

Vertical Engagement Scanners— Installation, Use and Maintenance

223-1 Description



Digital Instruments now offers “E” and “J” scanners which permit vertical engagement without significant lateral movement. The vertical scanners feature the following:

- Completely motorized tip-sample engage.
- Fully vertical engage head does not tilt.
- Easy to locate tip on desired scan area.
- 0.5 μm lateral repeatability on subsequent engages.
- Accommodates samples up to 8.0 mm thick.
- Integrated fluid seal at top of scanner resists fluid spillage.
- Retaining springs mount permanently to scanner body.

Document Revision History: Support Note 223

Rev.	Date	Section(s)	Ref. DCR	Approval
Rev. C	06FEB96	223.1	0095	<i>DB</i>
Rev. B	24JAN96	223.1-221.3	0094	<i>DB</i>
Rev. A	07DEC95	Released	0080	<i>DB</i>



Your vertical scanner should come shipped with the following:

- *Support Note 223, Vertical Engagement Scanner s* (this document)
- MMAFMJ.PAR (“J” scanners) or MMAFME.PAR (“E” scanners) parameter file on diskette¹.
- Stabilizing screw, P/N AFM-SCN-579
- Stabilizing screw, P/N AFM-SCN-580

In addition, you will require a calibration reference, such as a P/N STR10-180.

223-2 Hardware Installation

Installation of the vertical scanner is very similar to earlier models. To install the vertical scanner, do the following:

223-2.1 Remove old scanner.

If the SPM is engaged, disengage the sample by clicking on the **Withdraw** icon several times. Unplug and remove the SPM head from the microscope. Remove the sample, then unplug and remove the old scanner body.

223-2.2 Install vertical scanner.

Set the vertical scanner atop the MultiMode AFM or LFM support ring with the scanner’s leadscrew at the back. The leadscrew should slip into the flexible coupling. If the leadscrew does not seat completely into the coupling, toggle the **Tip Up-Down** switch on the microscope base; this will rotate the coupling until the leadscrew seats.

Plug the vertical scanner cable into the receptacle on the left-rear edge of the support ring.

1. Parameter file name may be labeled with scanner’s serial number (e.g., 1234JV.PAR).

Secure the scanner to the ring using one of two screws supplied (see Figure 223-1 below).



Figure 223-1 Stabilizing screw for securing the vertical scanner to the support ring. MultiMode AFM screw (left), and screw for other SPMs (right).

One screw is supplied with a longer shoulder (P/N AFM-SCN-580); this screw should be used with all MultiMode SPM bases. Use the short-shouldered screw (P/N AFM-SCN-579) for all other SPM models. The screw is inserted through a small hole on the front-underside of the support ring. Turn the screw until snug; do not overtighten.

IMPORTANT! The use of a fastening screw is necessary to ensure optimal system resolution and noise-free operation. **DO NOT** attempt to operate the scanner atop the support ring without a fastening screw!

223-2.3 Install parameter file.

The vertical scanner is shipped with a diskette containing its corresponding parameter file; this parameter file must be loaded into the computer's **EQUIP** directory. To load the file, exit the NanoScope software, then place the diskette into the floppy disk drive. Locate the EQUIP directory on the computer's hard drive, then transfer to it (e.g., **CD \EQUIP**).

NOTE: There may be more than one \EQUIP directory, especially if the SPM uses more than one version of the NanoScope software. If so, copy the file to ALL directories and sub-directories labeled "EQUIP."

The parameter file may be copied with any name, as long as it includes a .PAR extension. Make certain the vertical scanner's parameter file name is not the same as a preexisting file; otherwise, it will overwrite the preexisting file. The parameter file is copied using a DOS command. For example, for a "J" scanner:

```
COPY B:\MMAFMJ.PAR C:\EQUIP\1234JV.PAR
```

Once the parameter file is copied, reboot the NanoScope software to resume.

NOTE: The vertical scanner parameter files are identical to all other “J” and “E” scanner parameter files except for the **Motor sensitivity** parameter. On vertical scanners this parameter value is larger than older models. A summary of **Motor Sensitivity** parameter values is provided below.

	<i>Motor Sensitivity</i> parameter value (Tip travel per half step)	
	AFM, LFM, TipView STM	MultiMode™ AFM
Vertical Scanners	80	110
3-screw Scanners	19	26

223-2.4 Select scanner.

Transfer to the **Real Time / Microscope / Select** panel. Click on the “J” or “E” button within the “Scanner” selection box, depending upon whether a “J” or “E” scanner is to be installed. If another “J” or “E” scanner parameter file already exists in the \EQUIP directory, both choices will be presented. Select the newly copied parameter file, then click on the panel’s **Ok** button to exit.

223-2.5 Inspect scanner.

Load a calibration reference (e.g., P/N STR10-180) on the MultiMode SPM, engage the surface and obtain an image. Verify that the scanner is working properly, and take a series of measurements on the calibration reference to ensure accuracy.

If the calibration reference is not measuring accurately, it may be necessary to calibrate software parameters to ensure measuring accuracy. This calibration procedure is detailed in the latest revision of *Support Note 217, Calibration Procedures*. Follow instructions provided in this document to properly recalibrate your vertical scanner.

223-3 Troubleshooting

223-3.1 Scanner is not properly calibrated.

Verify that the scanner’s parameter file has been properly copied to each of the computer’s **EQUIP** directories. Check the parameter file name; it should include a .PAR extension (e.g., JVSCANR.PAR). Try to reselect the scanner using the **Real Time / Microscope / Select** panel.

If the parameter file is correctly selected but measures inaccurately, it may be necessary to calibrate the scanner. This calibration procedure is detailed in the latest revision of *Support Note 217, Calibration Procedures*.

223-3.2 Sample will not move (Tip “Up/Down” switch doesn’t work).

If the vertical scanner is adjusted to its maximum tube height, the leadscrew may disengage from the motor coupling on the MultiMode base. (This is a built-in feature to prevent motor burn-out.) To reengage the leadscrew, remove the scanner from the support ring, then manually back the screw out several turns. Replace the scanner on the support ring and reattempt motorized movement.

If the leadscrew becomes fouled with grit, rotation may become difficult or impossible. To inspect, remove the scanner from the support ring and turn the leadscrew manually while feeling for resistance. If the leadscrew resists rotation, it will have to be backed out, cleaned with solvent and lubricated. (DO NOT attempt to clean the leadscrew while in the scanner body; solvents will ruin the scanner circuitry!) A leadscrew cleaning procedure is detailed in *Support Note 216* available from Digital Instruments.

NOTE: If screw is frozen (i.e., cannot be rotated), DO NOT attempt to force it! Return the scanner body and screw to Digital Instruments for repair.