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"**The MicroStation V8 Training Manual 2D Level 1**"

The first six pages of Module 5, *Snaps and Tentative Points*, are shown below. The first two pages are typical for all Modules - they provide the Module title and set out the learning objectives. The suggested time for completion of the Module is given at the end of Page 5-2.

Pages 5-3 to 5-6 are instructional pages and, in this case, introduce MicroStation's AccuSnap and manual snapping systems, vital for accurate element placement. Please note the "Tool Tip" boxes located throughout the pages; these are added to emphasize a technique or to add specific points of information.

If you require more information about the contents of this book, please contact us directly at: *info@micro-press.com.*

MICROSTATION V8
2D LEVEL 1

Module **5**

SNAPS and TENTATIVE POINTS

Module Information

Prerequisites:　　　　Module 4　MicroStation - 2D

Introduction:　　　　As mentioned in an earlier Module, one of the major attributes of any CAD software is the ability to draw *absolutely precise* drawings. Such precision not only includes dimensional accuracy but also includes accurate *connections* between the elements in your drawing. This Module introduces the concept of *snapping to elements or locations* that assists in the accurate placement of new elements or the editing of existing elements.

Objective(s):

5.1	Set the Keypoint snap mode.
5.2	Identify (and change) snap options in the Locks setting box.
5.3	Use AccuSnap to automatically place tentative points and snap to elements.
5.4	Identify element keypoint snap locations and change Divisor setting.
5.5	Identify and describe all snap modes.
5.6	Identify (and change) the tentative point button assignment and manually place tentative points.
5.7	Perform snap override operations.
5.8	Perform "cycling" snap operations with simple elements.
5.9	Describe the use of tentative points as coordinate references.
5.10	Use the Shift-tentative point option to select snap modes.
5.11	Identify AccuSnap settings options.

Time:　　　　This Module should be completed within 2.5 hours.

DISCUSSION:

It is very important that you develop speed and efficiency in the use of *snaps* when drawing or editing. I strongly urge you to practice the following procedures until you are totally comfortable with the snap options and their actions.

The process you use to ensure *accurate connection* of elements is called "snapping", where elements are connected to each other in a variety of ways. If you are new to computer aided drafting (CAD), you must understand that dimensional accuracy and accurate connection of elements is vital in the drawing process. Without dimensional and connection accuracy you cannot dimension elements automatically or hatch enclosed areas, just to name two common CAD functions.

MicroStation uses a system of *tentative points* and *snap points* to snap to elements. As you will see, this is a two-part process that provides very flexible and intuitive snapping procedures.

MicroStation provides two methods for snapping to elements:

1. *AccuSnap*, an *automatic* snapping function that displays tentative points on elements.

2. A **Manual Tentative Point** system with which you *manually* place tentative points before accepting a snap location.

You will likely use *AccuSnap* for almost all of your drafting functions, but some snap operations only work with manual tentative points.

MicroStation also offers *four* methods of setting the snap *mode*. You can decide for yourself which method you prefer as you work through the instruction that follows.

5.1   SETTING THE KEYPOINT SNAP MODE

Before you start working with AccuSnap, it is important that you have the correct *active snap mode* selected. MicroStation provides a range of snap modes for use in a variety of drawing situations, and you need to know what modes are available and how to set them. However, to start with, I want you to set the *Keypoint* mode as the active snap mode.

> **TOOL TIP !**
> The *active* snap mode is *always* available when drawing or editing. You do *not* need to set the active snap before each use.

In typical MicroStation style, there are several methods of setting the active snap mode. Let's quickly run through three of them, and then you can choose which is best for you.

First, take a look at the *Snap Mode tool box*. Do the following:

Step 1   Go to the *Settings* menu and open the *Snaps* option.

This will display a list of all the snap *modes*. One of them will be have a *black dot* next to its name (most likely the default *Keypoint* mode), indicating the mode that is *currently active*.
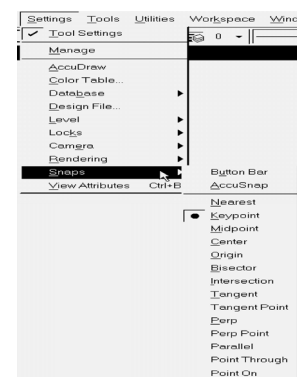
If the Keypoint mode is *not* the active mode, then set it active by doing the following:

**Step 2**   *Hold down* the *Shift* key and *left-click* on the *Keypoint* mode.

The menu will disappear. Look at the *Snap Mode Indicator* at the bottom-center of your screen. You should see a symbol of an arc-shaped line with three filled circles that represents the Keypoint snap mode.

Snap Mode Indicator
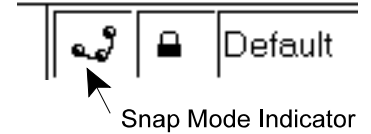
Note: *This is not the best way to set a snap mode* because you must navigate through the pulldown menus.

Try a *second* method for setting the snap mode:

Step 1   In the *Settings/Snaps* pulldown, click on the *Button Bar* option.

Keypoint mode

AccuSnap On/Off
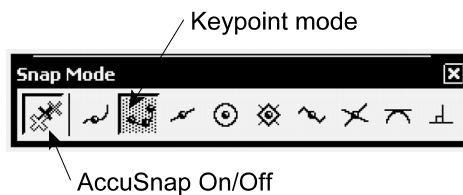
This action will float the *Snap Mode button bar* on your screen, from which you can select the desired snap modes. This is a more convenient way of selecting snap modes but, as always, remember that a floating or docked bar will take up screen space.

TOOL TIP !
You are likely to use the *Keypoint* snap the most since it can be set to snap to both the ends and to the midpoint of elements.

On the button bar, the *first* and *third* buttons should be depressed. If the third button, the Keypoint mode, is not depressed, then *double-click* on it to make it the active snap mode. The first button turns AccuSnap On or Off.
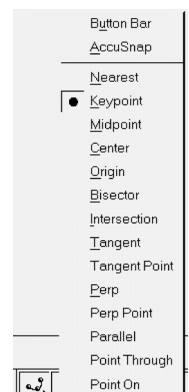
By default, MicroStation does not display all available snap modes on the button bar. Later, you will expand the button bar to show all snap modes.

Now try the *third* method for setting the active snap mode:

Step 1   Click on the *Snap Mode Indicator* at the bottom-center of your screen.

This action will pop up the list of snap modes. Again, the Keypoint mode should have the black dot indicating it is the active mode.

To set the *active* snap mode with this method, hold down the *Shift* key and *click* on the a snap mode. Try this now: hold down the *Shift* key and click on the *Center* mode. The list disappears but notice that the mode symbol has changed to a circle with a filled dot. This is the Center mode symbol. Click on the Snap Mode Indicator again. Notice the Center mode has the black dot. Hold down the Shift key and click on the Keypoint mode to set it active. Check that the Keypoint symbol is shown in the Snap Mode Indicator.

Button Bar
AccuSnap

Nearest
● Keypoint
Midpoint
Center
Origin
Bisector
Intersection
Tangent
Tangent Point
Perp
Perp Point
Parallel
Point Through
Point On

Clearly, the third method of setting the active snap mode is the most efficient if you need to conserve screen space. If you are working on a large screen, you may find that floating and docking the Snap Mode Button Bar to be more efficient. There is a fourth method you will use later in this Module.

Before you practice using the Keypoint snap there is one last setting you should look at that will come in useful later.

5.2   SNAPS and the LOCKS SETTINGS BOX

To ensure that MicroStation will actually snap to elements you need to look at the *Locks* settings box. Do the following:

Step 1   Pull down the *Settings* menu and open the *Locks* and *Full* settings box.

Step 2   Go to the *Snap* section of the box and set the following if they are not already set:

Snap Lock   Set this to ON by ensuring there is an tick in the box. MicroStation will *not* snap to elements unless this option is on.

Mode   Set the initial *Active Snap Mode* here. *Keypoint* should already be set. If another snap is shown in the field, click on the field and select *Keypoint*.

Divisor   The default value is *2*. Reset to that value if it is different. You will be working with this setting later. The divisor can also be set outside this dialog box.

Association   Make sure this toggle is also ON. This will become a useful option later when you work with dimensions.
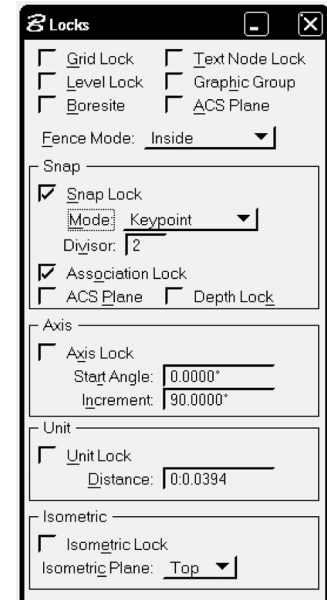
The above settings are the defaults for a standard MicroStation setup, and simply ensure that you are able to follow the instruction in this Module without difficulty. As a matter of interest, the Mode setting is a fifth method of setting the active snap mode, but it is so inefficient that it can be ignored.

Close the Locks settings box when you are finished.

Before you start the next Section you need to have a few line elements in your view. They should be single lines spaced apart from each other. The elements you placed in Module 3 are probably quite messy by now, so it would help to delete everything in your design and place new lines. To delete all existing elements go to *Edit/Select All*. This will select *all* elements in the design! With all elements selected, press the *Delete* key on your keyboard or click on the *Delete Element* tool. Now place several single, separated lines in the view using the *Place Line* tool.

Pages 5-8 to 5-9 below are typical of the way practical information is presented in the Manual. In this case, users are taken step-by-step though the basic use of AccuSnap, MicroStation's automatic snapping tool. An explanation of AccuSnap's operation is followed by a simple exercise to reinforce the tool's operation.

5.3 SNAPPING TO ELEMENTS WITH ACCUSNAP

Everything is now in place for you to begin drawing lines *from* snap points on the lines already in the view. You will probably already have noticed the snapping action when you placed the elements in the previous Modules.

First work with one of the lines you should already have on you screen. Do the following:

Step 1   Start the *Place Line* tool.
Step 2   *Move* the cursor near *any location* on the line.

As you move the cursor *close* to the line you will see three things:

Line [Default]

> **TOOL TIP !**
> The cursor has a "location area" around it that will find the line, so you don't need to waste time or motion trying to position the cursor exactly.

- The Keypoint snap symbol will appear.
- A small dotted "cross" will attach to the *end points* or *middle* of the line.
- A text box will pop up to tell you what you are about to snap to.
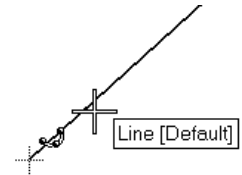
This is AccuSnap indicating that it has found *potential* snap points on the line.

The *small dotted cross* is indicating the locations of *tentative "hint"* snap points. The "hint" part implies that AccuSnap is finding *potential* snap point on the line. Note that there are three potential snap locations: *both ends* and the *middle* of the line. You will see why this is so later.

Step 3   Move the cursor *close* to *one end* of the line.

The small dotted *tentative* snap changes to a heavy "X" shape attached to the endpoint of the line. This is a full *tentative point* and can be made into an *actual snap point* with a single left-click *data-point*. You will also notice that the line you are snapping to has been color *highlighted*. This confirms which element the tentative point is on, a very useful feature when using some of the more complex snaps or working in congested designs. *Always* take note of *which element is highlighted* when a tentative point is in place.

Line [Default]
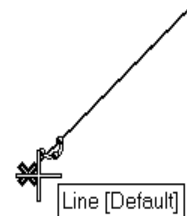
When the tentative point *is* in place you have three options:

1. If the *location* of the *tentative point* is where you want it, you can then enter a *data-point* to *confirm* the snap's location and a line will be drawn *from* the snap location.

2. If you don't like the tentative point location, simply move the cursor to another location and let AccuSnap find another tentative point location (that's why it's called "tentative"!). You can do this as many times as you need before you enter a Data-point to confirm the correct location.

> **TOOL TIP !**
> Think of a tentative point as a *preview* of the actual snap location.

3. If you want to *abandon* the entire snap process, press the *reset* button to cancel the operation.

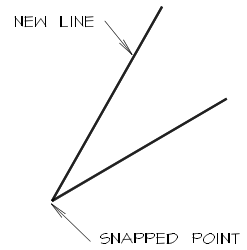With the tentative point attached to the endpoint of the line, snap to the line and draw another as follows:

Step 4   Enter a *Data-point* to *confirm* the snap and draw a short line.

Reset to stop the line tool after drawing the short line. You have now *guaranteed* that the new line is connected *directly* to the end of the existing line.

NEW LINE

SNAPPED POINT

New line starts from endpoint.

NEW LINE

SNAPPED POINT
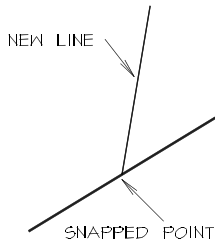
New line starts from midpoint.

**Step 5**   Now draw a new line from the *midpoint* of an existing line by locating a tentative-point near the midpoint of one of your lines.

For practice, repeat these procedures several times using the remaining lines.

Try this example of snaps used with the *Construct Angle Bisector* tool which you will find on the *Linear Elements* tool box. This tool draws a line that *bisects* an angle, in this case the angle between two lines. Follow the *Status Line* prompts as you go.

Step 1   Draw the two lines shown at the right.
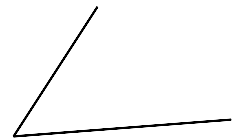
Step 2   Start the *Construct Angle Bisector* tool.
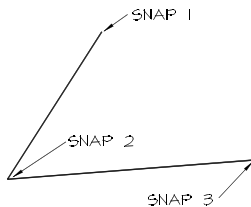
SNAP 1

SNAP 2
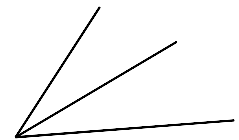
SNAP 3

Step 3   Snap to the endpoint of the first line (Snap 1).
Step 4   Snap to the angle vertex (Snap 2).
Step 5   Snap to the endpoint of the second line (Snap 3).

The angle is bisected and the third line is drawn.

Be sure that you are completely comfortable with the basic AccuSnap tentative point and snap process before proceeding with this Module. If necessary, draw more lines and continue practicing.

Pages 5-11 to 5-14 below show the typical mixture of technical definitions and practical examples and exercises that are presented in the Modules.

 In this case, users are guided though the settings and application of MicroStation's Keypoint snapping facility.

5.4 ELEMENT KEYPOINTS

Keypoints are simply *snappable points* located on an element. There are *three* keypoints on the line you just snapped to with the Keypoint snap: one at *each end* and one at the *midpoint* of the line.

You can change the number of keypoints on an element by changing the *Divisor* setting in the *Locks/Full* settings box you looked at earlier. Currently the Divisor value is set to *2*, meaning that each element is *divided into two parts* with a keypoint at *each end*. This results in a keypoint being located at the *middle* of the element.

Snap locations-
Divisor set to 2.

You can prove this by snapping a tentative point to the ends and to the middle of a line. Try this right now by locating the snap points along the line. The tentative points will locate at the keypoint closest to the cursor.

Now change the number of keypoints on an element and see what effect this has. Do the following:

Step 1   Open the *Settings/Locks/Full* settings box and change the *Divisor* to *4*.

Snap locations -
Divisor set to 4.

Leave this settings box open but move it to one side of the screen away from the drawing area. (Remember that you can push the box *not quite* beyond the limits of the screen so that only a small portion of it is still visible. When you need it again you can "recall" it by dragging it back onto the screen.)

Step 2   *Locate* the *tentative-points* along a line to find the keypoint locations.

You will find there are *five* tentative point locations on the line because the line is now divided into *four* separate parts, each with a keypoint at the ends. (Note that the line is *still intact*: the "division" is just the placement of tentative points at equal spaces along the line.)

For practice, draw short lines from each of the tentative points along the line as shown in the illustration at the right.
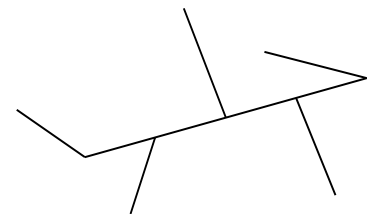
You can put up to 255 keypoints on an element, but if you want to snap to the *midpoint* using the Keypoint snap, you must always have an *even* numbered divisor.
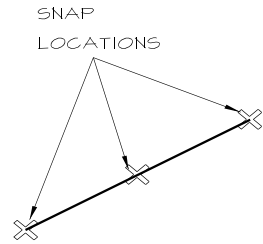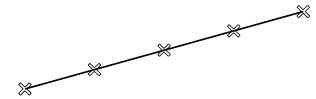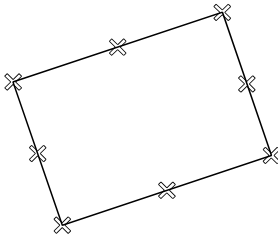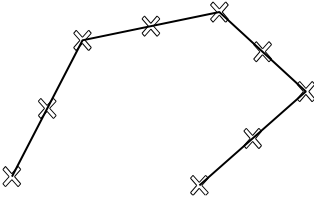
Five lines drawn from the five snap points.
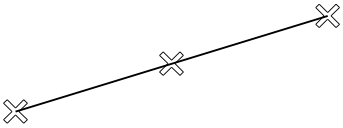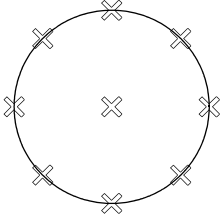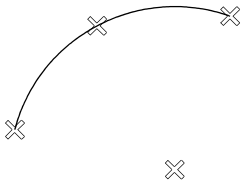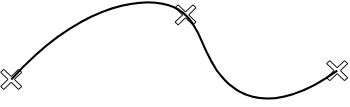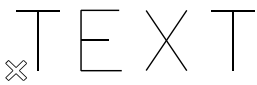
KEYPOINTS ON OTHER ELEMENTS

All elements in MicroStation have keypoints. The table below shows you the keypoint positions on typical element types when the divisor is set to *2*. Although you have not yet used some of the elements shown, I think you will find the keypoint locations to be quite logical. Remember that these locations will change as you increase the divisor value.

Element	Keypoint Locations	Illustration
Line:	As you have seen, a line is divided into two parts with a keypoint at each end.	
Circle: Ellipse:	The *four quadrants* of circles and ellipses are considered to be *separate elements*, so *each quadrant* contains the desired number of keypoints. The *center* of the circle is also a keypoint.	
Arcs:	An arc has the same keypoint locations as a line, *plus* the arc's center.	
Blocks: Shapes:	A Block or Shape is a *single element* (not separate lines). Each side of the block is considered to be a separate line for keypoints locations.	
SmartLine: Joined or not joined	A SmartLine is a *line string* and each line in the string is treated separately whether connected or unconnected.	
Curves:	Generally, keypoint locations on curves are similar to lines, but there are exceptions.	
Text:	Keypoints are located on text strings at the *point of justification*.	

KEYPOINTS EXERCISES

This is a good time to practice using the Keypoint snap. This exercise is simple to do and illustrates how to use keypoints to divide lines.
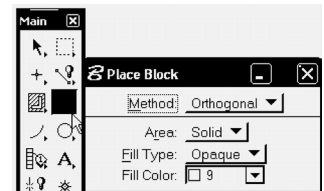
Do the following:
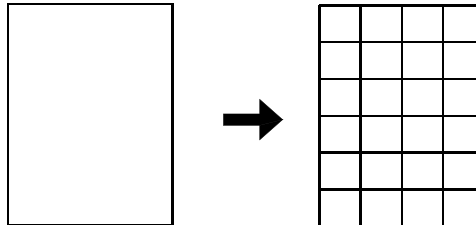
Place the rectangle and add the lines.

Step 1   Use the *Place Block* tool to draw the rectangle to any size.

You have not looked at this tool yet, but it is simple to use. Activate the tool, make sure the *Method* is set to *Orthogonal* in the Tool Settings window, and *data-point, drag*, and *data-point* again to place a rectangular shape of any size.

The Place Block tool.

Step 2   Drag the *Locks/Full* settings box back onto the screen and set the *Divisor* to *6*.

Step 2   Start the *Place Line* tool**.**

Step 3   Starting with the *left-side vertical line*, locate the first *tentative point* of the five tentative point positions on the line.
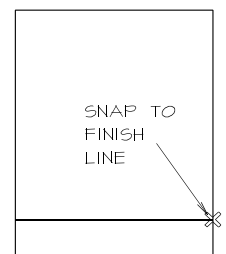
Step 4   When the tentative point is in place, *Data-point* to accept the location and *drag* the line across to the *right-side* vertical line.
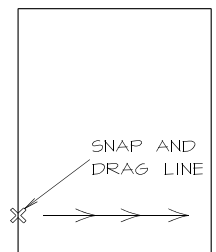
Steps 3 and 4.

**Step 5**   *Locate* the opposing *Tentative point* on the *right-side* line.

Step 6   With this tentative point in place, *Data-point* to accept, and *Reset* to stop the Line tool.

The first of the five horizontal lines should now be in place.

Steps 5 and 6.

Step 7   In the same way, continue drawing the remainder of the individual horizontal lines between the keypoints.

Step 8   Change the *Divisor* in the *Locks/Full* setting box to *4.*

Step 9   Draw the *vertical set* of interior lines in the same way you drew the horizontal lines, this time snapping to opposing keypoints on the two horizontal lines of the rectangle.
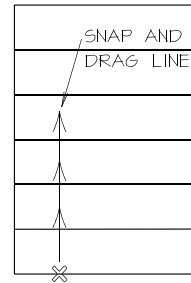
Steps 7, 8, and 9.

It is a good idea to do several more drawings of this type so that you are completely comfortable with the snapping process. Draw more rectangles (or any shape) and connect crossing lines using different *Divisor* settings.

The instruction continues for another twenty pages, covering the subject information shown on page 5-3 above.