MicroScribe 3D:
Using MicroScribe in Pro/ENGINEER on UNIX systems

- Overview
- Getting Started and the "Home Position"
- Setup for Unix
- Procedures for Gathering Data

<u>Overview</u>
GENERAL INFORMATION
The MicroScribe-3D is a tool used to digitize three-dimensional points. Simply, it translates the positional information of the stylus tip into X,Y,Z coordinates (i.e. points) directly into Pro/ENGINEER based on a defined origin.

This document will describe how to create points directly in Pro/ENGINEER on a UNIX platform. These points can be converted into Datum Points for use in creating Datum Curves, which can be used to create surface or solid geometry. There are three primary uses for the digitizer:

- **Reverse Engineering:** Create a part from surface information
- **Component Placement:** Determine object positional information
- **Two-Dimensional Data Transfer:** Convert Mylar or drawings into Datum Curves

GETTING STARTED

Component Information

To get the most from the MicroScribe, please take a few moments to get familiar with the principal components. Below is a diagram of the parts and a list of their function:
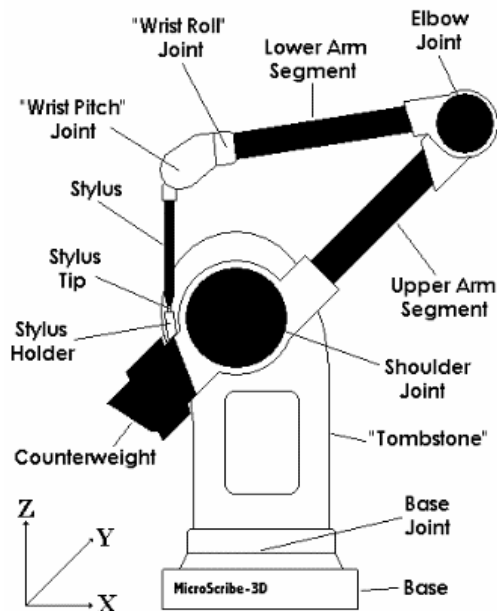
Base:

Foundation of MicroScribe, which remains stationary during use. All input and output connections are located on the base as well as the green Power Indicator and on/off switch.

Power Indicator:

Green light indicating that power is available to unit and it is turned on.

Counterweight:

Weight to offset the weight of the arm to afford ease of movement and balanced positioning.

Digitizing Arm:

Single-jointed arm that allows the stylus to be positioned nearly anywhere within the radius of the arm.

Stylus Tip:

The portion of the arm where the MicroScribe reads positional information.

Stylus Holder:

Place where stylus is to be stored when not in use and on start-up.

"Home" Position/Default Coordinate Reference Frame

At power-up, the default origin (0,0,0 point) is set directly below the center of the base joint axis, flush with the bottom of the base plate. This also corresponds to the center of the threaded insert used for tripod-mounting the MicroScribe.
The default X axis runs parallel to the shoulder upright (or "tombstone"), with positive X being in the direction that the counterweight points (opposite the direction the "elbow" points.) The default Y axis runs perpendicular to the tombstone, with positive Y extending straight out from the face (front) of the tombstone. The Z axis is up (from the desktop.)
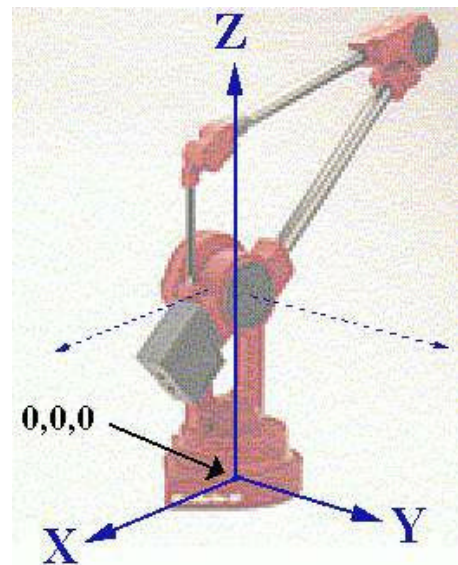
MicroScribe 3D - Unix operations

The following describes how to connect and set-up the MicroScribe for use with the Unix operating system. The following topics will be covered:
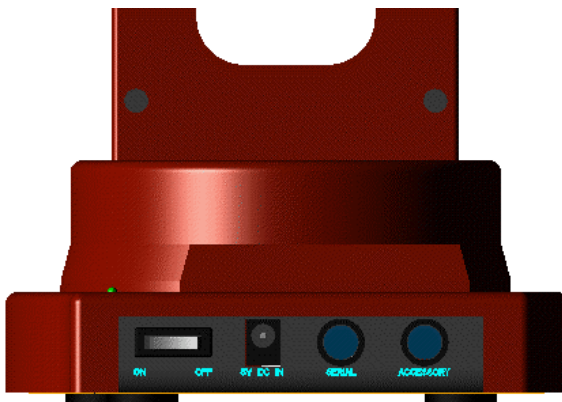
- Connecting the MicroScribe

- Configuring the MicroScribe

Connecting the MicroScribe
Perform the following to connect the MicroScribe to your workstation:
- Unpack MicroScribe and all cables.
  - Power cable and adapter.
  - Appropriate serial cable.
    - O_2: Nine pin, D-type
    - Indigo$_2$: PS-2 type
       Foot pedal.

ENSURE POWER SWITCH IS OFF AND SCRIBE IS IN ITS HOME POSITION PRIOR TO PROCEEDING.
- Connect power cable to *5V DC IN* jack.
- Connect Serial cable to *SERIAL* jack and to Serial Port 2 on your workstation.
- Connect foot pedal to *ACCESSORY* jack.

Position the MicroScibe on a solid surface and central to your work.

Configuring the MicroScribe

Perform the following to configure the MicroScribe for use:

- Create a subdirectory of your $HOME directory named *pro_scribe*.
  - *cd*
  - *mkdir pro_scribe*
- Download the following files to the *pro_scribe* directory then *uncompress* them:
  - *Inscribe-SGI* from http://www.immerse.com/microscribe/software.html

Follow these steps to download and uncompress the above files:

- Pick link.
- When page loads, select **File | Save As ...**
- This should leave you with an *events* file and an *mxse* file in your *pro_scribe* directory.

Configuring Pro/ENGINEER

You need to add the following lines to your *config.pro* file:

SPIN_WITH_PART_ENTITIES YES

   Allows seeing datum features during spins.

DATUM_POINT_SYMBOL DOT

   Shows datum points as dots.

KBD_CMD_ABBREVIATION ON

   Allows abbreviated keyboard commands.

MicroScribe 3D - Gathering Data directly in Pro/ENGINEER on UNIX System

The following describes how to collect data using the MicroScribe. Specifically, it addresses how to retrieve data points directly into Pro/ENGINEER using the Unix set-up.

Synopsis

The MicroScribe can be used to directly input Datum Points in Pro/ENGINEER. This is done using the existing Pro/ENGINEER functionality of **Feature|Create|Datum|Point|Offset Csys|Enter**. Normally, you would need to enter the x, y, z coordinates manually. With the MicroScribe, you can enter the point data by using the foot pedal. These Datum Points are then used to create Surface Features or Datum Curves. The following procedure outlines the general steps to create Datum Points using the Microscribe-3D.

Initial Conditions
- Unix workstation on and user logged into HOME directory (i.e. /usr/people/jonesp).
- Software installed in "pro_scribe" directory (i.e. /usr/people/jonesp/pro_scribe).
- MicroScribe connected via serial cable and turned off.
- Stylus in Home Location. (Figure 1.1)
- Events file configured.
- Config.pro configured.
- Pro/ENGINEER started.

Note: The unit should be placed so that the cables are pointing away from the user. The stylus should be in the Home Location with the counterweights to the left of center and the stylus to the right. This would be the typical set-up for right-handed users.

Start-up

- Turn the Power Switch to *On*.
- Change to the *pro_scribe* directory.

- Start the MicroScribe software by typing the following:
- *mxse*
- When the cross-hairs appear, pick inside the Pro/ENGINEER Message Window.
- Set the origin by performing the following:
    1. Pick *Set Origin* from the *mxse* menu.
    2. Place the stylus point on the point where the origin will be. Press the footpedal.
    3. Place the stylus point on a point on the x-axis. Press the footpedal.
    4. Place the stylus point on a point on the y-axis. Press the footpedal.

The z-axis is automatically formed according to the right-hand rule for cartesian coordinates.

Note on the origin setting: By mounting your physical model to a digitizing platform (available from Immersion Corp.), you can set your "0,0,0", "X", and "Y" directly on the platform. If you maintain the reference of your model on the platform, you can recall a working file and re-reference the origin to the physical world by re inputting the original "0,0,0", "X", and "Y". This process allows you to exit your digitizing session and return to it.

Datum Point Creation
- Start a new Pro/ENGINEER part or retrieve an existing part.
- Ensure there is a coordinate system to use as a reference.
- Select the following Pro/ENGINEER commands:

> Feature
> >Create
> >>Datum
> >>>Point
> >>>>Offset Csys
> >>>>>Pick the reference coordinate system. This coordinate system will be analogous to the origin you set previously with the scribe.
> Cartesian

Enter Points

> Place the stylus at the point you want digitized and press the footpedal. The x,y,z coordinates will be entered into the Pro/ENGINEER Message Window and will allow you to enter more points. Simply press the footpedal at each point you want digitized. When you have completed all of your points, perform the following:

- Press the *enter* key to quit entering points.
- Select **Done** from the *Point Array* menu.
-

You may now use your datum points to create datum curves.

MicroScribe 3D – Precautions

PRECAUTIONS
General

- Avoid excessive heat. The MicroScribe is designed to work at room temperature.
- Avoid direct sunlight.
- Prevent static electricity discharge. Be sure the serial cable is always connected.
- Prevent physical shock to the unit especially the joints.
- Avoid moisture and all contaminants.
- Always transport in packaging provided.

Imperative

- Ensure the stylus is in its holder prior to turning on the power.
- Turn off the power while the system is not in use.
- Never connect any external cables while the power is on.
- Clean off any spills immediately.
- **Never pack the system with the stylus in the home position.**

NEVER TRY TO FORCE THE MICROSCRIBE BEYOND ITS PHYSICAL LIMITS. If the MicroScribe requires excessive force to move, it is becuse you have reached a mechanical limit. Forcing beyond these limits can result in damage to the system.