

MicroScribe 3D: Part Referencing and Daisy-Chaining in Rhino to Digitize Objects Larger than the Workspace

Daisy Chaining and Part Referencing are terms used to describe the process of positioning an object within the physical workspace of the MicroScribe and then re-referencing the object's orientation within that workspace. By using commands in the software you will be prompted to enter three reference points with the MicroScribe. These points will define how your physical model's real coordinate system will relate to Rhino's world coordinate system.

This document will describe how to set the MicroScribe up within a workspace and move the device or model within this workspace. It assumes the following:

- You have a MicroScribe 3D digitizing system.
- Your MicroScribe 3D system is connected and communicating through your computer's serial port.
- You have a foot pedal or hand switch (supplied with the device) connected to the accessory port of the MicroScribe.

1. Connect the Digitizer

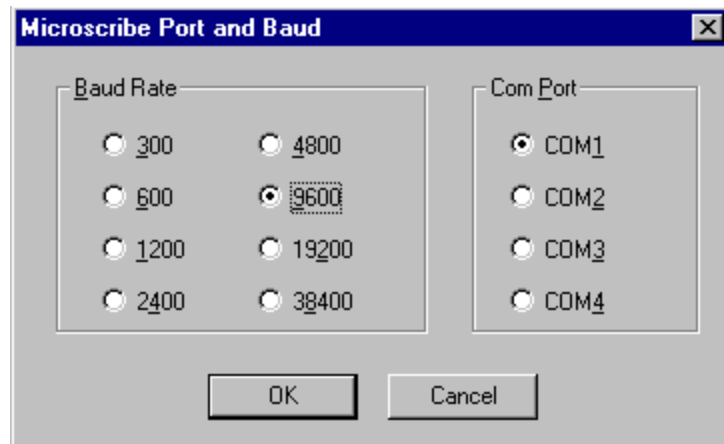
To daisy chain an object complete the initial calibration process that will identify the origin (0,0,0) and Cartesian systems (XYZ axes):



Click the *Connect Digitizer* icon on the 3-D Digitizing Toolbar.

At the *Select Digitizer* pull down list choose *Immersion MicroScribe*. Click *OK*.

Select the proper Baud Rate and Com Port in the *MicroScribe Port and Baud* dialog box. The default Baud Rate of 9600 is fine. Choose the Com Port the MicroScribe is connected to on the back of the computer. Click *OK*.



At the *Enter origin with digitizer* prompt place the MicroScribe stylus tip at the point you would like the origin of your workspace to be. Press the foot pedal or button on the hand switch to input the point.

At the *Enter X axis with digitizer* prompt place the MicroScribe stylus tip in the direction you would like the positive X-axis. Press the foot pedal or button on the hand switch to input the point.

At the *Enter Y axis with digitizer* prompt place the MicroScribe stylus tip in the direction you would like the positive Y-axis. Press the foot pedal or button on the hand switch to input the point.

At the *Enter origin in Rhino (press Enter to use world origin)* prompt press the *Enter* key on the keyboard.

The MicroScribe is now connected through Rhino.

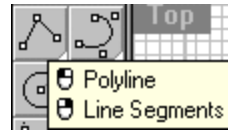
2. Mark & Digitize Reference Points on the Model

This process will define three reference points for your model to allow part referencing and daisy-chaining operations.

In considering the 3 points, you must find physically repeatable points to touch with the MicroScribe. A reference point's ideal position is the intersection of three surfaces which create an inverted corner to "sink" the MicroScribe stylus tip into. Other methods include marking 3 points on a model with a fine pen or pencil.

After deciding on the location, place markers near the points you wish to use as reference points. Marking methods vary, but can include writing on the model or writing on a piece of tape with an arrow to the marker point. Label the markers 1, 2, and 3.

Start a polyline by clicking on the icon from the main toolbar:



Draw a polyline using the three labeled points. Starting with the point labeled 1, place the MicroScribe stylus on the marker and click the hand switch or foot pedal.

Move the MicroScribe stylus tip to the point labeled 2 and click to take a second point on the polyline.

Finally, click on the point labeled 3. Finish the polyline by pressing *Enter* on the keyboard or click the left foot pedal.

Click on the polyline with the mouse to select it. Display the edit points by choosing *Edit > Point Editing > Edit Points On* from the top menu.

In the Osnap panel check *Point*.



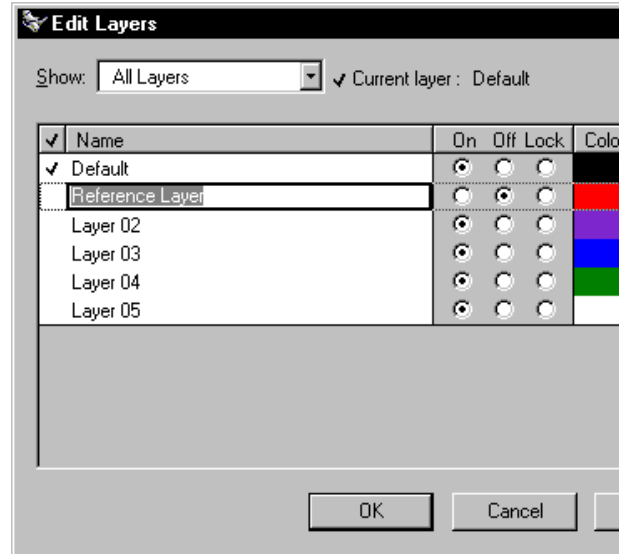
Show the *Annotate* toolbar by choosing *Tools > Toolbar Layout* from the top. Select *Annotate* from the list, then click *Show*. Click *Close* to exit out of the dialog box.

Label the points on the polyline by clicking on the *1* button on the *Annotate* toolbar, then the first point on the polyline. The first point will be labeled with the *1* dot.

Label points two and three in the same manner.

Select the three points, the polyline, and the three annotation dots by clicking and dragging a window around the objects with the mouse.

Create a new layer by right clicking on the layer selector at the bottom of the screen. Click the *New* button and enter "Reference Points" in the name field. Check the *Off* option.



3. Move the MicroScribe and Re-calibrate

After inputting the reference points, the physical model or the MicroScribe can then be moved. When moving either it is crucial that the three reference points are still reachable by the MicroScribe from the new location.

If the MicroScribe or the model is moved, or you need to close or restart Rhino, you will need to recalibrate the MicroScribe so that the new data matches up with the existing data.

Turn on the "Reference Points" layer. If desired, it may be helpful to hide all other layers.

Click on the polyline with the mouse to select it. Display the edit points by choosing *Edit > Point Editing > Edit Points On* from the top menu.

In the Osnap dialog box, check the *Point* option.

Initiate the MicroScribe calibration sequence

At the *Enter origin with the digitizer* prompt, place the MicroScribe stylus tip on the marker labeled 2.

At the *Enter x-axis point with the digitizer* prompt, place the MicroScribe stylus tip on the marker labeled 3.

At the *Enter y-axis point with the digitizer* prompt, place the MicroScribe stylus tip on the marker labeled 1.

At the *Enter origin in Rhino* prompt, use the mouse to click on the annotated *Dot 2* point in Rhino.

At the *Choose an x axis* in Rhino prompt, use the mouse to click on the *Dot 3* point in Rhino.

At the *Choose a y axis in Rhino* prompt, use the mouse to click on the *Dot 1* point in Rhino.

Previously unreachable sections of the model are not ready to be digitized.

To digitize additional sections, establish 3 new reference points per the instructions, move the MicroScribe again, and recalibrate as explained above.