INTRODUCTION

If you are new to CAD, this section will be helpful to understand the concepts used in MicroStation. If you are experienced in CAD, however, you can skip directly to the User Interface.

CONCEPTS

SYSTEM OVERVIEW

MicroStation V8i can be operated as a 2D general-purpose drafting program or as a 3D modeling program.

POSITIONING THE CURSOR

MicroStation V8i receives its graphic input from the mouse or digitizer. This manual refers to the graphic input device as a mouse, i.e. the object you use to move the graphic cursor on the screen.

MENUS

Many of MicroStation V8i commands reside in menus. A menu is a list of options available to you. Each menu has a specific purpose. For example, the File menu allows you to enter a command to open or retrieve a drawing you have previously saved. Note that a file is a place in the computer where a drawing is stored. This manual will interchangeably use File or Drawings. If you are familiar with products like Microsoft Office then the menus will be very familiar in behavior.

Some menu selections open a dialog. A dialog provides further options for the active command.
TOOLBOXES

Some menus can be opened as a toolbox. A toolbox consists of tools identified by representative images called icons. You can click on an icon to command MicroStation V8i. For example, click on the little circle icon to command MicroStation V8i to draw a circle.

TASK BAR

The task bar that appears on the left side is how MicroStation V8i presents its toolboxes. Tools are grouped into categories. Click on the category name such as “Drawing” and it opens up to show tools (this task is usually open by default.) If a tool has a small arrow on the lower right corner of the icon, click and hold to see the popout list of tools. Having both name and icon helps in learning. When you want, you can open each group as a toolbox by right mouse clicking on the section of the tool bar and clicking “Open <toolboxname> as a toolbox.

ELEMENTS

MicroStation V8i allows you to create a drawing using basic building blocks called elements. Other CAD software programs often refer to these building blocks as objects, entities, or primitives. Elements include lines, circles, arcs, French curves (Bezier curves), points, text and more.

Cells (referred to as symbols or blocks in other software) are created from elements and stored in libraries for later use.

A series of elements can be connected such as lines, arcs and curves into “complex chains”. The complex chain can then be treated as an element. Some software call these connected elements a “polyline”. MicroStation V8i also uses the term “SmartLine” for connected elements.

LEVELS

MicroStation V8i allows you to manipulate an unlimited number of different layers or levels. A level can be thought of as one sheet of clear plastic. All elements with the same level number or name are on the same sheet. Turning on a single level is like viewing only one of the “plastic” sheets. Turning on a second level is like placing a second sheet on top of the first.

REFERENCES

Information can also be organized by the use of References. When making a new drawing, any existing drawings can be viewed simultaneously with the new drawing. When a drawing is viewed as such, it is called a “reference” since it is being used as a reference for the new drawing. An example would be to view a floor plan as a reference when making a new drawing of the electrical wiring for a house. A new drawing can reference any number of other drawings. The major difference between levels and references is the fact that you cannot make changes to references, only display them.
**VIEWS**

MicroStation V8i can display from 1 to 8 different views of the same file (2D drawing or 3D model). Each view is independent of the other views, but all views show the same active drawing’s content.

**VIEW CONTROL**

You can move each the contents of each view around (called panning), and thus look at different portions of your drawing. In addition, you can shrink the window so that you are looking at a tiny detail of the drawing (magnifying or zooming in to fill the view on your display screen). Or, you can take a “bird’s eye” view by “zooming out” to look at your entire design from a distance. The view control tools are located in the upper left corner of each view as well as available from the Settings menu.

**ATTRIBUTES**

Each element you create is automatically assigned certain display attributes. For example, a line will have a ‘linestyle’, i.e. solid, dashed, dotted, etc. Other attributes include color, level, line weight, priority (order of drawing) and transparency. The attributes of an element can be changed at any time.

**REAL WORLD COORDINATES**

Each drawing is created using the appropriate “real world” measuring units. Whether the drawing consists of a 100 millimeter machine part or a 1000 foot facilities layout, you can create and position each element in its true dimensions. All scaling for the sake of putting your design on paper is done at the time you send your design to the printer.

**SNAP**

Snapping pulls (or snaps) the cursor to a precise X, Y location. Several types of snap can be selected from the Snaps menu. Keypoint is, by far, the most commonly used snap. Keypoints are the characteristic points on an element such as end-points and center of a line, center and quarter-points of a circle or arc to name a few. You can also snap to the intersection of two lines, tangent or perpendicular, and more. When active, MicroStation’s Accusnap feature automatically finds the nearest snap point.

**DESIGN PLANE**

MicroStation V8i uses the concept of a design plane. A MicroStation V8i design plane is essentially infinite in all directions. More precisely, coordinates are stored in 64 bit IEEE floating point which provides a huge range of coordinates that for all practical purposes is infinite.
GLOBAL ORIGIN

Since the design plane is really a coordinate system that you draw on, somewhere in the design plane there has to be a point with the coordinates 0,0 or 0,0,0 in 3D. This point is referred to as the global origin. This coordinate system is set up for master units. For instance, the coordinate “1,0” lies one master unit to the right of the global origin, and the coordinate “1.5,0” lies one and one half master units to the right of the global origin. Master units will be described in more detail throughout this course.

HANDLE POINT

A handle point is the point on an element by which you control placement or modification. These are usually only visible when you select individual elements using the Select Element tool.

COMMAND PROMPTS

When adding elements to your drawing, you are guided by text prompts in MicroStation’s status bar located at the bottom of the screen. For example: Place first point of line, place center of circle, etc.

When modifying elements, such as moving a rectangle (called a block in MicroStation) you will control its movement with the point at which you select it.

MANUAL COORDINATE ENTRY

There are several ways to enter the X and Y coordinates for placement of an element. When a prompt calls for the location of a point, you can move the cursor to the desired coordinates and press the left mouse button. This is called a “Data Point”.

You can also directly enter coordinate values via the Key-in window (Utilities menu > Key-in) For an absolute location coordinate in your drawing, you type “XY=a,b <enter>” to supply the coordinates a and b from the keyboard.
For relative location coordinates type “DL=c,d <enter>” to supply c (the change in X from the previous location) and d (the change in Y) from the previous location. For polar location coordinates type “DI=e,f <enter>” to supply the radius “e” and angle “f” offset from the previous location.

ACCUDRAW COORDINATE ENTRY

The preferred and dominant method of entering coordinate values is AccuDraw. AccuDraw uses a combination of your last data point and your hand motion to determine whether you want to enter positive or negative, x or y coordinates and then you simply type the number representing the distance. AccuDraw greatly reduces the number of keystrokes required to enter precise coordinates as well as provide immediate feedback in the form of the AccuDraw “compass.”
EXECUTING COMMANDS

MicroStation V8i offers several ways to execute commands:

1. **Click-click**, example: click on the menu name at the top of the screen. Then click on the menu in the pull-down.

2. **Click/drag/let go**, example: hold button down over menu and keep it down while moving to menu item in pull-down. Then let go of button.

3. **Powerkey**, press “Alt” and underlined letter on main menu. Press only the underlined letter in sub menus.

4. **Type-in the complete command name** after opening the key-in dialog (*Utilities menu* > *Key-In*). Example: typing “Place Line” invokes the Place Line tool.

5. **Shortcut keystrokes**, As an alternative to using the mouse for tool selection, you can use keystroke navigation where you press single keystrokes to execute commands. This method provides more efficiency as you use one hand for commands and the other for graphics. For example, press Q followed by 2 activates the Place Line tool. The task bar provides the first letter to the left of the tools and the number appears next to the individual tool name in the pop-up menu. In the main tool bar at the top of the Tasks bar, note the single letters at lower left of each icon. These are also the first character of the shortcut keystrokes.

MICROSTATION SETTINGS

The first thing to do with any new design file is to set-up its working units.

MicroStation has a flexible dimensional unit system for which there are two parts:

- **MU** – short for – master units (for example feet, or meters)
- **SU** – short for – sub units (for example inches, or millimeters)

A practical set up would be to set up your design with:

- **MU** = feet or meters
- **SU** = inches or millimeters
EXERCISES

WORKING WITH MENUS

To experiment with menus first select File menu > New, Give the file your name, click Save and then set up working units before adding any geometry to the new file. Try Getting to Working Units 2 different ways, first:

1. On the Main menu, click on Settings
2. Click on Design File
3. Click on the Working Units category
4. Click on Cancel

Also, try:

1. While pressing on “Alt” then type “S”
2. Type “D”, then “W”
3. Change Master Units to Feet
4. Use tab key to the label field and key-in the mark ’ for feet
5. Use tab key to go to sub units
   Sub units were automatically changed to inches.
6. Tab to the Label field and change to ” to represent inches on drawings.
7. To select “OK” from the dialog, note that you can tab until OK is identified, then press enter, or:
   a. Type “alt-O” key since O is underlined
   b. Move cursor to OK and press button

Your drawing file is now set up for a drawing of feet and inches. To set up a mechanical drawing, use inches or millimeters for master units. Of course, your master units could be set to meters with subunits set to centimeters or millimeters.

SETTING UP GRIDS

When using MicroStation you have the option of using a grid. A grid is a visual reference for measurement and alignment consisting of evenly spaced points and lines. For example you can place a grid line every 12 inches giving you a visual representation of how far you are
drawing. You may want to have a grid of light colored lines to help with your design. To set up a grid in your new file, assuming the feet and inches example:

1. Click Settings menu > Design File.

2. Click on Grid category.

3. Change “Grid Reference” to 12

4. Change “Master grid” to 0:1 (i.e. 1”)

5. Turn the Grid lock “on” by clicking the box next to “Grid Lock” label

6. Click OK to save your changes and close the Design File Settings.

If you don’t see your grid, Click on Settings > View Attributes and click on Grid (second column towards the top of the list.)

You now have a typical US architectural drawing set up. Changes to these settings affect only the current design session unless you save them. To save these settings for the next time you open this drawing, select File menu > Save Settings.

COORDINATE READOUT

MicroStation will show you coordinates in the format: mu:su (observe the use of the colon character). For example entering the value: 5:4.125 defines the following coordinate: 5 master units and 4.125 subunits. This format is useful when working with master units in feet and sub units in inches, such as US architectural drawings. The example 5:4.125 would represent 5'-4.125". For this format, choose Settings menu > Design File. Select the Working Units category again and set Format to MU:SU from its option menu. Set Accuracy to something reasonable, for example 1/16, then above example would show as 5'-4 1/8" (Note: Accuracy means the precision by which coordinates and dimensions will be displayed. Coordinates are stored in the computer to a much greater precision).

However, when working with units in inches and decimal inches or millimeters and decimal mm as is common for mechanical drawings, the coordinate readout is better understood as 5.4125 rather than 5:4.125. Therefore, when working with mechanical drawings, civil drawings or any drawing that is expressed in units and decimal units, on the Working Units category of the Design File Setting dialog, change Format to MU (master units). Change the Accuracy to something appropriate to your requirements, for example 0.1234 to represent 4 decimal digits of precision.

While your new file is open, place some drawing elements. Just click on the icons on the left side of the screen until you recognize one, like a circle or line. Then, look at the bottom left corner of the screen to see the name of the tool you chose, and how MicroStation is prompting you for the next step. Don’t spend too much time; just sketch a few things to get a bit of a feel for MicroStation.