

3 Drawing Aids

3.1 Overview

MicroStation has a number of useful drawing aids which can be used to accurately place elements. They are Grid, Snap, Locks and a MicroStation specific aid - AccuDraw. The use of these aids dramatically increase productivity and accuracy and should be used whenever possible.

3.2 Working Units

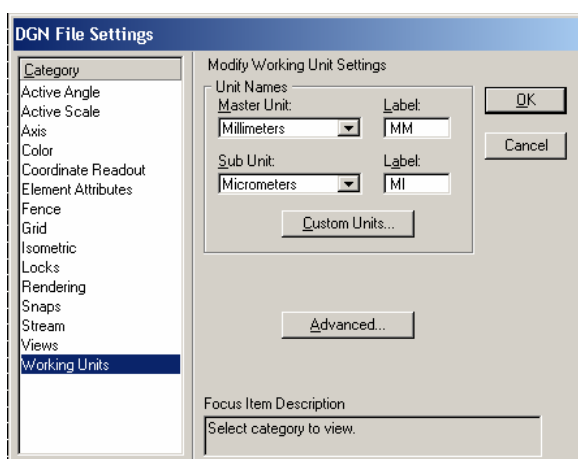
Before exploring the various drawing aids it is worth considering how MicroStation 'measures' things. MicroStation measures and positions elements on the basis of a 'positional unit'. This unit is the smallest possible increment that MicroStation can work with and is a consequence of a limit placed on the biggest number that it can store in its database, (which differs between versions but is pretty big!)

Positional units however are an arbitrary way of measuring things and so we need to tell MicroStation how many positional units make up one 'working unit'. For example we could assign so many positional units to every millimetre, metre, foot, yard or perhaps even a mile. The choice is yours and depends on the type of drawing you are creating.

The biggest number MicroStation can store naturally places a limit on how precise we can draw and also on the maximum drawing size. However version 8 uses 64-bit floating point coordinates and in reality if we were to assigned say even 10,000 positional units to every millimetre, (which is not an uncommon setting) then the 2D drawing space would still be several hundred thousand kilometres along each axis! Enough for most practical applications.

It is a good idea to check the current working units before going further...

- Select the **Settings** menu and then **Design File**



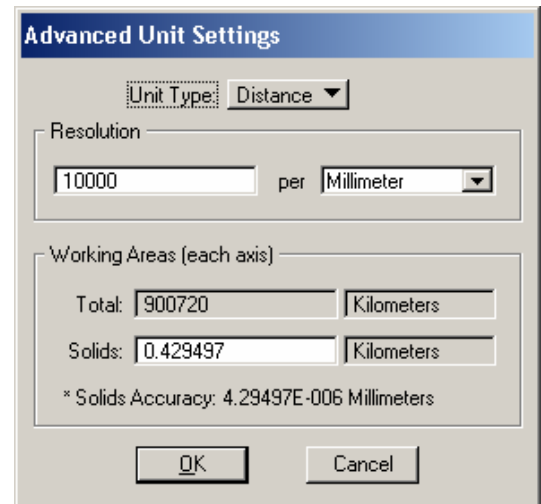
- From the 'DGN File Settings' dialog select '**Working Units**' from the Category list as shown left...
- In here you can specify a 'Master Unit' (millimetres in this case)...
- and also a 'Sub Unit', (micrometres in this case)
- Select **OK** when done

NB : although it is possible to set custom units from this dialog it is always better use the standard settings.

To see the number of positional units per working unit and the size of the design space...

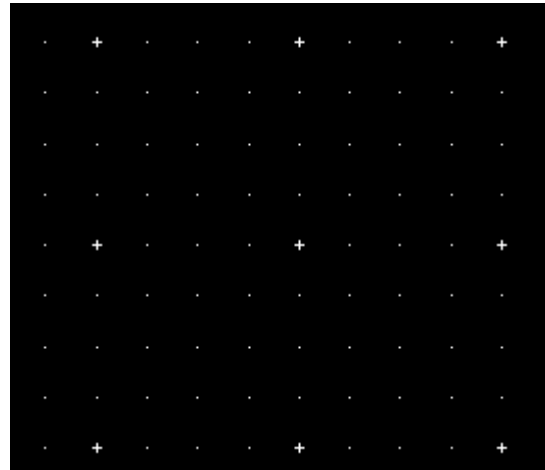
- From the 'DGN File Settings' dialog select the 'Advanced' button as shown right...

The example shows that there are currently 10,000 positional units to 1 mm and that each 2D drawing axis is 900,720 km long!




3.3 The Grid

The grid is an extremely useful aid for accurately placing elements in a design. It can be adjusted to match your needs, based on the working units set above. When visible, the grid comprises of a number of small white crosses and white dots as shown in the example right.

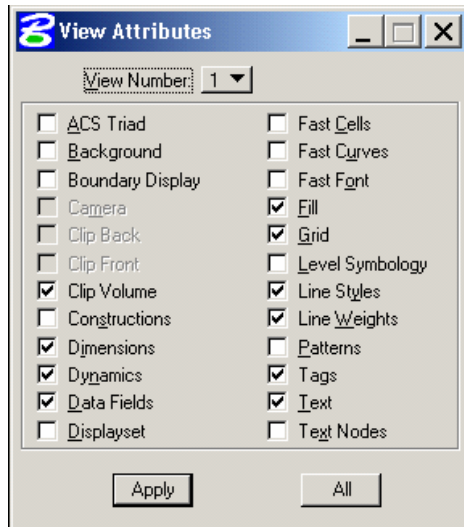


NB : if you are zoomed out the grid may disappear (or just show crosses), in which case try zooming in again.

To switch the grid on or off...

- Select **Settings** and **View Attributes** or...
- Click the Bentley logo  (top left of every View) and select **View Attributes** or...
- Press <Ctrl> + B

You will now see the 'View Attributes' dialog as shown below...



- Simply de-select (or select) the 'Grid' option and then **Apply**
- Close the 'View Attributes' dialog when finished.

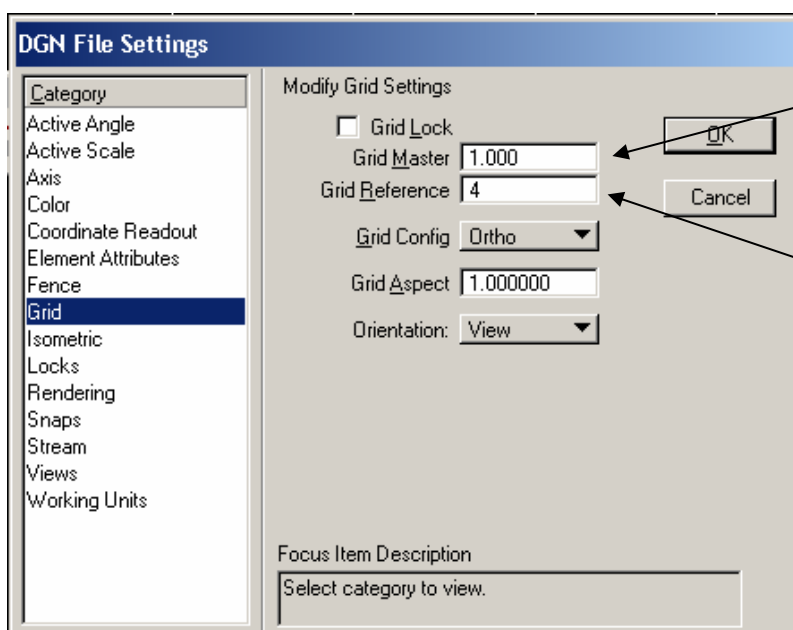
3.4 Grid Spacing

The grid spacing may be customised by the user and is defined by two settings – 'Grid Master' and 'Grid Reference'. These are set separately but one affects the other. The **Grid Master** is set using working units. This determines how many working units there are between two adjacent grid points. This is a measure of distance.

The **Grid Reference** is a whole number and it is not in working units. Instead, it specifies how many grid points there are between each 'Grid Reference Point'. A Grid Reference Point is indicated with a cross.

To set the grid spacing...

- Select the **Settings** menu and then **Design File...**



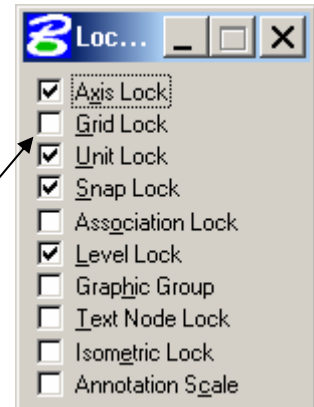
- Type a number in the '**Grid Master**' box to set the number of working units per grid point
- Type a number in the '**Grid Reference**' box to set the number of points between each cross
- Select **OK** when done

3.5 Grid Lock


The most useful feature of the grid is the ability to select grid-lock. This forces all selected points to lie on the grid and is a real boon for increased precision.

The 'Locks' dialog box is usually floating in the design area. If it has been switched off however you can display it again as follows...

- Select the **Settings** menu and then **Locks and Toggles...**



- From the 'Locks' dialog select the 'Grid Lock' option or...

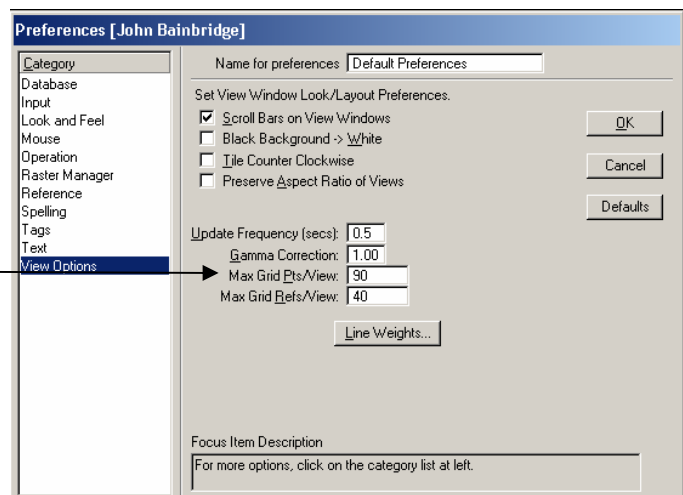
- Select the 'padlock'  symbol on the status bar at the bottom of your view Window and either 'toggle' the Locks dialog or make lock settings directly

3.6 Maximum Grid Points Displayed

When you zoom out (with the grid visible) you will notice that the dots pack closer together, then change to crosses only and finally disappear altogether.

To change the maximum number of dots displayed when you are zoomed out ...

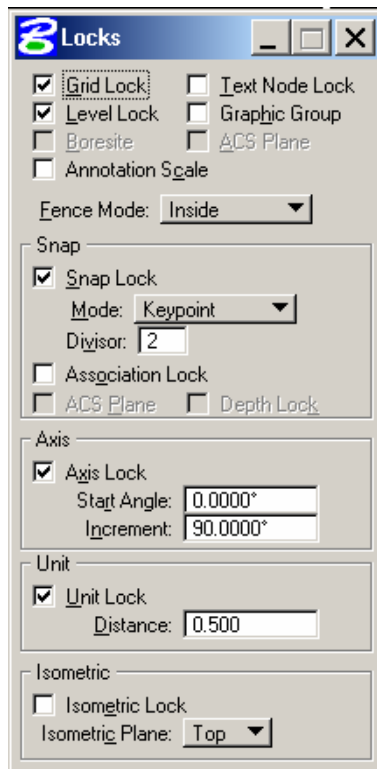
- Select the **Workspace** menu **Preferences...**
- Now select 'View Options' from the left-hand list...
- and increase the 'Max Grid Pts/View' and 'Max Grid Refs/View', (the defaults are 90 & 40 respectively)



3.7 Displaying Full Locks

In addition to the standard locks dialog described above there is also a 'full' dialog with extra options.

- To see the full locks dialog select the **Settings** menu, **Locks and Full**



3.8 Level Lock

If on, you can only select elements on the 'Active Level'. You cannot manipulate elements that are not on the Active Level. This is useful for protecting elements on other layers.

3.9 Snap Lock

Drawing snaps allow you to create elements which are joined to existing elements at precise locations, (at an intersection of two line or the centre of a circle, for example). These (very useful snaps) will only operate if the Snap lock is turned on.

3.10 Axis Lock

If on, each data point is forced to lie at an angle (or multiples of that angle) from the previous data point.

The angle is specified by the 'Axis Increment' relative to the 'Axis Start Angle' as shown in the dialog above. The default settings (0° and 90°) only permit 'orthogonal' lines to be drawn.

3.11 Unit Lock

This constrains elements to be drawn to the nearest unit, (or fraction of if set in the 'Distance' box above).

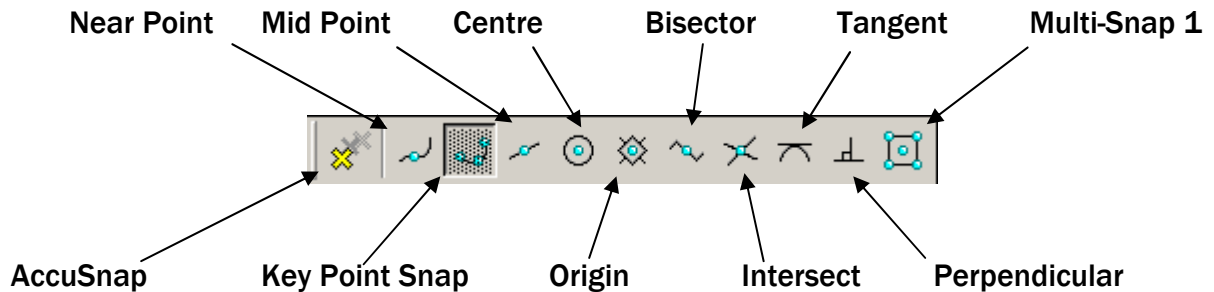
3.12 Isometric Lock

If enabled this allows elements to be drawn as if they were part of isometric shapes.

3.13 Snaps

Snaps are similar to locks in that they allow the user to create elements at specific points. The difference is that Snaps locate points based on existing elements. Common snaps include the ability to locate the endpoint of a line, the midpoint of a line, an intersection between two elements and the centre or quadrant of a circle.

The full range of snaps is shown on the 'Snap Mode' toolbox as shown below...



Near Point – snaps to the nearest location on an element to your cursor when you click

Mid Point – snaps to the midpoint of a line

Centre – snaps to the centre of a circle or arc

Bisector – snaps to the mid point of a complex element (such as a SmartLine)

Tangent – snaps to the tangent of an arc or circle

Multi-Snap 1 – a pre-defined sequence of snaps

AccuSnap – suggests possible snaps as you draw without the use of the 'Tentative' mouse button

Key Point Snap – the default snap setting that suggests possible snap locations when you use the 'Tentative' mouse button

Origin – snaps to the origin of a cell

Perpendicular – snaps elements so they are perpendicular (at right angles) to existing elements

3.14 Key Point Snap

In MicroStation a basic set of snaps are always available and no special key needs to be pressed or special function invoked to use them. This is known as 'Keypoint Snap' and provides the following snaps by default...

- Endpoint of a line
- Midpoint of a line (or specified fraction, such as a third for example)
- Quadrant of a circle (e.g at the main compass points)
- Insertion point of text