

Unpacking/Packing and Setting Up the CMC Semiprobe LA-150 Probe Station

The purpose of this guide is to ensure that the probe station is unpacked, set up, dismantled, and packed correctly and efficiently for transportation between CMC and Clients.

This manual details the unpacking of the shipping cases, and the subsequent repacking after test. There are some Operation Instructions related to special considerations in getting the best test results. In addition, consult the manual titled “LA-50 - LA 200 Operating Manual.pdf” supplied by Semiprobe.

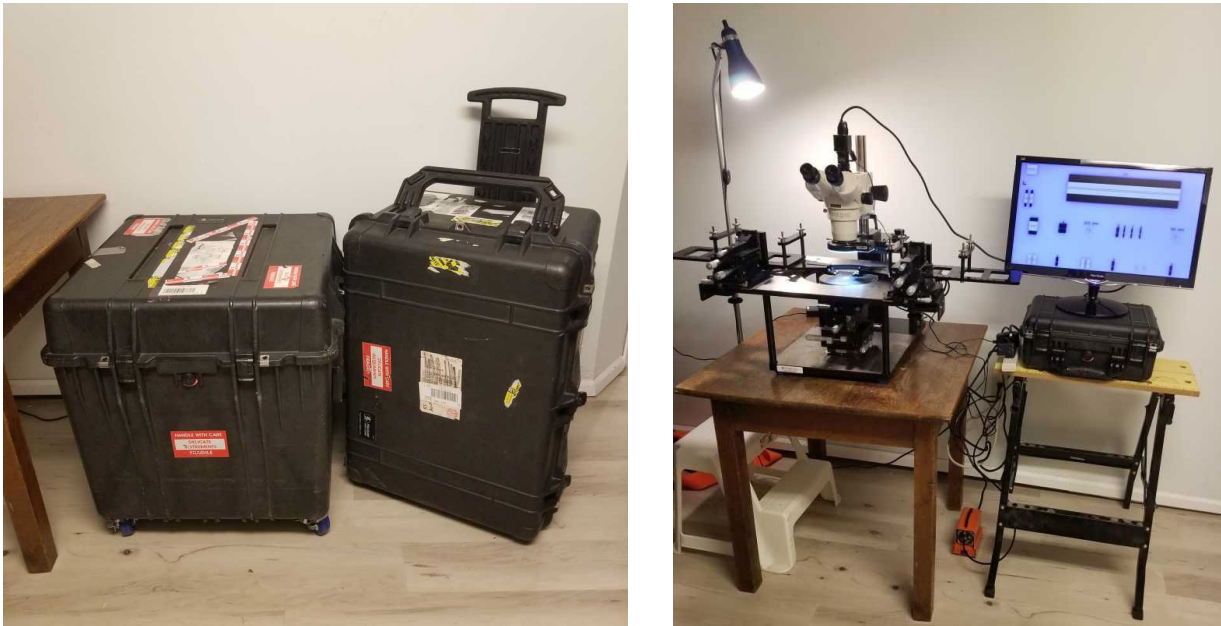


Figure 1 – Cases and final setup.

The probe station comes in two large mobile Pelican cases – a model 0370 cube case and a 1690 rectangular case. The large cube case holds the probe station and accessories. It has four locking wheels. The large rectangular case holds the positioners, monitor and accessories. It has an extendable handle and two wheels, like travel luggage.

To unpack and set up the prober, ensure that you have a sturdy table to set it up on. Ideally, and especially important for mm-wave probing, place the probe station on a floating vibration isolation table. Open the cube case first so that the probe station can be placed on the test table and the positioners, microscope, camera, monitor and accessories can be installed on it as they are unpacked.

***** Pay careful attention to how the cases have been packed. Take pictures if necessary *****

The following guide will outline proper unpacking and setup, with the take-down and packing for shipping being the reverse of these steps. It is mainly pictures and is intended as a reference for how to repack it after having used it.

Please see Figure 38 for the probe station exploded view and naming detail. The top surface of the station is called the platen, and note the Special Instructions before beginning test, given at the end of this document.

Opening the Large Cube Case

The large cube case contains the probe station platform, the stage with the chuck connected to the vacuum tubing, the microscope, microscope focus block, mounting post, camera with power supply and microscope cell-phone mount.



Figure 2 – Cube case opened. Left: Foam packing. Right: Accessory boxes.

***** Removing the probe station platform from the case is a 2-person lift *****

The probe station platform is very heavy. It is secured to a board with straps for lowering into the case. This board is bolted to the bottom of the case. Remove the foam packaging and the boxes of accessories and put them on the workbench. Pay close attention to the packaging order and any labeled pieces of foam.



Figure 3 – Left: Board at bottom of case has long protruding bolt in each corner.

Right: Station platform secured to board with straps using cross pieces holding the chuck stage in place. Note corner holes.

Figure 3 shows detail of the cube case, and board with straps having the station bolted to it by the two crosswise boards that also secure the chuck stage in place. The stage has the magnetic lock enabled (slider to the right).

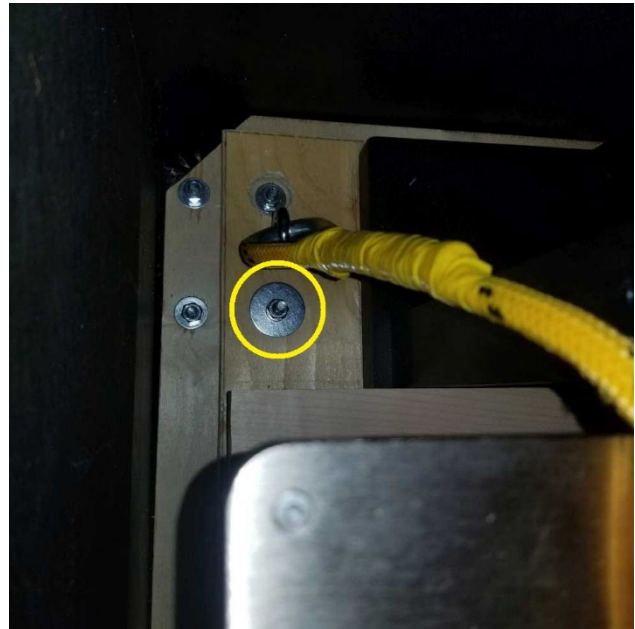
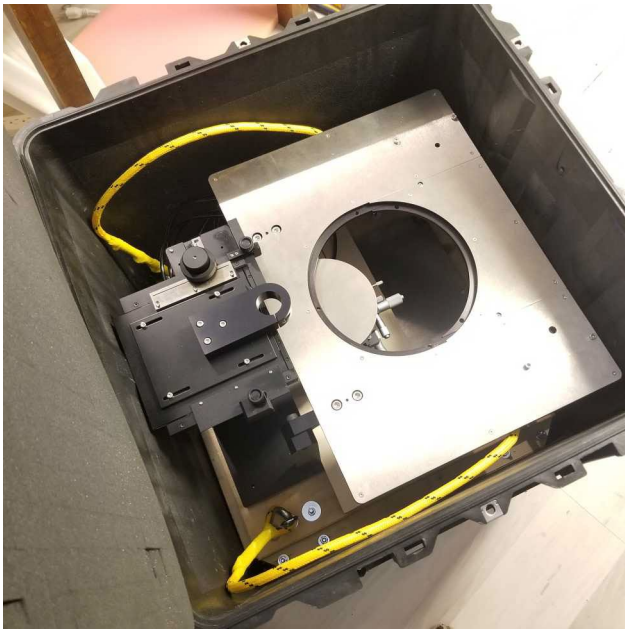


Figure 4 – Left: Station in cube case, all accessories and foam removed. Lifting straps accessible. Right: Station board with straps has a hole in each corner for the protruding bolts to pass through and be secured by nut and washer.

Before lifting out the station, remove all the accessories. Loosen and remove the nuts and large washers holding the board with straps to the bottom of the case. With two people to lift, use the straps to lift the platform out of the cube case and place it on your worktable.



Figure 5 – Left: Microscope post and cell phone holder accessories. Right: Station on sturdy bench.

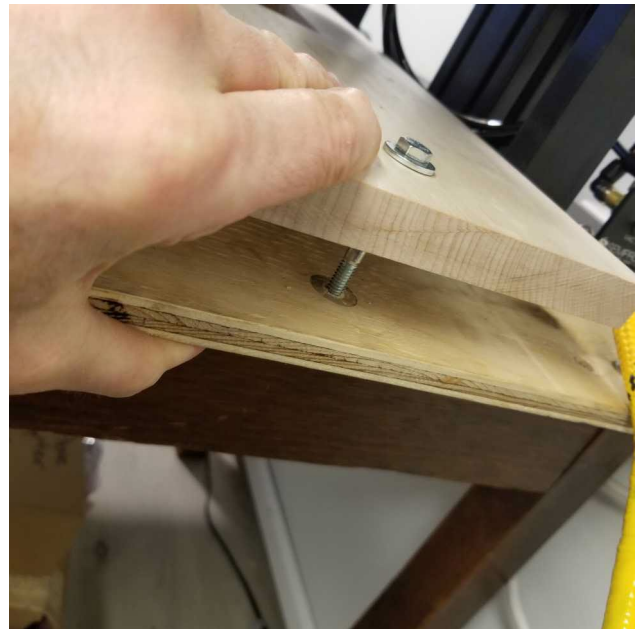


Figure 6 – The bolts for these retaining boards are a specific length not to protrude too far through the lower board as it sits directly on the bottom of the case. Remove for setup, and when reinstalling, the boards may need to be squeezed together to start the threads.

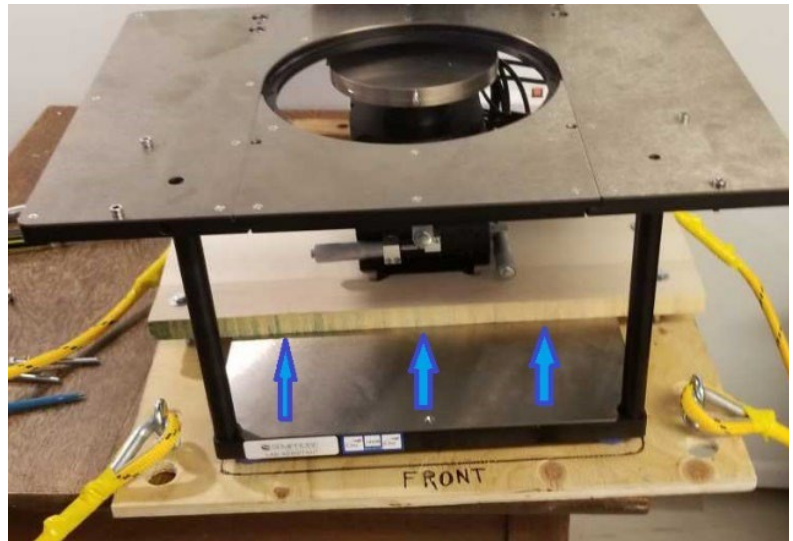
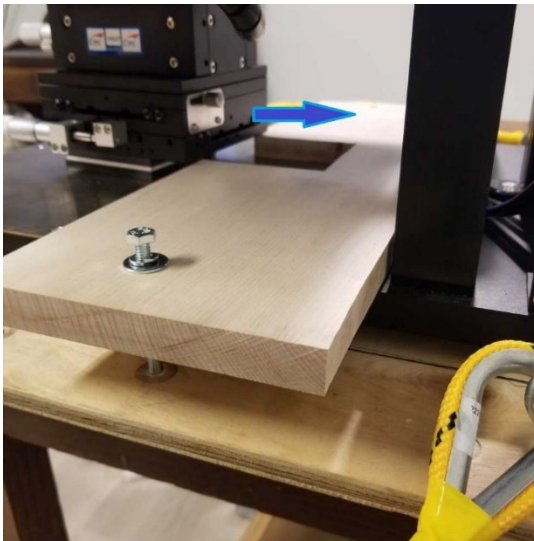


Figure 7 – The two retaining boards are of hard maple, for strength. They have cutouts for the chuck stage to slide into to be secured. To remove the stage, release the magnet base and slide out. To reinstall the stage, first install the rear board, then slide the stage in and engage the magnet base (move lever from left to right).

The bolts for these retaining boards are a specific length to not protrude too far through the lower board as it sits directly on the bottom of the case. Remove boards for setup, and when reinstalling for packing, the boards may need to be squeezed together to start the threads.

Note that the two retaining boards are of hard maple, for strength. They have cutouts for the chuck stage to slide into to be secured. To remove the stage, release the magnet base and slide out. To reinstall the stage, first install the rear board, then slide the stage in and engage the magnet base

Note: to engage the magnet base on the chuck stage, move lever from left to right.

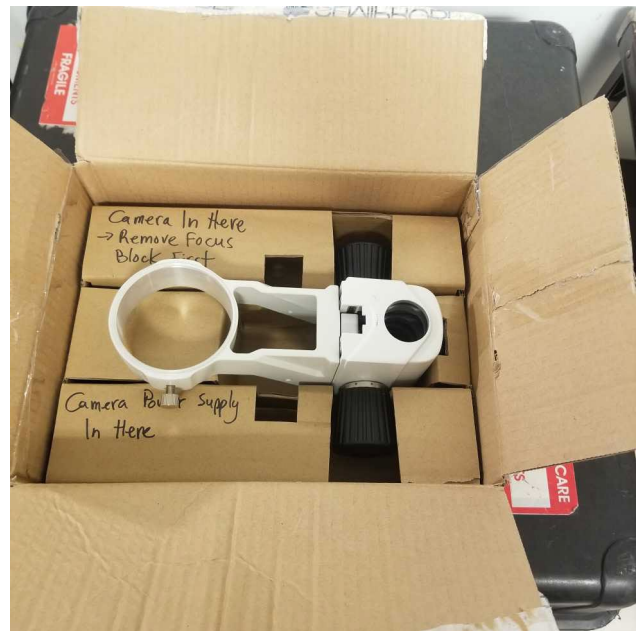


Figure 8 – The box with the focus block contains the camera and power supply.



Figure 9 – Install and tighten the microscope tube on the station, then add the focus block.



Figure 10 – Microscope packaging



Figure 11 - Left: Microscope packaging and after installing camera.

Right: Microscope on Focus Block. Ensure dust cap is in place before

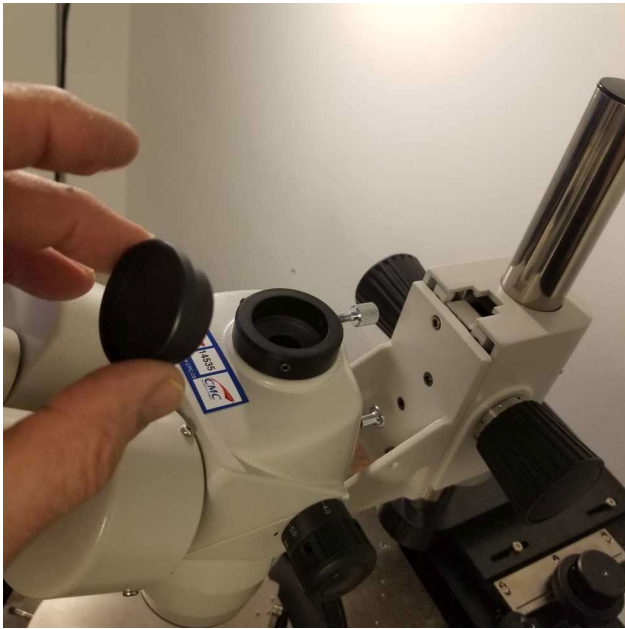


Figure 12 – Remove dust cap and install camera with label forward for upright image. Camera ring has hex screws and thumbscrew to securely mount camera. **Do not overtighten.**

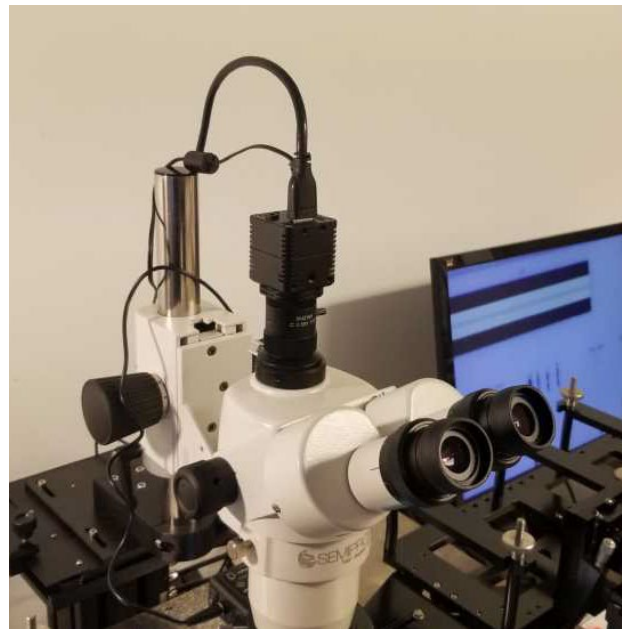


Figure 13 – Left: This pullrod switches between binocular eyepiece and camera views. Right: Route cables so as not to torque camera or the view will be skewed. See notes at end.

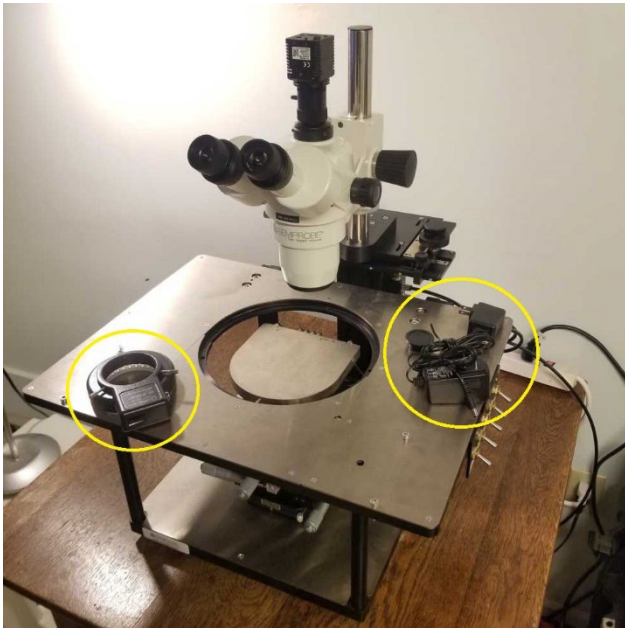


Figure 14 – attach the ring light to the camera lens. Note that the light has a dimmer dial.

**This completes the setup of the prober and accessories from the cube case.
The positioners and monitor with accessories are in the rectangular case.**



Figure 15 – Monitor is on top. The monitor base is in the box in the upper left corner, shown removed here.



Figure 16 – Top layer of case has a box of accessories, a box of manuals & tools, and the vacuum pump. Brown box contains cables, accessories, positioner brackets, tape and tie wraps.

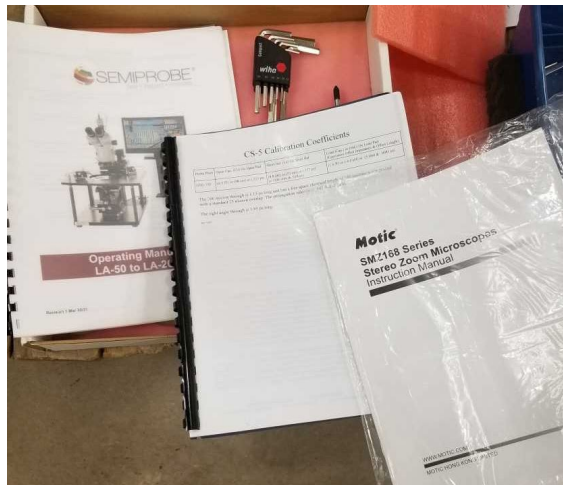


Figure 17 – white box contains manuals, impedance standard substrate (ISS – probe calibration substrate), and necessary tools.

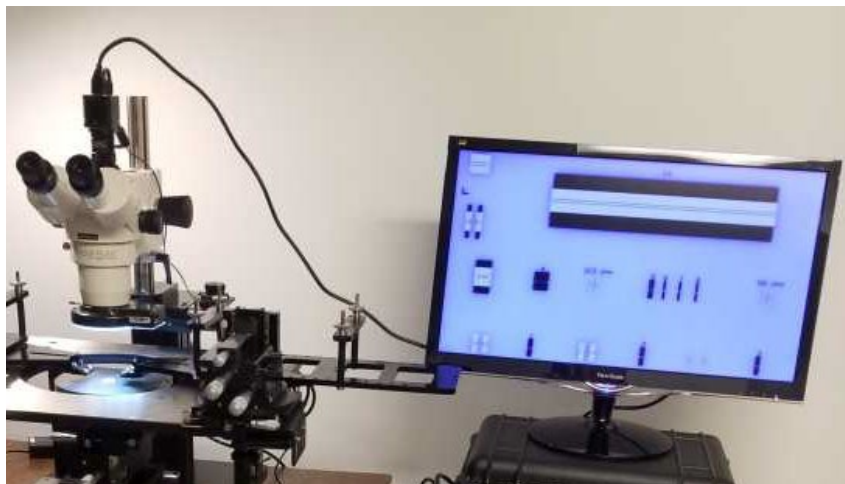


Figure 18 – The GGB CS-5 cal substrate under the microscope, shown on the monitor. The CS-5 is paired to GGB probes. You may need your own ISS if you're using other probes. You will also need a contact substrate to ensure planarity of the probes.

***** Do Not Use the Calibration Substrate to Planarize Probes *****



Figure 19 – Once the top layer boxes and vacuum pump are removed, remove the foam and shelf.

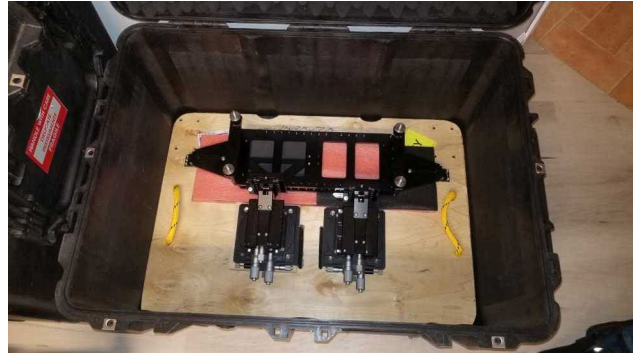


Figure 20 – Remove the foam protecting the positioners. The positioners are securely attached to the platform. When lifting out the platform of positioners, note that the brackets extend below the platform, so it will need to be placed on blocks. See next figure.

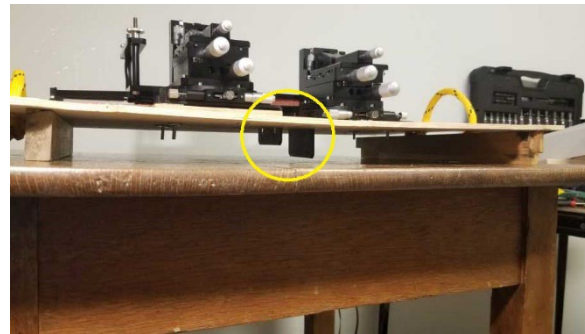
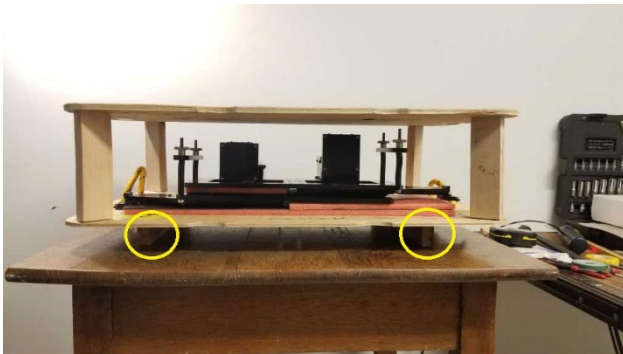


Figure 21 – Two risers (blocks, textbooks, etc.) are required to set the positioner platform on because the positioner brackets extend below the platform.



Figure 22 – When removing the positioners in the following steps, you will see that the brackets go through the platform. There are corresponding slots in the bottom foam of the case to accommodate this.

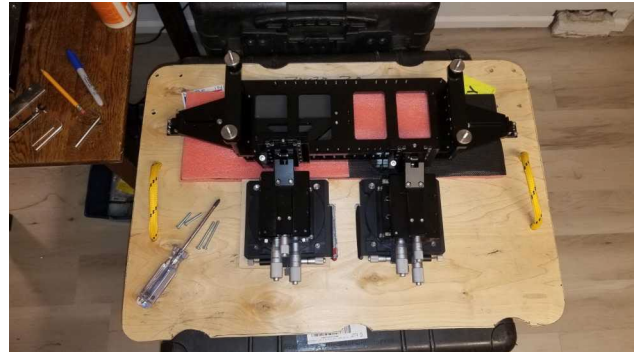


Figure 23 – These positioners are large form factor to hold the VNA frequency extension modules. After being secured to the platform for shipping, the positioner carriages are tie wrapped together.

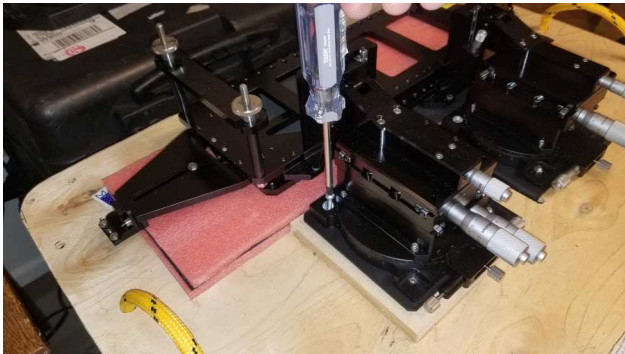


Figure 24 – To begin removal for setup, remove the tie wrap and remove the screws securing the positioner to the case. Note that there is a shim under the positioner base which will be required on the probe station.

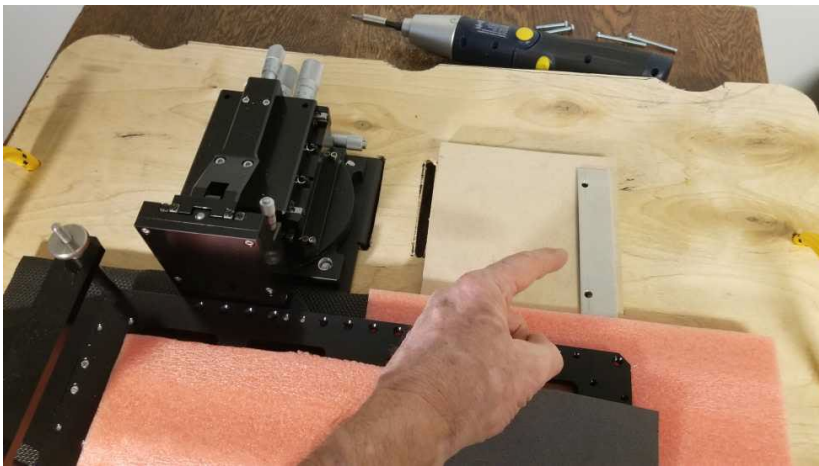


Figure 25 – These shims will be required on the probe station. The mounting hex screws are on the station platen.

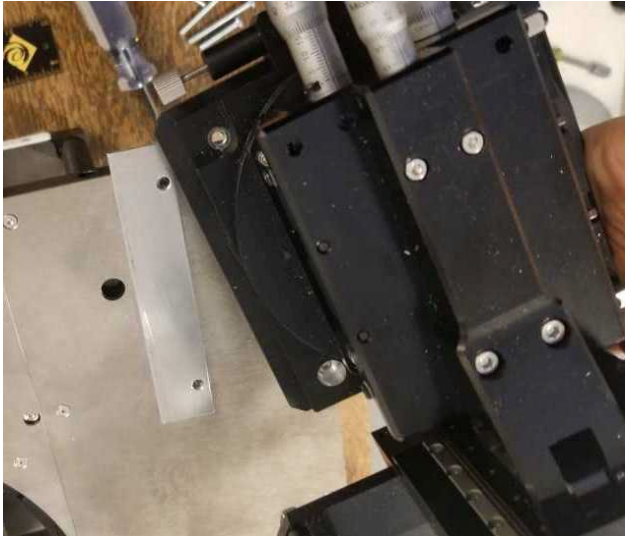


Figure 26 – Remove the hex screws, align the shim and mount the positioner. Use the hex screws to secure the positioner to the platen.

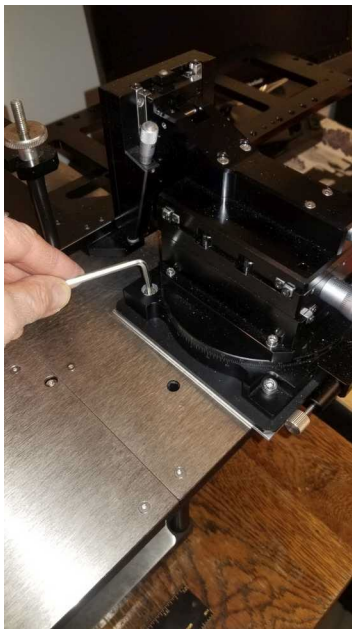


Figure 27 – The shim is required so that the positioner base, which has a rubber bottom, does not tilt forward when tightened. The accessory box has the clamp brackets required to be attached to the positioner bracket.

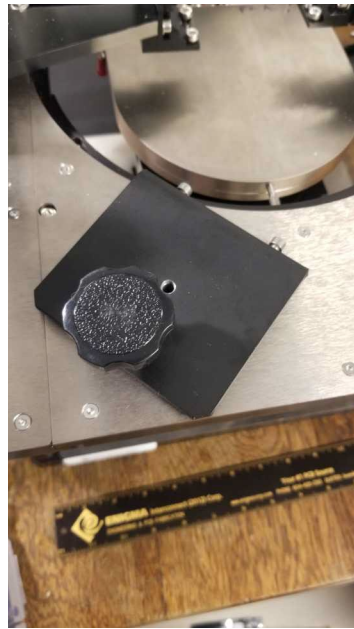


Figure 28 – Positioner clamp bracket detail.

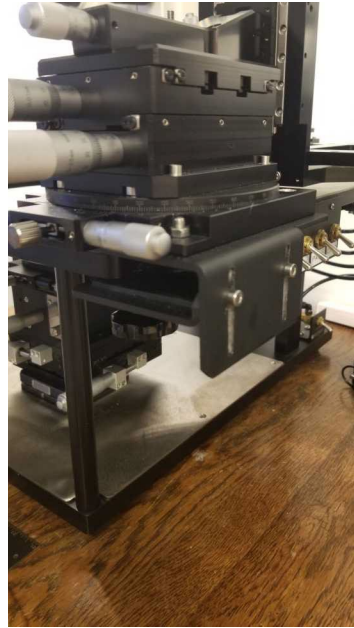


Figure 29 – Attach the positioner clamp bracket to the positioner clamp with the hex screws.



Figure 30 – Left: The clamp bracket tightening screw is right at the edge of the platen.
Right: With both positioners installed, the probe station setup is almost complete.



Figure 31 – The final step in the station setup is to install the vacuum pump. Then, the station will be ready to begin the measurement setup – installing probes, adjusting the probes to be planar and calibrating the test instruments.



Figure 32 – The station vacuum tubing is coiled and attached to the side of the microscope stand. Uncoil it and plug the tube into the front center port of the vacuum pump. It is a push-on quick-release connector. To release the tubing for packing up, pull on the cylindrical outer collar of the connector.

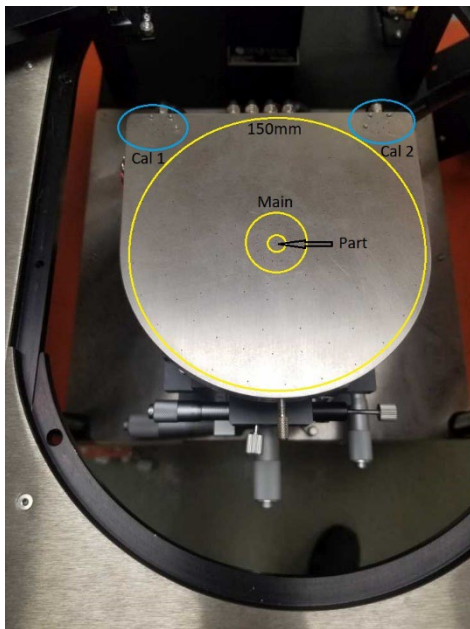


Figure 33 – Left: The vacuum pump provides vacuum to the various regions of the chuck. Note that there are two “auxillary regions” of the chuck, labeled Cal 1 and Cal 2, for positioning the contact substrate and the calibration substrate. There are also 3 rings of vacuum holes on the chuck, as shown. Right: These regions are controlled by the toggle switches on the right side of the probe station.



Figure 34



Special Instructions before beginning:

Facing the probe station, positive x-direction is left to right, positive y-direction is front to back and then, in accordance with the right hand rule, positive z-direction is up.

For shipping, the Chuck and Positioner stages are locked by thumbscrews and the magnetic base is enabled (locked or ON). Micrometers are used for fine positioning and then the thumbscrews lock the stage into place.

For rotational (theta, θ) adjustments of the chuck and positioners, coarse adjustment can be done by hand after releasing the micrometer connection, and then fine adjustment can be done with the micrometers when reconnected. The "micrometer connection" is shown in Figure 35L and Figure 37R in the yellow circles beside the micrometer – that thumbscrew connects the micrometer to the rotational stage, loosen it to adjust the chuck or positioner rotation by hand and then tighten it to make fine adjustments with the micrometer. Once you have the chuck and probes (on positioners) where you want them, you can tighten the thumbscrews to give greater friction or lock the position.

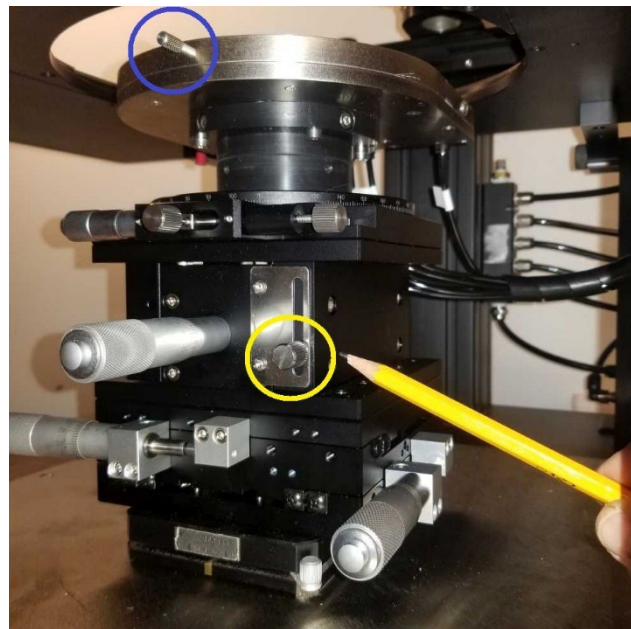
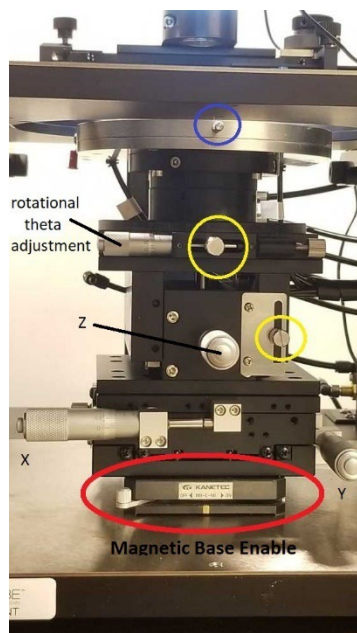


Figure 35 – Left: thumbscrew circled beside the rotational micrometer connects the micrometer to the stage. The magnetic base is enabled when lever is moved to the right. Move to the left to reposition the stage on the base plate.

Right: thumbscrew can be tightened to provide greater friction when moving the stage or lock it in place.

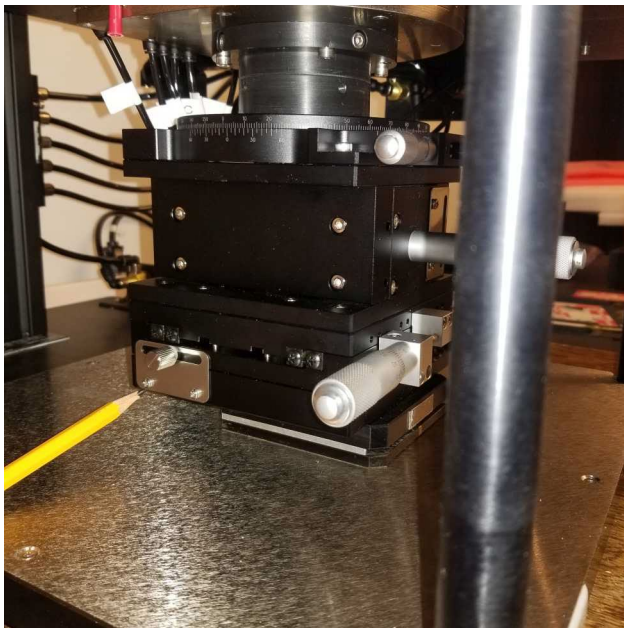


Figure 36

Coarse adjustments:



Figure 37 – Left: From pg 13 & 17 of “LA-50 - LA 200 Operating Manual.pdf”
Right: thumbscrew in circle connects or releases the rotational stage to the micrometer. The thumbscrew in the square locks the rotational stage once it is in the right position.

Special Packing Considerations:

Dismantle and pack the probe station up in the reverse order of the setup, beginning by removing the components and putting them in their assigned boxes, removing the positioners and attaching them to the boards to load first the rectangular case and then the cube case.

Positioners and Accessories in Pelican 1690 Rectangular Case:

Loosen the thumbscrew on the positioners, shown circled in Figure 37.

Station in Pelican 0370 Cube Case:

On the chuck stage, tighten the X, Y and Z stage Resistance/Lock thumbscrews as shown in Figure 35 and Figure 36.

Special Setup and Test Considerations:

Thoroughly read through this guide and the manual, “LA-50 - LA 200 Operating Manual.pdf”, provided by Semiprobe. Component labels and an exploded-view diagram are shown below in .

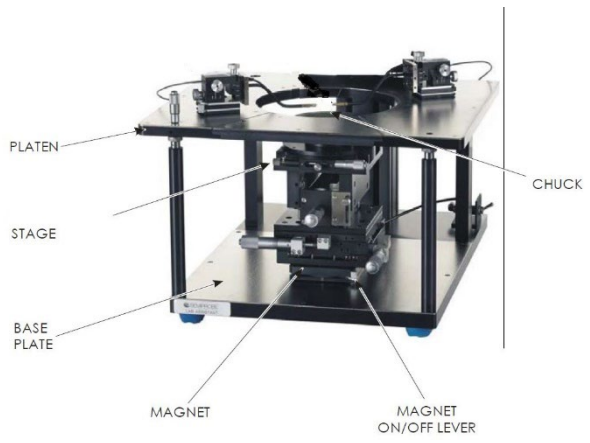
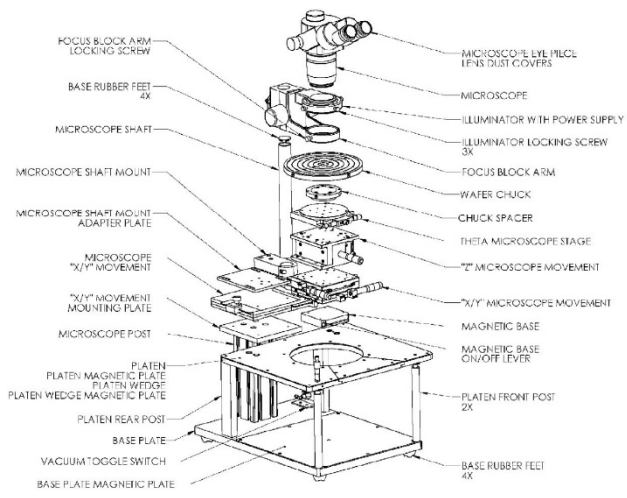


Figure 38 – Probe station exploded view and naming detail.