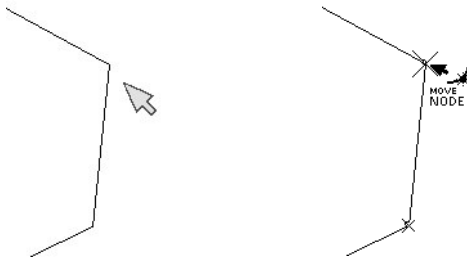


# Editing Nodes and Links

Also see the *Move Function* in Chapter 13

## Moving NODES with the keyboard

You can move a **node** using the keyboard. Start by moving the mouse over it (do **not** click the mouse). MillWrite will “hi-lite” the link and its nodes, and the mouse icon will change from an arrow (see the left image, below), to a smaller arrow with the word “node” under it (the image to the right). In this example, the mouse changed to “MOVE NODE”, but there are other possible messages.



However, if the mouse is set to one of the *drawing* functions, such as *Draw Circle*, the mouse icon will **not** change when you place it over a node.

Once the mouse is on a node you have four options for moving it. Specify one of these:

- 1) The **X-Y coordinate** you want it to be move to. You do **not** need to type the letters X or Y (unless you specify the Y value before the X value). Separate values with a comma.  
eg, **3.45, 7.66**
- 2) The **distance** in X and/or Y that you want it to move. The \* character signifies distances. Also, it separates the values so you do not need to separate values with a comma.  
eg, **\*.6 \*-2.3**
- 3) A mix of **coordinates** and **distances**  
The \* character signifies distances, so whichever value has the \* character is the distance, and other is the coordinate.  
eg, **\*.2, 7.66**
- 4) A **distance** and **angle**  
The < and > characters signify angles, use either one. You don't need to use the \* to signify distances because the < and > characters identify the first value as a distance.  
eg, **2.57 >35**

The screen will change as soon as you start to type a value. You could then backspace over whatever you typed and enter a **direction** and **distance** to move the node. Directions are up, right, left, down, which you enter as the letters **l**, **r**, **d**, and **u**. Both upper and lower case are accepted.

## Examples of how to move nodes

Notes:

- ♦ in all cases, enter X values before Y values, and distances before angles.
- ♦ the **units** in the examples are inches or mm, depending on what you set MillWrite for.

### Examples of moving by distances and angles

- if you enter: **2.57 <35**  
the node will move 2.57 units at an angle of 35 degrees.
- if you enter: **2.57<**  
the node will move 2.57 units at an angle of zero degrees, which is +2.57 units along the X axis.

### Examples of moving a node by distances in X and/or Y

- if you enter: **\*.2\*.1**  
the node will move +.2 units in X and +.1 in Y
- if you enter: **\*\*1**  
the node will move **only** in Y by +.1 units because you didn't specify any X value.
- if you enter: **\*.2**  
the node will move **only** in X by +.2 units because you didn't specify a Y value.

### Examples of moving a node by direction and distance

- if you enter: **R.2**  
the node will move to the right (ie, along the X axis) by .2 units.
- if you enter: **L.2**  
the node will move to the left (ie, along the X axis in the negative direction) by .2 units.
- if you enter: **D.2**  
the node will move to downward (ie, along the Y axis in the negative direction) by .2 units.

## EXAMPLES OF MIXING DISTANCES AND COORDINATES

- if you enter: **\*.2, 1.2**  
the node will move in X by +.2 units from wherever it is, and it will move in the Y direction to an absolute Y coordinate of 1.2

## REFERENCE POINTS WHEN MOVING NODES

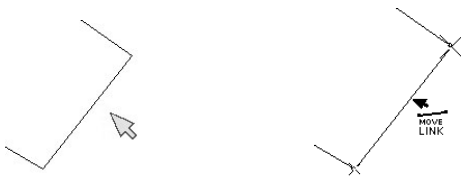
It is important to note that when you are moving a node by distances, you can specify a **reference** point from which the move takes place. By default the reference point is the coordinates of the node that you are moving, so if you specify a move of **\*3.2\*1.4**, the node moves from wherever it is to a new position that is +3.2 X units and +1.4 Y units away from itself.

However, if you want to move a node a certain distance from some **other** node, you can set that other node to be the reference point. To set a reference point, just click the left mouse button on it, as the prompt message on the screen will remind you.

## MOVING LINKS with the Keyboard

The previous description of moving nodes with the keyboard applies to moving **links**, with the exception that links move only by *distance* or *direction*, rather than to actual X and Y coordinates.

To move a link, start by touching it with the mouse. MillWrite will “hi-lite” the link and its nodes, and the mouse icon will change to a smaller arrow with the word “link” under it, as illustrated in the two images below. In the image at the right, the text is “MOVE LINK”, but there are other possible text messages.



After you touch the link you can move it in two ways:

- 1) By a distance and angle, eg, **2.57 >35**
- 2) By distances in X and/or Y from where it is, eg, **\*.6 \*-2.3**

Also, as with moving nodes, as soon as you start the first character, the screen changes, and you could backspace over the character and enter a direction and distance; eg, **U 3.45**

The examples of moving a **node** by distances and angles (on the previous page) apply to moving **links**, with these two exceptions:

- 1) The entire link (with both of its nodes) moves rather than just one node.
- 2) MillWrite doesn't care if you forget to use the **\*\*** character to signify distances because that is the only option with links; ie, you cannot move a link to an absolute X-Y coordinate, so MillWrite will only accept distances.

## Object Snap Functions

The Object Snap functions are similar to the Object Snap functions with AutoCAD, except that you choose them differently. Here are some examples of how to use them.

### SNAPPING TO AN INTERSECTION POINT

As seen in Figure 6-7, assume you have two lines and an arc, and assume you want the end node of one line to be located at the intersection point of the other line and arc. You can use the Object Snap functions to move the node to the intersection point. There are two ways to do this:

- 1) Put the mouse over the node you want moved to the intersection point. As seen in Figure 6-7, the prompt on the bottom right corner reminds you that you can press **[M]** for the **Move by Snap** function. (The **M** is a different color, which doesn't show in a black and white manual). The *Object Snap* menu will then appear, as seen in Figure 6-8.

You can quickly pick the *Intersection* option by pressing the letter **I**, its hotkey (the colored letter in the menu). MillWrite will then prompt you to pick the two items, one at a time. Using the mouse, click the line and arc. MillWrite will then move the node to the intersection point.

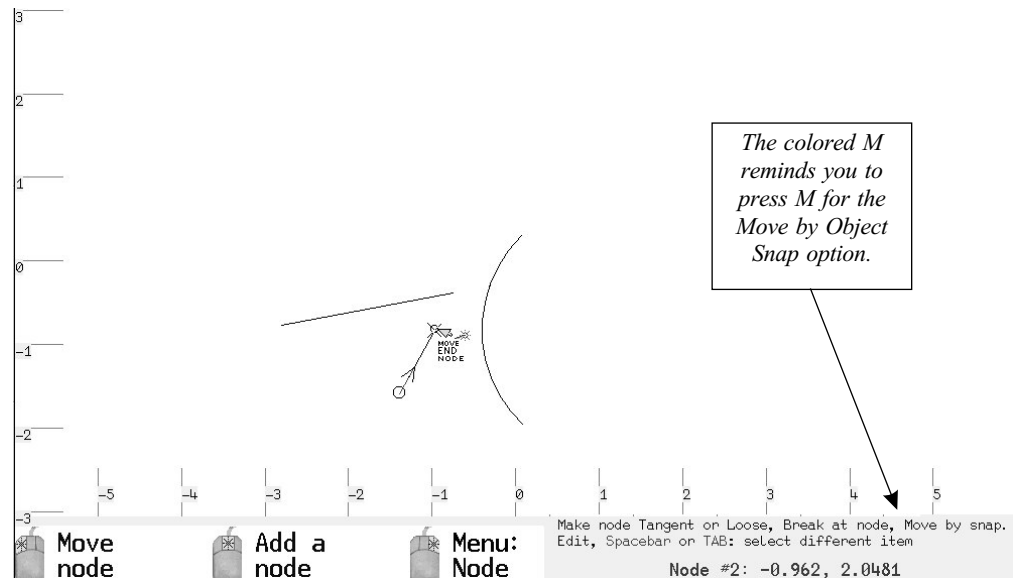
- 2) Set the left (or middle) mouse button to the *Move Node* function (you pick it from the *Node Menu*). Then click on the node you want to move, just like you do when you want to drag the node with the mouse. As soon as you start the dragging process, the mouse buttons change function, as seen in Figure 6-9. The **middle** mouse button becomes the *Object Snap* function. You can click the middle button, which pops up the *Object Snap* menu, then you can pick the intersection option, and then you pick the line and arc. MillWrite will then move the node to the intersection point.

If you don't have a middle button, the prompt at the lower right corner of the screen reminds you that you can press the **[S]** key for the *Object Snap* menu.

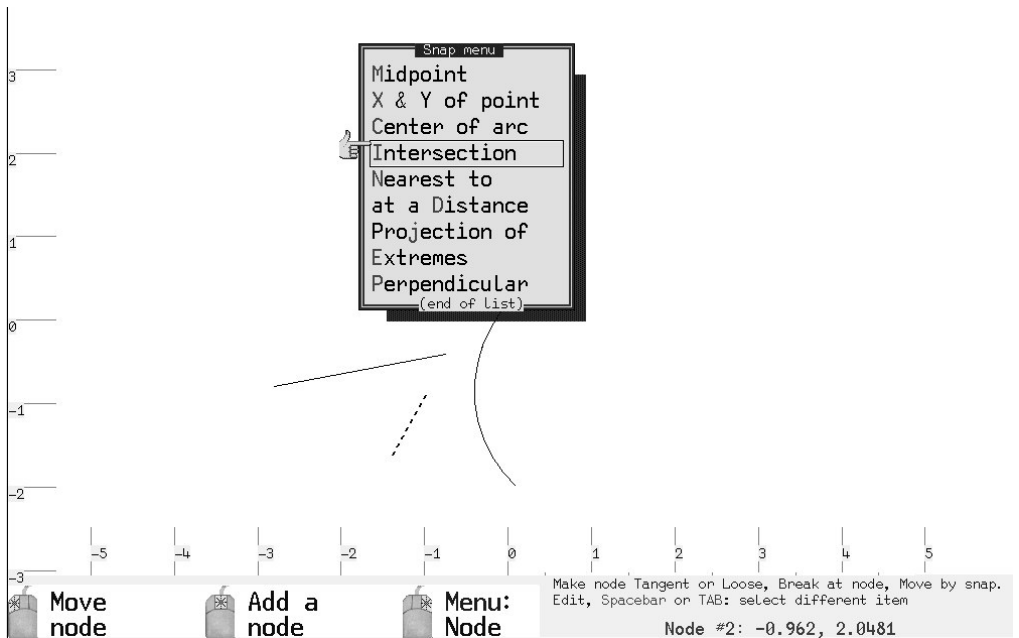
To summarize, you can move a node by putting the mouse over it and pressing **[M]** and then whatever the hotkey is for the *Object Snap* function you want. For example, to move a node to an intersection point, press **[M][I]**. To move a node to the center of an arc, press **[M][C]**.

**Figure 6-7**

When you put the mouse on top of a node, you can move that node in several ways. One is to press *M* for the Move by Snap option, as the prompt in the lower right corner will remind you.

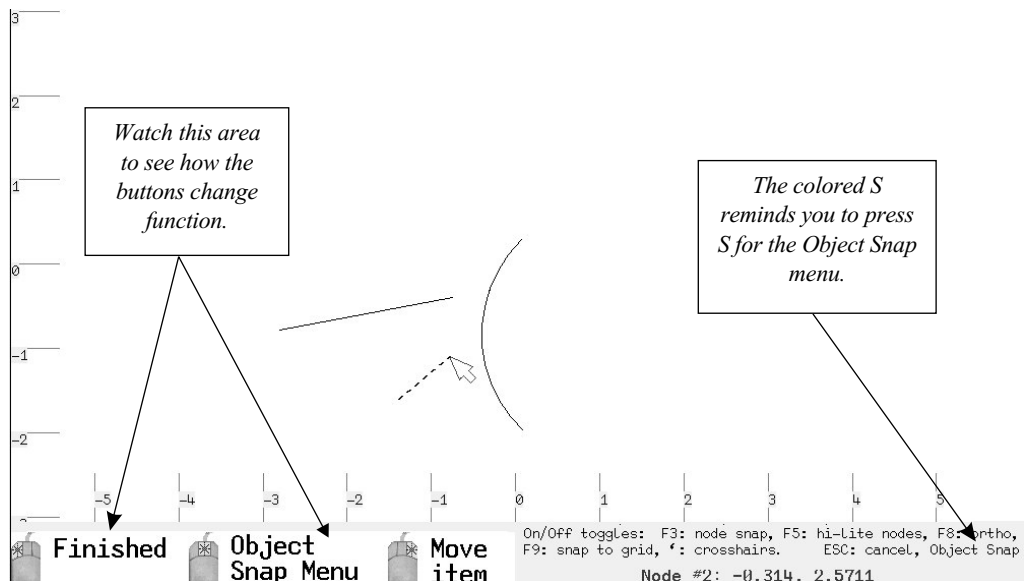
**Figure 6-8**

After pressing *M*, the Object Snap menu pops up.

**Figure 6-9**

When you are dragging a node with the mouse, the middle mouse button changes function and becomes the Snap menu.

As the prompt reminds you, you can also press the *S* key for the Snap menu.



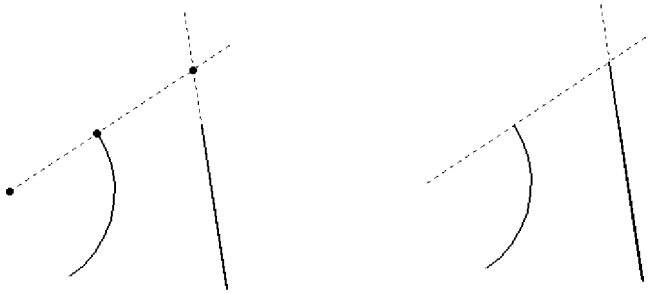
## YOU CAN SNAP TO ITEMS THAT DON'T EXIST

When you snap to an **intersection**, MillWrite prompts you to pick **two** links. You can pick two lines, two arcs, or a line and an arc.

MillWrite also offers you the option to **pick two points to serve as a line**. Since a line is just **two points**, instead of picking a line that actually exists in the drawing, you could instead pick two points. MillWrite will then pretend that the two points belong to a line, and it will use that imaginary line for calculating the intersection points.

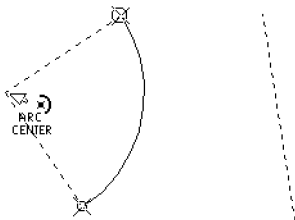
Since the Intersection function requires you to pick **two** links, if you pick two **other** points to serve as the **second** line, then MillWrite will calculate the intersection point of two imaginary lines.

The purpose for this is to reduce the quantity of **construction lines** that you must draw in order to make your drawings. For example, assume you have an arc and a line, as seen in the leftmost image below. And assume you want the line to extend at the intersection of **itself** and a line from the center of the arc and passing thru the node of the arc, as seen in the image to its right.

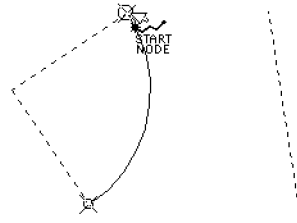


One way to do this is to draw construction lines (such as the dotted lines in the above drawings) and then move the node to their intersection point, and then delete the construction lines. But it is easier to use the two points in the above drawing as an imaginary line.

You start by touching the node that you want to move, and then you press **M** for the **Move by Snap** function, and then press **I** for **Intersection**. Then when MillWrite prompts you to “pick a line or two points”, put the mouse on the center of the arc, as seen below, (the mouse icon will change to “Arc Center” when you have it on the center), and click the left mouse button.



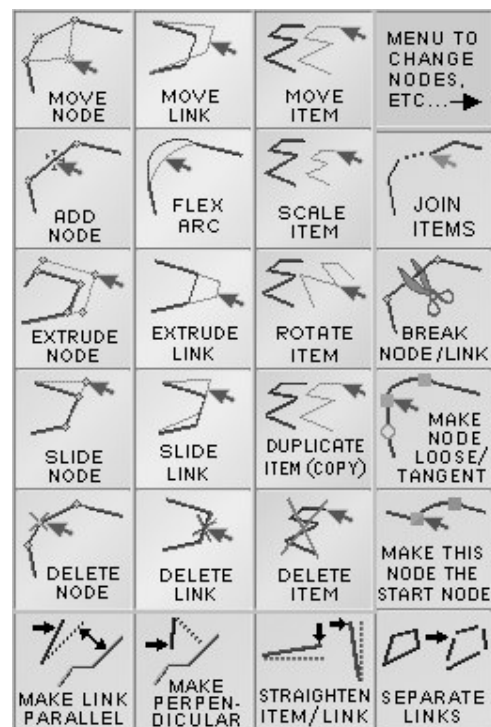
MillWrite will then change the prompt to tell you to pick the 2nd point that defines the line. You then put the mouse over the node of the arc (as seen in the image below) and click it. By clicking those two nodes you are showing MillWrite to use the imaginary line that passes thru those two locations.



You have just defined one of the two lines that MillWrite will use for the calculation of the intersection point. MillWrite will then ask you to pick the other line. You respond by clicking the line that you want to extend. MillWrite will then move the node to the intersection point of the imaginary line and the real line.

## NESTED Object Snaps

While you are in the middle of using an object snap function, you pop up the **Object Snap menu** again (such as by pressing the **[S]** key) and use the object snap functions to define one of the points that first object snap function is waiting for. This is referred to as “nesting” the object snap functions. However, most of us become hopelessly confused if we take the nesting of object snap to more than two levels. There are some situations where you will have to create some construction geometry rather than attempt nested object snap.



## The Node Menu

The **Node Menu** (at the bottom of previous page) provides you with access to lots of editing functions. You have to touch the mouse to some item in the drawing and click the **right** mouse button to get this menu. After the menu pops up but the mouse on the function you one and click the left button if you want to set the left button, or click the middle button to set the middle button. A message at the bottom of the screen will remind you of this.

After you have set one of the buttons to a function, you can click on the item you want to edit.

### THE NODE MENU IS FOR EDITING INDIVIDUAL ITEMS

The node menu provides functions that are useful when you have to edit individual items. But if you want to edit a large number of items at the same time, it may be easier for you to first **select** them all first. This assumes you want to perform an editing operation that makes sense with a group of items. The **Move** functions are example of editing operations that you can do with a large group of selected items. See the explanation about **Selecting items** on page 5 for more details. The example on page 13 about creating an array of items also explains about selecting items.

The functions of the Node Menu are:

### Move Node

This function lets you drag nodes, but for the sake of convenience, if you click on a link you will be able to drag the link also. So this function is actually a “Move Node or Move Link” function.

### Move Links

This function only lets you move links. If you try to move a node, the mouse becomes a NO symbol. This function is useful when you want to move only links. The Move Node function, by comparison, moves both nodes and links, so if you use the Move Node function instead, and if you accidentally click a node, the node will move. To avoid the accidental moving of nodes, use the Move Link function.

### Move Items

This function lets you drag the entire polyline, text, or whatever the item is, without distorting it or altering any of its nodes or links.

### MAKE NODE LOOSE / TANGENT

**T** AND **L**

When making polylines that contain arcs or splines, you will often want to make the nodes tangent or loose. The keyboard shortcuts (ie, T for Tangent and L for loose) are often the most useful, but you can use the mouse to do this. Just set the mouse

to this function, and then click the nodes. If a node is tangent, it will become loose, and vice versa.

### FLEX ARCS

This function lets you grab a point on an arc and drag it to a new location. The arc radius and sweep change in the process. This is something you use the mouse for; you cannot flex arcs using the keyboard.

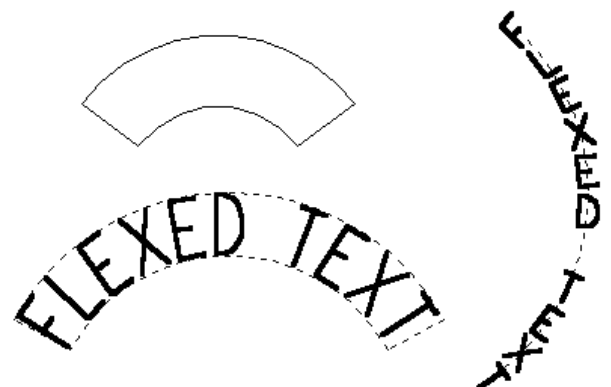
If you are familiar with geometry it will help you to realize that this function creates an arc using three points. Two of the points are the two nodes at the ends of the arc, and the mouse is the third point. With most CAD systems, if you want to create an arc with three points, you first pick the option to create a 3-point arc, and then you specify the three points. With MillWrite, you use the mouse to drag the third point.

What if you don't want to drag the third point? For example, what if you know the XY location you want the third point to be? Or what if you want the third point to be at the intersection of some items in the drawing? You have two solutions to this problem:

- 1) After you start the process of dragging the third point, just let go of the mouse and type the XY coordinate you want the third point to be located at. Follow the same rules that were discussed at the beginning of the chapter in regards to moving nodes with the keyboard.
- 2) As soon as you start the process of dragging the third point, the middle mouse button will become the **Snap menu** function, so you could click the middle button and then pick one of the snap functions. If you don't have a middle button, just press the **S** key.

### FLEXING RECTANGLES AND TEXT

The Flex function can also flex rectangles and text. However, only two lines will flex into arcs; the other two must remain lines. Examples of what a flexed rectangle and flexed text look like are shown below.



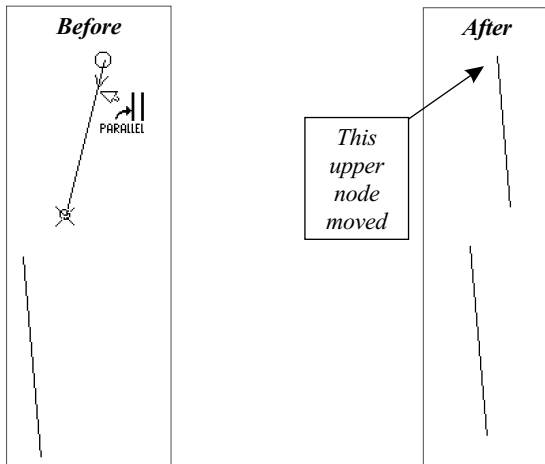
## MAKE PARALLEL



This function will make lines parallel to each other. You can also do this with arcs. When you requires an arc become parallel to some other arc or to a line, MillWrite will pretend that the two nodes of the arc are a line. Therefore, when you request an arc to be parallel to a line, the two end nodes of the arc will align themselves parallel to the line. The radius and sweep of the arc will not change.

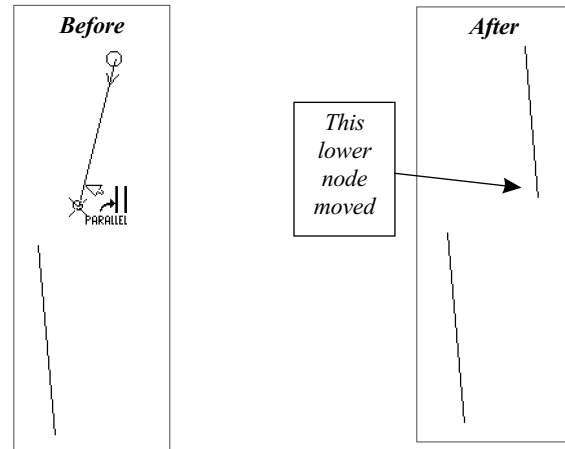
The keyboard shortcut for this function is **P**. You must put the mouse on a line (or arc) first, and then press P.

When you make a line parallel to another, at least one node of the line has to move its position. The node that will move is whichever node is nearest to the mouse when you clicked the line. For example, assume you have the two lines shown as the “Before” lines in the image below. You want the upper line to become parallel with the lower line. And you want the upper node of that line to move while the lower node remains stationary, as seen in the “After” image. You put the mouse nearest to the **upper** node and click the mouse. This shows MillWrite that you want to make this line parallel to some other line, and you want the node nearest to the mouse to be node that moves.



The screen will change as seen in Figure 6-10. MillWrite is waiting for you to pick the line that you want it to become parallel to. Put the mouse anywhere on the lower line (as seen in the figure) and click the left mouse button. It doesn't matter where on the line you put the mouse when you click because you are merely identifying the line as the reference that the other line becomes parallel to.

If you wanted the *upper* node of the line to remain stationary and have the *lower* node move, you click the mouse near the **lower** node, as seen in the images below.



### SEPARATION DISTANCES FOR PARALLEL ITEMS

As seen in Figure 6-10, the parallel function offers you the option of specifying a **separation** distance. When you specify a separation, **both** nodes of the line will move, so it doesn't matter which node is closest to the mouse when you click it.

In the images above and to the left, **no** separation distance was specified. However, in the images below, a separation of **zero**, **.2**, and **.4** was specified. This has the effect of making the items parallel **and** separated from each other by zero, .2, and .4 units (units are inches or mm).

If you want the separation distance to be the length of a line in the drawing, or the distance between points in the drawing, you can use the Object Snap functions to specify the separation distance by picking points in the drawing.

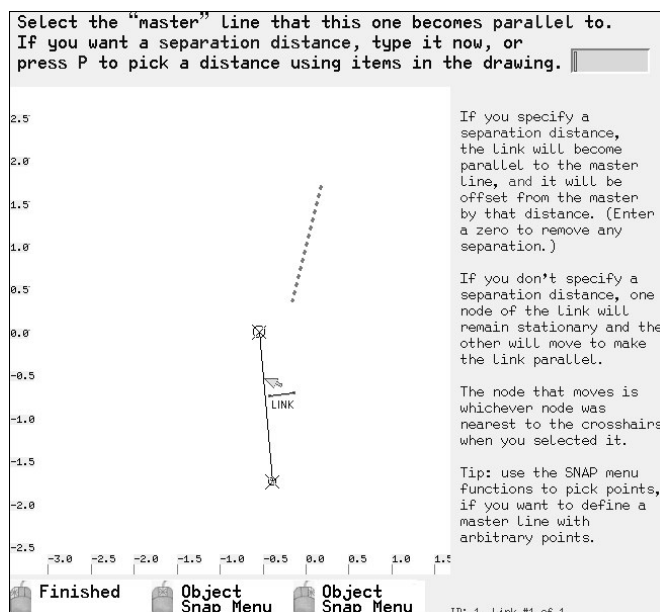


Figure 6-10

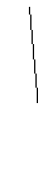
Before...

After specifying a separation of...

Zero

.2

.4



## Make Perpendicular

This is similar to the parallel function, but there is no option for a separation distance, so it is less complex.

As with the parallel function, when you make a line perpendicular to some other line, one node must move while the other remains stationary. As with the parallel function, the node that moves is the node nearest to the mouse when you click the mouse button.

There is no keyboard shortcut for this function.

## STRAIGHTEN Link/Item

**V** AND **H**

Often you want lines to be exactly vertical or exactly horizontal. An easy way to do this is to set the mouse to this function, and then click on any line you want vertical or horizontal. If the line is closer to being horizontal than it is to being vertical, MillWrite assumes you want it horizontal. You will see what MillWrite is assuming by looking at the mouse. For example, in the image below and to the left, the mouse icon has the word "vertical", which shows that MillWrite will make this vertical if you click it. In the other image the mouse icon doesn't show the word "horizontal", but that was only because the word was too large to fit, so instead it shows a line becoming horizontal.

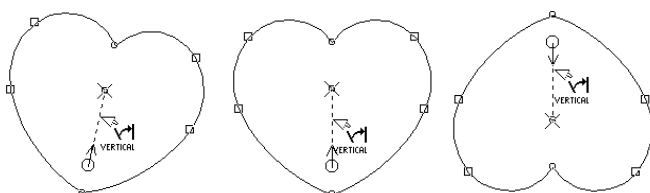


When MillWrite makes a line **vertical**, it slides the node nearest to the mouse along the X direction until it becomes aligned with the other node. And when MillWrite makes a line horizontal, it slides the node along the Y direction to align it with the other node. In other words, MillWrite does not **rotate** the line. This has an advantage when the line is part of larger polyline; specifically, the link will become vertical or horizontal without disrupting the other links.

The keyboard shortcuts for making items vertical and horizontal are **V** for vertical and **H** for horizontal. You must put the mouse on a link first, and then press H or V.

## STRAIGHTENING SYMMETRICAL POLYLINES

You can use this function to make symmetrical polylines vertical or horizontal also. For example, in the three images of the heart below, the left heart is slightly crooked. To straighten the heart put the mouse on the symmetry line. When you see



the mouse icon change to show the word **vertical**, click the left mouse button. The middle image of the heart shows the result. Or you could just press the **V** key.

If a symmetrical polyline is already vertical and you make it vertical a second time, MillWrite will flip it over, as seen by the third image of the heart. And if you make the heart vertical again, MillWrite will flip over again. This is also true if you made the polyline *horizontal*; ie, if you try to make it horizontal a second time MillWrite will flip it horizontally.

## MAKE THIS NODE THE START NODE

After setting the mouse button to this function, you click on the node of a **closed** polyline that you want to become the **start** node. The polyline will remain closed, but the start node will have moved.

If you click on the **end** node of an **open** polyline, MillWrite will reverse the polyline to make that node the start node. Clicking on a middle node of an open polyline does nothing.

## BREAK NODE / LINK

**B**

### BREAKING links

This function is like a scissors. If you click the mouse on a **link**, you cut the link at that location, creating two polylines. However, if the polyline was **closed**, the first time you break it you only **open** it at that location.

### BREAKING nodes

If you click the mouse on a **node**, you break the polyline at that node. If the polyline was closed, you open it at that node, otherwise you create two polylines.

### BREAKING nodes OR links WITH THE keyboard

The keyboard shortcut for the Break function is B. You must first put the mouse on a node or link before pressing **B**. However, when you use the keyboard to access the Break function, you will be provided with a menu. If the mouse is touching a **line** you get the menu seen at the left, below. If the mouse is touching an arc, you get the menu on the right. These menus allow more advanced breaking. For example, you can break an arc at a position that is 30° from its start node. Or you can break a line at a point where another item intersects it. Or you can break an arc at its midpoint or quadrant.

