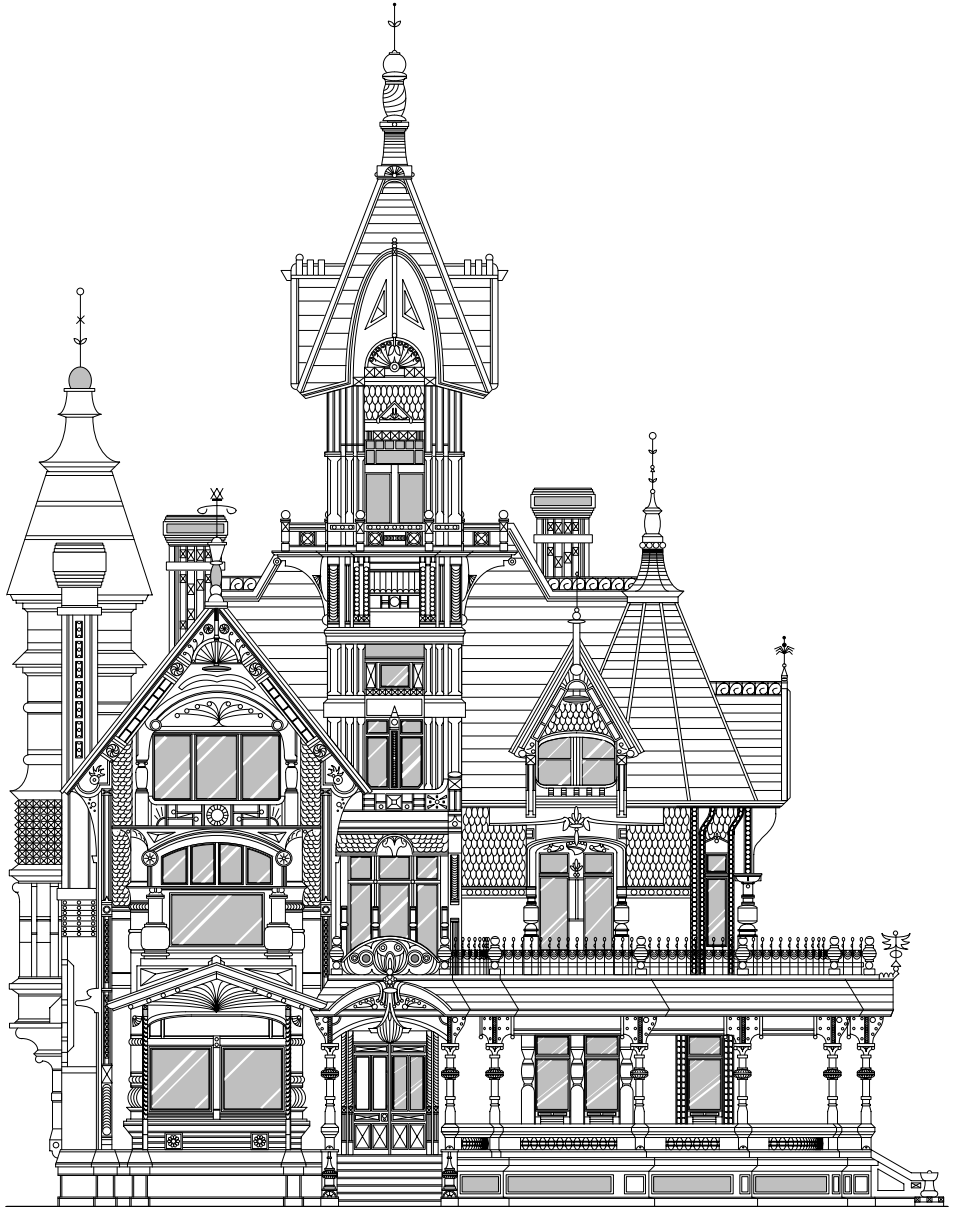


*Bring a whip and a chair.*



Version 9



*Bring a whip and a chair.*

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# Introduction

I wrote WildTools because I draw. I have spent many years on the drawing board producing highly detailed, ink-on-mylar aircraft assembly drawings with old-style tools like flexible splines and duck-weights. I'm compulsive about the appearance of my drawings, and I've devoted many thousands of hours to producing them. Drawing to me means backaches, eye strain, long hours, and incredible tedium when you have to revise a drawing done in ink.

Whenever I draw, I inevitably growl to myself, "Why can't a computer do this?" Yet when I look at the various CAD programs, I am simultaneously intrigued and appalled. A friend once told me, "I learn about something every day that my CAD system won't do." I agree, and I've found the drawing process even in PowerCADD—which I regard as the best program around—to often be a frustration-filled experience.

I finally realized that no commercial software company was going to please me, so beginning in August 1993, I began writing my own tool palette in my spare time. The result is WildTools, and I invite you to compare every tool to the drawing tools in PowerCADD or any other drawing program.

I've tried to make these tools as intuitive and elegant as possible, but these are extremely powerful tools, and some degree of complexity is unavoidable. While all of us yearn for greater power in our drafting tools, you should be aware that complex tools carry with them the possibility of every software publisher's nightmare—that users will inundate them with telephone calls instead of reading the manual.

Thus, I have for you a gentle plea: Please read the manual! And when you find yourself confused, read the manual again, and again. I've made every effort to explain these tools completely, and there are no undocumented features. If you want to see more tools like this, then please do yourself—and all PowerCADD users—a favor by reaching for the manual rather than the telephone. Besides, if something confuses you, it's also likely to confuse the nice people who answer your calls. Their instructions—if you must know—are simply to read you the manual!

Like PowerCADD, this software is available at a very modest cost. Please remember that really good software is the result of long hours of work by someone, and all the same rules about not copying commercial software programs and one-copy-per-user also apply to PowerCADD Externals. All of you architects and engineers out there know how you would feel if someone built a second house from your plans without compensation, and that's just the way it is for the hardworking people at Engineered Software with their PowerCADD software.

I'm always open to suggestions on ways I can improve these tools, their documentation, and ideas for additional tools. If you have any comments, criticisms or ideas, please write to me care of Engineered Software or email me at [alfred@seqair.com](mailto:alfred@seqair.com). If you are curious about what we do here at Sequoia Aircraft, please visit our website at [www.seqair.com](http://www.seqair.com).

I hope you enjoy using these tools, and I hope they make your drafting an easier and more enjoyable process.

*Alfred P. Scott*  
President  
Sequoia Aircraft Corporation

## **Acknowledgements**

I wish I could take credit for all the good ideas in WildTools, but only a small fraction of them came from me. Some came from other programs—Zoomer, for example, came from PageMaker. Most however came from the extraordinarily talented people who make up my beta testers, and we all owe them our thanks and appreciation.

My special thanks go to D. Todd Stanley, the quiet genius of PowerCADD, for so patiently explaining to me all of the intricacies and nuances of the programming side of PowerCADD. During the development of PowerDraw 4.0, there were many occasions when—in my normal obsessive way—I ruined Todd's dinner, then called him at midnight with a question just as he was beginning his nightly session of programming, and then the next morning—at what I *thought* was a decent hour—woke him from a deep sleep. “Are you awake, Todd”, I would ask. “I am now!”, he'd say, but he never once barked at me.

Being involved in the development of Externals for PowerCADD has been a fascinating and unique experience for me. No one using the program can ever understand the enormous effort than goes into something like this or the spectrum of frustrations, emotions and triumphs that are involved in writing the tools and commands that others use without a passing thought. Now it's my turn to apply all the lessons I've pumped from Todd's brain, so that others might benefit from what has come out of that remarkable collection of neurons.

And finally, no words are adequate to express my thanks to the three special ladies of my life, Meredith, Sara and Kakee Scott, for putting up with me while I did this thing.

Special thanks to Frank Christensen for his help with the documentation, and to my mathochist friend Jim Petty. Without his help with the math behind all of this, WildTools would not exist. Many thanks to Greg Johnson, who worked out the math for axonometric scaling. This is an incredible feature, and I didn't even know what an axonometric projection was—or that it existed at all—until Greg introduced this to me. Special thanks to Phil Loheed for this help in creating PerspectiveTools. Phil knows more about perspectives than anyone I've met, and without his depth of knowledge and interest in perspectives, all this would not exist.

*Alfred P. Scott*

## **Learning WildTools**

If you're like most Macintosh users, you'll try out the software right away, and then if you find it interesting, you'll glance at the manual until you have picked up enough information to be comfortable with the software—and then you'll rarely look at the manual again. If you do this with WildTools, you'll be cheating yourself, and you'll never get completely up to speed with the tools.

If you want to get the maximum benefit out of WildTools, you must force yourself to learn the tools. Because there's so much in WildTools, this process can take anywhere from a week to a month, however once you learn the tools, you can achieve an astonishing increase in productivity.

Start by reading the 'Basic Concepts of WildTools' several times until you understand it. Then read the entire manual.

Force yourself to use Zoomer until it becomes second-nature, otherwise you will never reach maximum drafting speed. Zoomer is built into many of the tools and provides on-the-fly zooming.

If you're an experienced PowerCADD user, the first thing you'll try is to set all of the attributes of the tools by holding down the Shift key as you select an attribute from the Attributes menu or Defaults Window. It does *not* work like this in WildTools. See the 'Tool Attributes' section of 'Basic Concepts of WildTools.'

Work especially hard to learn the Parallel Offset and Offset Line tools; how you can store two offsets in the dialog and switch between them with the Option key; how you can switch between interactive and non-interactive operation with the Shift key; and how you can use the Edit Window to temporarily change the offset on the fly. These tools allow you to lay out floor plans and designs with great speed. No other feature in WildTools will do as much to increase your productivity.

Make the extra effort to learn the Transformation tools. Because they operate on selected objects, they may initially be frustrating, however once you learn these tools, they will become something that you will use all the time, and you'll find yourself wondering how you ever survived without them.

There will be times in the learning process when you will become frustrated. These are professional-level tools, and it's up to you to learn them using the software and the manual. Many others have been through this process and can attest to the enormous benefit of learning the tools, but you cannot call Engineered Software with I-don't-understand questions. They're just going to read you the manual, and if too many users do this, Engineered Software will stop selling these tools and others like them. Don't do it!

At some point you will settle into WildTools and become comfortable with the tools. It's still a good idea to force yourself to read the manual at regular intervals—say every Sunday afternoon—until you feel that you have completely mastered the tools.

## What's New

The principal new features introduced with WildTools 9 are:

- Added Stretch tool.
- The Point tool now has style and size choices.
- The Join tool now has the ability to join multiple objects in a single operation and a trim-extend join of two lines.
- The Blend and Join tools now handle the Z heights of TopoTools.
- The Measure tool now has a high-precision measurement capability.
- Added Surface Texture tool to Dimension Tools palette.
- The Baseline Tools palette now has a Square Polygon tool.
- Added 'Smart Lines' to Nuts & Bolts palette.
- Added Setups for many tools.
- Added dramatic improvements for live drawing, live highlighting and live display to preview a tool's action. This is for many tools, perhaps half of the tools in WildTools.
- Added information balloons for many tools, to show the current settings for the tool or relevant information in the process of drawing.
- Added rulers, protractors, tangent and perpendicular snap indicators, cut marks, etc. as part of the display in the process of drawing.
- Changed name of the Z Move tool of TopoTools to the Z Nibble tool.
- Added a new Z Move tool to TopoTools.
- Added a Topo Breakline tool to TopoTools.

- Added a Z Delete tool to TopoTools.
- Added an Analyze Topo menu command of Find Contours and Analyze Slope to TopoTools.
- Added North Arrow and Sun Shadow tools to ShadowTools palette.
- You can now use the PowerCADD shortcut of “..” for the feet mark in all WildTools dialogs.
- Added an ‘actual dimension as typed’ display of fixed dimensions to tool dialog display and information balloons. That is, if you type a dimension of 1.23456” for the setting, you will see 1.23456” and not rounded off to, say 1.23” if you have the display accuracy set lower.
- In WildTools preferences pane, eliminated Zoomer Autoscroll and Zoomer Double-click options (they are now always on), added Smart Lines (Nuts & Bolts) choice and Analyze Topo as an optional menu command.
- Added 2:1, 3:1 and 4:1 slope buttons for the Slope Offset and Grading Tools in TopoTools.
- Added ability to ask for tangent snaps with the Extension Arc and Joggle tools.

WildTools 9 is compatible with PowerCADD 8.

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# Getting Started

## Installing

### To install WildTools:

- ❑ Insert the WildTools CD into your CD-ROM drive.
- ❑ On your computer hard drive, open the PowerCADD folder located inside your Applications folder.
- ❑ Drag the WildTools folder from the CD into the PlugIns folder located inside the PowerCADD application folder on your hard drive.
- ❑ Double-click the PowerCADD application icon to launch PowerCADD.
- ❑ Enter the installation code for WildTools included with your CD when prompted. (Using the caps lock makes the install code easier to input.)

You will only be prompted for the WildTools installation code the first time you launch PowerCADD.

You will now have WildTools, BaselineTools, Composite Wall Tools, WildTools3D, SpecialCurves, Doors & Windows, Nuts & Bolts, PerspectiveTools, SketchTools, CoreUtilities and WildThing in the PowerCADD Plug-Ins folder.

That's all there is to it. The next time you start PowerCADD, the tools and menu items in these Externals will be automatically loaded into PowerCADD.

WildThing is a 'shared library' which lets the other Externals 'talk' to each other. It shares and it cares. There are only three things that you need to know about WildThing: (1) it is necessary for the various WildTools Externals to run, (2) it must be compatible with the current copies of the WildTools Externals, and (3) you should only have one copy of WildThing installed.

## **What's Where**

All of the tools and menu items are included in ten External files.

**WildTools** contains the WildTools palette, the Style Tools palette, the Transformation Tools palette, the Dimension Tools Palette, Black Color for All, Colorize All, Convert to Group, Jiggle, Match, Mirror by Line, Rotate by Line, Simplify and Squiggle.

**BaselineTools** contains the Baseline Tools Palette.

**Composite Wall Tools** contains the Composite Wall Tools palette.

**Doors & Windows** contains the Doors & Windows tool palette.

**WildTools 3D** contains the WildTools 3D tool palette and the WildTools 3D Cube window.

**Nuts & Bolts** contains the Nuts and Bolts palette.

**PerspectiveTools** contains the PerspectiveTools palette and the Perspective Cube window.

**SketchTools** contains the SketchTools and ShadowTools palette.

**SpecialCurves** contains the Special Curves tool palette.

**TopoTools** contains the TopoTools palette and the Analyze Topo menu commands of Find Contours and Analyze Slope.

## WildTools-Dependent Tools

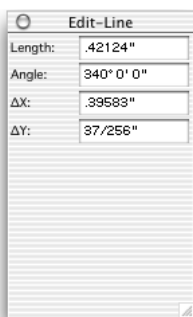
All of the various WildTools Externals (WildTools 3D, Nuts & Bolts, SketchTools, etc.) are dependent on WildTools for a number of settings. For example, all of the tools are hooked up to the Style Tools. This ‘sharing’ of information is handled by the ‘WildThing’ shared library.

## Review of Basics

WildTools is a collection of advanced drafting tools, and all of the following documentation assumes that you are familiar with the basic operation of PowerCADD. Nevertheless, let’s review two critical points:



Whenever you see a tool with two dots in the bottom right corner of the tool icon, this means that a settings dialog box is available if you press the Option key and select the tool by clicking on it.



One of PowerCADD’s best features is the Edit Window. You may use it to edit the dimensions of an object by selecting the object and then pressing the Tab key.

However, the *real* power of the Edit Window is the ability to edit the current operation on the fly. While you are in the process of drawing, you can press the Tab key to interrupt the drawing process, enter information in the Edit Window, and then click the mouse outside the Edit Window or press the Enter key to complete the operation. This on-the-fly editing of the current operation is extremely powerful. Throughout this manual when we say “You may tab into the Edit Window...” we are referring to this on-the-fly editing.

## Basic Concepts

The WildTools palette has been designed with one overriding objective: To speed the drawing process. This speeding-up is done by the simple device of eliminating steps, and the WildTools palette provides a number of methods to streamline the drafting process.

Think of WildTools as a highly-tuned race car, with gear-shift levers and other controls readily at hand but which are also out of sight because they're deep inside the cockpit. If you learn to drive the machine, instinctively and masterfully manipulating the controls, you'll be able to drive circles around cars with only a single-speed gearbox.

WildTools is like that, with controls and interface devices that are invisible and hidden from view. As a result, there is a longer learning curve, but once you get your brain wrapped around the basic concepts and master WildTools, you can achieve an absolutely astonishing increase in drafting speed. There are many new concepts, which you can only master by hard work, practice and reading the manual over and over until you understand all of the capabilities.

As you use WildTools, you'll find that the way you draw will change, and you'll adopt new methods of doing things. Even after you become comfortable with WildTools, it's a very good idea to force yourself to re-read the manual at regular intervals because you will find new ways to use the tools that fit your new methods of doing things.

Following is a general discussion of the concepts and features of WildTools.

## Tool Attributes

In PowerCADD, the standard method of operation is that every tool has its own tool attributes that you can set individually or all-at-once by holding down the Shift key as you select an attribute from the Attributes menu or Defaults Window.

△ **Important:** This is *not* true with WildTools. Instead, essentially all of the drawing tools share the same attributes, and they are tied to the Normal style of the Style Tools palette. If you're familiar with the Needle tool, you'll find the Style Tools easy to master. For a complete discussion, see 'Style Tools' below.

However, you can choose Use Styles in the WildTools preferences dialog, or if you deselect Use Styles, you may set the attributes of the tools individually. △

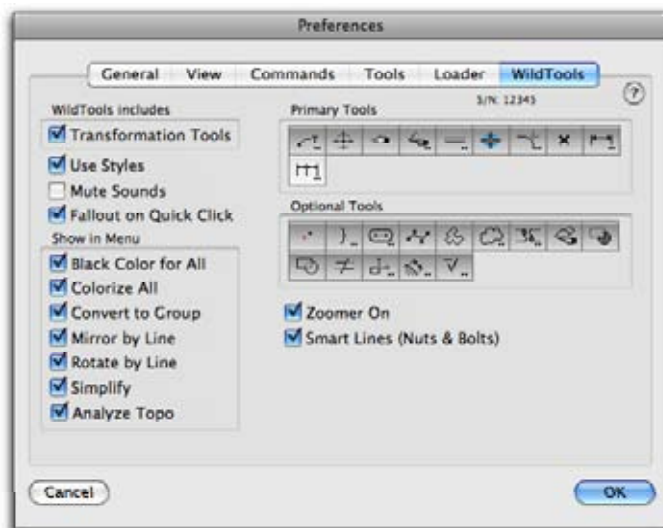
## Tool Palette Organization

The tool palette is organized so that tools can be easily and quickly located. The most commonly-used tools are located on separate rows and so that they typically are visible at all times. The drawing tools are provided in three separate tool palettes, which you can configure in a number of ways. If you have a larger monitor, you can expand the tool palette by designating certain tools as Primary tools, which have their own row. In addition, a number of specialized tools may be eliminated from the tool palettes completely.

You'll notice that many of the tools have color icons. A small red cross is used to indicate a click point that does not appear as a handle or object in the drawing, and a faint red (pink) line is used to indicate the movement of the mouse. In other cases, colors or gray tones are used to indicate 'background' objects which are not drawn by the tool. The tool icons are designed to indicate the function of the tool, and also to provide distinct, easily recognized shapes. Some tools have bright colors simply to distinguish them from others in their row so that you can quickly select the tool you want.

### To customize the tool palettes:

- ☐ Choose Preferences from the PowerCADD menu, then click on the WildTools tab. The following dialog box will appear.



- ☐ Choose if you want the Transformation Tools included in the WildTools palette.

- ☐ Choose if you want to use styles—see the Style Tools palette.
- ☐ Choose mute sounds if you don't want to hear the sounds in WildTools.
- ☐ Select Fallout on Quick Click if you prefer it.
- ☐ Choose the optional commands to show in the menus.
- ☐ Select which tools you want to be Primary Tools, that is, tools that will have their own row.
- ☐ Select which Optional Tools you want. Optional Tools which are not selected will not appear in the tool palette.
- ☐ Choose if you want Zoomer on.
- ☐ Choose Smart Lines for Nuts & Bolts if you wish.

These changes to the tool palettes will not take place until you restart PowerCADD.

## Zoomer

### ***On-The-Fly Zooming***

Studies show that users of CAD programs zoom and pan more than any other activity. Zoomer provides a method that you can use when any tool is active, and it is also available as Zoomer Command; see Menu Commands.

Zoomer is a toggling zoom that bounces between reduce-to-fit and normal size as its primary function with Command-Option click. From reduce-to-fit or normal size, you can double the zoom-in by using Command-Shift-Option-click. If you're zoomed in more than normal size, either of these combinations takes you back to normal size, or a double-click will return you to the previous view. You can use Zoomer to auto-scroll, or as a window-zooming tool.

#### **To toggle between reduce-to-fit and normal size:**

- ☐ Press the Command and Option keys. The cursor indication will change to one of the following:



The Zoom-Out cursor indicates that you will zoom out. Click to zoom out.

—or—

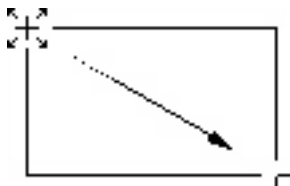


The drawing cursor with a rectangle indicates that you will zoom in. Click the mouse to zoom in.

You can double the zoom-in amount by pressing the Command-Shift-Option keys. If you are at normal size, Command-Option will produce the Zoom-Out cursor, while Command-Shift-Option will produce the drawing cursor and rectangle for zooming in.

If you press Command-Option or Command-Shift-Option keys, you're in Zoomer. Let up on these keys (without clicking), and you're out of it. The two cursor displays that tell you what is going to happen: a drawing cursor with a rectangle to tell you it will zoom in, or a zoom-out cursor with four arrows.

You may still use commands which use Command-Option and Command-Shift-Option combinations.



### To use Zoomer as a window zooming tool:

- ☐ Press the Command and Option keys to get into Zoomer. The cursor indication will change to the drawing cursor with a ghosted rectangle or the Zoom-Out cursor.
- ☐ Press the mouse button and drag away to draw a rectangle enclosing the view.

This action is present at any level of zoom, and it's the reason Zoomer uses a cursor with a vertical cross so that you can always see where you will be drawing the rectangle.

### To use Zoomer for Previous View:

- ☐ While you're in Zoomer, and if you're zoomed in to normal size or more, if you double-click you will go to the previous view, exactly as if you had used the Previous View command.

This is very useful when zoomed way in since it allows you to step back to the previous view. If you drag a rectangle in Zoomer, you are committed to the window-zooming action, and you cannot double-click for previous view.

There's a price to be paid for this feature, however, because Zoomer must wait to see if you double-clicked. This means that on normal operations, the response is slowed down. You can shorten this time by setting the mouse-click speed to fast in the Mouse control panel. When you are zoomed out to reduce-to-fit view, this double-clicking action is not available. If you don't like this feature, then you may turn it off in the WildTools preferences dialog as described below.

### To auto-scroll with Zoomer:

- ☐ Press the Command and Option keys to get into Zoomer. The cursor indication will change to the drawing cursor with a ghosted rectangle or the Zoom-Out cursor.
- ☐ Move the mouse to the top, bottom, left or right edge of the window to auto-scroll.

## **Zooming on Demand    *Zooming During Drawing***

You can zoom during the drawing process in a wide variety of ways, using Zoomer or key commands for

- Zoom In Now, typically 1
- Zoom Out Now, typically 2
- Previous View Now, typically 3
- Zoom In
- Wild Zoom In
- Zoom Out
- Normal Size
- Wild Normal Size

### ***Accelerated Scroll Wheel Zooming***

You may use scroll wheel zooming in the process of drawing. This method of zooming has three features.

1. It uses accelerated scroll wheel zooming, which means that a slow movement of the scroll wheel results in a small amount of zoom change, while a faster movement of the scroll wheel results in a larger amount of zoom change. This has a smoother and more intuitive feel.
2. The zooming 'hits a stop' at the 'reduce to fit' level of zoom so that you will not overshoot on a zoom-out operation, and it slows down as you zoom in past normal size.
3. The zooming is 'gridded' so that it zooms to sensible levels of zoom (2.0, 1.5, 1.0, 0.5, etc.) and not to unusual levels of zoom like 1.06 or 0.98.

## **Tool Fallout**

A tool 'falls out' when it stops being the current tool and the Selection Arrow tool takes its place as the current tool. The original purpose of tool fallout was to provide a method of handling exceptions and impossible situations. It is the tool's way of saying "I'm rejecting what you're doing", and it instantly tells you that you've done something wrong.

A poorly designed tool can trap you in an action and will give you the feeling of having something stuck to your fingers that you can't shake off. This can be very frustrating, but if the tool falls out easily, you'll never have that feeling, and the tool will feel very good and light.

A happy byproduct of this error-handling is that many PowerCADD users have developed the habit of clicking the mouse in the drawing to cause the tool to fall out. This provides a quick, easy way to change to the Selection Arrow tool. All of these tools are specifically

designed to accommodate this method of working, and they are ‘toughened’ so that you can be very rough with them. Thus, tool fallout is no longer an error-handling device. It is now an important feature to be used to attain maximum drafting speed.

Tool fallout is accomplished essentially by three mechanisms. First, a single down-up click with a line tool would produce a zero-length line, so the tool falls out. Additionally, drawing tools calculate the time between the mouse-down and mouse-up to prevent unwanted objects if you pop the mouse quickly and move it slightly.

Second, tools that place an object with a single click use a ‘timed fallout’ method. If you click on an object in the drawing, you probably intend to draw something so the tool will always place an object. If you are holding down a key, probably to get a snap, the tool will always place an object. If you click in white space, you may be trying to get the tool to fall out, so the mouse action is timed with the theory that if you’re drawing, you will probably be acting deliberately, and if you want to fall out, you will probably click quickly. If you click quickly down-and-up in white space, it will fall out. This behavior requires a little practice to master, but it’s become very popular, and it quickly becomes second nature.

Third, modifier tools such as the Fillet tool fall out if you click in white space because you’re expected to click on an object and didn’t do that. However, if you click close to an object without picking it, the computer plays a distinctive ‘missed pick’ sound, and the tool does not fall out.

Similarly, direct-action tools also exhibit this missed-but-close behavior.

This method of using the tool fallout as a quick way to get to the Selection Arrow tool is key to getting up to speed with these tools, so practice popping the mouse in the drawing quickly to get the tool to fall out. Once you become accustomed to this, you’ll soon forget what you are doing and can concentrate more on the drawing process.

However, if you don’t like this feature, you can turn Fallout on Quick Click off in the WildTools preferences dialog.

## **Deselect on Tool Fallout**

Most drawing tools in CAD programs deselect all of the objects in the drawing once you click the mouse. If you’re going to draw an object, that makes sense, but if you’re clicking in white space to fall

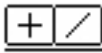
out, it's inconvenient. In most cases, the reason you're popping the mouse is to edit the object that you've just drawn, and this forces you to select the objects that you just drew. That's an extra step that will slow you down.

To keep this from happening, these tools do not deselect any objects until you are committed by mouse movement to draw a new object. Again, this provides a 'fast-track' method of drawing that you must deliberately adopt to get up to maximum speed.

## Shift-Toggling

Many of these tools operate in two different modes. For example, the Line tool can be set to operate as a constrained line tool or a tool that will draw at any angle. Most users have a strong preference for one method of operation, and these tools allow you to set the tool to the mode of operation that you prefer. In addition, you can quickly switch between the two different modes with a quick tap of the Shift key.

The interface idea derives from the call-waiting method used on most private telephone lines. If you have a call coming in and want to switch to it, tap the receiver button quickly down-and-up. That's the way shift-toggling works, tap the Shift key quickly down-and-up. You have to be quick about it, or it won't work.



How do you find out if the tool has shift-toggling? Bring up the dialog for the tool. There you'll see a pair of icons like these.

The cross indicates 'constrained', the diagonal line means 'unconstrained'. Notice that there is a line under the two icons. This indicates that the tool will toggle between these two modes with a quick tap of the Shift key.

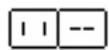
Another way is to just try it. Select a tool and tap the Shift key quickly down-and-up. If it toggles, you will get two indications. There will be a snapping "switch sound" from the computer's speaker that's actually a recording of an aircraft toggle switch. Second, the cursor will momentarily change to a mode indicator.



For example, if you're switching between constrained and unconstrained modes, one of these indicator cursors above will flash briefly on the screen. These indicator cursors always match the icons in the tool's dialog box.

Constraint-toggle tools are the most common form of shift-toggling tools. Let's take the Line tool as an example. You already know how the PowerCADD line tools work. With the Line tool, the Shift

key constrains the line to the snap angles. With the Constrained Line tool, the line is already constrained, and the Shift key breaks the constraint. Shift-toggling puts the tools together as a single tool that will toggle back and forth in the way it behaves. Tap the Shift key quickly down-and-up to switch. You can do this when the mouse is up, or while you're in the process of drawing.



A second variety are the toggle-interactive tools. The icons and indicator cursors for these tools are shown here. The arrow means interactive, while the equal sign means that the tool is constrained to a fixed dimension. The Parallel Offset tool is an example of a toggle-interactive tool, and you will quickly find that the tool becomes much more versatile as a result.

There are many different types of shift-toggling tools. Two sets of icons are shown to the left. The meaning of the icons may not be obvious at first glance, but they are quickly learned.

For most tools, the method of switching between modes with a quick down-and-up tap of the Shift key is available only when the mouse button is up.

There are two known problems with shift-toggling. First, Apple's Sticky Keys is incompatible with shift-toggling. In the unlikely event it is turned on, you can turn it off in the System Preferences, Universal Access, Keyboard.

Second, on older, slower computers, you will find that shift-toggling will not work on large drawings. This is because there are so many objects in the drawing that the snapping causes the tool's internal cycle to slow down so that the time between each cycle is greater than the minimum needed for shift-toggling. This only applies to the attempted use of shift-toggling while drawing—you can always use shift-toggling while the mouse is up (*i.e.*, before drawing).

## Option-Toggling

Many of the tools have an additional tool capability available by pressing the Option key once you have pressed the mouse button. For example, for most tools, the optional method is 'draw from center', but in the case of the elliptical arc tool, it allows you to switch the way the arc swings. You'll find with the regular polygon tool that the presentation is toggled. When the tool toggles, there is a soft, snapping sound.

In every case, the action is reversible by pressing the Option key again. Begin drawing and if you want to draw in 'another way', then press the Option key to see if another method is available. If

you don't like the new method, then press the Option key again to get back to the original method. With rare exceptions, there are only two drawing methods for each tool.

The main thing about this toggling business is that you don't need to read in the manual to see what it does. Press the Option key, and you will immediately see what the new method of operation is. You are always safe to experiment with the Option key because it is *always* reversible by pressing the Option key again.

## Direct-Action Tools

When the Macintosh computer was introduced, a number of principles were enunciated about the interface that made the computer easier to use than previous machines. An important principle was the concept of 'select-then-act'. Interface wonks call this "noun-verb", because you first select the object (the noun) and then press the Delete key (the verb) to delete the object. No one in their right mind would put a program into a delete mode. No, no, no.

So the very first drawing and CAD programs on the Macintosh all obeyed this principle. To fillet two objects, you had to select the two objects and then choose Fillet from a menu. It didn't take long for software companies to start changing all this. In PowerCADD, for example, the Fillet tool is used by clicking on one object and dragging to a second object. That's a verb-noun action—exactly what you're *not* supposed to do but as all PowerCADD users know, it works very well.

A third class of tool has become a standard part of many Macintosh programs. Take the eyedropper tool used in many graphics programs, for example. That's a verb-noun tool, the forbidden fruit of the Cupertino garden! Does it work well? Yes, indeedly! Yes, yes, yes.

The beauty of the direct-action tool is that it allows two steps to be reduced to a single operation, and one that often needs to be used repeatedly. The Needle tool is a good example of this sort of tool, and its value has been proven beyond any doubt.

Unfortunately there are no rules, guidelines or conventions established for direct-action tools—verily, verily, at this moment in California the interface wonks are having endless meetings on this particular subject. In the meantime, if you'll pardon the arrogance, we've developed a few standard devices to distinguish direct-action tools from their more civilized relatives.



Following in the style of the eyedropper cursor, all direct-action tools have cursors which look like the ones to the left—they approach the click point from the upper right. When you click with one of these cursors on an object, you’re saying “act on this” to the program. Each cursor has a standard meaning that you can always depend upon.

Second, when you click on an object with one of the direct-action cursors, there is always a sound associated with a successful operation.

## Cursors



*Fallout cursor*

For example, an obscure part of the PowerCADD interface is that you can hold down the Shift key and click in the drawing to cause the tool to fall out without deselecting any objects. Shift-clicking with any tool will cause it to fall out, and the Fallout cursor is used for this purpose.



The Zoom-Out cursor is used with Zoomer, discussed above, to mean that you’re going to zoom out when you click the mouse.



*Yin-Yang cursor*

As discussed below, many of the tools can convert objects in the drawing to other types of objects. This action of the tool opens up all sorts of useful, and wild, possibilities. The Yin-Yang cursor is used only for Shift-Option clicks.



*Eyedropper and  
Needle cursors*

The Eyedropper cursor is used in many other programs, and it’s used here only to mean “pick up”. It’s always used in conjunction with the Needle cursor which means the opposite of the Eyedropper cursor, *i.e.* “inject”. It has the advantage of having a clearly distinct meaning from the Eyedropper cursor, and no one will mistake the type of action to take place.

There are many other cursors which appear only with individual tools to make their action clear. You’ll also find a few unusual cursors in certain places, but where is it written that you must be serious all the time?

## Sights and Sounds

You'll find that the tools are very 'alive' and give you a lot of feedback about what is happening. For example, whenever an object is cut or shortened, there's a little visual 'explosion' at the cut point and there is also the sound of a pair of scissors snipping. When an object is extended, you'll see the visual 'explosion' and hear another distinctive sound. The Needle tool and its various relatives have distinctive sounds that you'll hear when you pick up or put down attributes.

Think for a moment how these tools would work without a sound. If you're in the habit of clicking the mouse in white space to get it to fall out, you could accidentally delete a large white-filled object that completely filled the screen with the Delete tool. However, because the Delete tool has a distinctive sound, you'll know immediately that you've deleted something by mistake.

## Edit Window and Show Location Bar Support

With WildTools, the Edit Window and Show Location bar operate slightly differently. The information that's shown in the Edit Window is related to the current action of the mouse, and there is no extraneous information. The theory is that if you are dragging the mouse to set the radius of a circle, all you are concerned with is the radius—and the display of any additional information is extraneous and distracting.

The Show Location bar is used as a short-hand version of the Edit Window and graphic indicators are used for length, angle or horizontal and vertical coordinates. Once you begin to drag the mouse, it will typically show the length and angle of the line that you are drawing, *not* the location of the mouse. In PowerCADD, if you hold down the Shift key to constrain a line, the display in the Show Location bar shows you the location of the mouse or the length-and-angle of the mouse movement—which is irrelevant in this case. In short, the Show Location bar now tells you the truth about the object that you are drawing, not the mouse location.

When working with WildTools, it's normally best to have the Show Location bar always showing, and the display set to show the X and Y location of the mouse—just click on the Show Location bar until the display changes to the one you want.

- △ **Important:** Edit Window support is 100%. This means that any time you see a display in the Edit Window while using a tool, you can tab into the Edit Window to edit the action of the mouse. As you will see with the Parallel Offset, Offset Line and Fillet tools, this dramatically increases the usefulness of the tools. Also you

should be aware that any time you are stretching an object created by WildTools by moving a handle, you can use the Edit Window. This applies to reshape operations as well. △

## **To-Scale vs. On-Paper**

Many of the tools in the WildTools palette have a To Scale checkbox. If this option is selected, then any length or size that you type will be to the normal drawing scale.

If you deselect this option, the dimensions will be an “on-paper” dimension, in inches, millimeters or points. This means the dimensions will be at 1:1 scale, regardless of the drawing scale. This is exactly the same as the size of text, for example—you would never think of the text size in meters or miles, would you? (Come to think of it, that’s exactly what AutoCAD users have to do, isn’t it!)

However, there is an anomaly when the Edit Window is involved. If you set a value for a tool for an on-paper size, when the Edit Window is used the value is always shown as a to-scale value.

## **Conversion Actions of Tools**

Many of the tools in the WildTools palette have the ability to convert objects from one type of object to another. This capability is provided as an optional tool action to reduce the problem of menu clutter that was created by previous “Convert to...” commands.

With any tool, press the Shift and Option keys. If the tool has a convert action, the Yin-Yang cursor will appear (if not, you’ll see the Fallout cursor). If you click with the Yin-Yang cursor on an object, you’ll convert it to the type of object that the tool draws. The standard meaning of this convert action is “convert this object to the type of object this tool creates”.

Thus, to convert a rectangle to a rounded-rectangle, select the Rounded-Rectangle tool and Shift-Option-click on a rectangle. Any of the circle/ellipse tools may be used to close an arc into a circle or ellipse. There are many possible combinations. Some are sensible, ordinary things and others are wild—thus the name *WildTools!*

## **Click-Click Drawing**

The click-click interface for drawing tools has proved to be very popular with many CAD programs. There are two advantages to this method. First, it is easier on the hand—there’s something very tiring about holding down a mouse button and dragging across your desk. Many users of Macintosh programs talk of sore hands and wrists, and of injuries caused by working on a computer with click-drag drawing. Second, it allows zooming while drawing.

The choices of click-drag, click-click or hybrid ('smart') are set in the PowerCADD preferences.

**To draw with the click-drag method:**

- ☐ Press the mouse in the drawing area.
- ☐ Drag away from the starting point.
- ☐ Release the mouse to complete the drawing operation.

If you choose click-click drawing, the tools will always require two clicks.

**To draw with the click-click method:**

- ☐ Press the mouse in the drawing area.
- ☐ You may release the mouse at the starting point, or as you drag away. It doesn't matter when you release the mouse.
- ☐ Move the mouse to the end point, press the mouse button again and release the mouse. Note that the mouse-release point is the relevant one.

In full click-click drawing, the tools always require two mouse clicks. It doesn't matter when you release the mouse button, except that you can still quickly pop the mouse in white space to fall out. The drawing tools use a timed fallout method, like the Point tool, and will fall out if you click quickly down-and-up in white space. If you click on an object, however, or if you are holding a key down, the tool assumes that you're trying to draw and will not fall out, even on a quick click.

In the hybrid choice, you may use either click-drag or click-click. For click-drag, use the method described above.

**To draw with click-click method when you have chosen hybrid click-click:**

- ☐ Press the mouse in the drawing area.
- ☐ Release the mouse button within two screen pixels of the starting point.
- ☐ Move the cursor away from the starting point.
- ☐ Press the mouse button and release the mouse at the desired end point.

The timed fallout method is used for a quick click in white space. The click-click method of working with the modifier tools (Trim, Fillet, etc.) is particularly nice, and the hybrid method allows you to use this even while drawing with click-drag. If you prefer drawing with click-drag, but want to use Zoomer while drawing a long line,

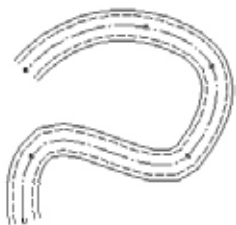
it's easy to shift into click-click drawing once the action becomes instinctive.

Whether in full or hybrid click-click, once the mouse is up, you may draw by moving the mouse. In this mouse-up phase, you may use Zoomer or your command keys for Reduce to Fit, Normal Size, Previous View, Zoom In and Zoom Out. However, there are several complications:

- Many tools use the Option key to toggle between some method of drawing, and this creates a conflict with Zoomer because any use of Zoomer would cause the tool to toggle. This means that either Option-toggling or Zoomer must be turned off during the mouse-up phase. For a tool like the Line tool, zooming is more important than Option-toggling for draw-from-center, therefore Option-toggling is turned off during the mouse-up phase. If you want to draw from center, press the Option key before releasing the mouse button. In other tools (Parallel Offset, Trim tool, etc.) the Option key's function is so important that Zoomer does not work at all.
- Some of the tools operate differently on a single click vs a click-drag. The Offset Point, Fixed Line, Scissors and Pen tools are like this. These tools are click-drag only.

## Parallel Objects

WildTools introduces Parallel Objects, a new type of External object. (An External object is one whose behavior is controlled by WildTools—like Balloon Text, Spline or Insulation Fill objects.) The original purpose of these objects was to provide a way to draw flexible plastic tubing consisting of a number of curved lines all of which are parallel to each other. The purpose of the Parallel Object is to automate the process of creating multiple parallel lines of any shape that can be easily changed so that the parallel lines follow along with the 'mother' object.



Parallel Objects may consist of lines, rectangles of all types, polygons, ellipses, arcs, Béziers, B-splines, and splines.

Parallel Objects can be created by selecting the Linked option with the Parallel Line, Parallel Polygon or Parallel Offset tools. Once created, additional offsets within the Parallel Object may be created with the Parallel Offset tool.

Using the Needle tool, you can set the line weights, color, dash

patterns of the individual objects within the Parallel Object (if you select the option to set individual objects within groups). Similarly, the Style tools may be used to set the attributes on objects within a Parallel Object.

Parallel Objects are highly unusual objects with many uses, but they also have a few eccentricities. When you select a Parallel Object, the handles that are displayed are for the 'mother' object. If you have offset a number of rectangles outside a 'mother' rectangle, the handles will be within the overall bounding box of the group. This can be disconcerting at first, until you understand what is going on.

With the case of rectangles, ellipses and arcs, inside offsets have obvious limitations since you cannot offset a circle, for example, by an amount greater than its radius, and this creates another eccentricity of Parallel Objects. If you reduce the size of a Parallel Offset object, objects offset to the interior will disappear when they get too small, however the Parallel Offset object still 'remembers' that it is supposed to offset an object to the inside, and if you subsequently enlarge the object, the interior objects will reappear.

If a Parallel Object is scaled uniformly in X and Y (by, say, scaling a group that contains the object) the offsets will be reduced appropriately, however if the scaling is non-uniform (*i.e.* where the scale in X does not equal the scale in Y), the Parallel Object is converted to a simple group.

⚠ **Important:** Because there is no way to change the offsets within a Parallel Object, these objects must be created with care and an understanding of how the objects work. ⚠

All of these objects are interactively reshapeable, so that as you change the shape of the centerline of the tubing, for example, the other lines will follow along. In addition, the Polygon, Parallel Polygon, B-Spline, Spline, and Pen tools may be used to reshape these objects in a number of ways.

## **Draw/Reshape Tools**

In PowerCADD, you can have tools which draw objects, such as polygons, B-splines, Béziars, etc., and you can also reshape these object by using Reshape. WildTools introduces a new type of tool, the draw/reshape tool. These include the Polygon, Parallel Polygon, B-Spline, Spline and Pen tools.

The concept is that these tools can edit their own children. Thus, the Polygon tool can not only draw polygons, but it can also edit

them. In many ways, this is like a reshape operation, but there are a number of distinct advantages. These are:

- You can resume the process of drawing an object, from either end, by selecting the end point and then continuing drawing.
- You can zoom in and out while drawing or reshaping. Zoomer works within these tools, so you can use the usual Zoomer key commands as well as your key commands for Normal Size, Reduce to Fit, etc.
- You can add or delete points from objects and Parallel Objects. Each tool that draws a particular object, say a polygon, can also reshape and resume drawing a Parallel Object of the same type.

The reshaping and drawing actions for each of these tools are described with the documentation for the tool.

## Multi-Click Drawing Modes



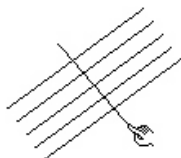
Many tools now have a multi-click drawing mode that offer the same Draw/Reshape capabilities as the Polygon tool, including the Cloud, Elliptical Arc, Chain Dimension, and Running Dimension tools. In fact, each of these tools are now just variants of the Polygon tool. Also the Offset Line and Join tools now have a multi-click capability.

## Pen modes



In addition, some tools have a Pen mode, including the Cloud and Linear Patterning tools. These are just variants of the Pen tool, so you would use the same drawing action.

## Finger Technology



Did you ever think of your finger as a high-tech device? Well, it is! Finger technology is a method of selecting multiple objects.

Using the Finger cursor, you drag a line across objects to select them. Since only objects which are crossed by the line are selected, this allows you to select a number of objects in close proximity to other objects.

In its simplest form, the Finger tool allows you to select objects. However the *real* power comes in the Trim, Multi-Trim, Line Break and Trim with Object tools, where finger technology allows you to select multiple objects to be trimmed at once. This means you can trim 50 lines as easily and quickly as you can trim a single line.

You'll also find finger technology in the Needle tool, Line Styles tools, Delete, Count, Intersection Point, Tornado, and Delete tools.

Be sure to learn finger technology. It provides an astonishing advance in productivity.

## **Dimension Text**

The Dimension tools in WildTools ‘share’ the same dimension text attributes (font, font size, etc) as the PowerCADD dimension line tools. Thus, to set the dimension text attributes, select any of the WildTools dimensioning tools and use the Attributes menu or Defaults Window to set the text attributes of the tool.

## **Guidelines**

There have been many enhancements to the way in which guidelines are handled in WildTools. You can do parallel offsets of guidelines, and the trimming tools will trim to guidelines.

As we all know, old habits die hard, but we would like to encourage you to aggressively pursue the concept of using guidelines in your drawings because with these new capabilities, you can achieve a significant increase in drafting speed. Because of the way they are drawn on the screen, there is a popular misunderstanding that guidelines are somehow less accurate than a line. They are not—guidelines have exactly the same geometrical accuracy as lines, and they use the same 64-bit double-precision data structures within the program. However, because they are always drawn as a single-pixel-wide line on the screen, at various levels of zoom-in or zoom-out, they will appear to not match normal lines in the drawing. Don’t let this illusion throw you off from the utility of guidelines.

And don’t forget that the Delete tool will allow you to delete all guidelines by using an Option-click or Command-click on a guideline. And now with finger technology in the Delete tool, you can drag across guidelines and delete multiple guidelines in one operation without deleting all guidelines.

## **Transparency, Stroking and Screen Effects**

There are many changes in the way objects are drawn on the screen during the process of drawing. In WildTools, filled objects are automatically transparent during drawing, moving or rotating.

In many of the tools, the objects that you are drawing are ‘stroked’, which means that a fine line is drawn down the center of the shape if you are zoomed in so the line is more than five or six pixels wide. This allows you to have a more precise sense of the shape of the object, particularly if you are drawing a curved shape.

## **Live Drawing and Live Display**

WildTools also has live highlighting, so that as you move the mouse over the drawing, objects that will be acted on are highlighted, and only objects that the tool can act on will be highlighted.

In addition, many of the tools have a live display that goes beyond the basic highlighting of the objects, and it allows you to see in advance what will happen when you click.

In the Trim tool, for example, you see a preview of the objects to be trimmed or extended as you move the mouse over the drawing. With the Needle tool you can see what the object will look like when the tool is used. With a few exceptions, all tools that act on objects in the drawing have a live display.

## Information Balloons

Many of the tools now have information balloons that show the current settings for the tools or relevant information in the process of drawing.

In addition, many tools have rulers, protractors, tangent and perpendicular snap indicators, cut marks, etc. as part of the display in the process of drawing.

## ‘Actual Dimension As Typed’ Display

WildTools now has an ‘actual dimension as typed’ display of fixed dimensions in tool dialog display and information balloons. That is, if you type a dimension of 1.23456” for a setting, you will see 1.23456” and not rounded off to, say 1.23” if you have the display accuracy set lower.

These are used with tools that have a fixed-length setting, such as with the Offset Line, Parallel Offset, Thicken and Linear Patterning tools.

## Setups



*Setups Menu Button*

Many of the tools have setups, which means that you can save the current settings of a tool’s dialog as a named setup, for example *1/4” socket head cap screw*, *36” door*, *1/2” fillet weld*, etc.

You can reset a setup to match the current settings in the tool’s dialog. To do this, select the setup you wish to reset from the setup menu, then press and hold the Option key as you release the mouse. This setup will then be changed to match the current setting of the dialog.

## Dimension Point Objects

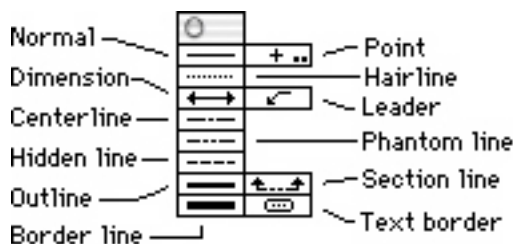
WildTools introduces Dimension Point objects, a new type of External object that can be used to dimension an X, Y or XY location in the drawing. These object update as they are moved.





## Style Tools Palette

The Style Tools palette brings the concept of style sheets to drawing, thus you can store in these tools your settings for normal lines, centerlines, hidden lines, etc. They operate like the Needle tool in that they allow you to assign the attributes (pen size, pattern and color, fill pattern and color, arrows, etc.) to objects with a single click.



There are twelve tools, all of which operate the same way on objects. Some of the tool icons have colors. These colors are not related to the attributes of the tool. Instead, they're used to identify the line weight, like the color of a cap on a drafting pen.

### To use a Style tool:

- ☐ Select one of the tools from the Style Tools palette.
- ☐ Each tool remembers its setting between open/quit sessions, thus it is ready to assign attributes immediately.
- ☐ To change any object in the drawing to the attributes of this tool, simply click on the object with the Needle cursor. This sets all of the attributes of the object. If you get an undesired effect, you may always choose Undo from the Edit menu.



### To assign attributes to a style tool:

- ☐ Select the tool from the Style Tools palette.
- ☐ Press and hold down the Option key. The cursor will change to an Eyedropper cursor.
- ☐ Click on an object in the drawing. The tool will 'adopt' the attributes of the option-clicked object.

—or—

- ☐ Assign attributes to the tool with the Attributes menu or Defaults window as you would with any other PowerCADD tool.

Normal	_____
Point	_____
Hairline	_____
Dimension	—●——●—
Leader	—●——●—
Centerline	— · — · —
Phantom	— · — · —
Hidden	— · — · —
Outline	_____
Section	—●——●—
Border	_____
Text Border	_____

It's a good idea to set up a stationery sheet with objects to store your most commonly-used attributes. This can serve as a seed for the Style tools.

An example of this sort of thing is shown to the left. The attributes for each style have been assigned to the lines and are easily picked up with the Eyedropper cursor.

Essentially all drawing tools operate in the Normal style, so if you set the attributes of the Line tool, for example, you've set the Normal style. The Point style is used by all of the Point tools, and the Dimension style is used by the Dimension tools. The Leader Text, Balloon Text, Radius Dimension and Diameter Dimension tools use the Leader style. However, this is optional—deselect Use Styles in WildTools Preferences. In that case, the attributes of each tool may be set individually.

#### To set how the tools work with groups:

- ❑ Press the Option key and select any of the tools from the Style tools palette. (You can get to this dialog by selecting any of the tools, although for the sake of simplicity, only the Point style tool has the usual two dots in the icon.) The following dialog box will appear:



- ❑ Groups and External objects can be handled two ways. If the 'In Groups, Apply to All Objects' option is selected, then all objects within the group will be changed. If the 'Individual Objects' option is selected, then only the object clicked on within the group or External object will be changed. These are very powerful tools, and they allow you to change the appearance of individual objects within groups and External objects (such as Parallel Objects) without ungrouping the group or destroying the External object.

Although there are twelve tools in the Style Tools palette, all of the tools share the same dialog setting, so a change to one tool is a change to all of them.



Note that the icons for the two choices have a line under them. This indicates that the tools are shift-toggling tools, and you can switch between the two modes when any of the tools are active by quickly tapping the Shift key down-and-up. See 'Shift-Toggling' in 'Basic Concepts' above.



- ☐ Click on the Reset Attributes button to reset the attributes of all of the Style tools to 'factory' settings or press the Option key before you click for an alternative 'factory special' settings.



### **Magic Needle Cursor**

Each Style tool, like the Needle Tool, has a Magic Needle cursor action to change the attributes of all objects in the drawing that match the object that you click on.

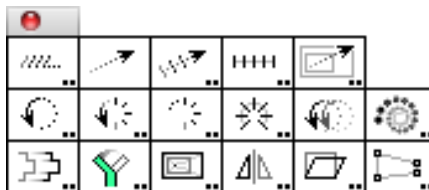
#### **To use the Magic Needle Cursor:**

- ☐ Select a Style tool from the Style Tools palette.
- ☐ Press and hold down the Shift keys. The cursor will change to a Magic Needle cursor.
- ☐ Click on an object in the drawing.

The tool will then change all matching objects in the drawing.



# Transformation Tools Palette



The first two rows of the Transformation Tools palette contains a new type of tool that operates on selected objects. The third row contains tools which allow you to operate on selected areas of the drawing. If you wish, you may install the Transformation tools at the top of the WildTools palette. You make this choice in the WildTools pane of the PowerCADD Preferences dialog.

These tools are extremely powerful, a bit dangerous, and will require some getting-used-to. However, once you master them, you will find they will dramatically speed up the drafting process. The Linear Move, Linear Repeat and Rotate tools are the most commonly used tools, but all of the tools serve a valuable function.

There are a number of important advantages offered by these tools and their method of operation:

- You can operate on a number of different objects without grouping them.
- You are not required to click directly on an object and thus you may indicate the geometry of the move, duplication or rotation by mouse movements that are not related to the selected objects.
- In the process of indicating the move, duplication or rotation with the mouse, you may click directly in the handles of existing objects with impunity. This allows you to click on the end of a selected line and move it, but not stretch it.
- In the process of using the mouse to indicate the move, duplication or rotation, you may tab into the Edit Window to edit the offset length-and-angle or rotation angle.
- You may Option-click on an existing line or arc in the drawing to define the move, duplication or rotation. This allows you to carry out these operations in a precise manner by using a construction line or arc.

⚠ **Important:** There is an annoying problem with all of these tools: If you visit the tool's dialog a second time without using the tool, PowerCADD will deselect all objects in the drawing. ⚠

## Selecting Objects

All of the tools in the first two rows of the Transformation Tools palette operate on selected objects. They move, rotate or duplicate selected objects in various ways. The tools can also select and deselect objects. When you select one of the Transformation tools, the cursor 'tells' you what the tool is going to do if you click.



When you see the two cursors to the left, they mean:

Some objects are selected

—and—

If you click-and-drag in the drawing, you are going to 'do something' to those objects.

The first cursor is used with the Linear tools, the second with the Rotate and Radial tools. The tools are described below.



When you see the Arrow cursor, however, it means that no objects are selected.

### To select an object with the Arrow cursor:

- ☐ Click on an object.



### To select or deselect an object when one of the 'other' cursors are active:

- ☐ Press and hold down the Shift key. The cursor will change to the Arrow cursor.
- ☐ Click on an unselected object to select it.
- or—
- Click on a selected object to deselect it.

In selecting objects, you must click directly on the objects—dragging a selection rectangle is not implemented here.

## Transform Points Tools

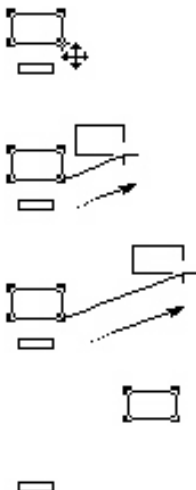


The third row of the Transformation Tools palette contains the 'transform points' tools. These operate on a selected area of the drawing, and they move, rotate, scale, mirror, scale, shear or distort objects or parts of objects within that area.



## Linear Move Tool

The Linear Move tool allows you to move selected objects by drawing a line with the mouse or by clicking on an existing line.



### To move selected objects:

- ☐ Select the Linear Move tool from the Transformation Tools palette—or WildTools palette, if it's installed there. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects" above.
- ☐ Place the Move cursor at a location in the drawing that will represent the starting point of the move.
- ☐ Drag away from the starting point until you reach the desired end of the move (i.e., draw a line) and release the mouse button. Perpendicular snapping is available.

You may press the Option key to duplicate the selected objects.

- △ You may tab into the Edit Window to edit the length and angle of the offset while in the process of drawing the line.

The selected objects will be moved.

### To move objects by using a line in the drawing:

- ☐ Select the Linear Move tool.
- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on any line in the drawing to indicate the length and angle of the desired move.

The selected objects will be moved.

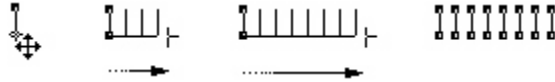
When you use a line in the drawing, if you're not sure of the direction of the line, it's a good idea to use an arrow at the end of the line to identify the direction. Use the Reverse tool to reverse the direction of the line.





## Linear Repeat Tool

The Linear Repeat tool allows you to create a number of linear duplications of selected objects by drawing a line with the mouse or by clicking on an existing line.

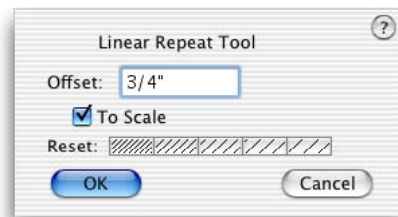


The offset distance is set in the tool's dialog, and the number of duplications is determined by the length of line that you draw or click on. Thus, you can repeat any number of objects along a line at a specified offset—the farther you drag, the more objects are duplicated.

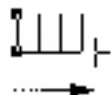
The Linear Repeat tool is useful for duplicating objects where the direction of the duplication is known but the number of duplications is not. Repeated patterns of lines or rectangles for studs, windows, hatching, or parking lot spaces are very easy.

### To set the offset of the Linear Repeat tool:

- ☐ Press the Option key and select the Linear Repeat tool from the Transformation Tools palette—or the WildTools palette, if it's installed there. The following dialog will appear:



- ☐ Type the desired offset.
- ☐ If To Scale is selected, the offset will be in the drawing scale. If To Scale is not selected, the scale will be the actual on-paper size and is not affected by the drawing scale. You may use the popup menu to change the displayed size unit from points, millimeters or inches.
- ☐ Five Reset choices are provided. These are intended as preset hatching distances in case you want to use this tool for manual hatching.



### To duplicate objects with the Linear Repeat tool:

- ☐ Select the Linear Repeat tool from the Transformation Tools palette—or WildTools palette, if it's installed there. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects" above.
- ☐ Place the Move cursor in the drawing that will represent the starting point of the line that indicates the length and angle of the linear repeat operation.
- ☐ Drag away from the starting point until you reach the desired end of the move (i.e., draw a line) and release the mouse button. Perpendicular snapping is available.
- ☐ You may tab into the Edit Window to edit the length and angle of the offset in the process of drawing the line.

The selected objects will be duplicated.

### To duplicate objects with the Linear Repeat tool by using a line in the drawing:



- ☐ Select the Linear Repeat tool.
- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on any line in the drawing to indicate the length and angle of the desired duplication.

The selected objects will be duplicated.

When you use a line in the drawing, if you're not sure of the direction of the line, it's a good idea to use an arrow at the end of the line to identify the direction. Use the Reverse tool to reverse the direction of the line.



## Linear Duplicate Tool

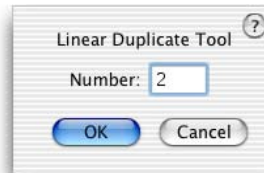
The Linear Duplicate tool allows you to do a number of linear duplications of selected objects with the mouse or by clicking on an existing line.



The offset and angle of the first duplication is determined by the mouse movement or the clicked-on line. All additional duplications, if any, are at the same offset and angle.

### To set the number of offsets for the Linear Duplicate tool:

- ☐ Press the Option key and select the Linear Duplicate tool from the Transformation Tools palette—or the WildTools palette, if it's installed there. The following dialog will appear:

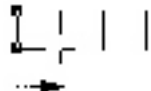
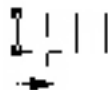


- ☐ Type the number of duplications.



### To duplicate objects with the Linear Duplicate tool:

- ☐ Select the Linear Duplicate tool from the Transformation Tools palette—or WildTools palette, if it's installed there. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects" above.
- ☐ Place the Move cursor in the drawing that will represent the starting point of the line that indicates the offset and angle of the linear duplication.
- ☐ Drag away from the starting point until you reach the desired end of the duplication (i.e., draw a line) and release the mouse button. Perpendicular snapping is available.
- ☐ You may tab into the Edit Window to edit the offset and angle of the offset while in the process of drawing the line.



The selected objects will be duplicated.

### To duplicate objects with the Linear Duplicate tool by using a line in the drawing:

- ☐ Select the Linear Duplicate tool.
- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on any line in the drawing to indicate the initial length and angle of the desired duplication.



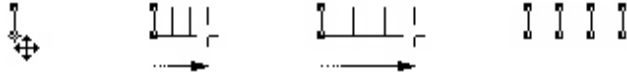
The selected objects will be duplicated.

When you use a line in the drawing, if you're not sure of the direction of the line, it's a good idea to use an arrow at the end of the line to identify the direction. Use the Reverse tool to reverse the direction of the line.



## Linear Distribute Tool

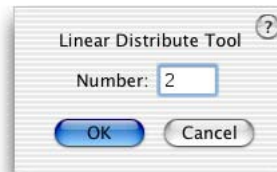
The Linear Distribute tool allows you to do a number of linear duplications of selected objects with the mouse or by clicking on an existing line.



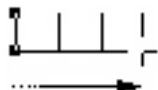
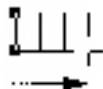
This tool is exactly like the Linear Duplicate tool described above, except that the mouse movement or clicked-on line is used to indicate the *overall* offset of the duplications. Thus the mouse or line is used to offset the last duplication, and all intermediate objects are evenly distributed along this line.

### To set the number of offsets of the Linear Distribute tool:

- ☐ Press the Option key and select the Linear Distribute tool from the Transformation Tools palette—or the WildTools palette, if it's installed there. The following dialog will appear:



- ☐ Type the number of duplications.



### To duplicate objects with the Linear Distribute tool:

- ☐ Select the Linear Distribute tool from the Transformation Tools palette—or WildTools palette, if it's installed there. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects" above.
- ☐ Place the Move cursor in the drawing that will represent the starting point of the line that indicates the offset and angle of the linear distribution.
- ☐ Drag away from the starting point until you reach the desired end of the distribution (*i.e.*, draw a line) and release the mouse button. Perpendicular snapping is available.
- ☐ You may tab into the Edit Window to edit the offset and angle of the offset while in the process of drawing the line.

The selected objects will be duplicated.

### To duplicate objects with the Linear Distribute tool by using a line in the drawing:



- ☐ Select the Linear Distribute tool.
- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on any line in the drawing to indicate the overall offset and angle of the desired duplication.

The selected objects will be duplicated.

When you use a line in the drawing, if you're not sure of the direction of the line, it's a good idea to use an arrow at the end of the line to identify the direction. Use the Reverse tool to reverse the direction of the line.



## Stretch Tool

The Stretch tool allows you to scale and rotate selected objects, and optionally scale the pen sizes as well. This lets you resize and position objects to match other objects in the drawing. For example, if you have traced a photograph or a map and then want to resize and position it to match existing points in the drawing, this tool makes the operation a simple and easy process.

### To set the behavior of the Stretch tool:

- ☐ Press the Option key and select the Stretch tool from the Transformation Tools palette—or WildTools palette, if it's installed there. The following dialog will appear:



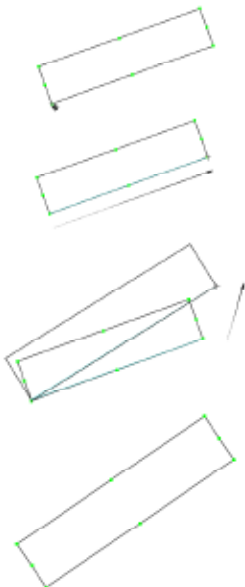
- ☐ Select if you want to scale objects, objects and pen sizes, or pen sizes only.
- ☐ Select if you want to scale or scale-and-rotate.

### To stretch objects with the Stretch tool:

- ☐ Select the Stretch tool from the Transformation Tools palette—or WildTools palette, if it's installed there. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects" above.
- ☐ Place the cursor in a location that will represent the center of the rotation and the scaling. Press the mouse button.
- ☐ Drag away from the center point until you reach the desired starting point of the stretch operation and release the mouse.
- ☐ Drag to the ending point of the stretch operation and release the mouse.

The objects will be stretched.

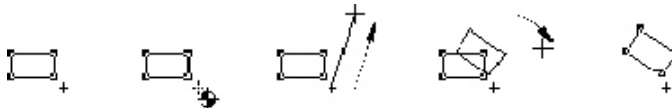
As you can see, this tool operates like the Rotate tool except that it also provides the ability to scale objects.





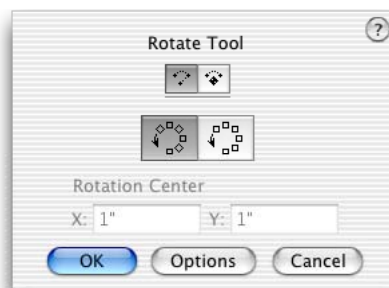
## Rotate Tool

The Rotate tool allows you to rotate selected objects by drawing an arc with the mouse or by clicking on an existing arc.



### To set how the objects are rotated by the Rotate tool:

- ☐ Press the Option key and select the Rotate tool from the Transformation Tools palette—or WildTools palette, if it's installed there. The following dialog will appear:

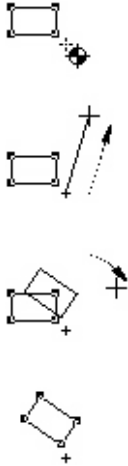


- ☐ Select between normal rotation and locked apex mode. See below for a description of locked apex mode.
- ☐ Select whether the objects are to be rotated about the center of the rotation point, or whether they are merely to be moved in a rotational direction.
- ☐ If you have selected the locked apex mode, then you may type the coordinates of the rotation center.
- ☐ In the Options dialog, select if the Shift key constrains the rotation to snap angles or to an incremental rotation of a specified angle.

### ***Locked Apex Mode***

The locked apex mode and the rotation center is shared by the Rotate, Radial Duplicate, Radial Repeat and Radial Distribute tools. This is provided for repeated rotations about a common point, thus it gives you a way to 'pin' the rotations about one point. The rotation point is reset with any use of these tools in the normal mode of operation, or by typing in the dialog box. When in locked apex mode, the cursor is a drawing cursor, and a line is ghosted from the apex point to the cursor. You click to establish the starting angle relative to the apex point and then drag to set the ending angle. Because of the risk of unwanted repeated operations, most of these tools will fall out at the end of the operation. The only

exceptions are the Rotate tool and Radial Duplicate tool when there is only one duplication.



#### To rotate objects with the Rotate tool:

- ☐ Select the Rotate tool from the Transformation Tools palette—or WildTools palette, if it's installed there. If no objects are selected, the Arrow cursor will be active. See “Transformation Tools—Selecting Objects” above.
- ☐ Place the cursor in a location that will represent the center of the rotation. Press the mouse button.
- ☐ Drag away from the starting point until you reach the desired starting angle and release the mouse at the end of the line.
- ☐ You may tab into the Edit Window to edit the starting angle while in the process of drawing the line.
- ☐ Move the cursor in the direction you want to rotate the objects. As you move the cursor, the selected objects will be rotated. When the objects have reached the desired rotation angle, click to establish the angle.
- ☐ You may tab into the Edit Window to edit this rotation angle while in the process of moving the cursor after mouse release.

The selected objects will be rotated.

Since the rotation is established by mouse movement, you can snap to existing objects in the drawing. For most situations, this ability to snap to objects allows you to establish the center of rotation and rotation angle entirely with respect to other objects in the drawing—and without having to know any coordinates or angles.

#### To rotate objects with the Rotate tool by using an arc in the drawing:



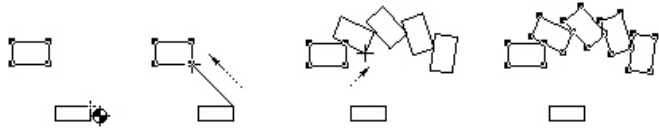
- ☐ Select the Rotate tool.
- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on any circular arc in the drawing to indicate the center of rotation (established by the center of the arc) and the angle of the arc.

When you use an arc in the drawing, if you're not sure of the direction of the arc, it's a good idea to use an arrow at the end of the arc to identify the direction. Use the Reverse tool to reverse the direction of the arc.



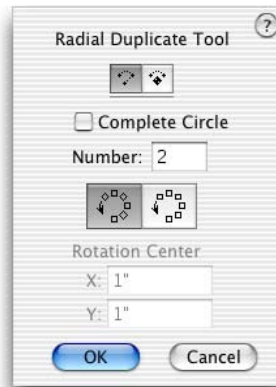
## Radial Duplicate Tool

The Radial Duplicate tool allows you to radially duplicate selected objects by drawing an arc with the mouse or by clicking on an existing arc.



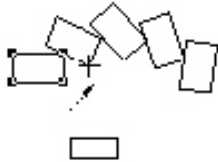
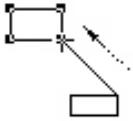
### To set the behavior of the tool:

- ☐ Press the Option key and select the Radial Duplicate tool from the Transformation Tools palette—or WildTools palette, if it's installed there. The following dialog will appear:



- ☐ Select between normal rotation and locked apex mode. See Rotate tool for a description of locked apex mode.
- ☐ If Complete Circle is selected, the number of duplicates will be determined automatically so that they are evenly distributed through 360°.
- ☐ If Complete Circle is not selected, you may type the desired number of duplicates.
- ☐ Select whether the objects are to be rotated about the center of the rotation point, or whether they are merely to be moved in a rotational direction.
- ☐ If you have selected the locked apex mode, then you may type the coordinates of the rotation center.

The Complete Circle option produces an interesting kaleidoscopic effect, so if you're having a bad day, playing with this tool is more fun than throwing cats out of airplanes.



### To duplicate objects with the Radial Duplicate tool:

- ☐ Select the Radial Duplicate tool from the Transformation Tools palette—or WildTools palette, if it's installed there. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects" above.
- ☐ Place the cursor in a location that will represent the center of the rotation. Press the mouse button.
- ☐ Drag away from the starting point until you reach the desired starting angle and release the mouse at the end of the line.
- ☐ You may tab into the Edit Window to edit the starting angle while in the process of drawing the line. If the Complete Circle option is checked, you may tab into the Edit Window to edit either the angle or the number of duplicates. This is provided in case you want to put 17 points around a circle, for example. Because of the special nature of the Complete Circle option, the number is actually one more than the duplications since it counts the original. If you want to duplicate objects every 1 degree, it seems more natural to use 360 instead of 359.
- ☐ Move the cursor in the direction you want to rotate the objects. As you move the cursor, the selected objects will be rotated and duplicated. When the objects have reached the desired rotation angle, click to establish the angle.

You may tab into the Edit Window to edit this rotation angle while in the process of moving the cursor after mouse release.

The selected objects will be radially duplicated.

### To duplicate objects by using an arc in the drawing:

- ☐ Select the Radial Duplicate tool.
- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on any circular arc in the drawing. The center of rotation will be established by the center of the arc and the angle will be established by the angle of the arc.



When you use an arc in the drawing, if you're not sure of the direction of the arc, it's a good idea to use an arrow at the end of the arc to identify the direction. Use the Reverse tool to reverse the direction of the arc.



## Radial Repeat Tool

The Radial Repeat tool allows you to radially duplicate selected objects by drawing an arc with the mouse or by clicking on an existing arc.

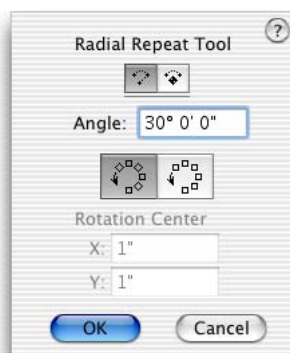


The repeat angle is set in the tool's dialog, and the number of duplications is determined by the angle of the arc that you draw or click on. Thus, the number of duplications depends on the angle that you indicate—the farther you drag, the more objects are duplicated.

The Radial Repeat tool is useful for duplicating objects where the direction and angle of each duplication is known but the number of duplications is not.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Radial Repeat tool from the Transformation Tools palette—or WildTools palette, if it's installed there. The following dialog will appear:



- ☐ Select between normal rotation and locked apex mode. See Rotate tool for a description of locked apex mode.
- ☐ Type the angle of each duplication.
- ☐ Select whether the objects are to be rotated about the center of the rotation point, or whether they are merely to be moved in a rotational direction.
- ☐ If you have selected the locked apex mode, then you may type the coordinates of the rotation center.



### To duplicate objects with the Radial Repeat tool:

- ☐ Select the Radial Repeat tool from the Transformation Tools palette—or WildTools palette, if it's installed there. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects" above.
- ☐ Place the cursor in a location that will represent the center of the rotation. Press the mouse button.
- ☐ Drag away from the starting point until you reach the desired starting angle and release the mouse at the end of the line.
- ☐ You may tab into the Edit Window to edit the starting angle while in the process of drawing the line.
- ☐ Move the cursor in the direction you want to rotate the objects. As you move the cursor, the selected objects will be rotated and duplicated. When the objects have reached the desired rotation angle, click to establish the angle.
- ☐ You may tab into the Edit Window to edit this rotation angle while in the process of moving the cursor after mouse release.

The selected objects will be radially duplicated.

As you can see, there is much like the Radial Duplicate tool, except that in this case, the angle is specified and the number of duplicates is determined by the movement of the mouse.

### To radially repeat objects by using an arc in the drawing:



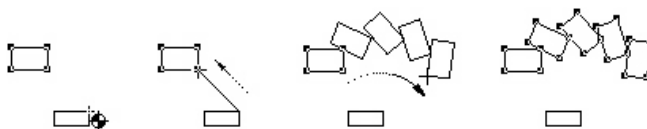
- ☐ Select the Radial Repeat tool.
- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on any circular arc in the drawing. The center of rotation will be established by the center of the arc and the number of duplicates will be established by the angle of the arc.

When you use an arc in the drawing, if you're not sure of the direction of the arc, it's a good idea to use an arrow at the end of the arc to identify the direction. Use the Reverse tool to reverse the direction of the arc.



## Radial Distribute Tool

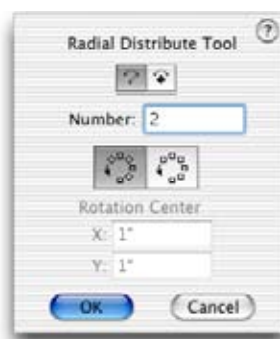
The Radial Distribute tool allows you to radially duplicate selected objects by drawing an arc with the mouse or by clicking on an existing arc.



This tool is exactly like the Radial Duplicate tool described above, except that the mouse movement or clicked-on arc is used to indicate the *overall* arc angle of the duplications. Thus the mouse or arc is used to determine the angle of the last duplication, and all intermediate objects are evenly distributed along this arc.

### To set the behavior of the tool:

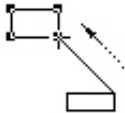
- ☐ Press the Option key and select the Radial Distribute tool from the Transformation Tools palette—or WildTools palette, if it's installed there. The following dialog will appear:



- ☐ Select between normal rotation and locked apex mode. See Rotate tool for a description of locked apex mode.
- ☐ Type the desired number of duplicates.
- ☐ Select whether the objects are to be rotated about the center of the rotation point, or whether they are merely to be moved in a rotational direction.
- ☐ If you have selected the locked apex mode, then you may type the coordinates of the rotation center.

### To radially distribute objects:

- ☐ Select the Radial Distribute tool from the Transformation Tools palette—or WildTools palette, if it's installed there. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects" above.



- ☐ Place the cursor in a location that will represent the center of the rotation. Press the mouse button.
- ☐ Drag away from the starting point until you reach the desired starting angle and release the mouse at the end of the line.
- △ You may tab into the Edit Window to edit the starting angle while in the process of drawing the line.
- ☐ Move the cursor in the direction you want to rotate the objects. As you move the cursor, the selected objects will be rotated and duplicated. When the objects have reached the desired rotation angle, click to establish the angle.
- △ You may tab into the Edit Window to edit this rotation angle while in the process of moving the cursor after mouse release.

The selected objects will be radially duplicated.

As you can see, there is exactly like the Radial Duplicate tool, except that in this case, the movement of the mouse sets the overall arc angle and all intermediate objects are evenly distributed along the arc angle.

#### To radially distribute objects by using an arc in the drawing:

- ☐ Select the Radial Distribute tool.
- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on any circular arc in the drawing. The center of rotation will be established by the center of the arc and the number of duplicates will be established by the angle of the arc.



### Spin Tool

The Spin tool allows you to rotate selected objects by drawing an arc with the mouse. The tool works like the Rotate tool, except that each selected object is rotated about its center.



### Swirl Tool

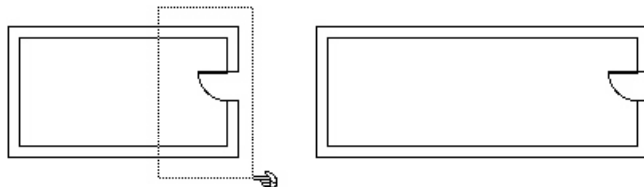
WildTools deserves a few tools that walk on the wild side. This tool duplicates selected objects in a spiral. You can scale and rotate the objects, scale the line weights and blend colors.

- △ **Important:** You can create an enormous number of objects in the drawing. Select only the objects you want to duplicate. Keep it reasonable. If the machine appears to be doing nothing, it is because it is doing the insanity you have asked it to do. △



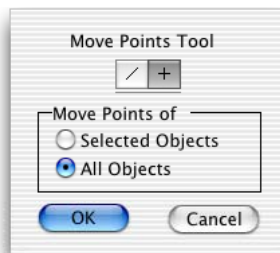
## Move Points Tool

The Move Points tool allows you to move all vertices of objects within a selected area to a new location. This may include one end of a line, or both ends. Or it may include a few vertices in a polygon or the entire polygon. You can control whether the tool operates on all objects or only selected objects.



### To set the behavior of the tool:

- ❑ Press the Option key and select the Move Points tool from the Transformation Tools palette—or WildTools palette, if it's installed there. The following dialog will appear:

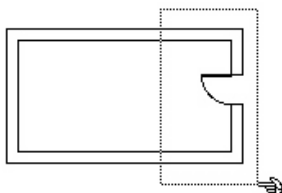


- ❑ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles during an interactive move operation.
- ❑ Choose whether you want to move points of all objects or only selected objects.

### To move points of objects:

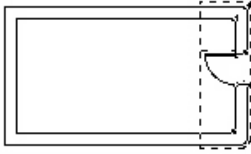
- ❑ Select the Move Points tool from the Transformation Tools palette—or WildTools palette, if it's installed there.

If the tool is set up to operate on selected objects only, and if no objects are selected, then you are presented with an Arrow cursor for selecting objects. You may also hold down the Shift key to select or deselect objects, in the standard way.



- ❑ Draw a rectangle around the points, or hold down the Option key and draw a polygon around the points. See the Rectangle tool and Polygon tool for the standard method of drawing these objects.

If you have failed to select any points, the tool will fall out.



If you have selected points to be moved, they will be shown by ‘marching ants’ boxes on each point, and there will also be a ‘marching ants’ rectangle enclosing all of the points. If you move the mouse inside or near the marching ants rectangle enclosing the points, the marching ants boxes at each point will not be painted.

If Edit All Layers is turned on, then the points may be on many different layers. If Edit All Layers is turned off, then the points will only be for objects on the current layer only.

**When the ‘ants are marching’, you have a choice of the following actions:**

- ☐ Press the Enter key to cancel and get out of this operation.
- ☐ Press the Shift key and drag a selection rectangle containing the vertices you wish to add to the selection.
- ☐ Press the Shift and Option keys and drag a selection rectangle containing the selected vertices you wish to delete from the selection.
- ☐ Press the Nudge arrow keys to nudge selected vertices. When you have begun nudging vertices, you may end the move-points operation by pressing the Enter or Escape keys, or you may continue with one of the three methods listed below.
- ☐ Option-click on a line in the drawing to move points by the geometry of the line, including any nudging you have already begun. The length and angle will be adopted from the line.
- ☐ Tab into the Edit Window to edit the move by delta X and delta Y, including any nudging you have already begun. The selected points will be moved. If you want to move the points by length and angle and edit these settings in the Edit Window, then see the next choice.
- ☐ Click in the drawing and drag to interactively move the points. You may press the Shift key to constrain or unconstrain the move. You may tab into the Edit Window to edit the move by length, angle, delta X and delta Y. This move includes any nudging you have already begun. You may press the ‘P’ key to ask for a perpendicular snap and click on a line—just like drawing a perpendicular line.

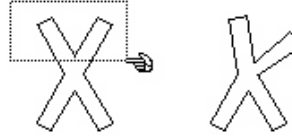
The selected points will be moved. Note that, like the Linear Transformation tools, you may click anywhere in the drawing.

The objects may be inside groups. Rectangles will be converted to polygons and rounded rectangles will be converted to Béziers, but if possible they will remain as rectangles or rounded rectangles. Arcs are selected by the ends of the arc, as if they were lines. Thus, if both ends of the arc are selected, then the entire arc is moved. Dimension lines with witness lines are moved by this tool as well. In addition, the tool also operated on points, lines, dimension lines, polygons, B-splines, Béziers, ellipses and arcs. All other objects, if fully enclosed, are offset appropriately.



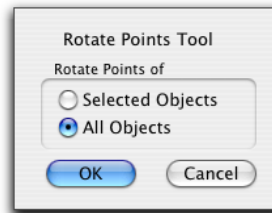
## Rotate Points Tool

The Rotate Points tool allows you to rotate vertices of objects within a selected area.



### To set the behavior of the tool:

- ☐ Press the Option key and select the Rotate Points tool from the Transformation Tools palette—or WildTools palette, if it's installed there. The following dialog will appear:



- ☐ Choose to rotate points of selected objects or all objects.

### To rotate points of objects:

- ☐ Select the Rotate Points tool from the Transformation Tools palette—or WildTools palette, if it's installed there.
- ☐ Select the points to be rotated using the same technique described for the Move Points tool. At this point in their operation, the tools are identical.

### When the 'ants are marching', you have a choice of the following actions:

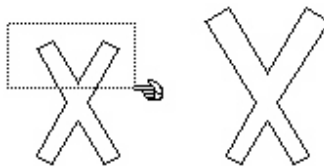
- ☐ Press the Enter key to cancel and get out of this operation.
- ☐ Option-click on a circular arc in the drawing to rotate points by the geometry of the arc. This is exactly like the Rotate by Arc action of the Rotate tool—see the Rotate tool for a complete description of this action.
- ☐ Click in the drawing to establish the center of rotation, drag to set the starting angle and then drag to set the ending angle. This action is exactly like the interactive action of the Rotate tool, and you may tab into the Edit Window to set the angles—see the Rotate tool for a complete description of this action.

The Rotate Points tool operates on the same types of objects as the Move Points tool. The objects can be inside groups.



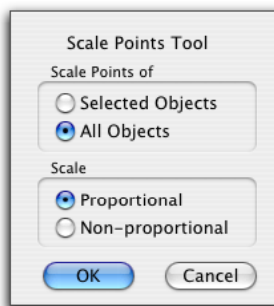
## Scale Points Tool

The Scale Points tool allows you to scale vertices of objects within a selected area. The scaling can be proportional or non-proportional and can be for all objects or selected objects only. It operates exactly like the Move Points tool, except that it scales the points instead of moving them. This is useful for scaling a portion of a polygon or Bézier up or down in size.



### To set the behavior of the tool:

- ❑ Press the Option key and select the Scale Points tool from the Transformation Tools palette—or WildTools palette, if it's installed there. The following dialog will appear:



- ❑ Choose whether you want to scale points of all objects or only selected objects.
- ❑ Choose whether you want the scaling to be proportional or non-proportional. This will affect not only the behavior of the tool, but also the information that will be displayed in the Edit Window as you use the tool.

### To scale points of objects:

- ❑ Select the Scale Points tool from the Transformation Tools palette—or WildTools palette, if it's installed there.
- ❑ Select the points to be scaled using the same technique described for the Move Points tool. At this point in their operation, the tools are identical.

**When the 'ants are marching', you have a choice of the following actions:**

- ☐ Press the Enter key to cancel and get out of this operation.
- ☐ Option-click on any point in the drawing to set the point about which the scaling takes place. The scale-about point is initially the center of the rectangle that encloses all of the selected points.
- ☐ Tab into the Edit Window to set the scaling operation. The information edited will depend on whether proportional or non-proportional scaling is selected in the tool's dialog.
- ☐ Click in the drawing and drag to interactively scale the points relative to the scale-about point. As you drag, the scale will be shown in the Edit Window, and you may tab into the Edit Window to set the scaling on the fly. Because the scaling is determined by the distance of the mouse click points from the scale-about point, the initial mouse point cannot be directly on top of the scale-about point in the case of proportional scaling. In the case of non-proportional scaling, the initial mouse point cannot be on the same vertical or horizontal plane as the scale-about point. Because of this, when the mouse is within 4 pixels of these forbidden areas, the cursor will become white, and clicking the mouse will cause the tool to fall out. If you have the tool set up for non-proportional scaling, you may press the Shift key to constrain the scaling to proportional scaling.

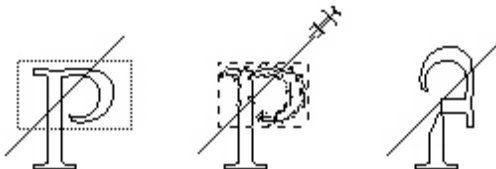
The Scale Points tool operates on the same types of objects as the Move Points tool. The objects can be inside groups.

Text objects will be scaled or not depending on the setting in the PowerCADD Scale dialog.



## Mirror Points Tool

The Mirror Points tool allows you to mirror vertices of objects within a selected area.



### To set the behavior of the tool:

- ❑ Press the Option key and select the Mirror Points tool from the Transformation Tools palette—or WildTools palette, if it's installed there. The following dialog will appear:



- ❑ Choose whether you want to mirror points of all objects or only selected objects.

### To mirror points of objects:

- ❑ Select the Mirror Points tool from the Transformation Tools palette—or WildTools palette, if it's installed there.
- ❑ Select the points to be mirrored using the same technique described for the Move Points tool. At this point in their operation, the tools are identical.

### When the 'ants are marching', you have a choice of the following actions:

- ❑ Press the Enter key to cancel and get out of this operation.
- ❑ Click on any line or side of a rectangle or polygon. This operation is the same as Mirror by Line—see Mirror by Line for a complete description.
- ❑ Press the Option key and draw a line about which the points will be mirrored. This operation is the same as the PowerCADD Mirror command—see Mirror in the PowerCADD manual for a complete description.

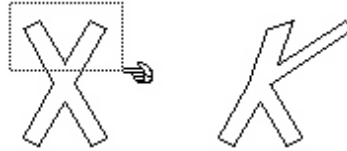
The tool operates on the same types of objects as the Move Points tool. The objects can be inside groups.

**Note:** If you have any text objects in the mirrored area, you may experience a problem with PowerCADD in that the text is mirrored to the wrong location. This is associated with the Scale Text option in the Scale dialog. If you turn Scale Text off, it will work properly.



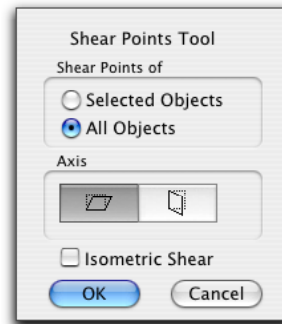
## Shear Points Tool

The Shear Points tool allows you to shear vertices of objects within a selected area.



### To set the behavior of the tool:

- ❑ Press the Option key and select the Shear Points tool from the Transformation Tools palette—or WildTools palette, if it's installed there. The following dialog will appear:



- ❑ Choose whether you want to shear points of all objects or only selected objects.
- ❑ Choose whether you want to shear the points along a horizontal or vertical axis.
- ❑ Choose whether you want to shear the points along a horizontal or vertical axis.
- ❑ Choose Isometric Shear if you want the lengths of vertical or horizontal lines to stay the same when they are sheared.

**To shear points of objects:**

- ☐ Select the Shear Points tool from the Transformation Tools palette—or WildTools palette, if it's installed there.
- ☐ Select the points to be sheared using the same technique described for the Move Points tool. At this point in their operation, the tools are identical internally.

**When the 'ants are marching', you have a choice of the following actions:**

- ☐ Press the Enter key to cancel and get out of this operation.
- ☐ Option-click on any point in the drawing to set the line about which the shearing takes place. The shear-about line initially goes through the center of the rectangle that encloses all of the selected points. This line is either horizontal or vertical, depending on the choice you made in the tool's dialog.
- ☐ Tab into the Edit Window to set the shear angle.
- ☐ Click in the drawing and drag to interactively shear the points relative to the shear-about line. As you drag, the shear angle will be shown in the Edit Window, and you may tab into the Edit Window to set the shear angle on the fly. Because the shearing is determined by the distance of the mouse click points from the shear-about line, the initial mouse point cannot be directly on top of this line. Because of this, when the mouse is within 4 pixels of this forbidden area, the cursor will become white, and clicking the mouse will cause the tool to fall out.

The tool presently operates on the same types of objects as the Move Points tool. These objects can be inside groups.

The shear angle is limited to 80 degrees.



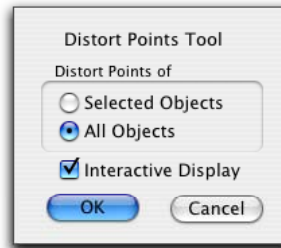
## Distort Points Tool

The Distort Points tool allows you to distort vertices of objects within a selected area. This may be used to create perspective drawings, however PerspectiveTools now offers better capabilities. To convert text to a perspective view, you must first convert the text to Béziers with Text>Convert Outlines.



### To set the behavior of the tool:

- ❑ Press the Option key and select the Distort Points tool from the Transformation Tools palette—or WildTools palette, if it's installed there. The following dialog will appear:

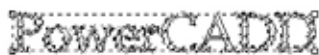


- ❑ Choose whether you want to distort points of all objects or only selected objects.
- ❑ Choose whether you want to see an interactive display as you distort the points. If you are distorting a complicated part of a drawing, the display may become so slow that it is meaningless. You can eliminate this by turning the Interactive Display option off.



### To distort points of objects:

- ☐ Select the Distort Points tool from the Transformation Tools palette—or WildTools palette, if it's installed there.
- ☐ Select the points to be distorted using the same technique described for the Move Points tool. At this point in their operation, the tools are identical.



After doing this, a marching-ants rectangle will surround all selected points, and there will be a hollow handle at each corner of the rectangle. If you wish, you may manipulate the points by these handles, or by the sides of the bounding box.

### When the 'ants are marching', you have a choice of the following actions:

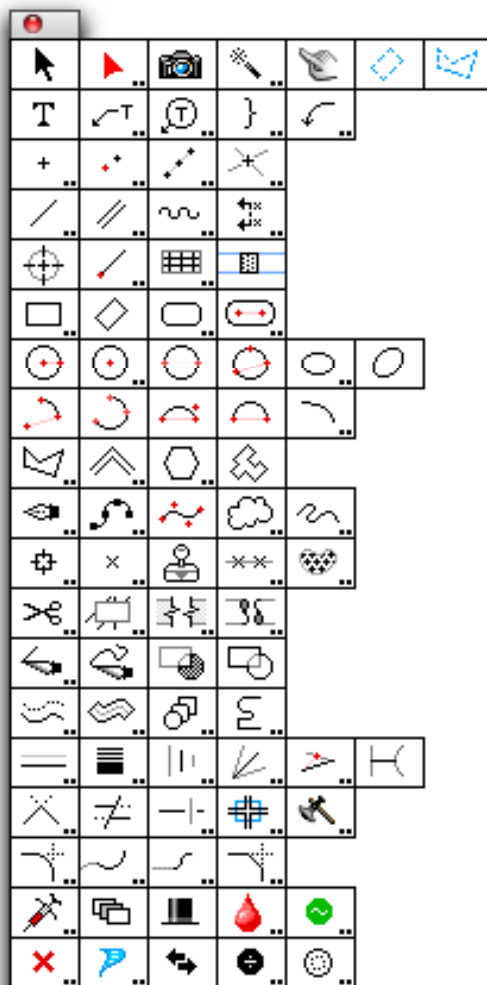
- ☐ Press the Enter key to cancel and get out of this operation.
- ☐ Click in a hollow handle and drag to distort the objects.
- ☐ Press the Command key, click in a hollow handle and drag to move all of the points at once. This is useful for dragging the entire image over a perspective grid.
- ☐ Click and drag on a side of the box to distort by one side.



Once the distortion has begun, as in Photoshop, you can cancel the distortion by clicking outside the box with the 'Cancel' cursor, or confirm the distortion by clicking inside the box with the Gavel cursor.

The tool operates on the same types of objects as the Move Points tool. These objects can be inside groups.

## WildTools Palette



The WildTools palette contains a broad assortment of powerful drafting tools. A few of the tools are simply PowerCADD's own tools installed in this tool palette in the interest of offering a logical arrangement of tools for the user who wants to work primarily with the WildTools palette.



## Selection Arrow Tool

This is PowerCADD's Selection Arrow tool installed in the WildTools palette in the interest of offering a logical arrangement of tools for the user who wants to work primarily with the WildTools palette.



## Super Arrow Tool

The Super Arrow tool allows you to duplicate objects or sides of objects as lines with a single click-and-drag action.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Super Arrow tool from the WildTools palette. The following dialog will appear:



- ☐ Choose Invalidate Groups if you want to 'reach inside' groups to duplicate individual objects.
- ☐ Choose Place on Current Layer if you want the duplicated object to be placed on the current layer. If you don't choose this, the objects will be placed on the same layer as the clicked-on objects.
- ☐ Choose Option-Click to Invalidate Other Layers if you want to be able to duplicate objects on other layers, even if Edit All Layers is turned off.
- ☐ Choose Option-Click to Copy Line Segments if you want to be able to create a line of the same length and angle as the flat side of a rectangle or polygon.

### To duplicate objects with the Super Arrow tool:

- ☐ Select the Super Arrow tool from the WildTools palette.
- ☐ Place the cursor in the drawing area over the object that you want to duplicate. Press the mouse button.
- ☐ Move the cursor to the location that you want the new object to be located.
- ☐ Release the mouse button.

The duplicated objects will be placed in the drawing.

Press the Option key prior to clicking in the drawing if you want to invade other layers or to copy line segments—the choice you made in the tool's dialog.



## Camera Tool

The Camera tool allows you to draw a rectangle and duplicate all objects enclosed in the rectangle in the drawing as a single group object. This is primarily useful for creating details from the existing drawing

### To duplicate objects with the Camera tool:

- ☐ Select the Camera tool from the WildTools palette.
- ☐ Draw a rectangle around the area that you want to duplicate. The duplicated objects will be placed in the drawing and offset slightly. If you want the objects to be duplicated in place (without an offset), press the Option key before you release the mouse button.

Lines are clipped to the perimeter of the rectangle that you draw, but other objects, such as polygons are not. You'll have to trim these yourself once you get the detail placed on the drawing.



## Magic Wand Tool

The Magic Wand tool allows you to select—with a single click—multiple objects that match your selection criteria. You may select objects by object type, pen color, pattern, etc. This allows you to select all red lines, or all blue-filled objects, or all external objects of a particular type.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Magic Wand tool from the WildTools palette. The following dialog will appear:



- ☐ Choose the matching conditions that will be used when you select objects with the Magic Wand tool.

**To select objects with the Magic Wand tool:**

- ☐ Select the Magic Wand tool from the WildTools palette.
- ☐ Click on an object to select it and all other objects that match the object type, pen color, pattern, etc. as selected in the dialog.

**To select additional objects, or to deselect selected objects:**

- ☐ Press the Shift key before you click on the object.

Dimension lines and arcs, even with witness lines, are treated as similar objects, thus you can use the Magic Wand tool to select all dimension objects with a single click. Leader text objects are treated as a distinct object type. External objects (Insulation Fill, Balloon Text, etc.) may be selected by type, but the attributes are ignored.

**Finger Tool**

The Finger tool allows you to select objects by drawing a line across them. Since only objects which are crossed by the line are selected, this allows you to select a number of objects in close proximity to other objects.

**To select objects by drawing a line:**

- ☐ Select the Finger tool from the WildTools palette.
- ☐ Place the cursor in the drawing at a location which will represent the starting point of the line. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, the line will follow the mouse.
- ☐ Release the mouse button to complete the line.



Objects crossed by the line will be selected.

The Finger tool obeys selection discrimination, i.e. it only selects objects that the Selection Arrow tool is set to select.

**To select additional objects, or to deselect selected objects:**

- ☐ Press the Shift key before you click in the drawing to draw the line.

### To select objects by drawing a polygon:

- ☐ Draw a line as described above, but before you release the mouse button, press the Option key to continue to draw more line segments.

—or—

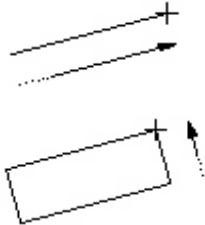
- ☐ Press the Option key before you click in the drawing.

See the Polygon tool for a complete description of how to draw a polygon.



## Marquee Tool

The Marquee tool allows you to select objects by drawing a rotated rectangle or a polygon around the objects to select them.



### To select objects by drawing a rotated rectangle:

- ☐ Select the Marquee tool from the WildTools palette.
- ☐ Place the cursor in the drawing at a location will represent one corner of the rectangle. Press the mouse button.
- ☐ Drag away from the starting point to draw a line along one side of the rectangle. This line may be at any angle. Release the mouse button to complete this line.
- ☐ Move the mouse away from the line to set the height and width of the rectangle. Click the mouse to complete the rectangle.

Objects inside the rectangle will be selected.

### To select additional objects, or to deselect selected objects:

- ☐ Press the Shift key before you click in the drawing to draw the rotated rectangle.

### To select objects by drawing a polygon:

- ☐ Select the Marquee tool from the WildTools palette.
- ☐ Move the cursor to a location in the drawing that will represent the starting point of the polygon. Press and hold the Option key and then press the mouse button. Once you have pressed the mouse button, you may release the Option key.
- ☐ Draw a polygon (see the Polygon tool for a full description).

The test for whether the object is inside the selection object is pretty basic. In the case of a line or dimension line, the object is considered with the selection object if both ends of the lines are inside the object. In the case of a rotated rectangle, all four points of the rectangle must be within the selection object. In the case of a polygon, all points must be within the selection object. For all other objects, the four points of the bounding box of the object must be within the selection object.

This tool can select objects behind other objects. For example, let's say you have a small rectangle that's completely covered up by a larger rectangle but the larger one is filled with a pattern. You can't select the object behind with the Selection Arrow tool by drawing a rectangle around it, because it will select the larger filled rectangle. With the Marquee tool, you can select the smaller object by drawing a rectangle or polygon around it.

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## **Polygon Marquee Tool**

The Polygon Marquee tool allows you to select objects by drawing a polygon around them, or you may use the tool to select objects using an existing object in the drawing.

### **To select objects by drawing a polygon:**

- ☐ Select the Polygon Marquee tool from the WildTools palette.
- ☐ Move the cursor to a location in the drawing that will represent the starting point of the polygon. Press the mouse button.
- ☐ Draw a polygon (see the Polygon tool for a full description).

Objects enclosed by the polygon will be selected.

### **To select additional objects:**

- ☐ Press the Shift key before you click in the drawing to draw the polygon.

Objects enclosed by the polygon will be selected, and any objects that are already selected will be deselected.

### ***Select by Object***

The Polygon Marquee tool can be used to select objects inside any closed object in the drawing. The object may be a rectangle, rotated rectangle, ellipse, B-spline, polygon or Bézier.

### **To select objects by an existing object in the drawing:**

- ☐ Select the Polygon Marquee tool from the WildTools palette.
- ☐ Hold down the Option key and click on any closed object in the drawing.

Objects enclosed by the clicked-on object will be selected.

This tool obeys selection discrimination, however this tool will not work if the object type that you are clicking on is not one of the object types selected in the Selection Arrow tool dialog box.



## Text Tool

The Text tool is PowerCADD's Text tool installed in the WildTools palette in the interest of offering a logical arrangement of tools for the user who wants to work primarily with the WildTools palette.

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## Leader Text Tool

The Leader Text tool is PowerCADD's Leader Text tool installed in the WildTools palette in the interest of offering a logical arrangement of tools for the user who wants to work primarily with the WildTools palette.

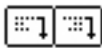
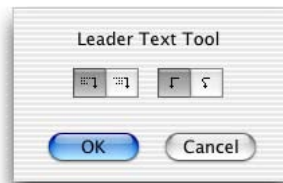


The tool uses the Leader style. This is optional; see 'Basic Concepts—Tool Attributes'.

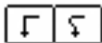
In programming jargon, WildTools “sits on top” of PowerCADD's tool and offers some additional features. You can control how text is aligned or whether a smooth leader is used.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Leader Text tool from the WildTools palette. The following dialog will appear:



- ☐ Select whether you want left- or right-aligned text when the leader is to the right.

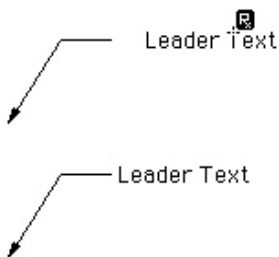


- ☐ Select whether you want a polygon leader or smooth leader.

After you use the tool to place a Leader Text object, WildTools will justify the text as selected above, and will move the text over closer to the leader. (For the operation of PowerCADD's Leader Text tool, please refer to the PowerCADD user's manual.)

### *Adjusting Leader Text Objects*

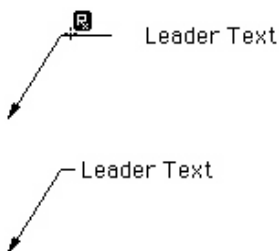
Many users are compulsive about the location of the leader text relative to the leader line and also about the length of the horizontal segment of the leader. WildTools provides the capability to adjust both of these.



**To move the text of any existing Leader Text object into a close-to-the-leader-end position:**

- ☐ Select the Leader Text tool from the WildTools palette.
- ☐ Press and hold down the Option key. The cursor will change to an Rx cursor.
- ☐ Click on the text of a Leader Text object in the drawing. To adjust the position of the text only, you must click *only* on the text.

The text will be moved.



**To move the text of any existing Leader Text object into a close-to-the-leader-end position *and also* to shorten the horizontal section of the leader:**

- ☐ Select the Leader Text tool from the WildTools palette.
- ☐ Press and hold down the Option key.
- ☐ The cursor will change to an Rx cursor.
- ☐ Click on the leader of a Leader Text object in the drawing.

The text will be moved and the horizontal section of the leader will be adjusted to match the default setting in the Preferences dialog for the leader of radius and diameter dimensions.

***Converting Balloon Text Objects to Leader Text Objects***

The Leader Text tool may be used to convert certain types of objects created by the Balloon Text tool (specifically those objects with a single text object and a three-point polygon leader) into a Leader Text object.



**To convert a Balloon Text object to a Leader Text object:**

- ☐ Select the Leader Text tool from the WildTools palette.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on a Balloon Text object as described above.

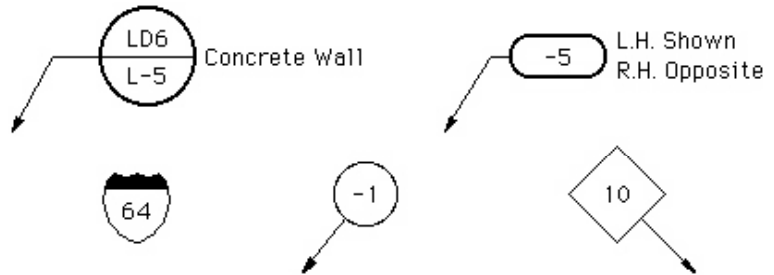
The object will be converted.

This is useful because the Balloon Text objects behave better than Leader Text objects when rotated, but you need to convert those objects to Leader Text objects to edit the text with the PowerCADD Text tool. The Balloon Text tool may be used in a similar fashion to convert Leader Text objects to Balloon Text objects.



## Balloon Text Tool

The Balloon Text tool allows you to create a variety of balloon text objects, as shown below:



There are a variety of balloons: circle, oval, rectangle, highway sign shapes, etc. A leader is optional and is created by dragging. The leader may be with or without a leader break. The leader may also be a polygon or smoothed polygon.



The Balloon Text uses the Leader style. This is optional; see 'Basic Concepts—Tool Attributes'.



However you have the option of using the Text Border style for the balloon object. See the Balloon Text Options dialog below for a complete description.

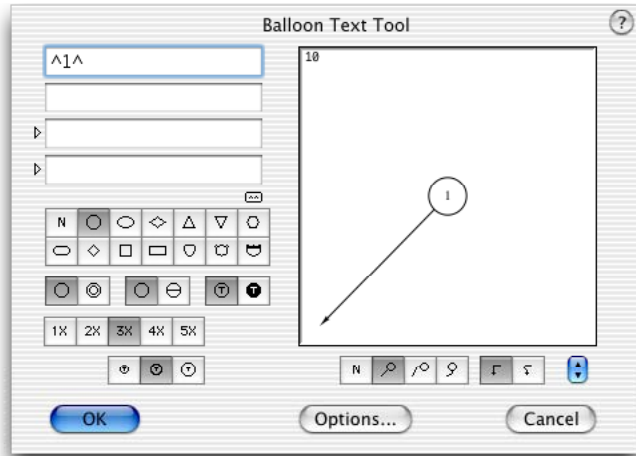
The text may consist of one or two lines, each of which may contain a programmable sequence counter for numbers (1, 2, 3, 4, ...), upper-case letters (A, B, C, D, ...) or lower-case letters (a, b, c, d, ...).

The Balloon Text tool is intended for the placement of short strings of text. While you can use long strings of text, it will not work particularly well.

When you place a Balloon Text object without a leader or side note, the object is placed as a Marker object (see the Marker tool). This means that the object will have a single handle in the center of the object and when you move the object, you can tab into the Edit Window to edit the center location point. If you want to see four handles, then you can Ungroup the object or use Convert to Group.

### To change the settings of the Balloon Text tool:

- ❑ Press the Option key and select the Balloon Text tool from the WildTools palette. The following dialog box will appear:



- ❑ Type the desired text for each line.
- ❑ The programmable sequence will be between the up-caret (^) characters, and the type of sequencing (numbers, upper-case letters, and lower-case letters) will depend on the first character found within the up-carets symbols. Any characters typed before the first up-caret symbol will be considered the prefix, and any characters typed after the second up-caret symbol will be considered the suffix for that line. For example:

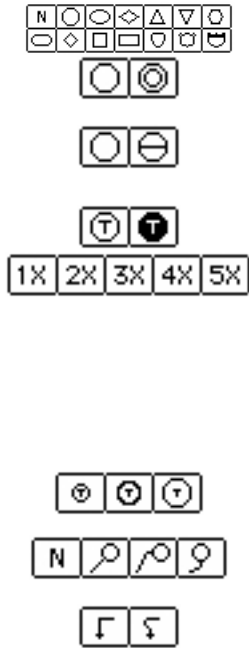
Type	To Produce
^1^	1, 2, 3, ...
^-11^	-11, -12, -13, ...
Abc^4^def	Abc4def, Abc5def, ...
Hey^A^	HeyA, HeyB, HeyC, ...
-12^a^	-12a, -12b, -12c, ...

- ❑ Turn off the programmable sequence counter by eliminating the up-caret (^) characters, for example:

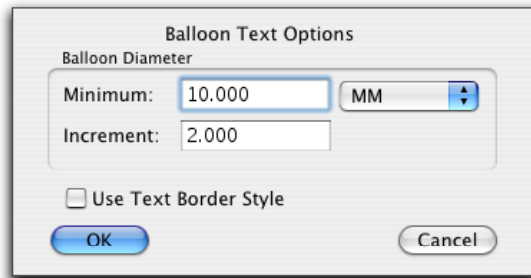
Type	To Produce
A	A, A, A, ...
-123	-123, -123, -123, ...



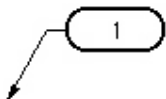
- ❑ A Reset button is provided in case you forget about the syntax of the programmable sequence counter.



- ☐ Two side notes are provided. These are not available for the text-only choice of 'balloon'. The incremental counter mechanism is not available for side notes.
- ☐ Select the balloon style that you want.
- ☐ Select single or double balloon.
- ☐ Select plain or split balloon.
- ☐ Select normal or reversed text.
- ☐ Select the minimum size of the balloon. It is normally desirable to use a consistent size symbol in a drawing, and this option gives you a certain amount of control by sizing the balloon for one, two, three, four or five characters and then increasing the size of the balloon only if the text will not fit within that minimum-size balloon. In other words, a choice of '3X' means to "make this balloon at least large enough for three letters."
- ☐ Choose the text clearance option that you prefer.
- ☐ Choose the leader and leader break option that you want.
- ☐ Choose the smooth leader option if you want a smooth leader. A smooth leader will not be drawn unless you have a leader break or unless you draw a multi-segment leader as described below.
- ☐ You may store commonly used setups.
- ☐ Click on the Options button and the following Balloon Text Options dialog will appear:



- ☐ Set the minimum on-paper size of the balloon and also the incremental dimension by which balloons are increased when they must be enlarged so the text will be enclosed.



- ❑ When you select to use the Text Border style, the pen size, pen pattern and pen color of the Text Border style are used for the balloon, however any changes to the attributes of the Balloon Text tool will change the Leader style and not the Text Border style. This option allows you to use a heavier line weight on the balloon than on the leader.

#### **To use the Balloon Text tool:**

- ❑ Select the Balloon Text tool from the WildTools palette.
- ❑ Click with the mouse to place balloon text symbols without a leader.

—or—

Use a press-and-drag action with the mouse to create a leader. At any time that you are drawing a leader line, you may hold down the Shift key to constrain the angle of the leader line.

If you have a leader break, you can control which side of the leader the balloon is by dragging left or right beyond 45° from the last point. This allows you to ‘flick’ the balloon and leader left or right with ease.

- △ In the process of placing the balloon, you may tab into the Edit Window to edit the text placed in the balloon. When you do this, the incremental counter of the tool is not advanced, thus if you want to place two balloons with the same number, then you can simply press Tab and Enter to arrest the incremental counter.
- ❑ To create a multi-segment leader, press and drag as normal, but press and hold the Option key before mouse-up. Continue to click the mouse to create additional segments. Release the Option key to complete the operation and place the balloon.

#### **To add and delete vertices from the leaders of existing Balloon Text objects:**

- ❑ Select the object and choose Reshape from the Edit menu.
- ❑ Hold down the Option key and click on the leader or leader handle. Not all vertices can be deleted.

#### ***Converting Leader Text Objects to Balloon Text Objects***

The Balloon Text tool may be used to convert objects created by the Leader Text tool into a Balloon Text object.

#### **To convert a Leader Text Object to a Balloon Text object:**

- ❑ Select the Balloon Text tool.



- ❑ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ❑ Click on a Leader Text object.

The object will be converted. This is useful because the Balloon Text objects behave better than Leader Text objects when rotated, but you need to convert those objects to Leader Text objects to edit the text with the PowerCADD Text tool. The Leader Text tool may be used in a similar fashion to convert certain Balloon Text objects to Leader Text objects.



## Bracket Tool

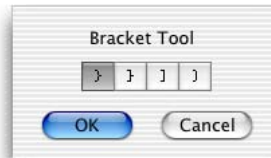
The Bracket tool allows you to draw several styles of brackets. This tool is included with the text tools because it is an annotation tool and is often used with text. Four styles of brackets are available.



The Bracket tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To change the settings of the Bracket tool:

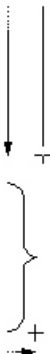
- ❑ Press the Option key and select the Bracket tool from the WildTools palette. The following dialog box will appear:



- ❑ Select the style of bracket you want to draw.

### To use the Bracket tool:

- ❑ Select the Bracket tool from the WildTools palette.
- ❑ Place the cursor at a location that will represent the end of the bracket. Press the mouse button.
- ❑ Drag away from the starting point until you reach the desired end point of the bracket and release the mouse. The line is constrained to your snap angles, however you may press the Shift key to unconstrain it. You may tab into the Edit Window to edit the length and angle of this line.
- ❑ Move the cursor in the desired direction of the bracket and to establish the width of the bracket and click. There is a limit to the width of the bracket as a proportion of the length. You may tab into the Edit Window to edit the width of the bracket in the process of moving the mouse.



If you want to draw a series of brackets stacked vertically at different lengths but equal widths, it's a good idea to create some guidelines and snap to them.



## Leader Line Tool

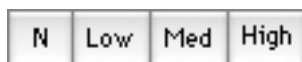
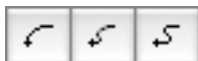
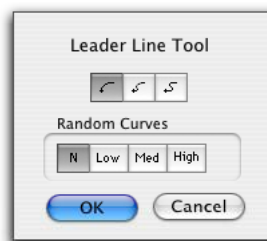
The Leader Line tool allows you to draw informal curved leader lines, typically used in conjunction with a note in the drawing. Three styles of curves are available.



The Leader Line tool uses the Leader style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To change the settings of the Leader Line tool:

- ☐ Press the Option key and select the Leader Line tool from the WildTools palette. The dialog box will appear:



- ☐ Choose the type of curve that you want to draw.
- ☐ Choose if you want to use a random curve and the degree of variation.

### To use the Leader Line tool:

- ☐ Select the Leader Line tool from the WildTools palette.
- ☐ Place the cursor in the drawing at the location that you want to start the leader. Press the mouse button.
- ☐ Move the cursor in the desired curve direction.

You may press the Option key to 'freeze' the curve and rotate it about the starting point.

- ☐ Release the mouse button.

The leader will be placed in the drawing.



## Point Tool

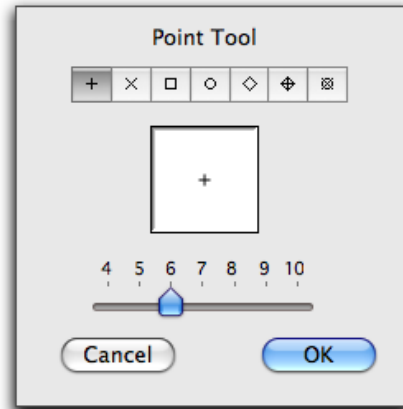
The Point tool allows you to place reference points in the drawing. Points do not print, but they are useful for marking locations and creating locations to which you can snap.



The Point tool uses the Point style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To change the settings of the Point tool:

- ☐ Press the Option key and select the Point tool from the WildTools palette. The following dialog box will appear:



- ☐ Select the style and size of the points to be placed.

The size choice is global in WildTools, so if you prefer a certain size point, this is the place to set it.

### To use the Point tool:

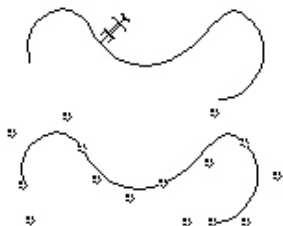
- ☐ Select the Point tool from the WildTools palette.
- ☐ Place the cursor in the drawing at the location that you want to create the point and click.

The point will be placed.

This tool uses the 'timed-fallout' method described in 'Basic Concepts—Tool-Fallout'.

### Vertex Points

The Point tool also allows you to quickly place reference points at the vertices of a line, rectangle, polygon, B-spline (smoothed polygon), Bézier or spline. In the case of the Bézier or spline, it will optionally place points at the Bézier control points.



### To place reference points along a Bézier, polygon, smoothed polygon or spline:

- ☐ Select the Point tool.
- ☐ Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- ☐ Click on the Bézier, polygon, smoothed polygon or spline.

The points will be placed along the object.

### *Converting Objects to Points*

The Point tool can convert all of the same types of objects that apply to Vertex Points to points.



### To convert an object to points:

- ☐ Select the Point tool from the WildTools palette.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on an object in the drawing.

The object will be converted to points.



### Offset Point Tool

The Offset Point tool allows you to place a reference point with a fixed offset length from the mouse-click point. The angle may be fixed or variable by manipulation with the mouse.

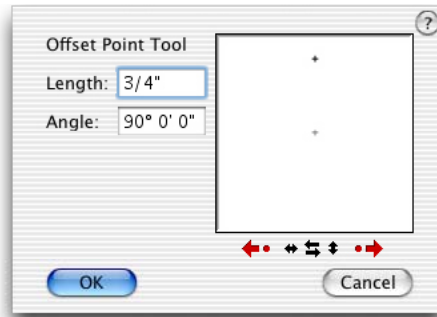
An offset point is the equivalent of the manual drafting method of placing a ruler on the drawing at a specific angle, making a measurement and then making a tick mark in the drawing.



The Offset Point tool uses the Point style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To edit the offset and angle:

- ☐ Press the Option key and select the Offset Point tool from the WildTools palette. The following dialog box will appear:



- ☐ The length is the displacement of the offset point from the mouse location. Type the offset length desired—the standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ You may edit the angle of the offset point by typing, or you may click on a number of buttons.
- ☐ Change the angle by 90° increments with the arrow buttons or by 15° increments with the dots. Any change in the angle can be seen immediately in the sample window.
- ☐ Click on any of the three flip buttons to flip the angle vertically or horizontally, or to reverse the direction of the angle. The meaning of the buttons is immediately obvious from the display in the sample window.

#### To use the Offset Point tool:

- ☐ Select the Offset Point tool from the WildTools palette. As you move the mouse, the offset point will be ghosted on the screen.
- ☐ Click in the drawing to place an offset point at the offset length and angle.

—or—

Click and drag in the drawing to place an offset point at the offset length but at an angle that is in the direction of the mouse. You may use the Shift key to constrain the angle to a snap angle.

In either case, before you release the mouse button, you may press the Option key to toggle the direction of the offset point. Perpendicular snaps are available on request. Also, you may tab into the Edit Window to edit the offset and angle of the point.

This tool uses the ‘timed-fallout’ method described in ‘Basic

Concepts—Tool-Fallout’.

An easy way to set the angle of the offset point is to adopt the angle of an existing line in the drawing.



#### To ‘adopt’ the angle of an existing line:

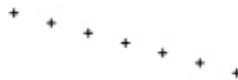
- ☐ Select the Offset Point tool.
- ☐ Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- ☐ Click on any line in the drawing. You may also click on a side of a rectangle or polygon, even in a group.

The angle of the line will be adopted, but this does not change the length of the offset. Note that the angle will be toward the center of the line, thus you can control the angle by clicking near one end of the line or the other.



### Points Along Tool

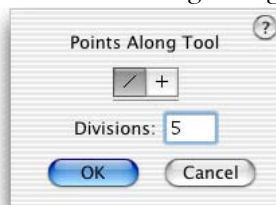
The Points Along Tool allows you to quickly draw a number of evenly spaced reference points in the same fashion that you would draw a line.



The Points Along tool uses the Point style. This is optional; see ‘Basic Concepts—Tool Attributes’.

#### To set the number of divisions of the Points Along object:

- ☐ Press the Option key and select the Points Along tool from the WildTools palette. The following dialog will appear:



- ☐ Choose whether the tool will be constrained or unconstrained to snap angles.
- ☐ Type the number of divisions that you want.

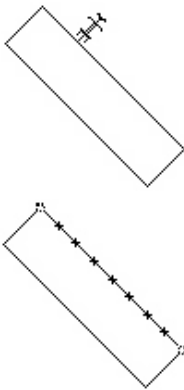
#### To draw a Points Along object in the drawing:

- ☐ Select the Points Along tool from the WildTools palette.
- ☐ Draw the object in the same way that you draw a line. As you draw, you may press the Option key to toggle between draw-

from-center and normal line drawing. Before you release the mouse button, you may tab into the Edit Window to edit the length and angle of the line.

The Points Along object that you place will behave like a line, however, you may use the Ungroup command to change the object to a group of points.

The Points Along tool is a 'constraint-toggle' tool that can be flipped from constrained to unconstrained with a quick down-and-up tap on the Shift key. This may be done while drawing, or while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.



**To place a Points Along object on a line or side of a rectangle or polygon:**

- ☐ Select the Points Along tool.
- ☐ Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- ☐ Click on a line in the drawing, or on the side of any rectangle or polygon. The object may be in a group.

The Points Along object will be placed in the drawing.

***Converting Lines to Points Along Objects***

The Points Along tool may be used to convert lines to Points Along objects containing the number of divisions set for the tool.

**To convert a line to a Points Along object:**

- ☐ Select the Points Along tool.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on a line in the drawing.



The line will be converted.

The Line tool may be used in a similar fashion to convert a Points Along object to a line.



## Intersection Point Tool

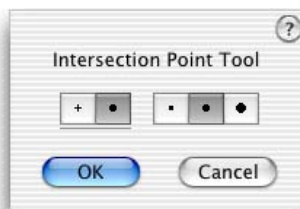
The Intersection Point tool allows you to place points at the intersection(s) of two objects, including guidelines. The operation of the tool is very similar to the Trim tool. Additionally, you may place connection dots instead of reference points.



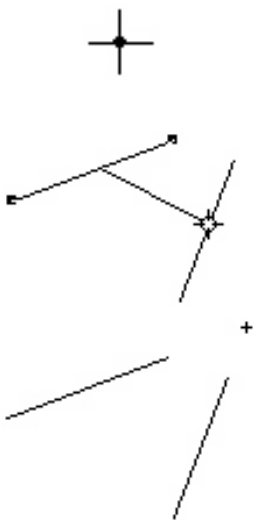
The Intersection Point tool uses the Point style (this is optional; see 'Basic Concepts—Tool Attributes'), however, if connection dots are selected, the attributes of the dot are adopted from the clicked-on objects.

### To set the operation of the tool:

- ☐ Press the Option key and select the Intersection Point tool from the WildTools palette. The following dialog will appear:



- ☐ Choose whether to place points or connection dots.
- ☐ If connection dots are selected, choose the size of the connection dot. The sizes are calculated as a multiple of the largest of pen size of the two clicked-on objects.



### To use the Intersection Point tool:

- ☐ Select the Intersection Point tool from the WildTools palette.
- ☐ To place a point at the intersection of two lines, move the mouse to one line, press the mouse button and drag the mouse to the second line. As you drag, a bridge line will be drawn on the screen.

When you let up on the mouse button, a point will be placed at the intersection of the two lines.

This same method is available to place points at the intersections of many combinations of object types, and all of the explanations of how the Trim tool operates also apply to the Intersection Point tool, including the selection of the nearest intersection point to the mouse-click point and the use of the Command key to choose an intersection when there are multiple intersections.

To place points at all intersections between two objects, press and hold down the Option key as you drag and release the mouse button, and points will be placed at all intersections found. If the Option key is used concurrently with the Command key, the Command key will be ignored by the tool.

The Intersection Point tool now has finger technology which you can get to by click-pause-drag or by Option-clicking. Because of the way finger technology works, you cannot select any object with more than one crossing point with the finger line, so you will be disappointed if you try to use it on multiple rectangles or ellipses and another object, because your finger line will cross the rectangle or ellipse at more than one point. Finger technology works with guidelines.

This tool can find the intersections of two ellipses. This intersection is a mathematically pure intersection. (This is particularly useful in isometric drawings.)

When a connection dot is placed, the dot is not selected (a slight departure from the standard PowerCADD interface) because it looked strange to have all those handles.

The Intersection Point tool is a 'shift-toggling' tool that can be flipped between placing points and connection dots with a quick down-and-up tap on the Shift key. This may be done while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.



## Line Tool

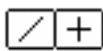
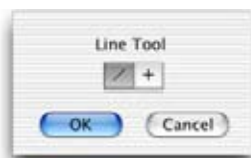
The Line tool allows you to draw lines at any angle. The tool can operate both as a tool that is constrained and unconstrained relative to snap angles, and it offers the ability to easily toggle between draw-from-center and the normal method of drawing.



The Line tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the Line tool:

- ☐ Press the Option key and select the Line tool from the WildTools palette. The following dialog will appear:



- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles.

### To draw a line:

- ☐ Select the Line tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the starting point of the line. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, the line will follow the mouse.

If the tool is set to be unconstrained, you may press the Shift key to constrain the line to snap angles.

If the tool is set to be constrained to snap angles, you may press the Shift key to unconstrain the line.

In the process of drawing the line, you may press the Option key to toggle between draw-from-center and normal line drawing. For more information, see 'Basic Concepts—Option-Toggling'.

- ☐ In the process of drawing the line, you may tab into the Edit Window to edit the length and angle of the line.
- ☐ Release the mouse button to complete the line. The line will be placed in the drawing.

The Line tool is a ‘constraint-toggle’ tool that can be flipped from constrained to unconstrained with a quick down-and-up tap on the Shift key. This may be done while drawing, or while the tool is active and the mouse is up. For a complete description, see ‘Basic Concepts—Shift-Toggling’.

### ***Converting Objects to Lines***

The Line tool can be used to convert a guideline, Points Along object or dimension line to a line, or it will convert a rectangle or polygon to a series of lines.

#### **To convert an object to a line:**

- ☐ Select the Line tool from the WildTools palette.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on a guideline, Points Along object, dimension line, rectangle or polygon.

The object will be converted.



### **Parallel Line Tool**

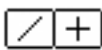
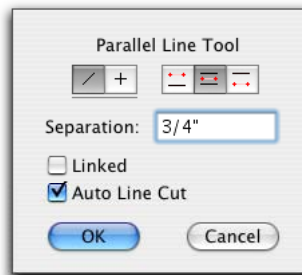
The Parallel Line tool allows you to draw parallel lines at any angle. The tool can operate both as a tool that is constrained and unconstrained relative to snap angles, and it offers the ability to easily toggle between draw from left, center or right.



The Parallel Line tool uses the Normal style. This is optional; see ‘Basic Concepts—Tool Attributes’.

#### **To set the behavior of the Parallel Line tool:**

- ☐ Press the Option key and select the Parallel Line tool from the WildTools palette. The following dialog will appear:



- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles.



- ☐ Select whether the tool will draw from left, center or right.
- ☐ Type the separation of the two lines. The standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ Select the Linked option if you want the lines placed as a Parallel Object. For more information on Parallel Objects, see 'Basic Concepts—Parallel Objects'.
- ☐ Select the Auto Line Cut option if you want the tool to cut lines at the ends of the lines that you draw.

#### To draw a parallel line:

- ☐ Select the Parallel Line tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the starting point of the line. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, the line will follow the mouse.



If the Parallel Line tool is set to be unconstrained to snap angles, you may press the Shift key to constrain the line to those angles.

If the tool is set to be constrained to snap angles, you may press the Shift key to unconstrain the line.

In the process of drawing the line, you may press the Option key to switch between the three offset drawing methods: left, center or right. For more information, see 'Basic Concepts—Option-Toggling'.

- ☐ In the process of drawing the line, you may tab into the Edit Window to edit the length and angle of the line.

- ☐ Release the mouse button to complete the line.

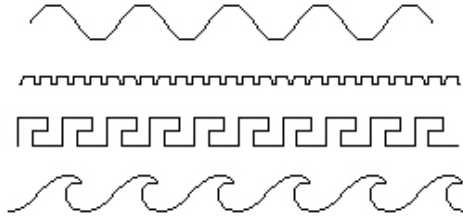
The line will be placed in the drawing.

The Parallel Line tool is a 'constraint-toggle' tool that can be flipped from constrained to unconstrained with a quick down-and-up tap on the Shift key. This may be done while drawing, or while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.



## Wavy Line Tool

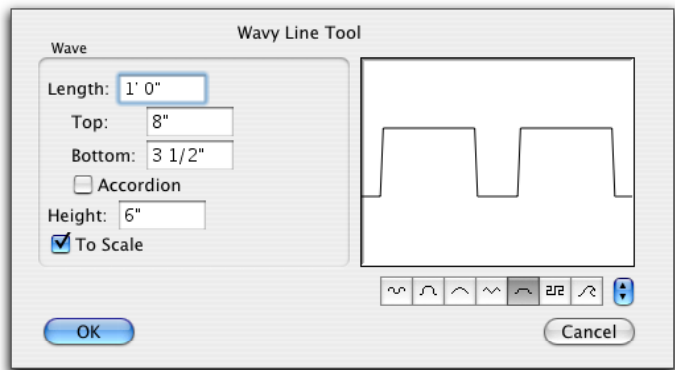
The Wavy Line tool allows you to draw a variety of wavy lines for fabric walls, zig-zag lines, steel decking, frieze details or water waves.



The Wavy Line tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Wavy Line tool from the WildTools palette. The following dialog will appear:



- ☐ Choose the type of wavy line you want to place.
- ☐ Type the wave length. In the case of the sine wave curve, this is the length of a full up-and-down 'S' wave.
- ☐ Type of wave height, or amplitude.
- ☐ Choose Accordion if you want the wave length to be adjusted in an accordion-like manner with your mouse movement. If you turn this off, then the wave length specified will be rigidly followed.
- ☐ If the To Scale option is selected, the dimensions will be to the drawing scale, if not they will be an on-paper size.
- ☐ Use the popup menu for a number of preset choices.

**To use the Wavy Line tool:**

- ☐ Select the Wavy Line tool from the WildTools palette.
- ☐ Place the cursor in the drawing at a location will represent the starting point of the line. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, the line will follow the mouse.

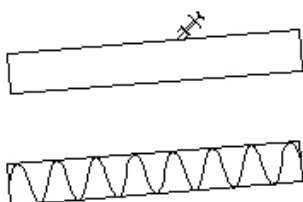
Press the Shift key to constrain the angle of the line.

You may press the Option key to toggle the presentation of the wavy line. This only applies to some of the wavy line shapes. For more information, see 'Basic Concepts—Option-Toggling'.

- ☐ You may tab into the Edit Window to edit the length and angle of the wavy line.

- ☐ Release the mouse button to complete the line.

The wavy line will be placed in the drawing.

**To place a wavy line using an existing line or rectangle in the drawing:**

- ☐ Select the Wavy Line tool from the WildTools palette.
- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on a line, rectangle or rotated rectangle.

The wavy line will be placed in the drawing. If you click on a line, it will use the length of the line in the same way that you would draw a wavy line. In the case of a rectangle, it will adjust the wave height to fill the narrow width of the rectangle.

***Converting Lines to Wavy Lines***

The Wavy Line tool can be used to convert a line to a wavy line.

**To convert a line to a wavy line:**

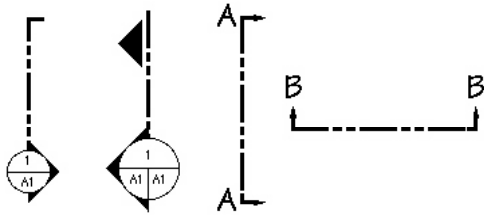
- ☐ Select the Wavy Line tool from the WildTools palette.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on a line.

The line will be converted.



Section Line Tool

The Section Line tool allows you to draw several styles of section lines.



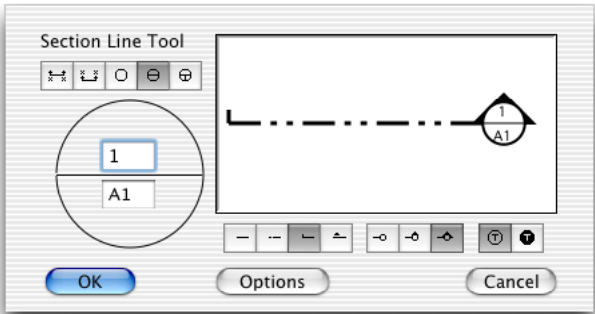
This tool uses the Section Line style. This is optional; see ‘Basic Concepts—Tool Attributes’.



With architectural bubble-style section indicators, the bubble is either Normal Style or Text Border style, depending on your choice in the Balloon Text Tool options dialog.

To set the behavior of the tool:

- ☐ Press the Option key and select the Section Line tool from the WildTools palette. The following dialog will appear:



- ☐ Choose the style of section line you want to draw.
- ☐ Type the text that will be used in the section line. Depending on the style of section line that you choose, there will be one, two or three text entries. The text should typically be limited to a few characters.
- ☐ If you have chosen one of the architectural styles, you have additional choices on the styles of the display.
- ☐ Select normal or reversed text.
- ☐ If you click on the Options button, one of two dialogs will appear depending on whether you have selected an architectural or mechanical style. These allow you to choose the size of the bubble and the font size.

**To use the Section Line tool:**

- ☐ Select the Section Line tool from the WildTools palette.
- ☐ Place the cursor in the drawing at a location will represent the starting point of the line. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, the line will follow the mouse.

You may press the Shift key to unconstrain the angle of the line.

You may press the Option key to toggle the direction of the arrow of the section line—if it has one. For more information, see ‘Basic Concepts—Option-Toggling’.

- ☐ You may tab into the Edit Window to edit the text placed with the section line.

- ☐ Release the mouse button to complete the line.

The section line will be placed in the drawing. The objects that are placed are external objects, with handles that you can manipulate in the normal manner.

***Converting Lines to Section Lines***

The Section Line tool can be used to convert a line to a section line.

**To convert a line to a section line:**

- ☐ Select the Section Line tool from the WildTools palette.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on a line in the drawing.

The line will be converted to a section line of the type that the tool is set up to draw.





## Fixed Line Tool

The Fixed Line tool allows you to draw or place lines of a fixed angle. The length of the line may be fixed or variable.

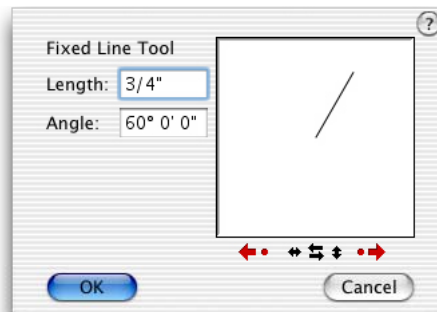
The tool can adopt the length and angle of existing lines in the drawing, and this allows you to quickly copy angles and lengths in the drawing without having to know the actual angles or dimensions. This capability is very useful for drawing things like picket fences where there are a large number of repetitive lines of the same length and angle.



The Fixed Line tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To edit the length and angle of the line placed by the tool:

- ☐ Press the Option key and select the Fixed Line tool from the WildTools palette. The following dialog box will appear:



- ☐ Type the length desired—the standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ You may edit the angle of the line by typing, or you may click on a number of buttons.
- ☐ Change the angle by 90° increments with the arrow buttons or by 15° increments with the dots. Any change in the angle can be seen immediately in the sample window.
- ☐ Click on any of the three flip buttons to flip the angle vertically or horizontally, or to reverse the direction of the angle. The meaning of the buttons is immediately obvious from the display in the sample window.

**To place a fixed line:**

- ☐ Select the Fixed Line tool from the WildTools palette. As you move the mouse, the fixed-length line will be ghosted on the screen.
- ☐ Click in the drawing to place a line at the set length and angle.

—or—

Click and drag in the drawing to place a line at the set angle but at a length that is determined by the mouse. Before releasing the mouse, you may press the Option key to toggle between drawing from center or drawing normally. You may also tab into the Edit Window to edit the length and angle of the line. Even after dragging some distance, you may use the Shift key to constrain the line to the set length. Tangent snaps to circles are available on request prior to the mouse click.

This tool uses the ‘timed-fallout’ method described in ‘Basic Concepts—Tool-Fallout’.

An easy way to set the length and angle of the line is to adopt the length and angle of an existing line in the drawing. This allows you to quickly copy the geometry of an existing line.

**To ‘adopt’ the geometry of an existing line:**

- ☐ Select the Fixed Line tool.
- ☐ Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- ☐ Click on any line in the drawing. You may also click on a side of a rectangle or polygon, even in a group.

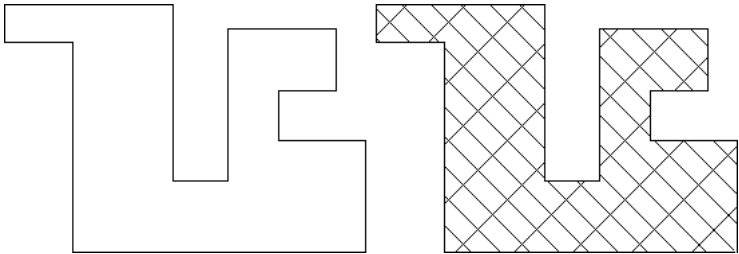


The tool is smart about noticing which end of the line you click on, and it will set the angle toward the center of the line.



Grid Line Tool

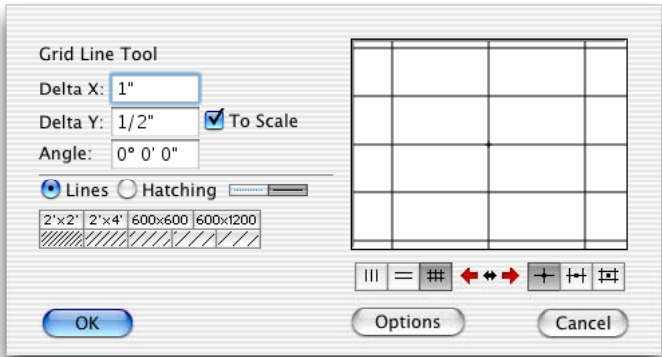
The Grid Line tool allows you to place a grid of lines within an object, such as a polygon, ellipse, rectangle, Bézier or B-spline. The tool can be used for reflected ceiling grids or ‘manual’ hatching.



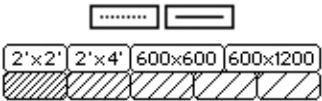
The Grid Line tool uses either the Normal or Hairline style. It's your choice, made in the tool's dialog.

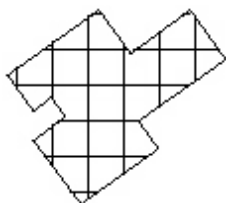
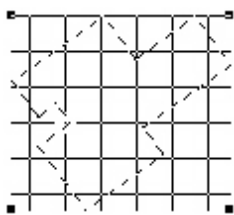
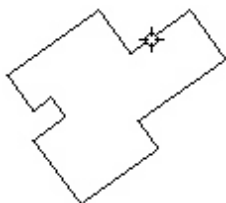
To set the behavior of the tool:

- ❑ Press the Option key and select the Grid Line tool from the WildTools palette. The following dialog will appear:



- ❑ Type the Delta X and Delta Y. The standard PowerCADD math functions and mixed dimensional units may be used.
- ❑ If the To Scale option is selected, the Delta X and Delta Y dimensions will be to the drawing scale, if not they will be an on-paper size.
- ❑ Type the angle.
- ❑ Choose whether the tool will place lines or hatching.
- ❑ Choose the Hairline or Normal style.
- ❑ A number of reset buttons can be used to quickly set up a ceiling grid or hatching. The 600x600 and 600x1200 buttons are for standard millimeter ceiling tile sizes.





- ☐ Choose whether the tool will place horizontal lines, vertical lines or a cross grid.
- ☐ Choose whether the grid lines will be placed by the crossing point, half-way point on one side, or center of a grid rectangle.
- ☐ Click on the left or right buttons to adjust the grid by 15° increments, or click on the arrow button to flip the angle about a vertical line.

#### To use the Grid Line tool:

- ☐ Select the Grid Line tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the rectangle, ellipse, circle, polygon, B-spline, Bézier, or spline. Press the mouse button.
- ☐ Drag the mouse to locate the grid.

You may press the Shift key to reverse the angle of the grid.

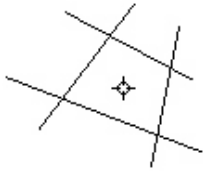
You may press the Option key to toggle the presentation if you are placing a cross grid of lines, to toggle through three placement choices. These are tile center, tile corner or the center of one side of the tile.

- ☐ You may tab into the Edit Window to edit the mouse point.
- ☐ Release the mouse to place the grid.

The grid will be placed within the object. Normally the object will be a closed shape, but if it is not, it is treated as one anyway.

#### ***Flooding a Grid***

The Grid Line tool can place grid lines within an enclosed space defined by one or more objects. In this action, it operates like the Flood tool in finding the perimeter of the enclosed area. For a complete description of this action, see the Flood tool.



#### **To use the Grid Line tool to flood a grid:**

- ☐ Select the Grid Line tool from the WildTools palette.
- ☐ Place the cursor in the drawing area in 'white space' within an area enclosed by other objects. Press the mouse button, hold it down and do not move the mouse at all for about a second. (If you click quickly, or move the mouse, the tool will fall out.)

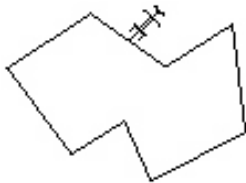
The flooding action will begin, and the cursor will change to the watch cursor as the tool attempts to find the boundaries of the enclosed space. The flooding operation will not trace an out-of-view line.

- ☐ When the flooding action is completed, the grid will draw on the screen. Drag the mouse, as described above, to locate the grid. The Shift and Option keys may be used as described above, and you may tab into the Edit Window.

When you release the mouse, the grid will be placed in the drawing.

#### ***Adopting a Grid Angle***

You may want to set the angle of the grid to match the angle of a line or flat side of a polygon or rectangle in the drawing.



#### **To adopt a grid angle:**

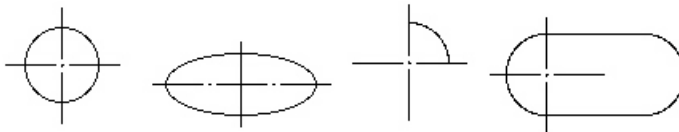
- ☐ Select the Grid Line tool from the WildTools palette.
- ☐ Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- ☐ Click on a line or a flat side of a polygon or rectangle in the drawing.

The angle of the line will be adopted by the tool.



## Center Mark Tool

The Center Mark tool places a vertical and horizontal centerline at the center of a circle, ellipse, arc, rectangle, rounded rectangle, or polygon, and at the corners of a rounded rectangle.



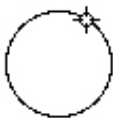
The tool can also convert existing lines to centerlines that are symmetrical about the dash pattern.



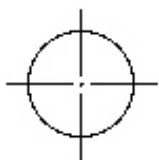
The Center Mark tool uses the Centerline style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To use the Center Mark tool:

- ☐ Select the Center Mark tool from the WildTools palette.
- ☐ Place the cursor on the object in the drawing on which the centerlines are to be placed and click the mouse. In the case of a rounded rectangle, click, drag to the desired corner of the object and release the mouse button.



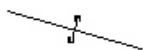
If you click on a circle, you may rotate the center mark with a click-and-drag action, and you may press the Shift key to constrain the angle.



The centerlines will be placed in the drawing.

Note that the centerlines are placed so that the dash patterns are symmetrical about the center of the lines and the line length is set so that it results in a crossing solid piece at the center. If the object is too small to get a sensible dash pattern on the object, then short solid lines are placed.

Centerlines placed on polygons are placed at the center of the bounding box containing the polygon. In the case of regular polygons, such as hexagons, this is sensible. In the case of irregular polygons, the center is likely to have little meaning.

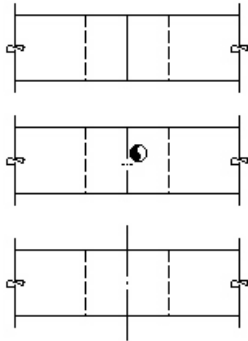


**Note:** You can also use the Center Mark tool to place a small tick mark at the center of a line—simply click on any line.

### Converting a Line to a Centerline

The Center Mark tool can be used to convert a line to a centerline, lengthening the line as necessary to get a symmetrical dash pattern

about the center of the line. For instance, in the example below, we want the vertical line in the center to have a centerline dash pattern and also be centered vertically in the drawing.



#### **To convert a line to a centerline:**

- ☐ Create a line as shown.
- ☐ Select the Center Mark tool from the WildTools palette.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on the line in the center.

The line will be lengthened as appropriate.

You can do this repeatedly to get an increasingly long line that is symmetrical about the dash pattern.



### **Projection Tool**

This tool allows you to click on an object and drag in a direction so that you get either vertical or horizontal guidelines off the object. This is primarily useful for creating side or top views from something that you've already drawn.

#### **To use the tool:**

- ☐ Select the Projection tool from the WildTools palette.
- ☐ Place the cursor in the drawing area over the object from which you want to create projection guidelines. Press the mouse button.
- ☐ Move the cursor horizontally or vertically to create horizontal or vertical guidelines.
- ☐ Release the mouse button.

The guidelines will be placed in the drawing.

#### ***Converting Objects to Guidelines***

The Projection Tool can be used to convert a line, dimension line, rectangle or rotated rectangle to guidelines.

#### **To convert an object to a guideline:**

- ☐ Select the Projection tool from the WildTools palette.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on a line, dimension line, rectangle or rotated rectangle in the drawing.

The object will be converted to one or more guidelines.





## Rectangle Tool

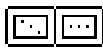
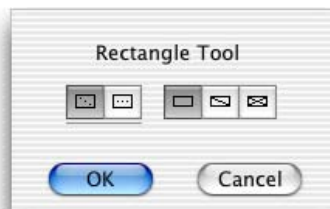
The Rectangle tool allows you to draw rectangles. Two methods of drawing are available: corner-to-corner and along-the-middle.



The Rectangle tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the drawing method of the Rectangle tool:

- ☐ Press the Option key and select the Rectangle tool from the WildTools palette. The following dialog will appear:

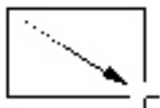


- ☐ Choose whether the tool will draw from corner-to-corner or along-the-middle.
- ☐ Choose if the rectangle will be drawn with single or double criss-cross lines. These use the Hairline style.



### To draw a rectangle from corner-to-corner:

- ☐ Select the Rectangle tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the one corner of the rectangle. Press the mouse button.
- ☐ Drag away from the starting point.



You may use the Shift key to constrain the angle of the corner-to-corner line—when constrained to 45° this will give you a square.

You may press the Option key to toggle between drawing from center and normal drawing.

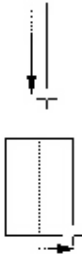
- △ You may tab into the Edit Window to edit the height and width of the rectangle.
- ☐ Release the mouse button to complete the rectangle. The rectangle will be placed in the drawing.



The along-the-middle method allows a rectangle to be drawn by a line in the middle and then expand the width of the rectangle on either side of the line.

#### **To draw a rectangle along-the-middle:**

- ☐ Select the Rectangle tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the starting point of the line down the middle of the rectangle. Press the mouse button.
- ☐ Drag away from the starting point. You may use the Shift key to constrain the angle of the line. In the process of drawing, you may tab into the Edit Window to edit the length and angle of this line. Release the mouse button to complete this line.
- ☐ Move the mouse to the side of the line (shown in gray) to expand the width of the rectangle. You may tab into the Edit Window to edit the width. Click the mouse to complete the rectangle.



The rectangle will be placed in the drawing.

The Rectangle tool is a 'shift-toggling' tool that can be flipped between the corner-to-corner and along-the-middle drawing methods with a quick down-and-up tap on the Shift key. This may be done while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.

#### ***Converting Objects to Rectangles***

The Rectangle tool can be used to convert an ellipse or rounded rectangle to a rectangle, or a rotated ellipse to a rectangle. This includes Parallel Objects of the same base type.



#### **To convert an object to a rectangle:**

- ☐ Select the Rectangle tool.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on the object in the drawing.

The object will be converted.



## Rotated Rectangle Tool

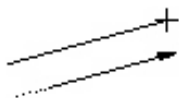
The Rotated Rectangle tool allows you to draw rectangles at any angle.



This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To draw a rotated rectangle:

- ☐ Select the Rotated Rectangle tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent one corner of the rectangle. Press the mouse button.
- ☐ Drag away from the starting point to draw a line along one side of the rectangle. This line may be at any angle.

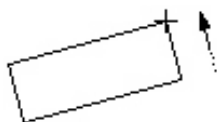


Press the Shift key to constrain the angle of the line.

You may press the Option key to toggle between drawing from center or normal drawing. When you select drawing from center, you are drawing not only the line, but also the rectangle from the center.

- ☐ You may tab into the Edit Window to edit the angle of this line.

Release the mouse button to complete this line.



- ☐ Move the mouse away from the line to set the height and width of the rectangle.
- ☐ You may tab into the Edit Window to edit the height and width of the rectangle.

Click the mouse to complete the rectangle.

The rectangle will be placed in the drawing.

Like the Rectangle tool, this tool can be used to convert an ellipse or rounded rectangle to a rectangle, or a rotated ellipse to a rectangle. This includes Parallel Objects of the same base type. For a description of this, see the Rectangle tool above.



## Rounded Rectangle Tool

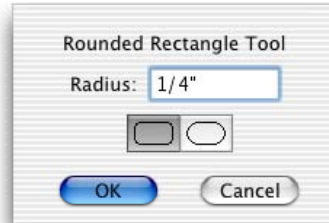
The Rounded Rectangle tool allows you to draw rectangles with rounded corners.



This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

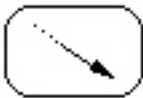
- ☐ Press the Option key and select the Rounded Rectangle tool from the WildTools palette. The following dialog will appear:



- ☐ Choose whether you want rectangles with filleted corners or rounded ends. This will only affect the drawing behavior of the tool and in either case the rounded rectangle is the same type of object that can be edited in the same way.
- ☐ If filleted corners are selected, you may type the corner radius—the standard PowerCADD math functions and mixed dimensional units may be used.

### To draw a rounded rectangle:

- ☐ Select the Rounded Rectangle tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the one corner of the rectangle. Press the mouse button.
- ☐ Drag away from the starting point. You may use the Shift key to constrain the angle of the corner-to-corner line—when constrained to 45° this will give you a square.



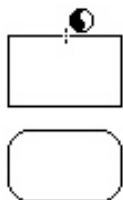
You may press the Option key to toggle between drawing from center and normal drawing.

- △ You may tab into the Edit Window to edit the height and width of the rectangle.
- ☐ Release the mouse button to complete the rectangle.

The rectangle will be placed in the drawing.

### ***Converting Objects to Rounded Rectangles***

The Rounded Rectangle tool can be used to convert an ellipse or rectangle to a rounded rectangle. This includes Parallel Objects of the same base type.



#### **To convert an object to a rounded rectangle:**

- ☐ Select the Rounded Rectangle tool.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on the object in the drawing.

The object will be converted.



### **Slot Tool**

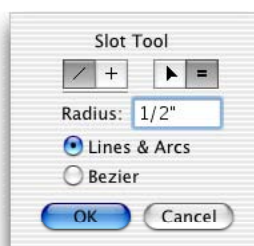
The Slot tool allows you to draw slots consisting of two semicircular arcs and two lines that are placed as a group or as a single Bézier. Two methods of drawing the slots are provided.



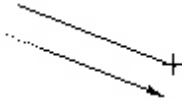
The Slot tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

#### **To set the behavior of the tool:**

- ☐ Press the Option key and select the Slot tool from the WildTools palette. The following dialog will appear:



- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles.
- ☐ Choose whether the radius will be set interactively with the mouse (arrow) or to a fixed dimension (equals sign).
- ☐ If the radius is fixed, you may type the radius—the standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ Choose if a Bézier or a group of lines and arcs is placed.



### To draw a slot with the radius set interactively:

- ☐ Set the behavior of the tool as described above.
- ☐ Select the Slot tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the center of one of the semicircular arcs. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, a line will follow the mouse.

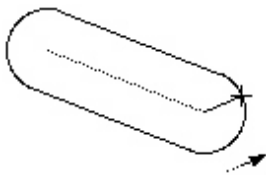
If the Slot tool is set to be unconstrained to snap angles, you may press the Shift key to constrain the line to those angles.

If the tool is set to be constrained to snap angles, you may press the Shift key to unconstrain the line.

In the process of drawing the line, you may press the Option key to toggle between draw-from-center and normal end-to-end drawing. For more information, see 'Basic Concepts—Option-Toggling'.

- ☐ In the process of drawing the line, you may tab into the Edit Window to edit the length and angle of the line between the arc center points.

Release the mouse button.

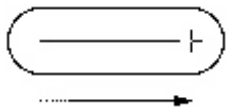


- ☐ Move the mouse away from the center of the arc to set the radius of the arc.
- ☐ The radius will be displayed in the Edit Window. You may tab into the Edit Window to edit the radius.

Click the mouse to complete the slot.

The slot will be placed in the drawing.

The Slot tool is a 'constraint-toggle' tool that can be flipped from constrained to unconstrained with a quick down-and-up tap on the Shift key. This may be done while drawing the initial line, or while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.



### To draw a slot with the radius set to a fixed dimension:

- ☐ Set the behavior of the tool as described above.
- ☐ Select the Slot tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the center of one of the semicircular arcs. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, the slot will follow the mouse.

If the Slot tool is set to be unconstrained to snap angles, you may press the Shift key to constrain the line to those angles.

If the tool is set to be constrained to snap angles, you may press the Shift key to unconstrain the line.

In the process of drawing the slot, you may press the Option key to toggle between draw-from-center and normal end-to-end drawing. For more information, see 'Basic Concepts—Option-Toggling'.

- ☐ In the process of drawing the slot, you may tab into the Edit Window to edit the length and angle of the line between the arc center points.

Release the mouse button to complete the slot.

The slot will be placed in the drawing.

The Slot tool is a 'constraint-toggle' tool that can be flipped from constrained to unconstrained with a quick down-and-up tap on the Shift key. This may be done while drawing the initial line, or while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.



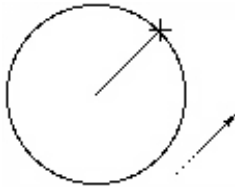
## Circle from Center Tool

The Circle from Center tool allows you to draw circles from the center.

This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To draw a circle with this tool:

- ☐ Select the Circle from Center tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the center of the circle. Press the mouse button.
- ☐ Drag away from the starting point to enlarge the circle.
- ☐ The radius of the circle will show in the Edit Window, and you may tab into the Edit Window to edit the radius.



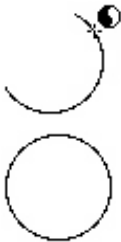
In the process of drawing, you may press the Option key to toggle between drawing a circle and drawing an ellipse. For more information, see 'Basic Concepts—Option-Toggling'.

- ☐ Release the mouse button to complete the circle.

The circle will be placed in the drawing.

## Converting Objects to Ellipses

All of the circle tools can be used to convert a rectangle, arc or rounded rectangle to an ellipse. This includes Parallel Objects of the same base type.



### To convert an object to an ellipse:

- ☐ Select one of the circle tools from the WildTools palette.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on the object in the drawing.

The object will be converted.

Note that this technique can be used to 'close' an arc.



## Fixed Circle Tool

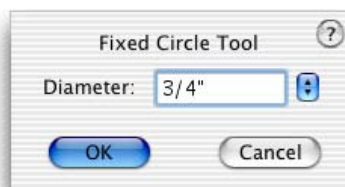
The Fixed Circle tool allows you to place fixed-diameter circles by their center. The tool can adopt the diameter of any existing circle in the drawing, and this allows you to quickly copy circles without having to know the diameter of the circle.



The Fixed Circle tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To edit the diameter of the circle placed by this tool:

- ☐ Press the Option key and select the Fixed Circle tool from the WildTools palette. The following dialog will appear:



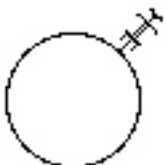
- ☐ Type the diameter—the standard PowerCADD math functions and mixed dimensional units may be used.

### To use the Fixed Circle tool:

- ☐ Select the Fixed Circle tool from the WildTools palette.  
As you move the mouse, the fixed-diameter circle will be ghosted on the screen.
- ☐ Click in the drawing.  
The circle will be placed in the drawing.

This tool uses the 'timed-fallout' method described in 'Basic Concepts—Tool-Fallout'.

An easy way to set the diameter of the circle is to adopt the diameter of any existing circle or arc in the drawing.



### To adopt the diameter of a circle or arc:

- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on any circle or arc in the drawing.  
The tool will adopt the diameter of the circle or arc.

Like other circle and ellipse tools, this tool can be used to convert a rectangle, arc or rounded rectangle to an ellipse. For a description of this, see Circle from Center tool above.



## Circle by Two Points Tool

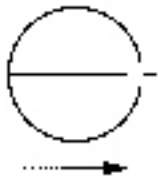
The Circle by Two Points tool allows you to draw a circle by two points directly opposite each other on the circumference of a circle.



The Circle by Two Points tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To place a circle with this tool:

- ☐ Select the Circle by Two Points tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent one of the points on the circle. Press the mouse button.
- ☐ Drag away from the starting point to enlarge the circle.
- ☐ You may tab into the Edit Window to edit the diameter of the circle.



Release the mouse button when you have reached the desired end point.

The circle will be placed in the drawing.

Perpendicular and tangent snaps are available on request, however they apply to the line being drawn by the mouse.

Like other circle and ellipse tools, this tool can be used to convert a rectangle, arc or rounded rectangle to an ellipse. For a description of this, see Circle from Center tool above.



## Circle by Three Points Tool

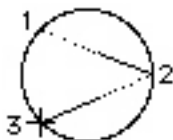
The Circle by Three Points tool allows you to draw a circle located by three points on the circumference of the circle.



This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To place a circle with this tool:

- ☐ Select the Circle by Three Points tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent one of the points on the circle. Press the mouse button.
- ☐ Drag away from the starting point to the second point and release the mouse button.
- ☐ Move the mouse to the third point and click.



The circle will be placed in the drawing.

Like other circle and ellipse tools, this tool can be used to convert a rectangle, arc or rounded rectangle to an ellipse. For a description of this, see Circle from Center tool above.



## Ellipse Tool

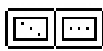
The Ellipse tool allows you to draw ellipses. Two methods of drawing are available: corner-to-corner or along-the-middle.



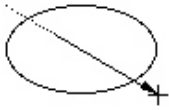
The Ellipse tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the drawing method of the Ellipse tool:

- ☐ Press the Option key and select the Ellipse tool from the WildTools palette. The following dialog will appear:



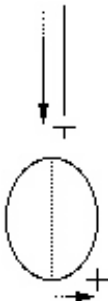
- ☐ Choose whether the tool will draw from corner-to-corner or along-the-middle.



### To draw an ellipse from corner-to-corner:

- ☐ Select the Ellipse tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent one corner of a rectangle enclosing the ellipse. Press the mouse button.
- ☐ Drag away from the starting point. You may use the Shift key to constrain the angle of the corner-to-corner line—when constrained to 45° this will give you a circle. You may press the Option key to toggle between drawing from center and normal drawing. You may tab into the Edit Window to edit the height and width of the ellipse.
- ☐ Release the mouse button to complete the ellipse.

The ellipse will be placed in the drawing.



The along-the-middle method allows an ellipse to be drawn by a line in the middle and then expand the width of the ellipse on either side of the line.

### To draw an ellipse along-the-middle:

- ☐ Select the Ellipse tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the starting point of the line down the middle of the ellipse. Press the mouse button.
- ☐ Drag away from the starting point. You may use the Shift key to constrain the angle of the line. You may tab into the Edit Window to edit the length and angle of this line. Release the mouse button to complete this line.
- ☐ Move the mouse to the side of the line (shown in gray) to expand the width of the ellipse. You may tab into the Edit Window to edit the width. Click the mouse to complete the ellipse.

The ellipse will be placed in the drawing.

The Ellipse tool is a 'shift-toggling' tool that can be flipped between the corner-to-corner and along-the-middle drawing methods with a quick down-and-up tap on the Shift key. This may be done while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.

Like other circle and ellipse tools, this tool can be used to convert a rectangle, arc or rounded rectangle to an ellipse. For a description of this, see Circle from Center tool above.



## Rotated Ellipse Tool

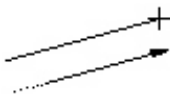
The Rotated Ellipse tool allows you to draw an ellipse at any angle.



The Rotated Ellipse tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To draw an ellipse with this tool:

- ☐ Select the Rotated Ellipse tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent one corner of a rectangle enclosing the ellipse. Press the mouse button.
- ☐ Drag away from the starting point to draw a line along one side of the enclosing rectangle. This line may be at any angle.

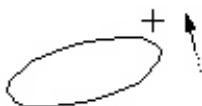


You may use the Shift key to constrain the angle of the line.

You may press the Option key to toggle between drawing from center or normal drawing. When you select drawing from center, you are drawing not only the line, but also the ellipse from the center.

- ☐ You may tab into the Edit Window to edit the angle of this line.

Release the mouse button to complete this line.



- ☐ Move the mouse away from the line to set the height and width of the ellipse.
- ☐ You may tab into the Edit Window to edit the height and width of the ellipse.

Click the mouse to complete the ellipse.

The ellipse will be placed in the drawing.

Like other circle and ellipse tools, this tool can be used to convert a rectangle, arc or rounded rectangle to an ellipse. For a description of this, see Circle from Center tool above.



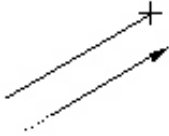
## Arc from Center Tool

The Arc from Center tool allows you to draw an arc by the center point and two points on the ends of the arc.

This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To draw an arc with this tool:

- ☐ Select the Arc from Center tool from the WildTools palette.
- ☐ Place the cursor in the drawing at a location that will represent the center of the arc. Press the mouse button.
- ☐ Drag away from the center to establish the radius and starting angle.

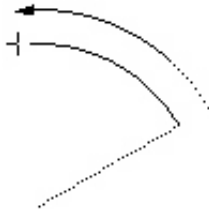


You may press the Shift key to constrain the angle of the line to a snap angle.

- ☐ You may tab into the Edit Window to edit the radius, starting angle and circumferential length of the arc.

Release the mouse button.

- ☐ Move the cursor to establish the arc angle. If you wish, you may tab into the Edit Window to edit this arc angle.



Click the mouse to complete the arc.

The arc will be placed in the drawing.

### Converting Dimension Arcs to Arcs

All of the arc tools can convert a dimension arc to an arc.

### To convert a dimension arc to an arc:

- ☐ Select one of the arc tools from the WildTools palette.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on the object in the drawing.



The object will be converted.

Similarly, the dimension arc tools can be used to convert arcs to dimension arcs.



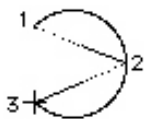
## Arc Three-Points Tool

The Arc Three-Points tool allows you to draw an arc located by three points on the circumference of the arc.



This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To draw an arc with this tool:



- ☐ Select the Arc Three-Points tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent one of the points on the arc. Press the mouse button.
- ☐ Drag away from the starting point to the second point and release the mouse button.
- ☐ Move the mouse to the third point and click.

The arc will be placed in the drawing.



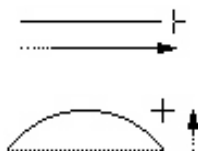
## Arc by Chord Tool

The Arc by Chord tool allows you to draw an arc by the ends of the arc and a third point. This is useful for drawing arches and side views of hex nuts where the 'height' of the arc is easily located by snapping to objects in the drawing.



The Arc by Chord tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To draw an arc with this tool:



- ☐ Select the Arc by Chord tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent one end of the arc. Press the mouse button.
- ☐ Drag away from the starting point to the second point that will represent the other end of the arc and release the mouse button.
- ☐ Move the mouse to set the 'height' of the arc.

You may press the Option key to toggle between the 'by height' method and 'by a third point on the arc' method.

- ☐ You may tab into the Edit Window to edit the height, radius, arc angle and circumferential length of the arc.
- ☐ When you have achieved the desired arc, click.

The arc will be placed in the drawing.



## Semicircle Tool

The Semicircle tool allows you to draw a semicircle by two points at the ends of the arc.



The Semicircle tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To draw a semicircular arc with this tool:

- ☐ Select the Semicircle tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent one end of the arc. Press the mouse button.
- ☐ Drag away from the starting point to the second point that will represent the other end of the arc. You may press the Option key to toggle between two directions for the arc. Release the mouse button.



The arc will be placed in the drawing.

Like all other arc tools, this tool can be used to convert a dimension arc to an arc. See Arc from Center tool above.



## Elliptical Arc Tool

The Elliptical Arc tool allows you to draw an elliptical arc by two points representing the corners of a rectangle enclosing the elliptical arc. Isn't that *great*? This method of drawing an elliptical arc is little used by draftsmen but is included here because it's greatly favored by nerds who review programs.



The Elliptical Arc tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To draw an elliptical arc with this tool:

- ☐ Select the Elliptical Arc tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent one end of the arc. Press the mouse button.
- ☐ Drag away from the starting point to the second point that will represent the other end of the arc. You may press the Option key to toggle between two directions for the arc. Release the mouse button.



The arc will be placed in the drawing.

Like all other arc tools, this tool can be used to convert a dimension arc to an arc. See Arc from Center tool above.



## Polygon Tool

The Polygon tool allows you to draw polygons—objects with two or more straight sides. The tool can operate both as a tool that is constrained and unconstrained to snap angles.

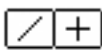
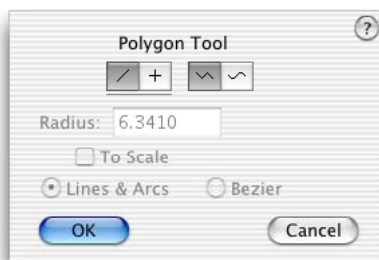
The Polygon tool is a Draw/Reshape tool, which means that it can reshape—or edit—existing polygons and parallel polygons.



The Polygon tool uses the Normal style. This is optional; see ‘Basic Concepts—Tool Attributes’.

### To set the behavior of the tool:

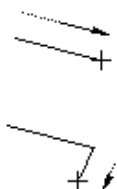
- ☐ Press the Option key and select the Polygon tool from the WildTools palette. The following dialog will appear:



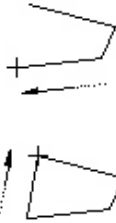
- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles.
- ☐ Choose if you want rounded corners, and if so, the radius size and whether the object is to be placed as a group of lines and arcs, or as a single Bézier.

### To draw a polygon:

- ☐ Select the Polygon tool from the WildTools palette.
- ☐ Place the cursor in the drawing area where you want to start the polygon. Press the mouse button.
- ☐ Move the cursor to the end of the first side. Release the mouse button.
- ☐ To add another leg to the polygon, move the cursor to the end of the next side and click.



- △ You may tab into the Edit Window to edit the leg.



Repeat this step to add as many sides as you wish.

Click in the same place twice or press the Enter key to stop drawing.

- ☐ To create a closed polygon, move the cursor to the original starting point. When you reach this point, you will hear a 'click' sound from the computer. Click at this point.

If you want to prevent the polygon from closing, press the Option key to override the automatic closing. In this case, the polygon will look exactly the same, but the starting and ending points will be individually editable with Reshape and the Reshape mode of this tool.

The drawing process for this polygon is now over, and you may now start a new polygon.

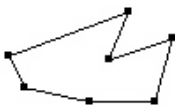
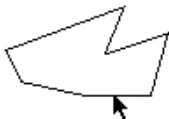
As you draw the polygon, notice that there are handles at the vertices of the polygon. You can click in these handles to reshape the polygon as you draw.

### ***Reshaping Polygons with the Polygon Tool***

The Polygon tool can be used to reshape an existing line, rectangle, polygon or Parallel Object of the same base type. This allows you to 'resume drawing' an existing polygon, and to convert a line or rectangle to a polygon so that it can be manipulated as a polygon.

#### **To reshape an existing object:**

- ☐ Select the Polygon tool from the WildTools palette.
- ☐ Press and hold down the Option key. The cursor will change to an Arrow cursor.
- ☐ Click on the object in the drawing. If you click on a line or rectangle, it will be converted to a polygon. When an object is converted, you will hear a distinctive sound from the computer.



The object will be redrawn on the screen with selection handles. You are now in the reshape mode, and you may now engage in four operations: selecting handles, drawing, dragging and adding points.

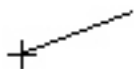
You may press the Enter key at any time to get out of the reshape mode.

You may zoom in and out (if Zoomer is turned on) with the normal Zoomer actions and the usual command keys for Reduce to Fit, Normal Size, etc.

As you move the mouse around over the object, one of two cursors will be active.



The Drawing cursor indicates that if you click with the mouse, you will add a new side to the polygon. This allows you to ‘resume drawing’ an existing polygon. You can only add to an open polygon, and only if one end handle is selected (one and only one).



To save you from having to memorize this rule, the tool always tells you what it is trying to do. If it is trying to draw, the cursor will be the Drawing cursor, and a line will ‘rubber-band’ between the cursor and the selected end of the polygon.



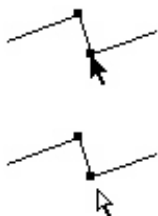
If the tool is unable to draw, the Drag cursor indicates that the tool is trying to drag (move) a part of the polygon. It can drag handles or sides of the polygon. If the tool is unable to drag anything (i.e. because it is not over the object or in a handle) the Drag cursor will be white. This is the tool’s way of saying to you, “I’m trying to drag, but I can’t right now”.

Handles may be selected and are shown as hollow handles. In this context, dealing with a handle is much like dealing with an object.

#### To select a handle:

- ☐ Click in a handle. The handle will be selected and will change to a hollow handle. (You may also Option-click in a handle to select it.)

If any other handles are selected, they will be deselected.



#### To select additional handles:

- ☐ Hold down the Shift key and click in an unselected handle.

When you press the Shift key, the cursor will change to an Arrow cursor, but if you’re not in a handle, the cursor will be white. This is the tool’s ways of saying, “I’m trying to select, but I can’t right now.” This makes it easy to find the ‘mother’ object in a Parallel Object.

If you click in a handle that is already selected, the handle will be deselected.

**To deselect a handle that is already selected:**

- ☐ Hold down the Shift key and click in a selected handle.

**To select a side of the polygon:**

- ☐ Press and hold down the Shift key.
- ☐ Click on the polygon with the Arrow cursor.



If the handles at both ends of the side are not selected, they will be selected, otherwise they will be deselected.

**To select all of the handles of the object:**

- ☐ Use the command key for Select All. (You may not use the menu for Select All.)

**To delete selected handles:**

- ☐ Press the Delete key. The selected handles will be deleted.

**To Undo the deletion:**

- ☐ Use the command key for Undo. (You may not use the menu for Undo.)

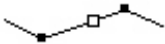
The last editing operation is undo-able. This is an incremental undo, and the entire reshape operation is undo-able when you finish. Selecting and deselecting of handles is not undo-able.

**To nudge the selected handles:**

- ☐ Press one of the Arrow keys.

**To add a point to the polygon:**

- ☐ Press and hold down the Option key.
- ☐ Move the cursor over one of the sides of the polygon.
- ☐ When the tool is capable of adding a point, the cursor will change to the Pen Plus cursor.
- ☐ Click on the polygon to add the point, and if you wish, you may drag as well before releasing the mouse. The new point will be a selected handle, and all other selected handles will be deselected.



Center snaps are available if you want to divide the side of the polygon exactly in half, and if you drag before releasing the mouse button, the dragging action will be constrained so that the two new sides are of equal length.

**To move a handle with the mouse:**

- ☐ Click in a handle and move the cursor.

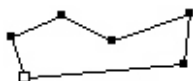
If the handle is not selected, the handle will be selected and all other selected handles will be deselected.

As you move the cursor, all selected handles will move with the mouse. If you wish, you may tab into the Edit Window to edit the location of the handle you are moving.

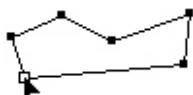
**To close an open polygon:**

- ☐ Click in one of the end handles of the polygon and move it over to the other end handle. To do this, only one handle can be selected.

When you get to the other handle, you will hear a 'clicking' sound from the computer. Release the mouse button and the polygon will close.



To move an end handle over the other end handle but *without* closing the polygon, hold down the Option key to override the closing action.

**To open a closed polygon:**

- ☐ Click in a handle and move the cursor. Only one handle may be selected.



- ☐ Press and hold down the Option key to open the polygon. When the ends pull apart, you will hear a 'snipping' sound from the computer.

- ☐ Release the mouse button.

**To drag a side of the polygon:**

- ☐ Click in a side of the polygon and move the cursor.



If the handles at both ends of the side are selected, all selected handles will move with the mouse, otherwise only one side will move.

You can also 'resume drawing' an open polygon from either end.

**To add a new leg to the polygon:**

- ☐ Select the handle at either end of the polygon (one and only one).
- ☐ Move the cursor to the location where you want the new end to be. You may press and hold the Shift key to constrain the new leg to a snap angle.
- ☐ Press and release the mouse button. If you wish, you may tab into the Edit Window to edit the new point prior to releasing the mouse button.

This uses the 'timed-fallout' method described in 'Basic Concepts—Tool-Fallout', thus you can click the mouse quickly to cause the reshape operation to fall out.

This reshape operation obeys one of the basic principles of the PowerCADD interface, that a click in a handle means that you are manipulating that handle. This makes everything very predictable, however it means that there is no way to close a polygon at the same time that you are adding a new leg. To close a polygon, you have to create a new end and then drag the end handle to the other end to close it as described above.

***Converting Objects to a Polygon***

The Polygon tool can be used to convert a rectangle, arc, ellipse, B-spline, spline, Bézier or a Parallel Object of the same base type to a polygon. To do this:

- ☐ Select the Polygon tool from the WildTools palette.
- ☐ Press and hold down the Shift and Option keys.  
The cursor will change to a Yin-Yang cursor.
- ☐ Click on the object in the drawing.

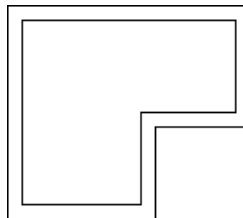
The object will be converted.





## Parallel Polygon Tool

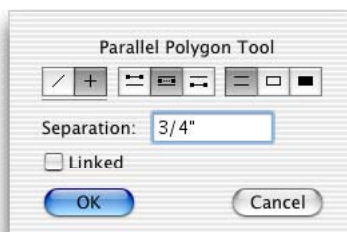
The Parallel Polygon tool allows you to draw double-line polygons. The tool can operate both as a tool that is constrained or unconstrained relative to snap angles, and it offers the ability to easily toggle between draw from left, center or right.



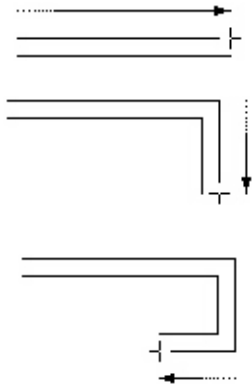
The Parallel Polygon tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ❑ Press the Option key and select the Parallel Polygon tool from the WildTools palette. The following dialog will appear:



- ❑ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles.
- ❑ Select whether the tool will draw from left, center or right.
- ❑ Select whether the polygon will have open ends, closed ends or closed ends with solid fill. Solid fill means that the fill pattern and fill color will be set to match the pen pattern and pen color of the object. Since this tool is commonly used to trace over double lines to fill a solid wall in architectural drawings, this option saves the extra steps of changing the attributes of the polygon after drawing it.
- ❑ Type the separation of the two lines. The standard PowerCADD math functions and mixed dimensional units may be used.
- ❑ Select the Linked option if you want the polygon placed as a Parallel Object. For more information on Parallel Objects, see 'Basic Concepts—Parallel Objects'.



### To draw a parallel polygon:

- ☐ Select the Parallel Polygon tool from the WildTools palette.
- ☐ Place the cursor in the drawing area where you want to start the polygon. Press the mouse button.
- ☐ Move the cursor to the end of the first side. Release the mouse button.

In the process of drawing the line, you may press the Option key to switch between three offset drawing methods: right, center or left. You must do this on the first leg; after that you are committed to one method.

- ☐ To add another leg to the polygon, move the cursor to the end of the next side and click. Repeat this step to add as many sides as you wish.

Click in the same place twice or press the Enter key to stop drawing.

- ☐ To create a closed polygon, move the cursor to the original starting point. When you reach this point, you will hear a 'click' sound from the computer. Click at this point.

If you want to prevent the polygon from closing, press the Option key to override the automatic closing. In this case, the polygon will look exactly the same, but the starting and ending points will be individually editable with Reshape and the Reshape mode of this tool.

The drawing process for this polygon is now over, and you may now start a new polygon.

The Parallel Polygon tool can be used to reshape an existing line, rectangle, polygon or Parallel Object of the same base type. The action of this tool is *exactly* the same as for the Polygon tool described above—please see that description.

Like the Polygon tool, this tool can be used to convert certain objects to a polygon. For a description of this, see Polygon tool above.



## Regular Polygon Tool

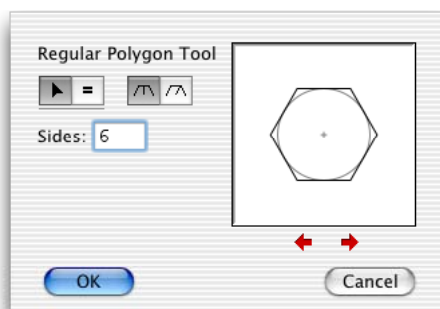
The Regular Polygon tool allows you to place or draw regular polygons. The polygons may be of a fixed size or drawn interactively with the mouse.



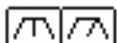
This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Regular Polygon tool from the WildTools palette. The following dialog will appear:



- ☐ Choose whether the tool will draw interactively (arrow) or place a fixed-size polygon (equals sign).

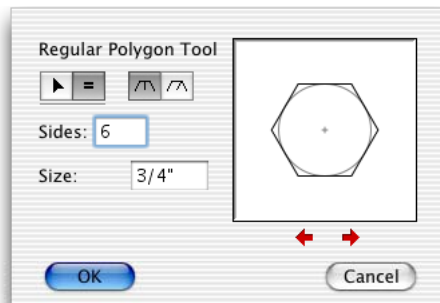


- ☐ Choose whether the polygon will be placed by size (measured across the flats) or by enclosing diameter.

- ☐ Type the number of sides you want.



- ☐ Click on the arrow buttons to adjust the presentation.



- ☐ If you've selected a fixed-size polygon, type the size or diameter. The standard PowerCADD math functions and mixed dimensional units may be used.



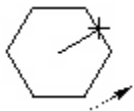
#### **To place a fixed-size polygon:**

- ☐ Set the tool as described above.
- ☐ Select the Regular Polygon tool from the WildTools palette. As you move the cursor, the polygon will be ghosted on the screen. You may press the Option key to toggle the presentation.
- ☐ Click to place the polygon. While the mouse is down, you may press the Option key to toggle the presentation or you may tab into the Edit Window to edit the center point of the polygon.



#### **To draw a regular polygon interactively:**

- ☐ Set the tool as described above.
- ☐ Select the Regular Polygon tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the center of polygon. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, the polygon will expand to follow the mouse.



You may press the Option key to toggle the presentation.

The presentation is constrained to an angle that makes sense depending on the number of sides for the polygon, however you may press the Shift key to unconstrain it.

- ☐ You may tab into the Edit Window to edit the size or diameter.
- ☐ Release the mouse button to complete the polygon.



## Square Polygon Tool

The Square Polygon tool allows you to draw polygons that have all of the sides alternately at right angles. The tool is primarily used to trace the outline of a building when tracing a topographical map.



The Square Polygon tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To draw a square polygon:

- ☐ Select the Square Polygon tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the object where you want to start the polygon. Press the mouse button.
- ☐ Move the cursor to the end of the first side. Release the mouse button.
- ☐ To add another leg to the polygon, move the cursor to the end of the next side and click.

Repeat this step to add as many sides as you wish.

Click in the same place twice or press the Enter key to stop drawing.

- ☐ To create a closed polygon, move the cursor to the original starting point. When you reach this point, you will hear a 'click' sound from the computer. Click at this point.

The drawing process for this polygon is now over, and you may now start a new polygon.



## Pen Tool

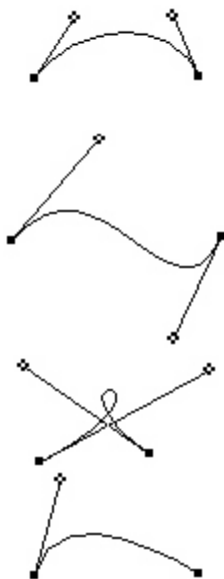
The Pen tool allows you to draw and reshape Bézier curves, which can consist of a series of straight-line or smooth, curved segments.

The Pen tool uses the Normal style. This is optional; see ‘Basic Concepts—Tool Attributes’.

A Bézier curve is a special type of curve developed to display images on computer screens and to create lines on laser printers. Essentially all curves printed on a laser printer, from the shape of each letter of the alphabet to circles and all other curves, are created by Béziers.

Béziers are popular because it’s easy for the computer to draw a curve from the four points that define each curve segment. Thus, it’s well to remember that the reason these things exist at all is for the convenience of the computer and not the user. It just happens that the Bézier curve is the only one of its type that a human has any hope of controlling, but they’re not particularly easy to use or to understand. Drawing with Béziers is an unnatural act, probably punishable by God.

By the way, Bézier curves get their name from the French computer scientist, Pierre Bézier, who invented them, so when people refer to Béziers as the ‘French curve’ of computer graphics, that’s true in more ways than one.



A typical Bézier will consist of one or more segments. Each segment is defined by four points: two anchor points at the ends of the segment and two control points.

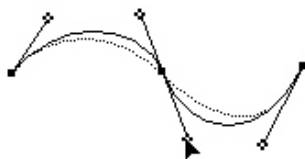
The control points are usually off in space somewhere, away from the anchor points. In this case, the segment is curved, and when you edit the curve with the Pen tool, you will see square handles at the anchor points and cloverleaf handles at the control points. When the cloverleaf handles are visible, you’ll also see a line connecting the anchor point to the control point. The line is always tangent to the curve at the anchor point.

Bézier curve segments can represent three common shapes: a simple curve, an ‘S’ curve and a looping curve.

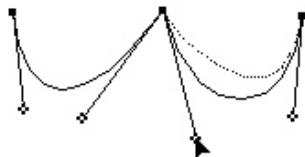
If a control point is at the same point at the anchor point, it is said to be ‘retracted’. In this case, you won’t see a handle for the control point, and the curve dies into the anchor point.



If both control points are retracted, the 'curve' segment becomes a straight line. You only see the handles for the anchor points, and you manipulate the segment like the side of any polygon.



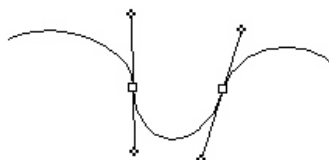
In a typical Bézier, there are a number of curve segments joined together. If the control points to each side of an anchor point are all in one line, there will be a smooth transition of one curve segment to the next. In this case the anchor point is called a 'smooth point'. When you manipulate a control handle at a smooth point, the two control points act together in a 'see-saw' fashion.



In other cases, the control points are not in line with each other. This produces a change in the direction at the anchor point. The anchor point in this case is called a 'corner point'. When you manipulate a control handle at a corner point, it acts independently of its neighbor.



When you manipulate the control handles, you change the shape of the curve. You can move these in any direction. If you pull them out so that they are longer, the curve 'bellies' out. If you shorten them, the curve gets sharper. In all cases, however, the line from the control point to the anchor point is tangent to the curve.

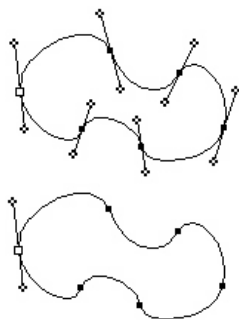


Working with handles for a Bézier is much like working with objects. The handles may be selected or not. Selected handles at the anchor points are shown as hollow handles. When you select a handle at an anchor point, you have also selected the two control points to each side, but there is no change to the appearance of the cloverleaf handle.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Pen tool from the WildTools palette. The following dialog will appear:





- ☐ Choose Show All Handles if you want all control handles to show. This makes it easier to work on the entire Bézier, but it also clutters up the screen. If this option is not selected, then only control handles for selected points will show, and it makes it easier to see the shape you're drawing.
- ☐ Choose if you want the Pen tool to snap to objects. If you're tracing a scanned image, you will want to turn this off, but there may be times when you want to use the Pen tool like all other drafting tools.
- ☐ Choose if you want the Pen tool to snap to the grid. Given the nature of the Pen tool, snapping to the grid makes no sense, but it's your machine, Jasper.
- ☐ Choose whether the Shift key constrains to existing angles or snap angles when editing control handles.

In other programs, tools that draw Béziers have been notoriously difficult to use. Because there are so many different operations required, the programmers resort to using various combinations of the Shift, Option, Command, Caps-Lock and Control keys along with each click of the mouse. These combinations are difficult to remember, and the tools are not predictable if you aren't certain that you are pressing the proper key combination. This Pen tool is radically different. It builds on what you already know, and it is always predictable because the tool 'tells' you (with the cursor) what you are going to do if you click.

Another problem with Bézier tools is that the drawing operation is normally a separate operation from the reshaping action. And often the tool will fall out in the process of drawing something, and you're not finished. Grrr!

Growl no more. The Pen tool will draw Béziers, and it will also reshape existing Béziers. And once you initiate the action (drawing or reshaping), the behavior of the tool is the same, so you only need to learn one set of rules.

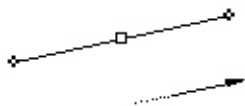
### ***Drawing with the Pen Tool***

#### **To start the drawing process with the Pen tool:**

- ☐ Select the Pen tool from the WildTools palette.
- ☐ Place the cursor in the drawing area.
- ☐ Press and release the mouse button in the same location to begin a Bézier with a single, polygon-like point. When you do this, you will only see a single selected handle.

☐

—or—



- ❑ Press the mouse button and drag away from this point to begin a Bézier with a smooth point with two control handles. Use the Shift key to constrain the angle of the line that you are drawing. Perpendicular and tangent snapping is available.

In either case, a ‘timed-fallout’ method is used, so the clicking action must be deliberate or the tool will fall out. See ‘Basic Concepts—Tool-Fallout’.

You have now begun the process of drawing a Bézier. See ‘Using the Pen Tool’ below for additional steps.

### ***Reshaping with the Pen Tool***

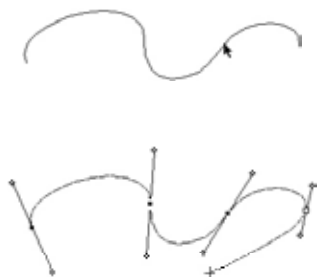
The Pen tool can be used to reshape Béziers, parallel Béziers, and many other object types. Lines, rectangles, arcs, ellipses, B-splines, splines and Parallel Objects of the same base type can be reshaped by the Pen tool, but this converts the object to a Bézier curve.

This allows you to draw a parallel rectangle with many additional rectangles, and then convert the entire thing to a parallel Bézier and work on it with the Pen tool. Because it is not possible to convert Béziers back to the original object, whenever the Pen tool converts an object to a Bézier, you will hear a highly distinctive sound to tell you what is happening.

The editing of Parallel Objects is like Samuel Johnson’s famous quotation about a dog walking on his hind legs. “It is not done well, but you are surprised to find it done at all.”

#### **To reshape an existing object:**

- ❑ Select the Pen tool from the WildTools palette.
- ❑ Press and hold down the Option key. The cursor will change to an Arrow cursor.
- ❑ Click on the object. If the object is not a Bézier, it will be converted to a Bézier, and you will hear a distinctive sound from the computer.



The object will be redrawn on the screen with control handles.

You have now begun the process of reshaping a Bézier. See ‘Using the Pen Tool’ below for additional steps.

### ***Using the Pen Tool***

To use the Pen tool, first begin drawing as described in ‘Drawing with the Pen Tool’ above, or begin the reshaping operation described in ‘Reshaping with the Pen Tool’ above.

If you are drawing a Bézier for the first time, you may want to repeat the previous click or click-and-drag actions a few times. Adding curve segments to the Bézier is described in greater detail below.

You may now engage in five operations: selecting handles, converting handles, drawing, dragging and adding points.

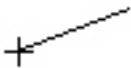
You may press the Enter key at any time to get out of the Pen tool.

You may zoom in and out (if Zoomer is turned on) with the normal Zoomer actions and the usual command keys for Reduce to Fit, Normal Size, etc. This can be very important while tracing a scanned image, since it allows you to zoom in on a detail that would be hard to see otherwise, and then zoom back out to see the entire shape.

As you move the mouse around over the object, one of two cursors will be active.



The Drawing cursor indicates that if you click with the mouse, you will add a new curve segment to the Bézier. This allows you to ‘resume drawing’ an existing Bézier. You can only add to an open Bézier, and only if one end handle is selected (one and only one).



To save you from having to memorize this rule, the tool always tells you what it is trying to do. If it is trying to draw, the cursor will be the Drawing cursor and a curve segment will ‘rubber-band’ between the cursor and the selected end of the Bézier.



If the tool is unable to draw, the Drag cursor indicates that the tool is trying to drag (move) a part of the Bézier. It can drag handles or segments of the Bézier. If the tool is unable to drag anything (i.e., because it is not over the object or in a handle) the Drag cursor will be white. This is the tool’s way of saying to you, “I’m trying to drag, but I can’t right now”.

Handles may be selected and are shown as hollow handles at anchor points. Control points are always shown as cloverleaf handles. In this context, dealing with a handle is much like dealing with an object.

**To select a handle:**

- ☐ Click in a handle of an anchor point. The handle will be selected and will change to a hollow handle.

If any other handles are selected, they will be deselected.

When you select a handle at an anchor point, you have also selected the two control points to each side, but there is no change to the appearance of the cloverleaf handle.

**To select additional handles:**

- ☐ Hold down the Shift key and click in the handle of an unselected anchor point.

When you press the Shift key, the cursor will change to an Arrow cursor, but if you're not in a handle, the cursor will be white. This is the tool's way of saying, "I'm trying to select, but I can't right now." This makes it easy to find the 'mother' object in a Parallel Object.

If you click in a handle that is already selected, the handle will be deselected.

When you deselect a handle at an anchor point, you have also deselected the two control points to each side, but there is no change to the appearance of the cloverleaf handles.

**To deselect a handle that is already selected:**

- ☐ Hold down the Shift key and click in a selected handle.

**To select a curve segment:**

- ☐ Press and hold down the Shift key.
- ☐ Move the cursor over the Bézier until the Arrow cursor is black.
- ☐ Click on the Bézier with the Arrow cursor.



If the handles at both ends of the curve segment are not selected, they will be selected, otherwise they will be deselected.

**To select all of the handles of the Bézier:**

- ☐ Use the command key for Select All. (You may not use the menu for Select All.)

**To delete selected handles:**

- ☐ Press the Delete key.

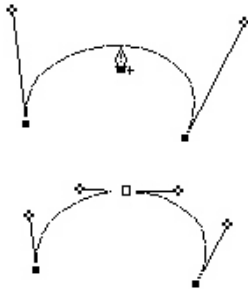
### To Undo the deletion:

- ☐ Use the command key for Undo. (You may not use the menu for Undo.)

The last editing operation is undo-able. This is an incremental undo; the entire draw/reshape operation is undo-able when you finish. Selecting and deselecting of handles is not undo-able.

### To nudge the selected handles:

- ☐ Press one of the Arrow keys.



### To add a point to the Bézier:

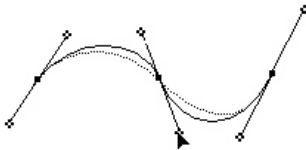
- ☐ Press and hold down the Option key.
- ☐ Move the cursor over one of the sides of the Bézier.
- ☐ When the tool is capable of adding a point, the cursor will change to the Pen Plus cursor.
- ☐ Click on the Bézier to add the point.

A new point is added with a single click (i.e. without any dragging action) to produce a point that does not change the shape of the curve. The new point will be a selected handle, and all other selected handles will be deselected.

Center snapping is available prior to the click, and this action is unusual. Bézier curves are drawn as a polygon in a number of steps, and center snapping produces a new point at exactly halfway through the step process. In the case of a straight-line segment, that produces a new point at the half-way point. In the case of a curved segment, the new point is half-way only in the sense of the steps involved in producing the curve. (This may have great significance to some Bézier freaks, but probably none at all to most people.)

### To change the shape of a Bézier with a control handle:

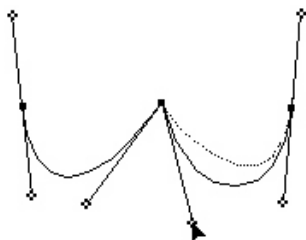
- ☐ Click in a cloverleaf handle and move the cursor.



Press the Shift key to constrain the angle of the line to the anchor point to the same slope or to a snap angle (per your choice in the Pen tool dialog).

If the anchor point is a smooth point, the control handle on the other side will pivot in a 'see-saw' action. You may break this action by pressing the Option key while dragging the control handle. This creates a corner point and the control handle can be manipulated independently of its neighbor. (You cannot

break the 'see-saw' action of a control handle at either end of an open Bézier.) Press the Option key again to revert to the 'see-saw' action.



If the anchor point is a corner point, the control handle will be manipulated independently of its neighbor. You can change this action to a 'see-saw' action by pressing the Option key while dragging the control handle. This creates a smooth point. Press the Option key again to revert to the independent action.



#### To retract a control point:

- ☐ If Show All Handles is off, you must first select an anchor point to see the cloverleaf handle.
- ☐ Press and hold the Option key.
- ☐ Move the cursor over a cloverleaf handle. The cursor will change to the Delete cursor.
- ☐ Click in the cloverleaf handle.

The handle will be retracted. (It is not deleted, of course, only retracted.)



#### To convert a smooth point to a corner point or vice-versa:

- ☐ Press and hold the Option key.
- ☐ Move the cursor over the handle of an anchor point. The cursor will change to the Yin-Yang cursor.
- ☐ Click in the handle.

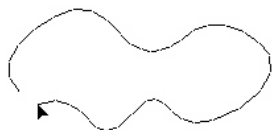
The cloverleaf handles will be extended from a corner point, or retracted from a smooth point.

#### To move an anchor point with the mouse:

- ☐ Click in the handle of an anchor point and move the cursor.

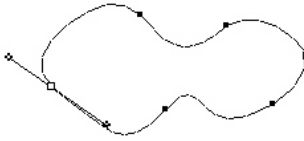
If the handle is not selected, the handle will be selected and all other selected handles will be deselected.

As you move the cursor, all selected handles will move with the mouse. If you wish, you may tab into the Edit Window to edit the location of the handle you are moving.



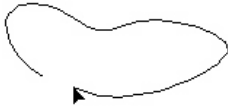
#### To close an open Bézier:

- ☐ Click in one of the end anchor point handles of the Bézier and move it over to the other end anchor point handle. To do this, only one anchor point handle can be selected.



When you get to the other handle, you will hear a 'clicking' sound from the computer. Release the mouse button and the Bézier will close.

To move an end handle over the other end handle but without closing the Bézier, press and hold down the Option key to override the closing action.



#### **To open a closed Bézier:**

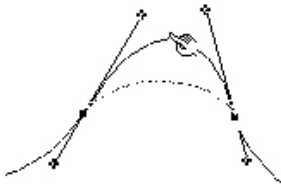
- ☐ Click in the handle of an anchor point and move the cursor. Only one anchor point handle may be selected.
- ☐ Press and hold down the Option key to open the Bézier. When the ends pull apart, you will hear a 'snipping' sound from the computer.
- ☐ Release the mouse button.



#### **To drag a curve segment of the Bézier:**

- ☐ Move the cursor directly over the Bézier.
- ☐ When you are directly over the Bézier, the cursor will change to the Drag cursor. This is helpful in finding the 'mother' object in a parallel Bézier.
- ☐ Click directly on the Bézier and move the cursor.

If the handles at both ends of the segment are selected, all selected handles will move with the mouse, otherwise only one segment will move.



#### **To pull on a curve segment of the Bézier:**

- ☐ Press and hold down the Command key.
- ☐ Move the cursor directly over the Bézier.
- ☐ When you are directly over the Bézier, the cursor will change to the Finger cursor. This is helpful in finding the 'mother' object in a parallel Bézier.
- ☐ Click directly on the Bézier and move the cursor.

The shape of the curve will change by adjustments of the distance of the control points from the anchor points, but the angle will be constrained. You may press the Shift key to break the angle constraint.

You can add curve segments to an open Bézier from either end.

#### **To add a new curve segment:**

- ☐ Select the handle at either end of the Bézier.
- ☐ Move the cursor to the location where you want the new end to be.
- ☐ To add a polygon-like corner point to the Bézier, press and

release the mouse in the same point.

To constrain the angle of this point to the end of the Bézier, press the Shift key before clicking the mouse.

—or—

- ❑ To add a smooth point to the Bézier, press the mouse button and drag away from this point.

To constrain the angle of the line you are dragging, press the Shift key after clicking the mouse.

Perpendicular and tangent snapping is available.

In either case, this uses the ‘timed-fallout’ method described in ‘Basic Concepts—Tool-Fallout’, thus you can click the mouse quickly to cause the tool to fall out.

The operation of the Pen tool obeys one of the basic principles of the PowerCADD interface, that a click in a handle means that you are manipulating that handle. This makes everything very predictable, however it means that there is no way to close a Bézier at the same time that you are adding a new curve segment. To close a Bézier, you have to create a new end point and then drag the end anchor point handle to the other end to close it as described above.

Whenever the tool is not trying to draw, you may click in the drawing area away from the Bézier to deselect all handles; however, the tool will fall out if no handles are selected.

At any time, you can cause the tool to fall out by clicking off the object (quickly if you are in the process of drawing).

### ***Converting Objects to Béziers***

The Pen tool can be used to convert a line, rectangle, arc, ellipse, B-spline, spline or Parallel Objects of the same base type to a Bézier.

#### **To convert an object to a Bézier:**

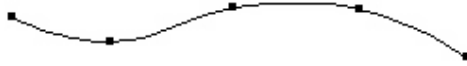
- ❑ Select the Pen tool from the WildTools palette.
- ❑ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ❑ Click on the object in the drawing.

The object will be converted.



## Spline Tool

Naval architects, highway engineers, illustrators and aircraft designers use flexible metal or plastic rulers to draw smooth curves connecting a series of points. The Spline tool provides the ability to do the same thing in a PowerCADD drawing.



The Spline tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

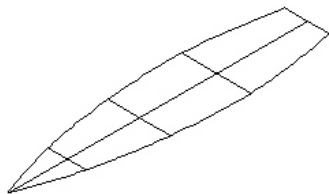
A 'smooth curve' is not an easily defined entity; however, for the purposes of this tool, an important requirement is that a spline connecting points along a circle should match the curve of a circle. Additionally, when the curve changes radius or direction, the curve should transition smoothly. Curve fitting methods used by many so-called 'powerful' CAD system are notoriously inadequate—many depend on such crude methods of fitting a series of arcs, while others depend on adjusting points that are well off the curve. The curves produced are almost always lumpy, and they are difficult to edit.

The Spline tool uses Bézier curve segments and automatically calculates the control handle positions. Three spline methods are provided.

- **Standard Spline.** For points A, B and C, the Standard Spline solves for the center of an arc defined by the three points, then sets the Bézier control points perpendicular to a line from the center point to B.
- **Skewed Spline.** For points A, B and C, the Skewed Spline sets the Bézier control points parallel to AC.
- **Simple Spline.** For points A, B and C, the Simple Spline bisects the angle formed by ABC, then sets the Bézier control points perpendicular to that line.

All three spline methods adjust the length of the Bézier control points for 'circle magic', and this adjustment is essential to producing smooth curves. To see the Bézier points, use the Vertex Points action of the Point tool.

All three splines will produce the same curve if the points are evenly spaced. The Standard Spline is usually the best since it will duplicate an arc with unequally spaced points along a circle, while the others will not.



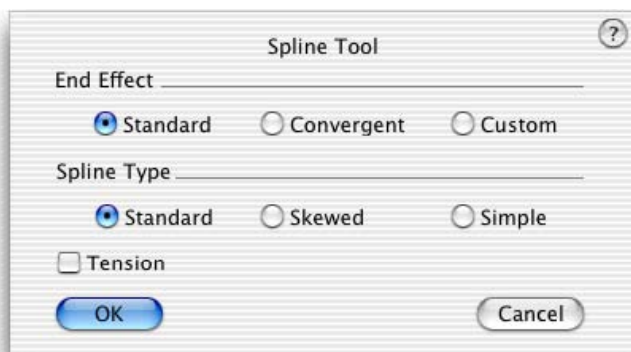
The Skewed Spline is useful only for isometric drawings as shown to the left when the nodes of the spline are directly 'opposite' each other about a centerline that falls on one of the isometric planes. In this sort of situation, the other splines will not produce curves which are isometric mirrors of the other curves.

Simple Spline is the PowerCADD method with Bézier point length adjustments for arcs thrown in.

All three splining methods break down badly when the included angle is less than 90°, and some arbitrary curve is selected.

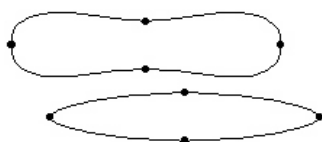
#### To choose the type of spline you want:

- ☐ Press the Option key and select the Spline tool from the WildTools palette. The following dialog box will appear:



The ends of a curve are difficult to define automatically. Standard Ends attempts to keep the curve going in a logical way. Custom Ends are initially the same as Standard Ends, except that you can edit them by pulling on an extra cloverleaf handle that is provided for interactive editing.

Convergent ends have the Bézier control point at the same point as the end point of the Bézier (i.e. 'retracted'). The curve straightens out as it approaches the end of the curve.



Tension only applies to sharp corners, as shown to the left with two identical shapes except for the tension setting.

To draw a spline, you draw a polygon, exactly as if you had selected the Polygon tool, and then when you are finished, the polygon is converted into a spline.

**To draw a spline:**

- ☐ Select the Spline tool from the WildTools palette.
- ☐ Place the cursor in the drawing area where you want to start the polygon. Press the mouse button.
- ☐ Move the cursor to the end of the first side. Release the mouse button.
- ☐ To add another leg to the polygon, move the cursor to the end of the next side and click.

Repeat this step to add as many sides as you wish.

Click in the same place twice or press the Enter key to stop drawing. The polygon will be converted to a spline.

- ☐ To create a closed spline, move the cursor to the original starting point. When you reach this point, you will hear a 'click' sound from the computer. Click at this point.

If you want to prevent the spline from closing, press the Option key to override the automatic closing.

The drawing process for this spline is now over, and you may now start a new spline.

To 'unsmooth' a spline to the original polygon you drew, use the conversion action of the Polygon tool.

If you develop a smooth curve and then shear the curve into, say, an isometric projection, you will find that the curve will initially be a true isometric projection of the original curve, but that if you touch the handles, the curve will change. For this sort of situation, the spline curve should first be converted to a Bézier with the Pen tool before shearing.

You may reshape Splines and Parallel Splines by using the Reshape command or by using the Spline tool, as described below.

### ***Reshaping Splines with the Spline Tool***

The Spline tool can be used to reshape existing splines and parallel splines. This allows you to ‘resume drawing’ an existing spline, add or delete points and close/open splines.



#### **To reshape an existing spline:**

- ☐ Select the Spline tool from the WildTools palette.
- ☐ Press and hold down the Option key. The cursor will change to an Arrow cursor.
- ☐ Click on the object in the drawing. The spline will be redrawn on the screen as a object.

The action of the reshaping operation is the same as that of the Polygon tool, except that you cannot drag a ‘leg’ of the spline as you can with a polygon. Please see the Polygon tool above for a complete description.

You may also reshape Splines and Parallel Splines by using the Reshape command.

### ***Converting Objects to a Spline***

The Spline tool also allows you to convert an existing polygon to a spline or to convert one type of spline to another. This also works with Parallel Objects of the same base type.



#### **To convert an object to a spline:**

- ☐ Hold down the Option key and select the Spline tool.
- ☐ Change the settings of the Spline tool to the type of spline that you want to convert the polygon or spline to.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on the object in the drawing.

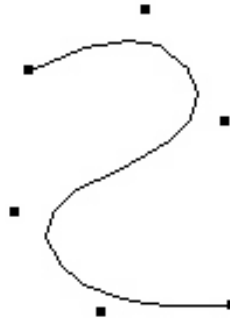
The object will be converted.

The type of spline that is produced depends upon the settings selected in the dialog box for the Spline tool. This includes the spline type—Standard, Skewed or Simple—as well as tension and end types.



## B-Spline Tool

The B-Spline tool allows you to draw B-splines—commonly called ‘smoothed polygons’. In addition, the tool provides a reshape mode to add and delete points from existing B-splines and parallel B-splines as well as the ability to convert polygons and parallel polygons to B-splines.



The B-Spline tool uses the Normal style. This is optional; see ‘Basic Concepts—Tool Attributes’.

### To draw a B-spline:

- ☐ Select the B-Spline tool from the WildTools palette.
- ☐ Place the cursor in the drawing area where you want to start the B-spline. Press the mouse button.
- ☐ Move the cursor to the end of the first leg. Release the mouse button.
- ☐ To add another leg to the B-spline, move the cursor to the end of the next leg. Press and release the mouse button. The end of the leg is established at the mouse-release point.

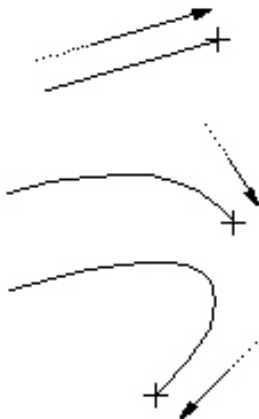
Repeat this step to add as many sides as you wish.

Click in the same place twice or press the Enter key to stop drawing.

- ☐ To create a closed B-spline, move the cursor to the original starting point. When you reach this point, you will hear a ‘click’ sound from the computer. Press and release the mouse at this point.

If you want to prevent the B-spline from closing, press the Option key to override the automatic closing.

The drawing process for this B-spline is now over, and you may now start a new B-spline.



### ***Reshaping B-Splines with the B-spline Tool***

The B-Spline tool can be used to reshape an existing B-spline or parallel B-spline. This allows you to 'resume drawing', add or delete points and close/open a B-spline.

#### **To reshape an existing B-spline:**



- ☐ Select the B-Spline tool.
- ☐ Press and hold down the Option key. The cursor will change to an Arrow cursor.
- ☐ Click on the object in the drawing. The B-spline will be redrawn on the screen as a 'ghosted' object.

The action of the reshaping operation is the same as that of the Polygon tool, except that you cannot drag a 'leg' of the B-spline as you can with a polygon. Please see the Polygon tool above for a complete description.

### ***Converting Objects to a B-Spline***

The B-Spline tool can be used to convert a polygon, spline or Parallel Object of the same base type to a B-spline. This allows you to 'smooth' a polygon or parallel polygon. To do this:



- ☐ Select the B-Spline tool.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on the object in the drawing.

The object will be converted.



## Cloud Tool

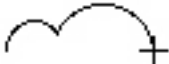
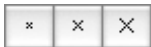
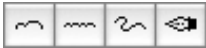
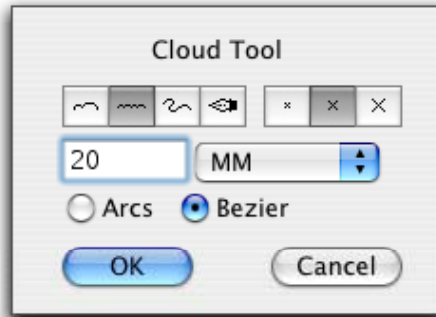
The Cloud tool allows you to draw a series of arcs for clouds to indicate a revised area of the drawing. This is also useful for drawing hedgerows and treelines.



The Cloud tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Cloud tool from the WildTools palette. The following dialog will appear:



- ☐ Select the drawing method. In the first two methods, the tool draws like the Polygon tool, and you have a choice of two arcs or a series of arcs per 'leg'. In the other methods, the tool draws like the Freehand tool and the Pen tool.
- ☐ In the last three drawing methods, three editable sizes are available. The size is an on-paper size and is the maximum length of a two-arc segment.
- ☐ You have a choice of whether the cloud will be placed as a series of arcs in a group or as a single Bézier. If you want to fill the shape with a pattern or color, you need to use a Bézier.

### To draw a cloud using a 'polygon' drawing method:

- ☐ Select the Cloud tool from the WildTools palette.
- ☐ Place the cursor in the drawing area where you want to start the cloud. Press the mouse button.
- ☐ Move the cursor away from the starting point. As you do this, the arcs will follow the mouse.

You may press the Option key to toggle the direction of the arcs. This action is available on the first 'leg' only.

Release the mouse button to end the first 'leg'.



- ❑ To add another 'leg' to the cloud, move the cursor to the end of the next leg and click.

Repeat this step to add as many legs as you wish.

Click in the same place twice or press the Enter key to stop drawing.



- ❑ To create a closed cloud, move the cursor to the original starting point. When you reach this point, you will hear a 'click' sound from the computer. Click at this point.

If you want to prevent the cloud from closing, press and hold the Option key to override the automatic closing.



The cloud will be placed in the drawing.

The drawing process for this cloud is now over, and you may now start a new cloud.



#### **To draw a cloud using the freehand drawing method:**

- ❑ Select the Cloud tool from the WildTools palette.
- ❑ Place the cursor in the drawing area where you want to start the cloud. Press the mouse button.
- ❑ Move the cursor away from the starting point with the mouse button still pressed. As you do this, the arcs will follow the mouse. This is much like drawing with a pencil.

You may press the Option key to toggle the direction of the arcs. This action is available on the first pair of arcs.

To create a closed cloud, move the cursor to the original starting point. When you reach this point, you will hear a 'click' sound from the computer. If you want to prevent the cloud from closing, press and hold the Option key to override the automatic closing.

Release the mouse button to end the drawing process for the cloud.

The cloud will be placed in the drawing.



#### **To draw a cloud using the Pen drawing method:**

- ❑ Use the same drawing action as for the Pen tool.



## Freehand Tool

The Freehand tool allows you to draw a polygon using a freehand, drawing-with-pencil style. The tool offers three degrees of accuracy.



The Freehand tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Freehand tool from the WildTools palette. The following dialog will appear:



- ☐ Choose from Fine, Normal or Coarse. These settings correspond to a resolution of 4, 6 or 8 screen pixels per polygon segment.

### To draw a freehand object:

- ☐ Select the Freehand tool from the WildTools palette.
- ☐ Since the drawing resolution is determined by screen pixels, if you want to draw something very detailed, zoom in on the drawing.
- ☐ Place the cursor in the drawing area where you want to begin drawing. Press the mouse button.
- ☐ Move the cursor away from the starting point with the mouse button still pressed. As you do this, an irregular line will follow the mouse.





You may press the Option key to interrupt the drawing. If you're close to the last point, you'll get a Nibble cursor, and you can 'back up' on the polygon to erase the last line segments that you've drawn.

To create a closed shape, move the cursor to the original starting point. When you reach this point, you will hear a 'click' sound from the computer.



Release the mouse button to end the drawing process for this polygon.

The polygon will be placed in the drawing.

The polygon created with the Freehand tool is exactly the same type of object created by the Polygon tool—it just has more points—and it can be reshaped and edited like other polygons.

If you lay down too many points, you'll create a polygon that has so many points that it will exceed the memory capacity of a printer and cause it to not print. To prevent this, the Freehand tool breaks long polygons into pieces with a maximum of 150 points. If you want to put the things back together, that's your decision, Ralph, and you can use Attach for that purpose.



## Symbol Tool

The Symbol tool is PowerCADD's Symbol tool installed in the WildTools palette in the interest of offering a logical arrangement of tools for the user who wants to work primarily with the WildTools palette.

If no Symbol file is open, you will get a 'Sad Symbol' cursor. For the operation of this tool, please refer to the PowerCADD user's manual.

In programming jargon, WildTools "sits on top" of PowerCADD's tool and adds one additional feature, the Rotate Randomly option. This is intended for placing shubs, bushes and plants in landscape architecture at random placement angles.



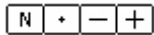
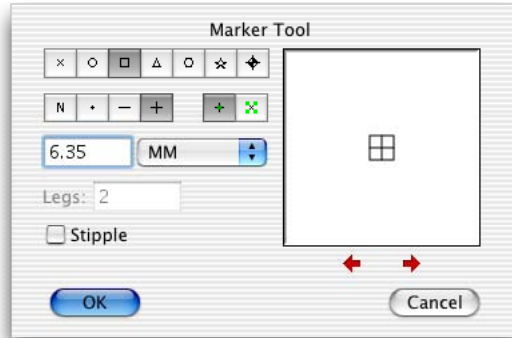
## Marker Tool

The Marker tool allows you to place a number of different shapes with a single click of the mouse.

The Marker tool is a 'no-style' tool, i.e., it has its own attributes and is not tied to any of the Style tools.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Marker tool from the WildTools palette. The following dialog will appear:



- ☐ Select the shape that you want. You can think of a cross as a 'printing point', but it's actually a group of lines.
- ☐ A number of options for a dot or line in some of the shapes are provided to allow for a variety of different markers for statistical charting purposes.
- ☐ You have a choice of whether the object should be placed as a Marker object, which has a single handle in the center of the object, or as a normal object which has four handles.
- ☐ Each shape has its own on-paper size, which you can edit.
- ☐ If you select the Stipple option, grid and object snapping are turned off, and the object placed is not selected. This is useful for texturing areas with small circles or rectangles.
- ☐ The arrow buttons control the rotation of the object and the optional line in the center of the shape. Not all objects can be rotated.

### To place an object with the Marker tool:

- ☐ Select the Marker tool from the WildTools palette.
- ☐ Place the cursor in the drawing at the location that you want to create the object and click.

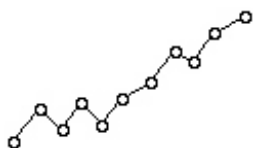
The object will be placed.

This tool uses the 'timed-fallout' method described in 'Basic Concepts—Tool-Fallout'. You may find that the tool will fall out too easily when you are stippling, however if you hold down the Command key when you use the tool, the tool will not fall out on a quick click.



### ***Placing Markers on a Polygon***

The Marker tool can be used to place markers at the vertices of a polygon. This only works if the tool is set to place crosses, circles, squares, triangles or hexagons. This can be used to automate the charting process for statistical charts.



#### **To place markers at the vertices of a polygon:**

- ☐ Select the Marker tool.
- ☐ Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- ☐ Click on a polygon in the drawing.

The markers will be placed along the polygon.

### ***Converting Objects to a Marker Object***

The Marker tool can be used to convert any type of object (except a point object) to a Marker object. This means that you can convert literally any type of object, or group of objects, to an object that has only one handle in the center of the object.



#### **To convert an object to a Marker object:**

- ☐ Select the Marker tool.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on an object in the drawing.

The object will be converted.

To convert the object back to a normal object, use Ungroup or Convert to Group.



## Rubber Stamp Tool

The Rubber Stamp tool allows you to copy objects in the drawing and place additional objects. The Rubber Stamp tool has many similarities to the standard Macintosh Copy and Paste commands except that the object is not stored in the clipboard. It also resembles the operation of the Symbol tool.



### To use the Rubber Stamp tool:

- ☐ Select the Rubber Stamp tool from the WildTools palette. Whenever you quit PowerCADD, the Rubber Stamp tool ‘forgets’ about the type of object that it is supposed to duplicate. Whenever its private ‘clipboard’ is empty, it displays a Picklefork cursor. When the Picklefork cursor is showing, this means that you are in the mode of ‘picking up’ an object.
- ☐ When the Picklefork cursor is showing, click on any object in the drawing. The Rubber Stamp tool will then make a copy of that object, including all of its attributes for line weight, pen and fill patterns and colors, etc.
- ☐ When the Rubber Stamp tool has an object in its private ‘clipboard’, the cursor changes to a normal drawing cursor, and the object is ghosted with the cursor.
- ☐ To place an object in the drawing, simply click in the drawing.

**Note:** The object is placed by the point where you clicked on it. Thus, if you want to place a series of rectangles by the top left corner, you should select the object by that corner.

### To cause the Rubber Stamp tool to forget about the last object and to ‘pick up’ another object:

- ☐ Select the Rubber Stamp tool from the WildTools palette if it is not already selected.
- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on an object in the drawing.

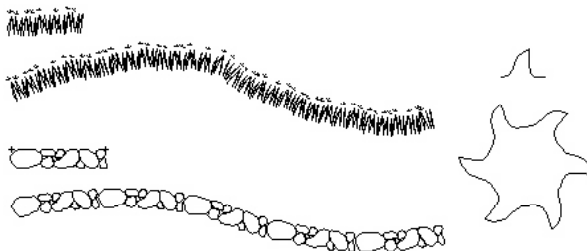
If you click on a blank area of the drawing, the Rubber Stamp tool will ‘forget’ about all objects and will be ‘empty’. In this case, it will not ghost an object, and the cursor will be a Picklefork cursor.

This tool uses the ‘timed-fallout’ method described in ‘Basic Concepts—Tool-Fallout’.



## Linear Patterning Tool

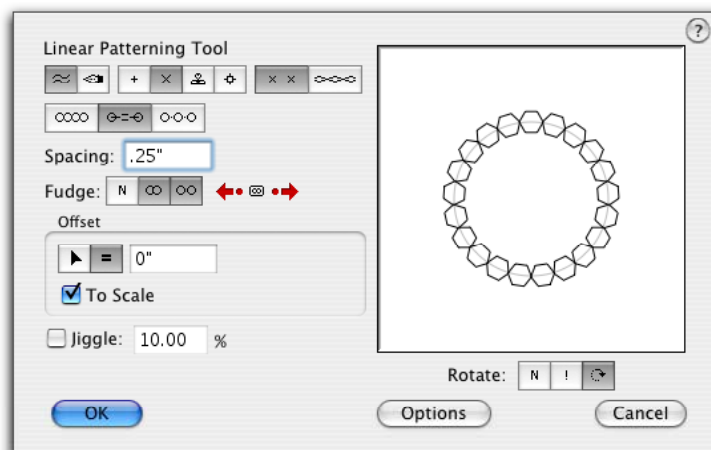
The Linear Patterning tool allows you to place repeated patterns of any objects along a line, curve or path. The objects can be on the path or offset from it, and you have a number of choices of how the objects may be located and/or rotated.



The tool has a wide range of possible uses, such as brick edging, flagstone walkways, rock walls, wavy lines, gear teeth, roller chain, decorative borders, rope, guitar inlay, shrubbery, or even grass with flowers sprinkled in there.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Linear Patterning tool from the WildTools palette. The following dialog will appear:



- ☐ Choose parallel offset or pen drawing mode.
- ☐ Choose what to place. The choices are Points, Markers, Rubber Stamp and Symbols. Markers means the currently selected choice of the Marker tool. Rubber Stamp means the currently adopted object of the Rubber Stamp tool. If the Rubber Stamp tool's private clipboard is 'empty' or if no PowerCADD Symbol library is currently open, an 'unhappy face' will be used in



- place of the object in the sample window in the dialog box.
- ☐ Choose objects-on-path to have the objects placed individually along the path and rotated as required.
- ☐ Choose Ribboning to have the objects distributed or stretched (see fan distortion below) along the path so that they form a continuous pattern. With Ribboning, any group structure will be destroyed, and the objects will be placed as individual objects, a single group or hatching, depending on your choice in the Linear Patterning Options dialog.
- ☐ Choose End-to-End spacing to have the objects placed adjacent to each other along the path, according to the width of the object. In this case, you have the additional Fudge choices of no fudging, overlap fudging and spaced-apart fudging. You may select one or both types of fudging.

**Fudge:** ☐ ☐ ☐

With fudging, if the objects don't fully fill up the length of the path, they will be distributed slightly so that they do fill up the length. If you choose both overlap and spaced-apart fudging, the tool will choose the option that would be the closest to the desired end-to-end spacing.



- ☐ Choose Fixed Spacing to have the objects placed a specified distance from object center to object center. In this choice, you type the spacing, and you also have the fudge choices again.

**Spacing:**

**Fudge:** ☐ ☐ ☐ ☐ ☐

Depending on your spacing, the objects may be separated from each other, or they may overlap. In this case, you may choose fudge to have the objects distributed evenly and as close as possible to the specified spacing. If the tool 'knows about' an object to place (no 'unhappy face') then you will have a number of nudge buttons as well.

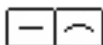


- ☐ Choose the arrow buttons to nudge the spacing up or down by 10% of the size of the object, or choose the dot button to nudge the spacing up or down by the Nudge amount you set in the Snap pane of the Drawing Setup dialog.



- ☐ Click on the Reset button to reset the spacing to the width of the object.
- ☐ Choose Distribute to have the objects distributed evenly along the path. Type the number of objects.

**Number:**



- ☐ Choose this option to place a single object along the path with the mouse. Because objects can be rotated to the angle of the path, this gives you the ability to place an object tangent to any curve.
- ☐ Choose if the offset will be interactive (arrow) or to a fixed dimension (equal sign). If the objects are to be directly on the path, then the choice would be a fixed offset of zero length.
- ☐ Type the offset that will be used for a fixed offset. The standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ If the To Scale option is selected, the offset will be to the drawing scale. If To Scale is not selected, the offset will be an on-paper length.
- ☐ Choose if you want to jiggle the objects. This means the objects would be moved in random amounts and angles relative to their size. This is intended for stippling or for placing shrubbery.
- ☐ Choose no rotation if you want the objects distributed along the path but not rotated.
- ☐ Choose random rotation if you want the objects rotated at random angles. This is intended for bushes and shrubbery.
- ☐ Choose rotation if you want the objects rotated perpendicular to the path.
- ☐ Choose fan distortion if you want objects stretched in a fan-like manner around curves in ribboning.
- ☐ Choose no distortion if you want objects to be placed individually in ribboning—typically you don't want bricks or tiles to distort.
- ☐ Choose straight or curved lines to be used with ribboning and fan distortion. If you choose straight lines, then lines, rectangles and polygons will retain their straight-line segments as they are distorted along the path. If you choose curved lines, then lines, rectangles and polygons will be converted to Béziars so that the straight-line segments will bend as they are distorted along the path.
- ☐ With very complex Rubber Stamp or Symbol objects, the sample window will take a long time to redraw. Click on the ✓ or ✗ buttons to toggle between a normal preview or a quick preview, in which case a rectangle with a criss-cross line will be shown in place of the actual object to be used.

- ❑ Click on the Options button and the following dialog will appear:

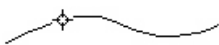


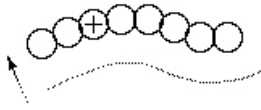
- ❑ Choose Place Group if you want to place one group of all of the new objects, or as individual objects.
- ❑ Choose Place Behind if you want to place the new objects behind the path that you click on. Normally, the objects would be placed on the current layer and on top of the drawing, however it may be desirable to place the objects behind the object that you click on. For example, if you want to construct a serpentine wall with bricks and bushes, then you don't want the original path to be covered up.
- ❑ Choose Hatching if you want the objects converted to hatching. This only applies to ribboning. Lines, polygons and Béziers are converted to hatching. This means that you can create your linear patterns with the usual drawing tools but place them as hatching. Note also that you can ribbon a single object along a line to create a hatch pattern that you can use as a linear pattern.
- ❑ Choose Omit Points if you don't want any reference points placed.



#### **To use the tool in the parallel offset mode:**

- ❑ Select the Linear Patterning tool from the WildTools palette.
- ❑ If the tool is set to place Rubber Stamp objects, and if the Rubber Stamp tool does not have an object in its private 'clipboard', then the Picklefork cursor will be displayed. You may use the Picklefork cursor to pick up an object in the drawing, and this will become the object that is on the Rubber Stamp tool's private 'clipboard'.
- ❑ Place the cursor in the drawing area on the object that you want to place objects along. This may be a line, arc, ellipse, rectangle, polygon, B-spline, spline or Bézier. Press the mouse button.





- ❑ Drag away from this point in the direction you want the objects to go.

For closed shapes, you can move the mouse to position the objects where you want them along the path. In the case of a line, an open path, or for end-to-end or fixed spacing, the objects would ‘hit’ the end of the object.

The offset distance will show in the Edit Window and Show Location bar.

If the tool is set for an interactive offset, you may press the Shift key to constrain the offset to the fixed offset set in the tool’s dialog box.

If the tool is set for a fixed offset, you may press the Shift key to break the offset free from the constraint of the fixed offset and to set the offset interactively with the mouse.

- ⚠ You may tab into the Edit Window to set the offset for this operation. If you do this, you may continue to move the mouse to locate the objects.

You may press the Option key to toggle between the normal or a mirrored presentation. For more information, see ‘Basic Concepts—Option-Toggling’.

- ❑ Release the mouse to complete the operation.

The objects will be placed along the path.



**To use the tool in the pen drawing mode:**

- ❑ Use the same drawing action as for the Pen tool.

### ***Picking-up a Rubber Stamp object***

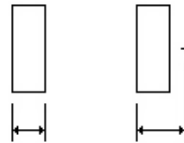
When the tool is set to place Rubber Stamp objects, you may use the Linear Patterning tool to pick up another object for the Rubber Stamp tool. This object can be placed by the Linear Patterning tool as well as the Rubber Stamp tool.

#### **To 'pick up' an object for the Rubber Stamp tool:**

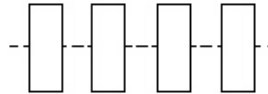
- ☐ Set the Linear Patterning tool to place Rubber Stamp objects.
- ☐ Select the Linear Patterning tool from the WildTools palette.
- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on an object in the drawing.

### ***Creating Symbols for Linear Patterning.***

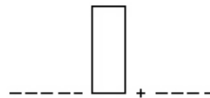
Objects are placed along the path according to their width.



If you want to control the spacing between objects, simply place a point to one side of the object and place both objects in the symbol file—or group them and pick them up with the Picklefork cursor.



Objects are normally placed along the path by their top-to-bottom center. However, Rubber Stamp objects are placed on the path in accordance with the click point that you used when you picked up the object.



In the case of symbols, in accordance with the established convention of the placing of Symbols in PowerCADD, if the topmost object in the symbol group is a point, then that will be used to locate the objects relative to the path. Without such an object, the path will be located about the vertical center of the symbol, in other words, halfway from the top to the bottom of the symbol.

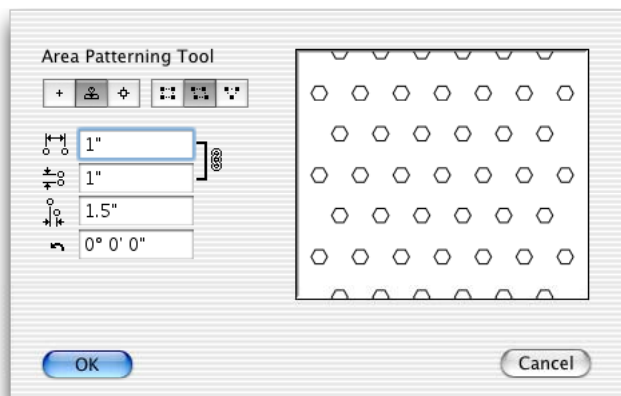


## Area Patterning Tool

This tool allows you to place patterns of objects within a closed shape. It can be used to locate individual objects, such as irrigation sprinkler heads, within a closed area.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Area Patterning tool from the WildTools palette. The following dialog will appear:



- ☐ Choose what to place. The choices are Points, Rubber Stamp and Symbols. Rubber Stamp means the currently adopted object of the Rubber Stamp tool. If the Rubber Stamp tool's private clipboard is 'empty' or if no PowerCADD Symbol library is currently open, an 'unhappy face' will be used in place of the object in the sample window in the dialog box.



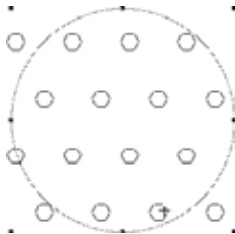
- ☐ Choose a rectangular, staggered or triangular spacing.
- ☐ Set the desired spacing and rotation angle.

### To use the tool:

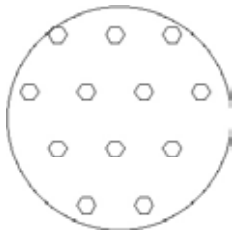
- ☐ Select the Area Patterning tool from the WildTools palette.
- ☐ If the tool is set to place Rubber Stamp objects, and if the Rubber Stamp tool does not have an object in its private 'clipboard', then the Picklefork cursor will be displayed. You may use the Picklefork cursor to pick up an object in the drawing, and this will become the object that is on the Rubber Stamp tool's private 'clipboard'.



- ☐ Place the cursor in the drawing area on the rectangle, ellipse, polygon, B-spline, spline or Bézier. Press the mouse button.



- ☐ Drag the mouse to locate the grid.
- ☐ Release the mouse to place the grid.



The grid of objects will be placed in the drawing.

### ***Flooding a Grid.***

The Area Patterning tool can place a grid of objects within an enclosed space defined by one or more objects. Please see 'Flooding a Grid' for the Grid Line tool for a description of how this works.

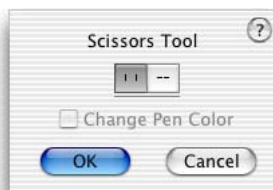


## Scissors Tool

The Scissors tool allows you to cut an object in one place by clicking on it or to cut a portion out of an object by dragging along it.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Scissors tool from the WildTools palette. The following dialog will appear:



- ☐ Select the 'clean break' option if you want to cut a portion out of an object.



- ☐ Select the hidden break option if you want to replace the cut-out portion with a dashed line of the Hidden Line style; however, if the object being cut already has a dashed line, then the section is replaced with an object of the Normal style. In other words, if the line is solid, it is replaced with a dashed line, and if the line is dashed, it is replaced with a solid line.
- ☐ The Change Pen Color only applies if the hidden break option is selected. If Change Pen Color is selected, the new pen color of the new dashed line is changed to match that of the Hidden Line style or Normal style, as appropriate.

The Scissors tool will cut B-splines and splines, however the objects that remain in the drawing will be Béziers.

As a practical matter, most of the time when you cut an object, you want to cut the object at an intersection with another object. To give you maximum control over which object is cut, the Scissors tool always tries to cut a selected object first.

### To cut an object:

- ☐ Select the Scissors tool from the WildTools palette.



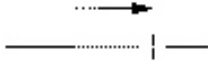
- ☐ If you want to select an object to be cut, press the Option key. The cursor will change to an Arrow cursor.

Click on an object in the drawing to select it.



- ❑ Place the cursor over the object in the drawing that you want to cut and at the location that you want to begin the cut. Press the mouse button.

If you want to cut the object in one place only, release the mouse, and the cut will be complete.



- ❑ To cut a portion out of the object, drag along the object. As you do this a ghosted line will indicate the length of the cut. Release the mouse button to complete the cut.



If the object being cut is a closed shape, such as a circle, rectangle, polygon, B-spline, etc., you may press the Option key to toggle the direction of the cut to 'the other way around'.

The Scissors tool can be used repeatedly to cut objects, and you may always hold down the Option key to select objects to be cut. This allows you to cut objects behind other objects. It does not matter if the object was already selected when you select the tool or if the Scissors tool selected the object.

When you cut an object, you will see a visual burst indication at the cutting point and hear a 'snip' sound. This confirms that the cut is being made.

The Scissors tool is a 'shift-toggling' tool that can be flipped between the clean break and hidden break cutting methods with a quick down-and-up tap on the Shift key. This may be done while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.



## Trim with Object Tool

The Trim with Object tool is a cookie-cutter trimming tool that allows you to cut lines with rectangles, ellipses, polygons, B-splines or Béziers. It is particularly suited for cutting multiple lines.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Trim with Object tool from the WildTools palette. The following dialog will appear:

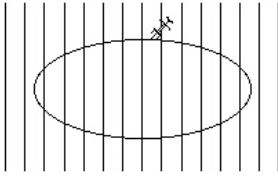


- ☐ Select the 'clean break' option if you want to cut a portion out of an object.
- ☐ Select the hidden break option if you want to replace the cut-out portion with a dashed line of the Hidden Line style, however if the object being cut already has a dashed line, then the section is replaced with an object of the Normal style. In other words, if the line is solid, it is replaced with a dashed line, and if the line is dashed, it is replaced with a solid line.
- ☐ The Change Pen Color only applies if the hidden break option is selected. If Change Pen Color is selected, the new pen color of the new dashed line is changed to match that of the Hidden Line style or Normal style, as appropriate.

To operate as it does, this tool must keep a private copy of the object that is being trimmed to.

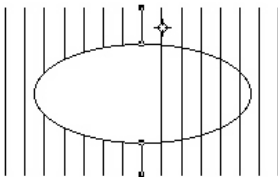
### To use the tool:

- ❑ Select the Trim with Object tool from the WildTools palette.



Whenever you quit PowerCADD, the tool 'forgets' about the 'trim-to' object. Whenever the tool 'doesn't know' about a trim-to object, it displays the Picklefork cursor. When the Picklefork cursor is showing, this means that you are in the mode of adopting a trim-to object.

- ❑ When the Picklefork cursor is showing, click on any rectangle, ellipse, polygon, B-spline or Bézier in the drawing. The tool will then adopt this object by making a private copy of the trim-to object.



- ❑ When the tool has a trim-to object, the cursor changes to the Target cursor. Click on lines with the Target cursor to trim them to the trim-to object.

If the lines cross the trim-to object, the lines will be trimmed, but not extended. In keeping with the logic used by the Trim tool, the part of the line that you click on will be the portion that is retained. Thus if you click on a portion of a line within a trim-to object, the portions outside the object will be the parts that are thrown away. If the hidden break option is selected, then these parts of the line will be converted to a line of the Hidden Line style.

- ⚠ **Important:** A peculiarity of this tool is that it will continue to use its private copy of the trim-to object even after the original object has been deleted, therefore you must insure that it 'knows' about the object that you want to trim to. ⚠

### To adopt a new trim-to object:

- ❑ Select the Trim with Object tool from the WildTools palette if it is not already selected.
- ❑ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ❑ Click on a rectangle or ellipse in the drawing.

The Trim with Object tool is a 'shift-toggling' tool that can be flipped between the clean break and hidden break cutting methods with a quick down-and-up tap on the Shift key. This may be done while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.

**To trim multiple objects in a single operation:**

- ☐ Select the Trim with Object tool from the WildTools palette, if it is not already selected.



- ☐ Click directly on a line, as before, but do not release the mouse button. Instead, drag a line across the other lines to be trimmed with the finger cursor.

—or—

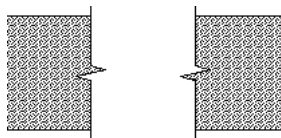


- ☐ Click in white space, pause momentarily, and then drag a line across the lines to be trimmed with the finger cursor.

In either case, the line that you drag across the lines determines the 'mouse click' location on each line, which is used in the logic about which end of the line is trimmed or extended.

**Break Line Tool**

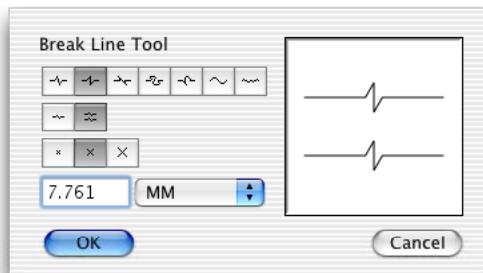
This tool allows you to draw break lines in a variety of styles, including double break lines which cover up details in the drawing.



The Break Line tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

**To set the behavior of the tool:**

- ☐ Press the Option key and select the Break Line tool from the WildTools palette. The following dialog will appear:



- ☐ Select the style of break line.
- ☐ Select a single break or double break line. Double breaks allow you to cover up details in the drawing.

- ❑ Five of the break line styles are available in three editable sizes. These are on-paper sizes, and the effect of any change in size can be seen immediately in the sample window.

The S-shaped curve is frequently use for sheet metal breaks and is available in three degrees of curvature.

The jagged line is available in three degrees of roughness. This squiggly break line is simplified according to the simplification settings in Squiggle.

#### **To draw a break line:**

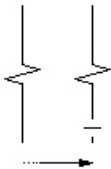
- ❑ Select the Break Line tool from the WildTools palette.
- ❑ Place the cursor in the drawing area at a location that will represent the starting point of the line. Press the mouse button.
- ❑ Drag away from the starting point. As you move the mouse, the break line will follow the mouse.



Notice that the ends of the line overshoot the ends of the line that you draw. This overshoot amount is the same as the witness line extension that you set in the PowerCADD Dimensions Preferences dialog.

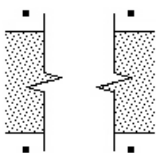
This is a 'smart tool' in that if you click on a line or side of a rectangle or polygon, the line will be automatically perpendicular to that line, however you may use the Shift key to override this and constrain to a normal snap angle.

Release the mouse to complete the line.

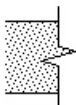


- ❑ If you are drawing a double break line, the operation is not yet complete. Move the cursor to one side until the second break line is in the desired location and click.

A single break line is placed with a white fill pattern so that the zig-zag portion of the break line will cover up part of the drawing between the break lines.



A double break line is placed as a group of three objects, the two break lines that you can see, plus a white-filled polygon or Bézier that is placed behind the lines. This allows you to cover up details in the drawing. Note that the cover-up object follows the zig-zag shape of the break line so that details below are properly masked off.



**Note:** If you want to use a single break and still cover up an area, then use the double break option, ungroup the object, and delete the unwanted break line.

### ***Converting Lines to a Break Line***

The Break Line tool can be used to convert existing lines in the drawing to single break lines of the style that the tool is currently set to draw. This allows you to draw lines with precision and then convert them to a break line.

#### **To convert a line to a break line:**

- ☐ Select the Break Line tool.
  - ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
  - ☐ Click on the line in the drawing.
- The object will be converted.



When the lines are converted, the new break line overshoots the original line, exactly as it does when drawn with the mouse.



### **S-Break Tool**

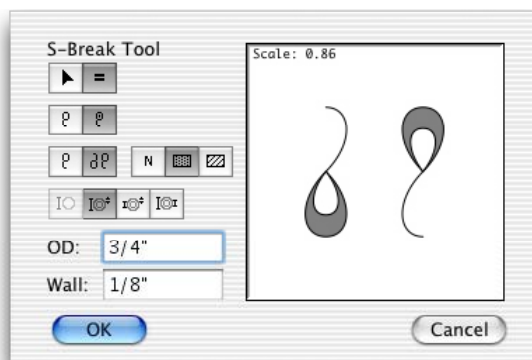
This tool allows you to draw two types of S-breaks, which we'll call rod breaks and tube breaks. The S-breaks can be placed singularly or as a pair and may be filled with gray fill or hatching.

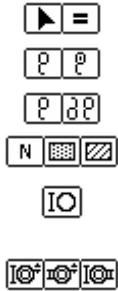


The S-Break tool uses the Normal style (this is optional; see 'Basic Concepts—Tool Attributes'), however any hatching is of the Hairline style.

#### **To set the behavior of the tool:**

- ☐ Press the Option key and select the S-Break tool from the WildTools palette. The following dialog will appear:





- ☐ Select whether the tool will draw interactively (arrow) or to a fixed size (equals sign).
- ☐ Select whether you want to draw rod break or tube break.
- ☐ Select single or double breaks.
- ☐ Choose between filling the S-breaks with gray fill, hatching or neither one.
- ☐ If a fixed-size rod break is selected, type the diameter of the rod.
- ☐ If a fixed-size tube break is selected, type the size of the tube by one of the three methods.

#### To draw an S-Break using the interactive method:

- ☐ Select the S-Break tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at the starting point of the S-break. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, the S-break will follow the mouse.

This is a 'smart tool' in that if you click on a line or side of a rectangle or polygon, the S-break will be automatically perpendicular to that line.

You may press the Option key to toggle the presentation.

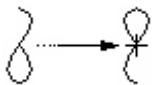
- △ You may tab into the Edit Window to edit the length of the line that you are drawing.

Release the mouse to complete the S-break.

- ☐ If you are drawing a tube break, the operation is not yet complete. Move the cursor to establish the wall thickness of the tubing and click.
- △ Before clicking, you may tab into the Edit Window to edit the wall thickness.
- ☐ If you are drawing a double S-break, the operation is not yet complete. Move the cursor to establish the location of the second S-break, and click.
- △ Before clicking, you may tab into the Edit Window to edit the offset.

Before clicking, you may press the Option key to toggle the presentation.

Before clicking, you may hold down the Shift key to constrain the S-breaks to a fixed distance from each other. This distance is a proportion of the 'diameter'.



#### To draw an S-Break using the fixed-size method:

- ☐ Select the S-Break tool from the WildTools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the center of the S-break. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, the S-break will pivot to follow the mouse. If a double break is being drawn, the second S-break will follow the mouse.

This is a 'smart tool' in that if you click on a line or side of a rectangle or polygon, the S-break is automatically perpendicular to that line.

You may press the Option key to toggle the presentation.

- △ You may tab into the Edit Window to edit the line that you are drawing.

If you are drawing a double-break, you may hold down the Shift key to constrain the S-breaks to a fixed distance from each other. This distance is a proportion of the 'diameter' of the S-breaks.

#### ***Converting Lines to S-Breaks***

The S-Break tool can be used to convert existing lines in the drawing to single S-breaks of the type that the tool is set to draw, except that if a tube break is chosen, a rod break will be substituted. This allows you to draw lines with precision in the drawing and then convert them to an S-break.

#### To convert a line to an S-break:



- ☐ Select the S-Break tool.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on the line in the drawing.

The object will be converted.

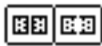


## Knife Tool

The Knife tool is an interactive cut-with-line tool that will cut lines, dimension lines, rectangles, polygons, arcs, ellipses, Béziers, splines, B-splines and bitmaps. You may cut all objects or only selected objects.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Knife tool from the



WildTools palette. The following dialog will appear:

- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles.
- ☐ Two types of cutting actions are available. In the 'open cut', rectangles and polygons are cut as with an Exacto knife, and the cut is left open. In a 'closed cut', the cut ends are closed. The closed cut option does not work with arcs, Béziers or splines.
- ☐ Choose whether to cut selected objects only, or all objects.

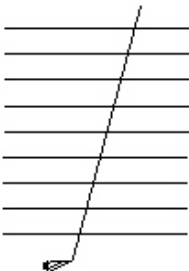
To cut objects in the drawing, you draw a line with the Knife tool, exactly as you would with the Line tool, and this line is used to cut the objects.

### To cut objects in the drawing:

- ☐ Select the Knife tool from the WildTools palette.
- ☐ Place the cursor at a location that will represent the starting point of the line. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, a line will follow the mouse.

If the Knife tool is set to be unconstrained to snap angles, you may press the Shift key to constrain the line to those angles.

If the tool is set to be constrained to snap angles, you may press the Shift key to unconstrain the line.



You may press the Option key to toggle between draw-from-center and normal line drawing. For more information, see 'Basic Concepts—Option-Toggling'.

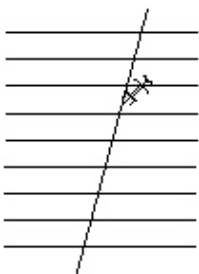
- △ You may tab into the Edit Window to edit the length and angle of the line.

Release the mouse button to complete the line.

The objects in the drawing will be cut with the line. If objects are cut, you will hear a snipping sound, and there will be a visual burst indication on the screen at all cut-points.

To cut a bitmap, the line must go completely across the bitmap.

The Knife tool is a 'constraint-toggle' tool that can be flipped from constrained to unconstrained with a quick down-and-up tap on the Shift key. This may be done while drawing a line, or while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.



Alternatively, you may use the Knife tool to cut with an existing line or guideline in the drawing. This allows you to locate the cutting line with precision in advance of the cutting operation.

#### To cut with an existing line:

- ☐ Select the Knife tool.
- ☐ Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- ☐ Click on the cutting line, guideline or dimension line in the drawing.

The objects in the drawing will be cut with the line.



### Freehand Knife Tool

The Freehand Knife tool allows you to cut lines and bitmaps with a freehand, drawing-with-pencil shape, or to use an existing object in the drawing to cut the lines with a 'cookie-cutter' action.

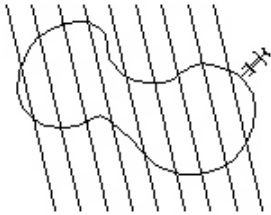
#### To cut lines or bitmaps in the drawing:

- ☐ Select the Freehand Knife tool from the WildTools palette.
- ☐ Place the cursor in the drawing area where you want to begin cutting. Press the mouse button.
- ☐ Move the cursor away from the starting point with the mouse button still pressed. As you do this, an irregular line will follow



the mouse. Release the mouse button to end the drawing process.

Lines or bitmaps in the drawing will be cut by this shape.



The problem with this sort of cutting action is that it's inaccurate because nobody can draw a freehand shape with any accuracy. The *real* power of this tool comes from its ability to cut with an existing object in the drawing.

**To cut lines using an existing object:**

- ☐ Select the Freehand Knife tool from the WildTools palette.
- ☐ Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- ☐ Click on any line, ellipse, rectangle, polygon, B-spline, or Bézier in the drawing that you want to be the cutting object.

Lines and bitmaps in the drawing will be cut by this shape. If you Option-click on a line, you will have done exactly the same thing as with the Knife tool, and it will cut all of the object types that the Knife tool can cut. If you Option-click on an ellipse, then the cutting action will be accurate with line-ellipse intersections used. If you click on any of the other object types, the cutting action will be with a polygon.



## Clip Tool

The Clip tool is PowerCADD's Clip tool installed in the WildTools palette in the interest of offering a logical arrangement of tools for the user who wants to work primarily with the WildTools palette.



## Combine Tool

The Combine tool is PowerCADD's Combine tool installed in the WildTools palette in the interest of offering a logical arrangement of tools for the user who wants to work primarily with the WildTools palette.



## Parallel Offset Tool

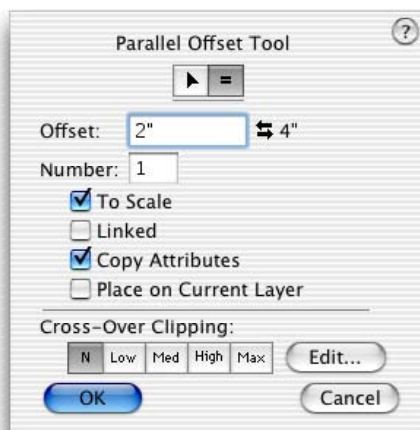
The Parallel Offset tool allows you to create a duplicate object that is offset from the original object. In the case of a rectangle, this means that the new object will be offset to the inside or outside. If the offset is 3 millimeters, for example, each side of the new rectangle will be 3mm from the original rectangle. In the case of a line, the new line is offset to one side of the original line.

This tool, along with the Offset Line tool, are most commonly used for laying out a design. In a floor plan, for example, you will typically create a horizontal and vertical line, and then offset these lines for the thicknesses of the walls or width of the rooms. These two tools allow you to layout floor plans and other designs with astonishing speed—once you understand the tools and know how to use them. No other tools in the WildTools palette will do as much to improve your productivity. Learn them well. They are the most powerful and flexible parallel offset tools yet seen on a Macintosh or PC screen.

In addition, both tools will offset a guideline, and you can offset both way. Both tools will offset from objects on other layers, even if Edit All Layers is off.

### To set the behavior of the tool:

- ❑ Press the Option key and select the Parallel Offset tool from the WildTools palette. The following dialog will appear:



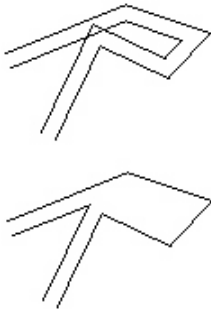
- ❑ Choose whether the offset will be interactive (arrow) or to a fixed dimension (equal sign).
- ❑ Type the fixed-dimension offset—the standard PowerCADD math functions and mixed dimensional units may be used. As

you will see, you can use this offset when the tool is operating interactively. This is known as the ‘active offset’.

- ❑ To the right of the active offset is an additional offset amount (shown as 4” above). This is the ‘on-deck’ offset, and it provides a second offset that is available at the touch of the Option key while you are using the tool.

Only one offset is active at any time, but you can switch the values by clicking on the left-right arrow icon (or on the text of the ‘on-deck’ offset). As you use the tool, you may press the Option key to toggle between the two offsets.

The ‘on-deck’ offset will only be visible when the To Scale option is selected.

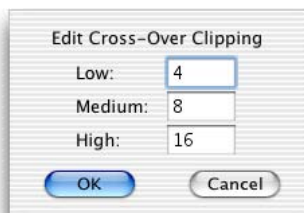


- ❑ Type the number of offsets you want.
- ❑ If you select the To Scale option, the offset will be to the drawing scale—this is the normal use of the tool. If To Scale is not selected, the offset will be an on-paper size, and the ‘on deck’ offset will not be visible in the dialog.
- ❑ Select the Linked option if you want the tool to create a Parallel Object. For more information on Parallel Objects, see ‘Basic Concepts—Parallel Objects’.
- ❑ Cross-over clipping affects polygons that loop back over themselves, and it clips these loops off depending on the setting chosen.

**Note:** Cross-over clipping doesn’t always behave the way you will expect, and it is a quirky, sometimes-frustrating thing. Accordingly, it’s always best to leave cross-over clipping off unless you have a particular need for it (even then you’re likely to curse at it!), but it can be a great time-saver in some situations.

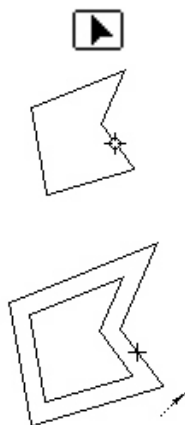
- ❑ Choose Copy Attributes if you want to copy the attributes of the object that you click on.
- ❑ You may choose Place on Current Layer. If this is not selected, the new object will be placed on the same layer as the original object.

- ❑ Click on the Edit button to edit the cross-over clipping values. The following dialog box will appear:



- ❑ The values for low, medium and high cross-over clipping control how far ahead the function looks to see if the polygon loops back over itself. These values are used whenever the cross-over clipping function within WildTools is used, thus if you create a Parallel Object with cross-over clipping, you may not edit the cross-over clipping setting for that object (low, medium, high), but you can control the values that are used by the cross-over clipping function when it is called by the reshape routine. A cross-over clipping of max means that the routine will look ahead to the end of the polygon.

The Parallel Offset tool is a 'shift-toggling' tool that can be flipped from interactive to fixed-offset with a quick down-and-up tap on the Shift key. This may be done while dragging the mouse, or while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.



#### To use the Parallel Offset tool interactively:

- ❑ Set the behavior of the tool as described above.
  - ❑ Select the Parallel Offset tool from the WildTools palette.
  - ❑ Place the cursor in the drawing area on the object to be offset. Press the mouse button.
  - ❑ Drag away from this point in the direction you want the offset to occur. The first duplicate offset object will follow the movement of the mouse, and any additional offset objects will ghost on the screen as well.
- △ The offset distance and number of offsets will be displayed in the Show Location bar and Edit Window. You may tab into the Edit Window to set the offset and number of offsets for this specific operation (i.e., it does not change the values in the dialog box). If you do this, the offset operation is complete.

Press the Shift key to constrain the offset to the active offset in the dialog box. The offset will show in the Show Location

bar and Edit Window. You may also press the Option key to exchange the active and on-deck offsets of the dialog. The new offset will show in the displays. The action of the Option key is a toggling action, thus the values are exchanged each time you press the Option key.

While the mouse button is down, you may switch between interactive and fixed-offset modes with a quick down-and-up tap on the Shift key. For a complete description, see 'Basic Concepts—Shift-Toggling'.

Release the mouse button to complete the offset operation.

⚠ **Important:** You can store two offsets (say for common wall thicknesses), access them with the manipulation of the Shift and Option keys, and also tab into the Edit Window to set the offset for a room width. The ability to switch rapidly between two stored offsets while editing the offset on the fly is a great time-saver since it avoids visiting the dialog box on every use of the tool.

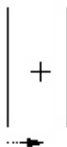
For architects, it is very common to lay out a floor plan as a series of offsets for walls and rooms. The walls are almost always the same width while the rooms will vary in size. To create a room, simply mouse-down on a line, drag in the direction of the offset you want, and then tab into the Edit Window to set the width of the room. To create a wall, mouse-down on the line, drag in the direction of the offset, and press the Shift key to constrain the offset to the setting in the dialog. The offset is displayed in the Edit Window and Show Location bar, so you can see what offset you are using, and you may press the Option key to switch between the active and on-deck offsets on the fly. ⚠



#### **To use the Parallel Offset tool for a fixed-offset:**

- ☐ Set the behavior of the tool as described above.
- ☐ Select the Parallel Offset tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the object to be offset. Press the mouse button.

If you want to offset both ways, press the Option key before you press the mouse button.



- Drag away from this point in the direction you want the offset to occur. The first duplicate offset object will follow the movement of the mouse, and any additional offset objects will ghost on the screen as well.

The offset distance and number of offsets will be displayed in the Show Location bar and Edit Window.

You may press the Option key to exchange the active and on-deck offsets of the dialog. The new offset will show in the Show Location bar and Edit Window. The action of the Option key is a toggling action, thus the values are exchanged each time you press the Option key.

- △ You may tab into the Edit Window to set the offset and number of offsets for this specific operation (i.e., it does not change the values in the dialog box). If you do this, the offset operation is complete.

You may press the Shift key to break the offset free from the constraint of the fixed-offset and to set the offset interactively with the mouse. The offset will show in the Show Location bar and the Edit Window. As before, you may tab into the Edit Window to set this offset.

While the mouse button is down, you may switch between interactive and fixed-offset modes with a quick down-and-up tap on the Shift key. For a complete description, see 'Basic Concepts—Shift-Toggling'.

Release the mouse button to complete the offset operation.

As in the interactive method of operation, the dramatic increase in drafting speed comes for the use of two stored offsets and the use of the Edit Window.

It doesn't matter whether you use the interactive or fixed-offset method. Pick the one that suits you the best. Because the Offset Line tool is so similar to the Parallel Offset tool, you will end up using the two tools together. The Offset Line tool also has two stored offsets, so that gives you a total of four stored offsets that you can use without calling up a dialog box.

**Note:** The Edit Window and Show Location bar always show the offset as a to-scale dimension, even when the To Scale option is turned off.

Remember that if the Linked option is turned on, you will create a Parallel Object. An architect once told us, “I offset a line and then couldn’t select it.” In fact, he had created a Parallel Object and didn’t realize it. For more information, see ‘Basic Concepts—Parallel Objects’.

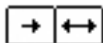
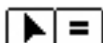
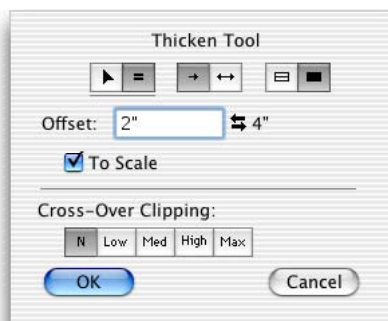


## Thicken Tool

The Thicken tool allows you to create a parallel polygon from an object in the drawing. This tool is a variation of the Parallel Offset tool described above and shares many similarities.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Thicken tool from the WildTools palette:



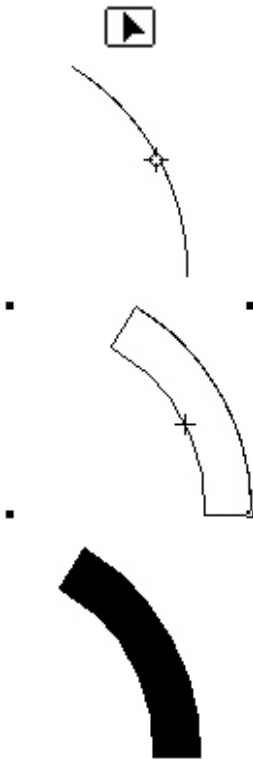
- ☐ Choose whether the tool will be interactive (arrow) or to a fixed dimension (equal sign).
- ☐ Choose whether you want to offset in one direction or both. As you use the tool, you may use the Option key to toggle between these two settings.
- ☐ Choose whether you want an outline or filled offset. In the outline offset, the attributes of the original object are used in the new object, thus it will have the same fill pattern and color as the original object. If the filled offset is used, the new object will also adopt the pen pattern and color as its new fill pattern and color.
- ☐ Type the fixed-dimension offset—the standard PowerCADD math functions and mixed dimensional units may be used. As you will see, you can use this offset even when the tool is operating interactively. This offset is known as the ‘active offset’.
- ☐ To the right of the active offset is an additional offset amount (shown as 4” above). This is the ‘on-deck’ offset, and it provides a second offset that is available at the touch of the Option key while you are using the tool.

Only one offset is active at any time, but you can switch the values by clicking on the left-right arrow icon (or on the text of the ‘on-deck’ offset).

The ‘on-deck’ offset will only be visible when the To Scale option is selected.

- ❑ If you select the To Scale option, the offset will be to the drawing scale—this is the normal use of the tool. If To Scale is not selected, the offset will be an on-paper size, and the ‘on-deck’ offset will not be visible in the dialog.
- ❑ Cross-over clipping affects polygons that loop back over themselves, and it clips these loops off depending on the setting chosen. See the Parallel Offset tool above for a complete description of cross-over clipping.

The Thicken tool is a ‘shift-toggling’ tool that can be flipped from interactive to fixed-offset with a quick down-and-up tap on the Shift key. This may be done while dragging the mouse, or while the tool is active and the mouse is up. For a complete description, see ‘Basic Concepts—Shift-Toggling’.



#### **To use the Thicken tool interactively:**

- ❑ Set the behavior of the tool as described.
- ❑ Select the Thicken tool from the WildTools palette.
- ❑ Place the cursor in the drawing area on the object to be offset. Press the mouse button.
- ❑ Drag away from this point in the direction you want the offset to occur. The offset polygon will follow the movement of the mouse.

You may press the Option key to toggle between offsetting to one or both sides.

- ⚠ The offset distance will be displayed in the Show Location bar and Edit Window. You may tab into the Edit Window to set the offset for this specific operation (i.e., it does not change the values in the dialog box). If you do this, the operation will be complete.

Press the Shift key to constrain the offset to the active offset in the dialog box. The offset will show in the Show Location bar and Edit Window.

While the mouse button is down, you may switch between interactive and fixed-offset modes with a quick down-and-up tap on the Shift key. For a complete description, see ‘Basic Concepts—Shift-Toggling’.

Release the mouse button to complete the offset operation.



#### To use the Thicken tool for a fixed-offset:

- ☐ Set the behavior of the tool as described above.
- ☐ Select the Thicken tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the object to be offset. Press the mouse button.
- ☐ Drag away from this point in the direction you want the offset to occur. The offset polygon will follow the direction of the mouse.

You may press the Option key to toggle between offsetting to one or both sides.

The offset distance will be displayed in the Show Location bar and Edit Window.

- △ You may tab into the Edit Window to set the offset for this specific operation (i.e., it does not change the values in the dialog box). If you do this, the offset operation will be complete.

You may press the Shift key to break the offset free from the constraint of the fixed-offset and to set the offset interactively with the mouse. The offset will show in the Show Location bar and Edit Window. As before, you may tab into the Edit Window to set this offset.

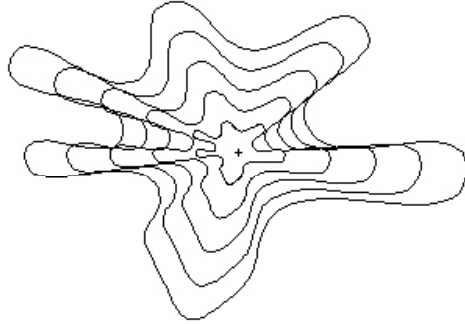
While the mouse button is down, you may switch between interactive and fixed-offset modes with a quick down-and-up tap on the Shift key. For a complete description, see 'Basic Concepts—Shift-Toggling'.

Release the mouse button to complete the offset operation.



## Blend Tool

The Blend tool allows you to blend two similar objects in a fixed number of steps. The Blend tool will work with all types of objects (except for text and groups of objects), and you can blend any combination of those objects.



You can blend a point with a Bézier—see example above—a line with a polygon, a Bézier with a rectangle.

The Blend tool works by making copies of the original objects, converts them to the same type of object (points, lines, rectangles, arcs, ellipses, polygons, B-splines, Béziers, etc.) and then blends those objects. The type of blending is shown as the title to the preview dialog box.

Thus, if you are blending a point with a Bézier, the Blend tool creates a Bézier with all of its points at the same location. For Béziers of unequal size, the Blend tool distributes new points so that the blending Béziers will have the same number of points.

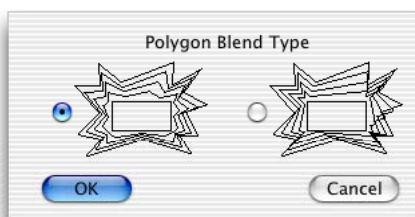
The Blend tool can be used for many interesting graphic effects, but it also has some serious practical uses for drafting. Blending two points is a simple way of distributing a number of points equally between them. Blending two line-type objects is a way of finding the mean line of the two objects—for the mean line of an airfoil, for example. You can blend lines, polygons or Béziers to create a hatching effect. The Blend tool can also be used for contour maps to create intermediate lines.

**To set the behavior of the tool:**

- ❑ Press the Option key and select the Blend tool from the WildTools palette. The following dialog will appear:



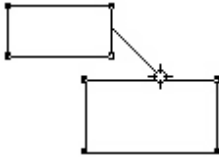
- ❑ Type the number of steps in the blend. There must be at least two steps. You can type any number between 2 and 500.
- ❑ If you choose Preview Dialog, the full-blown Blend dialog will appear after you have selected the two objects to be blended with the mouse. For most simple blends, you don't need to preview the blend.
- ❑ Rectify Lines prevents 'crossing blends' and makes the blending of lines work out the way you probably intended.
- ❑ Click the Options button, and the following dialog will appear:



- ❑ There are two methods of blending polygons with an unequal number of legs. In order to blend these objects, the Blend tool creates private copies of the original objects that have the same number of points. In the first method, the 'shorter' polygon has new points distributed along it. In the second method, the new points are placed at the vertices of the original polygon, for a 'bunched up' effect.

**To blend two objects with this tool:**

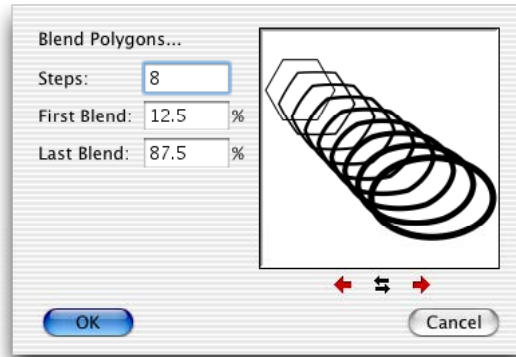
- ❑ Select the Blend tool from the WildTools palette.
- ❑ Place the cursor in the drawing area on the first object and press the mouse button.



- ❑ Drag to the second object and release the mouse button.

Before you release the mouse button, you may press the Option key to reverse the Preview Dialog choice.

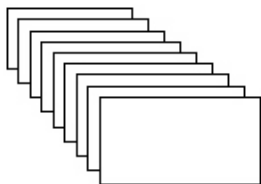
- ❑ If the Preview Dialog choice is selected, the following dialog will appear:



- ❑ The number of steps is shown, and you may change it. Type the number of steps in the blend—there must be at least 2 steps. You can type any number between 2 and 500. When you change the number of steps, the First Blend % and Last Blend % change accordingly.
- ❑ In the sample window, projection lines show the location of the first and last blends. Once you have set the number of steps in the blend, you may change the first and last blends. First Blend is the percentage of the distance between the selected objects where you want the first blend object positioned. Last Blend is the percentage of the distance between the selected objects where you want the last blend object positioned. For 'standard' linear blends, these percentages will fall between 0 and 100%, but they may be outside that range.
- ❑ Because polygons, B-splines (smoothed polygons), Béziers and lines all have a 'first point', the blending of these objects can sometimes produce unexpected results, which can easily be seen in the sample window of the dialog when the number of steps is more than two. Click on the left-right arrow button to reverse the order of one of the objects. Arcs may also be reversed.

### ***Z Heights***

The Blend tool handles the Z heights used by TopoTools.



- ☐ Closed polygons, smoothed polygons and Béziers appear to the eye to be a continuous line, however they have a first point. To move the first point around the closed shape, click on the right and left arrow buttons to change this. The projection lines will show how the blend will be done.
- ☐ Click OK to dismiss the dialog.

The objects will be blended.

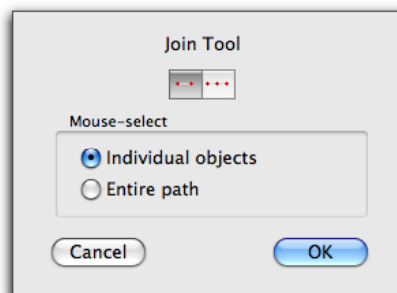


## Join Tool

The Join tool allows you to attach a number of objects together into a single object. You may join many combinations of arcs, lines, polygons, Bézier and B-splines, and you may join many objects together in a single operation.

### To set the behavior of the tool:

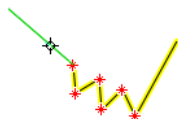
- ☐ Press the Option key and select the Join tool from the WildTools palette. The following dialog will appear:



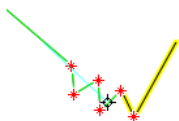
- ☐ Choose the two-click or multi-click method of operation.
- ☐ Choose if you want to select individual objects or the entire path with the mouse.

### To join two objects together:

- ☐ Select the Join tool from the WildTools palette.
- ☐ Press the mouse on the first object and hold the mouse down.

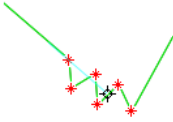


The tool will search through the drawing for all objects that can potentially be joined in a single operation. The tool identifies these for you with yellow hiling.



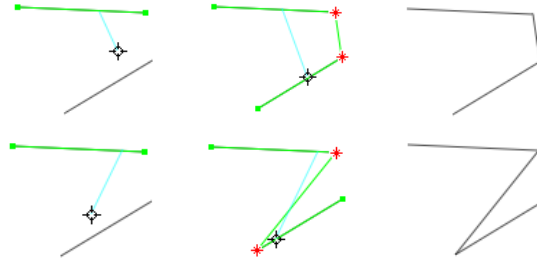
- ☐ Drag to any object with the yellow hiling.

If you have chosen Mouse-Select Individual Objects, the join will be from the first object to this object.



If you have chosen Mouse-Select Entire Path, the join will be for the entire path. Thus it will 'look ahead' and join all possible objects in the hilited chain of objects.

You may press the Shift key to reverse the Individual-Objects/Entire-Path choice.



*Jumping Gaps*

You may also drag to another object that is not hilited to join the objects into a single polygon that connects the open ends of the objects. The nearest ends to the mouse click points are joined.



*Press the Option key for a trim-extend join of two lines*

You may also press the Option key to join two lines that intersect at a point in space, in which case the lines are trimmed or extended as necessary to join them into a polygon.

- ☐ Release the mouse button to complete the operation.

The objects must have exactly matching ends or the Join tool will not operate on them.

If you have selected the multi-click method of operation, you may continue to click on objects in the drawing.

You may join two lines that are directly in line with each other into a single line.

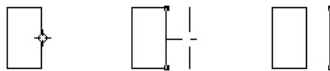
### **Z Heights**

The Join tool handles the Z heights used by TopoTools. The joined object adopts the height of the first object you click on.



## Offset Line Tool

The Offset Line tool allows you to create a line that is a parallel offset from a line or side of a rectangle or polygon, even if in a group. Like the Parallel Offset tool, the Offset Line tool can offset both ways if you press the Option key before you click in the drawing. The tool can offset a guideline as well.



**⚠ Important:** The Offset Line tool is similar to the Parallel Offset tool except that it only places lines or guidelines. The primary reason for this tool is that it allows you to create a floor plan with a rectangle and then offset walls from the sides of the rectangle without first converting the rectangle to lines. ⚠

Because of the similarities between this tool and the Parallel Offset tool, only the differences will be documented here.



The Offset Line tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Offset Line tool from the WildTools palette. The following dialog box will appear:



- ☐ Choose to place a single or double offset. If you choose the double offset, then the second line is placed in the drawing with the fixed offset in the dialog. This provides the ability to draw a room plus the next wall in one operation.
- ☐ Choose two-click or multi-click method of operation.
- ☐ If the Place Guidelines option is selected, the tool will place a guideline in the drawing.
- ☐ If the Copy Attributes option is selected, the offset line will take on the attributes of the original clicked-on object, otherwise it takes on the attributes of the Normal style.
- ☐ If Edit All Layers is on, the tool places the offset line on the

same layer as the object being offset from, however the Place on Current Layer option allows you to override the standard action.

- ☐ For all other settings in the dialog, please see the Parallel Offset tool.

**To use the tool:**

- ☐ Select the Offset Line tool from the WildTools palette.
- ☐ For all other actions, please see the Parallel Offset tool.

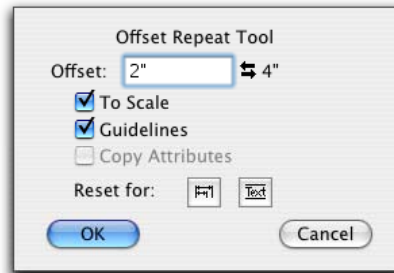


## Offset Repeat Tool

The Offset Repeat tool allows you to create a number of offset lines or guidelines from a line or side of a rectangle or polygon in the drawing. The offset distance is fixed, and the number of offset lines is determined by the distance that you drag with the mouse.

**To set the behavior of the tool:**

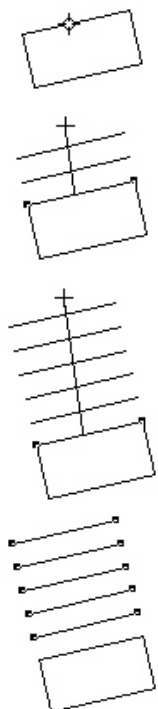
- ☐ Press the Option key and select the Offset Repeat tool from the WildTools palette. The following dialog box will appear:



- ☐ Type the offset—the standard PowerCADD math functions and mixed dimensional units may be used. This offset is known as the ‘active offset’.
- ☐ Like many other tools, this tool has an on-deck offset. You can exchange this value with the active offset by clicking on the left-right arrow icon or on the on-deck text.
- ☐ If the To Scale option is selected, the offset will be to the drawing scale, if not the offset will be an on-paper size.
- ☐ If the Guidelines option is selected, the tool will place guidelines in the drawing instead of lines.
- ☐ If the Copy Attributes option is selected, the offset line will take on the attributes of the original clicked-on object, otherwise it takes on the attributes of the Normal style.
- ☐ The Reset for Stack Dimension turns the To Scale option off, turns the Guidelines option on and sets the offset distance to the stack height default that you set in the Dimensions

Preferences dialog. When you are dimensioning a drawing, the drawing will look best if the dimension lines are spaced evenly apart. You can specify this distance in the PowerCADD Dimensions Preferences dialog, but this spacing is used only by the Stack Dimensioning tool. This tool allows you to pull a series of guidelines from a face of an object in the drawing that will serve as guidelines during the dimensioning process. The Stack Guideline tool offers this same capability, but not in the editable form offered here.

- ❑ The Reset for Text button turns the To Scale option off, turns the Guidelines option off, and sets the offset distance to the height of the text that the Text tool will place. This is useful for placing a grid of horizontal lines for a table of text used for revisions or similar things. Note that if you change the font or font size of the Text tool, you must revisit the Offset Repeat tool dialog and use the Reset for Text button again.



#### To use the Offset Repeat tool:

- ❑ Select the Offset Repeat tool from the WildTools palette.
- ❑ Place the cursor in the drawing area on the line or a side of rectangle or polygon. Press the mouse button.
- ❑ Drag away from this line in the direction that you want the offset lines to go.

At first it will appear that nothing is happening, but you have to drag at least the distance of the specified offset before any lines begin to show. The farther you drag, the more lines will be created.

You may press the Option key to toggle between the length and on-deck lengths.

Release the mouse to complete the operation.

Guidelines may be deleted in the normal way by dragging them out of the window or by using the Delete tool (which is quicker if there are multiple guidelines).

The Offset Repeat tool can also be used to draw lines matching a text object in the drawing. This can be used to locate the bounding box of a text object or to create lines for tables.

#### To draw lines matching a text object:

- ☐ Select the Offset Repeat tool from the WildTools palette.

PowerDraw has all the features  
of the best programs plus a lot  
more, yet is stunningly easy to use.  
Parts of it are so slick a walrus  
would fall down.

- ☐ Place the cursor in the drawing area on the text object. Press the mouse button.

PowerDraw has all the features  
of the best programs plus a lot  
more, yet is stunningly easy to use.  
Parts of it are so slick a walrus  
would fall down.

- ☐ Drag toward the bottom of the text object.

A line will be placed at the top of the text object and then additional lines will be placed at offset from the top depending on the height of the text. The tool looks only at the first character in the text object for the text height, so this operation of the tool will not work properly if you have mixed text sizes in a text object.

PowerDraw has all the features  
of the best programs plus a lot  
more, yet is stunningly easy to use.  
Parts of it are so slick a walrus  
would fall down.

Continue to drag in the direction of the bottom of the text until you have all of the offset lines that you want. Release the mouse button to complete the operation.

PowerDraw has all the features  
of the best programs plus a lot  
more, yet is stunningly easy to use.  
Parts of it are so slick a walrus  
would fall down.

This action with text objects does not change the default offset or other settings for the Offset Repeat tool.



## Blend Line Tool

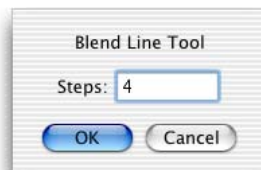
The Blend Line tool allows you to blend two lines or sides of any rectangle or polygon, even if in a group. The lines are always rectified, that is, 'crossing' blends are not permitted.



The Blend Line tool uses the Normal style.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Blend Line tool from the WildTools palette. The following dialog will appear:

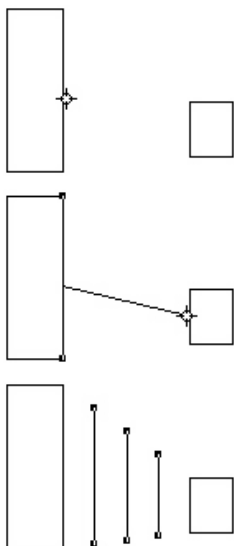


- ☐ Type the number of steps in the blend. There must be at least two steps. You can type any number up to 500.

### To use the tool:

- ☐ Select the Blend Line tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the first object and press the mouse button.
- ☐ Drag to the second object and release the mouse button.

You may click on the side of any rectangle or polygon, and the two sides may be on the same object.





## Bisector Line Tool

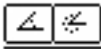
The Bisector Line tool allows you to divide an angle formed by two lines or the sides of any rectangle or polygon, even if in a group.



The Bisector Line tool uses the Normal style.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Bisector Line tool from the WildTools palette. The following dialog will appear:

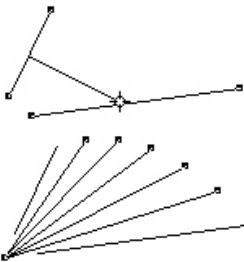


- ☐ Choose between dividing the inside or outside angle. Turn on the inside angle choice if you want to divide the acute angle formed by two lines. Select the outside angle if you want to divide the obtuse angle formed by the two lines.

- ☐ Type the number of divisions to divide the angle.

### To use the tool:

- ☐ Select the Bisector Line tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the first object and press the mouse button.
- ☐ Drag to the second object and release the mouse button.



New lines will be placed in the drawing to divide the angle. The lines begin at the intersection of the two original lines and the lengths of the lines are evenly stepped for a fan effect.

The way this process works is: The intersection point is calculated, then the Bisector Line tool finds the end point of each line which is the farthest away from the intersection point, and these three points are used to calculate the angle. If you remember this, you will always be able to predict which angle will be divided when the two lines cross each other.

The Bisector Line tool is a 'shift-toggling' tool that can be flipped between the inside and outside angle methods with a quick down-and-up tap on the Shift key. This may be done while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.

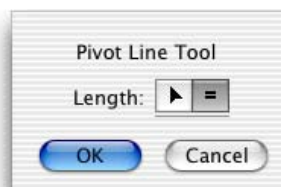


## Pivot Line Tool

The Pivot Line tool allows you to create a line that is a radial offset from a line or side of a rectangle or polygon, even if in a group. It operates in many ways like the Offset Line tool, except that the new line is pivoted about one end of the line that you click on.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Pivot Line tool from the WildTools palette. The following dialog box will appear:



- ☐ Choose interactive or fixed length line. Fixed length means that the new line will be the same length as the line that you click on. Interactive means that the line will extend to your mouse point.

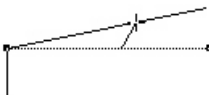
### To use the tool:

- ☐ Select the Pivot Line tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the object to be offset. Press the mouse button.



If you want to offset both ways, press the Option key before you press the mouse button.

- ☐ Drag away from this point in the direction you want the new line to go.



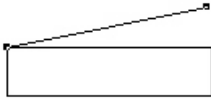
The length and angle of the offset line will be displayed in the Show Location bar and Edit Window.

You may press the Option key to switch between drawing from each end of the line or the center of the line.

- △ You may tab into the Edit Window to set the length and angle of the line. If you do this, the offset operation will be complete.

You may press the Shift key to constrain/unconstrain the line length.

While the mouse button is down, you may switch between interactive and fixed-length modes with a quick down-and-up tap on the Shift key. For a complete description, see ‘Basic Concepts—Shift Toggling’.



Release the mouse button to complete the offset operation.

The line will be placed in the drawing.



## Minimum Distance Line Tool

The Minimum Distance Line tool allows you to find the minimum distance between two objects and draws a line between the closest points.

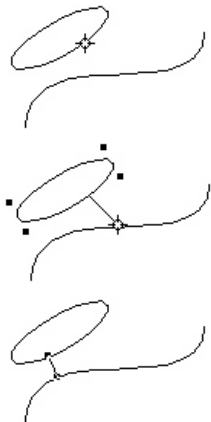


The Minimum Distance Line tool uses the Normal style.

### To use the tool:

- ☐ Select the Minimum Distance Line tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the first object and press the mouse button.
- ☐ Drag to the second object and release the mouse button.

A line will be placed in the drawing between the closest points of the two objects. The tool works with essentially all combinations of objects.





## Trim Tool

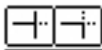
The Trim tool allows you to trim or extend lines and other objects to the objects' intersection with other objects in the drawing. This is the most powerful trim-extend tool of *any* CAD system, and it greatly speeds up the process of drawing. The tool has the capability of trimming multiple objects in a single operation.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Trim tool from the WildTools palette. The following dialog will appear:



- ☐ Choose if the tool should trim one object or both objects.



The Trim tool is a 'shift-toggling' tool that can be flipped between the trimming one object or both objects with a quick down-and-up tap on the Shift key. This may be done while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.

- ☐ Choose if you want to initiate the multi-trim action with Option-Click or Click-Pause-Drag.

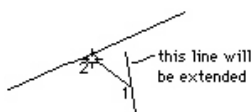
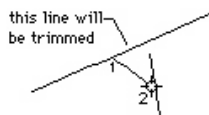
### To use the tool:

- ☐ Select the Trim tool from the WildTools palette.



*Trim One    Trim Both*

The cursor will indicate whether the tool will trim one or both objects.



- ☐ Press the mouse on an object and hold the mouse down.
- ☐ Drag to the second object. The first object will be trimmed or extended as necessary to the intersection with the second, and any trimming will be on the other side of the intersection from the initial mouse-down point. Note that a line can be extended 'out in space' to an intersection that would exist if both lines were extended.

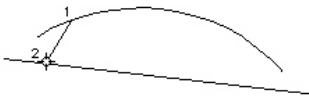
To give you some feedback that an intersection has been found, a visual 'explosion' takes place at the intersection. If the

first object is cut, you will hear a snipping sound. If the object is extended, you will hear an 'extend' sound.

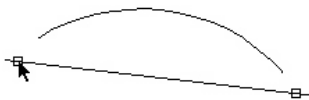
- ❑ Hold down the Option key to reverse the action set in the dialog. In other words, if the tool is set to trim one object, the Option key will cause it to trim both objects. If the tool is set to trim both objects, the Option key will cause it to trim the first object only.

This trimming-or-extending method is available for line-to-line, line-to-polygon, line-rectangle, polygon-to-polygon, polygon-rectangle, arc-to-line, arc-to-arc, Bézier-to-line and many other combinations of objects, including guidelines and dimension objects.

With many combinations of objects, there are more than one possible intersections. The Trim tool selects the intersection that is nearest to the click point on that object.



For example to extend a Bézier to an intersection with a line, press the mouse on the Bézier near the end of the Bézier that you wish to extend and then drag to the line. The Trim tool is always sensitive to the place that you click on each object. The Trim tool will select the intersection that is nearest to the click points.



For situations where this automatic intersection selection doesn't work, as you drag from the first object, press and hold the Command key before you let up the mouse on the second object. This will cause hollow boxes to appear, and you can pick the intersection you want.

As before, the Option key is used to do the reverse of the setting in the dialog. The Option key may be used concurrently with the Command key.

Because the Trim tool is the first tool in any CAD system on any computer that can extend a Bézier curve, some explanation is in order. Although you probably think of a Bézier as a short curve segment, in fact, a Bézier curve that you see is only a part of a larger curve. Like a line segment or arc segment, any segment of the larger Bézier curve will identify the entire curve. Try extending a Bézier curve to see the larger curve, and you will begin to understand the concept of Bézier curves that go on forever.

This will explain to you why you will sometimes see intersections between a line and a Bézier that seem nonsensical until you try one of them.

The Trim tool will trim or extend objects to objects that are inside groups, however the objects within groups will not be modified.

The Trim tool will trim or extend to objects on other layers, even if Edit All Layers is off.

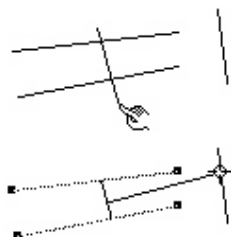
When you drag from a line to one side of a rectangle or polygons, the line will be extended to an intersection with only that one side—even if it is ‘out in space’. If you drag to a vertex of a polygon or to the interior of a filled polygon, the tool will assume that you want to find an intersection with the perimeter of the polygon, and it will not find any intersections ‘out in space’. The method of operation also applies to rectangles, rotated rectangles and rounded rectangles.

The Trim tool will always eliminate from consideration any line-Bézier intersections which occur outside your field of view in the drawing window, thus you can sometimes speed up the operation of this tool by zooming in on a detail.

Intersections with B-splines (smoothed polygons) with lines are handled; however, if you trim or extend a B-spline, it will be converted to a Bézier.

#### To use the tool for trimming multiple objects:

- ☐ Select the Trim tool from the WildTools palette.
- ☐ Per your choice in the tool's dialog, initiate multi-trimming by option-clicking or with the click-pause-drag method.
- ☐ Drag the Finger cursor across the objects to be trimmed. This line determines the ‘mouse click’ location on each object, which is used in the logic about which end of the object is trimmed or extended. If you have selected the wrong lines, you may press the Enter key or click in white space to cancel the operation.
- ☐ Click on the trim-to object.



The objects will be trimmed or extended as appropriate.



## Multi-Trim Tool

The Multi-Trim tool is a variation of the Trim tool described above. The tool does exactly the same thing as the Trim tool, however it is designed to trim or extend multiple objects to a single object.

To operate as it does, the Multi-Trim tool must keep a private copy of the object that is being trimmed to.

### To use the tool:

- ❑ Select the Multi-Trim tool from the WildTools palette.



Whenever you quit PowerCADD, the tool 'forgets' about the 'trim-to' object. Whenever the tool 'doesn't know' about a trim-to object, it displays the Picklefork cursor. When the Picklefork cursor is showing, this means that you are in the mode of adopting a trim-to object.

- ❑ When the Picklefork cursor is showing, click on an object in the drawing. The tool will then adopt this object by making a private copy of the trim-to object.
- ❑ When the tool has a trim-to object, the cursor changes to the Target cursor. Click on lines with the Target cursor to trim them to the trim-to object.

As with the Trim tool, the position of the mouse-clicks is used to determine what part of the object is thrown away, and the original Option-click point on the trim-to object is remembered. At any time you may hold down the Option key to change the trim-to object, which also changes the Option-click point that the tool remembers.

**Note:** A peculiarity of this tool is that it will continue to use its private copy of the trim-to object even after the original object has been deleted, therefore you must insure that it 'knows' about the object that you want to trim to.

### To adopt a new trim-to object:

- ❑ Select the Multi-Trim tool from the WildTools palette, if it is not already selected.
- ❑ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ❑ Click on an object in the drawing.

- ⚠ **Important:** It's important that you understand a major quirk of this tool that is a result of using the same logic as the Trim tool, specifically that the mouse click on each object is used to determine how objects are trimmed. With each use of the tool, there are two mouse-click locations that enter into the decision-making process within the tool as to which intersection is used and which end of an object is trimmed.

Take a line-circle intersection as example. There are normally two intersections between a line and a circle, and the mouse-click on the circle is used to determine which intersection is to be used for trimming. With the Trim tool, this action comes naturally, but with the Multi-Trim tool, in order to predict the behavior of the tool, you have to remember the mouse-click location on the circle. ⚠

#### To trim multiple objects in a single operation:

- ☐ Select the Multi-Trim tool from the WildTools palette, if it is not already selected.



- ☐ Click directly on an object, as before, but do not release the mouse button. Instead, drag a line across the other objects to be trimmed with the finger cursor.

—or—



- ☐ Click in white space, pause momentarily, and then drag a line across the objects to be trimmed with the finger cursor.

In either case, the line that you drag across the objects determines the 'mouse click' location on each object, which is used in the logic about which end of the object is trimmed or extended.



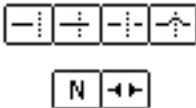
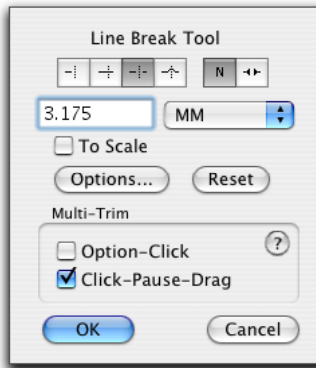
## Line Break Tool

The Line Break tool allows you to put gaps in a line at a fixed distance from a second line or guideline. This sort of break is used for piping, electrical diagrams and to break crossing witness lines.

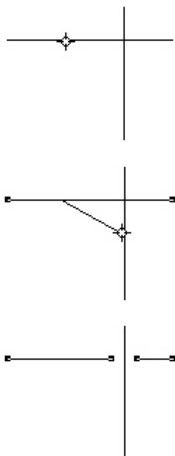
You may trim a single line at a time, or multiple lines in one operation.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Line Break tool from the WildTools palette. The following dialog will appear:



- ☐ Choose whether you want to undershoot, overshoot, break the line on both sides or use a jumper arc.
- ☐ Select the line ends. Triangular ends are used for structural moment connections in structural steel drawings.
- ☐ Type the gap size.
- ☐ If the To Scale option is selected, the gap will be to the drawing scale, if not the gap will be an on-paper size.
- ☐ Click the Options button to set the on-paper size of the triangular line ends.
- ☐ The Reset button sets the gap to be an on-paper size and the same as the witness gap set in the PowerCADD Dimensions Preferences dialog. When triangular ends are selected, the Reset button sets the gap to be the same as the size of the triangle, as specified in the Line Break Options dialog.
- ☐ Choose if you want to initiate the Multi-trim action with option-click or click-pause-drag.

**To use the tool:**

- ☐ Select the Line Break tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the first line and press the mouse button.
- ☐ Drag to the second line and release the mouse button.

The first line will be cut. If you are using the jumper arc option, you may press the Option key before releasing the mouse button to reverse the direction of the arc.

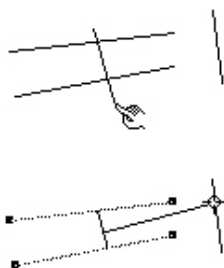
This tool will now trim lines to circles, ellipses and arcs. Like the Trim tool, when there are more than one intersections, the closest one to the mouse is used.

If you are compulsive about showing line breaks where dimension lines cross other lines, the Line Break tool will place a white circle for you.

**To place a white circle:**

- ☐ Select the Line Break tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the a dimension line and press the mouse button.
- ☐ Drag to a second line or object and release the mouse button.

A white circle will be placed on top of the dimension line or the other object, depending on which is first in the drawing database. If the objects are on two different layers, it is just a matter of luck if the circle is placed so that it will cover up only one of the crossing objects. The size of the circle is determined by the witness line gap setting of the PowerCADD Dimensions Preferences dialog.

**To use the tool for multi-line trimming:**

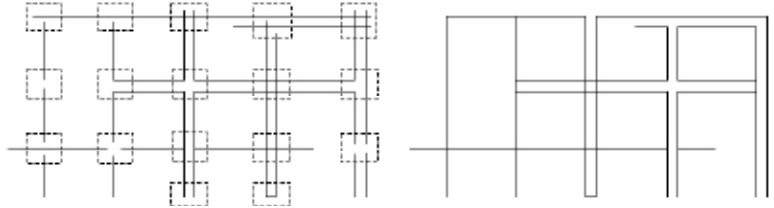
- ☐ Select the Line Break tool from the WildTools palette.
- ☐ Per your choice in the tool's dialog, initiate multi-trimming by option-clicking or with the click-pause-drag method.
- ☐ Drag the Finger cursor across the lines to be trimmed. This line determines the 'mouse click' location on each line, which is used in the logic about which end of the line is trimmed or extended. If you have selected the wrong lines, you may press the Enter key or click in white space to cancel the operation.
- ☐ Click on the trim-to line.

The lines will be trimmed.



## Wall Trim Tool

The Wall Trim tool allows you to clean up an architectural drawing by trimming or healing lines that represent walls by drawing a rectangle around the area to be trimmed or healed. The principal actions of the tool are illustrated below, where the dashed rectangles indicate the rectangles that you draw.



The tool handles lines only, and the lines may be on different layers. To be considered for trimming, extending or joining, the lines must cross the rectangle.

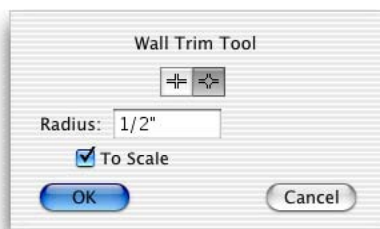
In general, the philosophy of the tool is that it only operates on lines which have one end, and one end only, within the selection rectangle, but there are exceptions to this rule. Also the intersection point must also be within the rectangle. This means that the tool will not extend two nearly-parallel lines to some point out in space.

The tool can be used to trim corners, add or remove end caps, heal openings in lines and walls, cut out lines at intersections of walls, or heal these intersections if they are already trimmed. In the case of wall intersections and end caps, if you use the tool repeatedly on an area, the result will toggle between a trimmed condition and a healed condition.

The tool can also be used to place arcs tangent to the lines at the corners to create a rounded corner between the lines.

**To set the behavior of the tool:**

- ❑ Press the Option key and select the Wall Trim tool from the WildTools palette. The following dialog will appear:



- ❑ Choose if you want sharp corners or a fillet radius on the corners.
- ❑ Type the radius—the standard PowerCADD math functions and mixed dimensional units may be used.
- ❑ If the To Scale option is selected, the radius will be to the drawing scale, if not the radius will be an on-paper size.

**To use the Wall Trim tool:**

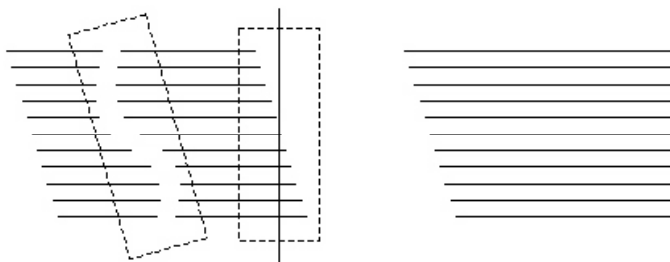
- ❑ Select the Wall Trim tool from the WildTools palette.
- ❑ Draw a rectangle around the area to be trimmed.

—or—

- ❑ Press the Option key and draw a rotated rectangle around the area to be trimmed.

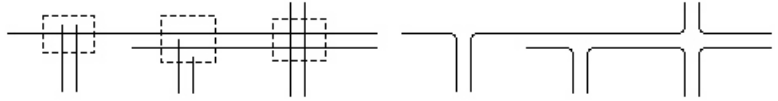
The lines will be trimmed, extended or joined as appropriate.

As shown below, the Wall Trim tool can be used to heal multiple lines, or to trim multiple lines to a single line.



To heal multiple lines, all of the lines must have one end within the selection rectangle, and none of the lines may cross the selection rectangle. To trim multiple lines, only one line may cross the selection rectangle, while all others must have one end within the

selection rectangle.



The Wall Trim tool can fillet the corners of the trimming situations shown above. This is useful for cleaning up intersections of streets after tracing a city map. Set the radius in the tool's dialog.



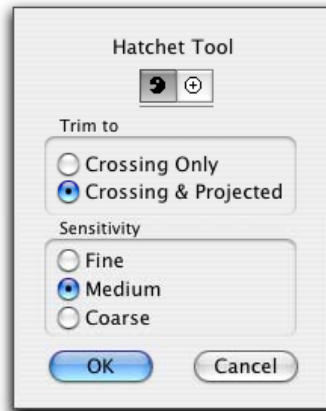
## Hatchet Tool

This is a one-click trim/extend tool. You click on the object to be trimmed, and the tool finds the nearest object in the drawing to trim your object to. The trim-to object must be within your view.

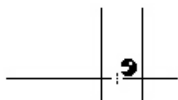
Think of this tool as a hatchet/hammer combination. You chop on a portion of a line with the hatchet to trim it out, and you hit a line with the hammer to extend it out into space where it will hit another object.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Hatchet tool from the WildTools palette. The following dialog will appear:



- ☐ Choose if the tool is to shorten ('nibble') or extend (plus sign) lines.
- ☐ Choose if the tool is to trim to crossing objects only, or crossing and projected.
- ☐ Select the sensitivity of the tool. This controls the minimum length of the lines that the tool will 'see' in the drawing.



### To use the tool:

- ❑ Select the Hatchet tool from the WildTools palette. The cursor will clearly show which mode (nibble or extend) that the tool is set to operate in.

Before you click, you can hold down the Option key to reverse the tool's current mode.

- ❑ To trim, click on the portion of the line that you want to delete with the Nibble cursor. To extend, click on the end of the line that you want to extend with the 'plus' cursor.

If you click on a line that is between two lines, the line will be trimmed to both lines. This is useful for trimming lines which cross a wall.

The Hatchet tool is a 'shift-toggling' tool that can be flipped between shorten and extend modes with a quick down-and-up tap on the Shift key while the tool is active and the mouse is up. For a description, see 'Basic Concepts—Shift-Toggling'.



## Fillet Tool

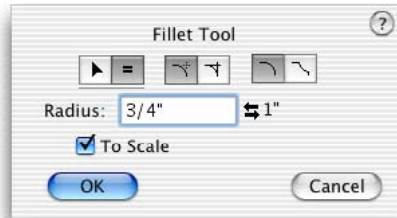
The Fillet tool allows you to place an arc tangent to two objects to create a rounded corner between the objects.

- ⚠ **Important:** The Fillet tool is the most powerful and flexible fillet tool yet seen on any computer. It can fillet any two types of objects, interactively or to a fixed-dimension. In the interactive operation, you may use the Edit Window to set the fillet radius on the fly. ⚠

The Fillet tool will operate on any visible object that you click on, whether in a group or another layer, even if Edit All Layers is turned off, however it will not trim any object that it shouldn't.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Fillet tool from the WildTools palette. The following dialog will appear:



- ☐ Choose whether the fillet will be interactive (arrow) or to a fixed dimension (equal sign).
- ☐ Choose if you want trimming at the fillet. This only applies to lines.
- ☐ Choose whether you want an inside or outside fillet. This determines which way the arc will be placed.
- ☐ Type the radius—the standard PowerCADD math functions and mixed dimensional units may be used. This radius is known as the 'active radius'.
- ☐ Like many other tools, the Fillet tool has an on-deck setting for the radius. You can exchange this value with the active radius by clicking on the left-right arrow icon or on the on-deck text.
- ☐ If the To Scale option is selected, the fillet will be to the drawing scale, if not the radius will be an on-paper size.



### To use the Fillet tool interactively:

- ☐ Set the behavior of the tool as described above.
- ☐ Select the Fillet tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the first object and press the mouse button.



- Drag to the second object and release the mouse button. There are four possible locations of the fillet arc at the intersection of the two objects. The location of the fillet is determined by where you click on the objects.



- Move the cursor to establish the radius of the fillet arc.



- △ As you move the cursor, the fillet radius will be displayed in the Show Location bar and Edit Window. You may tab into the Edit window to set the radius for this specific operation (i.e., it does not change the value in the dialog box.) If you do this, the filleting operation will be complete. However if you type a radius that is too large for the current situation, the fillet arc will not be placed.

Click the mouse button to complete the operation.

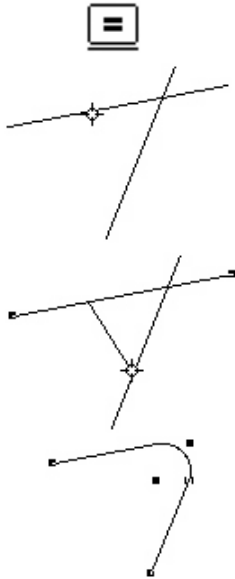


The fillet arc will be placed in the drawing.

When you move the cursor to establish the fillet radius, the relationship between the mouse location and the arc is sensible in the case of line-line, line-circle and circle-circle fillets.

In all other cases (say for polygon-Bézier, B-spline-ellipse, arc-rectangle, etc.), this relationship is awkward, and it may help to know what is really happening. In these cases, the Fillet tool makes a copy of the objects, converts them to polygons, parallel-offsets the polygons, and then looks for intersections between the offset polygons to determine the center of the fillet radius arc. Thus the fillet radius is determined by the distance of the cursor from the second object. In cases where more than one fillet is possible, the nearest one to the mouse location is chosen.

In all cases where two objects cross each other, there are four potential fillet arcs, however the Fillet tool will only fillet the quadrant specified by the two mouse click locations. If the mouse location is outside the chosen quadrant, or otherwise in a senseless location, the radius shown in the Edit Window and Show Location bar will be '####' and a fillet arc will not be placed.



#### To use the Fillet tool for a fixed-radius fillet:

- ☐ Set the behavior of the tool as described above.
- ☐ Select the Fillet tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the first object and press the mouse button.
- ☐ Drag to the second object and release the mouse button. There are four possible locations of the fillet arc at the intersection of the two objects. The location of the fillet is determined by where you click on the objects.

The fillet arc will be placed in the drawing.

The Fillet tool is a 'shift-toggling' tool that can be flipped from interactive to fixed-dimension with a quick down-and-up tap on the Shift key. This may be done while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.

#### *Adopting a Fillet Radius*

You will often come across the situation where you want to fillet two objects to the same radius of an arc or circle in the drawing. The Fillet tool offers a quick way to do this.



#### To adopt a fillet radius:

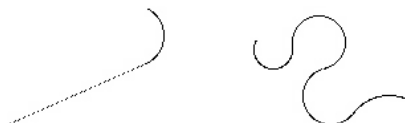
- ☐ Select the Fillet tool.
- ☐ Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- ☐ Click on a circle or circular arc in the drawing.

The radius of the object will be adopted at the active radius of the Fillet tool.



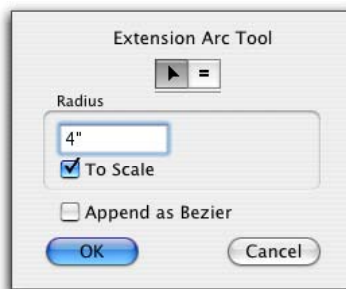
## Extension Arc Tool

The Extension Arc tool allows you to place arcs at the end of a line, polygon, arc, B-spline or Bézier, or parallel objects of the same base type. These arcs are tangent to the end of the object and may be placed in the drawing as a separate object or appended as a Bézier. While the tool may be used for all sorts of colorful serpentine shapes, the original purpose of the tool was to recreate a survey where an arc of a given radius and arc angle is tangent to a line and the center of the arc is not given.



### To set the behavior of the tool:

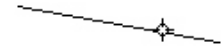
- ☐ Press the Option key and select the Extension Arc tool from the WildTools palette. The following dialog will appear:



- ☐ Choose whether the radius will be interactive (arrow) or to a fixed dimension (equal sign).
- ☐ Type the radius, the standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ If the To Scale option is selected, the radius will be to the drawing scale, if not the radius will be an on-paper size.
- ☐ Append as Bézier allows you to add a circular arc to the end of a line, arc, B-spline, polygon or Bézier with the resulting object being a single Bézier. Non-Bézier objects will be converted to a Bézier.

### To use the Extension Arc tool:

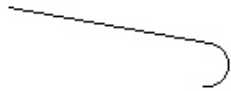
- ☐ Select the Extension Arc tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the object, nearest the end of the object that you want to add the arc to, and press the mouse button. You may click on a line or an arc. If you click on a polygon, B-spline or Bézier, it must be an open object.



- ☐ Drag away from the object to set the direction of the arc.

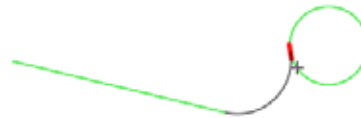
You may press the Shift key to constrain or unconstrain the arc to the radius set in the dialog.

- ☐ You may tab into the Edit Window to edit the arc.



- ☐ Release the mouse button to complete the operation.

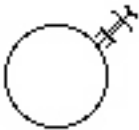
The arc will be placed in the drawing, and the attributes of the arc are adopted from the object that you click on. If you have selected Append as Bézier, non-Bézier objects will be converted to a Bézier, and you will hear the distinctive 'convert sound' used in WildTools.



*Tangent Snap*

You have the ability to ask for a tangent snap.

You may click on objects within groups. In this case, the tool will find the objects and place an arc in the drawing, but it will not append as Bézier to such objects.



### Adopting a Radius

The Extension arc tool provides a quick way to adopt the radius of an arc or circle in the drawing.

#### To adopt a radius:

- ☐ Select the Extension Arc tool.
- ☐ Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- ☐ Click on a circle or circular arc in the drawing.

The radius of the object will be adopted at the active radius of the Extension Arc tool.



## Joggle Tool

The Joggle Tool allows you to place two arcs at the end of a line, polygon, arc, B-spline or Bézier, or parallel objects of the same base type. These arcs are tangent to the end of the object and may be placed in the drawing as separate objects or appended as a Bézier. This type of 'double fillet' is a common problem when drawing mechanical parts or gutters in architectural drawings.



### To set the behavior of the tool:

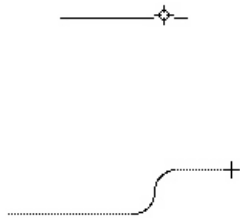
- ☐ Press the Option key and select the Joggle tool from the WildTools palette. The following dialog will appear:



- ☐ Choose whether the radius will be interactive (arrow) or to a fixed dimension (equal sign).
- ☐ Type the two radii. The standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ Delta R is the difference between the two radii. For the inside/outside joggle in sheet metal, this would be the thickness of the material. Type the Delta R, and it will be added to the smaller of the two radii. It will automatically calculate the larger radius.



- ☐ If the To Scale option is selected, the radii will be to the drawing scale, if not they will be an on-paper size.
- ☐ Append as Bézier allows you to add the arcs to the end of a line, arc, B-spline, polygon or Bézier with the resulting object being a single Bézier. Non-Bézier objects will be converted to a Bézier.



### To use the Joggle tool:

- ☐ Select the Joggle tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the object, nearest the end of the object that you want to add the arcs to, and press the mouse button. You may click on a line or an arc. If you click on a polygon, B-spline or Bézier, it must be an open object.
- ☐ Drag away from the object to set the direction of the arcs. The arcs are limited to 90-degree arcs at a maximum. Said another way, the maximum offset is the sum of the two radii.

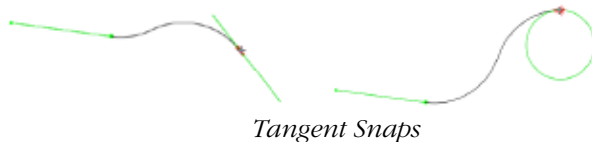
You may press the Option key to reverse the radii of the two arcs. This is helpful if you have an inside/outside junction with sheet metal.

△ You may tab into the Edit Window to edit the offset.



- ☐ Release the mouse button to complete the operation.

The arcs will be placed in the drawing, and the attributes of the arcs are adopted from the object that you click on. If you have selected Append as Bézier, non-Bézier objects will be converted to a Bézier, and you will hear the distinctive 'convert sound' used in WildTools.



If you choose the interactive mode, then the fixed sizes are ignored, and you have the ability to ask for a tangent snap.

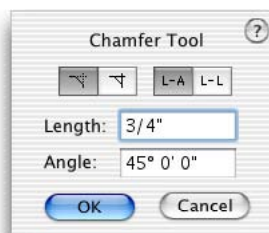


## Chamfer Tool

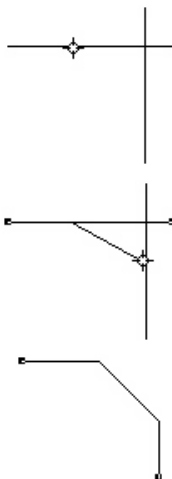
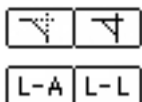
The Chamfer tool allows you to place a line as a beveled corner at the intersection of two lines or on adjacent sides of a polygon or rectangle.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Chamfer tool from the WildTools palette. The following dialog will appear:



- ☐ Type the length of the chamfer—the standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ Type the angle of the chamfer. This angle is relative to the first object that you click on.
- ☐ Choose if you want trimming at the chamfer. This only applies to lines.
- ☐ Choose whether you want to specify the chamfer by length and angle or by two lengths.



### To use the tool:

- ☐ Select the Chamfer tool from the WildTools palette.
- ☐ Place the cursor in the drawing area on the first object and press the mouse button.
- ☐ Drag to the second object and release the mouse button. There are four possible locations of the chamfer at the intersection of the two objects. The location of the chamfer is determined by where you click on the objects.

The chamfer line will be placed in the drawing.



## Needle Tool

The Needle tool allows you to copy the attributes (pen size, pattern and color, fill pattern and color, etc.) of one object and assign them to other objects with a single click. It is an extremely quick way of changing the attributes of a few objects to match another. The Needle tool also has finger technology available to apply the attributes to multiple objects.

### To use the Needle tool:

- ☐ Select the Needle tool from the WildTools palette.
- ☐ The Needle tool remembers its settings between open/quit sessions, thus it is ready to assign attributes immediately.
- ☐ To change any object in the drawing to the attributes of this tool, simply click on the object with the Needle cursor. If you get an undesired effect, you may always choose Undo from the Edit menu.



You may also use click-pause-drag to use finger technology to apply attributes to multiple objects.

### To assign attributes to this tool:

- ☐ Select the Needle tool from the WildTools palette.
- ☐ Press and hold down the Option key.
- ☐ The cursor will change to the Eyedropper cursor.
- ☐ Click on an object in the drawing. The Needle tool will 'adopt' the attributes of the option-clicked object.

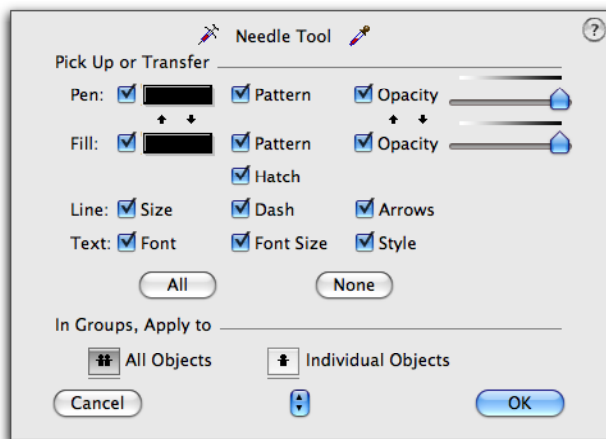


—or—

- ☐ You may also assign attributes to the tool with the Attributes menu or Defaults window as you would with any other PowerCADD tool.

### To set the options for the Needle tool:

- ☐ Press the Option key and select the Needle tool from the WildTools palette. The following dialog will appear:



- ☐ The operation of the Needle tool is controlled by the checkboxes in this dialog. If all of the Pen, Line and Fill choices are selected, then all of these attributes are picked up or transferred by the Needle tool. If you want to change only the line size, for example, turn all other options off and leave Line Size selected. With such a setting, the other attributes (pen color, pen pattern, fill color, fill pattern, etc.) are not affected.
- ☐ You may choose to pick up and put down text font, font size and font styles for text objects, dimension line and dimension arcs.
- ☐ You may edit the pen or fill color with the Color Picker.
- ☐ Groups and external objects can be handled two ways. If the 'In Groups, Apply to All Objects' option is selected, then all objects within the group will be changed. If the 'Individual Objects' option is selected, then only the object clicked on within that group or External object will be changed. This is a very powerful tool, and it allows you to change the appearance of individual objects within groups and External objects without ungrouping the group or destroying the external object.
- ☐ You may store commonly used setups. These include the attributes: color, pen size, hatching, etc.



The Needle tool can set individual objects in Parallel Objects.

The Needle tool is a 'shift-toggling' tool that can be flipped from setting all objects to individual objects in groups with a quick down-and-up tap on the Shift key. This may be done while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.

## Magic Needle Cursor

The Needle Tool has a Magic Needle cursor action to change the attributes of all objects in the drawing that match the object that you click on.

### To use the Magic Needle Cursor:



- ☐ Select the Needle tool from the WildTools palette.
- ☐ Press and hold down the Shift keys. The cursor will change to a Magic Needle cursor.
- ☐ Click on an object in the drawing.

The tool will then change all matching objects in the drawing.

The purpose of this is to allow you to change the pen size, color, or other attributes for all objects that are an exact match with the object that you click on. Let's say you want to change all objects with a pen color of green and a pen size of two points to a one-millimeter pen size. Set the Needle tool to a one-millimeter pen size and for the tool to change only the pen size, then hold down the Shift key and click on a green, two-point line and all green, two-point objects in the drawing will be changed in one setting.

The Needle tool has the ability to pick up and put down text font, font size and font styles for text objects, dimension line and dimension arcs. In the case of the Magic Needle cursor action, these objects will only be changed if there is an exact match with the original object that you click on, that is, not only must the attributes match, but you must click on a text object to change all text objects, etc. Additionally, in the case of a text object, the Needle tool will only change text objects with the same font, font size and font style as the original object that you click on.



## Find Layer Tool

This is a 'find layer' tool that allows you to click directly on an object in the drawing, and if the object is on another layer, the drawing will be switched to that layer.

### To use the Find Layer tool:

- ☐ Select the Find Layer tool from the WildTools palette.
- ☐ Click on an object in the drawing.

If the object is on another layer, the drawing will be switched to that layer.

The tool shows a 'Layer Tip' that shows the layer name as you move the mouse over an object.

If the object is on the current layer, then a soft 'everything's okay' sound will be heard.



## Magician Tool

Magicians touch things with their magic wand and make them disappear. That's what this tool does. You click on an object in the drawing, and it hides the layer that the object is on.

### To use the Magician tool:

- ☐ Select the Magician tool from the WildTools palette.
- ☐ Click on an object in the drawing.

The Layer will become a hidden layer.

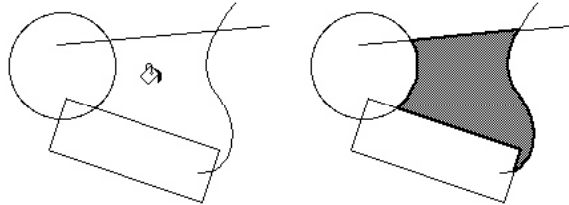
You may press the Option key to grey the layer. And you may Option-click on a greyed layer to make it a normal, visible (non-gray) layer.

The tool shows a 'Layer Tip' that shows the layer name as you move the mouse over an object.



## Flood Tool

The Flood tool allows you to click in white space—say in the cavity of a wall—and the tool will find all bounding lines and place a polygon in the drawing. It's a quick way to trace around the bounds of an enclosed space. In many ways, it works like the Paint Bucket tool in Photoshop. It does not matter if the enclosed space is created by individual lines, polygons, arcs, Béziers, or whatever. The tool will find the borders and create a new object, which will be placed in the drawing.



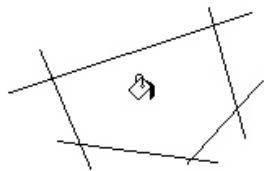
The Flood tool is a 'no-style' tool, i.e., it has its own attributes and is not tied to any of the Style tools.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Flood tool from the WildTools palette. The following dialog will appear:

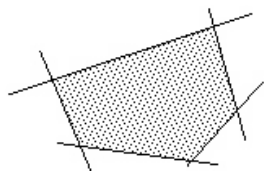


- ☐ Choose if you want to be able to flood offscreen. Normally, the flooding is limited to what you can see in the window view, but sometimes you may want to fill a narrow wall and can't get the flood started unless you zoom in. Use this with care, but you won't be able to see if and when the Flood tool gets lost, as it sometimes does.



### To use the Flood tool:

- ☐ Select the Flood tool from the WildTools palette.
- ☐ Click in white space with the Paint Bucket cursor. The Flood Tool uses a timed fallout method, thus you must click and hold the mouse button down momentarily. If you click quickly, it will fall out.



If you click in a closed space, the Flood tool will attempt to trace the perimeter. If the trace is successful, then you will hear a 'drop' sound and a polygon will be placed in the drawing. If the fill pattern of the tool is black, then it will appear that you have 'filled' the space.

If you click inside a single closed object, then it will just change the attributes of that object and a new object will not be created in the drawing. Undo does not work in this situation.

If you click directly on a closed object, it will behave like the Needle tool and assign attributes to the object directly.

If you click in a non-enclosed space, the Flood tool will not find anything and will fall out.

### How It Works

If you click in a closed space, the tool first looks north and south. If it sees a crossing line above and below (which must be within the user's view) then it will attempt a trace. It turns right and traces around. If it fails for some reason, the polygon is erased, and then it tries again looking 90 degrees to the right. If the trace is successful and comes back to the starting point, then you will hear a 'drop' sound and a polygon will be placed in the drawing. The tool will attempt to trace in four directions before giving up.

The tool does not attempt to trace objects that are invisible, thus lines with a pen pattern of white or none are ignored.

If Edit All Layers is on, then objects on all visible layers are traced. If Edit All Layers is off, then only objects on the current layer are checked. This gives you a method of selecting which objects are traced.

Normally, the Flood tool does not attempt to trace lines that are out of the user's view. If that happens, it gives up immediately and does not look in any other direction. However, in the tool's dialog, you may turn this off so that the tool will attempt to trace offscreen lines.

The Flood tool will handle a situation where one side of the enclosed space is made up by a number of parallel lines, provided the pixels of the lines overlap.

The tool has its own attributes so that you can assign the Flood tool its own line weight, pen pattern, pen color, fill color and pattern. Like the Needle tool, you can also adopt attributes of objects in the drawing.

**To assign attributes to the Flood tool:**

- ☐ Select the Flood tool from the WildTools palette.
- ☐ Press and hold down the Option key. The cursor will change to the Eyedropper cursor.
- ☐ Click on an object in the drawing. The Flood tool will 'adopt' the attributes of the option-clicked object.

—or—

- ☐ You may also assign attributes to the tool with the Attributes menu or Defaults window as you would with any other PowerCADD tool.



## **Squiggle Tool**

The Squiggle tool allows to squiggle objects by clicking directly on them. This is the same as a Squiggle menu command, except that you can choose to operate on objects inside groups with the choice in the tool's dialog.



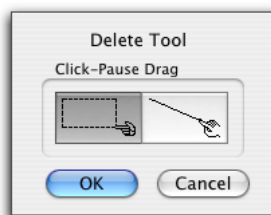
## Delete Tool

The Delete tool allows you to delete an object with a single click, multiple objects within a rectangle or polygon, or multiple objects with finger technology. It can also delete a guideline, multiple guidelines with finger technology, or all guidelines in a single operation.

The purpose of this tool is to eliminate steps in the process of deleting an object. This is particularly important when you want to delete multiple objects.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Delete tool from the WildTools palette. The following dialog will appear:



- ☐ Choose if you want to delete objects inside a rectangle or with finger technology with a click-pause-drag action.

There are three ways to use the Delete tool, clicking directly on a single object, click-pause-drag to select multiple objects with a rectangle or finger technology, or Option-click-pause-drag to select multiple objects with a polygon.

### To delete an object:

- ☐ Select the Delete tool from the WildTools palette.
- ☐ Click on an object in the drawing.

When an object is deleted, the computer plays a distinctive sound to confirm the action.

To delete all guidelines, press the Option or Command key before clicking on a guideline. If you delete two or more guidelines, you will hear the 'delete sound' once for each guideline deleted.

### To delete multiple objects:

- ☐ Select the Delete tool from the WildTools palette.
- ☐ Click in white space, pause briefly before moving the mouse.
- ☐ Drag the mouse and draw a rectangle around multiple objects.

If you have selected finger technology with click-pause-drag, then you drag the mouse across the objects you want to delete—including guidelines.

—or—

- ☐ Press and hold down the Option key.
- ☐ Click in white space, pause briefly before moving the mouse.
- ☐ Drag the mouse and draw a polygon around multiple objects.

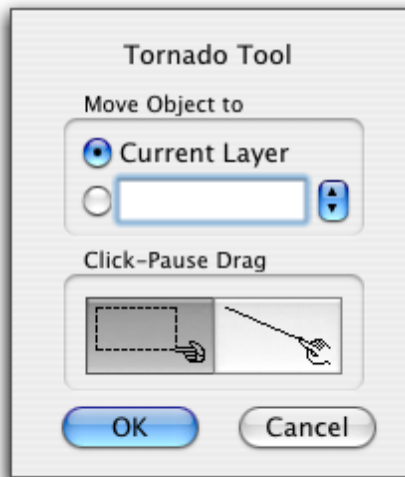


## Tornado Tool

The Tornado tool provides a method of moving an object to the current layer or a target layer with a single click, or multiple objects within a rectangle or polygon. You know how tornadoes work, they pick things up and put them down somewhere else!

### To set the behavior of the tool:

- ☐ Press the Option key and select the Tornado tool from the WildTools palette. The following dialog will appear:



- ☐ Choose if you want to move objects to the current layer or to a specified layer.
- ☐ Choose if you want to to move objects inside a rectangle or with finger technology with a click-pause-drag action.

There are three ways to use the Tornado tool, clicking directly on a single object, click-pause-drag to select multiple objects with a rectangle, or Option-click-pause-drag to select multiple objects with a polygon.

**To use the Tornado tool:**

- ☐ Select the Tornado tool from the WildTools palette.
- ☐ Click on an object in the drawing.

—or—

- ☐ Click in white space, pause briefly before moving the mouse.
- ☐ Drag the mouse and draw a rectangle around multiple objects.

—or—

- ☐ Press and hold down the Option key.
- ☐ Click in white space, pause briefly before moving the mouse.
- ☐ Drag the mouse and draw a polygon around multiple objects.

If the object is on another layer, the object will be moved to the current layer or the specified layer. If the object is already on the current or specified layer, the tool will make a soft beep and do nothing to the object.

As you use the tool, you have a ‘tool tip’ at the cursor that tells you the name of the layer to which the object will be moved.

The Tornado tool has click-pause-drag for finger technology.

**Reverse Tool**

The Reverse tool allows you to reverse the direction of lines, arcs, polygons, Béziers, B-splines (smoothed polygons), splines and paths.

**To reverse an object:**

- ☐ Select the Reverse tool from the WildTools palette.
- ☐ Click on an object in the drawing.

When a direction is important, it is often helpful to assign an arrow at the end of the object when using both the Join and Reverse tools. This allows you to see the direction of the object at a glance.



## Divide Tool

The Divide tool allows you to divide a line, rectangle, ellipse, circle or arc into a number of even divisions.

### To set the number of divisions:

- ☐ Press the Option key and select the Divide tool from the WildTools palette. The following dialog will appear:



- ☐ Type the number of divisions.

### To divide an object:

- ☐ Select the Divide tool from the WildTools palette.
- ☐ Click on a line, rectangle, ellipse, circle or arc in the drawing.

The object will be divided into the specified number of pieces.

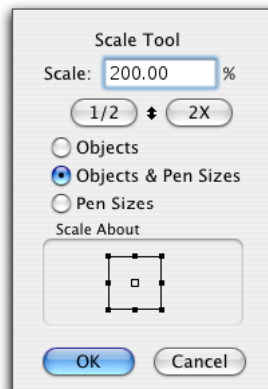


## Scale Tool

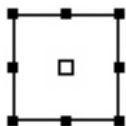
The Scale tool allows you to scale an object up or down with a single click. The purpose of the tool is to allow you to scale a number of objects up or down about the object's center, bottom, top, etc. You may also scale the pen size of the objects.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Scale tool from the WildTools palette. The following dialog will appear:



- ☐ Type the scaling percent.



- ☐ Click on the 1/2 or 2X buttons to set the scale to 50% or 200%. Click on the up-down arrow to toggle between the current setting and its reciprocal, for example between 25% and 400%, or between 20% and 500%.
- ☐ Select if you want to scale objects, objects and pen sizes or pen sizes only.
- ☐ Set the 'scale about point' to be used. This allows you to control whether the object is scaled about the object's center, top left, top center, top right, etc.

There are two cursors used by the Scale tool:



*Scale Up and Scale Down cursors*

These cursors indicate the scaling action of the current operation.

#### **To use the Scale tool:**

- ☐ Select the Scale tool from the WildTools palette. One of two cursors will show depending on whether the scale percent is above or below 100%.

Before you click, you can hold down the Option key to reverse the tool's current scaling mode.

- ☐ Click on an object in the drawing.

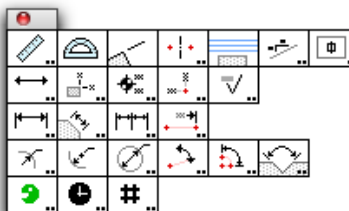
The object will be scaled up or down as you have selected.

Press the Option key and click on an object to reverse the scaling operation and to use the reciprocal scale. When you press the Option key, the cursor will change to show the change in action.

Text objects will be scaled or not depending on the setting in the PowerCADD Scale dialog.



# Dimension Tools Palette



The Dimension Tools palette contains powerful, flexible, and easy-to-use dimensioning tools.

These Dimension tools ‘share’ the same dimension text attributes (Font, font size, etc) as the PowerCADD dimension line tools. Thus, to set the dimension text attributes, select any of the WildTools dimensioning tools and use the Attributes menu or Defaults Window to set the text attributes of the tool.

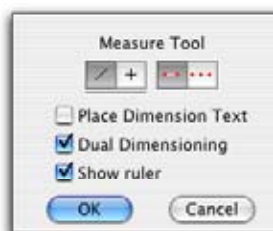


## Measure Tool

The Measure tool allows you to measure the distance and angle between two points. Also, the tool provides the ability to place text in the drawing for survey dimensions.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Measure tool from the Dimension Tools palette. The following dialog will appear:



- ☐ Choose whether the tool will be constrained or unconstrained to snap angles.
- ☐ Choose two-click or multi-click method of operation.
- ☐ Choose Place Dimension Text if you want to place text objects in the drawing for survey dimensions.
- ☐ Choose Dual Dimensioning if you want to see the lengths in both English and metric units. The second length is shown in English units if the current drawing setup is for metric units, and vice versa. The tolerances and units for the second length

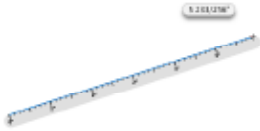
are the same as those set in the Dimensions Lines Dialog. The second length dimension is always displayed with the dimensional units.

- ☐ Choose Show Ruler if you want an on-screen ruler as you use the tool.

To measure between two points, you draw a line with the mouse.

#### To measure between two points:

- ☐ Select the Measure tool from the Dimension Tools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the starting point of the measuring line. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, a temporary line or ruler will follow the mouse.

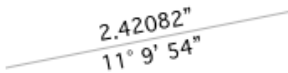


The length and angle of the line will be displayed in the Show Location bar and Edit Window. The length will be displayed near the mouse.

You may press the Option key to get high-precision measurements when drawing with the line drawing method.

- △ You may tab into the Edit Window to edit the dimension. If you do this, the Measure tool will place a reference point in the drawing at the length and angle of the Edit Window values (even if you don't edit these) from the starting point. In manual drafting terms, this allows you to measure from one point to another and 'make a tick mark' in the drawing. The reference points will not print.

Release the mouse button to end the measuring line.

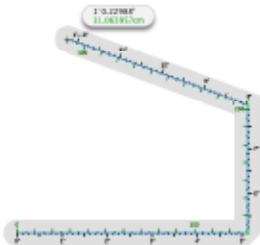


If Place Dimension Text is selected, survey dimensions will be placed in the drawing.

#### To measure between multiple points:

- ☐ Set the Measure tool to the multi-click method of operation.
- ☐ Draw a polygon.

The tool will show the overall cumulative length.





## Protractor Tool

The Protractor tool allows you to measure angles in the drawing. It also provides the ability to find an elliptical angle of a point relative to an ellipse, rotated ellipse or arc.

To measure an angle, you draw an arc with the mouse.

### To use the Protractor tool to measure an angle:



- ☐ Select the Protractor tool from the Dimensions Tools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the apex of the arc angle. Press the mouse button.
- ☐ Drag away from the starting point. As you move the mouse, a temporary line will follow the mouse.
- ☐ Release the mouse to complete the initial line from which the angle will be measured.
- ☐ Move the mouse to another location in the drawing. As you do this, the angle will be displayed in the Edit Window and near the mouse.

△ You may tab into the Edit Window to edit the angle. If you do this, the Protractor tool will place a reference point in the drawing at the angle (even if you don't edit the angle).

- ☐ Release the mouse button to end the angle-measuring operation.

### To use the Protractor tool to measure an angle relative to an ellipse in the drawing:



- ☐ Select the Protractor tool from the Dimensions Tools palette.
- ☐ Press and hold down the Option key.
- ☐ Place the cursor in the drawing area over an ellipse, rotated ellipse or arc. Press the mouse button.
- ☐ Drag in the direction that you want to measure. The elliptical angle relative to that ellipse will be displayed in the Edit Window and near the mouse.

△ You may tab into the Edit Window to edit the angle. If you do this, the Protractor tool will place a reference point in the drawing at the angle (even if you don't edit the angle).

- ☐ Release the mouse button to end the angle-measuring operation.



## Extension Line Tool

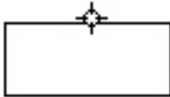
This tool allows you to draw extension or witness lines from any line or flat side of an object in the drawing.



The Extension Line tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To draw a witness line from a line or flat side of an object:

- ☐ Select the Extension Line tool from the Dimension Tool palette.
- ☐ Place the cursor in the drawing area over a line or flat side of a rectangle or polygon. Press the mouse button.



Perpendicular snaps are available on request prior to clicking the mouse.



- ☐ Drag in the direction that you want the witness line to go. As you 'pull' the line out, you will notice that there is a witness gap between the object and the witness line. Press the Shift key to eliminate the witness gap.



Release the mouse button to end the line.

The witness line will be placed in the drawing.

### To draw an extension line from a dimension line:

- ☐ Select the Extension Line tool from the Dimension Tools palette.
- ☐ Place the cursor in the drawing area over a dimension line. (In this case, you've already dragged the dimension text to one side.) Press the mouse button.
- ☐ Drag in the direction that you want the extension line to go. Because you have clicked on a dimension line, there will be no witness gap; however, you may press the Shift key to create a witness gap.



Release the mouse button to end the line.

The extension line will be placed in the drawing.

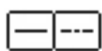
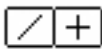
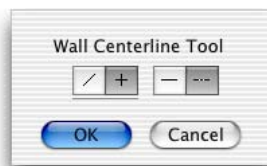


## Wall Centerline Tool

This tool allows you to draw a centerline between two points.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Wall Centerline tool from the Dimension Tools palette. The following dialog will appear:



- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles.
- ☐ Choose whether the tool will place a solid line or a dashed line.

If a solid line is selected, the Normal style is used, and the length of the line is determined by the witness extension distance that you set in the PowerCADD Dimensions Preferences dialog.

If a dashed line is selected, the Centerline style is used, and the length of the line is determined by the length of the dash pattern of the line itself, so that when a dimension line is drawn to the center of the wall centerline, the center dash will be above or to the left.



### To use the tool:

- ☐ Select the Wall Centerline tool from the Dimension Tools palette.
- ☐ Place the cursor in the drawing area at one side of the wall and press the mouse button.
- ☐ Drag to the other side of the wall and release the mouse button.

The centerline will be placed in the drawing.

This tool is a 'smart tool' in that, if you click on a line or flat side of a rectangle or polygon, it automatically snaps perpendicular to that line or side.

This tool is intended for architects who want to dimension to the center of a wall. For these situations, it works best to put a

guideline across the series of walls that you intend to dimension, use the Wall Centerline tool to place the wall centerlines (snap to the intersections between the guideline and the wall), and finally use the Dimension Line tool to place the dimension.

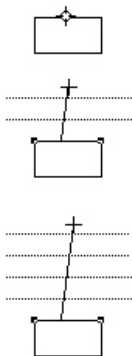
The Wall Centerline tool is a 'constraint-toggle' tool that can be flipped from constrained to unconstrained with a quick down-and-up tap on the Shift key. This may be done while drawing, or while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.



## Stack Guideline Tool

The Stack Guideline tool allows you to create a number of guidelines offset from a line or side of a rectangle or polygon in the drawing. The offset distance is the stack height default that you set in the PowerCADD Dimensions Preferences. The number of offset guidelines is determined by the distance that you drag with the mouse.

This allows compulsively neat draftsmen to arrange their dimension lines in an evenly spaced grid. Use the tool to create the grid of guidelines and then snap your dimension lines to the guidelines.



### To use the tool:

- ☐ Select the Stack Guideline tool from the Dimension Tools palette.
- ☐ Place the cursor in the drawing area on the line or side of a rectangle or polygon. Press the mouse button.
- ☐ Drag away from this line in the direction that you want the offset guidelines to go.

At first it will appear that nothing is happening, but you have to drag at least the distance of the stack offset before any guidelines begin to show. The farther you drag, the more guidelines will be created.

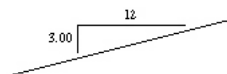
Release the mouse to complete the operation.

Guidelines may be deleted in the normal way by dragging them out of the window or by using the Delete tool which is quicker if there are multiple guidelines.



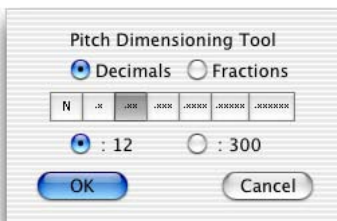
## Pitch Dimensioning Tool

This tool allows you to place a slope indication in the drawing by clicking on a line.



### To set the behavior of the tool:

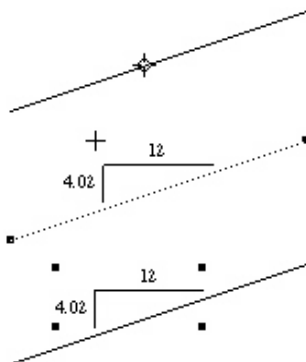
- ☐ Press the Option key and select the Pitch Dimensioning tool from the Dimension Tools palette. The following dialog will appear:



- ☐ Select Decimal or Fractions.
- ☐ Select the decimal or fractional accuracy.
- ☐ Select the base number—12 or 300—used for the slope.

### To use the tool:

- ☐ Select the Pitch Dimensioning tool from the Dimension Tools palette.
- ☐ Place the cursor in the drawing over the line whose slope you want to dimension. Press the mouse button.
- ☐ Move the mouse in the direction that you want the slope indicator to be located. Release the mouse button.



The slope indicator will be placed in the drawing.



## Area Tool

The Area tool allows you to place text in the drawing for the height, width and area of a rectangular area or the area of a irregular 'flooded' part of the drawing.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Area tool from the Dimension Tools palette. The following dialog will appear:



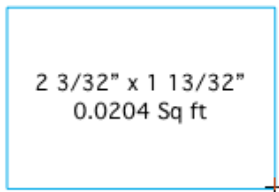
- ☐ Choose a draw-rectangle or flood-area method of operation.
- ☐ Select to place the width and height and area.

### To use the tool:

- ☐ Select the Area tool from the Dimension Tools palette.
- ☐ Draw a rectangle in the drawing.

—or—

- ☐ Press the Option key and draw a rotated rectangle in the drawing.



2 3/32" x 1 13/32"  
0.0204 Sq ft

The dimensions will be placed in the drawing.

### To use the Area tool to flood part of the drawing:

- ☐ Select the Area tool from the Dimension Tools palette.
- ☐ Place the cursor in the drawing area in 'white space' within an area enclosed by other objects. Press the mouse button, hold it down and do not move the mouse at all for about a second. (If you click quickly, or move the mouse, the tool will fall out.)

The flooding action will begin, and the cursor will change to the watch cursor as the tool attempts to find the boundaries of the enclosed space. The flooding operation will not trace an out-of-view line.

When the flooding action is completed, the area dimension will be placed in the drawing.



## Dimension Line Tool

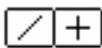
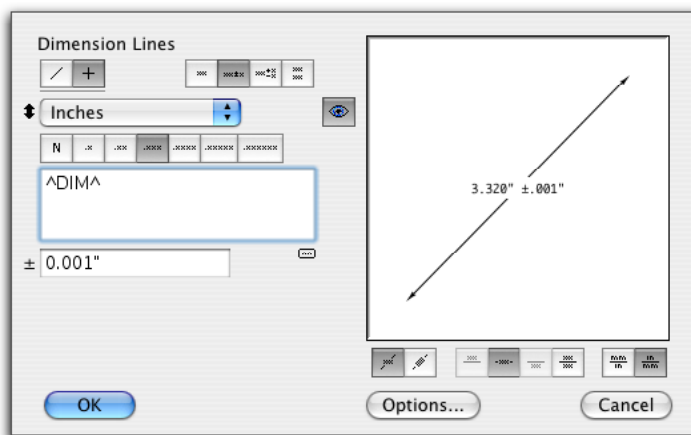
The Dimension Line tool allows you to draw dimension lines at any angle. Dual dimensioning is provided.



This tool uses the Dimension style. This is optional; see ‘Basic Concepts—Tool Attributes’.

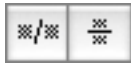
### To set the behavior of the tool:

- ☐ Press the Option key and select the Dimension Line tool from the Dimension Tools palette. The following dialog will appear:



- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles.
- ☐ To handle dual dimensioning, the dialog has a separate setting for English and metric dimensions. You switch between the English and metric choices by clicking on the up-down arrow to the left of the popup menu. Think of this as having a dual-scale ruler that you can flip over by clicking on the up-down arrow. For each ‘side of the ruler’, there is a separate setting for the dimensional units and the number of decimal places.
- ☐ For the English ‘side of the ruler’, you have a choice of inches, feet or miles (these are decimal units) and fractional inches or feet-and-inches. In the example to the left, the setting is for decimal inches to two decimal places.
- ☐ For the metric ‘side of the ruler’, you have a choice of millimeters, centimeters, meters or kilometers. In the example to the left, the setting is for millimeters to one decimal place.
- ☐ For decimal units, you have a choice of accuracy of one to six decimal places, or no decimals.



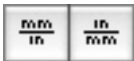


- ☐ For fractional units, you have a choice of fractions from 1/2 to 1/512. The buttons show only the denominator of the fraction.
- ☐ With fractions, you have a choice of fraction display styles.
- ☐ The eye button is the 'show unit' control. The effect of clicking on this button is to show/hide dimension units and will be immediately obvious in the sample window.
- ☐ Tolerance choices are handled as four dimension styles. As you click on these choices, the text editing boxes for the dimension and tolerances change. In the case of limit tolerances, you can only edit the tolerances.
- ☐ You may type in the dimension text editing box. This allows you to place a prefix or suffix in the dimension text. The dimension values will be placed between the up-carets (^).

If the up-carets are removed, no dimensional value will be placed in the drawing and the text for the dimension will be exactly what you typed. A carriage return can be placed in the dimension text by pressing the Return key. (Because of this, you may use the Enter key alone as a shortcut for clicking on the OK button in the dialog.)

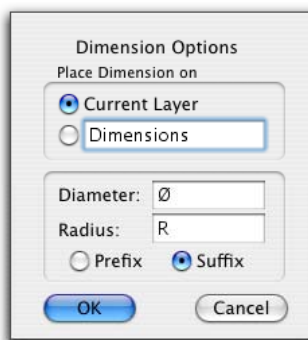


- ☐ A reset button is provided to reset the dimension text. This is provided in case you forget the '^DIM^' syntax. The reset button uses the default suffix for the Radius (R) and Diameter (Ø) dimensioning tools, which share this dialog box with all other dimension line tools.



- ☐ Below the example window, you can change the choice for whether the dimension text is to be rotated.
- ☐ If the dimension text is rotated, you can select from three dimension text positions (above, centered, or below). If not, the dimension text position must be centered.
- ☐ The last choice with the dimension text position buttons is for dual dimensioning. Dual dimensioning works by the simple device of placing two separate dimension line objects in the drawing, one for the English 'side of the ruler' and one for the metric side.
- ☐ Below the example window, you can change the choice of whether English or metric is the controlling (top) dimension for dual dimensions.

- ❑ Click on the Options button, and the following dialog will appear:



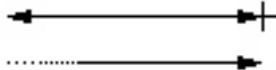
- ❑ Choose to place the dimension on the current layer or on the layer name of your choosing. All of the dimension tools (line, witness, chain, stack, face, running, baseline), dimension arcs and fillet radius tools have this 'Smart Layer' feature. There is only one setting for all of the tools.
- ❑ Set the default suffix for the Radius and Diameter Dimensioning tools. For example, for the diameter suffix, you may type *D*, *Dia* or *Ø*. This means that when you bring up the dialog for the Diameter Dimension tool, this suffix will be used if you press the reset button.
- ❑ Choose if you want this placed as a prefix or suffix. In the case of the Fillet Radius tool, the prefix/suffix is automatically appended. In the case of the Radius and Diameter Dimension tools, you must use the reset button to change the existing dimension style after visiting this dialog.

**Note:** You do not have an arrows-inside/outside choice for the dimension line tools. All arrows are automatically inside, however if the dimension is short, the arrows are flipped outside in accordance with the settings in the PowerCADD Dimensions Preferences dialog, however this will not happen if you use a slash-type arrow.

After placing the dimension, you can use the Edit command of the Edit window or the Dimension Edit floating window to change the arrows.

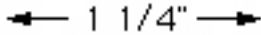
#### To draw a dimension line:

- ❑ Select the Dimension Line tool from the Dimension Tools palette.
- ❑ Place the cursor in the drawing area at a location that will represent the starting point of the line. Press the mouse button.



- ☐ Drag away from the starting point. As you move the mouse, the line will follow the mouse.
- △ You may tab into the Edit Window to edit the length and angle of the line.

Release the mouse button to complete the line.



The dimension line will be placed in the drawing.

- △ **Important:** If you have selected dual dimensioning, *two* separate and superimposed dimension lines are placed in the drawing. Each object is editable in the normal way. Be aware that the PowerCADD floating Dimension Edit window only edits one selected object. Select each object by clicking on the text. In many cases, so that the dimension text of both objects will appear on the screen, one of the objects will have a pen pattern attribute of none. This keeps it from drawing a line overtop the dimension text of the other object. △

PowerCADD has a tolerance choice of 'Literal (as typed)'. This choice is not handled by these tools, however once you place a dimension, you can edit the dimension with the Edit command of the Edit menu, or the Dimension Edit floating window.

The Dimension Line tool is a 'constraint-toggle' tool that can be flipped from constrained to unconstrained with a quick down-and-up tap on the Shift key. This may be done while drawing, or while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.

The Dimension tools in WildTools 'share' the same dimension text attributes (Font, font size, etc) as the PowerCADD dimension line tools. Thus, to set the dimension text attributes, select any of the WildTools dimensioning tools and use the Attributes menu or Defaults Window to set the text attributes of the tool.

### ***Converting Lines to Dimension Lines***

The Dimension Line tool can be used to convert a line to a dimension line.

#### **To convert a line to a dimension line:**

- ☐ Select the Dimension Line tool.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on a line.

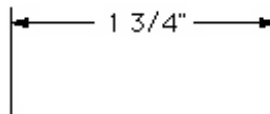
The object will be converted. The current settings of the Dimension Line dialog are used.





## Leader Dimension Line Tool

This tool allows you to draw a dimension line with witness lines on each end.



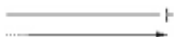
This tool uses the Dimension style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Leader Dimension Line tool from the Dimension Tools palette. This tool 'shares' (luv that California-word!) the same dialog as the Dimension Line tool. Please see the Dimension Line tool above for a full description of the dialog.

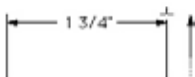
### To use the tool:

- ☐ Select the Leader Dimension Line tool from the Dimension Tools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the starting point of the dimension. Press the mouse button.



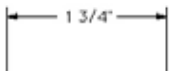
- ☐ Drag away from the starting point. As you move the mouse, a line will follow the mouse. This line represents the two points being dimensioned.

- ☐ You may tab into the Edit Window to edit the length and angle of the line.



Release the mouse button to complete the line.

- ☐ Move the cursor away from this line to locate the dimension line with the witness lines. As you move the mouse, you will see the witness lines being formed.



You may press the Shift key to constrain the dimension line to be parallel to the two points being dimensioned.

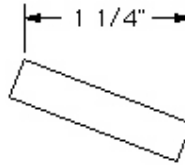
Click the mouse to complete the operation.

The dimension line and witness lines will be placed in the drawing.



## Face Dimension Tool

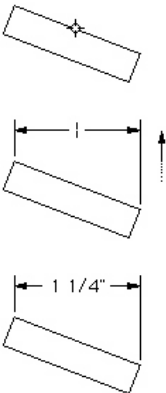
This tool allows you to place a dimension line with witness lines on each end by clicking on the flat side of an object in the drawing and dragging the mouse.



This tool uses the Dimension style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Face Dimension Line tool from the Dimension Tools palette. This tool shares (that word again!) the same dialog with the Dimension Line tool. Please see the Dimension Line tool above for a full description of the dialog.



### To use the tool:

- ☐ Select the Face Dimension Line tool from the Dimension Tools palette.
- ☐ Move the cursor over the line or side of the rectangle or polygon in the drawing. Press the mouse button.
- ☐ Drag away from this point. As you move the mouse, a dimension line with witness lines will follow the mouse.

You may press the Shift key to constrain the dimension line to be parallel to the face being dimensioned.

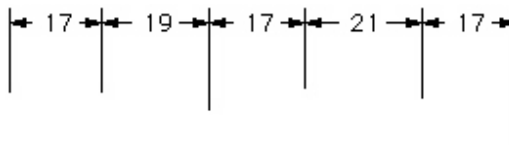
Release the mouse to complete the operation.

The dimension line and witness lines will be placed in the drawing.



## Chain Dimension Tool

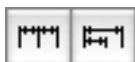
This tool allows you to draw a number of dimension lines with witness lines in a series where the dimension lines fall along the same line. The tool will place stacked dimensions as an option.



This tool uses the Dimension style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Chain Dimension tool from the Dimension Tools palette. Except as noted below, this tool uses the same dialog as the Dimension Line tool. Please see the Dimension Line tool above for a description of the dialog.
- ☐ Choose chained or stacked dimensions.



### To use the tool:

- ☐ Select the Chain Dimension tool from the Dimension Tools palette.
- ☐ Use exactly the same drawing technique as described above for the Leader Dimension line tool, and then...
- ☐ Move the mouse to each new point to be dimensioned and click.

Repeat this process as often as you like to place additional dimension.

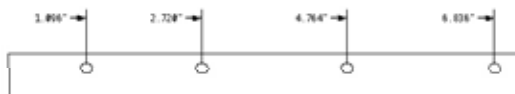
You may click in the same place twice or press the Enter key to stop the drawing process.

The dimensions will be placed in the drawing.



## Running Dimension Tool

This tool allows you to place running dimensions.

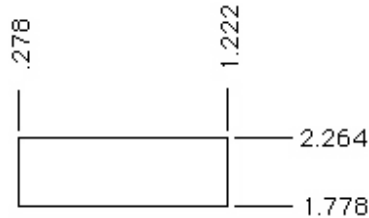


The tool operates like the Leader Dimension Line tool. In the tool's dialog, you have a choice of placing a single or chain of dimensions.



## Baseline Dimension Tool

This tool allows you to place a dimension in the drawing that indicates the location of the point relative to the current drawing origin. This type of dimension is frequently used in tool and die design.



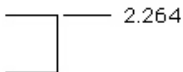
This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Baseline Dimension tool from the Dimension Tools palette. This tool uses the same dialog as the Dimension Line tool. Please see the Dimension Line tool above for a description of the dialog.

### To use the tool:

- ☐ Select the Stack Dimension tool from the Dimension Tools palette.
- ☐ Place the cursor at the point that you want to dimension. Press the mouse button.
- ☐ Drag vertically for an X-axis dimension or horizontally for a Y-axis dimension. Release the mouse button to complete the operation.



The dimension object will be placed in the drawing.

Note that you can only drag horizontally or vertically because a diagonal dimension line in this circumstance doesn't make any sense.

The dimensions are relative to the drawing origin, which you set by clicking in the shaded box of the rulers and dragging into the drawing. For more information, see "Drawing Origin" in the PowerCADD users manual. In addition, the vertical dimension depends on the Flip Vertical Axis choice you make in the PowerCADD Preferences.



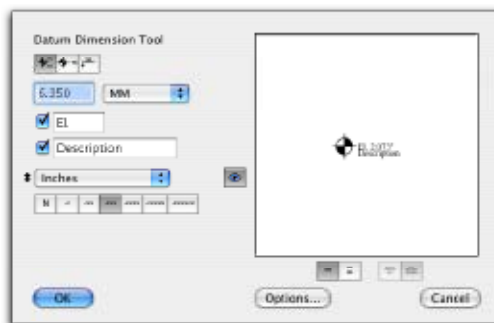
## Datum Dimension Tool

This tool allows you to place a datum dimension in the drawing that indicates the Y elevation relative to the drawing ruler origin.



### To set the behavior of the tool:

- ☐ Press the Option key and select the Datum Dimension tool from the Dimension Tools palette. This dialog will appear:



- ☐ Three styles of datum dimensions are available.

### To use the tool:

- ☐ Select the Datum Dimension tool from the Dimension Tools palette.
- ☐ Place the cursor at the point that you want to dimension. Press the mouse button.
- ☐ Drag to locate the dimension. In the case of the European style datum dimension, you drag vertically to set the height of the dimension's leader. Release the mouse button to complete the operation.

The dimension object will be placed in the drawing.

Like the Dimension Point objects described below, these objects indicate the current location of the object in the drawing, so if you move them, the elevation dimension will change.



## Dimension Point Tool

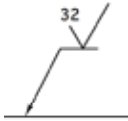
This tool allows you to place a dimension point object in the drawing. These objects can be for the X, Y or both X and Y location of the object.

Dimension Point objects indicate the current location for the object in the drawing, so if you move them, the dimension will change.



## Surface Texture Tool

This tool allows you to place standard surface texture symbols. As this is a rarely used tool, this description will be brief. The choices in the tool's dialog are obvious.

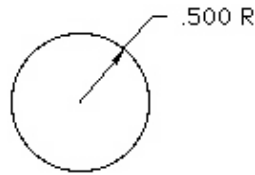


To use the tool, click on the side of an object in the drawing and drag the mouse. If you click on a vertically aligned side, you may press the Option key to flip the presentation of the symbol. You may also click anywhere in the drawing to place a symbol without a leader.



## Radius Dimension Tool

This tool allows you to dimension the radius of a circle or circular arc.



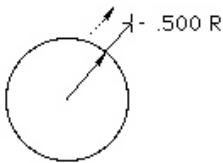
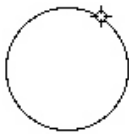
Because many architects use slash-type arrows on dimension lines, the Radius Dimension tool uses the Leader style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Radius Dimension tool from the Dimension Tools palette. This tool uses the same dialog as the Dimension Line tool. Please see the Dimension Line tool above for a description of the dialog.

### To use the tool:

- ☐ Select the Radius Dimension tool from the Dimension Tools palette.
- ☐ Place the cursor over the circle or arc that you want to dimension. Press the mouse button.
- ☐ Drag away from the object.



You may press the Option key to toggle between arrows inside and arrows outside.

You may move the mouse left or right past 45° to flip the leader left or right.

Release the mouse button to complete the operation.

The dimension object will be placed in the drawing.



## Fillet Radius Dimension Tool

This tool allows you to dimension circular arcs and circles in the three styles shown below. The tool places a Leader Text object which can be edited with the PowerCADD Text tool.

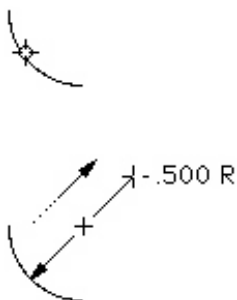


Because many architects use slash-type arrows on dimension lines, the Fillet Radius tool uses the Leader style. This is optional; see 'Basic Concepts—Tool Attributes'.

The dimension placed is the radius without tolerances. The choice of dimensional units, degree of accuracy, dual dimensions, etc., are all controlled by the Radius Dimension tool's dialog settings.

### To use the tool:

- ☐ Select the Fillet Radius Dimension tool from the Dimension Tools palette.
- ☐ Place the cursor over the circle or arc that you want to dimension. Press the mouse button.
- ☐ Drag away from the object. The angle of the leader is determined by the position of the mouse relative to the center of the arc or circle, however this causes a problem with a wildly-pivoting angle when the mouse is near the center of the circle. Because of this, the angle is locked when the mouse is within the middle area of the circle. Outside this area and still within the circle, the angle is locked when the mouse is moving toward the center of the circle, but it will pivot when the mouse is moving outward. The Shift key may be used to constrain the angle of the leader line. Release the mouse button to place the object.



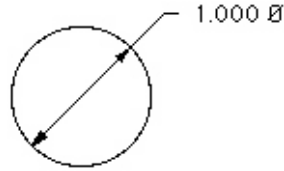
The dimension may be from the outside or across the center of the arc, in which case it will usually place a tick mark at the center, if there is room along the leader. This tick mark is a group of two lines with a white circle placed as a Marker object (see Marker tool). The size of the tick mark is a function of the arrowhead size. You may use the Option key to toggle between the two methods.

The dimension object will be placed in the drawing.



## Diameter Dimension Tool

This tool allows you to dimension the diameter of a circle or circular arc.



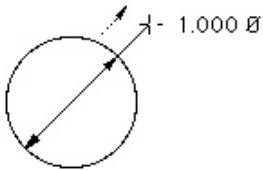
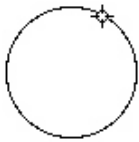
Because many architects use slash-type arrows on dimension lines, the Diameter Dimension tool uses the Leader style with arrows on both ends. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Diameter Dimension tool from the Dimension Tools palette. This tool uses the same dialog as the Dimension Line tool. Please see the Dimension Line tool above for a description of the dialog.

### To use the tool:

- ☐ Select the Diameter Dimension tool from the Dimension Tools palette.
- ☐ Place the cursor over the circle or arc that you want to dimension. Press the mouse button.
- ☐ Drag away from the object.



You may press the Option key to toggle between arrows inside and arrows outside.

You may move the mouse left or right past 45° to flip the leader left or right.

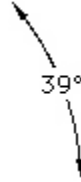
Release the mouse button to complete the operation.

The dimension object will be placed in the drawing.



## Dimension Arc Tool

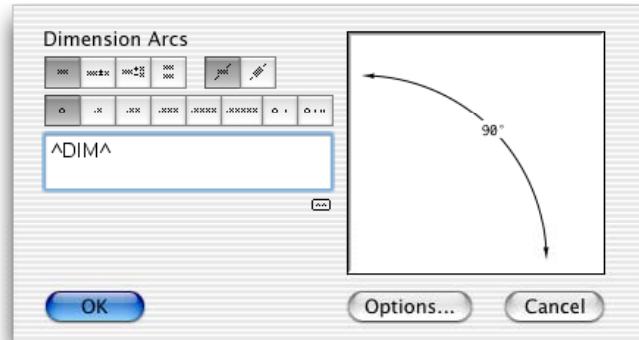
This tool allows you to draw a dimension arc.



Because many architects use slash-type arrows on dimension lines, this tool uses the Leader style with arrows on both ends. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Dimension Arc tool from the Dimension Tools palette. The following dialog will appear:



- ☐ Tolerance choices are handled as four dimension styles. As you click on these choices, the text editing boxes for the dimension and tolerances change. In the case of limit tolerances, you can only edit the tolerances.



- ☐ You can change the choice for whether the dimension text is to be rotated, however rotated text does not work on dimension arcs.



- ☐ You have a choice of angular accuracy. These are degrees up to four decimal places, degrees and minutes or degrees, minutes and seconds.



- ☐ You may type in the dimension text editing box. This allows you to place a prefix or suffix in the dimension text. The angular values will be placed between the up-carets (^).

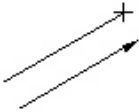
If the up-carets are removed, no angular value will be placed in the drawing and the text for the dimension will be exactly what you typed. A carriage return can be placed in the dimension text by pressing the Return key. (Because of this, you may use the Enter key alone as a shortcut for clicking on the OK button in the dialog.)



- ☐ In case you forget the '^DIM^' syntax, a reset button is provided to reset the angular dimension text.

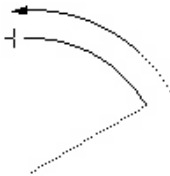
#### **To draw a dimension arc:**

- ☐ Select the Dimension Arc tool from the Dimension Tools palette.
- ☐ Place the cursor in the drawing at a location that will represent the center of the arc. Press the mouse button.
- ☐ Drag away from the center to establish the radius and starting angle. Release the mouse button.



You may press the Shift key to constrain the angle of the line to a snap angle.

- ☐ You may tab into the Edit Window to edit the radius and starting angle of the arc.
- ☐ Move the cursor to establish the arc angle. You may tab into the Edit Window to edit this arc angle.



Click the mouse to complete the arc.

The arc will be placed in the drawing.

#### ***Converting Arcs to Dimension Arcs***

All of the dimension arc tools can be used to convert an arc to a dimension arc using the settings of the Dimension Arc tool.

#### **To convert an arc to a dimension arc:**

- ☐ Select one of the dimension arc tools.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.
- ☐ Click on the object in the drawing.

The arc will be converted. Similarly, the arc tools can be used to convert dimension arcs to arcs.





## Extension Dimension Arc Tool

This tool allows you to draw a dimension arc with witness lines by indicating three points with the mouse and then positioning the dimension arc with another mouse click.

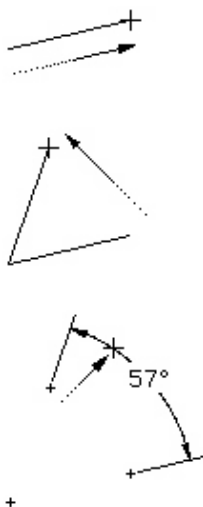
Because many architects use slash-type arrows on dimension lines, this tool uses the Leader style with arrows on both ends. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Extension Dimension Arc tool from the Dimension Tools palette. This tool uses the same dialog as the Dimension Arc tool. Please see the Dimension Arc tool above for a description of the dialog.

### To use the tool:

- ☐ Select the Extension Dimension Arc tool from the Dimension Tools palette.
- ☐ Place the cursor in the drawing area at a location that will represent the center of the arc. Press the mouse button.
- ☐ Drag away from the starting point to define the first side of the angle and release the mouse button.
- ☐ Move the cursor to define the second side of the angle and click.
- ☐ Move the cursor to define the position of the dimension arc. As you move the mouse, you will see the dimension arc and the witness lines. Click to complete the operation.

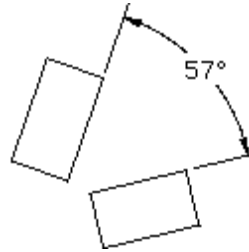


The dimension arc will be placed in the drawing.



## Face Dimension Arc Tool

The Face Dimension Arc tool allows you to place a dimension arc with witness lines by clicking on two lines or flat sides of an object in the drawing.



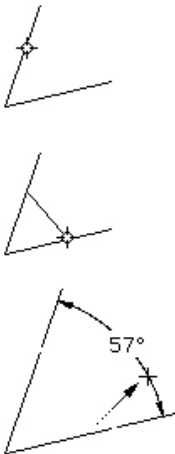
Because many architects use slash-type arrows on dimension lines, this tool uses the Leader style with arrows on both ends. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Face Dimension Arc tool from the Dimension Tools palette. This tool uses the same dialog as the Dimension Arc tool. Please see the Dimension Arc tool above for a description of the dialog.

### To use the tool:

- ☐ Select the Face Dimension Arc tool from the Dimension Tools palette.
- ☐ Move the cursor over the line or side of a rectangle or polygon in the drawing. Press the mouse button.
- ☐ Drag to the second line or side or rectangle or polygon in the drawing. Release the mouse button.
- ☐ Move the cursor to define the position of the dimension arc. As you move the mouse, you will see the dimension arc and the witness lines. Click to complete the operation.

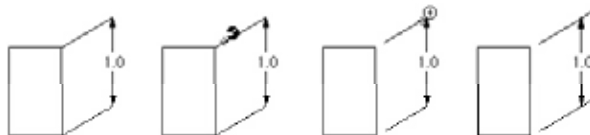


The dimension arc will be placed in the drawing.



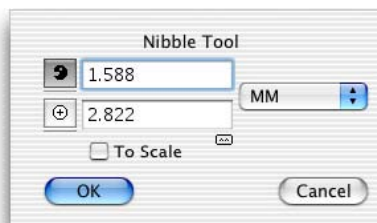
## Nibble Tool

The Nibble tool allows you to shorten or lengthen a line by a fixed amount. Typically, it is used to chop in witness gaps or extend witness lines as shown below.



### To set the behavior of the tool:

- ☐ Press the Option key and select the Nibble tool from the Dimension Tools palette. The following dialog will appear:



- ☐ Type the shorten ('nibble') and extend (plus sign) dimensions. By default, these will be the witness gap and witness extension defaults from the PowerCADD Dimensions Preferences dialog.
- ☐ If To Scale is selected, the dimensions will be to the drawing scale, if not the dimensions will be an on-paper size.
- ☐ Click the Reset button to set the nibble and lengthen dimensions to be the witness gap and witness extension defaults from the PowerCADD Dimensions Preferences dialog.

The Nibble tool can be used on lines, dimension lines, or the witness lines of dimension lines and arcs.

### To use the tool:

- ☐ Select the Nibble tool from the Dimension Tools palette. The cursor will clearly show which mode (nibble or extend) that the tool is set to operate in.

Before you click, you can hold down the Option key to reverse the tool's current mode.

- ☐ Click on a line to shorten or extend it. The line end that is changed is the nearest to the mouse click.

The Nibble Line tool is a 'shift-toggling' tool that can be flipped between shorten and extend modes with a quick down-and-up tap

on the Shift key while the tool is active and the mouse is up. For a complete description, see 'Basic Concepts—Shift-Toggling'.

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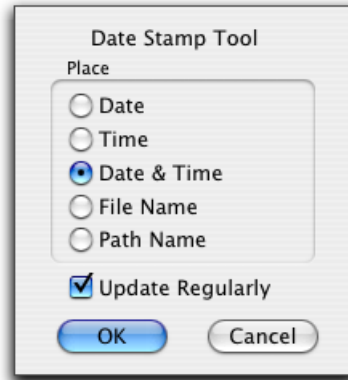


## Date Stamp Tool

The Date Stamp tool places a Date Stamp object in the drawing for the current date, time, date-and-time, file name or path name. The Date Stamp object is an External object that includes a single text object, and the objects update every minute, if you choose.

### To set the behavior of the tool:

- ❑ Press the Option key and select the Date Stamp tool from the Dimension Tools palette. The following dialog will appear:



- ❑ Choose what you want to place—date, time, date-and-time, file name or pathname.
- ❑ Choose if you want the objects to be updated regularly. This happens every minute, unless you turn it off. If you have no Date Stamp objects in the drawing, you may want to turn this option off.

### To place Date Stamp objects:

- ❑ Select the Date Stamp tool from the Dimensions Tools palette.
- ❑ Place the cursor in the drawing at the location that you want to create the object and click.

The object will be placed.

You may select these Date Stamp objects and assign Font, Font Sizes, and Styles in the standard way using Defaults Window or the Attributes menu.

The objects will be updated every minute, however there will be no change to the objects if no change is necessary.

There are three ways to keep one of these objects from updating:

- Turn off the Update Regularly option in the tool's dialog.
- Lock the object using the Lock command in the Arrange menu.
- Convert the Date Stamp object to a text object with Ungroup or Convert to Group.

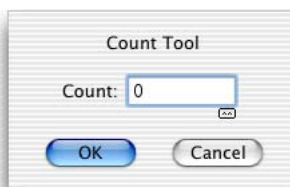


## Count Tool

This tool allows you to count things by clicking on objects in the drawing. Finger technology is also available.

### To set the current count:

- ☐ Press the Option key and select the Count tool from the Dimension Tools palette. The following dialog will appear:



- ☐ Type a whole number. The count is limited to positive values up to 32766.
- ☐ Click on the reset button to reset the count to zero.



### To use the tool:

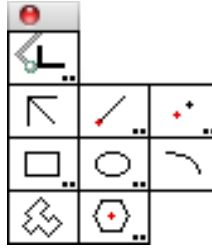
- ☐ Select the Count tool from the Dimension Tools palette. Whenever the tool is active, the current count is shown beside the Count cursor.
- ☐ Click on an object to add to the current count.
- ☐ Press the Option key and click on an object to subtract from the current count.

# 25

You will hear a distinctive sound when you add or subtract from the current count. The Count tool has click-pause-drag for finger technology. If the Option key is held down before clicking, then the count is decremented.



## Baseline Tools Palette



The Baseline Tools palette contains a number of drawing tools that closely resemble the methods used when working with a mechanical drafting machine to lay out a drawing.

The foundation upon which these tools work is the base line angle, an angle that corresponds to the setting of a drafting machine's arm. Once the base line angle is set, all drawing and placement of objects are relative to the base line angle.

The Offset Point tool and Line tool are nearly identical in concept. Each consists of an angle relative to the base line angle, a length relative to the placement point and a choice of the direction of the line or offset from the mouse.

There are five tools that are essentially identical to the regular tools, except that these tools draw lines, rectangles, square polygons, ellipses and elliptical arcs relative to the base line angle.

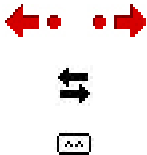
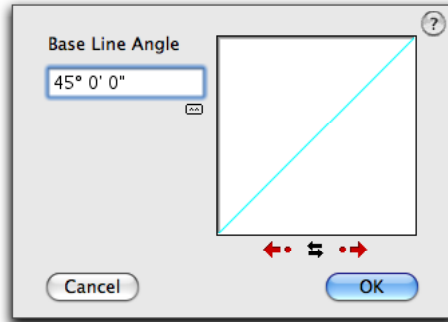


## Base Angle Tool

The Base Angle tool allows you to set the base line angle, i.e. the angle of the 'drafting machine'.

### To edit the base line angle:

- ☐ Press the Option key and select the Base Angle tool from the Baseline Tools palette. The following dialog will appear:



- ☐ You may edit the angle by typing, or you may click on a number of buttons.
- ☐ Change the angle by 90° increments with the arrow buttons, or by 15° increments with the dots.
- ☐ Click the flip button to mirror the angle about the vertical axis.
- ☐ The reset button is a quick way of zeroing the angle.

### To set the base line angle:

- ☐ Select the Base Angle tool from the Baseline Tools palette. As you move the mouse, the base line angle is shown by a line that moves with the cursor. This is the base line angle.
- ☐ To set the base line angle, use the tool as a normal line-drawing tool. When you release the mouse button, you can see the new base line angle.
- ☐ To set the base line angle to be the same as an existing line in the drawing, hold down the Option key and click on a line. When you release the Option key, you can see the new base line angle. You may also click on a side of a rectangle or polygon, even in a group.



## Constrained Line Tool

The Constrained Line tool of the Baseline Tools palette allows you to draw lines at the snap angles predetermined in the PowerCADD Preferences Dialog.



The Constrained Line tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To use the Constrained Line tool:

- ☐ Select the Constrained Line tool from the Baseline Tools palette.
- ☐ Press and hold down the mouse where you want to start drawing and drag the mouse in the desired direction.

The line is constrained to parallel or perpendicular to the base line angle.

You may press the Shift key to constrain the line to snap angles relative to the base line angle.

You may press the Option key to toggle between drawing from center and the normal drawing method.

- ☐ Release the mouse to complete the line.

The line will be placed in the drawing.



## Line Tool

The Line tool of the Baseline Tools palette allows you to draw or place lines of a fixed angle. The length of the line may be fixed or variable.



The Line tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

This tool is identical to the Fixed Line tool of WildTools, with the exception that the angle of the line in the dialog is relative to the base line angle. For more information, see the Fixed Line tool of WildTools.



### Offset Point Tool

The Offset Point tool allows you to place a reference point with a fixed offset length from the mouse-click point. The angle may be fixed or variable by manipulation with the mouse.

An offset point is the equivalent of the manual drafting method of placing a ruler on the drawing at a specific angle, making a measurement and then making a tick mark in the drawing.



The Offset Point tool uses the Point style. This is optional; see 'Basic Concepts—Tool Attributes'.

This tool is identical to the Offset Point tool of WildTools, with the exception that the angle of the offset point in the dialog is relative to the base line angle. For more information, see the Offset Point tool of WildTools.



### Rectangle Tool

The Rectangle tool allows you to draw a rectangle relative to the base line angle.



The Rectangle tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

#### To draw a rectangle:

- ☐ Select the Rectangle tool from the Baseline Tools palette.
- ☐ Press and hold down the mouse where you want to start drawing and move the mouse in the desired direction.

You may press the Option key to toggle between drawing from center and normal drawing.

Release the mouse to complete the rectangle.

The rectangle will be placed in the drawing.



## Ellipse Tool

The Ellipse tool allows you to draw an ellipse at an angle relative to the base line angle.



The Ellipse tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To draw an ellipse:

- ☐ Select the Ellipse tool from the Baseline Tools palette.
- ☐ Press and hold down the mouse where you want to start drawing and move the mouse in the desired direction.

You may press the Option key to toggle between drawing from center and normal drawing.

Release the mouse to complete the rectangle.

The ellipse will be placed in the drawing.



## Elliptical Arc Tool

The Elliptical Arc tool of the Baseline Tools palette allows you to draw elliptical arcs at an angle relative to the base line angle.



The Elliptical Arc tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To draw an elliptical arc:

- ☐ Select the Elliptical Arc tool from the Baseline Tools palette.
- ☐ Press and hold down the mouse where you want to start drawing and move the mouse in the desired direction.

You may press the Option key to toggle between two directions for the arc.

Release the mouse to complete the ellipse.

The arc will be placed in the drawing.



## Square Polygon Tool

This tool is just like the Square Polygon tool of WildTools except that it draws relative to the baseline angle.



The tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.



## Regular Polygon Tool

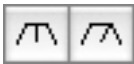
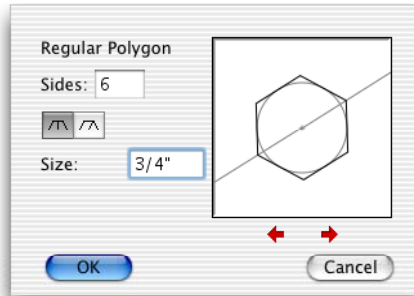
This tool allows you to place a regular polygon by the center at an angle relative to the base line angle.



This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Polygon by Center tool from the Baseline Tools palette. The following dialog box will appear:



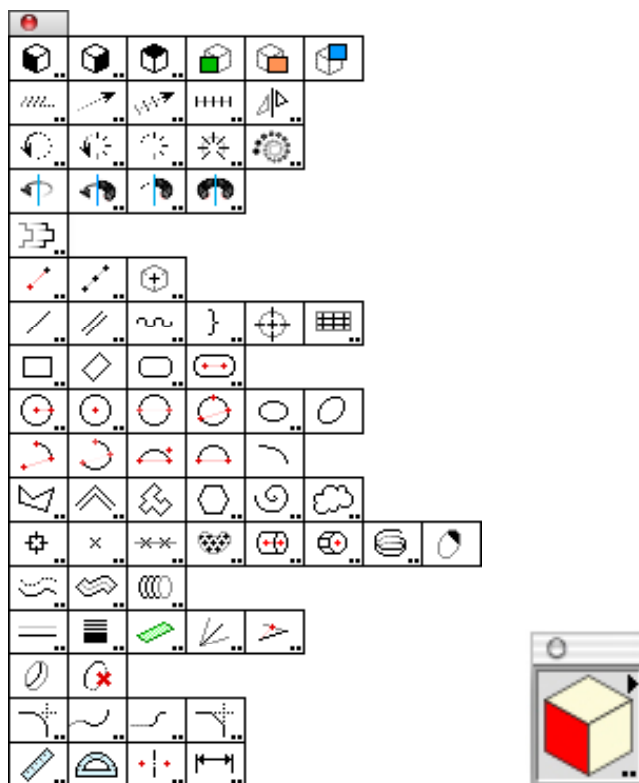
- ☐ Type the number of sides you want.
- ☐ You have the choice of specifying the polygon by size (measured across the flats) or by diameter. Click on the By-Diameter or Across-Flats buttons to change this.
- ☐ Type the diameter or size desired. The standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ Click on the arrow buttons below the sample window to change the rotation of the polygon.

### To place a regular polygon:

- ☐ Select the Regular Polygon tool from the Baseline Tools palette. As you move the mouse, the polygon will ghost with the cursor.
- ☐ Click the mouse in the drawing.

The polygon will be placed in the drawing.

# WildTools 3D Palette



*WildTools 3D and the WildTools 3D Cube Window*

The WildTools 3D palette contains a number of tools which greatly simplify the process of drawing three-dimensional depictions in the 2D world of a PowerCADD drawing. These are axonometric drawings, commonly called '3D' drawings, and they come in three types: isometric, dimetric and trimetric, which differ only in the angles used for the drawing axes.



*Isometric*

*Dimetric*

*Trimetric*

For a complete discussion of these types of drawings, please refer to *Technical Illustrations*, by T. A. Thomas, Gregg Div. of McGraw-Hill, 1978.

## **Basic WildTools 3D Concepts**

While you could always do isometric drawings in PowerCADD, prior to WildTools 3D you had to be familiar with the mechanics of isometric drawings, and you had to constantly remind yourself of the correct angles to use. And there were many common drafting problems that were extremely difficult. As you will see, WildTools 3D makes child's play of some of the most difficult problems in technical illustration and axonometric drawings.

There are two ways to create a 3D drawing using WildTools 3D: from scratch, or by shearing.

### ***Creating a 3D Drawing from Scratch***

If you want to begin with a 'clean sheet of paper' and do the entire drawing in a 3D presentation, then WildTools 3D offers a complete set of familiar tools for drawing and modifying objects. If you're an experienced WildTools user, you should be able to go right to work.

Much of the extraordinary power of WildTools 3D comes from the way dimensions are handled in the Edit Window. Lengths, angles and offsets are *relative to the current drawing plane*. If you've spent any time with axonometric drawings, you know the difficulty of locating a point in space. If you want to locate a new point in the drawing at a location relative to another (say 35mm at 15°) then you had to draw two construction lines. However, with WildTools 3D, you just draw a line, and tab into the Edit Window as you would with orthogonal drawing. Nothing to it!

### ***Creating a 3D Drawing by Shearing***

If you've already drawn something in an orthogonal presentation, then it's much easier to create a 3D drawing by copying a view, paste-at-mouse to a new location, and then shear the view using the shear commands located in the top right of the 3D Cube window. (You can also group the objects and use one of the Shear tools at the top of the WildTools 3D tool palette.) Once the view is sheared, you can move it into position relative to another view.

### ***WildTools 3D vs 'Real 3D'***

WildTools 3D offers a type of capability that's long been known in the CAD industry as '2-1/2 D' since it provides a way of drawing three-dimensional depictions in a 2D program. This is not 'true 3D' as it is commonly known, because true 3D programs have three-dimensional data associated with every object.

Before you get snippy about this, it's a good idea to remind yourself that just because you have a 3D drawing, you don't necessarily have anything that is very useful. The programs are confusing, notoriously difficult to use, and they add a lot of extra complications to the task of drawing. While there are some good 3D programs, 3D has largely been the fool's gold of the CAD world. Naïve users often imagine that they must have 3D to have a complete program, and then they discover that the capabilities are difficult, confusing and take far more time than they are worth. Simply put, the vast majority of users of 2D/3D programs make very little use of the 3D capabilities.

So we ask that you judge WildTools 3D not by what it is, but by what it can do for you. If you are an experienced WildTools user, chances are you can begin to draw three-dimensional depictions in a few minutes. However, don't let the ease-of-use fool you—WildTools 3D is by far the most powerful set of technical illustration tools ever offered on any computer.

### ***Tool Duplication***

You don't have to be a rocket scientist to notice that a lot of the tools in WildTools 3D look like they are the same as the tools in the WildTools palette except that these tools 'think in 3D'. Actually, they are *exactly* the same tools with little 2D/3D switches inside them, and the 'code' for the tools is now in the WildThing shared library where they are used by both WildTools and WildTools 3D. This means that the additional 3D capabilities add very little to the size of the programming or to the memory requirements of these tools.

### ***Setting Up the 3D Drawing Axes***

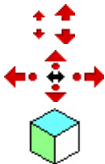
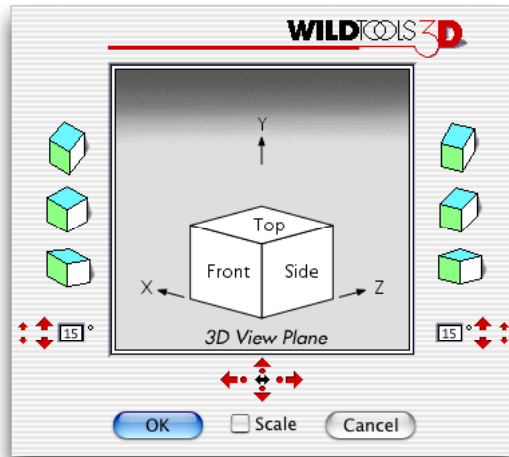
By now, you've probably already tried some of the tools, and you will have noticed that the tools draw objects which are distorted so that they appear to have been drawn on a three-dimensional view plane, and that you can change the plane by clicking on the cube control in the WildTools 3D Cube window.

You can begin to draw immediately with WildTools 3D in a standard "30-30 isometric" presentation. However you can also draw in other views with equal ease.



### To set the 3D axis angles for WildTools 3D:

- ☐ If the WildTools 3D Cube window is not visible, select it from the Window menu to make it visible.
- ☐ Press the Option key and click on the WildTools 3D Cube window. The following dialog box will appear:



- ☐ Click the up/down arrows to adjust the X and Z axis angles.
- ☐ Click on any of the arrows or dots to change the axis angles.
- ☐ Click on any of the six cubes for standard setups. The cube at the left center is for a 30-30 isometric setup.

The 3D axis angles determine:

- How many tools in WildTools 3D draw.
- The shear/unshear settings for the Shear/Unshear tools located at the top of the WildTools 3D tool palette.
- The shear/unshear settings for the Shear/Unshear commands in the popup menu located in the top right of the WildTools 3D Cube window.

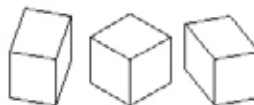
Once you have set these axes, all of the tools will 'know' that this is the way you want to draw. These settings are 'remembered' by WildTools 3D, and they are not stored in individual drawings.

- ☐ Choose Scale if you want to use axonometric scaling, which provides foreshortening of receding lines.

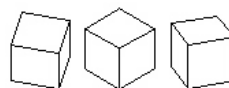
This produces a projection of the drawing onto a picture plane, similar to a perspective drawing, however parallel lines remain

parallel. Thus, the projection may be thought of as a perspective drawing viewed from infinity.

In an axonometric projection, the axes are scaled. In the case of a '30-30 isometric' projection, the scaling is the same for all three axes. In a trimetric drawing, each scale is different. Because of the calculations required, axonometric scaling is seldom used in commercial practice.



Axonometric drawings look distorted and different views look different sizes.



Axonometric projections look right and different views look the same size.

Isometric drawing are popular because they are easy to draw and dimension, but equal importance is given to each of the three visible planes, only one picture effect is possible and unsatisfactory line relations cannot be avoided.

Dimetric and trimetric drawings reduce the top or bottom area of the object, and allows emphasis on one of two planes represented and subordination of the other(s). This is often the best pictorial effect, and it is intuitively much easier to understand. Without axonometric scaling, the drawings are distorted, so the addition of scaling for these drawings is a major advance.

Confused about the difference between an axonometric drawing and an axonometric projection? Don't worry. It's much easier to understand the benefit. Up to now, we have all used '30-30 isometric' drawings because they were easy to draw, and other views produced a distorted appearance—sometimes highly distorted. Axonometric Scaling means that you can easily use any view of the object.

### Selecting the Current View Plane

An important feature of these tools is the *current view plane*. Many of the tools will draw in only one plane at a time, and you set this plane with the familiar cube control.



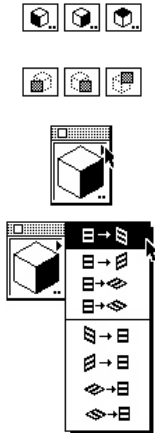
#### To set the current view plane:

- ☐ Click on a side of the cube control in the WildTools 3D Cube window.

This is your primary method of changing the current view plane. As you will see, you will also find the cube control in the dialog boxes of many of the tools, and this changes the same setting. Whenever you use the cube control, you will be setting a 'global' variable, i.e. a setting that is shared by all of these tools. Thus, if you set it in one plane for one tool, you will set it that way for all tools which depend on the current view plane.

### Shearing and Unshearing

Shearing converts a normal, orthogonal image into the distorted view of an axonometric drawing. Unshear converts the distorted view back to a normal, orthogonal image. Several methods are provided to quickly shear and unshear objects between orthogonal views and the distortions required for the current 3D axis setup.



- ☐ Use one of the Shear tools at the top of the WildTools 3D palette.
- ☐ Use one of the Unshear tools at the top of the WildTools 3D palette.
- ☐ Click on the triangle at the upper right of the WildTools 3D Cube window, and then...
- ☐ Select one of the four shear or unshear commands. The shear commands are at the top of the menu, the unshear commands are at the bottom. These commands shear or unshear all selected objects according to the setting of the 3D axis angles.

**Foolishness!** The WildTools 3D Cube contains a programmer's 'Easter egg'—a rite of spring for burned-out programmers. Command-click in the WildTools 3D Cube Window for a bit about me and the loves of my life. As you can see, I am a man of many riches. In sequence, the photos are: Brodie, Chester, Brogan, Meredith (6 photos), Kakee (4), Sara (5), nephew Jimmy Stanley, nephew Strother Scott, niece Nollen Scott, me (2), my mother and my late father. Life is too short not to have a little fun along the way.—*Alfred Scott*

### ***Three-Way Constraint***

WildTools 3D introduces a new form of angle constraint, in addition to the two familiar ones.



Choose this for unconstrained angles in the current view plane. When you choose this option, the tool will draw in the current view plane *only*—and angles and lengths will be in the current view plane. Use the Shift key to constrain the angles.



Choose this for constrained angles in the current view plane. When you choose this option, the tool will draw in the current view plane *only*—and angles and lengths will be in the current view plane. Use the Shift key to unconstrain the angles.



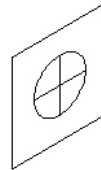
This is new. Choose the ‘draw three-way’ option for drawing or moving objects at an angle constrained to one of the 3D axes. Thus, you can draw or move objects at ‘vertical’ or ‘horizontal’ angles for each of the three view planes, but at *no other angles*. This provides the ability to work in ‘vertical’ and ‘horizontal’ angles without using the WildTools 3D Cube window to change the current view plane. Indeed, using the WildTools 3D Cube window to change the current view plane has no effect on a tool set to ‘draw three-way’. For a tool that operates in ‘draw three-way’ mode, use the Shift key to switch between interactive and fixed-length modes. The Shift key will not affect the angle of the constraint.

### ***In-Plane, Out-of-Plane and Free Rotations***

Much of the extraordinary power of WildTools 3D comes from the ability to draw circles, regular polygons, rods and spirals at literally any direction in space. Most tools can draw only in a single view plane, but when you can draw at any angle, you will see the following choices:



**In-Plane.** A circle, polygon or similar shape that is drawn directly on the current view plane is called 'in-plane'.



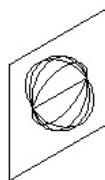
*In-Plane*

Select in-plane if you want to place or draw a shape directly on the current view plane. The diameter of an in-plane circle may be measured in two axes, as indicated by the two lines above, and by two lines in the sample window in a tool's dialog box.

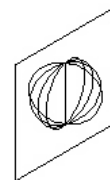
An axonometric drawing is a distortion of reality. An ellipse used to represent a one-inch-diameter circle measures one-inch on the two axis lines, and the major axis of the ellipse is substantially greater than one-inch.



**Out-of-Plane.** If a circle, polygon or similar shape is rotated up/down or left/right relative to the 3D plane, it is called an out-of-plane shape.

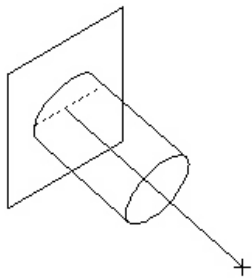


*About Horizontal*



*About Vertical*

Select one of the two out-of-plane choices, in which case the shape is rotated about the 'horizontal' or 'vertical' axis of the 3D plane. The diameter of an out-of-plane circle may be measured in one axis, as indicated by the horizontal or vertical line above, or by a single line in the sample window in a tool's dialog box.

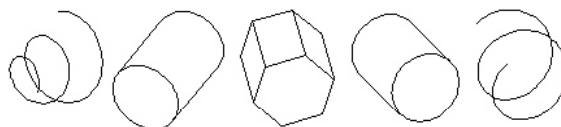


To draw an out-of-plane shape, you click at the center of the object and then move the mouse to draw a line that represents the centerline of a rod, as shown above, or the 'axle of the wheel' in the case of a circle.

When you do this, the angle of the line shown in the Edit Window is a correct 3D angle, thus a line normal to the view plane will be  $0^\circ$ . If you want to draw a rod or circle that is tilted up  $33.5^\circ$  relative to the view plane, just tab into the Edit Window and type the angle.

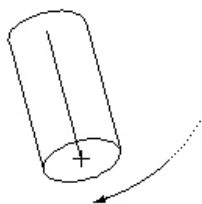
In the case of rods and spirals, the Edit Window will also show the length, and this is also a correct 3D length that you can edit in the Edit Window.

**Free Rotation.** Okay, great. You can draw shafts, nuts, spirals and helical springs of a given length and diameter on the current view plane or tilted up/down/left/right relative to the plane. But life isn't like that, and sometimes you want to draw these things at any angle in space. No problem.

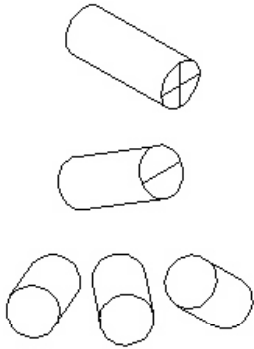


*Free Rotation*

This is known as a 'free rotation', and it solves one of the most difficult problems in drafting and technical illustration.



For a free rotation, begin to draw the shape either in-plane or out-of-plane, and then press and hold the Shift key to rotate the object in three dimensions. Note that if you are drawing a rod with an interactive length, the length is 'frozen' at the time that you press the Shift key. If you don't like the length, then you may release the Shift key and try again. Once you begin a free rotation, you may not use the Edit Window.



Again, let's remember that an axonometric drawing is a distortion of reality. Since 'circles' are dimensionally accurate in two axes for in-plane circles, and in one axis for out-of-plane circles, the major axis length of an ellipse used to represent a circle is longer than the diameter of the circle.

By the same token, a free-rotation circle may not be measured in any convenient way, but it does have a definable size and shape for a given 'diameter'. The major axis length of the ellipse used is the same as for the in-plane and out-of-plane 'circles', and the minor axis length is computed as a location on a sphere. This leads to the insanity that if you want to draw a six-inch diameter barrel of a cannon where you are looking directly down the bore of the cannon, the hole will be represented by a circle, but that circle must be larger than six inches. This sort of thing can be mind-boggling, but please-please-please don't call Engineered Software to chat about this 'interesting' phenomenon.



### 3D Shear Tools

The shear tools allow you to shear (distort the geometry of) an object according to the setting of the 3D drawing axes. The real benefit of these tools is that they allow you to click directly on an object, or group of objects, without having to wrestle with the logic of the Shear dialog.

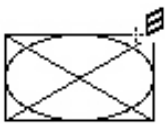
#### To set the 3D drawing axes:

- ☐ Press the Option key and select one of the three Shear tools from the WildTools 3D palette.

—or—

- ☐ Press the Option key and click on the WildTools 3D Cube window.

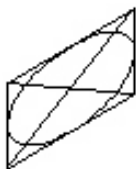
Set the angles in the dialog as described above in ‘Setting Up the 3D Drawing Axes’.



#### To shear an object:

- ☐ Select the appropriate (front, side, or top) Shear tool from the WildTools 3D tool palette. The cursor will indicate the direction of the shear action.

You may press the Option key to reverse the direction of the shear action. The cursor will change to indicate the direction of the shear.



- ☐ Click on an object in the drawing.

The object will be sheared. Because these tools work on single objects, it is always best to group all objects in a view before using one of these tools on them.

Because the Option key reverses the default shear of each tool, there are four 3D presentations that can be created with these tools. The two ‘side’ views are intuitively clear, but the ‘top’ shear is often confusing, so if it doesn’t work in the desired direction, undo and then try it in the other direction.

The WildTools 3D Cube window contains a popup menu to do the same as the 3D Shear and Unshear tools to all selected objects.

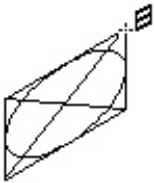


### 3D UnShear Tools

The Unshear tools allow you to unshear an object according to the setting of the 3D drawing axes. These tools reverse the action of the 3D Shear tools, thus they provide a method to take an object, or a group of objects, that has been sheared into a 3D view and convert it back into an orthogonal presentation.

#### To unshear an object:

- ☐ Select the appropriate (front, side, or top) Unshear tool from the WildTools 3D tool palette. The cursor will indicate the direction of the shear action.



You may press the Option key to reverse the direction of the shear action. The cursor will change to indicate the direction of the shear.



- ☐ Click on an object in the drawing.

The object will be unsheared. Because these tools work on single objects, it is always best to group all objects in a view before using one of these tools on them.

Because the Option key reverses the default unshear of each tool, there are four 3D presentations that can be created with these tools. The two 'side' views are intuitively clear, but the 'top' unshear is often confusing, so if it doesn't work in the desired direction, undo and then try it in the other direction.

The WildTools 3D Cube window contains a popup menu to do the same as the 3D Shear and Unshear tools to all selected objects.

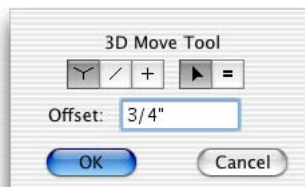


## 3D Move Tool

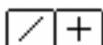
The 3D Move tool allows you to move selected objects by drawing a line with the mouse. The direction of the moves are relative to the current view plane or constrained to the 3D axes.

### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Move tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose 'draw three-way' if the tool will be constrained to moves in the direction of one of the 3D axes.
- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles in the current view plane.
- ☐ Choose whether the tool offset length will be interactive (arrow) or to a fixed-length (equal sign). This option is only available for 'draw three-way' moves.
- ☐ Type the length of the fixed-offset that will be used for fixed-length moves in 'draw three-way'.



### To move objects at angles in the current view plane:

- ☐ Set the tool as described above to constrained or unconstrained.
- ☐ Select the 3D Move tool from the WildTools 3D palette. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects".
- ☐ Use the tool like the WildTools Linear Move tool—please see the documentation for that tool. The only difference is that the angles and lengths are in the current view plane.



### To move objects in 'draw three-way':

- ☐ Set the tool as described above to 'draw three-way'.
- ☐ Select the 3D Move tool from the WildTools 3D palette. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects".
- ☐ Place the Move cursor at a location in the drawing that will represent the starting point of the move.
- ☐ Drag away from the starting point in the desired direction of the move, which is restricted to one of the 3D axis angles—the closest angle to your mouse movement.

If the tool is set to an interactive length, you may press the Shift key to constrain the move to the pre-set offset length.

If the tool is set to a fixed length, you may press the Shift key to make the length of the move interactive.

- ☐ You may tab into the Edit Window to edit the length of the move while in the process of drawing the line.

The selected objects will be moved.

### *Adopting an Offset*

The 3D Move tool provides a quick way to adopt the length of a line in the drawing as the offset length for the tool.



### To adopt an offset:

- ☐ Select the 3D Move tool.
- ☐ Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- ☐ Click on a line in the drawing.

The length of the line will be adopted as the active offset length of the 3D Move tool.

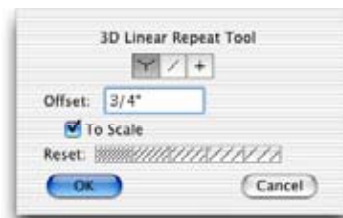


### 3D Linear Repeat Tool

The 3D Linear Repeat tool allows you to create a number of linear duplications of selected objects by drawing a line with the mouse. Except for the way angles are handled, it operates exactly like the Linear Repeat tool in WildTools.

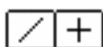
#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Linear Repeat tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose 'draw three-way' if the tool will be constrained to duplications in the direction of one of the 3D axes.
- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles in the current view plane.

All other choices are the same as the WildTools Linear Repeat tool. Please see the documentation for that tool.



#### To duplicate objects in the current view plane:

- ☐ Set the tool as described above to constrained or unconstrained.
- ☐ Select the 3D Linear Repeat tool from the WildTools 3D palette. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects".
- ☐ Use the tool like the WildTools Linear Repeat tool. The only difference is that the angles and lengths are in the current view plane.



#### To duplicate objects in 'draw three-way':

- ☐ Set the tool as described above to 'draw three-way'.
- ☐ Select the 3D Linear Repeat tool from the WildTools 3D palette. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects".
- ☐ Use the tool like the WildTools Linear Repeat tool. The only difference is that the angle of the duplication is restricted to one of the 3D axis angles—the closest angle to your mouse movement.

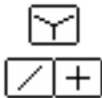
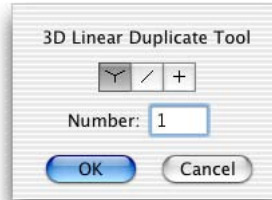


### 3D Linear Duplicate Tool

The 3D Linear Duplicate tool allows you to create a number of linear duplications of selected objects by drawing a line with the mouse. Except for the way angles are handled, it operates exactly like the Linear Duplicate tool in WildTools.

#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Linear Duplicate tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose 'draw three-way' if the tool will be constrained to duplications in the direction of one of the 3D axes.
- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles in the current view plane.
- ☐ Type the number of duplications.



#### To duplicate objects in the current view plane:

- ☐ Set the tool to constrained or unconstrained.
- ☐ Select the 3D Linear Duplicate tool. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects".
- ☐ Use the tool like the WildTools Linear Duplicate tool—please see the documentation for that tool. The only difference is that the angles and lengths are in the current view plane.



#### To duplicate objects in 'draw three-way':

- ☐ Set the tool to 'draw three-way'.
- ☐ Select the 3D Linear Duplicate tool. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects".
- ☐ Use the tool like the WildTools Linear Duplicate tool—please see the documentation for that tool. The only difference is that the angle of the duplication is restricted to one of the 3D axis angles—the closest angle to your mouse movement.

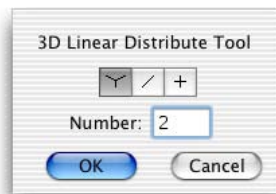


### 3D Linear Distribute Tool

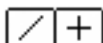
The 3D Linear Distribute tool allows you to do a number of linear duplications of selected objects by drawing a line with the mouse. Except for the way angles are handled, it operates exactly like the Linear Distribute tool in WildTools.

#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Linear Distribute tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose 'draw three-way' if the tool will be constrained to duplications in the direction of one of the 3D axes.
- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles in the current view plane.
- ☐ Type the number of duplications.



#### To duplicate objects in the current view plane:

- ☐ Set the tool as described above to constrained or unconstrained.
- ☐ Select the 3D Linear Distribute tool. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects".
- ☐ Use the tool like the WildTools Linear Distribute tool—please see the documentation for that tool. The only difference is that the angles and lengths are in the current view plane.



#### To duplicate objects in 'draw three-way':

- ☐ Set the tool as described above to 'draw three-way'.
- ☐ Select the 3D Linear Distribute tool. If no objects are selected, the Arrow cursor will be active. See "Transformation Tools—Selecting Objects".
- ☐ Use the tool like the WildTools Linear Distribute tool—please see the documentation for that tool. The only difference is that the angle of the duplication is restricted to one of the 3D axis angles—the closest angle to your mouse movement.



### 3D Mirror Tool

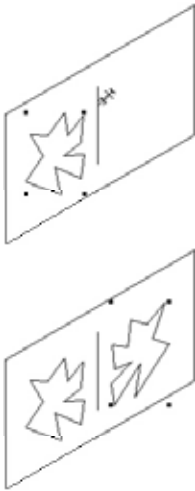
The 3D Mirror tool mirrors selected objects about a line or guideline. The mirroring is done in the current view plane.

#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Mirror tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose if you want the objects to be copied, in which case the object will be duplicated and mirrored about the line. If you do not select Copy Objects, then the objects will be mirrored about the line.



The tool allows you to mirror objects by clicking on a line in the drawing, or by drawing a line with the mouse.

#### To mirror selected objects by clicking on a line:

- ☐ Select the 3D Mirror tool from the WildTools 3D palette. The cursor will change to a Picklefork cursor. If no objects are selected, the Arrow cursor will be active. See “Transformation Tools—Selecting Objects”.
- ☐ Click on any line in the drawing—even in a group—to indicate the line about which the objects are to be mirrored.

The selected objects will be mirrored about the line, and in the current view plane.

Before you click on the line in the drawing, you may press the ‘P’ key to ask for a perpendicular snap. In this case, the mirroring will be about a line that’s perpendicular to the center point of the line that you click on.

Be aware that the mirroring is only correct for objects that are in the same plane as the line, and that if you have multiple objects for 3D depictions that have ‘depth’ relative to the plane that the line is in, the mirroring will be incorrect. Remember, the objects are ‘lines on paper’, and they contain no three-dimensional geometry.

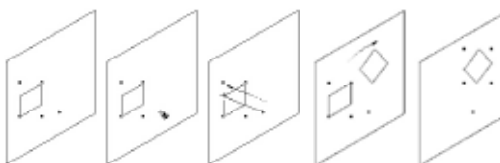
**To mirror selected objects by drawing a line:**

- ☐ Select the 3D Mirror tool from the WildTools 3D palette. If no objects are selected, the Arrow cursor will be active. See “Transformation Tools—Selecting Objects”.
- ☐ Place the cursor at a location in the drawing that will represent the starting point of the line. Press the mouse button.
- ☐ Drag away from the starting point.
- ☐ Release the mouse button to complete the line.

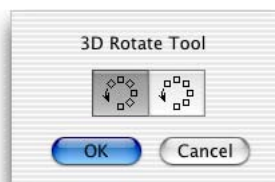
The selected objects will be mirrored about this line, and in the current view plane.

**3D Rotate Tool**

The 3D Rotate tool allows you to rotate selected objects in the current view plane by drawing an arc with the mouse.

**To set the behavior of the tool:**

- ☐ Press the Option key and select the 3D Rotate tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Select whether the objects are to be rotated about the center of the rotation point, or whether they are merely to be moved in a rotational direction.

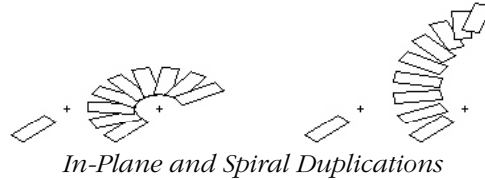
**To rotate objects with the 3D Rotate tool:**

- ☐ Press the Option key and select the 3D Rotate tool from the WildTools 3D palette. If no objects are selected, the Arrow cursor will be active. See “Transformation Tools—Selecting Objects”.
- ☐ Use the tool like the WildTools Rotate tool. The only difference is that the rotation is in the current view plane.



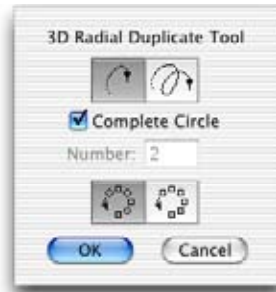
### 3D Radial Duplicate Tool

The 3D Radial Duplicate tool allows you to radially duplicate selected objects in the current view plane by drawing an arc with the mouse. Spiral duplications are also available.



#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Radial Duplicate tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose in-plane or spiral duplication.
- ☐ If Complete Circle is selected, the number of duplicates will be determined automatically so that they are evenly distributed through 360°. This option is not available for spiral duplications.
- ☐ If Complete Circle is not selected or available, you may type the desired number of duplicates.
- ☐ Select whether the objects are to be rotated about the center of the rotation point, or whether they are merely to be moved in a rotational direction.



#### To duplicate objects in-plane:

- ☐ Set the tool to in-plane.
- ☐ Select the 3D Radial Duplicate tool. If no objects are selected, the Arrow cursor will be active. See “Transformation Tools—Selecting Objects”.
- ☐ Use the tool like the WildTools Radial Duplicate tool—please see the documentation for that tool. The only difference is that the rotation is in the current view plane.



### To duplicate objects in a spiral:

- ☐ Set the tool to spiral duplication.
- ☐ Select the 3D Radial Duplicate tool. If no objects are selected, the Arrow cursor will be active. See “Transformation Tools—Selecting Objects”.



- ☐ Place the cursor in a location that will represent the center of the rotation. Press the mouse button.



- ☐ Drag away from the starting point until you reach the desired starting angle and release the mouse at the end of the line.

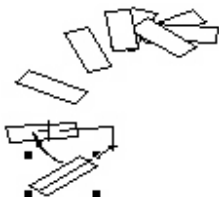
- ☐ You may tab into the Edit Window to edit the starting angle while in the process of drawing the line.



- ☐ Move the cursor in the direction that you want the spiral to go. This will automatically be normal to the current view plane.

- ☐ You may tab into the Edit Window to edit the length of this line, which will establish the offset distance of each rotation.

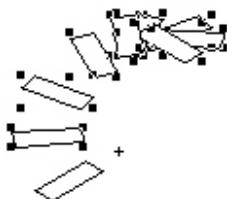
When the line has reached the desired offset, click to establish the line.



- ☐ Move the cursor in the direction you want to rotate the objects. As you move the cursor, the selected objects will be rotated, duplicated and offset in a spiral direction. When the objects have reached the desired rotation angle, click to establish the angle.

- ☐ You may tab into the Edit Window to edit this rotation angle while in the process of moving the cursor after mouse release.

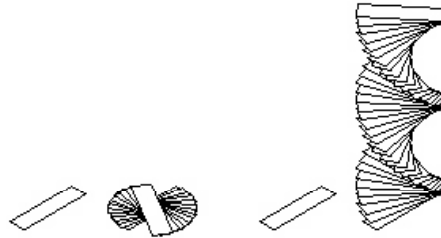
The selected objects will be radially duplicated in a spiral.





### 3D Radial Repeat Tool

The 3D Radial Repeat tool allows you to radially duplicate selected objects in the current view plane by drawing an arc with the mouse. Spiral duplications are also available.

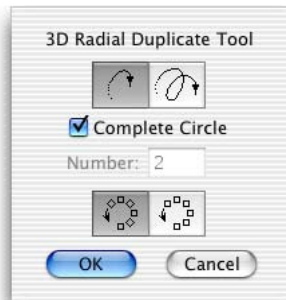


*In-Plane and Spiral Duplications*

The repeat angle is set in the tool's dialog, and the number of duplications is determined by the angle of the arc that you draw. Thus the number of duplications depends on the angle that you indicate—the farther you drag, the more objects are duplicated. In the case of a spiral duplication, you may have any number of complete revolutions.

#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Radial Repeat tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose in-plane or spiral duplications.
- ☐ Type the angle of each duplication.
- ☐ Select whether the objects are to be rotated about the center of the rotation point, or whether they are merely to be moved in a rotational direction.
- ☐ If spiral duplication is selected, you may type the offset of each duplication. The standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ If the To Scale option is selected, the offset will be to the drawing scale, if not, the offset will be an on-paper length.



### To duplicate objects in-plane:

- ☐ Set the tool as described above to in-plane.
- ☐ Select the 3D Radial Repeat tool. If no objects are selected, the Arrow cursor will be active. See “Transformation Tools—Selecting Objects”.
- ☐ Use the tool like the WildTools Radial Repeat tool—please see the documentation for that tool. The only difference is that the rotation is in the current view plane.



### To duplicate objects in a spiral:

- ☐ Set the tool as described above to spiral duplication.
- ☐ Select the 3D Radial Repeat tool. If no objects are selected, the Arrow cursor will be active. See “Transformation Tools—Selecting Objects”.
- ☐ Use the same drawing action as described above for the 3D Radial Duplicate tool. In this case, the length of the second line is not important—only the direction—and the total number of revolutions is determined by moving the cursor around the end of this line as many times as you like.

The selected objects will be radially duplicated in a spiral.



## 3D Radial Distribute Tool

The 3D Radial Distribute tool allows you to radially duplicate selected objects in the current view plane by drawing an arc with the mouse. Spiral duplications are also available.

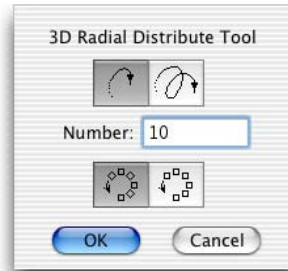


*In-Plane and Spiral Duplications*

This tool is exactly like the 3D Radial Duplicate tool described above, except that the mouse movement is used to indicate the overall arc angle of the duplications. Thus the mouse is used to determine the angle of the last duplication, and all intermediate objects are evenly distributed along this arc.

### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Radial Distribute tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose in-plane or spiral duplications.
- ☐ Type the desired number of duplications.
- ☐ Select whether the objects are to be rotated about the center of the rotation point, or whether they are merely to be moved in a rotational direction.



### To duplicate objects in-plane:

- ☐ Set the tool as described above to in-plane.
- ☐ Select the 3D Radial Distribute tool. If no objects are selected, the Arrow cursor will be active. See “Transformation Tools—Selecting Objects”.
- ☐ Use the tool like the WildTools Radial Distribute tool—please see the documentation for that tool. The only difference is that the rotation is in the current view plane.



### To duplicate objects in a spiral:

- ☐ Set the tool as described above to spiral duplication.
- ☐ Select the 3D Radial Distribute tool. If no objects are selected, the Arrow cursor will be active. See “Transformation Tools—Selecting Objects”.
- ☐ Use the tool like the 3D Radial Duplicate tool described above.



## 3D Swirl Tool

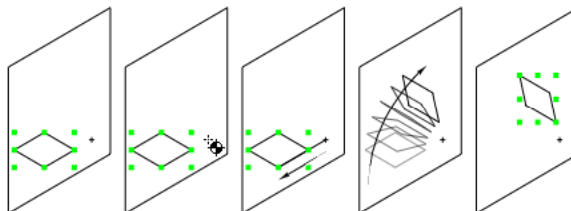
This tool is the same as the Swirl tool except that it operates in the current view plane and also in a spiral across the current view plane.





### 3D Axial Rotate Tool

The 3D Axial Rotate tool allows you to rotate selected objects about an axis that is perpendicular to the current view plane by drawing an arc with the mouse in the current view plane.

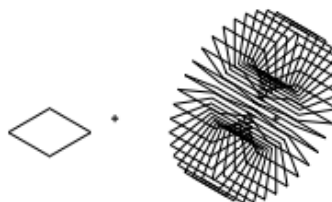


Thus, it operates exactly like the 3D Rotate tool except that the objects must be cross-plane. Also, the initial line that you draw must be directly in-line with objects.



### 3D Axial Duplicate Tool

This tool is the same as the 3D Radial Duplicate tool except that it rotates the objects about an axis that is perpendicular to the current view plane.



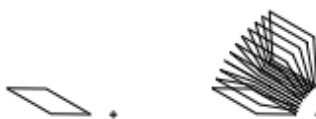
### 3D Axial Repeat Tool

This tool is the same as the 3D Radial Repeat tool except that it rotates the objects about an axis that is perpendicular to the current view plane.



### 3D Axial Distribute Tool

This tool is the same as the 3D Radial Distribute tool except that it rotates the objects about an axis that is perpendicular to the current view plane.





### 3D Move Points Tool

The tool is identical to the WildTools Move Points tool except that it operates in the current view plane.



### 3D Offset Point Tool

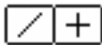
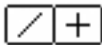
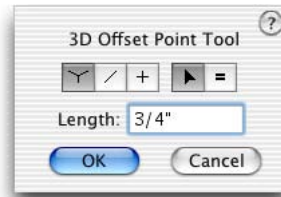
The 3D Offset Point tool is a ‘measure and mark’ tool that allows you to place a reference point by drawing a line with the mouse. The direction of the line is relative to the current view plane or constrained to the 3D axes.



This tool uses the Point style. This is optional; see ‘Basic Concepts—Tool Attributes’.

#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Offset Point tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose ‘draw three-way’ if the tool will be constrained to drawing in the direction of one of the 3D axes.
- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles in the current view plane.
- ☐ Choose whether the tool offset length will be interactive (arrow) or to a fixed-length (equal sign). This option is only available for ‘draw three-way’.
- ☐ Type the length of the fixed-offset that will be used for fixed-length offsets in ‘draw three-way’.

#### To place an offset point in the current view plane:

- ☐ Set the tool to constrained or unconstrained.
- ☐ Select the 3D Offset Point tool.
- ☐ Place the cursor at a location in the drawing that will represent the starting point of a line.
- ☐ Drag away from the starting point in the desired direction of the line.

If the tool is set to be unconstrained, you may press the Shift key to constrain the line to snap angles.

If the tool is set to be constrained to snap angles, you may press the Shift key to unconstrain the line.

In the process of drawing the line, you may press the Option key to toggle between normal drawing and drawing in the opposite direction.

△ In the process of drawing the line, you may tab into the Edit Window to edit the length and angle of the line.

□ Release the mouse to complete the line.  
A reference point will be placed at the end of the line.



#### **To place an offset point in 'draw three-way':**

- Set the tool to 'draw three-way'.
- Select the 3D Offset Point tool.
- Place the cursor at a location in the drawing that will represent the starting point of a line.
- Drag away from the starting point in the desired direction of the line, which is restricted to one of the 3D axis angles—the closest angle to your mouse movement.

If the tool is set to an interactive length, you may press the Shift key to constrain the line to the pre-set length.

If the tool is set to a fixed length, you may press the Shift key to make the length of the line interactive.

△ In the process of drawing the line, you may tab into the Edit Window to edit the length of the line.

□ Release the mouse to complete the line.  
A reference point will be placed at the end of the line.

#### ***Adopting an Offset***

The 3D Offset Point tool provides a quick way to adopt the length of a line in the drawing as the offset length for the tool.

#### **To adopt an offset:**

- Select the 3D Offset Point tool.
- Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- Click on a line in the drawing.



The length of the line will be adopted as the active offset length of the 3D Offset Point tool.



### 3D Points Along Tool

This tool is identical to the WildTools Points Along tool except that it draws in the current view plane.



### 3D Construction Point Tool

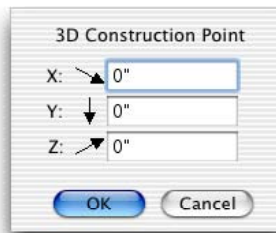
The 3D Construction Point tool is used to place offset 3D points. This tool may be used in place of construction lines in an axonometric drawing. It's very common in such a drawing to have to measure along each of the X, Y and Z axes to locate a point in the drawing. This tool reduces these steps to a single operation.



This tool uses the Point style. This is optional; see 'Basic Concepts—Tool Attributes'.

#### To set the offsets of the tool:

- ☐ Press the Option key and select the 3D Construction Point tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Type the offset dimensions. The standard PowerCADD math functions and mixed dimensional units may be used.

#### To use the 3D Construction Point tool:

- ☐ Select the 3D Construction Point tool from the WildTools 3D palette. The point's relative position to the cursor is shown by a ghosted point which moves with the cursor.
- ☐ Click in the drawing.

A point will be placed in the drawing at the relative location specified in the dialog box.



### 3D Line Tool

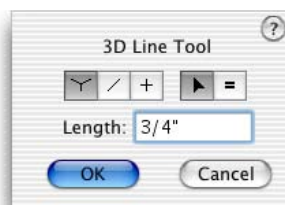
The 3D Line tool allows you to draw a line with the mouse. The direction of the line is relative to a 3D plane or constrained to the 3D axes.



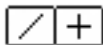
This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Line tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose 'draw three-way' if the tool will be constrained to drawing in the direction of one of the 3D axes.
- ☐ Choose whether the tool will be constrained (cross) or unconstrained (diagonal line) to snap angles in the current view plane.
- ☐ Choose whether the tool's line length will be interactive (arrow) or to a fixed-length (equal sign). This option is only available for 'draw three-way'.
- ☐ Type the length that will be used for fixed-length lines in 'draw three-way'.



#### To draw a line at angles in the current view plane:

- ☐ Set the tool as described above to constrained or unconstrained.
- ☐ Select the 3D Line tool from the WildTools 3D palette.
- ☐ Place the cursor at a location in the drawing that will represent the starting point of the line.
- ☐ Drag away from the starting point in the desired direction of the line.

If the tool is set to be unconstrained, you may press the Shift key to constrain the line to snap angles.

If the tool is set to be constrained to snap angles, you may press the Shift key to unconstrain the line.

In the process of drawing the line, you may press the Option key to toggle between normal drawing and drawing from center.

△ In the process of drawing the line, you may tab into the Edit Window to edit the length and angle of the line.

□ Release the mouse to complete the line.  
A line will be placed in the drawing.



**To draw a line in 'draw three-way':**

- Set the tool as described above to 'draw three-way'.
- Select the 3D Line tool from the WildTools 3D palette.
- Place the cursor at a location in the drawing that will represent the starting point of the line.
- Drag away from the starting point in the desired direction of the line, which is restricted to one of the 3D axis angles—the closest angle to your mouse movement.

If the tool is set to an interactive length, you may press the Shift key to constrain the line length to the pre-set length.

If the tool is set to a fixed length, you may press the Shift key to make the length of the line interactive.

△ In the process of drawing the line, you may tab into the Edit Window to edit the length of the line.

□ Release the mouse to complete the line.  
A line will be placed in the drawing.

***Adopting a Line Length***

The 3D Line tool provides a quick way to adopt the length of a line in the drawing as the pre-set length for the tool.

**To adopt a line length:**

- Select the 3D Line tool.
- Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- Click on a line in the drawing.

The length of the line will be adopted as the current pre-set length of the 3D Line tool.



**3D Parallel Line Tool**

This tool is identical to the WildTools Parallel Line tool except that it draws in the current view plane.



### 3D Center Mark Tool

The 3D Center Mark tool places a vertical and horizontal centerline at the center of an ellipse that represents a circle in the drawing.

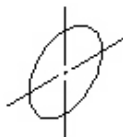


This tool uses the Centerline style. This is optional; see 'Basic Concepts—Tool Attributes'.



#### To use the 3D Center Mark tool:

- ☐ Select the 3D Center Mark tool from the WildTools 3D palette.
- ☐ Place the cursor on an ellipse in the drawing on which the centerlines are to be placed and click the mouse. The ellipse must be of the correct proportions to represent a circle in one of the three planes in the current 3D setup.



The centerlines will be placed in the drawing.



### 3D Wavy Line Tool

This tool is identical to the WildTools Wavy Line tool except that it draws in the current view plane.



### 3D Grid Line Tool

This tool is identical to the WildTools Grid Line tool except that it draws in the current view plane.



### 3D Bracket Tool

This tool is identical to the WildTools Bracket tool except that it draws in the current view plane.



### 3D Rectangle Tool

This tool is identical to the WildTools Rectangle tool except that it draws in the current view plane.



### 3D Rotated Rectangle Tool

This tool is identical to the WildTools Rotated Rectangle tool except that it draws in the current view plane.



### 3D Rounded Rectangle Tool

This tool is identical to the WildTools Rounded Rectangle tool except that it draws in the current view plane.



### 3D Slot Tool

This tool is identical to the WildTools Slot tool except that it draws in the current view plane.



### 3D Circle from Center Tool

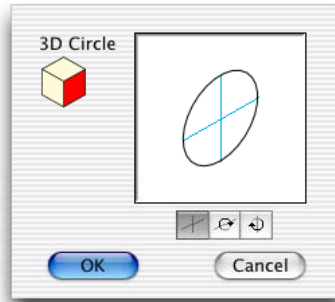
This tool draws dimensionally correct ‘circles’ in the current view plane.



This tool uses the Normal style. This is optional; see ‘Basic Concepts—Tool Attributes’.

#### To set the offsets of the tool:

- ☐ Press the Option key and select the 3D Circle from Center tool from the WildTools 3D palette. The following dialog will appear:

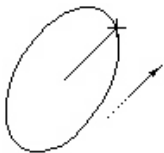


- ☐ Click on a side of the cube control to change the current view plane.
- ☐ Select in-plane if you want to place or draw the circle directly in the current view plane.
- ☐ Alternatively, you may select one of the two out-of-plane choices, in which case the circle is rotated about the ‘horizontal’ or ‘vertical’ axis of the current view plane. The diameter of these circles may be measured in one axis, as indicated by the solid line in the sample window in the dialog box.

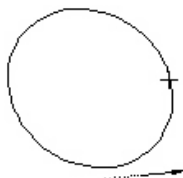
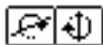


#### To draw an in-plane circle with this tool:

- ☐ Set the tool to in-plane.
- ☐ Select the 3D Circle from Center tool.
- ☐ Place the cursor in the drawing at a location that will represent the center of the circle. Press the mouse button.
- ☐ Drag away from the starting point to enlarge the circle.
- ☐ The diameter of the circle will show in the Edit Window, and you may tab into the Edit Window to edit the diameter.
- ☐ Release the mouse button to complete the circle.



The circle will be placed in the drawing.



### To draw an out-of-plane circle with this tool:

- ☐ Set the tool to out-of-plane.
- ☐ Select the 3D Circle from Center tool.
- ☐ Place the cursor in the drawing at a location that will represent the center of the circle. Press the mouse button.
- ☐ Drag away from the starting point to set the tilt angle of the circle. The line that you drag will be the 'axle of the wheel'.

△ You may tab into the Edit Window to edit the angle.

- ☐ Release the mouse button to set the angle of the circle.
- ☐ Drag away from the center of the circle to enlarge the circle.

△ The diameter of the circle will show in the Edit Window, and you may tab into the Edit Window to edit the diameter.

- ☐ Release the mouse button to complete the circle.
- The circle will be placed in the drawing.

### To draw a free-rotation circle with this tool:

- ☐ Set the tool to out-of-plane.
- ☐ Select the 3D Circle from Center tool.
- ☐ Place the cursor in the drawing at a location that will represent the center of the circle. Press the mouse button.
- ☐ Drag away from the starting point to set the tilt angle of the circle. The line that you drag will be the 'axle of the wheel'.
- ☐ Press and hold the Shift key to enter free rotation.
- ☐ Move the mouse to change the angle of the circle.
- ☐ Release the mouse button to set the angle of the circle.
- ☐ Drag away from the center of the circle to enlarge the circle.

△ The diameter of the circle will show in the Edit Window, and you may tab into the Edit Window to edit the diameter.

- ☐ Release the mouse button to complete the circle.

The circle will be placed in the drawing. However, as described in 'In-Plane, Out-of-Plane and Free Rotations', the diameter may make little sense to you if you draw an ellipse that is a true circle or nearly so.



### 3D Fixed Circle Tool

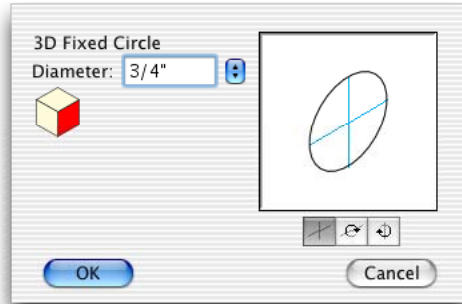
The 3D Fixed Circle tool allows you to place dimensionally correct fixed-diameter ‘circles’ in the current view plane.



This tool uses the Normal style. This is optional; see ‘Basic Concepts—Tool Attributes’.

#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Fixed Circle tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Type the diameter—the standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ Use the popup menu to set the diameter to standard fractional-inch, number and letter drill sizes.
- ☐ Click on a side of the cube control to change the current view plane.
- ☐ Select in-plane if you want to place or draw the circle directly in the current view plane.
- ☐ Alternatively, you may select one of the two out-of-plane choices, in which case the circle is rotated about the ‘horizontal’ or ‘vertical’ axis of the current view plane. The diameter of these circles may be measured in one axis, as indicated by the solid line in the sample window in the dialog box.

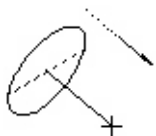
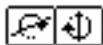


#### To place an in-plane circle:

- ☐ Set the tool to in-plane.
- ☐ Select the 3D Fixed Circle tool. As you move the mouse, a circle will be ghosted on the screen.
- ☐ Click in the drawing.

The circle will be placed in the drawing.

This tool uses the ‘timed-fallout’ method described in ‘Basic Concepts—Tool-Fallout’.



### To place an out-of-plane circle:

- ☐ Set the tool as described above to out-of-plane.
- ☐ Select the 3D Fixed Circle tool. As you move the mouse, a circle will be ghosted on the screen.
- ☐ Place the cursor in the drawing at a location that will represent the center of the circle. Press the mouse button.
- ☐ Drag away from the starting point to set the tilt angle of the circle. The line that you drag will be the 'axle of the wheel'.

△ You may tab into the Edit Window to edit the angle.

- ☐ Release the mouse button to set the angle of the circle. The circle will be placed in the drawing.

### To draw a free-rotation circle with this tool:

- ☐ Set the tool as described above to out-of-plane.
- ☐ Select the 3D Fixed Circle tool. As you move the mouse, the fixed-diameter circle will be ghosted on the screen.
- ☐ Place the cursor in the drawing at a location that will represent the center of the circle. Press the mouse button.
- ☐ Drag away from the starting point to set the tilt angle of the circle. The line that you drag will be the 'axle of the wheel'.
- ☐ Press and hold the Shift key to enter free rotation.
- ☐ Move the mouse to change the angle of the circle.
- ☐ Release the mouse button to place the circle.

The circle will be placed in the drawing. However, as described in 'In-Plane, Out-of-Plane and Free Rotations', the diameter may make little sense to you if you draw an ellipse that is a true circle or nearly so.

An easy way to set the diameter of the circle is to adopt the diameter of an existing isometric ellipse (representing a circle) in the drawing. To do this, Option-click on an isometric ellipse (representing a circle) in the drawing to adopt the diameter of the 'circle'.



### 3D Circle by Two Points Tool

This tool is identical to the WildTools Circle by Two Points tool except that it draws in the current view plane.



### 3D Circle by Three Points Tool

This tool is identical to the WildTools Circle by Three Points tool except that it draws in the current view plane.



### 3D Ellipse Tool

This tool is identical to the WildTools Ellipse tool except that it draws in the current view plane.



### 3D Rotated Ellipse Tool

This tool is identical to the WildTools Rotated Ellipse tool except that it draws in the current view plane.



### 3D Arc from Center Tool

This tool is identical to the WildTools Arc from Center tool except that it draws in the current view plane.



### 3D Arc Three Points Tool

This tool is identical to the WildTools Arc Three Points tool except that it draws in the current view plane.



### 3D Arc by Chord Tool

This tool is identical to the WildTools Arc by Chord tool except that it draws in the current view plane.



### 3D Semicircle Tool

This tool is identical to the WildTools Semicircle tool except that it draws in the current view plane.



### 3D Elliptical Arc Tool

This tool is identical to the WildTools Elliptical Arc tool except that it draws in the current view plane.



### 3D Polygon Tool

This tool is identical to the WildTools Polygon tool except that it draws in the current view plane.



### 3D Parallel Polygon Tool

This tool is identical to the WildTools Parallel Polygon tool except that it draws in the current view plane.



### 3D Square Polygon Tool

This tool is identical to the WildTools Square Polygon tool except that it draws in the current view plane.



### 3D Cloud Tool

This tool is identical to the WildTools Cloud tool except that it draws in the current view plane.



### 3D Regular Polygon Tool

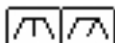
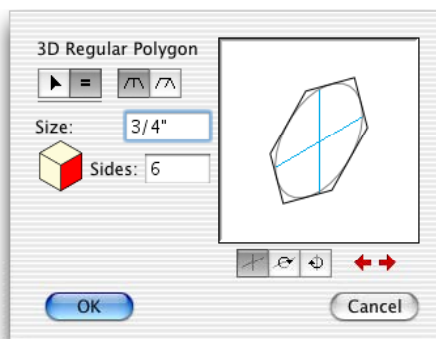
The 3D Regular Polygon tool allows you to place or draw regular polygons in the current view plane. The polygons may be of a fixed size or drawn interactively with the mouse.



This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Regular Polygon tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose whether the tool will draw interactively (arrow) or place a fixed-size polygon (equal sign).
- ☐ Choose whether the polygon will be placed by size (measured across the flats) or by the enclosing diameter.
- ☐ If you've selected a fixed-size polygon, type the size or diameter. The standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ Click on a side of the cube control to change the current view plane.
- ☐ Type the number of sides that you want.
- ☐ Select in-plane if you want to place or draw the polygon directly in the current view plane.
- ☐ Alternatively, you may select one of the two out-of-plane choices, in which case the polygon is rotated about the 'horizontal' or 'vertical' axis of the current view plane. The size/diameter of these polygons may be measured in one axis, as indicated by the solid line in the sample window in the dialog box.
- ☐ Click on the arrow buttons to adjust the presentation.



### To place a fixed-size, in-plane regular polygon:

- ☐ Set the tool to fixed-size and in-plane.
- ☐ Select the 3D Regular Polygon tool. As you move the mouse, a polygon will be ghosted on the screen.
- ☐ Click in the drawing.

The polygon will be placed in the drawing.

This tool uses the 'timed-fallout' method described in 'Basic Concepts—Tool-Fallout'.



### To place a fixed-size, out-of-plane regular polygon:

- ☐ Set the tool to fixed-size and out-of-plane.
- ☐ Select the 3D Regular Polygon tool. As you move the mouse, a polygon will be ghosted on the screen.
- ☐ Place the cursor at a location that will represent the center of the polygon. Press the mouse button.
- ☐ Drag away from the starting point to set the tilt angle of the polygon. The line you drag will be the 'axle of the wheel'.

△ You may tab into the Edit Window to edit the angle.

- ☐ Release the mouse button to set the angle of the circle.
- The polygon will be placed in the drawing.

### To draw a fixed-size, free-rotation regular polygon:

- ☐ Set the tool to fixed-size and out-of-plane.
- ☐ Select the 3D Regular Polygon tool. As you move the mouse, a polygon will be ghosted on the screen.
- ☐ Place the cursor at a location that will represent the center of the polygon. Press the mouse button.
- ☐ Drag away from the starting point to set the tilt angle of the polygon. The line you drag will be the 'axle of the wheel'.
- ☐ Press and hold the Shift key to enter free rotation.
- ☐ Move the mouse to change the angle of the polygon.
- ☐ Release the mouse button to set the angle of the polygon.

The polygon will be placed in the drawing.

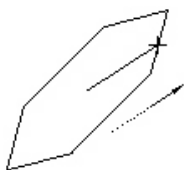
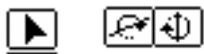


### To place an interactive, in-plane regular polygon:

- ☐ Set the tool as described above to in-plane.
- ☐ Select the 3D Regular Polygon tool.
- ☐ Place the cursor in the drawing at a location that will represent the polygon. Press the mouse button.
- ☐ Drag away from the starting point to enlarge the polygon.

△ The size of the polygon will show in the Edit Window, and you may tab into the Edit Window to edit it.

- ☐ Release the mouse button to complete the polygon. The polygon will be placed in the drawing.



### To place an interactive, out-of-plane regular polygon:

- ☐ Set the tool to interactive and out-of-plane.
- ☐ Select the 3D Regular Polygon tool.
- ☐ Place the cursor at a location that will represent the center of the polygon. Press the mouse button.
- ☐ Drag away from the starting point to set the tilt angle of the polygon. The line you drag will be the 'axle of the wheel'.

△ You may tab into the Edit Window to edit the angle.

- ☐ Release the mouse button to set the angle of the polygon.
- ☐ Drag away from the center of the circle to enlarge the polygon.

△ The size of the polygon will show in the Edit Window, and you may tab into the Edit Window to edit it.

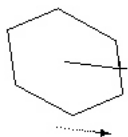
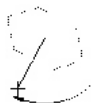
- ☐ Release the mouse button to complete the polygon. The polygon will be placed in the drawing.

### To draw an interactive, free-rotation regular polygon:

- ☐ Set the tool to interactive and out-of-plane.
- ☐ Select the 3D Regular Polygon tool.
- ☐ Place the cursor at a location that will represent the center of the polygon. Press the mouse button.
- ☐ Drag away from the starting point to set the tilt angle of the polygon. The line that you drag will be the 'axle of the wheel'.
- ☐ Press and hold the Shift key to enter free rotation.
- ☐ Move the mouse to rotate the polygon.
- ☐ Release the mouse button to set the angle of the polygon.
- ☐ Drag away from the center to enlarge the polygon.

△ The size of the polygon will show in the Edit Window, and you may tab into the Edit Window to edit it.

- ☐ Release the mouse button to complete the polygon. The polygon will be placed in the drawing.



## 3D Spiral Tool

This tool is identical to the Spiral tool in the Special Curves tool palette except that it draws in the current view plane.

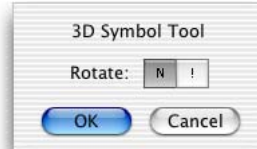


### 3D Symbol Tool

The 3D Symbol tool allows you to place symbol objects stored in a PowerCADD symbol file in the drawing. The symbols are sheared appropriately for the current view plane.

#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Symbol tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose rotation of none (N) or random (!).

The 3D Symbol tool works in a similar but slightly different fashion from the PowerCADD Symbol tool.

#### To use the tool to place a symbol:

- ☐ Make sure a PowerCADD symbol file is open.
- ☐ Select the 3D Symbol tool from the WildTools 3D palette. If no symbol file is open, you will have a 'sad symbol' cursor, you poor thing.
- ☐ Move the cursor to a location in the drawing and press the mouse button.

You may press the Shift key to mirror the object about the vertical axis of the current view plane.

- ☐ Release the mouse to place the object.  
The symbol objects will be placed in the drawing.

This tool uses the 'timed-fallout' method described in 'Basic Concepts—Tool-Fallout'.

#### To use the tool to place a rotated symbol:

- ☐ Make sure a PowerCADD symbol file is open.
- ☐ Select the 3D Symbol tool from the WildTools 3D palette. If no symbol file is open, you will have a 'sad symbol' cursor.
- ☐ Press and hold down the Option key. Move the cursor to a location in the drawing and press the mouse button.

- ❑ Drag the mouse to rotate the symbol.

You may press the Shift key to constrain the angle.

- △ You may tab into the Edit Window to set the angle.

You may press the Option key to mirror the symbol.

- ❑ Release the mouse to place the object.

The symbol objects will be placed in the drawing. Random rotation is ignored in this method of operation.



### 3D Marker Tool

This tool is identical to the WildTools Marker tool except that it draws in the current view plane.



### 3D Linear Patterning Tool

This tool is identical to the WildTools Linear Patterning tool except that it draws in the current view plane. Marker objects are not available here. Note that if you use this tool to pick up an object for the Rubber Stamp tool's private 'clipboard' the object should be drawn in an orthogonal presentation—in other words, it should not be sheared into a 3D depiction.



### 3D Area Patterning Tool

This tool is identical to the WildTools Area Patterning tool except that it draws in the current view plane. Note that if you use this tool to pick up an object for the Rubber Stamp tool's private 'clipboard' the object should be drawn in an orthogonal presentation—in other words, it should not be sheared into a 3D depiction.



### 3D Rod Tool

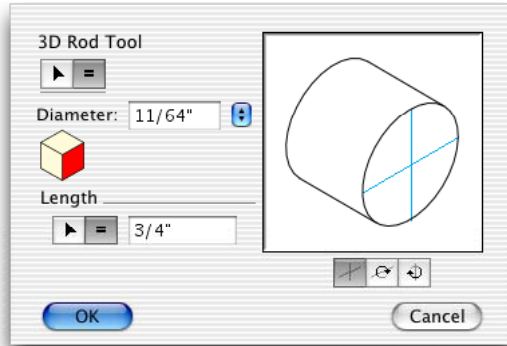
The 3D Rod tool allows you to draw dimensionally correct circular rods in the current view plane.



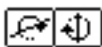
This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

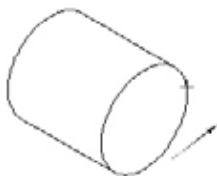
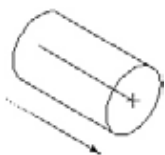
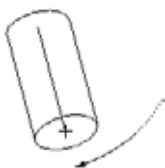
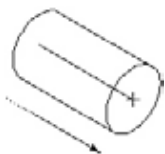
#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Rod tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose if the tool will draw the diameter interactively (arrow) or with a fixed-size diameter (equal sign).
- ☐ If you've selected a fixed-diameter, type the diameter. The standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ Use the popup menu to set the diameter to standard fractional-inch, number and letter drill sizes.
- ☐ Click on a side of the cube control to change the current view plane.
- ☐ Choose whether the tool will draw the length of the rod interactively (arrow) or with a fixed-size length (equal sign).
- ☐ If you've selected a fixed-length, type the rod length. The standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ Select in-plane if you want to place or draw the polygon rod in the current view plane.
- ☐ Alternatively, you may select one of the two out-of-plane choices, in which case the rod is rotated about the 'horizontal' or 'vertical' axis of the current view plane. The diameter of the rod may be measured in one axis, as indicated by the solid line in the sample window in the dialog box.





### To draw a rod with a fixed diameter:

- ☐ Set the tool to fixed-diameter.
- ☐ Select the 3D Rod tool.
- ☐ Place the cursor at a location that will represent the center of one end of the rod. Press the mouse button.
- ☐ Drag away in the desired direction of the rod.

You may press the Option key to toggle the ends of the rod. For more information, see 'Basic Concepts—Option-Toggling'.

- △ You may tab into the Edit Window to set the length and diameter of the rod.

You may press the Shift key for a free-rotation of the rod.

- ☐ Release the mouse to complete the direction of the rod. The rod will be placed in the drawing.

### To draw a rod with an interactive diameter:

- ☐ Set the tool to interactive diameter.
- ☐ Select the 3D Rod tool.
- ☐ Place the cursor at a location that will represent the center of one end of the rod. Press the mouse button.
- ☐ Drag away in the desired direction of the rod.

You may press the Option key to toggle the ends of the rod. For more information, see 'Basic Concepts—Option-Toggling'.

- △ You may tab into the Edit Window to set the length of the rod.

You may press the Shift key for a free-rotation of the rod.

- ☐ Release the mouse to complete the direction of the rod.
- ☐ Drag away to enlarge the rod diameter.

- △ You may tab into the Edit Window to set the diameter of the rod.

- ☐ Release the mouse to complete the rod. The rod will be placed in the drawing.

Like the 3D Fixed Circle tool, you can Option-click on an isometric ellipse (representing a circle) in the drawing to adopt the diameter of the 'circle'.



### 3D Hex Rod Tool

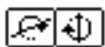
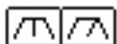
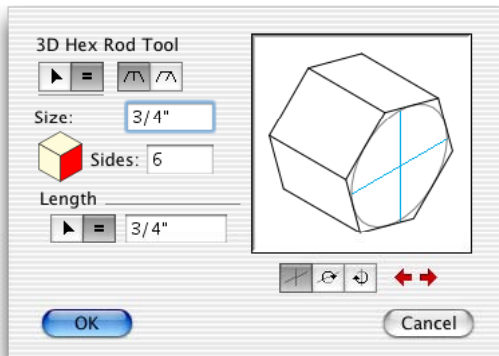
The 3D Hex Rod tool allows you to draw dimensionally correct multi-sided rods in the current view plane.



This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Hex Rod tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose whether the tool will draw the diameter/size interactively (arrow) or place a fixed-size rods (equal sign).
- ☐ Choose whether the rod size will be measured across the flats or by the enclosing diameter.
- ☐ If you've selected a fixed-size rod, type the size or diameter. The standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ Click on a side of the cube control to change the current view plane.
- ☐ Type the number of sides that you want.
- ☐ Select in-plane if you want to place or draw the rod directly in the current view plane.
- ☐ Alternatively, you may select one of the two out-of-plane choices, in which case the rod is rotated about the 'horizontal' or 'vertical' axis of the current view plane. The size/diameter of these rods may be measured in one axis, as indicated by the solid line in the sample window in the dialog box.
- ☐ Click on the arrow buttons to adjust the presentation.



### To draw a rod with a fixed size/diameter:

- ☐ Set the tool to fixed size/diameter.
- ☐ Select the 3D Hex Rod tool.
- ☐ Use the tool in the same manner for the 3D Rod tool as described above.



### To draw a rod with an interactive size/diameter:

- ☐ Set the tool to interactive size/diameter.
- ☐ Select the 3D Hex Rod tool.
- ☐ Use the tool in the same manner for the 3D Rod tool as described above.



## 3D Helix Tool

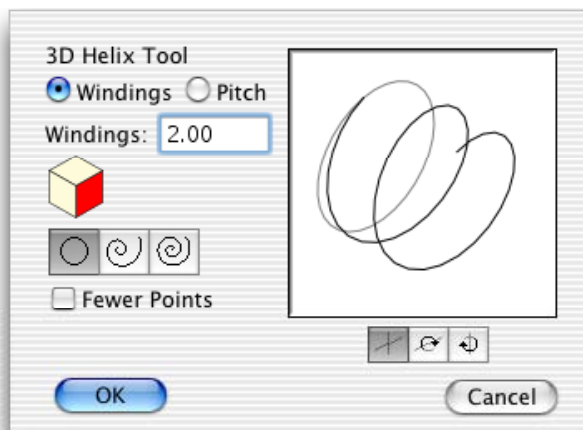
The 3D Helix tool allows you to draw three types of helical spirals, which may be in-plane, out-of-plane or free rotation. These may be used to draw springs, screw threads, handrails on spiral stairs... or frankly, just to play with when you're bored and nobody will talk to you.



This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Helix tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose to define the helical spiral by windings or pitch.
- ☐ Type the number of windings or the pitch for the helical spiral. Pitch is the length per winding.
- ☐ Click on a side of the cube control to change the current view plane.



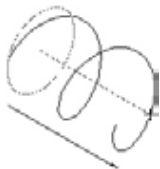
- ☐ Select the type of spiral: circular, logarithmic or arithmetic. See the Spiral tool for an explanation.
- ☐ Select Fewer Points if you want excess points to be removed from the polygon placed. This sort of filtering is automatic with the Spiral tool, but it's optional here since it can create some rough places in the spiral loops. (You may want to try Simplify to remove excess points.)
- ☐ Select in-plane if you want to place or draw the helical spiral directly in the current view plane.
- ☐ Alternatively, you may select one of the two out-of-plane choices, in which case the helical spiral is rotated about the 'horizontal' or 'vertical' axis of the current view plane.

#### To draw a helical spiral:

- ☐ Select the 3D Helical Spiral tool.
- ☐ Place the cursor in the drawing at a location that will represent the outside end of the helical spiral. Press the mouse button.
- ☐ Drag away from the starting point to establish the starting center of the spiral.

For a logarithmic or arithmetic spiral, you may press the Option key to toggle the direction of the spiral between clockwise and counter-clockwise. For more information, see 'Basic Concepts—Option-Toggling'.

- ☐ You may tab into the Edit Window to edit the starting diameter of the spiral.
- ☐ Release the mouse to establish the outside radius and starting center of the helical spiral.
- ☐ Move the mouse away to set the length of the spiral.



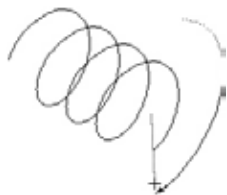
For a circular spiral, you may press the Option key to toggle the direction of the spiral between clockwise and counter-clockwise.

- ☐ You may tab into the Edit Window to edit the length.

You may press the Shift key for a free-rotation of the spiral.

- ☐ Release the mouse to establish the length of the spiral.





- ❑ Move the mouse away to set the end diameter and number of windings. You may wind the spiral either way.

For a logarithmic or arithmetic spiral, you may press the Shift key to constrain the end diameter to the same as the starting diameter. The result will be a circular spiral.

- △ You may tab into the Edit Window to edit the end diameter and number of windings.

- ❑ Release the mouse to complete the spiral. The helical spiral will be placed in the drawing.



Bored? Try this on a new drawing. Set the tool for logarithmic spiral and about 50 windings. Draw a helix. Fill it with a fill color. Hmm. Now, use the Knife tool to slice the helix right down the middle. Hm. Now, use the WildTools Distort Points tool to mess with the shape, or use the Shear and Unshear menu at the top right of the WildTools 3D Cube window. Don't tell your mother you've done this, or she'll make you wash the dishes.



### Hole Shadow Tool

The Hole Shadow tool places a 'shadow' on an ellipse that represents a circle in the drawing. This is a standard way to indicate some depth to a hole in technical illustrations.



#### To use the Hole Shadow tool:

- ❑ Select the Hole Shadow tool from the WildTools 3D palette.
- ❑ Place the cursor on an ellipse in the drawing on which the shadow is to be placed and click the mouse.



The shadow will be placed in the drawing.

The ellipse must be of the correct proportions to represent a circle in one of the three planes in the current 3D setup.



### 3D Parallel Offset Tool

This tool is the same as the WildTools Parallel Offset tool except that it operates in the current view plane.



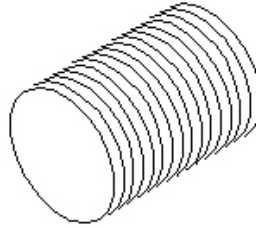
### 3D Thicken Tool

This tool is the same as the WildTools Thicken tool except that it operates in the current view plane.



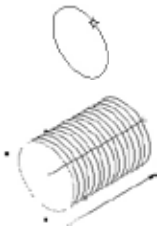
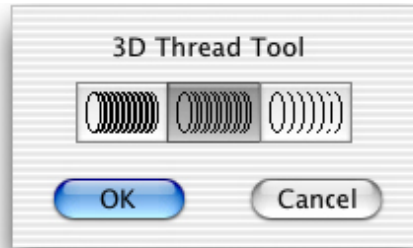
### 3D Thread Tool

The 3D Thread tool allows you to create a repeated series of semicircular arcs by clicking on a circle or ellipse in the drawing and dragging.



#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Thread tool from the WildTools 3D palette. The following dialog will appear:
- ☐ Choose the spacing of the arcs.



#### To use the tool:

- ☐ Select the 3D Thread tool from the WildTools 3D palette.
- ☐ Place the cursor in the drawing on an ellipse or circle. Press the mouse button.
- ☐ Drag away from the ellipse in the direction you want the arcs to go. The farther you drag, the more arcs will be created.

You may press the Option key to toggle the direction of the arcs. For more information, see 'Basic Concepts—Option-Toggling'.

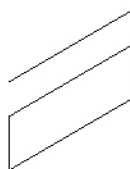
- ☐ You may tab into the Edit Window to set the length of the threads. This length is in the normal PowerCADD 2D coordinate system—i.e. *not* in the current view plane.
- ☐ Release the mouse button to complete the operation.

The arcs will be placed in the drawing.



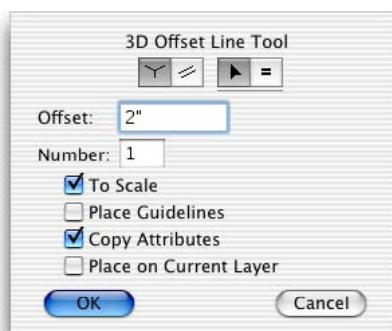
## 3D Offset Line Tool

The 3D Offset Line tool allows you to create a line or guideline that is a parallel offset from a line, guideline, or side of a rectangle or polygon, even if in a group. The offset is in the current view plane or constrained to the 3D axes.



### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Offset Line tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose 'draw three-way' if the tool will be constrained to offsets in the direction of one of the 3D axes.
- ☐ Choose if the tool will place parallel offsets in the current view plane. In this method, the tool works like the WildTools Offset Line tool, except in the current view plane.

All other choices are the same as the WildTools Offset Line tool. Please see the documentation for that tool.



### To use the tool in 'draw three way':

- ☐ Set the tool to 'draw three way'.
- ☐ Select the 3D Offset Line tool.
- ☐ Place the cursor in the drawing on the line or side of a rectangle or polygon. Press the mouse button.
- ☐ Drag away from this line in the direction that you want the offset line to go. The angle of the offset is restricted to one of the 3D axis angles—the closest angle to your mouse movement. In most cases (where the line is already on one of the 3D axis angles) there are only two possible offset angles, and the tool will 'vote' on which is the most logical offset angle.

If you are not happy with the angle choice, you may press the Option key to toggle between two (or possibly three) directions.

If the tool is set to a fixed offset, you may press the Shift key to break the offset free from the constraint of the fixed-offset and to set the offset interactively.

If the tool is set to an interactive offset, you may press the Shift key to constrain the offset to the offset in the dialog box.

△ You may tab into the Edit Window to set the offset and number of offsets for this specific operation. If you do this, the offset operation is complete.

□ Release the mouse button to complete the offset operation.



**To use the tool in the current view plane:**

- Set the tool as described above to place parallel offsets in the current view plane.
- Select the 3D Offset Line tool.

See the documentation for WildTools Offset Line tool.



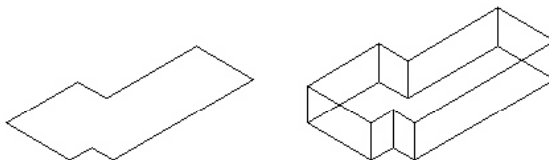
### 3D Offset Repeat Tool

This tool is the same as the WildTools Offset Repeat tool except that it draws in the current view plane. In this case, however, there are no reset buttons here, and you cannot click on text with this tool.



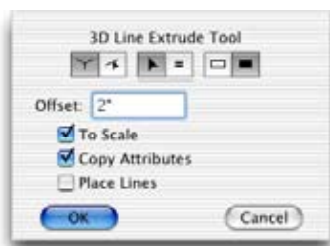
### 3D Line Extrude Tool

The 3D Line Extrude tool operates like the 3D Offset Line tool, except that it creates a new parallelogram polygon. This is useful for extruding floor plans into three-dimensional depictions, or to create shadows in the drawing.



#### To set the behavior of the tool:

- ☐ Press the Option key and select the 3D Line Extrude tool from the WildTools 3D palette. The following dialog will appear:



- ☐ Choose 'draw three-way' if the tool will be constrained to offsets in the direction of one of the 3D axes.
- ☐ Choose if the tool will be free to draw offsets in any direction.
- ☐ Choose whether the tool will be interactive (arrow) or to a fixed-dimension offset (equal sign).
- ☐ Type the fixed-dimension offset—the standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ If you select the To Scale option, the offset will be to the drawing scale, if not, the offset will be an on-paper length.
- ☐ If the Copy Attributes option is selected, the offset line will take on the attributes of the original clicked-on object, otherwise it takes on the attributes of the Normal style.
- ☐ Choose whether you want an outline or filled object. If a filled object is created, the new object will adopt the pen pattern and color as the new fill pattern and color. This option is only available if the Copy Attributes option is selected and the Place Lines option is not selected.
- ☐ If you select the Place Lines option, lines will be placed in the drawing instead of a polygon.

#### To use the tool:

- ☐ Select the 3D Line Extrude tool.
- ☐ See the documentation for WildTools Offset Line tool.



### 3D Bisector Line Tool

This tool is identical to the WildTools Bisector Line tool except that it operates in the current view plane.



### 3D Pivot Line Tool

This tool is identical to the WildTools Pivot Line tool except that it operates in the current view plane.

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### Hole Trim Tool

The Hole Trim tool is our first troglodyte drafting tool! It is used to trim a circle or ellipse to another circle or ellipse. This is a very common situation in 3D depictions, and the tool provides the ability to do the trimming in a single operation.

#### To use the tool:

- ☐ Select the 3D Hole Trim tool.
- ☐ Place the cursor in the drawing on the circle or ellipse to be trimmed—and on the portion of the ellipse that you want to keep. Press the mouse button.
- ☐ Drag to the trim-to ellipse and release the mouse button.

The first ellipse will be trimmed to the second object. In keeping with the logic of the WildTools Trim tool, you click on the portion of the ellipse you want to keep.

When there are four intersection points, the two points that are used are those closest to the initial mouse point, and this may produce an undesired trim, however in the normal use of this tool in axonometric drawings, this situation will not occur.





## Ellipse Hatchet Tool

The Ellipse Hatchet is another caveman tool, and it is used to convert an ellipse into a elliptical ‘semicircle’. This is often needed when drawing threads and shafts where an ellipse has been duplicated and repeated along the shaft. Don’t laugh until you try it, bubba!

### To use the tool:

- ☐ Select the 3D Ellipse Hatchet tool from the WildTools 3D palette.
- ☐ Place the cursor in the drawing on the circle or ellipse to be trimmed—and on the portion of the ellipse that you want to keep. Click.



The tool will whack off the opposite side, and the ellipse will be converted to a ‘semicircular’ elliptical arc.



This may be used on existing arcs as well, and it will force them into elliptical ‘semicircles’.



## 3D Fillet Tool

This tool is essentially the same as the WildTools Fillet tool except that it operates in the current view plane and places the correct elliptical arcs as the fillet radius.

Like the 3D Fixed Circle tool, you can Option-click on an isometric ellipse (representing a circle) in the drawing to adopt the diameter of the ‘circle’.



## 3D Extension Arc Tool

This tool is identical to the WildTools Extension Arc tool except that it draws in the current view plane.

Like the 3D Fixed Circle tool, you can Option-click on an isometric ellipse (representing a circle) in the drawing to adopt the diameter of the ‘circle’.



## 3D Joggle Tool

This tool is identical to the WildTools Joggle tool except that it draws in the current view plane.



## 3D Chamfer Tool

This tool is identical to the WildTools Chamfer tool except that it operates in the current view plane.



### 3D Measure Tool

This tool is essentially the same as the WildTools Measure tool except that it draws in the current view plane.



### 3D Protractor Tool

This tool is identical to the WildTools Protractor tool except that it draws in the current view plane.



### 3D Wall Centerline Tool

This tool is essentially the same as the WildTools Wall Centerline tool except that it draws in the current view plane.

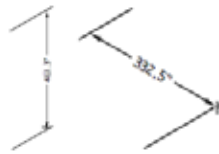


### 3D Extension Dimension Tool

This tool is essentially the same as the equivalent tool in the Dimensions Tools palette, except that it is a 'draw-three-way' tool.

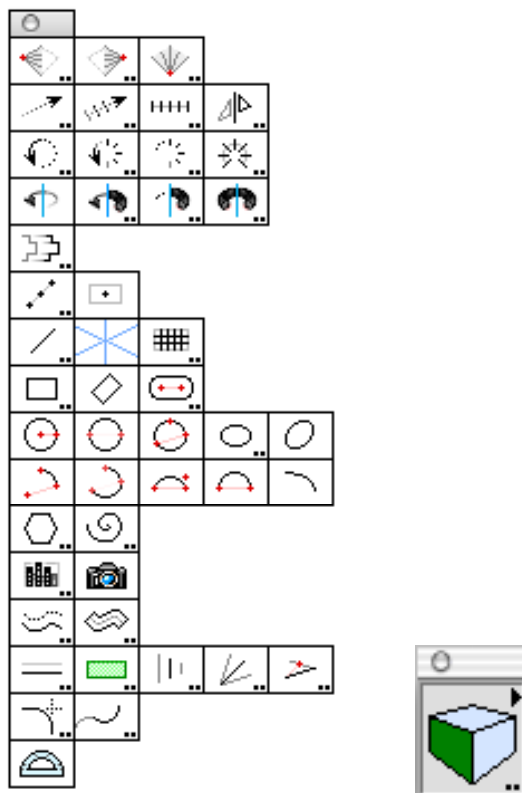
#### To use the tool:

- ☐ Select the 3D Extension Dimension tool from the WildTools 3D palette.
- ☐ Draw a line in the drawing between the points you want to dimension with a normal click-drag action and release the mouse.
- ☐ Move the cursor to position the dimension.



You may press the Option key to toggle between the two ways of dimensioning the points.

## PerspectiveTools Palette



*PerspectiveTools and the Perspective Cube Window*

PerspectiveTools provides a powerful set of tools to aid in one-, two-, or three-point perspective drawing.



*Vanishing Point Tools*

You use the three vanishing point tools at the top of the PerspectiveTools palette to set the vanishing points and station point. Use the Perspective Cube Window to select the current perspective plane, then select a tool to draw.

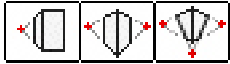
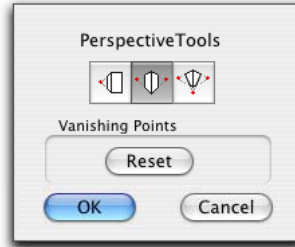
PerspectiveTools is very similar to WildTools 3D, so if you are familiar with WildTools 3D, you should be drawing perspectives very quickly.

## Setting the Perspective Drawing Mode

PerspectiveTools can draw in one-, two- or three-point perspective.

### To set a the drawing mode:

- ☐ Press the Option key and select one of the vanishing point tools from the PerspectiveTools palette. The following dialog will appear:



- ☐ Select one-, two-, or three-point perspective drawing mode.
- ☐ You may also reset the vanishing points to the default location. If you get your vanishing points way off the page and want to start over, this is an easy way to do it.

You may also press the Command key and click on the Perspective Cube window to quickly cycle through the three drawing modes.

## Setting the Vanishing Points

The vanishing points are 'named' the Left Vanishing Point, Right Vanishing Point and Bottom Vanishing Point, without regard to where they are located.



*Left Vanishing Point Tool*

One-point perspective uses the Left Vanishing Point.



*Left and Right Vanishing Point Tools*

Two-point perspective uses the Left and Right Vanishing Points.



*Left, Right and Bottom Vanishing Point Tools*

Three-point perspective uses all three vanishing points.

You may use these tools to set the vanishing points at any time, and you may set any of the three vanishing points, even if you are not using them in the current perspective drawing mode. In other words, you may set the Bottom Vanishing Point, even if you are in one-point perspective mode, which does not use that vanishing point.

The vanishing points may be off the page. They are stored in your drawing, but they are not visible objects.

**To set a vanishing point, select the appropriate vanishing point tool:**

- ☐ Click on a line and drag to a second line to set the vanishing point at the intersection of the two lines. This action is identical to the WildTools Trim tool or the Intersection Points tool.

—or—

- ☐ Hold down the Option key and click on a line or point with the Picklefork cursor. If you click on a line, the starting point of the line will be used for the vanishing point. This is to make it possible to leave lines in the drawing which extend from a vanishing point, which may be off-page.

—or—

- ☐ Move the cursor over an existing vanishing point, click and drag the vanishing point to a new location. You may move any of the vanishing points with any of the three tools. In three-point perspectives, the vertical vanishing point is constrained to a move that is perpendicular from the horizon, however you may press the Shift key to move the vertical vanishing point left or right.

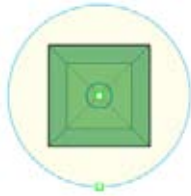
Once you have set the vanishing points, and set the tools to one-, two-, or three-point perspective drawing, you may use any of the tools to draw in perspective. Because of the nature of perspective drawings, in most cases you cannot tab into the Edit Window with these tools to set lengths, but you can do this for angles. Lengths and distances in perspective are relative, but angles are precision.

**⚠ Important:** All of the tools which work in the current perspective plane operate on the assumption that you will draw in a reasonable area relative to the vanishing points. This is particularly important in the case of three-point perspective where drawing outside the

area bounded by the three vanishing point is really a matter of 'drawing behind your head'. Expect to see goofy geometry created if you do this, but the machine will not crash. ⚠



*station point*



*One-point perspective,  
with vanishing point,  
lens circle  
and station point*



## Setting the Station Point

The station point is shown in the display as an eye, and you can drag it by its handle. The station point is the location of the viewer's eye relative to the picture plane, and it defines angles within a perspective drawing. When you adjust the location of the station point, you are changing the display of a cube that might be drawn in perspective.

The large yellow circle shown in the display in the lens circle, which is where the cone of view hits the picture plane. You should plan your drawing within the lens circle for the least amount of distortion.

## One-Point Perspective

In one-point perspective, the station point is the distance of the viewer's eye to the picture plane.

### To set the station point for one-point perspective:

- ☐ Set PerspectiveTools to one-point perspective as described above.
- ☐ Select one of the vanishing point tools from the PerspectiveTools palette.

The 'magic cube' display will show in the drawing and follow the mouse as you move it. By looking at the cube, you can see the effect of any change to the station point.

- ☐ Click in the station point and drag it up or down.

Drag the station point down to increase the distance from the picture plane. Drag up to decrease the distance.

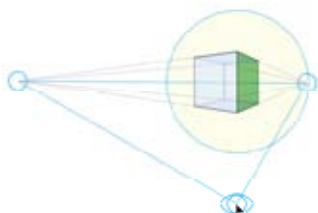
- ⚠ You may tab into the Edit Window to set the distance to the picture plane.

### ***Two-Point Perspective***

In two-point perspective, the station point is defined by the plan angle, and you can drag it along a semicircle below or above the horizon line.

#### **To set the station point for two-point perspective:**

- ☐ Set PerspectiveTools to two-point perspective as described above.
- ☐ Select one of the vanishing point tools from the PerspectiveTools palette.



The 'magic cube' display will show in the drawing and follow the mouse as you move it. By looking at the cube, you can see the effect of any change to the station point.

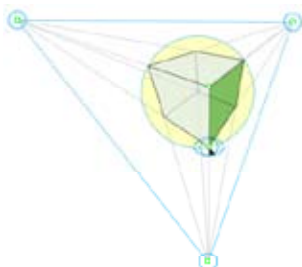
- ☐ Click in the station point and drag it left or right.
- ☐ You may tab into the Edit Window to set the plan angle.

### ***Three-Point Perspective***

In three-point perspective, the station point is defined by the location of the three vanishing points. You can move the station point by dragging it along the semicircle below or above the horizon line.

#### **To set the station point for three-point perspective:**

- ☐ Set PerspectiveTools to three-point perspective as described above.
- ☐ Select one of the vanishing point tools from the PerspectiveTools palette.



The 'magic cube' display will show in the drawing and follow the mouse as you move it. By looking at the cube, you can see the effect of any change to the station point.

- ☐ Click in the station point and drag it left or right.
- ☐ You may tab into the Edit Window to set the plan angle.

You can also move the vertical vanishing point by dragging it. The vertical vanishing point is constrained to a move that is perpendicular from the horizon, however you may press the Shift key to move the vertical vanishing point left or right.

You may also drag the point on the tip of the cube to change the perspective view.

## Vanishing Point Dump

With any of the vanishing point tools, you may place a 'vanishing point dump' in the drawing.

### To place a vanishing point dump:

- ☐ Select one of the vanishing point tools from the PerspectiveTools palette.
- ☐ Press and hold down the Shift and Option keys. The cursor will change to a DumpTruck cursor.
- ☐ Click in the drawing.



A group of objects will be placed in the drawing showing the current points. The station point is shown with an eye, and the lens circle is a gray circle. The lens circle is created by the cone of view with the picture plane, and you should plan your drawing within the lens circle for the least amount of distortion.

## Selecting the Current Perspective Plane

An important feature of these tools is the *current perspective plane*. Many of the tools will only draw in one plane at a time, and you set this plane with the familiar cube control.



### To set the current perspective plane:

- ☐ Click on a side of the cube control in the Perspective Cube window.

This is your only way to set the current perspective plane.

You may press the Command key and click in the Perspective Cube window to switch between one-, two- and three-point modes.

You may press the Option key and click in the Perspective Cube window to bring up the dialog to choose between one-, two- and three-point modes.

There is a pop-up menu in the upper right of the Perspective Cube window, which you may use to store setups of the current vanishing points in the current PowerCADD drawing.

## Cross Plane Moves

The Perspective Move, Duplicate, Distribute and Move Points, tools now have cross plane moves. Press the Option key to toggle between a normal move and a cross plane move.



### Perspective Move Tool

This tool is similar to the Linear Move tool except that it operates in the current perspective plane. Press the Option key to toggle between a normal move and a cross plane move.



### Perspective Duplicate Tool

This tool is similar to the Linear Duplicate tool except that it operates in the current perspective plane. Press the Option key to toggle between a normal move and a cross plane move.



### Perspective Distribute Tool

This tool is similar to the Linear Distribute tool except that it operates in the current perspective plane. Press the Option key to toggle between a normal move and a cross plane move.



### Perspective Mirror Tool

This tool is similar to the 3D Mirror tool except that it operates in the current perspective plane.



### Perspective Rotate Tool

This tool is similar to the Rotate tool except that it operates in the current perspective plane.



### Perspective Radial Duplicate Tool

This tool is similar to the Radial Duplicate tool except that it operates in the current perspective plane.



### Perspective Radial Repeat Tool

This tool is similar to the Radial Repeat tool except that it operates in the current perspective plane.



### Perspective Radial Distribute Tool

This tool is similar to the Radial Distribute tool except that it operates in the current perspective plane.



### Perspective Axial Rotate Tool

This tool is similar to the 3D Axial Rotate tool of WildTools 3D.



### Perspective Axial Duplicate Tool

This tool is similar to the 3D Axial Duplicate tool of WildTools 3D.



### Perspective Axial Repeat Tool

This tool is similar to the 3D Axial Repeat tool of WildTools 3D.



### Perspective Axial Distribute Tool

This tool is similar to the 3D Axial Distribute tool of WildTools 3D.



### Perspective Move Points Tool

This tool is similar to the WildTools Move Points tool except that it operates in the current perspective plane. Press the Option key to toggle between a normal move and a cross plane move.



### Perspective Points Along Tool

This tool lets you draw a line with the points evenly divided in perspective in three-way mode or in the current perspective plane.



### Perspective Center Point Tool

This tool lets you draw a rectangle in the current perspective plane and a point will be placed in the drawing at the perspective center of the rectangle.



### Perspective Line Tool

This tool allows you to draw lines in three-way mode or in the current perspective plane.

In three-way mode, the lines are always aligned with a vanishing point. Press the Option key to draw from center. Press the Shift key to unconstrain from perspective drawing.

When you draw with the tool constrained/unconstrained to snap angles, this is the WildTools Line tool operating in the current perspective plane. Thus you may use the Option and Shift keys as before, and you also have tangent and perpendicular snapping available and these snaps operate in the current perspective plane.



### Perspective Guideline Tool

This tool lets you click and drag to place a guideline relative to a vanishing point.



### Perspective Gridline Tool

This tool lets you draw a rectangle and a perspective grid of lines will be placed in the drawing in the current perspective plane.



### Perspective Rectangle Tool

This tool is similar to the WildTools Rectangle tool except that it draws in the current perspective plane.



### Perspective Rotated Rectangle Tool

This tool is similar to the WildTools Rotated Rectangle tool except that it draws in the current perspective plane.



### Perspective Slot Tool

This tool is similar to the WildTools Slot tool except that it draws in the current perspective plane.



### Perspective Circle from Center Tool

This tool is similar to the WildTools Circle from Center tool except that it draws in the current perspective plane.



### Perspective Circle by Two Points Tool

This tool is similar to the WildTools Circle by Two Points tool except that it draws in the current perspective plane.



### Perspective Circle by Three Points Tool

This tool is similar to the WildTools Circle by Three Points tool except that it draws in the current perspective plane.



### Perspective Ellipse Tool

This tool is similar to the WildTools Ellipse tool except that it draws in the current perspective plane.



### Perspective Rotated Ellipse Tool

This tool is similar to the WildTools Rotated Ellipse tool except that it draws in the current perspective plane.



### Perspective Arc from Center Tool

This tool is similar to the WildTools Arc from Center tool except that it draws in the current perspective plane.



### Perspective Arc Three Points Tool

This tool is similar to the WildTools Arc Three Points tool except that it draws in the current perspective plane.



### Perspective Arc by Chord Tool

This tool is similar to the WildTools Arc by Chord tool except that it draws in the current perspective plane.



### Perspective Semicircle Tool

This tool is similar to the WildTools Semicircle tool except that it draws in the current perspective plane.



### Perspective Arc Tool

This tool is similar to the WildTools Arc tool except that it draws in the current perspective plane.



### Perspective Regular Polygon Tool

This tool is similar to the WildTools Regular Polygon tool except that it draws in the current perspective plane.



### Perspective Spiral Tool

This tool is similar to the WildTools Spiral tool except that it draws in the current perspective plane.



### Perspective Block Out Tool

The Block Out tool allows you to take an entire orthogonal view and place it in the drawing in the current perspective plane.

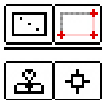
The tool has a three-points mode of drawing which allows you to draw one side of the rectangle first. This is particularly useful for putting the sides of a building together.

#### To set the behavior of the tool:

- ☐ Press the Option key and select the Perspective Block Out tool from the PerspectiveTools palette. This dialog will appear:



- ☐ Choose the method of drawing the rectangle, normal or by three-points.
- ☐ Select if you want to place a Rubber Stamp object or a symbol object.



#### To use the tool:

- ☐ Select the Perspective Block Out tool from the PerspectiveTools palette.
- ☐ If the tool is set to place Rubber Stamp objects, and if the Rubber Stamp tool does not have an object in its private 'clipboard', then the Picklefork cursor will be displayed. You may use the Picklefork cursor to pick up an object in the drawing, and this will become the object that is on the Rubber Stamp tool's private 'clipboard'.
- ☐ Click and drag in the drawing to draw a rectangle in the normal way, or by three points.

The rectangle is constrained to the proportions of the original object—press the Shift key to unconstrain it.

Press the Option key to flip the presentation.

When you release the mouse button, the objects will be placed in the drawing in the perspective orientation.



### **Perspective Camera Tool**

This works like the WildTools Camera tool, except that the duplicated objects are converted from a perspective view to an orthogonal presentation. You have the option of duplicating all objects or selected objects.

The Perspective Camera tool maintains the correct height-to-width proportions, but you must re-size the result to work with the drawing scale yourself.



### **Perspective Parallel Offset Tool**

This tool is similar to the WildTools Parallel Offset tool except that it operates in the current perspective plane.



### **Perspective Thicken Tool**

This tool is similar to the WildTools Thicken tool except that it operates in the current perspective plane.



### **Perspective Offset Line Tool**

This is an offset line tool for perspectives. It operates in three-way mode and in the current perspective plane.

In three-way mode, it is limited to a single offset in one direction only. In the current perspective plane, you may have multiple offsets, and you may press the Option key before clicking on an object to offset in both directions.



### **Perspective Line Extrude Tool**

This tool is the same as Perspective Offset Line tool, but it will place a closed four-sided polygon in the drawing.



### **Perspective Blend Line Tool**

This tool is similar to the WildTools Blend Line tool except that it operates in the current perspective plane.



### **Perspective Bisector Line Tool**

This tool is similar to the WildTools Bisector Line tool except that it operates in the current perspective plane.



### **Perspective Pivot Line Tool**

This tool is similar to the WildTools Pivot Line tool except that it operates in the current perspective plane.



### **Perspective Fillet Tool**

This tool is similar to the WildTools Fillet tool except that it operates in the current perspective plane.



### **Perspective Extension Arc Tool**

This tool is similar to the WildTools Extension Arc tool except that it operates in the current perspective plane.



### **Perspective Protractor Tool**

This tool is similar to the WildTools Protractor tool except that it operates in the current perspective plane.

## SketchTools Palette



The famous French architect Jacques Pochoy makes the point that there are three types of drawing done in architecture: sketching, semi-precision and precision. Precision drafting is what CAD does best. Semi-precision includes landscape architecture and urban planning—it is roughly to scale, but it is not important that anything be exact. After all, who cares if you draw a tree exactly to scale?



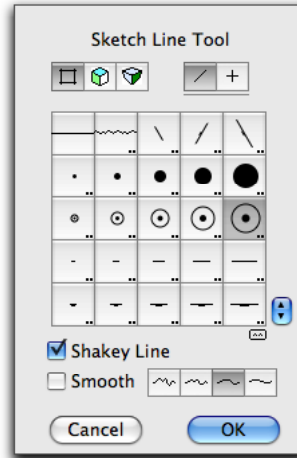
Sketching is the typical scribbling of an idea on a piece of paper, with complete disregard to any scale at all. It's just a quick way to get an idea down on paper, with variable-width lines. SketchTools provides that capability.

The SketchTools palette has eight tools, which share common setting for pen type, tool attributes and 2D/3D/perspective drawing mode.

All tools share the same tool attributes, thus if you set the pen color of one of these tools, you have set them for all of them.

### To set the behavior of SketchTools:

- ❑ Press the Option key and select any tool from the SketchTools palette. The following dialog will appear:



- ❑ Select a pen/brush shape. This may be a normal line, squiggled line, calligraphic pen, round brush, two elliptical brushes and a chisel-point quill pen.
- ❑ To edit a pen/brush, press the Option key and select the pen/brush shape—or you may double-click the pen/brush.

The elliptical brush and the chisel-point quill pen will draw at varying angles if you have an Intuos tablet.



- ❑ Click on the 2D/3D/Perspective icon at the top of the dialog to select the 2D/3D/perspective drawing mode. This is not available with the Brush tool.

When set to 2D, the tools behave like the equivalent tools in WildTools except for the pen type (squiggled line, round brush, etc.).

When set to 3D these tools behave like the equivalent tools in WildTools 3D.

When set to perspective these tools behave like the equivalent tools in PerspectiveTools.

- ❑ Select Shakey Line if you want to be able to ‘shake’ the cursor when drawing a line, arc or circle.



- ☐ Choose if you want to smooth the shape into a smoothed Bézier curve and the amount of smoothing.
- ☐ You may store commonly used setups.

Because of impossible internal complexities, you cannot tab into the Edit Window with these tools, and advanced snapping (perpendicular and tangent) are not provided.

## Wacom Tablets

While SketchTools can be used with a mouse, it really comes to life when you have a Wacom tablet, and it is important that you buy a tablet that supports both *pressure* and *pen tilt*. Pressure is used to control the variable-width brush. Pen tilt is used to control the rotation of elliptical brushes and the quill pen brush.

### What Works

All of the currently-offered Wacom Intuos tablets support both pressure and pen tilt. This is the one you want. The tablets are available in a number of sizes. All work fine. Pick one that suits your budget and screen size. You can use a small tablet with any screen size, but it's generally a good idea to get a larger tablet if you have a large screen, or two monitors.

The Wacom Graphire tablet supports only pressure. *Pen tilt is not supported*. While this tablet is fine, and it's very inexpensive, you give up a lot in not being able to rotate the chisel-point quill pen.



## Sketch Line Tool

This tool lets you sketch with lines.



## Sketch Parallel Line Tool

This tool lets you sketch parallel lines. This tool does not ever work in perspective mode.



## Sketch Rectangle Tool

This tool lets you sketch a rectangle.



## Sketch Rounded Rectangle Tool

This tool lets you sketch a rounded rectangle.

**Sketch Circle Tool**

This tool lets you sketch a circle.

**Sketch Arc Tool**

This tool lets you sketch an arc.

**Sketch Arc by Chord Tool**

This tool lets you sketch an arc.

**Brush Tool**

This is a freehand tool which used the pen type of the Sketch tools. There is no 3D or perspective mode for this tool.

# ShadowTools Palette



The ShadowTools palette has seven tools for creating and manipulating shadows and transparent objects.

**Shadows as Transparencies.** Shadows across the face of a building, say under the roof and eaves, are normally simple transparencies. They are nothing more than a darkening of the image behind. Thus, these can be achieved in PowerCADD by drawing a polygon or Bézier with a transparent pen and fill color, normally black for a grey effect. These could be with a hard edge or with a blurred edge.

**Quartz Shadows.** Quartz renders a shadow as a graduated, transparent and blurred copy of an image, and it can be offset from the original image or directly behind the image. Additionally the shadow has its own color, independent of the original image.

The amount of blur in a shadow in PowerCADD is limited because larger blurred shadows slow the computer.



## Move Shadow Tool

This tool allows you to click on an object with a shadow and then drag the shadow around.



## North Arrow Tool

This tool sets the north direction used in PowerCADD for azimuths, and which is also used by the Sun Shadow tool.



## Shadow Line Tool

This is the Sketch Line tool of SketchTools with additional settings for transparencies and blur. When you change the brushes for this tool, you are changing the brushes of SketchTools.



### Shadow Brush Tool

This is the Brush tool of SketchTools with additional setting for opacity and blur. When you change the brush for this tool, you are changing the brush of SketchTools.



### Shadow Pen Tool

This is a specialized version of the WildTools Pen tool, and you have a choice of a stroke or solid shadow. The stroke (not filled) shadow works like the Shadow Line and Brush tools.

In the solid shadow, the tool uses the pen color and opacity for both the pen and fill of the object.



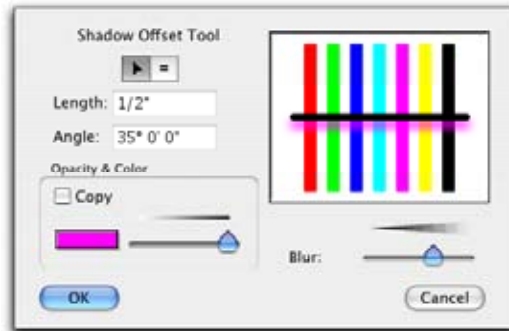
### Shadow Polygon Tool

This is a specialized version of the WildTools Polygon tool, with the same choices as the Shadow Pen tool.



### Shadow Offset Tool

This tool allows you to click on an object and add a shadow. You can locate the shadow interactively with the mouse or use a fixed shadow offset.



The tool has the capability of creating a shadow of the same color and opacity as the object you click on. For example, in a stained glass window, the shadows would be the same color as the glass pieces. If the object has a fill, then the object's fill color and opacity are used for the shadow. If the object does not have a fill, then the pen color and opacity is used for the shadow.

If Copy Color and Opacity is not selected, then the shadow is placed in the pen color and opacity set for the tool.

You can press the Option key to adopt a shadow, just like the Shadow Needle tool.



## Sun Shadow Tool

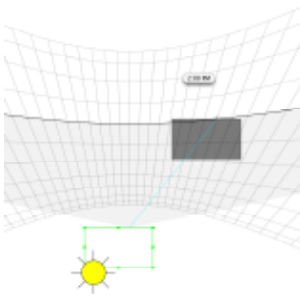
This tool allows you to do simple sun shadow studies.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Sun Shadow tool from the ShadowTools palette. The following dialog will appear:



- ☐ Type the height of the building.
- ☐ Type the latitude, north or south.
- ☐ Select the month of the year.
- ☐ Select if you want to place a text report in the drawing.



### To use the tool:

- ☐ Select the Sun Shadow tool from the ShadowTools palette.
- ☐ Move the cursor over an object in the drawing that is the outline of the building in plan view. Press the mouse button.
- ☐ Move the cursor around to set the hour of the day.
- ☐ Release the mouse to place the objects in the drawing.

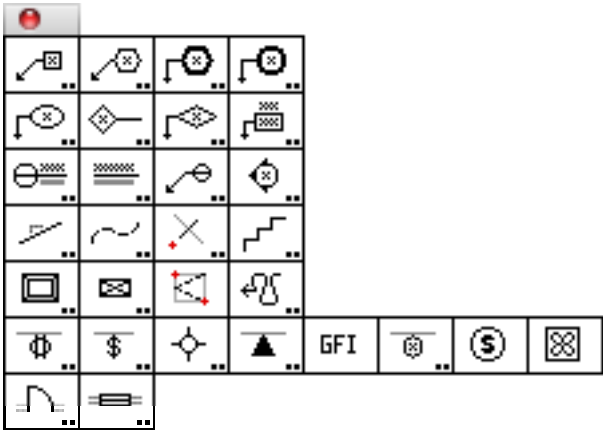
Many thanks to Greg Johnson for his assistance in creating the Sun Shadow tool.



## Shadow Needle Tool

This tool is like the WildTools Needle tool except that it only works with the shadow effects.

# Doors & Windows Palette



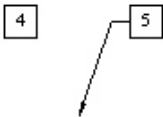
The Doors & Windows palette contains a number of architectural tools.

The first three rows contain tools originally written by David Bernhardt, of Kvell Corcoran Architects, Washington, DC to implement office standards for a variety of 'bubble notes', detail titles, and elevation indicators.



## New Work Keynote Tool

This tool allows you to place a keynote in the drawing.



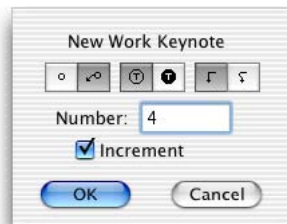
The tool uses the Leader style. This is optional; see 'Basic Concepts—Tool Attributes'.



The tool uses the Text Border style for the balloon.

### To set the behavior of the tool:

- ☐ Press the Option key and select the New Work Keynote tool from the Doors & Windows palette. The following dialog will appear:



- ☐ Choose if the keynote will have a leader line.
- ☐ Select normal or reversed text.
- ☐ Choose if the leader line will be a smooth curve.
- ☐ Type the number to be used in the keynote.
- ☐ Select Increment if you want the number to advance on each use of the tool.

#### To use the tool:

- ☐ Select the New Work Keynote tool from the Doors & Windows palette.
- ☐ Click and drag in the drawing to place the keynote.
- △ You may tab into the Edit Window to set the keynote number. If you do this, the operation is complete.

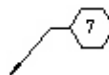
When you release the mouse button, the keynote will be placed in the drawing.

All of the tools in the first two rows share the same text attributes, so you can use the Defaults window to set the font and font size used for these keynotes.



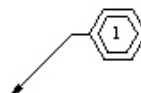
### Demolition Keynote Tool

This tool operates like the New Work Keynote tool to place a keynote in the drawing.



### Millwork Keynote Tool

This tool operates like the New Work Keynote tool to place a keynote in the drawing.





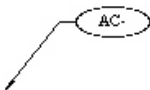
**Edge Detail Keynote Tool**

This tool operates like the New Work Keynote tool to place a keynote in the drawing.



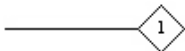
**Finish Bubble Tool**

This tool operates like the New Work Keynote tool to place a keynote in the drawing.



**Partition Keynote Tool**

This tool allows you to place a partition keynote in the drawing.



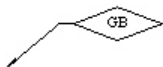
This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

This tool operates like the New Work Keynote tool, except that you click-and-drag to draw a line.



**Toilet Accessory Keynote Tool**

This tool operates like the New Work Keynote tool to place a keynote in the drawing.



**Room Name Keynote Tool**

This tool operates like the New Work Keynote tool to place a keynote in the drawing.





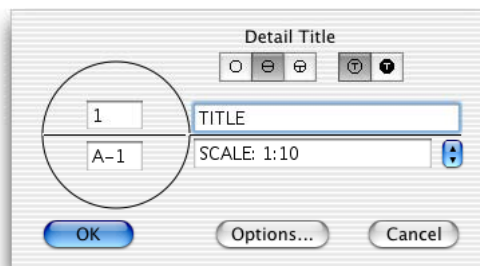
## Detail Title Tool

This tool allows you to place a standard detail title.



### To set the behavior of the tool:

- ☐ Press the Option key and select the Detail Title tool from the Doors & Windows palette. The following dialog will appear:



- ☐ Choose the style of the detail title.
- ☐ Select normal or reversed text.
- ☐ Type the text that will appear in the title.
- ☐ You may choose from a number of standard scales from the popup menu.
- ☐ Click the Options button to set a standard width.

### To use the tool:

- ☐ Select the Detail Title tool from the Doors & Windows palette.
- ☐ Click in the drawing.

- △ You may tab into the Edit Window to set the type of detail and the text. If you do this, the operation is complete.

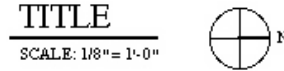
When you release the mouse button, the detail title will be placed in the drawing.

You can use the Defaults window to set the font and font size used for the detail title, however the size that you select will be used for the scale text below the line, and the title text will be at twice the selected font size. Also, you may select a bold text style, in which case it will only be used for the title text, and for the detail number in a single-number style.



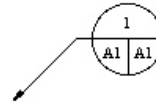
## Plan Title Tool

This tool allows you to place a standard plan title. It operates like the Detail Title tool described above.



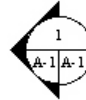
## Detail Indicator Tool

This tool operates like the New Work Keynote tool to place a keynote in the drawing.



## Elevation Indicator Tool

This tool operates like the New Work Keynote tool to place an elevation indicator in the drawing.



## Slope Tool

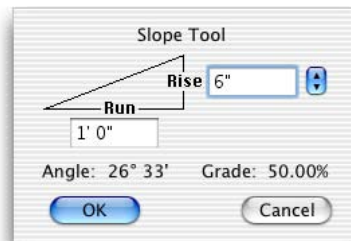
This tool allows you to draw a line at a selected slope in the drawing.



This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Slope tool from the Doors & Windows palette. The following dialog will appear:



- ☐ Type the rise and run for the slope.
- ☐ You may use the popup menu to choose from a number of standard roof slopes.

**To use the tool:**

- ☐ Select the Slope tool from the Doors & Windows palette.
- ☐ Click in the drawing, and drag the mouse in the direction that you want the slope line to go.

When you release the mouse button, the line will be placed in the drawing.

**To adopt the slope of an existing line:**

- ☐ Select the Slope tool.
- ☐ Press and hold down the Option key. The cursor will change to the Picklefork cursor.
- ☐ Click on any line in the drawing. You may also click on a side of a rectangle or polygon, even in a group.

The tool will adopt the slope of the line.

**Curved Dashed Line Tool**

This tool allows you to draw a dashed curved line in the drawing. In fact, this is simply the WildTools B-Spline tool with a hidden or phantom line style. The tool is provided here to draw the curved lines that are typically used with electrical drawings.



Depending on your choice in the tool's dialog, this tool uses the Hidden Line or Phantom Line style. This is optional; see 'Basic Concepts—Tool Attributes'.

**To set the behavior of the tool:**

- ☐ Press the Option key and select the Curved Dashed Line tool from the Doors & Windows palette. The following dialog will appear:



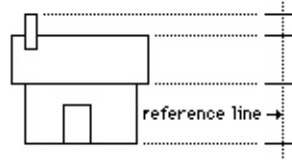
- ☐ Choose if you want the Hidden or Phantom Line style.

To use the tool, see the documentation for the B-spline tool.



## Projection Line Tool

The Projection Line tool places projection lines (or optionally, points) along a reference line.



The Projection Line tool closely emulates the process most draftsmen use on a drawing board. You establish a reference line, and when you click on the drawing, projection lines are drawn perpendicular to the reference line. This allows you to set up a view in any direction.



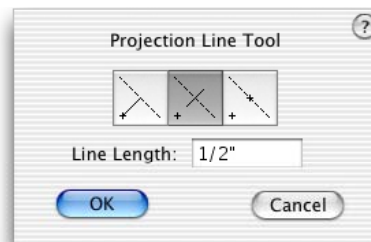
Depending on the object placed, the Projection Line tool uses the Normal style for lines or the Point style for points.

### To use the Projection Line tool:

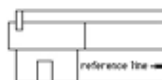
- ☐ Select the Projection Line tool from the Doors & Windows palette.
- ☐ The reference line will be shown as a guideline line.
- ☐ To change the reference line, hold down the Option key and click on any line in the drawing, or the side of a rectangle or polygon. The object that you option-click may be inside a group.
- ☐ Click in the drawing to place projection lines along the reference line.

### To set the behavior of the tool:

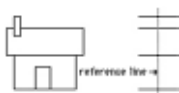
- ☐ Press the Option key and select the Projection Line tool from the Doors & Windows palette. The following dialog will appear:



You have three choices in the mode of operation of this tool.



- ☐ You can place a line extending from the click-point to the reference line.



- ☐ You can place a fixed-length projection line along the reference line. Type the desired line length.



- ☐ Or, you can place a point on the reference line.



## Stair Tool

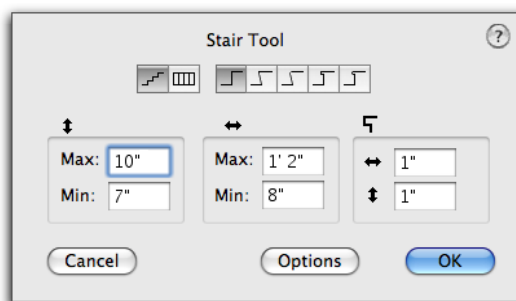
The Stair tool allows you to draw stairs in section or plan view.



The Stair tool uses the Normal and Hidden Line styles. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Stair tool from the Doors & Windows palette. The following dialog will appear:



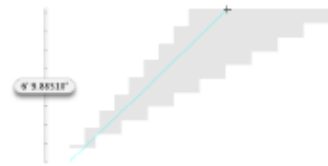
- ☐ Choose if the tool is to draw in section or plan view.
- ☐ Choose the profile of the step.
- ☐ Type the dimensional limits of the individual step.
- ☐ For plan view, type the dimension and number of steps.
- ☐ Click the Options button to set the rule-of-thumb parameters for the display shown while drawing the stairs.

### To use the tool in section view:

- ☐ Select the Stair tool from the Doors & Windows palette.
- ☐ Place the cursor in the drawing at the location that will represent the starting point of the stairs. Press the mouse button.

—or—

- ☐ To draw stairs at an angle, press and hold the Option key, move the cursor over a line that is a baseline for the stairs, and press the mouse button.



- ☐ Drag to establish the overall height of the stair.

The full range of possible stairs are shown in gray. These are based on the limits you set in the tool's dialog.

- ☐ In the process of drawing, you may tab into the Edit Window to edit the height.

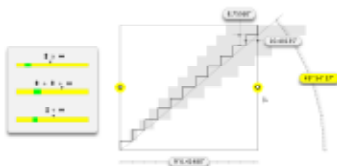
- ☐ Release the mouse button to complete setting the height.



- ☐ Move the mouse up and down to set the number of steps and the height of the individual steps.

- ☐ In the process of drawing, you may tab into the Edit Window to edit the number of steps.

- ☐ Release the mouse button to complete setting the number of steps.



The final step is to establish the overall length of the stair, and also within the limits you set in the tool's dialog. The screen display changes to show two handles at the start and end of the stair. These have yellow hilighting behind them to indicate the two handles that you are to click in.

- ☐ Click in the handle at the start of the stair to move it.

- ☐ Click in the handle at the end of the stair to stretch the stair length.

As you drag this handle, the rule-of-thumb display shows how the stair fits into the parameters that you set up. The angle of the stairs is shown with a yellow hilite when the angle exceeds 30 degrees.

- ☐ In the process of drawing, you may tab into the Edit Window to edit the number of overall length.

- ☐ Click any where in the drawing (not in either handle) to end the operation and place the stairs in the drawing.

The stairs will be placed in the drawing.

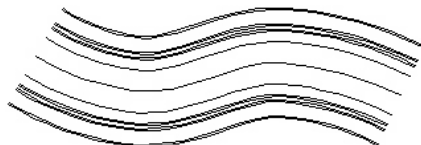
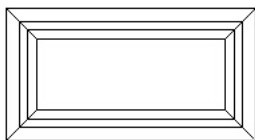
**To use the tool in plan view:**

- ☐ Select the Stair tool from the Doors & Windows palette.
- ☐ Place the cursor in the drawing over a line that represents the end of the stair. Press the mouse button.
- ☐ Move the mouse to the desired side of the line that you want the stairs to be placed.

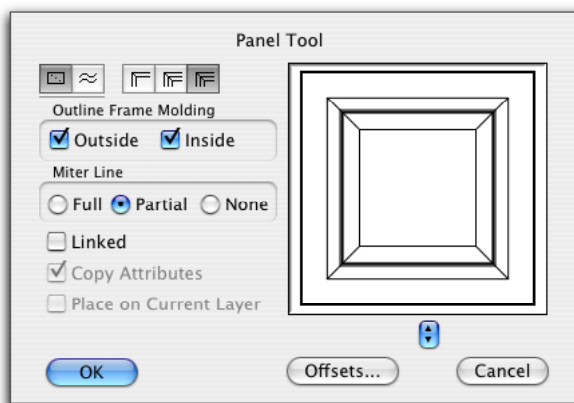
You may press the Option key to toggle the direction of the stairs if the stair profile results in hidden lines in the drawing.

**Panel Tool**

The Panel tool allows you to draw raised-panels by drawing a rectangle, and it also allows you to perform multiple parallel offsets—for a road or flexible plastic tubing.

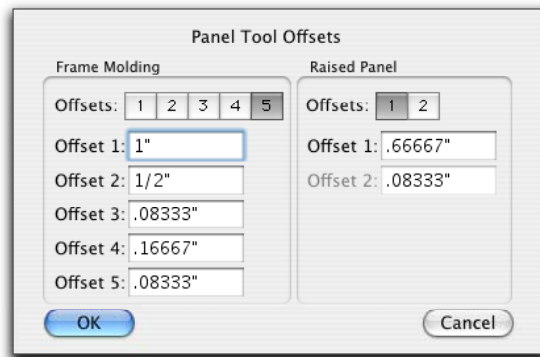
**To set the behavior of the tool:**

- ☐ Press the Option key and select the Panel tool from the Doors & Windows palette. The following dialog will appear:



- ☐ Choose if the tool is to operate in rectangle-drawing mode or parallel offset mode.
- ☐ Choose if the tool will place frame molding, raised panel or both. This determines which offsets are used, and which lines have the Outline line style when you choose to Outline the frame molding.
- ☐ Choose if you want the Outline line style used for the outside and/or inside of the frame molding.

- ☐ Choose full, partial or no miter lines. This only applies in the case of the rectangle-drawing mode.
- ☐ Choose Linked if you want to create a Parallel Object. For more information on Parallel Objects, see 'Basic Concepts—Parallel Objects'.
- ☐ Choose Copy Attributes if you want to copy the attributes of the clicked-on objects in parallel offset mode.
- ☐ Choose if you want to place the objects that you create in parallel offset mode on the current layer. If you don't choose this, the objects will be placed on the same layer as the clicked-on object.
- ☐ To set the offsets, click on Offsets and the following dialog will appear:



- ☐ Select the number of offsets to be used for the Frame Molding and the Raised Panel.
- ☐ Type the offset distances to be used.



#### **To draw panel from corner-to-corner:**

- ☐ Select the Panel tool from the Doors & Windows palette.
- ☐ Place the cursor in the drawing area at a location that will represent the one corner of a rectangle enclosing the Panel. Press the mouse button.
- ☐ Drag away from the starting point. You may use the Shift key to constrain the angle of the corner-to-corner line.

You may press the Option key to toggle between drawing from center and normal drawing.

- △ You may tab into the Edit Window to edit the height and width of the panel.
- ☐ Release the mouse button to complete the panel. The Panel will be placed in the drawing.



### To perform a parallel offset:

The parallel offset mode is provided so that you may use the tool like the Parallel Offset tool.

- ☐ Select the Panel tool from the Doors & Windows palette.
- ☐ Click on an object in the drawing and drag in the direction of the offset.

See the Parallel Offset tool for additional information. Like the Parallel Offset tool, you may press the Option key before clicking on the object to offset in both directions.



### Lumber Tool

The Lumber tool allows you to draw rectangles representing standard U.S. lumber sizes. The tool automatically 'snaps' to the nearest standard dressed lumber size.



This tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To use the Lumber tool:

- ☐ Select the Lumber tool from the Doors & Windows palette.
- ☐ Draw a rectangle in the drawing. You may use the Option key to toggle between normal drawing and drawing from the center.

The rectangle will be placed in the drawing. The Hairline style is used for the optional criss-cross lines.



### Hinge Indicator Tool

This tool allows you to draw a standard hinge indicator symbol.



This tool uses the Hidden Line style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To use the tool:

- ☐ Select the Hinge Indicator tool from the Doors & Windows palette.
- ☐ Draw a rectangle in the drawing. You may use the Option key to toggle the left-right presentation of the symbol.

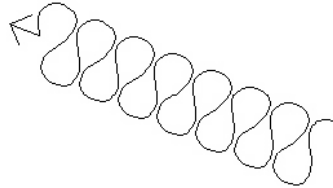
A polygon will be placed in the drawing.

Press the Option key before you click in the drawing to draw a vertical presentation. This can be used for awning/hopper windows and cabinets that swing like that.



## Insulation Fill Tool

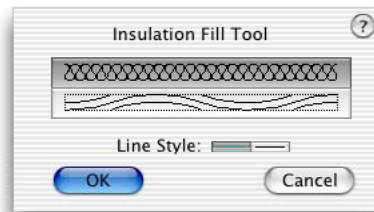
The Insulation Fill tool allows you to draw two standard architectural symbols for insulation as shown below:



The Insulation Fill tool uses the Normal or Hairline style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key, select the Insulation Fill tool from the Doors & Windows palette. The following dialog box will appear:



- ☐ Choose the type of insulation fill symbol that you want.
- ☐ Choose if you want to use the Normal or Hairline style.

### To use Insulation Fill tool:

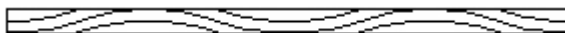
- ☐ Select the Insulation Fill tool from the Doors & Windows palette.
- ☐ Draw a rectangle to indicate the area. Use the same technique as the Rectangle tool.

The insulation fill object will be placed in the drawing.

To draw the insulation fill object at an angle, press the Option key before you click in the drawing, and then draw a rotated rectangle using the same technique as the Rotated Rectangle tool.

Arrows on the ends are drawn with lines as shown above, but they are assigned with the Arrow menu in the normal PowerCADD manner—by assigning arrows to the tool or to the object. You have the choice of placing arrows on one or both ends of the insulation

fill object, however if the area is too small to fit the arrows, they will be omitted.



A second pattern is available which is typically used for very thin wall sections. A wavy pattern will be drawn as shown above within a rectangle, and arrows will not be drawn even if specified. A minimum length of three 'waves' is necessary, or the wavy insulation symbol will not be drawn. If the fill pattern area is below 0.03" (actual size as printed on the page), nothing will be drawn.

#### To place an insulation fill object using an existing rectangle in the drawing:

- ☐ Select the Insulation Fill tool from the WildTools palette.
- ☐ Press and hold down the Option key. The cursor will change to a Picklefork cursor.
- ☐ Click on a rectangle or rotated rectangle. The rectangle may be in a group.

The insulation fill object will be placed in the drawing.



### Receptacle Tool

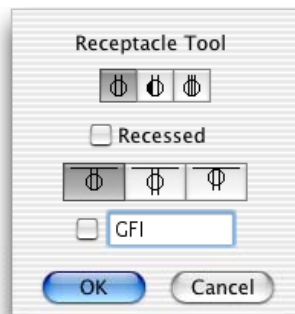
This tool allows you to place standard electrical symbols for receptacles in the drawing.



The Receptacle tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

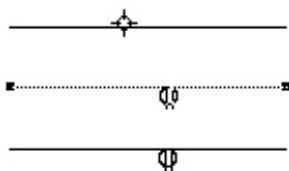
#### To set the behavior of the tool:

- ☐ Press the Option key, select the Receptacle tool from the Doors & Windows palette. The dialog box will appear:



- ☐ Choose the type of symbol to be placed.
- ☐ Choose if you want a recessed receptacle, in which case the symbol is placed with an enclosing rectangle.

- ☐ Choose the direction that you want the receptacle to be drawn when you click on a wall.
- ☐ Type an optional note to be placed with the symbol.



#### To use the Receptacle tool:

- ☐ Select the tool from the Doors & Windows palette.
- ☐ Click on a line in the drawing and move the cursor to locate the symbol along the line and on either side of the line. You may press the Shift key to move the symbol away from the line.

If you miss the line, or if the tool is set to the Recessed option, then you simply click in the drawing to locate the symbol.



#### Switch Tool

This tool allows you to place standard electrical symbols for a switch in the drawing. The tool operates like the Receptacle tool described above.



#### Light Fixture Tool

This tool allows you to place standard electrical symbols for light fixtures in the drawing. The tool operates like the Receptacle tool described above.



#### Telephone Jack Tool

This tool allows you to place standard electrical symbols for a telephone jack in the drawing. The tool operates like the Receptacle tool described above.



#### Ground Fault Interrupt Tool

This tool allows you to place 'GFI' text for 'ground fault interrupt' in the drawing.

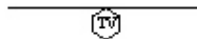
**GFI**

To place the symbol, simply click in the drawing. You may set the font and font size of the tool with the Defaults window.



## Junction Box Tool

This tool allows you to place standard electrical symbols for a junction box in the drawing. The tool operates like the Receptacle tool described above.



You may set the font and font size of the tool with the Defaults window.



## Smoke Detector Tool

This tool allows you to place the standard electrical symbol for a smoke detector in the drawing.



To place the symbol, simply click in the drawing.



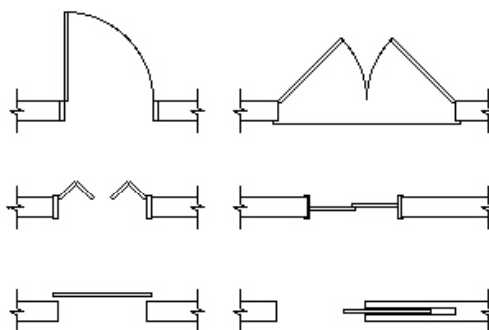
## Exhaust Fan Tool

This tool allows you to place a standard electrical symbol for an exhaust fan in the drawing. The tool operates like the Receptacle tool described above.



## Door Tool

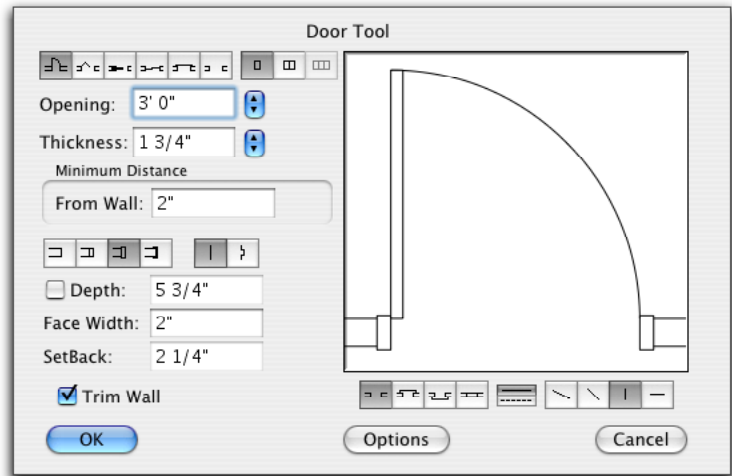
The Door tool allows you to place a variety of doors by clicking on parallel lines in the drawing. The tool provides a wide variety of options and detail.



Architects vary widely in the way they draw doors. Some regard doors as a symbol only and use the minimum amount of detail to show the door, while others are compulsive about showing details of trim, stops on the door frame, sills and thresholds. The Door tool attempts to serve the full spectrum of users by placing these decisions in your hands.

**To set the behavior of the tool:**

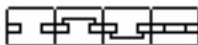
- ❑ Press the Option key and select the Door tool from the Doors & Windows palette. The following dialog will appear:



- ❑ Select the style of door. The choices are: hinged, bifold, pocket, sliding and overhead (garage) doors.
- ❑ Select whether you want one, two or three doors.
- ❑ Type the door opening. This is the finish opening, not the rough opening. You may use the popup menu to select standard door openings.



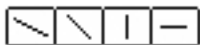
- ❑ Type the door thickness, or select a standard size from the popup menu. You may type a door thickness of zero, in which case the door will be represented by a single line of the Outline style.



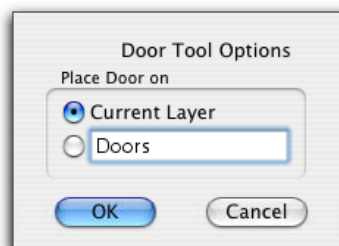
- ❑ You have four types of door frame styles, and with these the option of whether the door frame has a stop or not.
- ❑ Ordinarily, the frame will be drawn to include the width of the wall based on the two lines representing the wall, no matter how far they are apart. In the case of a block wall, say 12" thick, you often want to show the framing for the wall set back from the face of the wall. In this case, choose the Depth option, and type the depth of the framing and the setback from the face of the wall.



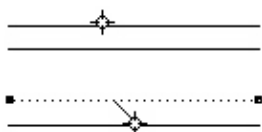
- ❑ Type the door frame width.
- ❑ You have a choice of additional lines drawn for sills and thresholds.
- ❑ You also have a choice of whether the door is drawn with a solid line (Normal Line style, or the Door tool's attributes) or the Hidden Line style.



- ☐ You also have a choice of four angles for hinged and bifold doors. The angles are 30°, 45°, 90° and 180°.
- ☐ Choose Trim Wall to cut lines in the drawing, however if the lines are in a group or are sides of a polygon, they will not be cut. If Trim Wall is turned off, a white rectangle will be placed with the door to cover up the wall.
- ☐ Click on Options and the following dialog will appear:



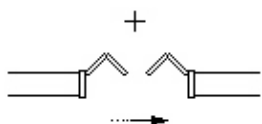
- ☐ Choose if you want the door placed on the current layer or on the layer name of your choice. For this to work, Edit All Layers must be on.



#### To place a door:

- ☐ Select the Door tool from the Doors & Windows palette.
- ☐ Place the cursor in the drawing area on the first line of the wall and press the mouse button.
- ☐ Drag to the second line and release the mouse button. The two lines must be parallel.
- ☐ Move the mouse to locate the door.

Move the mouse to the side of the wall that you want to door to face.



Move the mouse toward the end of the wall to 'hit' your specified minimum distance from wall. You may press the Shift key to move the door closer than this distance or to place the door completely to one side of the wall. If the wall is too short to contain a door, the door will float freely and will not be constrained to the end of the wall, however you may press the Shift key to constrain the door to the end of the wall that is nearest to the mouse.

Move the mouse beyond the end of the wall to flip the presentation of the door, however the door will not flip if you are pressing the Shift key or if the wall is too short to contain a door.

You may press the Option key to flip the presentation of the door. This only applies with asymmetrical doors. This method may be used if the Shift key is down or if the wall is too short to contain a door.

- △ You may tab into the 'Edit Window' in the normal way, however in this case, the Door tool dialog will come up instead so that you may change all of the settings for the door. These changes will apply only to this particular door, however you may select the Remember checkbox so that the tool will continue to use these setting from now on. Unlike the implementation of the Edit Window in other tools with WildTools, with the Door tool, you may return to this dialog repeatedly to change the setting for the door.

You may press the Enter key to cancel the operation.

- Click the mouse to complete the operation.

The door will be placed in the drawing. If Edit All Layers is on, the door frames will be placed on the layer of the first clicked-on wall line. If Edit All Layers is off, the door frames will be placed on the current layer.

### ***How Door Attributes Are Handled***

The door frames adopt the same line thickness, color and pattern from the first line that you click on, however in the case of a wrap frame or if the Depth option is selected, the frame is drawn in the Normal Line style.

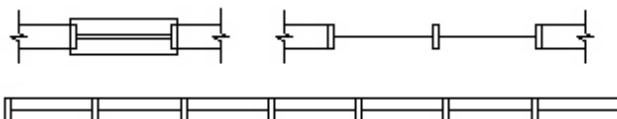
The door is drawn in the Normal Line or Hidden Line style with a white fill. If you have turned off Use Styles in the WildTools preferences, then the attributes of the Door tool are used for the door. However in either case, if you use a door thickness of zero, the door is drawn as a single line in the Outline style.

The arc for a hinged door is drawn in the Hairline style, however if the door is in the Hidden Line style, then the dash pattern of the door is also used for the arc. Sills and thresholds are drawn in the Hairline style. The pocket for a pocket door is drawn in the Hairline style.



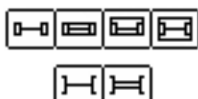
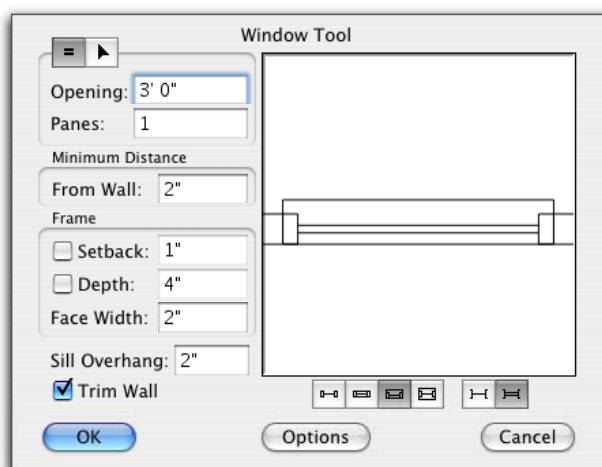
## Window Tool

The Window tool allows you to place a variety of windows by clicking on parallel lines in the drawing. The tool provides a variety of options and also the ability to place a storefront.



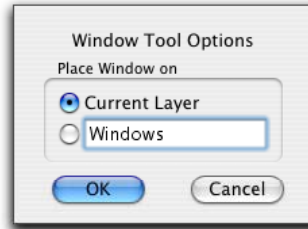
### To set the behavior of the tool:

- ☐ Press the Option key and select the Window tool from the Doors & Window palette. The following dialog will appear:

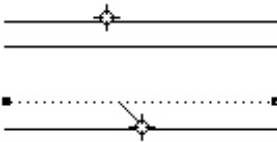


- ☐ Choose if you want to type the opening and number of window panes (equal icon) or interactive (arrow icon) for a storefront.
- ☐ Type the opening for the window. This is a rough opening and does not apply to a storefront.
- ☐ Type the number of panes.
- ☐ Type the minimum distance from the wall.
- ☐ Choose if you want the window frame set back from one of the wall lines. To do this, select the Setback option, and type the setback distance.
- ☐ You have a choice of specifying the window frame depth or have it automatically fit the thickness of the wall.
- ☐ You may type the face width of the window frame.
- ☐ You have four choices of window sills. Type the desired sill overhang.
- ☐ You have a choice of single or double pane glass.
- ☐ Select if you want to trim the wall.

- ❑ Click on Options and the following dialog will appear:.



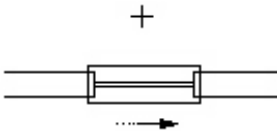
- ❑ Choose if you want the door placed on the current layer or on the layer name of your choice. For this to work, Edit All Layers must be on.



**To place a window with a fixed opening and number of panes:**

- ❑ Select the Window tool from the WildTools palette.
- ❑ Place the cursor in the drawing area on the first line of the wall and press the mouse button.
- ❑ Drag to the second line and release the mouse button. The two lines must be parallel.
- ❑ Move the mouse to locate the window.

Move the mouse to the side of the wall that you want the window to face.



Move the mouse toward the end of the wall to 'hit' your specified minimum distance from wall. You may press the Shift key to move the window closer than this distance or to place the window completely to one side of the wall. If the wall is too short to contain a window, the window will float freely and will not be constrained to the wall end.

You may press the Option key to toggle the direction of the window sill, if it is asymmetrical.

- ⚠ You may tab into the 'Edit Window' in the normal way, however the Window tool dialog will come up instead so that you may change all of the settings. The changes will apply only to this particular window, however you may select the Remember checkbox so that the tool will continue to use these settings from now on. Unlike the implementation of the Edit Window in other tools with WildTools, with the Window tool, you may return to this dialog repeatedly to change the settings.

You may press the Enter key to cancel the operation.

- ❑ Click the mouse to complete the operation  
The window will be placed in the drawing.

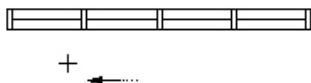


The windows placed use the Normal Line style. This is optional; see 'Basic Concepts—Tool Attributes'. Sills use the Hairline style.

In addition, a storefront window may be placed where the number of panes is determined interactively, that is, you move the mouse around until you get the number of panes that you want. In this method, the length of the storefront window is determined by the overall length of the two wall lines, thus you must first draw, or cut, the lines to the exact overall length of the storefront window.

#### To place a storefront window:

- ❑ Select the Window tool from the Doors & Windows palette.
- ❑ Place the cursor in the drawing area on the first line of the wall and press the mouse button.
- ❑ Drag to the second line and release the mouse button. The two lines must be parallel.
- ❑ Move the mouse to determine the number of window panes. The number of panes will be shown in the Show Location bar and also the pane width.

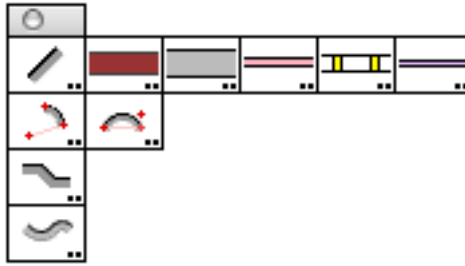


You may tab into the 'Edit Window' as described above.

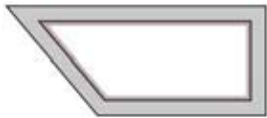
- ❑ Click the mouse to complete the operation

The storefront window will be placed in the drawing.

## Composite Wall Tools Palette



The Composite Wall Tools palette consists of ten tools to help with drawing composite walls, a heavily detailed depiction that is popular in Europe but rarely used in the U.S.



The tools are designed to decorate a drawing after all of the walls are already drawn. Typically, you would draw the walls with the usual Line, Offset Line, Parallel Offset, Trim and Wall Trim tools, and then put the composite walls on a separate layer above or below the wall lines.

There are five wall element tools, and five composite wall drawing tools.

The wall element tools exist so you can set the attributes of the individual wall elements.

The composite wall drawing tools allow you to draw combinations of the wall elements in a single drawing operation.

The tools have a 'smart layer' feature, which allows you to specify if you want the objects placed on the current layer or on a specified layer.

### Wall Element Tools

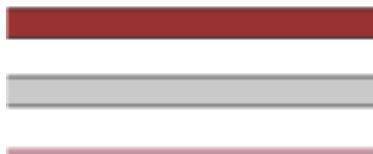
The wall element tools are simple line-drawing tools that draw the wall elements.



*Wall Element Tools*

*Brick, Concrete, Insulation, Framing and Plaster Line*

In the dialog for each tool, you can set the width of the brick, concrete, etc.



The Brick, Concrete and Insulation tools draw a single filled object and two lines on each side of the element.



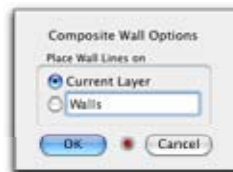
The Framing tool draws a series of filled rectangles to indicate the wall studs and two lines on each side. The studs are not shown to indicate where the studs are to be placed, but rather to simply show that this is a stud wall. These are simply wall decorations, like hatching.



The Plaster Line tool draws a single offset line at the specified plaster width.

The wall element tools exist so you can set the attributes of the individual wall elements. That is, set the fill color, fill pattern, hatching, pen color, pen size, etc. for the each tool. This allows you complete control over the appearance of the wall elements.

Composite Wall Tools has a set of standard attributes for each Wall Element tool. At any time, you can reset them to the standard attributes. In any of the dialogs for the various tools, click on the Options... button. The following dialog will appear:

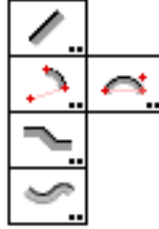


- ❑ Click on the Reset Attributes button to reset the attributes of all of the tools in Composite Wall Tools to 'factory' settings.

While the tools are named Brick, Concrete, etc. in actuality they just draw bands in the wall, so if you want to use the tools for other materials—adobe, log walls, exterior rendering, etc.—have fun! The Plaster Line tool simply draws a line, so you could use that for furring in a commercial building.

## Composite Wall Drawing Tools

The Composite Wall Drawing tools draw combinations of the wall elements in a series of wall styles.



### *Composite Wall Drawing Tools*

*Composite Wall Line Tool, Composite Wall Arc Tool*

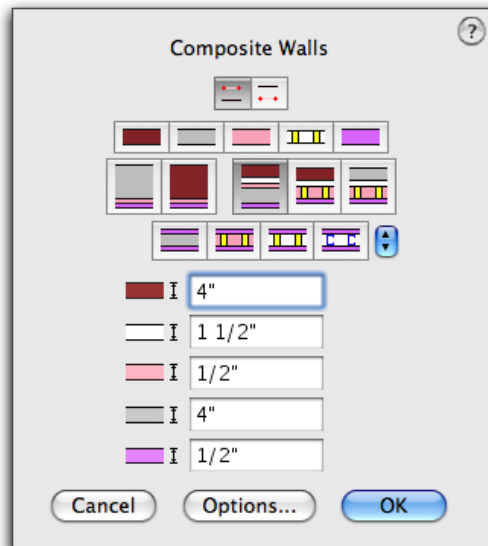
*Composite Wall Arc by Chord Tool, Composite Wall Polygon Tool,*

*Composite Wall Offset Tool*

These tools behave the same as the equivalent tools in the WildTools palette, and the Offset tool is like the WildTools Parallel Offset tool—click on any shape and move the mouse to one side or the other to place the wall along the shape.

The tools are smart about line sizes, so if you are drawing at a scale that would barely show a band of color, the tool will draw a simple line instead.

All of the Composite Wall Tools share the same dialog box and choices.



- ❑ Set whether the tools will draw from the left or right side of the object you are drawing. Like the other tools in WildTools, you can press the Option key in the process of drawing to change the drawing side.



*Brick, Concrete, Insulation,  
Framing, Plaster Line*

The first row of choices are for the wall elements themselves, which you can now draw with the arc, polygon and offset tools.

The second row of choices are for the wall styles. Left to right, these are:



*Solid Wall 1*

Solid Wall 1: Concrete, Insulation, Plaster



*Solid Wall 2*

Solid Wall 2: Brick, Insulation, Plaster



*Cavity Wall 1*

Cavity Wall 1: Brick, Cavity, Insulation, Concrete, Plaster



*Cavity Wall 2*

Cavity Wall 2: Brick, Cavity, Framing with Insulation, Plaster



*Cavity Wall 3*

Cavity Wall 3: Concrete, Cavity, Framing with Insulation, Plaster

The third row of choices are for interior partitions. Left to right, these are:



*Concrete Partition*

Concrete Partition: Plaster, Concrete, Plaster



*Insulated Stud Partition*

Insulated Stud Partition: Plaster, Framing with Insulation, Plaster



*Stud Partition*

Stud Partition: Plaster, Framing (no Insulation), Plaster



*Metal Stud Partition*

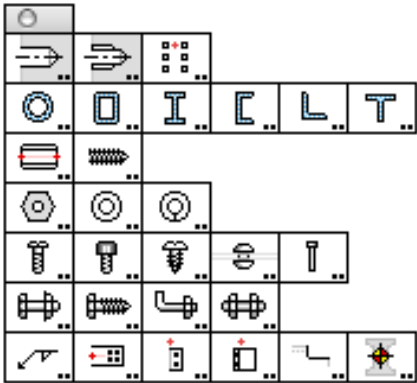
Metal Stud Partition: Plaster, Metal Studs (no insulation), Plaster

The attributes of the metal studs cannot be set independently. The pen color is always blue, in accordance with the European standard indication for metal.



- ❑ You may store commonly used setups.

# Nuts & Bolts Palette



The Nuts & Bolts palette contains a number of tools for mechanical drawings, common steel shapes and some tools for steel detailing.

⚠ **Important:** While you may choose not to use Line Styles, the tools in the Nuts & Bolts palette still do. Hairlines are used for thread lines and hatching. Centerlines are used for, well, centerlines, the Hidden Line style for hidden lines, and the Outline style is used for Outlines. So if you want to get the best results from these tools, set the Line Styles to a line type that you would like used for these things. ⚠



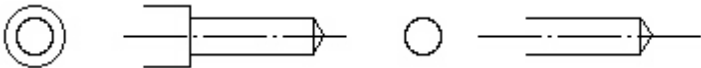
## Smart Lines

Many of the tools in the Nuts & Bolts palette use ‘Smart Lines’ which you can turn on in the WildTools Preferences Pane. This is used to proportionally reduce the pen sizes of objects.



## Hole Tool

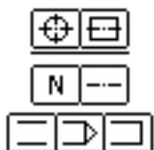
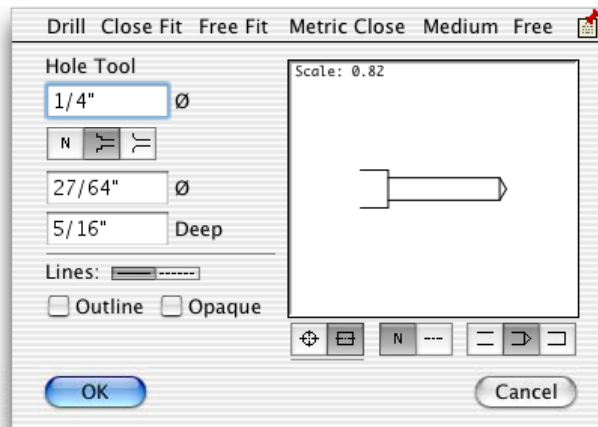
This tool allows you to draw or place end or side views of drilled, counterbored or countersunk holes.



The Hole tool uses the Normal style. This is optional; see ‘Basic Concepts—Tool Attributes’.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Hole tool from the Nuts & Bolts palette. The following dialog will appear:



- ☐ Type the hole diameter—the standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ You may choose a drill size from the menus located at the top of the dialog box.
- ☐ Click on the wall chart button for a decimal equivalents chart.
- ☐ Choose if you want a drilled, counterbored or countersunk hole.
- ☐ For a counterbored or countersunk hole, type the diameter and depth/angle.
- ☐ Choose if you want the lines to be drawn with the Normal or Hidden line style.
- ☐ Choose Outline if you want the Outline line style used for the outlines of the drilled hole.
- ☐ Choose Opaque if you want the side view of the drilled hole to be filled with a white fill pattern.
- ☐ Choose if you want to place the drilled hole by end view or to draw the side view.
- ☐ Choose if you want centerlines.
- ☐ Choose if you want a through, drilled or flat-bottom hole.

#### To place an end view:

- ☐ Select the Hole tool from the Nuts & Bolts palette.
- ☐ Place the cursor in the drawing area and click.

The drilled hole will be placed in the drawing.

#### To draw a side view:

- ☐ Select the Hole tool from the Nuts & Bolts palette.
- ☐ Place the cursor in the drawing area. Press the mouse button.
- ☐ Move the cursor in the direction that you want to draw the drilled hole.

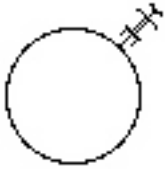
You may press the Option key to toggle between drawing to the bottom of the full-diameter hole or to the tip of the drill.

△ In the process of drawing you may tab into the Edit Window to edit the length and angle of the drilled hole.

□ Release the mouse button.

The drilled hole will be placed in the drawing.

An easy way to set the diameter of the hole is to adopt the diameter of any existing circle in the drawing.



#### To adopt the diameter of a circle:

□ Press and hold down the Option key. The cursor will change to a Picklefork cursor.

□ Click on any circle in the drawing.

The tool will adopt the diameter of the circle.

#### Converting Lines to Drilled Holes

The Hole tool can be used to convert a line to the side view of a drilled hole.



#### To convert a line to a drilled hole:

□ Select the Hole tool from the Nuts & Bolts palette.

□ Press and hold down the Shift and Option keys. The cursor will change to a Yin-Yang cursor.

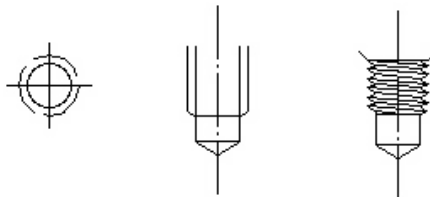
□ Click on a line.

The line will be converted to a side view of the drilled hole.



### Tapped Hole Tool

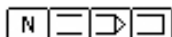
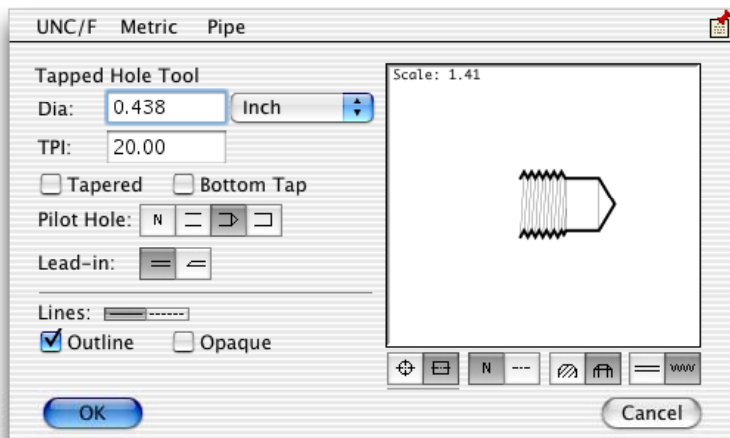
This tool allows you to draw or place end or side views of tapped holes.



The Tapped Hole tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

#### To set the behavior of the tool:

□ Press the Option key and select the Tapped Hole tool from the Nuts & Bolts palette. The following dialog will appear:



- ☐ Type the hole diameter—the standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ You may choose a thread size from the menus located at the top of the dialog box.
- ☐ Click on the wall chart button for a decimal equivalents chart.
- ☐ Type the threads per inch (TPI) or thread pitch.
- ☐ Choose Tapered if you want a tapered thread, as for pipe threads.
- ☐ Choose Bottom Tap if you want a very short extension of the tap drill.
- ☐ Choose the type of pilot hole that you want.
- ☐ Choose the thread lead-in—straight or chamfered.
- ☐ Choose if you want the lines to be drawn with the Normal or Hidden line style.
- ☐ Choose Outline if you want the Outline line style used for the outlines of the tapped hole.
- ☐ Choose Opaque if you want the side view of the tapped hole to be filled with a white fill pattern.
- ☐ Choose if you want to place the tapped hole by end view or to draw the side view.
- ☐ Choose if you want centerlines.
- ☐ Choose a cross-sectional view or a normal 'external' view.
- ☐ Choose standard-depiction or fully formed threads.

#### To use the Tapped Hole tool:

- ☐ Select the Tapped Hole tool from the Nuts & Bolts palette.
- ☐ Use the same drawing technique described for the Drilled Hole tool.

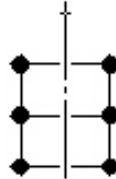
### Converting Lines to Tapped Holes

The Tapped Hole tool can be used to convert a line to the side view of a tapped hole. Use the same drawing technique described for the Hole tool.



### Hole Pattern Tool

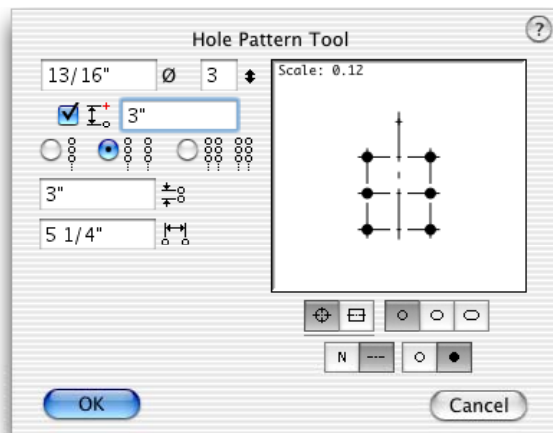
This tool allows you to draw or place end or side views of a pattern of holes. This type of hole pattern is commonly used for steel detailing, where a beam is bolted to another.



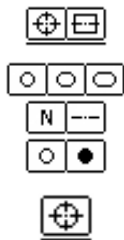
The Hole Pattern tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

#### To set the behavior of the tool:

- ☐ Press the Option key and select the Hole Pattern tool from the Nuts & Bolts palette. The following dialog will appear:



- ☐ Type the hole diameter—the standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ Type the number of holes (vertically) in the hole pattern.
- ☐ Choose if you want the hole pattern located a distance down from the mouse-click point, and type that distance.
- ☐ Choose the number of rows in the pattern.
- ☐ Type the vertical distance between the holes.
- ☐ Type the horizontal distance between the holes.



- ☐ Choose if you want to place the hole pattern by end view or to draw the side view.
- ☐ Choose round or slotted holes.
- ☐ Choose if you want centerlines.
- ☐ Choose a normal or black-filled hole.

#### To place an end view:

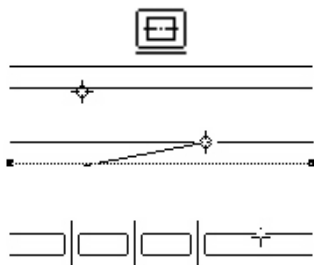
- ☐ Select the Hole Pattern tool from the Nuts & Bolts palette.
- ☐ Place the cursor in the drawing area and click.

—or—

Click and drag to place the hole pattern at an angle.

The hole pattern will be placed in the drawing.

You may place the holes in side view, between two lines. This is typical for showing holes in a flange of a steel beam or angle.



#### To draw a side view:

- ☐ Select the Hole Pattern tool from the Nuts & Bolts palette.
- ☐ Place the cursor in the drawing area over a line representing one side of the 'flange'. Press the mouse button
- ☐ Move the cursor over another line that represents the other side of the 'flange'. Release the mouse button.
- ☐ Move the cursor to locate the hole pattern.

You may press the Option key to toggle the direction of the hole pattern from the cursor location.

You may press the Shift key to get the 'top' view of the hold pattern.



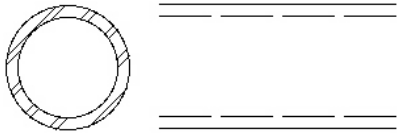
- ☐ Release the mouse button.

The hole pattern will be placed in the drawing.



**Tubing Tool**

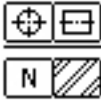
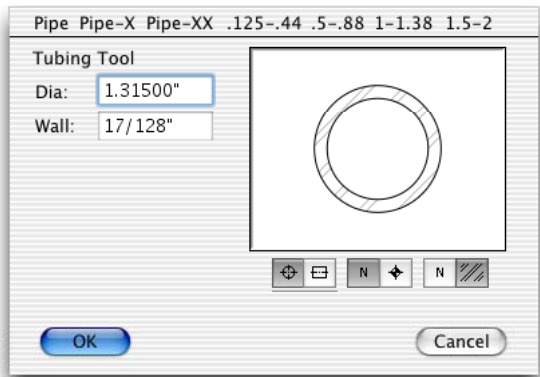
This tool allows you to draw tubing in side or end view.



The Tubing tool uses the Normal style. This is optional; see ‘Basic Concepts—Tool Attributes’.

**To set the behavior of the tool:**

- ☐ Press the Option key and select the Tubing tool from the Nuts & Bolts palette. The following dialog will appear:



- ☐ Type the tubing diameter and wall thickness.
- ☐ You may use the menus located at the top of the dialog box to get standard pipe and tubing sizes.
- ☐ Choose if you want to place the tubing by end view or to draw the side view.
- ☐ Choose if you want the end view hatched.

**To use the Tubing tool:**

- ☐ Select the Tubing tool from the Nuts & Bolts palette.
- ☐ Use the same drawing technique described for the Hole tool.

***Converting Lines to Tubing***

The Tubing tool can be used to convert a line to the side view of a tube. Use the same drawing technique described for the Hole tool.



## Rectangular Tubing Tool

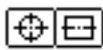
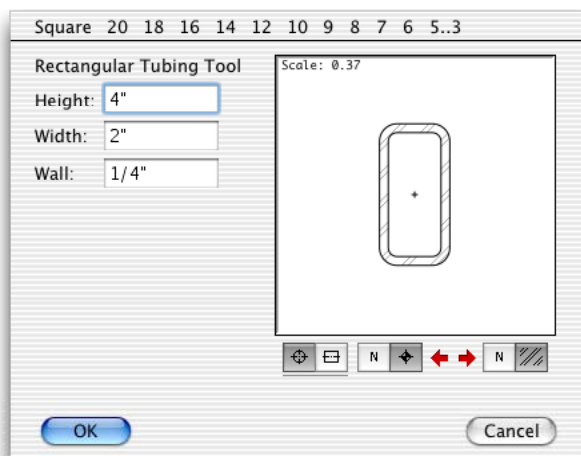
This tool allows you to draw rectangular or square tubing in side or end view.



The Rectangular Tubing tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Rectangular Tubing tool from the Nuts & Bolts palette. The following dialog will appear:



- ☐ Type the tubing height, width and wall thickness.
- ☐ You may use the menus located at the top of the dialog box to get standard tubing sizes.
- ☐ Choose if you want to place the tubing by end view or to draw the side view.
- ☐ Click the rotate buttons to rotate the view of the tubing.
- ☐ Choose if you want the end view hatched.

### To use the Rectangular Tubing tool:

- ☐ Select the Rectangular Tubing tool from the Nuts & Bolts palette.
- ☐ Use the same drawing technique described for the Hole tool.

**Converting Lines to Rectangular Tubing**

The Rectangular Tubing tool can be used to convert a line to the side view of a rectangular tube. Use the same drawing technique described for the Hole tool.



**I-Shape Tool**

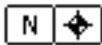
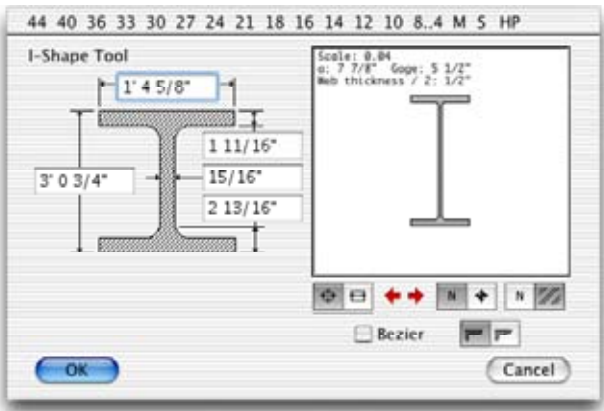
This tool allows you to draw a steel I-shape in side or end view.



The I-Shape tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

**To set the behavior of the tool:**

- ☐ Press the Option key and select the I-Shape tool from the Nuts & Bolts palette. The following dialog will appear:



- ☐ Type the dimensions of the shape.
- ☐ You may use the menus located at the top of the dialog box to get steel shape sizes.
- ☐ Choose if you want to place the shape by end view or to draw the side view.
- ☐ Click the rotate buttons to rotate the view of the shape.
- ☐ Choose if you want to show a point for the centroid in end view and a centerline in side view.
- ☐ Choose if you want the end view hatched.
- ☐ Choose to place the shape as a Bézier, to which you can assign a fill pattern or fill color.
- ☐ Choose if you want angled flanges.

**To use the I-Shape tool:**

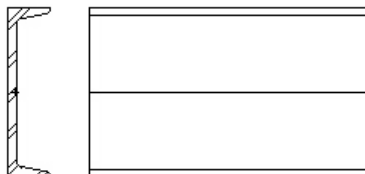
- ☐ Select the I-Shape tool from the Nuts & Bolts palette.
- ☐ Use the same drawing technique described for the Hole tool.

***Converting Lines to I-Shapes***

The I-Shape tool can be used to convert a line to the side view of an I-Shape. Use the same technique as for the Hole tool.

**Channel Tool**

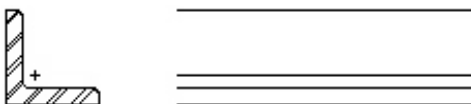
This tool allows you to draw a steel channel in side or end view.



The Channel tool is the same as the I-Shape tool described above, except that the shape is different.

**Angle Tool**

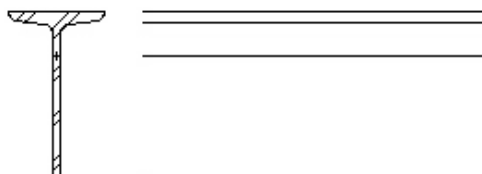
This tool allows you to draw a steel angle in side or end view.



The Angle tool is the same as the I-Shape tool described above, except that the shape is different. The AND10133 and AND10134 choices in the menu are standard aluminum extrusions used in the aircraft industry.

**Tee Tool**

This tool allows you to draw a steel T shape in side or end view.

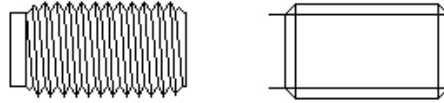


The Tee tool is the same as the I-Shape tool described above, except that the shape is different.



## Thread Tool

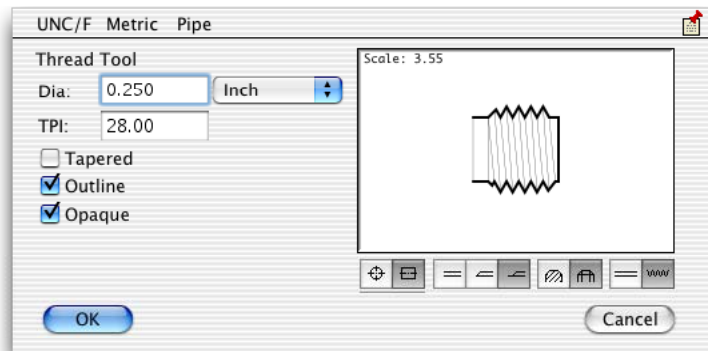
This tool allows you to draw machine threads in side view and end view.



The Thread tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Thread tool from the Nuts & Bolts palette. The following dialog will appear:



- ☐ Type the thread diameter.
- ☐ Type the threads per inch (TPI) or thread pitch.
- ☐ You may use the menus located at the top of the dialog box to get thread sizes.
- ☐ Type the threads per inch (TPI) or thread pitch.
- ☐ Choose Tapered if you want a tapered thread, as for pipe threads.
- ☐ Choose Outline if you want the Outline line style used for the outlines of the threads.
- ☐ Choose Opaque if you want the side view of the threads to be filled with a white fill pattern.
- ☐ Choose if you want to place the threads by end view or to draw the side view.
- ☐ Choose the style of the thread start.
- ☐ Choose a cross-sectional view or a normal 'external' view.
- ☐ Choose standard-depiction or fully formed threads.



**To use the Thread tool:**

- ☐ Select the Thread tool from the Nuts & Bolts palette.
- ☐ Use the same drawing technique described for the Hole tool, however when drawing threads in side view, you may use the Option key to toggle between right-hand and left-hand threads.

***Converting Lines to Threads***

The Thread tool can be used to convert a line to the side view of a thread. Use the same drawing technique described for the Hole tool.

**Screw Thread Tool**

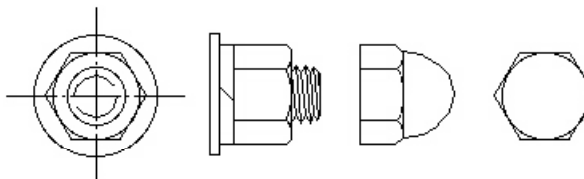
This tool allows you to draw the type of screw threads commonly used for wood and sheet metal screws.



The Screw Thread tool is essentially same as the Thread tool described above, except that the thread shape is different.

**Nut Tool**

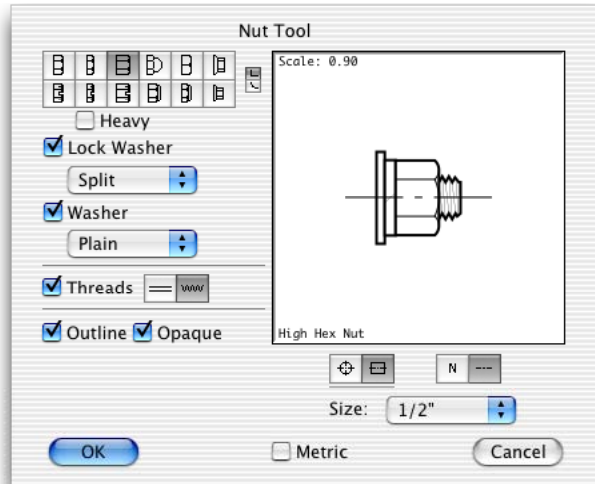
This tool allows you to place side and end views of standard nuts, optionally with threads, washers and lock washers.



The Nut tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

**To set the behavior of the tool:**

- ☐ Press the Option key and select the Nut tool from the Nuts & Bolts palette. The following dialog will appear:



- ☐ Choose the type of nut that you want.
- ☐ Choose if the nut is to have a rounded base.
- ☐ Select Heavy if you want a heavy nut.
- ☐ Choose if you want to use a lock washer, and the lock washer type.
- ☐ Choose if you want to use a washer, and the washer type.
- ☐ Choose if you want to show threads, and if the threads are standard-depiction or fully formed.
- ☐ Choose Outline if you want the Outline line style used for the outlines of the nut.
- ☐ Choose Opaque if you want the side view of the nut to be filled with a white fill pattern.
- ☐ Choose if you want to place the nut by end or side view.
- ☐ Choose if you want centerlines.
- ☐ Select a standard size for the nut.
- ☐ Choose Metric for metric nut sizes and washer types.

#### To use the Nut tool:

- ☐ Select the Nut tool from the Nuts & Bolts palette.
- ☐ Use the same drawing technique described for the Hole tool.

#### Converting Lines to Nuts

The Nut tool can be used to convert a line to the side view of a nut. Use the same drawing technique described for the Hole tool.



## Washer Tool

This tool allows you to place a washer in side or end view.

The Washer tool is similar to the Nut tool described above.



## Lock Washer Tool

This tool allows you to place a lock washer in side or end view.

The Lock Washer tool is similar to the Nut tool.



## Screw Tool

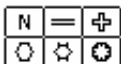
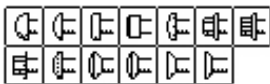
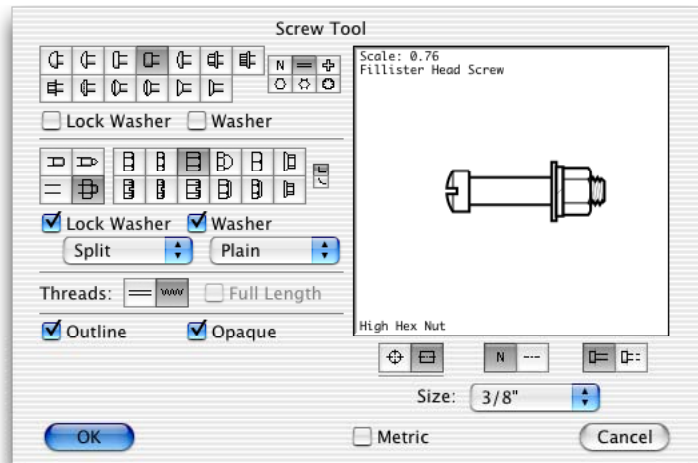
This tool allows you to draw a variety of machine screws in side or end views.



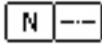
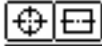
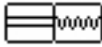
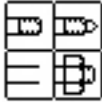
The Screw tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Screw tool from the Nuts & Bolts palette. The following dialog will appear:



- ☐ Choose the type of screw that you want.
- ☐ Choose the type of screw 'slot'.
- ☐ Choose if you want a washer and/or lock washer under the screw head.



- ☐ Choose the type of screw shank that you want to draw: threaded, threaded with tapped hole, plain or with nut and threads.
- ☐ Choose if you want a washer and/or lock washer under the nut, and the washer types.
- ☐ Choose standard-depiction or fully formed threads.
- ☐ Choose if you want full length threads.
- ☐ Choose Outline if you want the Outline line style used for the outlines of the screw.
- ☐ Choose Opaque if you want the side view of the screw to be filled with a white fill pattern.
- ☐ Choose if you want to place the screw by end or side view.
- ☐ Choose if you want centerlines.
- ☐ Choose if you want to use the Hidden line style for the shank.
- ☐ Select a standard size for the screw.
- ☐ Choose Metric for metric screw sizes.

#### To use the Screw tool:

- ☐ Select the Screw tool from the Nuts & Bolts palette.
- ☐ Use the same drawing technique described for the Hole tool.

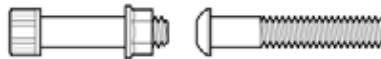
#### *Converting Lines to Screws*

The Screw tool can be used to convert a line to the side view of a screw. Use the same drawing technique described for the Hole tool.



### Cap Screw Tool

This tool allows you to draw cap screws by end or side view.

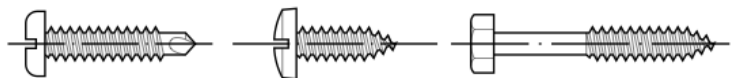


This tool is essentially the same as the Screw tool described above, except that you have the option of fixed or interactive screw lengths.



### Sheet Metal Screw Tool

This tool allows you to draw sheet metal screws, self-drilling sheet metal screws and wood screws by end or side view.

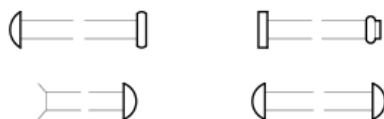


This tool is essentially the same as the Screw tool described above, except that you have the option of fixed or interactive screw lengths.



### Rivet Tool

This tool allows you to draw rivets by end or side view.



This tool is essentially the same as the Screw tool described above. Because of how rivets are usually drawn, the head base line is omitted.



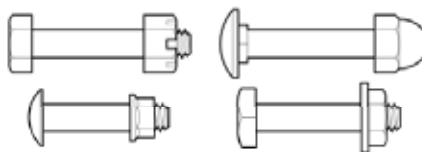
### Headed Weld Stud Tool

This tool allows you to draw headed weld studs of standard types.



### Bolt Tool

This tool allows you to draw four bolt styles by end or side view.

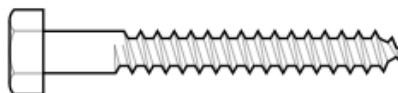


This tool is essentially the same as the Screw tool described above.



### Lag Screw Tool

This tool allows you to draw a lag screw by end or side view.

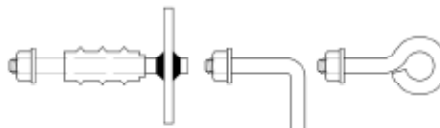


This tool is essentially the same as the Screw tool described, except that you have the option of fixed or interactive screw lengths.



### Anchor Bolt Tool

This tool allows you to draw several types of anchor bolts.



This tool is essentially the same as the Screw tool, except that you have the option of fixed or interactive screw lengths.



### Threaded Rod Tool

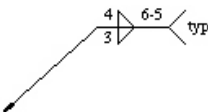
This tool allows you to draw several types of threaded rods.





Welding Symbol Tool

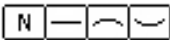
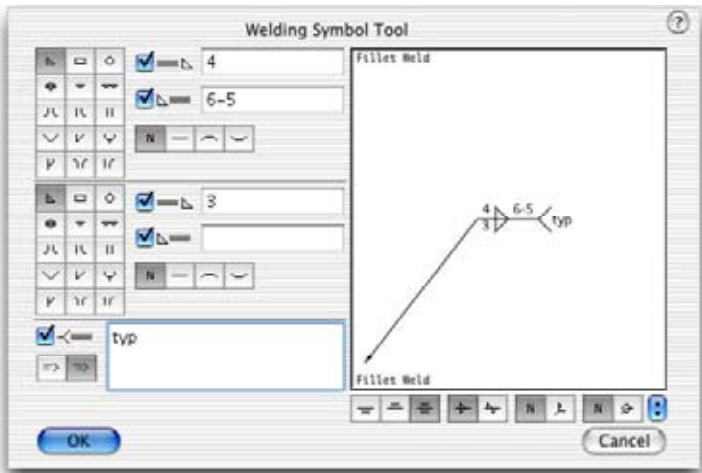
This tool allows you to draw standard welding symbols.



The tool uses the Leader style. This is optional; see 'Basic Concepts—Tool Attributes'.

To set the behavior of the tool:

- Press the Option key and select the Welding Symbol tool from the Nuts & Bolts palette. The following dialog will appear:



- Choose the type of weld symbol that you want on the top or bottom of the line.



You may choose a bevel groove weld with fillet. First, choose a bevel groove weld, then select the fillet option.

- Choose a surface finish for the weld.
- Type the size and length of the weld.
- Type a note to go with the welding symbol.
- Choose the text alignment of the note text.
- Choose if a weld symbol is above the line, below the line, or both.
- Choose if the weld is staggered.
- Choose if you want a field weld flag.
- Choose if you want an all-around indication.
- You may store commonly used setups.

**To use the Welding Symbol tool:**

- ☐ Select the Welding Symbol tool from the Nuts & Bolts palette.
- ☐ Place the cursor in the drawing area where you want to start the arrow of the welding symbol. Press the mouse button.
- ☐ Move the cursor in the direction that you want the welding symbol to go.

You may press the Option key to draw a multi-leg leader line.

- △ In the process of drawing you may tab into the Edit Window to edit the welding symbol, except that in this case the 'Edit Window' is really the tool's dialog box.

- ☐ Release the mouse button.  
The welding symbol will be placed in the drawing.

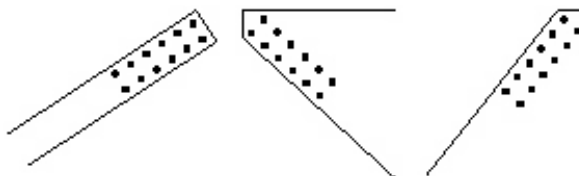
To add or delete segments from the welding symbol's leader:

- ☐ Select a welding symbol object in the drawing.
- ☐ Choose Reshape from the Edit menu.
- ☐ Press the Option key and click on a segment of the leader to add a point to the leader.
- ☐ Press the Option key and click in the handle of the leader to delete a point from the leader.

**Programmer's Note:** One of the problems with writing a tool like this has been dealing with engineers who get excited about this sort of thing. As you may know from personal experience, an excited engineer is a terrible thing to see.

**Gusset Plate Tool**

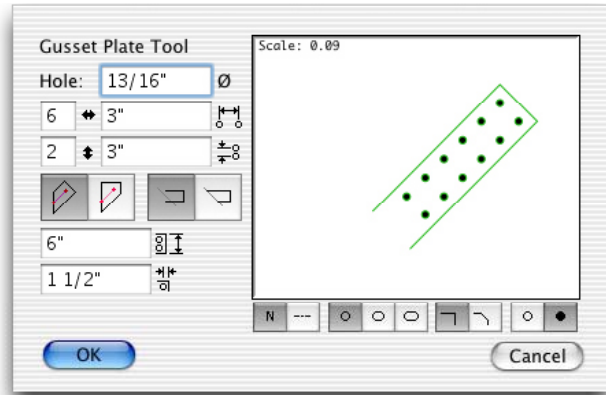
This tool allows you to draw a gusset plate—a common structural element used in steel construction.



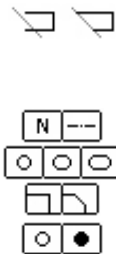
The Gusset Plate tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ❑ Press the Option key and select the Gusset Plate tool from the Nuts & Bolts palette. The following dialog will appear:



- ❑ Type the hole diameter—the standard PowerCADD math functions and mixed dimensional units may be used.
- ❑ Type the number of holes along the gusset plate and the spacing between these holes.
- ❑ Type the rows of holes in the gusset plate and the spacing between the rows of holes.
- ❑ Choose between a rectangular and trapesoid style of plate.
- ❑ Choose if you want the plate trimmed to lines in the drawing that you click on when you draw the gusset plate.
- ❑ Type the width of a rectangular gusset plate.
- ❑ Type the edge distance from the holes.
- ❑ Choose if you want centerlines.
- ❑ Choose round or slotted holes.
- ❑ Choose if you want the corners of the plate chamfered.
- ❑ Choose normal or black holes.



### To use the Gusset Plate tool:

- ❑ Select the Gusset Plate tool from the Nuts & Bolts palette.
- ❑ Place the cursor in the drawing area where you want to start the gusset plate. Press the mouse button.
- ❑ Move the cursor in the direction that you want the gusset plate to go.

If you are drawing a trapesoid style plate, you may press the Option key to toggle between drawing from a vertical line to drawing from a horizontal line.

- ⚠ In the process of drawing, you may tab into the Edit Window

to edit the length and angle of the line that you are drawing to create the gusset plate.

- ☐ Release the mouse button.  
The gusset plate will be placed in the drawing.



## Shear Tab Tool

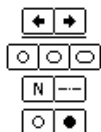
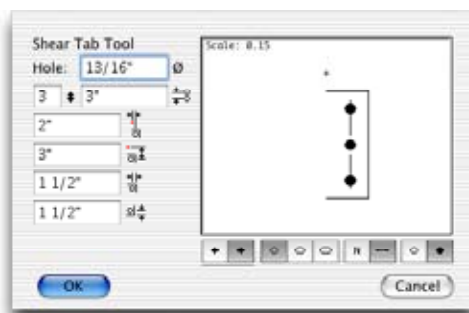
This tool allows you to draw a shear tab, a common structural element used in steel construction.



The Shear Tab tool uses the Normal style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To set the behavior of the tool:

- ☐ Press the Option key and select the Shear Tab tool from the Nuts & Bolts palette. The following dialog will appear:



- ☐ Type the hole diameter—the standard PowerCADD math functions and mixed dimensional units may be used.
- ☐ Type the other dimensions of the shear tab.
- ☐ Choose a left or right view of the shear tab.
- ☐ Choose round or slotted holes.
- ☐ Choose if you want centerlines.
- ☐ Choose normal or black holes.

### To use the Shear Tab tool:

- ☐ Select the Shear Tab tool from the Nuts & Bolts palette.
- ☐ Place the cursor in the drawing area where you want to place the shear tab and click.  
—or—  
Click and drag to place the shear tab at an angle.



## Clip Angle Tool

This tool allows you to draw a clip angle, a common structural element used in steel construction. This tool is the same as the Shear Tab tool, except that the shape is different, and the Opaque option allows you to place a white-filled object.



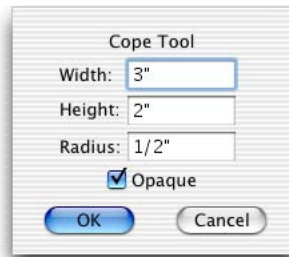
## Cope Tool

This tool allows you to draw a cope, a common cutout on the end of a steel beam.



### To set the behavior of the tool:

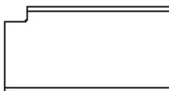
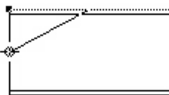
- ☐ Press the Option key and select the Shear Tab tool from the Nuts & Bolts palette. The following dialog will appear:



- ☐ Type the width, height and radius of the cope.
- ☐ Select Opaque if you want the coped area covered up with a white object.

### To use the Cope tool:

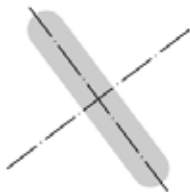
- ☐ Select the Cope tool from the Nuts & Bolts palette.
- ☐ Place the cursor in the drawing area over one side of the object that you want to cope. Press the mouse button.
- ☐ Move the cursor to the other side of the object that you want to cope and release the mouse button.



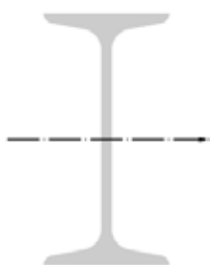
The cope will be placed in the drawing.



Centroid



Neutral Axes



Principal Axis


 $I_{xy} \neq 0$        $I_{xy} = 0$   
 Product of Inertia

## Centroid Tool

This tool calculates and marks the centroid of objects that you click on, and it can optionally calculate other engineering properties of the object's area. First, some terminology:

**Centroid** The centroid of a two-dimensional shape is the center of mass of the shape—assuming it has some ‘thickness’ to give it mass. It is also the center of gravity.

**Section Area  $A$**  The net cross-sectional area, after subtracting the interior holes, or ‘void’ objects. Expressed in units<sup>2</sup>.

**Neutral Axis** When a beam flexes it has tension strain on one side (e.g., the bottom face) and compression strain on the other (e.g., the top face). Somewhere between these two, there is a location of zero strain, *i.e.* where there is neither tension nor compression. This is the location of the neutral axis.

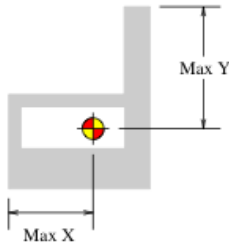
**Principal Axis** The neutral axis through the centroid that produces the maximum moment of inertia,  $I_{max}$ . In other words, the Principal Axis is the axis about which a beam is the ‘stiffest’. The Centroid tool indicates the Principal Axis with a centerline with an arrow on one end. The axis perpendicular to the Principal Axis is shown with a centerline with no arrows.

**Moments of Inertia  $I_x$   $I_y$   $I_{xy}$**  The second moment of the area with respect to the selected axis, a measure of the stiffness of the cross-section and its ability to resist bending moments.  $I_x$  is about the X axis;  $I_y$  is about the Y axis.  $I_{xy}$  is called the product of inertia, and it basically describes the symmetry of the object. If an object is spinning about its centroid and the object has an  $I_{xy} = 0$ , it will be in balance and there will be no wobble or vibration. If  $I_{xy}$  equals 0, it will be reported as 0.0, otherwise it will be reported to the decimals specified. Expressed in units<sup>4</sup>.

**Minimum/Maximum Moments  $I_{min}$   $I_{max}$**  For any shape there is a minimum and a maximum moment of inertia.  $I_{max}$  is the moment of inertia about the Principal Axis, and  $I_{min}$  is the moment of inertia about the axis that is perpendicular to the Principal Axis. If the Principal Axis lines up with either the X or Y axis, then the  $I_{min}$  and  $I_{max}$  will equal  $I_x$  and  $I_y$ , although they may be reversed.  $I_{min}$ ,  $I_{max}$  and the Principal Axis are important factors used to analyze the performance of a beam in compression. Expressed in units<sup>4</sup>.



*Polar Moment of Inertia*  
These objects have equal section area  
but the hollow circle has a much  
larger polar moment of inertia.



*Extreme Fibers*

**Polar Moment of Inertia  $I_p$**  The Polar Moment of Inertia is a measure of the resistance of an object to rotational acceleration. When the mass of an object is distributed far from its axis of rotation, the object has a high Polar Moment of Inertia. When the mass distribution is close to the axis of rotation, it has a low Polar Moment of Inertia. Expressed in units<sup>4</sup>.

**Extreme Fiber X, Extreme Fiber Y** The point in the cross-sectional shape farthest from the neutral axis. This is used to calculate the section modulus, and only applies if the neutral axis is about the object's centroid. Extreme Fiber X is the horizontal distance from the Y axis. Extreme Fiber Y is the vertical distance from the X axis. Expressed in units of length.

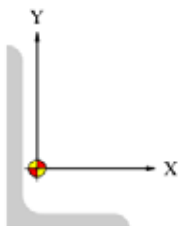
**Section Modulus  $S_x$   $S_y$**  The section modulus is useful for calculating the extreme bending stress, and it only applies if the neutral axis is about the object's centroid.  $S_x$  is about the X axis;  $S_y$  is about the Y axis. Expressed in units<sup>3</sup>.

**Radius of Gyration  $R_x$   $R_y$**  The distance from the selected axis to a point at which the entire area may be concentrated and still have the same moment of area as the distributed area. It describes the ability of a column to resist buckling, for example, a circular pipe is the most efficient shape to resist buckling.  $R_x$  is about the X axis;  $R_y$  is about the Y axis. Expressed in units of length.

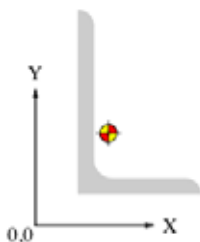
#### To set the behavior of the tool:

- ☐ Press the Option key and select the Centroid tool from the Nuts & Bolts palette. The following dialog will appear:





*Reference Axis: Centroid*



*Reference Axis: Ruler Origin*

- ☐ You may select to calculate the moment of inertia, which will also calculate a number of additional things.
- ☐ Select if you want the moment of inertia calculated about the  $X$  axis, or about both the  $X$  and  $Y$  axes.
- ☐ You may select to have the moment of inertia to be calculated about the object's centroid or about the ruler origin.

The Centroid tool calculates the properties of the area around the  $X$  and  $Y$  axes of the drawing either through the centroid or the ruler origin. If you were only considering a section by itself, then you would only be interested in the calculations made about the centroidal axes.

The Ruler Origin would typically be used when you want to add and subtract values for built-up sections, because you cannot add individual values that have been calculated about individual centroidal axes. This is because each section has a geometry relative to the other sections and the 'square of the distance' rule comes into play, *i.e.* the farther the sections are away from each other, the higher the resulting moment values will be.

Another reason for calculating moment values about non-centroidal axes is because in some structures an individual beam can be forced to bend around some other axis. An example is a truss. In this case, we have two sections, the top and bottom chords, held apart by some form of bracing. This has the effect of forcing the chords to bend around an axis somewhere between the two chords. To calculate the stress in one of the chords, an engineer needs to know the moment values for the section when it is calculated around the other axis.

- ☐ Select Min/Max, Polar Moment of Inertia, Radius of Gyration and Section Modulus & Extreme Fiber if you want these to be reported.

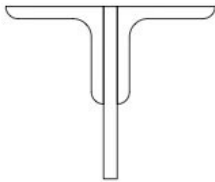
### To use the tool:

- ☐ Select the Centroid tool from the Nuts & Bolts palette.
- ☐ Click on the desired object.

The objects may be rectangles, ellipses, circles, polygons, splines, B-splines, Béziers and groups containing these objects. Other types of objects (lines, text, arcs, etc) may be in the group, but they are ignored. All objects must be closed shapes for the calculations to work properly, and the Centroid tool closes all open shapes prior to making a calculation.



*Void objects are holes.*



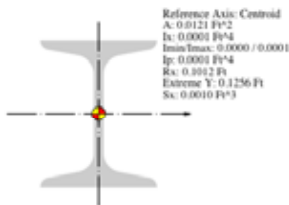
*Multiple objects must be in a group to be considered as a single object.*

A group of objects may consist of 'solid' and 'void' objects. 'Solid' objects will be totalled in the calculation. 'Void' objects will be subtracted from the calculation and are intended as hollow shapes or holes in a cross-sectional shape.

The Centroid tool will calculate which objects are within other objects. Objects within 'void' objects are considered as solid objects. When objects overlap, the Centroid tool will show the results with the text in red, and with a warning that objects overlap. You can also confuse the Centroid tool by creating duplicate objects.

A polygon which crosses over itself ('complex polygon') will result in completely inaccurate results.

- ☐ The tool will place a centroid marker at the centroid of the selected objects. If you have selected the Moment of Inertia option, lines will be drawn to show the Principal Axis of the shape and text will be placed in the drawing with a report on the characteristics of the shape.



The Centroid tool draws lines on the Principal Axis of the object for identification when any calculations of the moments of inertia are made. This makes it easy to rotate the object to align the Principal Axis to the  $X$  axis and then, after using the Centroid Tool again, you can obtain full report of values for the Principal Axis.

The Principal Axis lines are only marks. All calculated values are for properties of the area around the  $X$  and  $Y$  axes, except for  $I_{min}$  and  $I_{max}$  which by definition relate to the Principal Axis.

If the Centroid tool encounters any open shapes, it will close them, and this will be reported in the text report and the report will be in red, since it may result in an inaccurate report.

The Centroid tool uses the Area Units and Area Accuracy of the Drawing Setup/Units pane, except that acres and miles are reported as feet, and hectares and kilometers are reported as meters. Thus the units may be mm, cm, m, inches and feet.

The Centroid tool converts rounded rectangles, Béziers and B-splines to polygons to make all of the calculations for area and moments of inertia. The conversions of some shapes vary in extremely small amounts depending on the size of the object, so it's possible you may see some very small variations for the same shape comprised of Béziers and B-splines at different sizes and scales. The moments and areas of circles and ellipses are found by direct calculation.

In an effort to provide very precise areas, the Centroid tool bases its conversion of objects to polygon on the Area Accuracy of the Drawing Setup/Units pane up to six decimal places. It will be accurate up to six decimal places for square inches at 1:1 scale, which produces an area accurate to a millionth of a square inch. Setting the Area Accuracy to higher numbers will change the display, but the accuracy is never calculated higher than six decimal places for square inches.

Many thanks to Derek Dubout for his assistance in creating the Centroid tool.



*Derek is obviously a little out of balance.*

## Special Curves Palette



This tool palette contains the Spiral and Faired Curve tools.



### Spiral Tool

The Spiral Tool allows you to draw two types of spiral curves.



*Spiral of Archimedes*



*Logarithmic Spiral*

The spiral of Archimedes is an arithmetic spiral, which increases in radius at a fixed amount for each winding—like a roll of paper. The logarithmic spiral increases in radius at an exponential rate—the familiar shape of a Chambered Nautilus.



The Spiral tool uses the Normal style. This is optional; see ‘Basic Concepts—Tool Attributes’.

#### To set the behavior of the tool:

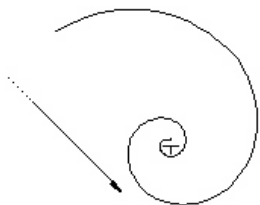
- ☐ Press the Option key and select the Spiral tool from the Special Curves palette. The following dialog will appear:



- ☐ Type the number of windings. There is no upper limit, thus you should use a reasonable number. If you attempt to use a high number, you risk crashing your computer if it has insufficient memory to accommodate the spiral object.
- ☐ Choose between a logarithmic or arithmetic spiral.
- ☐ Choose if you want the spiral placed as a polygon or a smoothed Bézier.

**To draw a spiral:**

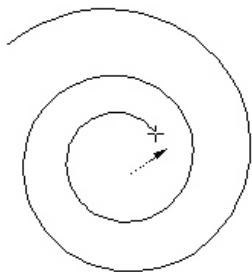
- ☐ Select the Spiral tool from the Special Curves palette.
- ☐ Place the cursor in the drawing area at a location that will represent the outside end of the spiral. Press the mouse button.
- ☐ Drag away from the starting point.



You may press the Option key to toggle the direction of the spiral between clockwise to counter-clockwise. For more information, see 'Basic Concepts—Option-Toggling'.

- △ You may tab into the Edit Window to edit the length and angle of the initial mouse movement.

Release the mouse to establish the outside radius and center of the spiral.



- ☐ Move the mouse away to set the inside radius and number of windings.

Move the mouse around the center of the spiral to change the number of windings.

You may press the Option key and move the center of the spiral.

- △ You may tab into the Edit Window to edit the inside radius and number of windings of the spiral.

Click the mouse to complete the spiral.

The spiral will be placed in the drawing.

**Faired Curve Tool**

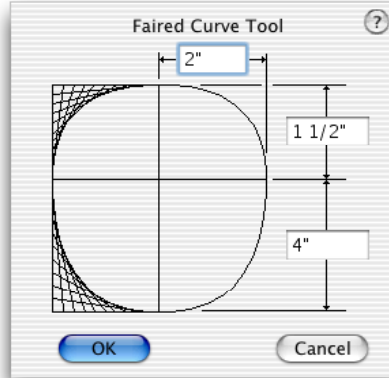
The Faired Curve tool allows you to place a specialized type of smoothed curve common in the aircraft industry. This shape originated with the North American P-51 "Mustang" and was used for the fuselage cross-sectional shape as well as fuselage/wing intersections, wing fillets and wing tips.



The Faired Curve tool uses the Normal style (this is optional; see 'Basic Concepts—Tool Attributes'), plus the Centerline style for the vertical and horizontal reference lines.

**To set the dimensions of the fuselage shape:**

- ☐ Press the Option key and select the Faired Curve tool from the Special Curves palette. The following dialog will appear:



- ☐ Type the dimensions required.

**To place the fuselage cross-sectional shape:**

- ☐ Select the Faired Curve tool from the Special Curves palette.
- ☐ Click in the drawing to place the shape, which is placed by the centerline and “water line 0.”

The Faired Curve tool may also be used to smooth a polygon with an even number of sides.

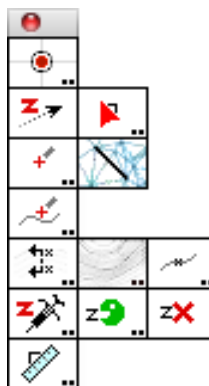

**To create a faired curve for a wing tip, wing fillet, or any other similar situation:**

- ☐ Select the Faired Curve tool from the Special Curves palette.
- ☐ Hold down the Option key and click on a polygon with an even number of sides.

A smooth curve will be placed in the drawing but the polygons will not be replaced. Two examples are shown to the left. To replace the polygon with the smooth curve, hold down both the Shift and Option keys when you click on the polygon.

If two adjacent polygon segments are collinear (as are the vertical segments of the example to the left), the Faired Curve tool will create a smooth curve segment across at the polygon vertex, otherwise it will begin a new smooth curve.

# TopoTools Palette



This tool palette consists of thirteen tools that help in the construction and analysis of topographical drawings.

## TopoTools and Topography Tools

The first topographical tools for PowerCADD were developed by Paolo Rossi in Italy. His external, known as Topography Tools offers a series of tools for placing topo points, slope interpolation as well as the import and export of topo survey data.

After seeing these tools, I began to develop some ideas on how topographical tools might operate. Working with a number of civil engineers and architects, I have developed TopoTools and collaborated with Engineered Software and Paolo Rossi to establish a standard way to store a Z height and topo data in a PowerCADD drawing.

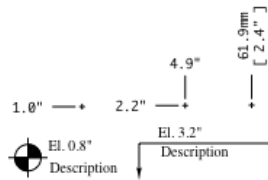
I regret any overlap of capabilities, and I urge everyone to investigate Topography Tools and the additional capabilities it offers, particularly the ability to import and export survey data.

*Alfred Scott*

## Z Height

A PowerCADD drawing consists of two-dimensional objects, however PowerCADD provides the capability to store additional information with each object. The Z height of an object is stored this way, and it is optional. Thus, most objects will not have a Z height at all.

To get started, use the Z Needle to assign a Z height to an object in the drawing. Once you do this, many of the tools in TopoTools will suddenly come alive when they 'see' the Z height of the object.

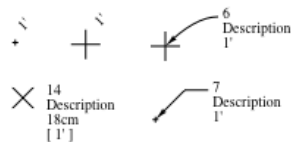


*Dimension Point Objects*

## Dimension Point Objects

This is a new type of object which shows the X and/or Y location of the object in the drawing as dimension text. When the object is moved, the dimension text changes to the current X and Y location. The dimensions may be single or dual dimensions. The Dimension Point tool and Datum Dimension tool place dimension point objects in the drawing. These objects do not have a Z height, but you can use the Z Needle tool to give them a Z height.

Dimension point objects have a single marker, which can be literally any PowerCADD object, including groups of objects, pictures, etc. They are always a fixed size and are normally centered on the object, but not always—as in the case of the European Datum.



*Topo Point Objects*

## Topo Point Objects

These are a special type of dimension point objects which always have a Z height. As placed by TopoTools, the markers will be a reference point, or a vertical or diagonal cross. Topography Tools offers many other choices of topo point markers.

Topo point objects may show only the Z height as dimension text, and may also have additional text for the survey point number and a description. While you may edit the survey point number and description with the Text tool, this will not work well because the text will be replaced with the original internally-stored point number and description.

Topo points may also show the X, Y and Z values for the object, and this is implemented in Topography Tools, but not in TopoTools. The topo point dimensions may be single or dual dimensions. The topo point object may have a leader, which can be a polygon or a smooth B-spline.

You can edit these objects by using the PowerCADD Edit > Edit... command.

## Getting Started

If you try to use these tools, some of them will appear to do nothing, and indeed they will not until there are objects in the drawing with Z height.

If you have a topo map with contour lines, get started by using the Z Needle tool on these contours.

If you are starting from scratch with topo points from a survey, then begin with the Topo Point tool.



## Drawing Benchmark Tool

This tool lets you set the global drawing origin by specifying the location of a benchmark in the drawing.

### *Global Coordinates*

The X and Y coordinates in a PowerCADD drawing are all relative to the drawing origin, that is the zero-zero point in the drawing. You set this by dragging from the top left corner of the ruler.

There are drawings where the drawing coordinates are relative to an off-page origin. Survey and topographic information is normally in the State Plane Coordinate system, but there is also the North American Datum, UTM and other similar systems. Additionally, aircraft and ship design drawings use their own datum points to specify locations in the vehicle.

To accommodate this, PowerCADD provides an optional, alternative drawing origin called the Global Origin. It's just a second drawing origin that you can use, but because the zero-zero point is almost always off the page, you must specify this location by typing the coordinates. Do this in the Show pane of Drawing Setup. However, calculating the location of the origin relative to your drawing can be difficult.

The Drawing Benchmark tool simplifies the process. Like a surveyor who drives a stake in the ground to establish a benchmark location, you use the tool to establish a benchmark location in your drawing, then specify the location of the benchmark in your global coordinate system and finally set the Global Origin.

### **To use the Drawing Benchmark tool:**

- ☐ Select the Drawing Benchmark tool from the TopoTools palette.



The drawing benchmark is shown as a red dot, and a leader line extends to the cursor so you can easily find the benchmark.

- ☐ Click in the drawing to establish a new location for the benchmark.

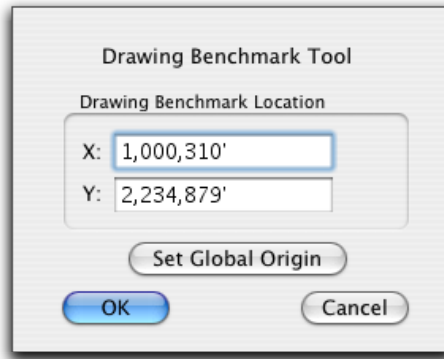
—or—

- ☐ Click in the handle of the benchmark and move it to the desired location.

Once you have located the benchmark, it is now time to set the location of the benchmark point.

**To set the benchmark location:**

- ☐ Press the Option key and select the Drawing Benchmark tool from the TopoTools tool palette. The following dialog will appear:



- ☐ Type the X and Y coordinates of the drawing benchmark expressed in the global coordinate system.
- ☐ Select Set Global Origin.

The tool will calculate the location of the origin and set the global origin. Now, when you draw, the X and Y coordinates of the drawing will be relative to the global origin.

***Drawing Benchmark Dump***

You can place a benchmark indication in the drawing.

**To place a benchmark indication:**

- ☐ Press and hold down the Shift and Option keys. The cursor will change to a DumpTruck cursor.
- ☐ Click in the drawing.



A benchmark image will be placed in the drawing. This is a group of PowerCADD objects. If you change the Global Origin, this indication in the drawing will no longer be applicable, and you will need to place another up-to-date image.



## Z Move Tool

This tool allows you to move the Z height of selected objects up and down by drawing a line up or down with the mouse.

### To use the tool:

- ☐ Select the Z Move tool from the TopoTools palette. If no objects are selected, the Arrow cursor will be active, and you may click on objects to select them.
- ☐ Place the cursor at any point in the drawing and click.
- ☐ Drag up or down to change the Z height.

△ You may tab into the Edit Window to edit the length of the Z-move while in the process of drawing the line.

The Z height of selected objects will be changed.

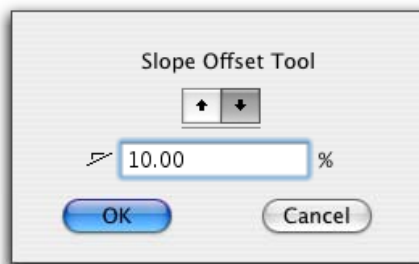


## Slope Offset Tool

This tool allows you to duplicate and move an object with a Z height to a new location *and* to change the Z height of the new object to a specified slope.

### To set the behavior of the tool:

- ☐ Select the Slope Offset tool from the TopoTools palette. The following dialog will appear:



- ☐ Type the slope.
- ☐ Select whether this is an up or down slope.

### To use the tool:

- ☐ Select the Slope Offset tool from the TopoTools palette.
- ☐ Click on an object in the drawing with a Z height and drag the duplicate object to a new location.

Like the Super Arrow tool, the tool duplicates the object, moves it to a new location, *and* it changes the Z height of the new object to match the specified up or down slope.



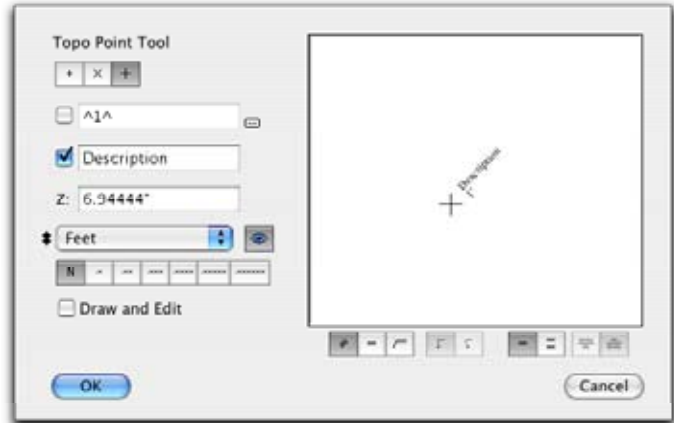
## Topo Point Tool

This tool lets you place topo point objects with a specified Z height in the drawing.

The size of the marker places is relative to the font size selected for the tool.



The tool uses the Point style for points, the hairline style for cross and X markers, and the Leader Line style for leader-style objects. This is optional; see ‘Basic Concepts—Tool Attributes’.

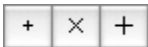


### To set the behavior of the tool:

- ☐ Select the Topo Point tool from the TopoTools palette. The following dialog will appear:
- ☐ Select the type of point.
- ☐ Type the optional point number and description.
- ☐ Type the Z height.
- ☐ You have a choice of three styles, with angled text, horizontal text or with a leader.
- ☐ You also set the TopoTools Dimension style of dimension units, tolerances, etc. This style is used globally in TopoTools, and may also be set in the Grading tool. This setting is also used in the display of the Contour Label tool, as well as the Z height shown for any object in the ‘Z height’ tip.

However, whenever you enter a Z height in a dialog or in the Edit Window, you will be using the same dimensional units used in the drawing for length, offset, etc.

- ☐ Select Draw and Edit to have a dialog come up on each use of the tool.



**To use the tool:**

- ☐ Select the Topo Point tool from the TopoTools palette.
- ☐ Click in the drawing to place the topo point object.

△ You may tab into the Edit Window to edit the X, Y and Z coordinates of the object.

**Topo Breakline Tool**

After you have imported topo points from a field survey of a site, a common problem is that the calculated contours (see Analyze Topo, Find Contours) do not always match what is on the ground. For a football stadium we know that the field will be flat, but the contours for the surrounding terrain would not show the 'hard edge' of the field. You need to strike a line across the drawing to put a 'crease' in the terrain. The Topo Breakline tool allows you to do this.

△ **Important:** It is best if you use this tool after you have imported the topo points, and before you have calculated the topo contours with Analyze Topo, Find Contours.

This tool 'sees' Topo Point objects created with either TopoTools, Topography Tools or imported by Topography tools, as well as point objects with a Z height. The objects may be selected or not. It ignores all other objects including contour lines with a Z height. △

**To use the tool:**

- ☐ Select the Topo Breakline tool from the TopoTools palette.



The tool will 'see' the terrain and it will construct a triangulated irregular network (TIN) which is used to calculate the contour lines. The TIN triangles are shown as a network of blue lines. The contours will be calculated using the setting of Analyze Topo, Find Contours and the terrain will be shaded so that you can visualize the topography.

Topo Point objects will be shown with a yellow hiliting to indicate the objects that you can click.



- ☐ Move the mouse over a Topo Point object and click.



- ❑ Drag to a second Topo Point object.

When the mouse is over the second object, the tool will calculate a new TIN with the proposed topo breakline, and it will show the 'before' and 'after' contours. Thus, you can see before you release the mouse button how the terrain and its contours will change.

- ❑ Release the mouse button.

A topo breakline will be placed in the drawing and the new contours will be shown.



In fact, it is actually just a reference point object placed half-way between the two points and with a Z height that is the average of the two points. And to help you see what has happened, the tool also places two lines in the drawing, one black and the other a wide yellow line to hilite the topo breakline.



The two lines are cosmetic only and have no effect on the terrain. They may be deleted at any time without affecting the terrain. However the point object should remain in the drawing if you want to keep this change in the terrain.

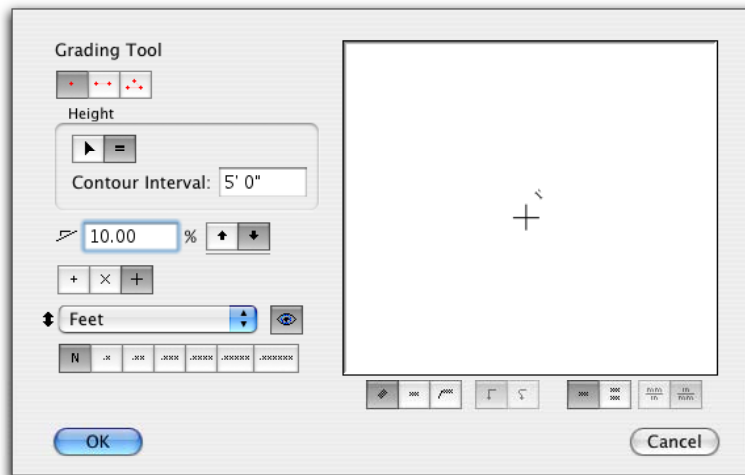


## Grading Tool

The Grading tool lets you do slope interpolation and calculation by clicking on objects in the drawing with a Z height. The tool has three modes of operation: one-, two- and three-point modes. In all three modes, you select the type of new topo point object to be placed, along with the dimension units and precision.

**To set the behavior of the tool:**

- ❑ Select the Grading tool from the TopoTools palette. The following dialog will appear:



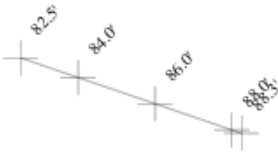
- ❑ Select one-, two- or three-point grading mode.
- ❑ Select interactive (arrow) or fixed (equal sign) height.
- ❑ The Contour Interval is used for the fixed height. This allows you to click on an object at any Z height and then as you move the mouse away from the object, new topo point objects are placed in the drawing at this interval. You would use this to create topo points at two-foot contour intervals, for example.
- ❑ Type the desired slope and whether it is an up or down slope. Because of PowerCADD's 'math in dialogs' you can enter a slope of say 1:3 by typing 1 divided by 3.



**To use the tool in the one-point mode:**

- ❑ Select the Grading tool from the TopoTools palette.
- ❑ Click on an object with a Z height, move the mouse away to a new location.

A new topo point object will be placed in the drawing at the specified slope from the original object.



#### **To use the tool in the two-point mode:**

- ☐ Select the Grading tool from the TopoTools palette.
- ☐ Place the cursor in the drawing area on the first object with a Z height and press the mouse button.
- ☐ Drag to the second object with a Z height and release the mouse button.
- ☐ Move the mouse to locate the interpolated points.

The height may be interactive or fixed. Again, the contour interval can be used to specify two-foot, five-foot or ten-foot intervals.

You have a Place Line choice, and this line is in the Hairline Style of the Style Tools.

When used in conjunction with the Place Line choice, the height interval provides a simple, manual way of performing the standard Triangular Irregular Network, or TIN, for locating contour lines.

#### **To use the tool in the three-point mode:**

- ☐ Select the Grading tool from the TopoTools palette.
- ☐ Place the cursor in the drawing area on the first object with a Z height and press the mouse button.
- ☐ Drag to the second object with a Z height and release the mouse button.
- ☐ Move the cursor to a third object with a Z height and click.
- ☐ Move the cursor to a new location to place the interpolated point.

The Grading tool uses a straight-line interpolation method.

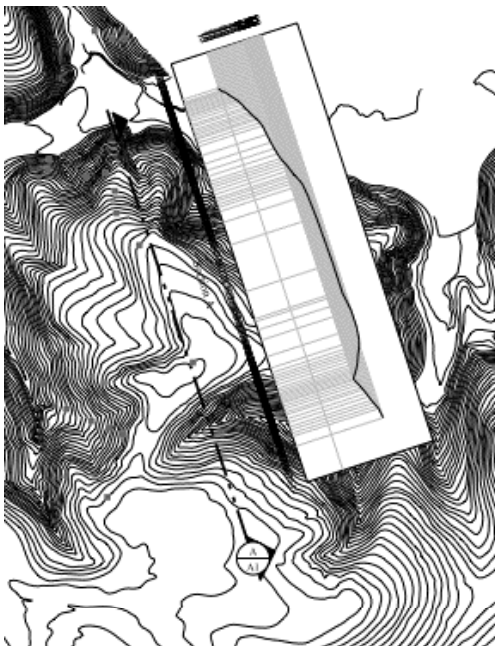
You may use the tool to interpolate between topo point objects or any other object with a Z height, such as a circle, polygon, B-spline, Bézier or spline.



## Section Profile Tool

This tool lets you draw a section line across a series of contour lines in a topo map, and it produces a section profile chart.

The tool's dialog is identical to the WildTools Section Line tool.



### To use the tool:

- ☐ Draw a section line across a topo map with contour lines (which must have Z heights).

As you move the mouse, a simple line will draw on the screen, until you cross contours lines with Z heights. When the tool 'sees' the Z heights, the you will see a full section line and a section profile chart.

You may press the Option key to flip the chart to the other side.

The section line and section profile chart will be placed in the drawing.

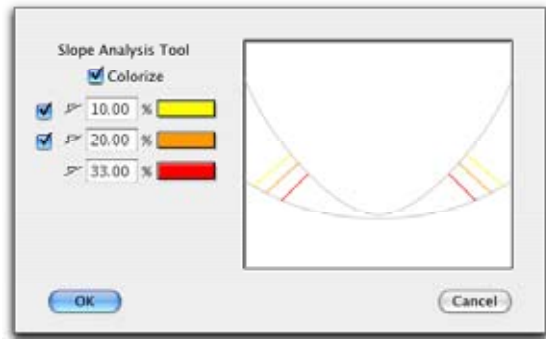
For the chart, the tool uses Outline style lines for the rectangular border and the contour line polygon and uses the Hairline style plus gray pen color for the grid lines. The text font, size and style. is the same as is used for the Topo Point and others.



## Slope Analysis Tool

This tool places lines in the drawing to indicate slope limits.

In the typical manual method to indicate areas of steep slopes, you will find the distance for a given slope, say 33%, and then measure between contour lines to find where the contours are that distance apart. Then you would draw lines to indicate the limits of the slope. The Slope Analysis tool does this for you.



### To set the behavior of the tool:

- ☐ Select the Slope Analysis tool from the TopoTools palette. The following dialog will appear:
- ☐ Select the slope limits.
- ☐ Select if you want the lines colorized.
- ☐ Select the colors to be used for the lines.

### To use the tool:

- ☐ Select the Slope Analysis tool from the TopoTools palette.
- ☐ Place the cursor in the drawing area on the first topo contour with a Z height and press the mouse button.
- ☐ Drag to the second topo contour with a Z height.

The tool will then do a parallel offset for each desired slope, and you will see the parallel offset objects on the screen. The limit lines are found as intersections with the parallel offset contour.

- ☐ Release the mouse button.

If the topo contours are close enough to each other so they fall within the desired slopes, then a line will be placed at each point where the parallel offset curve and the second curve intersect. This will establish lines at the end points of the slope area. If the curves are too far apart, then there will be no intersections and no lines.

You may fill the areas between the limit lines to show the slopes using the Paint Bucket or Flood tools.



## Contour Text Tool

This tool lets you click on a contour in a topo map and then locate text objects along that object. This is just a specialized variation of the Linear Patterning tool. The tool uses the same Z dimension style that you set in the Topo Point or Grading tool.

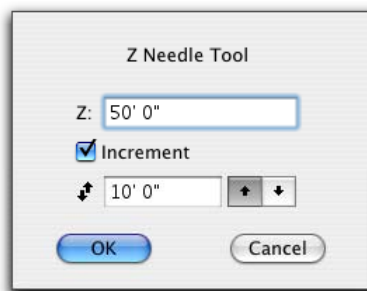


## Z Needle Tool

This tool lets you pick up (adopt) or apply a Z value to objects in the drawing.

### To set the behavior of the tool:

- ☐ Select the Z Needle tool from the TopoTools palette. The following dialog will appear:



- ☐ Set the Z height.
- ☐ Select Increment if you want the tool to change the Z height after each use of the tool.
- ☐ Type the increment amount and whether it is up or down.

### To use the tool:

- ☐ Select the Z Needle tool from the TopoTools palette.
- ☐ Click on an object in the drawing to apply a Z height.

—or—

- ☐ Press the Option key and click on an object in the drawing with a Z height to pick up (adopt) the Z height.



## Z Nibble Tool

This is a simple up-down nudge tool that only affects the Z height. like the Nibble tool, it lets you bump things up or down by a specified amount.



## Z Delete Tool

This tool allows you to delete the Z height of an object in the drawing.

### To use the tool:

- ☐ Select the Z Delete tool from the TopoTools palette.
- ☐ Click on an object in the drawing with a Z height.

The Z height of the object will be deleted but there will be no other change to the object.



## Slope Measure Tool

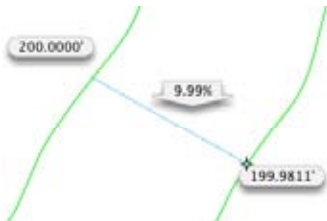
This tool provides the ability to measure the slope between two objects with a Z height. In the tool's dialog, you may select Place Dimension to place a slope indication in the drawing.



The Slope Measure tool uses the Leader Line style. This is optional; see 'Basic Concepts—Tool Attributes'.

### To use the tool:

- ☐ Select the Slope Measure tool from the TopoTools palette.
- ☐ Click on an object in the drawing with a Z height and press the mouse button.
- ☐ Drag to the second object with a Z height. The slope will be indicated on the screen.
- ☐ Release the mouse button when you are finished.



If you selected Place Dimension, a slope indications will be placed in the drawing.

# TopoTools Menu Commands

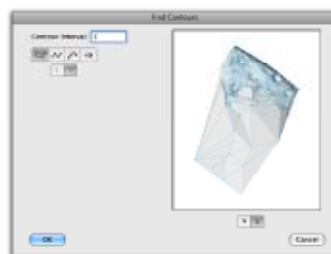
## Find Contours

Find Contours calculates contours for all visible Topo Point objects and reference points with a Z height in the drawing. The objects may be selected or not. It ignores all other objects with a Z height, such as the contour lines it places in the drawing.

### To use Find Contours:

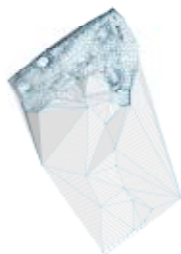
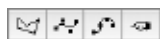
- ☐ Choose Analyze Topo, Find Contours... from the Tool menu.

If there are enough Topo Point objects in the drawing, the following dialog will appear:



The contours will be calculated.

- ☐ Type the desired contour interval.
- ☐ Select the type of objects to be used for the contours. The choices are polygon, B-spline, Spline and Bézier. Because the contours are calculated from a network of triangles, the best choice is polygon, however you may prefer the smoother appearance of the other curves. Be aware, however, that subsequent calculations, such as cut and fill, will be confused and complicated by any shape other than polygon.
- ☐ Choose if you want one or two contours placed in the drawing. The dual-line choice is available with the smooth curves, and when selected both polygons and the smooth curves are placed in the drawing.
- ☐ Choose if you want the TIN triangles placed in the drawing.
- ☐ Click OK and the objects will be placed in the drawing.



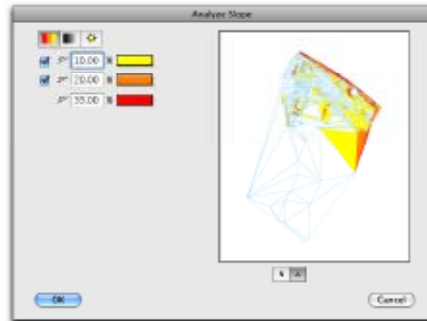
## Analyze Slope

Analyze Slope calculates slopes for a terrain represented by all visible Topo Point objects and reference points with a Z height in the drawing. The objects may be selected or not. It ignores all other objects with a Z height, such as contour lines in the drawing.

### To use Analyze Slope:

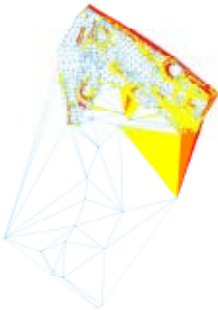
- ☐ Choose Analyze Topo, Analyze Slope... from the Tool menu.

If there are enough Topo Point objects in the drawing, the following dialog will appear:



The slopes will be calculated.

- ☐ Choose from three types of shading.
  - ☐ Select the slope limits.
  - ☐ Select if you want the lines colored.
  - ☐ Select the colors to be used for the slopes.
  - ☐ Choose if you want the TIN triangles placed in the drawing.
  - ☐ For sun shading, adjust the position of the sun.
- ☐ Click OK and the slope objects will be placed in the drawing.



## Menu Commands

Many of the menu commands are optional and may be turned off in the WildTools preferences dialog.

---

### Black Color for All

Changes the pen color of all objects on visible layers to black. The purpose of this is to reverse the effect of Colorize All.

You can control whether text objects are changed to a black color. To set this, press the Option key, choose Black Color for All, and make the selection in the dialog.

You also have a Points to Point Style option. This means that when you choose Black Color for All, points will be converted to the Point Style in the Line Styles palette. This is handy, for example, if you want all of your points to be red.

---

### Colorize All

Colorize All is a quality-control device for line weights. Colorize All converts all objects on visible layers to various pen colors. The colors are presently hard-coded to light brown for Hairline, light blue for Normal, red for Outline and brown for Section Line styles. All other pen sizes are made black. This allows you to see at a glance if you have the right pen sizes in the drawing.

---

### Convert to Group

Converts External objects to groups without a protest alert and also does intelligent things when converting some External object to groups. For example, Insulation Fill objects have the invisible rectangle thrown away. With Path objects, the invisible objects are all assigned pen patterns to they will be visible.

Convert to Group converts a rounded rectangle to a group of lines and arcs.

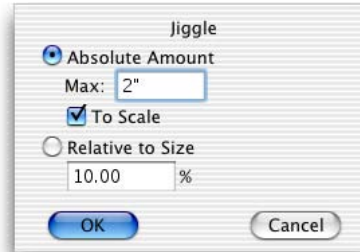
Convert to Group converts dimension lines and arcs to ordinary lines, arc and text objects.

## Jiggle

Jiggle moves selected objects in random angles and at random distances within the maximum distance specified or at a relative distance based on the size of the object. This is intended for scattering shubbery or similar objects and to give a drawing a more human touch.

### To set the default settings for Jiggle:

- ☐ Press the Option key and choose Jiggle from the Tool menu. The following dialog will appear:



- ☐ Choose between an absolute amount or a distance relative to size. The distance the objects will be moved will be random between 0 and this distance.
- ☐ If you select the To Scale option, the distance will be to the drawing scale. If To Scale is not selected, the distance will be an on-paper size.
- ☐ A relative distance, say 10%, is based on the average of the width and height of the object.

### To jiggle objects in the drawing:

- ☐ Select the objects to be jigged (moved in random angles and at random distances within the maximum distance specified).
- ☐ Choose Jiggle from the Tool menu.

If you wish, you may press the Option key as you choose Jiggle from the Tool menu to bring up the dialog box as described above.

The selected objects will be jigged.

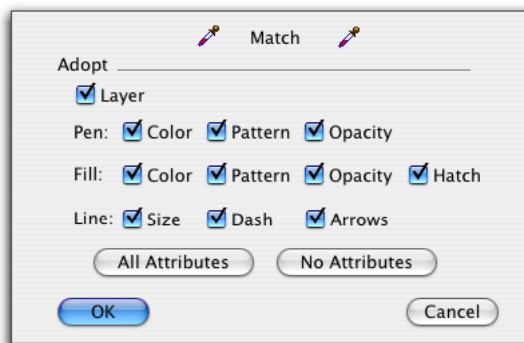
## Match

Match provides the ability to click on an object to adopt the layer that the object is on. You may also adopt the attributes of the object that you click on—they become the attributes of the currently selected tool. There are two ways to use Match: from the Menu or with Match Now. The real power of Match comes from using Match Now.

In the past, Match could be invoked by pressing the Control key and clicking in the drawing, however the Control key is now reserved by the Mac OS for contextual menus. Match Now is a replacement for the old Control-key method of using Match.

### To set the default settings for Match:

- ☐ Press the Option key and choose Match from the Attr Menu. The following dialog will appear:



- ☐ Select Layer if you want Match to adopt the layer of the object that you click on.
- ☐ Select the attributes that you want Match to adopt from the object that you click on.

### To use Match from the menu:

- ☐ Choose Match from the Attr menu.
- ☐ Click on an object in the drawing.

If Match is set to adopt the layer and if the object is on another layer, the drawing will be switched to that layer. If the object is on the current layer, then a soft ‘everything’s okay’ sound will be heard.

If Match is set to adopt some or all attributes, the attributes of the object will be adopted by the currently selected tool. This is true even if you use the Style tools—in that case, the style tool of the currently selected tool will also be changed.

### ***Match Now***

Match Now is a ‘miscellaneous command’ installed by WildTools. This type of command can only be invoked by a Command key. It does not appear in any menu.

#### **To set a Command key for Match Now:**

- ☐ Choose Preferences from the PowerCADD menu.
- ☐ Select the Commands tab.
- ☐ Set a command key (say ‘m’) for Match Now. To find Match Now, click on the Miscellaneous button, then XTNL Misc and you can select Match Now.

#### **To use Match Now:**

- ☐ Press the Command key you have assigned to Match Now and click on an object in the drawing.

If Match is set to adopt the layer and if the object is on another layer, the drawing will be switched to that layer. If the object is on the current layer, then a soft ‘everything’s okay’ sound will be heard.

If Match is set to adopt some or all attributes, the attributes of the object will be adopted by the currently selected tool. This is true even if you use the Style tools—in that case, the style tool of the currently selected tool will also be changed.

---

### **Mirror by Line**

Mirror by Line will mirror the selected objects just like the PowerCADD Mirror command (with Copy Items selected); however, instead of drawing a line about which to mirror the selection, you click on the line. The purpose of this is to allow you to mirror objects in an easier manner than drawing a line, since it’s sometimes possible to miss a snap to an existing line.

#### **To use Mirror by Line:**

- ☐ Select the objects to be mirrored.
- ☐ Choose Mirror by Line from the Edit menu.
- ☐ The cursor will change to a Picklefork cursor, indicating that you are expected to click on a line.
- ☐ Click on any guideline or line in the drawing—even in a group—to indicate the line about which the objects are to be mirrored.

The selected objects will be mirrored about the line.

When the Picklefork cursor is showing, you may cancel the command by pressing the Enter or Return key.

Before you click on the line in the drawing, you may press the 'P' key to ask for a perpendicular snap. In this case, the mirroring will be about a line that's perpendicular to the center point of the line that you click on.

---

## **Rotate by Line**

Rotate by Line allows you to easily accomplish a precision rotation of the current selection to match a line in the drawing. This is particularly useful for precise rotation of text to be parallel to a line in the drawing.

### **To rotate selected objects:**

- ☐ Select the object you want to rotate.
- ☐ Choose Rotate by Line from the Arrange menu.
- ☐ The cursor will change to a Picklefork cursor, indicating that you are expected to click on a line.
- ☐ Click on any guideline or line in the drawing—even in a group—to indicate the line.

The selected objects are rotated by the angle of the indicated line.

---

## **Simplify**

Simplify removes every other point from selected polygons, except it skips over any point where the angle changes by more than 30°. The removed points are 'exploded' so that you can see what is being done. This is useful for removing unwanted points on polygons created with the Freehand tool or after using Squiggle. Squiggle is optimized for a 600 dpi PostScript printer, but it will create more points than will show on some basic printers. In general, you will find that you can run Simplify twice on objects that have been squiggled.

### **To simplify polygons in the drawing:**

- ☐ Select the polygons you want to simplify.
- ☐ Choose Simplify from the Tool menu.

The selected polygons will be simplified.

## Squiggle

Squiggle converts selected objects into many-sided polygons to give the appearance of a line drawn by a shaking hand. Squiggle works by using a recorded series of points taken from a hand-drawn line and applying these to the shape.

**Before:**



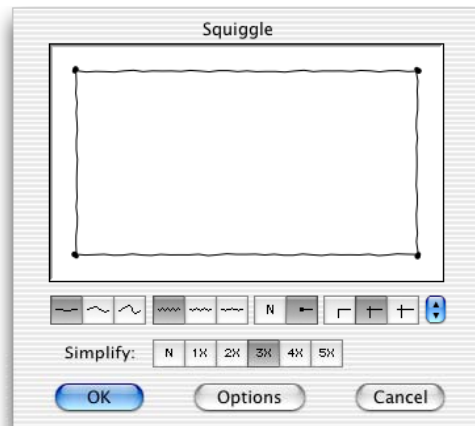
**After:**



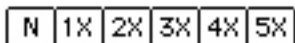
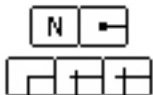
▲ **Warning:** Squiggle can effectively destroy a drawing, so you should use it with great care. In normal circumstances, you will use this only on a copy of a drawing that is being roughened for presentation purposes. Because Squiggle is potentially so damaging to a drawing, there is a distinctive sound that plays when the command is executed. If you use the command by mistake, choose Undo immediately. ▲

### To set the default settings for Squiggle:

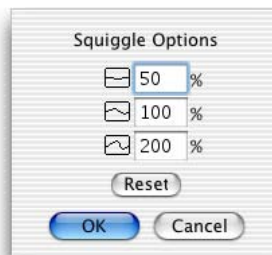
- ❑ Press the Option key and choose Squiggle from the Tool menu. The following dialog will appear:



- ❑ Select the degree of roughness. The center choice is the original hand-drawn line. As a default, the choice on the left uses 50% of the original pen movements and the choice on the right uses 200% the original pen movements. You may edit these percents in the Squiggle Options dialog so that you can get a line of any degree of roughness desired.
- ❑ You have the choice of three spacings of the polygon points. In inches, these are .0125", .025" and .05", with the smallest spacing representing the original hand-drawn line.



- ☐ You may choose to have blobs on the ends of the lines.
- ☐ You have three choices for line extensions: none, small and medium extensions. If small or medium extensions are selected, then rectangles are converted to lines and are extended—as are lines, of course. The small extension is .02". The medium extension is .04".
- ☐ You may store commonly used setups.
- ☐ Choose a Simplify choice of none or 1 through 5. This is the equivalent of choosing Simplify to remove points a number of times. This is the most straightforward way of eliminating excessive points in a squiggled shape while still retaining the sharp corners and shape of the original object.
- ☐ To edit the roughness of the squiggle, click on the Options button. The following dialog will appear:



- ☐ The values are for the percent of the original pen movements. Any positive integer values are permitted to provide the maximum flexibility, therefore you should use discretion on typing very large numbers.
- ☐ You may use the Reset button to restore the default values of 50, 100 and 200%.

#### To squiggle objects in the drawing:

- ☐ Select the objects to be squiggled.
- ☐ Choose Squiggle from the Tool menu.

If you wish, you may press the Option key as you choose Squiggle from the Tool menu to bring up the dialog box as described above.



The selected objects will be squiggled.

We say again: Because Squiggle is potentially so damaging to a drawing, there is a distinctive sound that plays when the command is executed. If you use the command by mistake, choose Undo immediately.

## **Wild Normal Size**

### **Wild Zoom In**

These are ‘miscellaneous commands’ like Zoomer Command (see below) and they operated in a slightly different manner from the PowerCADD commands. You can assign these command keys and use them to zoom to normal size or to zoom in. These are also integrated into the tools of WildTools and may be used in the process of drawing.

### **Zoomer Command**

Zoomer Command is a ‘miscellaneous command’ installed by WildTools. This type of command can only be invoked by a Command key. It does not appear in any menu.

Zoomer Command is simply another way to invoke Zoomer and it provides a way for a user to set the command keys used. For example, Command-spacebar is used for similar zooming in Adobe Photoshop, InDesign and Illustrator. Zoomer Command allows you to use your own command keys that may match those used in other programs.

#### **To set a Command key for Zoomer Command:**

- ☐ Choose Preferences from the PowerCADD menu.
- ☐ Select the Commands tab.
- ☐ Set a command key (say Command-spacebar) for Zoomer Command. To find Zoomer Command, click on the Miscellaneous button, then XTNL Misc and you can select Zoomer Command.

#### **To use Zoomer Command:**

- ☐ Press the Command key you have assigned to Zoomer Command while the mouse is over the drawing, or in the process of drawing with any of the tools in WildTools.

Because of the way commands like this work in PowerCADD, you will probably find that you must first press the Command, Option or Shift key first.

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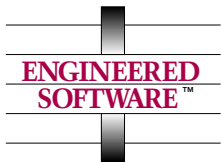
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