 mm above the height of the head's laser adjustment screws.

**DO NOT CRASH THE CAMERA OBJECTIVE INTO THE SPM HEAD!** It is safest to position the camera objective just barely above the head's laser adjustment screws, then focus the optical viewing system by raising it upward (*never downward!*). This will prevent crashing the camera objective.

### **213.3.2 Set Illuminator Level**

Turn the illuminator's knob to the ON position, then increase the light intensity until an image appears on the monitor.

The illuminator intensity should be set to a level which is sufficiently bright to clearly view objects in the camera's field of view, but no brighter.

### **213.3.3 Fine Alignment of SPM and Camera**

Use the X-Y translation stage to align the SPM and optical viewing system. The camera may be rotated in the beam splitter body to obtain proper angular alignment on the monitor. The monitor should render a "true" image, showing the probe positioned at the right side of the screen

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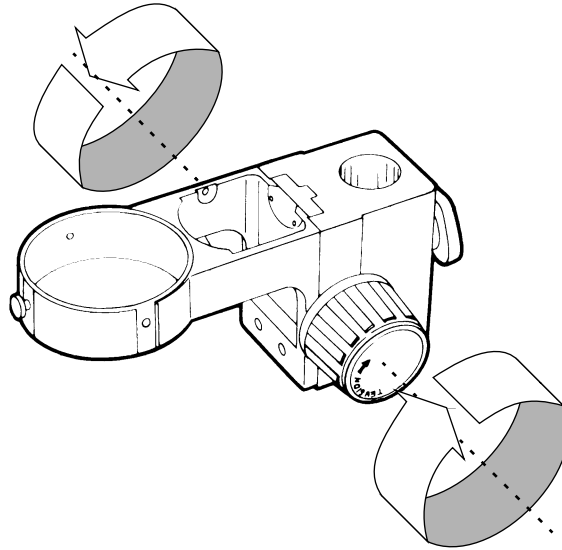
## *213.4 Suggestions*

When operating your SPM with the optical viewing system, it is recommended that the tip be brought close to the sample surface BEFORE aligning the laser with the tip.

If specks of dirt appear on the video image, clean the camera objective's dust cover (the clear glass plate located on the business end of the camera). The dust cover is removed by unscrewing the camera objective. Clean inside and out, then replace.

Use adjustment knobs on the focus mount assembly to raise and lower the camera; however, tension in the mount assembly's slide must be maintained sufficiently to prevent the optical assembly from slipping downward. To adjust tension in the

focus mount assembly slide, counterrotate left-right adjustment knobs clockwise as shown below:



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**Figure 213-4 To increase tension, turn both knobs CW.**

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It is recommended that tension be adjusted with the SPM removed to ensure the objective does not drop onto the SPM head.