Eazy Draw ®

Drawings that communicate.

User Manual

Revision 12

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Credits

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This manual created and designed entirely with EazyDraw. Production included all text entry, spell checking, page layout, graphics integration, and electronic pdf pre-press production.

This manual created and designed entirely with EazyDraw. Production included all text entry, spell checking, page layout, graphics integration, and electronic pdf pre-press production. Features used heavily were: link text boxes, flow around graphics, spell checking, find and replace, tabs with leaders, auto numerate.

Final assembly and publication was performed as a single drawing file, 424 pages long. Work was performed on a MacBook Pro with M4 Mac processor running macOS Tahoe. No CPU response issues were noted. Drawing word count, as reported by EazyDraw's spelling and grammar palette was 125,467. A full document spell check was instantaneous. File save to EazyDraw JSON format was instantaneous. Print to PDF, for the full manual, about 4 seconds.

The original saved to and maintained using EazyDraw JSON format. This project has switched to JSON file format, retiring the EazyDraw graphics format of 2001.

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Chapter

1

Welcome To EazyDraw

Getting Started

Thank you for selecting EazyDraw, a vector drawing application designed exclusively for macOS.

If you have used an earlier version of EazyDraw, we recommend that you read the README file provided with your USB or the downloaded disk image. This documentation is more dynamic and will be current with the version that you are using. This printed manual is designed for assisting those new to EazyDraw or vector drawing, and those in need of detailed reference information. If you are using an App Store version, go to the Help menu and access Online Resources.

What Is EazyDraw

EazyDraw can do a lot of things but it has a focus and that is to allow one to draw lines, shapes, and free form curves on your computer screen. EazyDraw tries to provide this capability with friendly user interface. EazyDraw is not a painting

application. Painting programs work with the little dots or pixels such as are used in digital photography, so you will not see the paint brush, paint bucket, or eye dropper tools in our user interface. The drawings that you create with EazyDraw are constructed with mathematically-defined lines, shapes, and curves - these ideal perfect geometrical elements are then outlined and/or filled with color. If this is not making sense to you, don't worry this topic is actually the point of the entire manual, so hang in there.

While EazyDraw is not a painting application, it lets you add photos, scanned images, and bitmap clip art to your drawing. This makes it useful for integration and layout tasks such as creating an ad, poster, t-shirt art, or this book's cover.

While EazyDraw is not a CAD (Computer Aided Design/Drafting) application, it offers capability for creating basic technical drawings. Layers, measuring units, drawing to scale, and automatic dimensions are just some of the core CAD tools that are available and easy to master with EazyDraw.

Finally, EazyDraw is a true macOS application. It is not a converted unix program, nor co-developed for the PC. The first line of code was written on macOS for macOS. This makes it a (we hope) perfect macOS citizen that will work seamlessly with similar native macOS applications. In the spirit of this great macOS technology, everything sort of works just as you always thought it should.

Capabilities

EazyDraw is a vector based drawing application for desktop publishing (DTP) with Apple's Macintosh OS (macOS) operating system. It is an illustration or drawing software application that offers vector-based graphics editing and creation capabilities for creating simple non-photographic drawings, technical diagrams and illustrations such as logos, icons, buttons and stylized art.

Applications

There are several specialized drawing applications available for the graphic arts, or architectural professional. We all know how much these cost and how hard they are to master. EazyDraw is drawing for the rest of us who want to have fun exploring our own creative potential.

EazyDraw is a new design tool for use on the macOS platform. Its uses range from simple technical drawings, flow charts, business communications, commercial line

art illustrations to graphic elements for application software and web design elements. Educators also find EazyDraw perfect for introducing new users to computer drawing.

Apple Silicon Support

EazyDraw 10 is a Universal 2 Binary providing native binary support for both Intel architecture and the new M1 Apple Silicon integrated system chip. .

EazyDraw 10 runs native M1 Apple Silicon systems while maintaining optimal performance on older Intel CPUs. All is automatic and seamless, the universal binary supports both Intel and ARM64 chip architecture.

Mobile Computing

View, edit, export, print, share, or just admire your drawings on the move with your iPhone and / or iPad. No additional charge.

EazyDraw for iOS and iPadOS is now available in the Apple mobile App Store. EazyDraw will run on all iPhones and iPads using iOS 12 or newer. Search for EazyDraw (remember that is with a z) from your iPhone or iPad to download, it is a free download. Visit the App store, from your iPhone or iPad, and search for EazyDraw..

Graphic File Formats

Graphic exchange with other modern macOS applications is quite seamless with full vector quality support for PDF. But in today's world one must exchange creative content with numerous other technologies - other operating systems, older technology applications, archive graphic files, the world wide web, and electronic publishing work flows (just to name a few). EazyDraw is the perfect solution for these interesting times.

EazyDraw provides a rich suite of supported graphic file formats for both import and export. This will allow you to use or provide high quality graphic images to or from other applications, other operating systems or the web. Full seamless support for PDF is "built in" since EazyDraw is a true native macOS application. In most cases you should not need to involve a separate graphic converter application in your work flow. Our "ungroup" capability will let you edit PDF and PICT content.

For Web publishing EazyDraw provides export to several widely used graphic bitmap formats. These include the Windows formats of BMP, ICO and even FAVICON. Full support for transparency is provided with all graphic file formats that support transparency.

Electronic publishing is supported with vector PDF and EPS import and export. Color space management and conversion is provided with our professional grade Export panel for these industry standard formats. Nearly all publishing or printing companies will accept the EPS vector format for graphics and typeset text. Professionals and perfectionists avoid font problems by converting type set text to Bezier paths before exporting to EPS, EazyDraw lets you do the same with a simple menu click.

User Interface

EazyDraw's parameter palettes are designed with a clean and open look. The size is not "big" but large enough to easily read and understand without being crowded. We understand that screen real estate is valuable, but on the other hand we have more than 640x480 pixels of desktop these days; so we feel that a new design concept is in order. Our design is not "frilly eye candy" or microscopic palettes with 100's of parameters. We think we have a sound pleasing approach is great for learning, valuable when returning to EazyDraw (if you don't use it every day), useful for a rarely used palette or feature, and unfolds the capability of EazyDraw making it fun to explore.

The User Interface is very configurable, and you do not need to be a power user to organize things optimally for your needs. The new (with EazyDraw 6) User Tools should be one of the first to explore. Simply drag and drop the tools you use onto you personal tool palettes.

EazyDraw's frequently used palettes have a "mini" form; the gray disclosure button (top right of the palette) is used to switch between the two forms. The mini form is small with abbreviated labels, absolutely minimizing consumed screen real estate. The parameters included and their order on the mini palette are fully user configurable, just drag a label to re-order.

The tall button found on the top right of each palette is an enhanced "window shade" button, with three height settings. Frequently used parameters are placed at the top of the palettes, so it is often useful to shorten the palette to free up the desk top. Click the button to "roll up" the palette and shorten it to the top two or three key parameters.

 Parameter measurement units are chosen, independent of the drawing units, individually for each palette. A drawing might use feet and inches for graphic elements, but millimeters for specifying lengths of arrow heads. Different decimal precision settings for lengths, angles, and percentages found on parameter palettes are supported.

The color schemes and styles are fully configurable. On the EazyDraw Preferences Panel there is access to a full Theme definition panel. This allows you to choose colors and shapes for over 30 user interface elements. For example the color and shape of on screen editing control handles are easily changed allowing you to choose the best presentation for your project, current display screen, and eyes.

P3 Wide Color Gamut

View, edit, export, print, share, or just admire your drawings on the move with your iPhone and / or iPad. No additional charge.

EazyDraw for iOS and iPadOS is now available in the Apple mobile App Store. EazyDraw will run on all iPhones and iPads using iOS 12 or newer. Search for EazyDraw (remember that is with a z) from your iPhone or iPad to download, it is a free download. Visit the App store, from your iPhone or iPad, and search for EazyDraw..

Chapter

2

Installing EazyDraw

Drag and Drop Install

The "App Store" version of EazyDraw is downloaded and Installed using the Mac operating system, your Apple ID, and the App Store for Mac. Refer to the information provided by Apple. This process is the same for all applications purchased from the App Store, there is nothing special about the installation and startup of EazyDraw.

If you purchased EazyDraw directly it is a simple Drag and Drop operation. Drag the EazyDraw icon from the download disk image (or from the USB image) to the Applications folder on your hard drive. When upgrading, replace the old copy of the EazyDraw application with the new one.

Preferences File

When EazyDraw is launched for the first time, a preferences file is created to save persistent settings that are maintained when you quit and restart EazyDraw. This file is saved in your macOS preferences folder that is found in the Library folder in your home folder. This file is named according to a convention established for macOS, based on registered world wide web domain names. EazyDraw's unique preferences name is "com.dekorra.EazyDraw.plist."

The plist file is a text file; it may be viewed with any text editor. The text is formatted according to XML design conventions and more particularly as macOS property lists. These lists are made up of arrays and dictionaries. The values are self-documenting with descriptive English language names and values. If you have installed macOS's development tools there is an application called "Property List Editor" that may be used to view or edit the contents of the file.

It is, as you might expect, not advisable to edit or change the contents of the preferences file. It is very easy to damage the file with a simple text editor and this should be avoided. If the Property List Editor is used, the base file format is safe from damage and EazyDraw would likely be able to work through any errors introduced in this fashion.

Resetting Preferences

If the preferences file "~home/Library/Preferences/com.dekorra.EazyDraw.plist" is removed the next launch of EazyDraw will cause a new preferences file to be created with a fresh set of "Factory" settings. This can be a useful debugging technique if you are experiencing problems with EazyDraw. If there is a problem that is preventing EazyDraw from launching - this approach might provide a recovery path.

It is not necessary to "throw away" your preferences to debug by resetting preferences. A test reset is accomplished just by moving the preferences file.

Starting with macOS version 10.7 (Lion) the Library folder is hidden. With macOS version 10.12 the file can still be accessed, use contemporary resources to learn about methods for accessing the Library folder.

Another recovery technique is to move a drawing that you suspect is opening on launch of EazyDraw. The drawing likely has an issue causing your crash upon launch, moving the drawing will keep it from loading.

Toolbar Support Files

The colors that are shown on the pop-down menus found in the EazyDraw toolbar are derived from a standard macOS color list, as described above. The color list used is determined by the selection of "Toolbar Colors" on the main EazyDraw preferences panel. The default color list is named "EazyDraw.clr" which provides a sequence of 256 color varied by hue, saturation and brightness. You may change the Toolbar's colors by changing the EazyDraw.clr file selection to a color list of your own design.

The textures that are shown on the pop-down menus found in the Toolbar are derived from a standard macOS color list, as described above. The textures are stored in the file "ToolbarTextures.ezdraw.clr." You can manage these, make additions or changes with EazyDraw using the Pattern palette, or any other application that supports editing *.clr files. If you "mess up" the file - just remove it and relaunch EazyDraw and the factory default table will be rebuilt.

The gradients shown in the gradient fill pull-down toolbar button are derived from a resource file that is contained in the EazyDraw application bundle - read ahead to the next section. A file called "ToolbarGradients.ezdata" is found in the package resources folder. The master gradients for the pop-down menu are derived from the gradients present in this file. Adding or changing the contents of this drawing will change the gradients provided by the gradient tool. The colors provided on the two color arrays are the same as those used for the Toolbar color picker as describe above.

Application Support Files

The latest macOS provides a folder for applications to save persistent information, the Application Support folder which is found in the Library folder (or the Sandbox container if using App Store version). EazyDraw uses this folder for persistent attributes, most associated with a particular parameter palette.

When you save a dash pattern, or arrow you will find the information is stored in the associated file in this folder. The names are assigned in a self-documenting fashion, so it is easy to understand each file's use.

These are plist (property list) files, constructed with XML formatted, human readable, English text. For example, if you save a custom Arrow head shape with a name - you will find that name as a key entry in this file if you inspect it with the Property List Editor or a text editor.

These files are all private to EazyDraw and you'll not find any interaction of these files with other applications on your system - in contrast to the *clr* files discussed above.

If you are a power user and create complex custom arrows, dash patterns, gradients, shadows, or special free transforms - you will want to back up this folder from time to time. In the event of a system problem, if these files are lost - your custom information will need to be re-created. If one or all of these files are removed, a new default file is created the next time you access the corresponding palette in EazyDraw. If you are reading this and you have lost any of these files, use the macOS Time Machine utility and recover the folders discussed above.

The Application Bundle

The EazyDraw application is represented in the macOS Finder with the icon shown to the right. It is customary to place the application in your Applications folder, but it is not necessary and the actual location of the application bundle is not important.

If you perform "Get Info" from the Finder you'll see the current version information and size of the application. The size, as of this writing, is now over 100 MBytes.

This design makes it easy to uninstall EazyDraw, simply remove the Application bundle from your system. The actual binary image (program) and all the necessary associated files and resources are hidden from view and bundled into this single entity.

If you are interested, you can investigate the contents of the application bundle, select the EazyDraw application in the Finder, control click and access the provided popup menu - select "Show Contents." Then you will see that the Application bundle is actually just another folder. But do not alter contents as this may void the licensing.

Entering License

If you purchased from the App Store, there is no license code. Your licensing is automatic from your iTunes account.

If EazyDraw is newly installed or unlicensed and running in the demo (or viewer) mode, it will ask for a license number each time it is launched. You are given the choice to enter a license or use in the demo/viewer mode.

After installing, you need to launch EazyDraw (double click on the application icon) in order to access the Enter License procedure.

If you have entered a valid license, entered it correctly, you will not see the "Enter License" prompt again. If it is repeating and you are entering the license more than once - something is wrong.

If EazyDraw is running in the demo/viewer mode, the EazyDraw Help menu will have a selection "Enter License." This selection may be used to access the license entering palette.

The About EazyDraw window has a button, near the bottom for accessing the Enter License window. If you are running in the demo/free reader mode the button will offer "Enter New License." If you have entered a valid license correctly this button will offer "Clear License." The latter action will remove the license code from the computer.

The license code is grouped into 4 sets of letters and numbers. The letters l (el) and o (oh) and the number 0 are never present in the code (to avoid confusion to humans). There are no dashes or other non alpha numeric characters in the code. Upper case and lower case is important, "A" is considered different than "a" and will cause the license to fail.

If you received your license codes via email you may copy and paste the code directly from the email into the boxes provided. That would be 4 individual copy/paste actions - one set at a time. It is best to select the codes from the email by double clicking on a set of code characters (one of the four) rather than dragging across the text to select. The double click will make sure that no characters are left out of the copy action.

If you are typing the codes into the text boxes, click tab after each entry, or use the mouse to click in the next box. EazyDraw will not automatically advance to the

next text box. After the last entry **HIT TAB KEY**, this or another mouse click is needed to inform EazyDraw that you are done entering. After the last tab key, EazyDraw performs a preliminary check on the license, if the license is potentially valid the Enter key will enable. If there has been a mistake or if the code is invalid the Enter key will not enable and remains grayed out.

When the Enter key enables - click it. Don't lose concentration and click one of the other keys like Learn More. Your license is not received by EazyDraw unless the Enter Key enables and is clicked. Again if the Enter key is not enabling - hit the Tab key on your keyboard - one more time.

You do not need to be connected to the internet to enter a valid license code and begin using all the capabilities of EazyDraw.

EazyDraw does not provide any overt indication that the license entered was valid. This is not user friendly, you need to remain proactive with this process. Normal polite and informative user feedback from EazyDraw during this process is very helpful to hackers and is not a good thing for us at EazyDraw and the community of honest paying customers.

If you have problems email support@eazydraw.com for assistance. Take a screen shot (Cmd-Shift-4) of the license enter panel, after all codes are entered, and after hitting Tab key one more time, but before clicking Enter. Attach the screen shot to your email an EazyDraw support will get you running.

Uninstall Checklist

All EazyDraw content is found in the Application Bundle. To uninstall simply move the EazyDraw icon to the trash.

All other content placed on your system by EazyDraw will be found in the EazyDraw Applications support folder and the EazyDraw preferences. To completely remove all traces of EazyDraw, delete the following:

EazyDraw Application

~/Library/Preferences/com.dekorra.EazyDraw.plist

~/Library/Application Support/EazyDraw

Chapter

3

Working With Files

Launching EazyDraw

Start the EazyDraw application - Launch it - by double clicking on the application icon shown to the right. You will likely find this icon in your applications folder; it will be found in the location that you used when initially moving EazyDraw onto your hard drive.

You may also launch EazyDraw automatically by double clicking on a drawing file created by EazyDraw.

If you use EazyDraw frequently, you may want to add the application to your macOS Dock. This is done by dragging the EazyDraw application icon to the Dock, place it where you wish. Lift the mouse key and the macOS Finder will add EazyDraw to your system dock. Once placed in the dock, a single click of the EazyDraw dock icon will launch EazyDraw and bring it to the front of your macOS windowing system.

EazyDraw is removed from the dock, by clicking and dragging it off the Dock and it will "poof" away. Don't worry, this action only removes EazyDraw from the Dock, the real application is left on your hard drive and is still fully installed. If you are trying to uninstall EazyDraw, see chapter 2.

Reliably double clicking a file to launch EazyDraw requires that you keep only one copy of the application on your system. If you have older "backup" copies tucked away, they may well launch instead of the newest version that you intend.

You can check which version was launched from the "About EazyDraw" panel on the leftmost main menu. You can locate a running version on your file system by control clicking the EazyDraw icon (while EazyDraw is running) in the macOS dock, this will bring up a popup menu with a selection to "Show in Finder." This trick is useful if an unwanted version is launching and you wish to find it in the file system.

When EazyDraw is running you will see the EazyDraw icon, as shown at the top of this page, in the macOS dock. The icon is shown in the dock even if you have not placed it there for permanent display. A small dot at the base of the dock indicates that the application is running.

Make sure you do not have 2 or more EazyDraw's running at the same time. macOS is a full multi-tasking system, based on BSD Unix, so it is capable of running 2 or 10 EazyDraw's at once. This can happen even if only one copy

is installed, they are referred to as multiple instances of the same program. EazyDraw is not designed for this use - on a single macOS login - so this may lead to problems and will definitely lead to confusion on your part. Again, if you see two or more EazyDraw icons in the macOS dock, slow down, back up, and sort out how this came about; contact EazyDraw support if needed.

Open At Launch

The macOS operating system and Sandboxing protocol now defines the initial behavior of all applications, including EazyDraw. System Settings, General Tab provides settings that determine behavior of open drawings when quitting and launching EazyDraw. Look near the bottom of the General settings panel for relevant settings

One note: do not set Recent Items to zero, this can cause problems on EazyDraw's File menus.
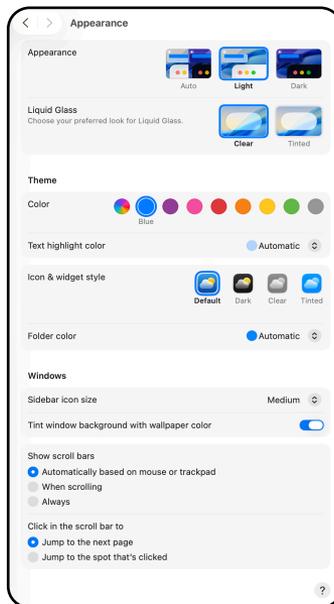
Creating a New Drawing

A new blank drawing is started by selecting the New menu selection, found at the top of the File main menu. The new drawing opens as a blank drawing window, or canvas. It is given the name "Untitled," perhaps with a dash number suffix if there are other untitled drawings open.

EazyDraw is a fully multi window application. You can have an unlimited number of drawing windows open and active.

A new drawing is not associated with nor saved to a disk file until you save the file. It is wise to do this before a large body of work is invested in the drawing. Autosave will periodically save a protected copy of your work to the disk. There are settings in your macOS preferences (General) that control what happens to unsaved work when quitting EazyDraw. In most cases if a system shut down or crash happen, your will be recovered at the next launch of EazyDraw.

Drawing Window Tabs

Drawing window management with Tabs is supported by EazyDraw. The primary setting for this behavior is the Prefer tabs: setting on the general system settings panel (see above). EazyDraw Preferences provides a companion setting, found on EazyDraw preferences.

Tab drawing organization is a powerful screen management tool when working with several drawings at once. There is a problem: when tabs are preferred creating a new drawing can be confusing -- no new window appears. It is easy to miss the tab context and think that the new drawing request failed.

New Drawings

The size and position of a new drawing is derived from the selection of the New Drawings parameter found on the main EazyDraw preferences panel.

The Default screen is a small, not a full screen, window positioned near the top left of your main screen. If you prefer a more full screen size for your new drawings, select Wide for your New Drawings setting. The Last Quit selection will capture your top drawing window's position and size when you Quit EazyDraw. This is a rather easy method to personalize this setting.

To set up a particular drawing window configuration, use the Current selection. After you make the menu selection "Current," the Set button will enable. Make sure the window of interest is the top drawing window (it will be behind your preferences panel as is necessary), and click the Set button. Then your "new drawing" configuration will be that of the top drawing window when the button was clicked.

If you have a multiple screen system, the Second and Third screen options will enable. They will cause EazyDraw to fill the chosen screen with a newly created drawing window.

The View setting menu selection (View submenu found at the bottom of the menu) controls the portion of the new drawing window that is shown. Normally you have a larger drawing area than is shown on the drawing window, think of it as "zoomed in." In this case, there is a choice as to what zoomed in area is shown on the new drawing window. The selections are Top Left, Drawing Center, or Bottom Left.
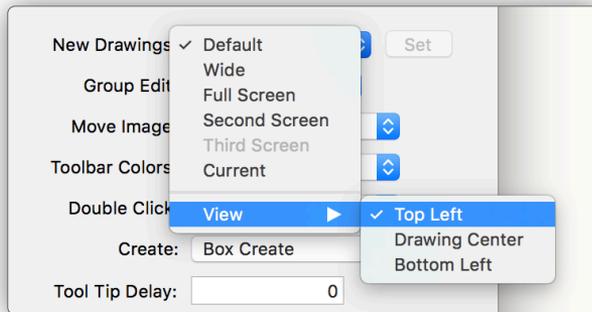
Saving Drawings

There are three save commands available, Save, Save As, and Duplicate. All of these accomplish the task of creating a permanent record of your drawing. This snap-shot record is recorded to a normal data file on your hard drive. You will establish a location for your drawing. Operating system will maintain other backup copies on your system. If you are using iCloud backup copies will exist on iCloud servers.

Save: If you are saving a document for the first time, a folder (directory) navigation sheet allows selection of a destination folder. The text box at the top of the sheet is for a name for the document file. You do not need to type the file name extension (.ezdraw) when entering the name, if you do this an "are you sure" dialog will ask for clarification. If the drawing has been previously saved and named, the Save command will simply save the drawing to disk, no parameter entry panel will be presented.

Save As:	EazyDraw_Manual_Rev11_09 copy
Tags:	
Where:	📁 2023-10-Oct

File Forma	✓ EazyDraw Graphic Format
	EazyDraw Binary Format
	EazyDraw JSON Format
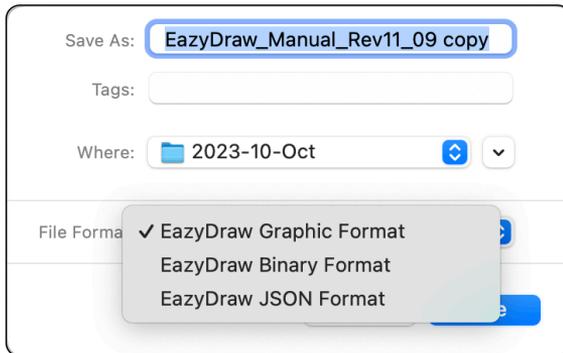
Save As: If you wish to save a copy of a drawing under a different name use the "Save As" selection. If you need to save a drawing in a different format, use the "Save As" selection. This command presents the folder navigation sheet that allows entry of the name and selection of the folder location for the drawing. The original drawing's document file was likely modified by macOS, you cannot assume that the original was not modified even if you did not overtly save the drawing. The operating system attempts to prevent loss of work so changes to a drawing may happen even if you did not do an explicit Save. A new file is created with the new name, location, and drawing contents. The new copy then becomes the current drawing (for this window) and further changes to the document apply to the new file.

Duplicate: This selection will duplicate the current drawing. If the current drawing has changes (is edited) a dialog box will ask if you wish to revert the original to the last saved state. The duplicated drawing needs to be Saved to establish a file and location for the drawing. At the time of the first Save of a duplicated drawing you may set or change the drawing format.

Duplicate before instead of save-as after. It is common to start a new drawing using an existing drawing as a starting point. However, the starting drawing may be necessary for reference and possible future editing. In this case, be sure to duplicate the starting drawing and open the duplicate for editing. Changes made for the new design will overwrite the original.

Versions

Each time you execute "Save" the operating system will save your drawing and save a hidden copy of the drawing. If you find that you need to go back to a previous version of the drawing (perhaps some content was accidentally erased, or major design change *did not work out*) you will use "Revert to Saved."

"Revert To" will present a "Time Machine" like interface, with your current drawing shown on the left and a stack of previous "Save" drawings on the right. Use the history-date indicators on the right to go back in time to the desired previous version. Refer to the screen shot on the next page for an example of the interface provided for review of saved versions of a drawing.

The drawings in macOS Time Machine are accessible. EazyDraw allows you to access content in the previous version showing on the right. You can drag and drop from the previous version to the current version. This is handy if you just need to obtain a one or two graphics from the older drawing.
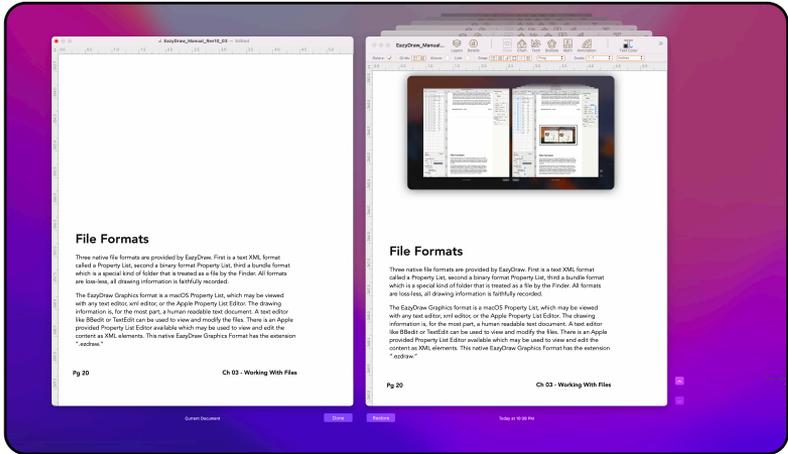
File Formats

Three native file formats are provided by EazyDraw. First is a text XML format called a Property List, second a binary format Property List, third a bundle format which is a special kind of folder that is treated as a file by the Finder. All formats are loss-less, all drawing information is faithfully recorded.

The EazyDraw Graphics format is a macOS Property List, which may be viewed with any text editor, xml editor, or the Apple Property List Editor. The drawing information is, for the most part, a human readable text document. A text editor like BBedit or TextEdit can be used to view and modify the files. There is an Apple provided Property List Editor available which may be used to view and edit the content as XML elements. This native EazyDraw Graphics Format has the extension ".ezdraw."

The EazyDraw binary format results in approximately 10 fold smaller files. This can be important for drawings containing large numbers of graphics or embedded photos. The smaller size will reduce the time required to save or open the file. The extension for this format is "ezdata" and the Kind displayed by the operating system is "EazyDraw Binary Format." The Property List Editor application can be used to examine and modify these drawings.

EazyDraw version 6 provided a new variation of the native file formats. The current versions of EazyDraw do not provide reverse compatibility to the older format. However, all versions of EazyDraw, including current versions read the older format, this provides full forward compatibility..

Modern system performance is sufficient to support use of JSON format drawing files. This is true for all but the very largest of drawing files, up to 10s of Megabytes in size. The advantages of UTF-8 text content far out weigh the smaller file size of the binary format. But ultimate choice is to the user and should be dictated by constraints of the work flow. If Binary format is used, it is advised to save archival backup copies as JSON with with universally cross platform supported UTF-8 encoding.

EazyDraw
Graphic Format

Binary
Format

EZD

JSON

Bundle Format

Newer technology and methods have replaced the Bundle format. This format is no longer supported. If a Bundle file is encountered, use the Finder to show contents, then use EazyDraw to recover and reconstruct the drawing. Or use an older version of macOS and EazyDraw version 10 or older to recover.

JSON Format

JSON (JavaScript Object Notation) is an open standard data interchange format that uses human-readable text to store and transmit data. JSON is language-independent, even though the definition references Java language. The file extension is .json.

EazyDraw's JSON is UTF-8 encoded, ensuring open ecosystem compatibility across operating systems (Apple, Microsoft, and Unix) and languages supporting Emoji characters. EazyDraw dot JSON drawing files may be examined and edited with present-day text editors and integrated code development systems.

JSON is slightly more compact than Apple's PList format; the base format for EazyDraw Graphics format is PList. Over the next few years, beginning with 2024, the EazyDraw Graphics and Binary form will be phased out in favor of JSON. At this time of the release of EazyDraw 12, users should begin to use the JSON format for all projects. EazyDraw Graphics format is still the default format for EazyDraw 12. Change existing Graphics format or Binary format drawings to JSON format with Duplicate or Save As menu commands found on the File main menu.

Plans exist for support for EazyDraw on Microsoft Windows. JSON will be the file format for cross-platform use.

Summary, File Formats

The file format is selected from the popup menu found on the lower portion of the Save panel, perform a Save As to access this selection. Select the desired format before clicking the Save Button.

Use EazyDraw JSON format for normal file saves of smaller drawings and for all archival purposes. Use EazyDraw Binary format for larger files when File Save and File Open times become noticeable.

Do NOT use the binary format for archival purposes. The EazyDraw JSON format should be used for the final master copy save of a project.

EazyDraw Graphics format files have a blue colored file Icon showing a box of graphic components. The EazyDraw JSON and binary format file icon is the same graphic but gray in color.

Archival of Drawing Files

When archiving drawings, saving them for possible future use including the distant future, it is best to use the Eazydraw Graphics Format. This is a little counter intuitive as these files will be much larger. But one should consider that size is not the important consideration for current and future archiving media. The predominant issue is to be rather certain that the data can be read in the future, probably on a different CPU with a different version of EazyDraw, another drawing application or different operating system. The human readable text format is important for this task. If a file is corrupted, any text editor can be used to locate and correct the corruption in a text based file. But if this happens to binary data or a compressed file, detection and correction is nearly impossible.

Changing Saved File Format

Use Duplicate to change the file save format. The current file format becomes part of the file information, hence a simple Save or Rename will conveniently save the drawing using the existing file format.

When switching to a new version of EazyDraw, it is recommended to save important drawings in the EazyDraw graphics format with the old version. We try to make all version changes transparent for our file format, but bugs are always possible, especially for backwards compatible legacy format issues. If a problem does occur, it can always be addressed by EazyDraw support but only if the EazyDraw Graphics format is available.

Inserting Files and Content

EazyDraw's file menu does not have insert or import commands. Present-day design conventions consider these redundant user interface elements. The Open menu command works with all file types supported by EazyDraw. If you wish to open content of any kind, not just EazyDraw drawings, use the Open item on the File menu.

Insert content with drag and drop or copy and paste. These standard methods work with the Finder, Preview, and all other macOS applications.

If the clipboard contains content understood by EazyDraw (JPG, PNG, SVG, ...), EazyDraw's main File menu presents a command: New From Clipboard. Use the to create a new drawing containing the contents of the clipboard.

Registered File Types

The three formats are registered with macOS. Files saved by EazyDraw are recognized and associated with EazyDraw by the System Finder. A Finder Double click on any of these files will call up EazyDraw to open the file.

It is not a good idea to have older versions of EazyDraw on your system. This could cause macOS to obtain file type registration (and QuickLook) information from the old version which will not be compatible with a newer version of macOS.

Summary: The EazyDraw Graphics Format is recommended over all others, unless the save time becomes a problem. If anything untoward happens to a file in this format, recovery of the drawing content will be possible.

iCloud

This is a remote - "off line" storage capability that allows you to save and export drawings to a central storage area provided by Apple and accessed via your internet connection. This storage concept is termed "cloud" storage and on your Mac it is termed the iCloud.

EazyDraw 6 and later supports reading and writing your drawings and graphics to and from the iCloud. Apple only supports iCloud with Applications that are obtained from the Mac App store. If you are using a Free Market version of EazyDraw, then (at the time of this writing) you cannot directly use the iCloud.

EazyDraw access to iCloud is seamless, you will see your familiar iCloud choice buttons in the usual locations when you use Open, Save, or Export from EazyDraw.

This manual will not directly instruct the use of the iCloud, that information will be part of your system documentation. Consult contemporary information on your system, Apple.com, or use an internet search for information. See the screen shot below, the button to choose iCloud is found on the upper right of the Open panel (the normal panel you access from EazyDraw's Open menu command found on the File main menu).

The export panel provides access to iCloud on the top level selection popup menu, top - center. It may be in different locations on future or updated versions of macOS.

Large Files

If a file grows to tens of megabytes, you may begin to experience a slowing response. Here are a few suggestions.

Switch to binary format. Perform Duplicate, then Save, then choose EazyDraw Binary as the file format.

Turn off Quick-Look preview. This technology provides the image seen as a preview or file badge for the drawing file. The preview image is often as large as the drawing, which doubles the file size. Open drawing Properties using the item on EazyDraw's main File menu. Set Quick-Look content to None.

A large bitmap image may be the cause of the large file size. If this is possible, locate the image in the drawing and inspect DPI using the Graphic Details inspector. Open Graphic Details using the menu item at the top of EazyDraw's Tools main menu. Inspect the DPI, which stands for dots per inch, on the Quality tab in Graphic Details. A reasonable DPI is 72 to 144—the image size increases as the area of the image, the square of width, and height lengths.

Opening Drawings

The Open command is found on the File main menu and is used to open a file that has been saved on your file system. The Open panel is used to create a new EazyDraw document from the contents of graphic files; EazyDraw native files and other graphic data formats such as PDF, TIF, SVG, DXF, PNG and others.

The Open command is fully generalized. Today's conventions funnel all "open" actions here, there is no special command for Import.

The Open command is used to open User Library files. Previous versions of EazyDraw had a special "open" command for User Libraries on the User Library menu. This has been stream-lined, there is now only the one Open command.

Import: There is no longer a specific "import" command. As mentioned above use the standard "open" command to open (import) a file in another graphic format. Use Drag and Drop to introduce or include a graphic file in an existing EazyDraw drawing. Drag the file from the Desktop / Finder to the target EazyDraw drawing canvas.

To Edit PDF or EPS: introduce the PDF or EPS to a drawing using Open or Drag and Drop. Select the image on the drawing, then perform Ungroup PDF or Ungroup EPS using the menu commands on the Image submenu found on the Format main menu.
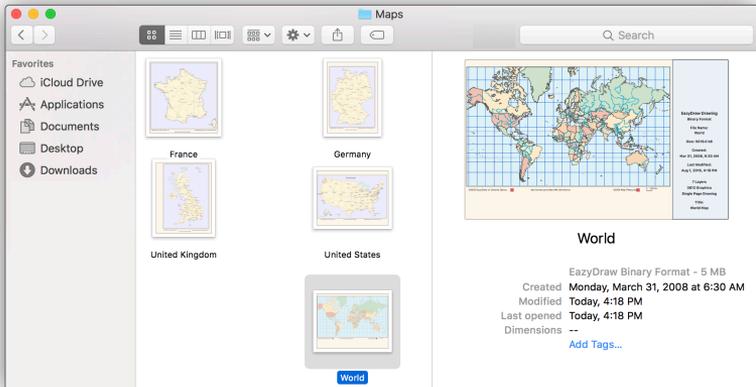
Open Recent

The Open Recent menu is provided as a convenience. The most recent saved files are shown on the sub menu. These files may be opened by selecting desired file from the sub menu.

Preview, Quick Look & Cover Flow

A pdf preview of the first page of your drawing is saved in binary format at the front of the the drawing file. This high quality image is used by macOS QuickLook.

Cover Flow lets you see your EazyDraw drawings in large size previews as you flip through a folder of drawings. See the Cover Flow example below. Cover Flow is selected in the finder, use the circled button found in the finder toolbar.

Note On File Size: Quick Look preview content may add significant size to the drawing file, especially for large complex drawings. The drawing Properties palette (access from File main menu) has parameters to manage the Quick Look content. In some cases you may need a different format (PDF is default) or you may want to turn off Quick Look for a particular drawing.
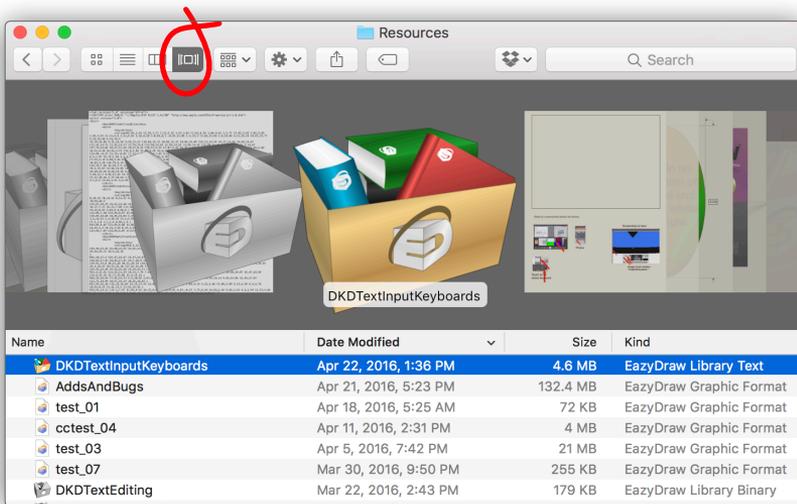
Quick Look: Quick Look lets you view a drawing without opening the drawing, EazyDraw does not even need to be running for this to work. The Quick Look view is not a jaggy little icon, it is a clear pdf representation of the first page of your drawing. This gives you a sneak peek of the drawing without the full double click, load and open delays. The Quick Look button is found on the toolbar of a finder window, it is circled on the example shown below.

Quick Look works with Cover Flow, the normal Open panel, column Finder browser, and the Get Info Finder panel. The Quick Look view provides a high quality pdf image of the first page of the drawing and key statistics such as number of layers, author and the other personalized document specifics, all in real time.

Quick Look is accessed from the actions / gear pull down menu. See circled selection below.

The screen shot on the next page show and example Quick Look of an example EazyDraw drawing. Hint: The space bar is Quick Look by default.
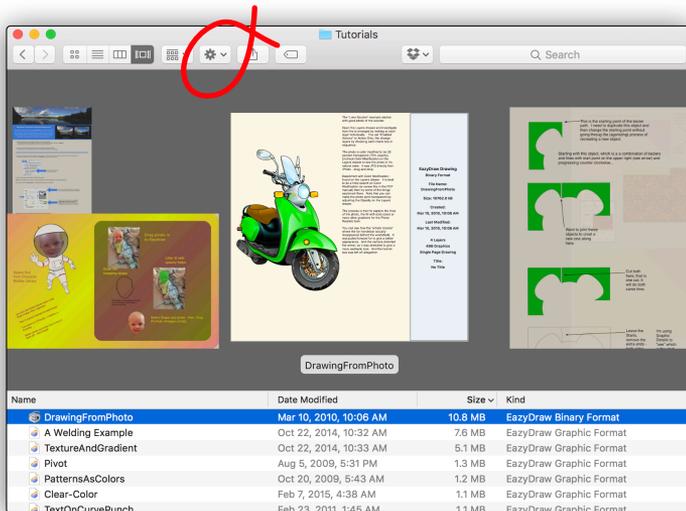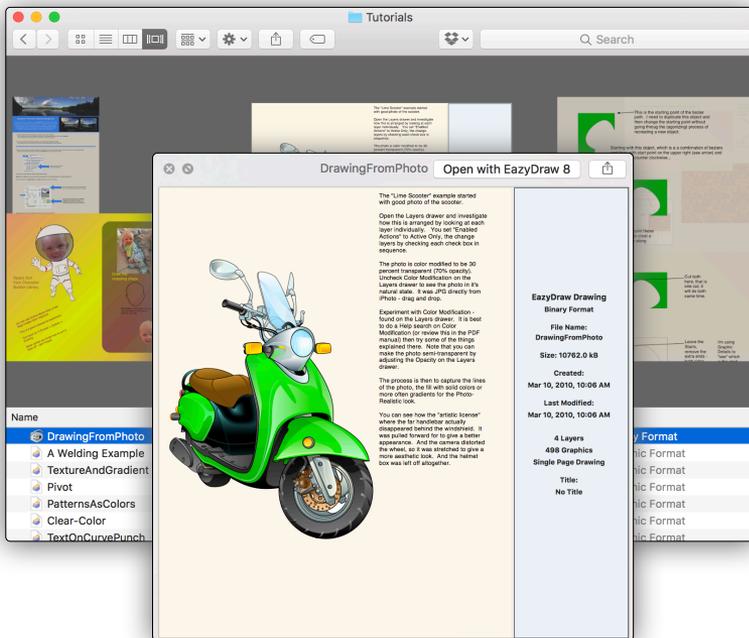
Properties and File Size: Quick Look information can contribute significantly to file size of a saved drawing. PDF provides the best quality preview image. In the case of a complex drawing with a large amount of detailed vector information the PDF image will be about the same size as the drawing. The format used for the Quick Look preview image is managed with parameters found near the bottom of the Document Properties panel (access from File main menu). There is a parameter to choose the preview content, it offeres a provision to not include preview information, this provides the smallest file size.

There is a setting for "smallest," this setting first tries a PDF image, if that image is rather small it is used. If the PDF is rather large, then a JPG image is created and the smaller of the two is used. This is the default setting (new with EazyDraw version 5), this logic will normally provide a good quality preview and small drawing size in nearly all cases. For some projects you may want to work with no preview information until the final archive drawing is created at the completion of your work.

Chapter

4

Other Graphic File Formats

Opening Other Graphic Files

The standard Open panel provides the ability to open (or import) several graphic file formats.

This ability allows you to incorporate these industry standard files into your EazyDraw drawing.

Drag and Drop technology provides another way to bring other graphics and or files into EazyDraw. You may drag a file's icon from the Finder, or a graphic from another application and drop on an open EazyDraw drawing. If you see the green "+" sign when over an EazyDraw drawing that indicates that the contained graphic format is understood by EazyDraw and will be accepted.

Drag and drop will work in a wide variety of situations. You may drag a graphic right from a web page or email for example, and drop it directly into an EazyDraw drawing.

Copy and Paste provides another path for bringing generic graphic content into EazyDraw. For example copy directly from the Finder: Highlight a graphic file on your desk top, click Copy then select an open EazyDraw drawing and paste.

EazyDraw Retro

MacDraw, MacDrawII, MacDrawPro, ClarisDraw, AppleWorks, PICT

The primary versions of EazyDraw no longer support AppleWorks, MacDraw or the PICT graphic files and formats.

EazyDraw Retro provides a solution to access AppleWorks, ClarisDraw and MacDraw drawings on macOS 10.4 to macOS 10.13 Visit the EazyDraw web site, Support web page for more information about this solution.

PICT pseudo graphic format

PICT is a legacy graphic file format common on older, early 1990's OS 09 applications. EazyDraw and macOS no longer support the PICT format. Use EazyDraw Retro to open drawings with this content, convert the PICT to PDF, save a new master, then return to the contemporary version of EazyDraw.

Working With PDF

The following from the introduction to the Adobe's PDF reference manual:

"Adobe Portable Document Format (PDF) is the the native file format of the Adobe Acrobat family of products. The goal of these products is to enable users to exchange and view electronic documents easily and reliably, independent of the environment in which they were created. PDF relies on the same imaging model as the PostScript page description language to describe text and graphics in a device-independent and resolution-independent manner."

PDF is found in wide use on macOS, the internet, and other operating systems.

The important thing to you, the user, is that PDF is a vector format, not a Bitmap. This is the important phrase in the definition "resolution-independent." PDF should not become fuzzy or pixelated, whether viewed on your screen or a high quality photo printer.

EazyDraw conserves the vector quality of pdf contents that you open or add to an EazyDraw drawing. You can check that you have included high quality pdf by zooming in several times - the text and graphics should remain crisp and well defined. Note that PDF provides for the inclusion of bitmap images, so you may still see resolution-dependent content in a pdf, an included digital photo would be a common example.

Filling Out PDF Forms

Filling out pdf forms, or any "form document" is a task well suited to EazyDraw. Open or include the form in an EazyDraw drawing. Then just type or draw over the included image of the form. If you are familiar with using layers, it is convenient to place the form on one layer while you draw and type your information on a different layer - over the form. This technique is great for example when doing your taxes.

It is very easy to add your information. You have full control over placement, size, font, including circles, x's and small sketches. Then the information that you add to the completed form is there for "next year." If the form changes the next time it is required - remove the old form (pull it out from under your information) - add the new form (slide it back under your information). Then simply rearrange of your information, if necessary.

Edit or Ungroup PDF

PDF) graphics can be converted to native EazyDraw vector content. Ungroup PDF, found on the Images submenu on the Format main menu, is used to convert a PDF graphic to a native EazyDraw group of components, Bezier paths, text, and bitmaps. This same action results when Convert To Bezier is called from the Convert submenu found on the Tools main menu.

Ungroup PDF actually results in a EazyDraw Group graphic and one more Ungroup command is needed to access individual components of the pdf content.

EPS is a file format similar to PDF. The EPS format has been deprecated by Apple and is no longer supported by EazyDraw. EazyDraw Retro does support EPS.

Do Not Unnecessarily Ungroup PDF

There is often no need to convert the PDF to native EazyDraw graphics. The PDF is drawn, using the Core Graphics compatibility component of macOS, with vector quality. Ungrouping is required only if editing of the PDF content is required.

Keep in mind that PDF is a "pen and ink to paper" file format designed primarily for presenting graphic content to printers. This means that while the converted EazyDraw graphics will look the same as the original pdf image, they may be constructed in inefficient and counterintuitive ways. Constructs such as simple shapes and paths may be drawn as a large number of small straight lines.

In some cases the conversion to EazyDraw native graphics may result in no visual changes to the drawing -- the drawing may look exactly the same after the conversion. To confirm the conversion, inspect the graphic properties with the Graphic Details Drawer.

PDF Fonts, Text and Typesetting

The PDF file format contains embedded font and character glyph information. EazyDraw's conversion is directed at converting text content to EazyDraw editable text content - rather than precise "inking" of the typeset text. The conversion will attempt to match the text with fonts available on the host macOS system. After derivation of font family, font size, and other

attributes the text is typeset with EazyDraw and macOS typesetting technology. It is likely that text line endings and spacing will reflow with associated differences in exact layout and appearance.

PDF is a mature graphic file format with several revisions. You will encounter PDF content from many different originating applications and operating systems, produced to different revision levels. There will likely be cases where the EazyDraw conversion will fail to properly interpret 100 percent of the pdf image. In these cases the pdf image may be sent to EazyDraw support for investigation of the cause of the problems and possible improvements with future versions of EazyDraw.

Font Mapping

It is likely that a PDF document will contain fonts that are not present on your macOS system. The Text menu, Font submenu provides access to a Font Mapping palette. You may need to perform a preliminary conversion to identify fonts .

Working With SVG

Scalable Vector Graphics (SVG) is a family of open (non-proprietary) specifications for a XML based graphic file format. The specification allows interchange of two-dimensional vector graphics.

The vector information provides an interchange mechanism for shared editing and import of graphic content, it also provides a mechanism for presentation of vector quality images. All major modern web browsers except Microsoft Internet Explorer support and render SVG drawing directly (without plugins or conversions to lower quality bitmap representations). SVG also incorporates definitions for precision typeset text allowing use of embedded or system native fonts.

Comparing SVG and PDF

PDF is designed to represent graphic content to printing devices. SVG is more appropriate for interchange of graphic source content. EazyDraw provides a means for converting PDF content into meaningful editing content (Ungroup PDF) but this process is not robustly defined. For

example, a circle may be represented as a series of small straight line segments which EazyDraw must sense and reconstruct as a circle. Whereas the SVG specification has a well defined circle entity. This and many other aspects make SVG a more reliable interchange format.

PDF is far more widely supported than SVG. SVG is a younger specification that has had a rather slow adoption rate. But now that the major browsers properly support the format acceptance is broadening. The advantages of SVG over bitmap representations will likely lead to wider usage in the future.

Opening SVG

To import a SVG drawing into EazyDraw, use the normal Open command found on the File main menu. Then navigate your system or the network to access the drawing. There is no extra "ungroup" step for this format.

The SVG Icons have a "orangish" color scheme and present an "appearance / look" consistent with that developed by the W3C.

SVG is supported by most drawing applications across most computing platforms.

Working With DXF

DXF is the file extension and generic file type reference for the "Drawing Exchange Format" developed by Autodesk for enabling data interoperability between AuotCAD and other vector graphics applications. EazyDraw has the ability to open these drawing files

DXF drawings, being CAD based, usually will require adjustments to compensate for the drawing scale. Frequently the drawing content will be shifted and/or spread out over large expanses. The DXF format has information that should specify these scales and shifts but the implementation is inconsistent and often not present in the DXF file. For this reason EazyDraw has a post-import analysis window to help you locate the drawing content and expanse of the content Opening SVG

DXF Analysis Panel

The analysis panel opens after the initial conversion. The red border defines the full extent of the DXF drawing. Inside the red border is a density plot showing the location of graphics in the drawing.

The blue border defines the EazyDraw drawing area. It may start out very small - be sure to look closely for the blue border. The size of the blue border is computed from the page size, number of pages and drawing scale. The analysis panel provides access to the settings for these EazyDraw settings.

The goal is to get the blue border to enclose the red boarder. In many cases this is accomplished by choice for a drawing scale. In some cases you may want to use a large number of pages to capture the DXF content.

EazyDraw is reading the Model Space content of the DXF drawing. Often a DXF file will have contain more than one "drawing." You will be able to notice this situation represented by different blocks on the density plot. In this case focus the blue border on one of these populated regions. The blue border may be moved by dragging on analysis plot.
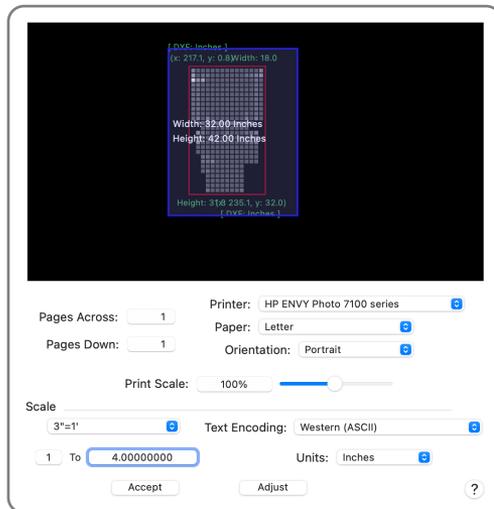
Working With Bitmaps

EazyDraw will accept the most common bitmap file formats: TIFF, JPG, BMP (Windows BitMap), GIF, and PNG. These are common graphic formats used by digital cameras, scanners, photo touchup applications, web sites, and non-vector drawing or painting applications.

If the bitmap graphic is saved in a file on your system, you can Open it directly using EazyDraw's Open command. Or you can drag and drop the file's Finder Icon on an open EazyDraw drawing window.

Drag and drop of bitmap graphics is accepted on any EazyDraw drawing window. For example, a graphic from a web site or iPhoto is copied by simply dragging the graphic from your browser's window, over to an EazyDraw drawing window. If the graphic's format is known and understood by EazyDraw you will see a fat green "+" sign near your cursor when over the EazyDraw drawing window.

Copy and Paste via the masOS system pasteboard is another way to incorporate bitmap images into your EazyDraw drawing.

Bitmap graphics are simple array's of tiny color dots. If you zoom in closely you will see the jaggedness from these dots, or pixels. This limitation arises from the limitations of the original image defined by the original pixel density of the image source, perhaps digital camera. There is no way to improve the fundamental quality of the bitmap graphic in EazyDraw. And EazyDraw does not have an automatic tracing capability at this time. Manual tracing is a viable option, it is quite common to use a bitmap graphic as a starting point for a drawing. In this case one usually places the bitmap image on a separate layer and traces over the image.

Interaction Level

When bitmap graphics are brought into an EazyDraw drawing the display size will nearly always need adjusting. Images can start out at strange sizes, a high quality image might initially show as very large - 20 inches across for just a "small" photo. This depends on many things related to the original creation of the image.

The bitmap image may be re-sized with the normal editing handles. If you do not want to distort the image or photo, set the Interaction level for the image to Uniform Scale. This is found on the Format main menu, Interaction

submenu, or on the Attributes bar. Uniform Scale will reduce the number of resize handles to two. Then adjustments of size will maintain the original image's aspect ratio.

Caution on File Size

Bitmap graphics can be sizable, in terms of the number of bytes needed to represent the image. This is not normally a problem for graphic clips obtained from the world wide web, but digital photos and scanned images are often very large. If you add a bitmap graphic to a drawing, it becomes part of the drawing file. The bitmap is saved in whole with all of the other drawing information. EazyDraw does not down sample or reduce the pixel density of an incorporated bitmap. Nor does EazyDraw support a source graphic indirect referencing scheme, the bitmap becomes part of the drawing.

The number of bytes of memory used to save an included bitmap graphic is not changed when the displayed size of the image is changed. These two "size" aspects are independent. So: if a high quality multi-megabyte digital photo is included in a drawing and then reduced to a small postage stamp size - the saved drawing file will be still be multi-megabytes.

If bitmap graphics are used, it is wise to keep an eye on the drawing size.

Down Sample

You can use EazyDraw to reduce the quality and corresponding memory size of a bitmap graphic. Bring the graphic into a drawing. Then resize it to be small, approximately the needed geometric size. Now do a screen grab, remove the original graphic from the drawing. Copy then paste from the screen grab back to the EazyDraw drawing. Now the bitmap graphic will have a storage size more in line with its geometric size. Of course, if you need to expand the graphic and show it at a larger geometric size - the quality will not be there and you would need to go back to the original to recover the quality.

Clear Color (or Instant Alpha - Remove Background)

This command is used to remove a background color from a bitmap image such as a JPG or TIFF. Use this to remove a solid color (or region of similar colors) and replace it with a clear transparent region. Often used to remove a background of a photo to allow placing the subjects of the photo before another background. Similar to Crop (or Frame) but works at a dot-by-dot level.

Images such as photos from a digital camera are stored as individual dots called pixels. Most graphics downloaded from the web are also bitmap graphics saved as a large array of small pixels. These images usually are composed of solid colors and solid colored borders. The Clear Color command is used to clear out regions of a relatively solid color and replace them with clear transparent uncolored pixels.

This Clear Color command is accessed from the Format main menu, Images submenu. A bitmap graphic must be the first selected graphic on the drawing otherwise this menu command will not enable. This action does not apply to vector graphics that you draw with EazyDraw. This command does not apply to pdf or PICT images, they are vector graphics too.

To apply Clear Color, first select a bitmap graphic image (such as a photo). Then execute the command or click the toolbar button. The active cursor will change to a "gun sight" appearance when over your drawing. Click down as close as possible to the color and location that needs "clearing." Drag away to pull out a circular indicator. The diameter of your indicator circle relates to the range of neighboring colors that are accepted as a match and hence cleared.

In order for a dot (pixel) to be cleared, it must a) match the initially clicked color and b) touch another cleared pixel. So as you increase the radius of the indicator circle larger regions of your photo may (or may not) be cleared.

Note that the indicator circle is just that - only an indicator. The actual circle does not limit or expand the geometrical region that may or may not be cleared. The individual pixel colors and their relative locations determine which pixels are cleared.

Exporting Graphics

Export Introduction

The Export submenu (on File main menu) provides methods for saving drawings to various graphic file formats, other than EazyDraw's native formats. These are file formats that you will use to provide your drawings to other users, applications, operating systems or web sites.

The top portion of the save panel is a standard Save File navigation and selection panel. The bottom portion provides selection for the available parameters associated with each format. This portion of the panel will change significantly with your selection of export file/data format.

Exchanging your work with others on macOS is best with EazyDraw's native file format. Anyone on macOS may download the latest version of EazyDraw and view files you have created - no license is needed to open, edit, or save the file you have sent to them. The Export file formats are used to send your work to other operating systems or for use on the World Wide Web. Files sent to external printing services like a newspaper or ad agency are best sent in a vector format such as PDF or EPS.

Prepress

If your drawing needs to be sent electronically to an agency, newspaper, publisher, or another printing service you will want to send a high quality format with a reasonable file size. EazyDraw provides professional grade PDF export support for these purposes. The Graphic Details drawer shows the DPI of any bitmap images (photos and the like) contained in your drawing.

It may be necessary to convert text to Bezier paths. This is a common prepress requirement. Converting text in this fashion prevents problems with Font Families that may surface when your drawing is reproduced with the publishing equipment.

Special color preparation for ink printing will often require CMYK colors. This is supported by EazyDraw at two levels; ColorSync preview for on screen and embedded CMYK colors within EPS and TIFF export.

Web Graphics

JPG, GIF, and PNG are supported for publishing drawings to the World Wide Web. Compression is supported to get files as small as possible for rapid emailing and web download.

Icon Composer

Icon Composer is Apple's modern tool for creating app icons from layered artwork. Rather than producing a single flattened image, Icon Composer uses multiple visual layers to generate icon assets that adapt correctly to different sizes, materials, and system appearances. EazyDraw supports this workflow by allowing you to prepare and manage the individual vector layers required by Icon Composer, making it easy to design, organize, and export precise icon components before assembling the final icon set in Icon Composer.

Icon Support

ICO: The ICO format is used by internet browsers for "favicon" files. If you place a favicon.ico file on your web site, internet browsers will find the file and use the images contained to show an icon next to the web address or on the Favorites menu. If you look at EazyDraw's web site with your web browser you should see our trademarked icon. This image was drawn with EazyDraw, exported as a favicon.ico file, placed on our web site and automatically found by your browser.

Dual Representation TIFF: Dual Rep TIFF is a TIFF file with two images, one at the specified resolution and one at 2 times the resolution. Apple originally defined this as the file format to be used by applications to support high resolution (Retina) displays but this no longer applies.

ICNS: Apple defines a set of specifically named, and sized png images, all present in a folder named the ".iconset" extension. This image set provides a full high-resolution icon. EazyDraw allows the complete set of images to be designed in one drawing and saved with a single export. Open Page Setup, choose "App Developer" as the electronic printer, then select "Iconset" as the Paper. The drawing page provides a canvas to hold all necessary images. A particular iconset layer provides properly defined bounding boxes and file names. All you need to do is design and draw each graphic (little joke "all you need to do") in the corresponding bounding Rectangles, then export.

Legacy Formats

The App Store version of EazyDraw does not support MacDraw, MacDrawPro, Claris Draw, AppleWorks and PICT files. Obtain EazyDraw Retro, from the EazyDraw web site, to access these drawings on macOS (Lion and Mountain Lion supported).

Seamless With Other Apps

EazyDraw actually presents all these formats to the macOS clipboard. The receiving application chooses the format best suited for the task at hand.

Export Content

Most of the export panels provide a parameter for control of the content of the exported graphic image. This is determined by the popup menu just to the right of the popup menu that selects the export type.

There are 3 choices: Selected Graphics, Just Graphics or Full Drawing area. They are self-explanatory and specify the method that is used to define the bounding box for the exported graphic.

In some cases you need to define a certain size for the exported image, and this size would naturally be somewhat larger than the graphics that make up the image but smaller than the drawing size. There is a common technique for this situation: draw a bounding box at the precise size needed for the graphic, make certain that it contains all of the graphics and that they are well centered, then make bounding box invisible with a setting of "no outline" and "no fill" (on Color and Style palette). Now do the export and select "Just Graphics," this will give you a well defined rectangle image with the graphics position and centered as desired. This trick is also used when exporting just graphics has the problem that some of the edges are shaved or maybe a drop shadow is clipped.

The other method for creating a well define export image rectangle dimension is to use the Page Setup panel. On Page Setup select one of the electronic publishing virtual printers. Then you may define a precise drawing size of the required dimensions. In this case you select "Full Drawing" for your export content.

Export Background

All export panels provide a parameter for control of the background of the exported graphic image. This is determined by a popup menu, found just to the right of the Export Content popup menu.

You have 5 choices for background: None, White, Black, Colored, and Color

With Grid. White, Black and Colored are self-explanatory. The color for a Colored background is determined by the color well found on the Page Layout palette.

The Export Background parameter setting will allow a white exported background, even if your display has a defined colored background.

No Background

This background setting is used to provide an image that is transparent where there are no drawn graphics. This setting will require that the target displaying technology supports transparency. In some cases, such as an macOS icon, transparency is required for the graphic to have the proper appearance.

In other cases such as a MS Word graphic the transparent background may cause problems. If the receiving application does not support transparency then you may get the "black on black" problem. Suppose your graphic is an empty rectangle and circle; both have no fill. If both graphics are drawn with black outline, as set on the Color and Style palette, the resulting image might be a solid black rectangle when displayed by an application that does not support transparency and uses the color black for transparent image regions. This is the case in many older 1990's technology applications, especially on Windows or MS Word on macOS.

Tag Image File Format (TIFF)

TIFF is perhaps the most versatile and diverse bitmap format. It is used for data storage and interchange. It can be viewed on almost any computer or computer application.

The Dots Per Inch (DPI) parameter is used to define the resolution or quality of the exported representation. Normal display screen viewing requires about 72 DPI for acceptable visual quality. Printed applications usually require 300 DPI for good quality representation. High quality printed results may need 600 DPI or greater.

The size of an uncompressed TIFF bitmap depends directly on the imaged area, with color depth as a third dimension. It grows rapidly (square law) as the DPI or area is increased.

Keep in mind that we cannot regenerate an EazyDraw vector representation from a TIFF export file. If your final work needs to be TIFF (or any other bitmap format) be sure to save and archive the EazyDraw original in case modifications to the work are needed in the future. You can always generate a revised TIFF export from the original-but the reverse is not possible.

For best compatibility TIFF is not compressed. Think of it as a raw bitmap format. The resulting file may be compressed using the Finder's Create Archive menu command. If compression and small file size is important, use the JPG format. A JPG starts as a TIFF and is compressed to greater or lesser degrees as desired.

Use the save button to execute the save action after all parameter selections are made.

EazyDraw uses vectors to define all graphics. A vector representation does not need to record each dot along a curve. For example only 4 dots are needed for a full Bezier curve segment. The size of a vector representation is driven by the amount of content, not size and detail. A small icon containing numerous curves, colors and shading can result in a somewhat large vector based representation. The TIFF representation of this example would require only a small file at 72 DPI. These are the trade-offs that are important, especially if the work product is intended for communication over networks or the internet.

With no compression a bitmap file's size does not depend on content, a 5 page blank document (with a border) is the same size as a 5 page brochure packed with curves, special effects, and text. If the bitmap is visually sparse, compression may provide significant file size reduction. If the bitmap is rich in detail, colors, and shades lossless compression may not significantly reduce the size.
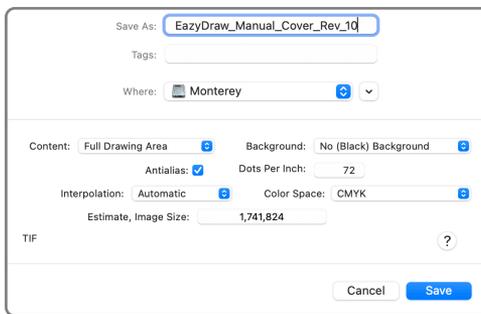
pixels, not a sharp dark line. This is the antialiasing technology at work. When viewed at normal zoom the antialiased line looks clean and crisp, zoomed in it will be fuzzy. Conversely if antialiasing is not used the line viewed at normal zoom will be jaggy and uneven, up close though you will see only the black pixels actually drawn. If you need exact control over the color of each pixel be sure to turn off antialiasing as it will modify individual pixel color on color contrast borders.

Interpolation is applied to Bezier paths during preparation of the image. This normally has little affect on the image. If exact control over placement of pixels of lines and curves is needed select no interpolation. There are 3 levels and an automatic selection.

Apple Iconography: EazyDraw provides a complete, professional workflow for creating modern Apple iconography, including full support for SF Symbols and Apple's Icon Composer. Rather than treating icons as flattened images, EazyDraw is designed around precise vector layers, guides, and editable geometry—exactly what Apple's current icon and symbol tools expect. This makes EazyDraw an ideal companion for developers and designers building icons that must adapt cleanly across sizes, materials, and system appearances.

For SF Symbols, EazyDraw recognizes SVG templates exported from Apple's SF Symbols app and automatically organizes the content into meaningful layers for guides, notes, and editable artwork. The SVG import preserves template structure and integrity, allowing you to design custom symbol artwork while remaining fully compatible with the SF Symbols pipeline. A typical workflow is straightforward: export a template from SF Symbols, open it in EazyDraw, design or refine the vector artwork, export the updated SVG, and drop it back into SF Symbols for validation and SwiftUI use.

For app icons, EazyDraw supports preparation of the individual layered artwork used by **Icon Composer**, Apple's modern icon-assembly tool. You can design and manage each icon component as a separate vector layer, ensuring clarity, alignment, and scalability before final assembly. Together, EazyDraw, SF Symbols, and Icon Composer form a clean, modern workflow—giving you precise control at the design stage and confidence that your icons will integrate smoothly into Apple's latest platforms.

Portable Document Format (PDF)

Adobe's PDF is the native file format for the Adobe Acrobat family of products. PDF is inherently supported by macOS and is available to all applications developed for macOS.

PDF is a vector format, and therefore provides high quality information with reasonable file sizes. It is the best format for exporting EazyDraw's vector drawings. Suitable for most uses except perhaps the World Wide Web.

The naturally inherent full quality of the PDF representation means that there are actually very few parameters that need to be specified. There's no "resolution" to define, or compression needed. So this panel is quite simple to use and requires little explanation.

Save As PDF

There are two ways to export PDF. One method is to use the Export panel. The other is to call for a Print of the drawing, then from the Print panel elect "Save As PDF." Both methods result with a PDF file being written to disk. The Export method will draw one page with the full drawing content, as specified with the Drawing Content popup menu. In this case the drawing image will be on one page of a PDF document. The PDF document page size will be as you have defined it with the drawing, drawing size, and export content settings.

A Save As PDF call also writes to disk a PDF file. In this case the PDF document may consist of multiple pages. The pages will be defined by the printer (real or virtual) paper size. If your drawing is multi-page you will have a multi-page PDF.

To summarize: a multiple page drawing, when exported as PDF will be exported as one "big" page. But when Save As PDF is used a multiple-page pdf document will result.

Encapsulated PostScript (EPS)

Encapsulated PostScript (EPS) is a legacy graphics format dating back to the early days of desktop publishing and PostScript printing. While it was widely used for many years, EPS has been formally deprecated across modern platforms and is no longer supported by Apple's current graphics frameworks. As a result, **EazyDraw no longer supports EPS**. Today, modern vector formats such as **PDF and SVG** fully replace EPS, offering better fidelity, transparency support, color management, and long-term compatibility. We recognize that some long-time users may still encounter EPS files in older workflows, but moving to PDF or SVG ensures reliable editing, display, and export on current and future versions of to control the color space used for individual layers - on the Layers drawer.

DXF

The mnemonic DXF stands for Drawing Interchange Format. It is a vector graphics CAD (Computer Aided Design) data file format defined by Autodesk. It is text based, human readable and well suited for the exchange of 2d CAD drawings. DXF is the adopted file extension for this drawing type.

The format was introduced in 1982 and has evolved with about 5 major revisions. The EazyDraw export supports the most commonly supported revisions.

Scale and units are an important part of a CAD drawing. The drawing units and axis directions in use at the time of export become the units and axis direction for the DXF file. Many of the CAD packages will assume an origin at the lower left of the drawing, with the y axis in the up direction. This is not a common arrangement on a Mac, but an EazyDraw drawing can be easily configured for this convention. Use the Scale palette to make adjustments if necessary.

The exported file is a text file. It may be viewed and even edited with a text editor. The format consists of line pairs, with the first line of each pair specifying a group code. The files can be large but they compress to a reasonable core size for transmission.

AutoCad LT is used as the gold standard for EazyDraw's export and import of DXF. At this writing the exchange of DXF drawings is tested and confirmed against AutoCad LT 2013 for macOS (App Store version) and AutoCad LT 2012 running on Windows.

JPG

Joint Photographic Expert Group (JPG) is technically a compression technique not a file format. But wide spread common usage has made JPG a file format for all practical purposes. The uncompressed contents of a JPG file will be a TIFF (EazyDraw's implementation) or BMP bitmap image. The bitmap is compressed with a JPG compression method. Since a JPG file is actually a JPG compressed TIFF file, all the parameters documented for TIFF exporting apply. Refer to the TIFF discussion earlier in this chapter to learn about these parameters, especially the Dots Per Inch (DPI) parameter and size/quality related issues.

The key point of JPG compression is that it may be "lossy" where gZip compression methods are "lossless." This makes JPG useful for applications such as photographic-like images that are rich in continuous-tone, high definition (24 bit, or millions of) colors. An aggressive JPG compression will save size by skipping over the subtle aspects of the coloring and shading of the input image. In many cases this "loss" of information may not be detectable at the target viewing resolution of the image. Especially if the ultimate output device is a computer screen.

The Compression numeric text box and corresponding slider are used to specify the degree of compression of the JPG output. By convention a value of 0 indicates no compression and a value of 1 specifies the most aggressive compression.

Proper selection of the correct export parameters depends on the ultimate use of the exported file. It is usually best to determine settings by experimenting, possibly with test files.

Test first with high compression, viewing on the ultimate target medium. There will probably be unacceptable defects in the image. Decrease the compression value (go to 0.5 to begin a binary search) and recheck, continuing until defects are barely perceivable.

In many cases care in choice of the compression value will result in very small image size with fully adequate viewing quality. This can be especially important for web graphics that require communication over finite bandwidth networks.

In some cases the recipients software applications may require JPG file format. If

lossless image quality is required, just set compression to zero, and pretend that JPG is really a file format.

The Antialias check box selects the use the macOS antialiasing algorithms during preparation of the image. In some cases it may be best not to use this capability. See the discussion of this topic in the TIFF section above. In most cases antialias should be used for a JPG export.

Interpolation is applied to Bezier paths during preparation of the image. This normally has little affect on the image. If exact control over placement of pixels of lines and curves is needed select no interpolation. There are 3 levels and an automatic selection.
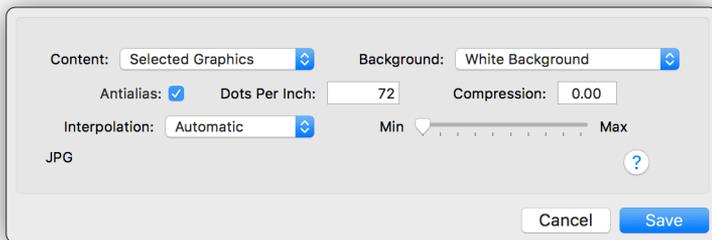
Graphic Interchange Format (GIF)

GIF is a creation of CompuServe. It is a bitmap file format. The format allows for saving multiple images in a single file. When used properly this format can result in very small files sizes. This is a widely used format for Web graphics.

GIF files are always compressed in a way that conserves all spacial image information. However it takes care to maintain the color information the image. All colors of a GIF image are mapped to a fixed number of colors. These colors are saved with the image in a record know as the color table. Color tables contain a maximum of 256 colors and are always a power of 2 in size. If your drawing was prepared using a fixed set of colors from a defined color table, you may select that color set using the Color Table popup menu. Otherwise you should use one of the automatic methods provided by EazyDraw. Select the automatic method and size of table desired using the popup menu. EazyDraw will analyze your full image and optimize the color table to best represent your image with the size of color table specified.

GIF files support an older concept of transparency, not to be confused with the opacity capability of the macOS color management system. In a GIF file one color is chosen as the transparent color. This chosen color is not drawn when the image is rendered. On a typical "Mac" desktop this color would be White. Use the popup to control this selection, use automatic and EazyDraw will make an intelligent selection for you. Note that it is not necessary to use the transparent color attribute. The popup is also a good way to see what colors will be placed in your color table. There is no selection for compression, GIF files are always compressed with the LZW algorithm. This is a lossless compression method

Color Table

The GIF file format uses a color table. The image is constructed with a limited set of colors which are the ones defined in the embedded color table. There is a popup menu that is used to select the color table that is used to define the colors in the exported graphic. The color tables that you see on the popup menu are those found in your Colors Folder in the Library folder of your home directory. See "Color Files" in chapter 1 for more information.

Normally you will want EazyDraw to analyze your drawing and prepare an optimal color table that best matches the colors that you have used in your image. The selections near the top of the popup menu provide this behavior. You will see selections like 4 Best on up to 256 Best. GIF color tables are limited to 256 colors and must be a power of 2, hence the selections that you see. Larger color tables

require a little more storage size which can be important for web graphics.

Color lists are used for these color tables, patterns and textures are also saved as color tables. A list of color patterns can not be used with the bitmap format, as they are themselves bitmaps. The GIF format only supports RGB (Red, Green, Blue) color specifications. Any color list that contains at least one non-RGB color is disabled on the Color List Popup menu.

EazyDraw does not support the export of multi-frame GIF files which are used to provide animation. EazyDraw is a great companion App for an animation App, but EazyDraw is not an animation App.

You may encounter information related to CompuServe and patent problems related to the LZW compression algorithm that is integral to the GIF file format. This patent problem was one of the driving issues that resulted in the design of the PNG file format. The CompuServe patent expired several years ago and is no longer an issue. The PNG format is a more versatile format and should be used in favor of GIF in most cases.

Save As:	Tiny-Image-For-Web
Tags:	
Where:	Monterey

Content:	Full Drawing Area	Background:	White Background
Antialias ☑	Dots Per Inch:	72	Dither ☐
Transparent:	White	Color Table:	256 Best

GIF   ?

Cancel   Save
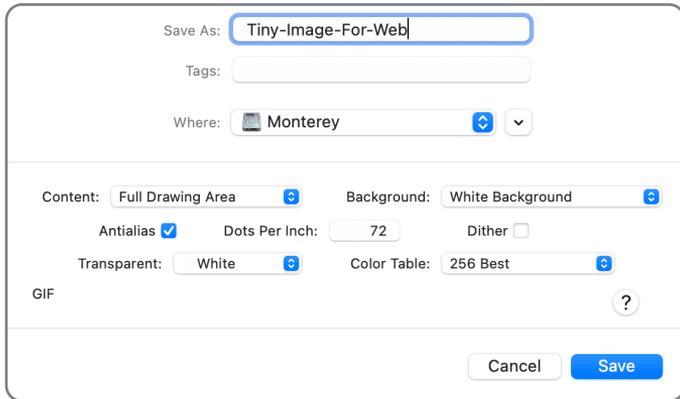
Portable Network Graphic (PNG)

PNG, pronounced "ping, or more properly pronounced the way your boss pronounces it" is a bitmap file format. It is specifically designed for network image data transmission and storage. It is capable of lossless storing bi-level to 48 bit true color image data. Historically, in the early 2000's PNG replaced GIF for web graphics.

PNG provides inclusion of transparency with 8 or 16 bit alpha channel. JPG does not support transparence. Transparency avoids the white background problem for web graphics. PNG is the preferred interchange format for web, network, Windows exchange and computer display applications. JPG and lossy compression is appropriate for photographic content.

PNG does not support multiple images per file that are used for storage of animation sequences. GIF is used for simple animation.

PNG is the most prevalent interchange format across all platforms. It provides high quality color, inherent minimum file size with lossless compression. You can generally assume that your exported image will look good when displayed by a Windows application with all browsers - at least up to the limitation of a bitmap image.

The Dots Per Inch (DPI) parameter defines the resolution and quality of the exported representation. 72 DPI provides acceptable visual quality. Retina-quality displays require 144 DPI, often known as @2x graphics. Dual mastered PNG images offer the best web experience, especially for the macOS audience. For example, each PNG graphic in the EazyDraw user interface has 2 PNG images, one at 72 DPI and the @2x version at 144 DPI. In reality, there will be four images: 2 each for light and dark mode. The User Interface elements you see in EazyDraw were designed and produced with EazyDraw and used this PNG export feature.

Antialias applies complex algorithms for pixel coloring of sharp edges in the image. A narrow 45-degree narrow line illustrates the problem. Black pixels have a jagged stair-step appearance, quite noticeable to the eye. Antialiasing shades some of the stair-steps black and white pixels with gray. The result is greater realism for the digital image.

Color Space is a complex topic, covered well on the Web. Display P3 is a

computer display-oriented wide-gamut color space. It offers about a 25% greater range of colors than the circa 2010 standard sRGB color space. If your audience is viewing with a Mac computer, iPhone or iPad, or other computers and displays manufactured after 2016, your images will be brighter and sharper (especially red to yellow colors) with P3 colors.

The fourth numeric value specifies transparency. The three primary values define red, green, and blue. This four numeric value associated with each pixel is called the Alpha channel. Format choice specifies the order of the three color values and the alpha channel. The Alpha popup menu provides control of the formatting of the values for each pixel. Usually, the choice will be Premultiply Last. Or a setting of None for Alpha will decrease the image data size. The receiver of your image will be the defining factor in the selection of this parameter. Or, if no information is available, Premultiply Last will almost always work. Image metadata includes specification of your export settings; in theory, your client is responsible for reading the metadata and interpreting the image.

Bits per color is part of the export specification. For most of the early 2000s, 8 bits per color has been a defacto standard. The 8-bit selection provides 8 bits for each of R, G, B, and Alpha. The other choice for PNG is 16 bits (and 5 bits, but that is not generally sufficient). Of course, this doubles the size of each image. Improved display capability of the post-2015 era and decreased performance penalty for doubling of image size, in some cases, will lead to 16 design needs.

Save As:	Bright-Display-P3-Image		
Tags:			
Where:	📁 Morana	⬍	⌄

Content:	Full Drawing Area ⬍		Background:	White Background ⬍	
Antialias ☑	Interlace ☐		Color Space:	Generic RGB ⬍	
Interpolation:	Automatic ⬍		Alpha:	Premultiply Last ⬍	
Dots Per Inch:	72		Bits Per Color:	8 ⬍	

PNG   ?

Cancel   **Save**

BMP

The Windows BMP file format is a simple bitmap file format introduced and standardized with Windows version 3.0. It has been highly standardized and is extremely widespread. The format does not standardly support compression, but that can be easily applied with a separate compression program. Transparency is only provided with the 32 bit color variant, commonly referred to as Windows XP format.

Colors are defined in an indexed fashion, using a finite list of colors. Usually 16 or 256 colors. More recent standards for this format allow for "True" colors defined as RGB (red, green, blue) 8 bit color components. The newest Windows XP standard supports an additional 8 bit alpha channel, i.e. transparency.

The file extension is BMP. The first two bytes of the file are the characters B and M.

The Width and Height of the image are important in a BMP export. You should design the size of the drawing appropriately. The Color Depth popup determines the encoding format used for colors with the bitmap. If 2, 16 or 256 colors are specified the Colors popup is used to specify the color table included in the exported file. If the 24 bit or 32 bit color method is selected, no color table applies and that popup menu is disabled.

The Color popup menu is used to select a color table for inclusion with the bmp file. All colors of the image are converted to the closest color found in the specified color list. The selection of Best 16 or Best 256 will automatically generate a color table from the EazyDraw drawing. A table is created with the colors used most frequently in the drawing. The other color lists shown on this popup menu are those found in the Colors folder of the User Preference Library folder.

The View Colors pull down list may be used to review the colors of the specified color list, but not the automatically generated lists. There is no action associated with this menu, it is just provided for convenient review. The easiest way to draw and export with no scaling is to enclose the graphics in a rectangle with a point size corresponding to the desired and specified pixel size. The rectangle can be changed to No Stroke and No Fill after drawing is complete. If all other graphics are inside this invisible rectangle, no scaling will be applied to the image.

256 colors are usually sufficient to depict most vector drawings. If photographs are included in the drawing, 256 colors will probably not be sufficient to properly represent the image. Also the use of several or complex color gradients will rapidly exceed 256 colors, so care must be used in this situation.

As noted above, the color lists may show pattern or texture color tables, these can not be used as color tables for this export format.

ICO, Windows Icons and Favicon

ICO File format is a Windows file format used to store a family of images that are used as icons. This format is used for the Favicon in common use on the World Wide Web.

A Favicon is a multi-resolution image included on nearly all web sites. The Favicon allows the browser to display a desktop or menu icon representing the web site. The multi-resolution aspect allows the icon image to be displayed optimally at 16x16 pixels up to 64x64 pixels. Different "color
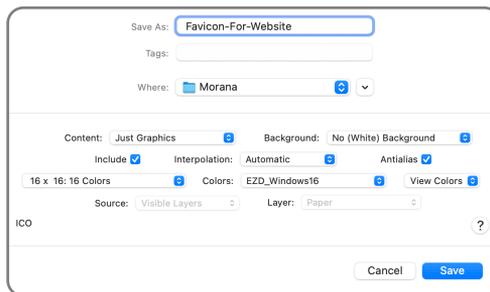
depths" can (and should) be included in the file, these allow the display application (operating system or browser) to draw with the preferred color model.

Most Web browsers support the Favicon.ico file. If someone bookmarks a web site containing a Favcion.ico file the icon is displayed beside the web site name in the menu system or the table of the user's favorite sites. The icon is also commonly displayed next to the site address in the main navigation entry field.

This export panel can be used to automatically generate a family of images from a vector drawing. More detailed control over the individual image generation is provided through the integration of individual layers.

The popup menu just below the Include checkbox is used to select a particular image format for inspection and interaction with the parameters of this panel. Use this menu to select an image format, then the individual parameters associated with this image are made available for interaction.

The Image Selection popup menu, found just below the Include checkbox, is used to select a particular image for inspection and interaction with the parameters of this panel. The Include checkbox is used to include or exclude the image of the specified size and color depth in the final exported file.

The lower portion of the Image Selection popup is used to select a family of image specifications appropriate for different uses or target systems. Selecting one of these entries, which are shown in light blue, will select and deselect the include option appropriate for each support image size and color style. If a set of selections matches one of these defined standard sets, a check is shown next to the set on the popup menu.

The Colors popup menu is used to select a color table for inclusion with the bmp file. All colors of the image are converted to the closest color found in the specified color list. The selection of "Best 16" or "Best 256" will automatically generate a color table derived from an examination of the colors used in the drawing. A table is created with the colors found most frequently in the drawing. The other color lists shown on this popup menu are those found in the Colors folder of the User Preference Library folder.

The View Colors pull down list may be used to review the colors of the specified color list, but not the automatically generated lists. There is no action associated with this menu, it is only provided for convenient review. If the drawing has more than one layer, the Source popup is enabled. If Visible Layers is selected, the drawing graphics are automatically scaled to

the size needed for each image. If One Layer is selected as the source, the Layer popup is enabled so that it may be used to specify a specific layer for the currently inspected image. In this manner different layers may be used for individual images. In this manner a completely different design may be used for the 16 x 16-16 color image than a 64 x 64-32 bit color image.

FAVICON Cookbook Instructions

Favicon (short for Favorite Icon), is a generally small sized graphic associated with a web site or particular web page. Browsers and mobile devices use the graphic to badge or graphically identify the web site for the user. This allows a web designer to push a high quality (using EazyDraw's vector technology) branding logo image to the readers browsing experience. Providing Favicons (yes you need several) is now a must for a professional quality web site.

Historically the Favicon was one simple graphic, very small (16 x 16) that is displayed in the web address bar (on the left). But the technology has expanded evolved and is becoming standardized.

EazyDraw makes this task simple (very simple). From EazyDraw, open Page Setup - choose favicon as the virtual printer. Then you will see the "virtual" paper menu populated with the recommended image sizes denoted with names indicative of the target operating systems and browsers. The design task is then simply to design a graphic for each of the sizes and export them as 72 dpi PNG graphics.

To implement, upload the png graphics to the web site. In the HTML code, in the <head> section add a link element with a r-e-l attribute specifying each png image and corresponding size.

It is important to scale and design the image for each size in your EazyDraw original drawing(s). Don't simply scale the PNG -- think about it: if that sort of quality was acceptable then multiple images would not be needed or sought by the browser or end-consumer user interface. Scale and design each graphic as vector content in each properly sized image. As the size increases the design will encompass more detail. As the size decreases the design must simplify, at the smallest size the result will often be extremely simple using logo colors to convey branding.

The resulting favicon images will appear in several places in browsers and mobile devices. The web site (or a single web page) can automatically acquire a full iOS-icon status if you have the proper size png image available on the web site.

When exporting the PNG, remember to export at 72 dpi and (most important) export Full Drawing Area. If you do not choose Full Drawing Area, and if anti-aliasing is used (of course it will be used) then EazyDraw will add a few pixels on the border to anti-aliase the edges of the image. These extra pixels will result in improper image sizes and possible exclusion of your image. It is always best to check the exact size of each png image using Preview or another inspector.

Note: on Page Setup, use Points as palette units. Click the small "i" - "p" - "m" button top right of the panel until "p" for Points is selected. Points is a defined unit of length, defined as 72 per inch. This works perfectly when we export at 72 dpi (dots per inch), the choice ensures that one Point corresponds to on dot (not a defined length).
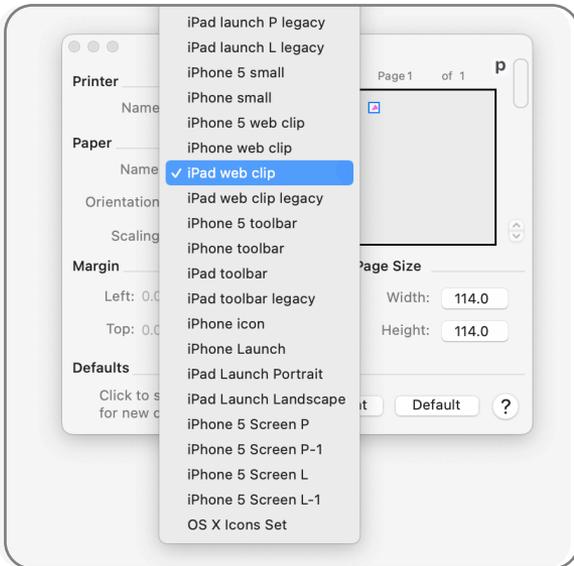
SVG (Scalable Vector Graphics)

The mnemonic SVG stands for Scalable Vector Graphics. It is a vector graphics format, as compared to a bitmap graphic format. It is text-based and human readable, the content format is similar to the web page HTML format.

Scalable Vector Graphic format, an open standard vector format. This is a text file format, the output is human readable. The content is formatted in accordance with a set of encoding rules called XML (Extensible Markup Language). The output resembles HTML, using start tags and end tags to define vector graphic elements. SVG is now supported and displayed by most browsers and is required for posting diagrams to Wikipedia.

SVG is an XML (Extensible Markup Language) language (or application). SVG is an "open" format published, defined, and maintained by the W3C (World Wide Web Consortium). Complete information and documentation for the format is available on the Web and there several technical publications available for in-depth study.

SVG can be used to exchange drawings between applications, or for content publication of web based graphics. There is a defined reduced scope format for use with resource limited hand-held devices (this format is defined as a "profile" called SVG TINY. EazyDraw supports all defined SVG profiles.

This panel is accessed from the File menu, the Export selection. Use the top left popup menu found on the Export Panel to select "SVG" for the file format.
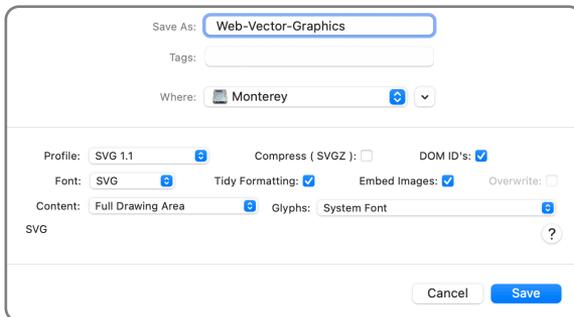
The EazyDraw SVG export is a full implementation, all EazyDraw graphic elements are mapped to SVG content. Where possible SVG abstractions are implemented. If an EazyDraw graphic element is not representable as a SVG element or attribute, the EazyDraw graphic is generated using SVG primitive graphic elements. For example, a simple linear gradient has a SVG representation and the representation is used in the SVG exported drawing. But a Conic Gradient does not have a SVG representation; in this case the gradient is generated as a series of small elongated triangle fills. Another example is Arrows (defined as Markers in SVG), some EazyDraw arrows can be represented as Markers, but "Arrows - Along" are drawn as basic Bezier paths in the SVG drawing.

For specific details on the export parameters consult the W3C web site, or refer to the EazyDraw Help page for this export format.

Keynote

Export to APXL, Apple's Keynote version 1 XML file format. These files may then be fully integrated into a Keynote presentation, as editable vectors, fills, and text. Keynote II can also use these files, they are automatically converted to from the Keynote I format when imported into Keynote. Copy and paste of PDF and full resolution TIFF between Keynote and EazyDraw provides another method to integrate high quality graphics drawn in EazyDraw into Keynote's advanced presentation capabilities.

The Presentation Slides popup menu provides options for the generation of individual slides in the Keynote presentation. If One Slide is selected a simple single graphic of the visible portion of your drawing is exported to a single
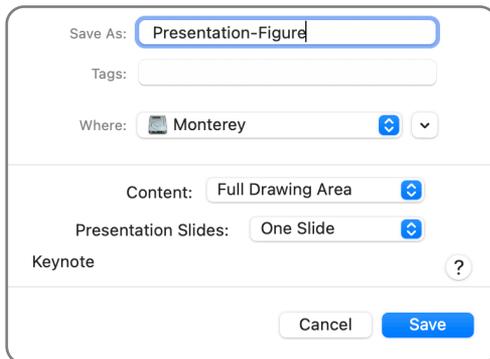
Keynote Slide. The other two options will export multiple slides, one provides a slide for each page of a drawing, the other for each layer of the drawing..

Path As SVG

This export is found on the Edit menu (not the export menu). Choose Edit -> Copy Special -> Path as SVG. The source of the copy can be any graphic that has a Bezier path (rectangle, Bezier curve, circle, ...). When the command is executed a plain text string is generated and placed on the system clipboard.

The string contains all the information needed to generate the Bezier path, encoded as a SVG path. It is becoming common that other Apps can interpret these strings as graphic shapes. For iOS development we use this format to incorporate graphic elements as vector content using XCode and the standard iOS development environment (these paths are much smaller with greatly improved quality and scalable properties when compared to multiple-png images.

CSV

Comma Separated Values (CSV) is commonly used to exchange data table, often used with a database or spreadsheet application. The output is a simple table of Bezier vertices and control points.

This is an advanced topic. A working knowledge of Bezier graphic geometry is needed to understand the CSV table. If needed, a quick study on the internet or any computer graphics textbook should suffice. The Apple Developer Connection website has detailed information on this topic.

The numeric values are defined in the current drawing units (inches, centimeters, points, ...). The drawing units are defined on the Scale palette (Format main menu). For reference, the drawing ruler can be used to illuminate the values that are provided in the CSV table.

The precision (number of decimal points) is the same as seen on the Graphic Details drawer. This is user definable on the Graphic Details drawer when "nothing" is selected, refer to Numeric Formats in Chapter 6 for information on this topic.

EazyDraw does not provide "round-trip" support for this format. EazyDraw cannot import a CSV table. SVG should be used to import Bezier graphics.

Copy Paste Order

When you execute a Copy from one application (e.g. EazyDraw) and a Paste to a second application (e.g. PowerPoint) the operating system (macOS) facilitates the transfer of information (your EazyDraw graphics) using the system pasteboard.

Data can be placed in the pasteboard server in more than one representation. For example, your EazyDraw graphic might be provided both in Tag Image File Format (TIFF) and as encapsulated PostScript code (EPS). Multiple representations give the pasting (receiving) application the option of choosing which data type to use.

In some cases this automated selection may not provide the desired results. In the example (EazyDraw to PowerPoint) the TIFF format would be correct if the graphic was a photograph that was perhaps cropped and enhanced with a composition affect. But this would be the wrong format for an electronic timing diagram, in the later case a vector representation would be far superior.

These check boxes and ordering specifiers provide control over this inter-application interaction.

When applications interact with the pasteboard server they indicate the allowed formats and an order of preference. In some cases the preference order may define the actual format used.

The Order parameters provided allow control of this preference ordering. The check boxes on the Copy column define which formats are included when a Copy (or drag off screen) action is performed by EazyDraw. Check the box to include the format.

The numbers specified in the Copy Order column determine the order in which the formats are placed on the pasteboard. A lower number indicates a preferred format. Change the order by typing a number in the text box associated with a format.

The Paste column works in the same fashion, except it provides control over the formats accepted with a paste (or Drop) operation into EazyDraw from another application.

These parameters are not used when copying from one EazyDraw drawing to another. In these cases EazyDraw makes use of internal proprietary formats that are more complete.

For communication with newer applications on macOS, known as Cocoa Apps, TIFF and PDF will be formats that are more likely to provide high quality image rendering in the destination application.

	Copy	Format	Paste	
Order	Include		Accept	Order
2	☑	TIFF	☑	2
1	☑	PDF	☑	1
3	☑	EPS	☑	3
4	☑	Rich Text	☑	4
5	☑	Plain Text	☑	5
	Copy DPI:	72		?

Chapter

6

The Drawing Window

Drawing Window Components

The drawing window is your working view or window into your drawing. It has a number of components most of which are standard macOS window user interface elements which you will find are used by most macOS applications. Below is a brief rundown of the window elements names and uses.

Close Button: Click the red button to close a drawing, same as Executing Close from the main menu or CMD "w." If the drawing has changed since last save, a pull down panel will ask if the drawing should be saved to its disk file before closing.

Send to Dock Button: Click this yellow button to collapse your drawing window and place it on the system Dock. The drawing will remain in the system dock and off the desktop until it is needed. In the dock it is represented as a thumbnail snapshot of the drawing. The drawing window will return to the desktop if you click it in the Dock.

Full Screen / Normal Size Button: Click this green button to expand the drawing window to occupy the full screen. It will expand out to use the full display area of the screen. The actual "zoom" setting for the drawing remains the same, all graphics will remain the same size, but the expanding window will expose more drawing area. If a window is expanded, clicking this button will return the window to its previous size and location on the desktop.

Close Button

Send to Dock Button

Large Size / Normal Size Button

Click and drag to move a window

Drawing File Name

HistoricPermit

Layers   Details   Chart   Tech   Stellate   Math   Annotation   Dashes   Combine   Convert   Customize

Rulers: ✓   Grids: ⊞ ⊞   Above: Link: Snap: ⊞ ⊞ ⊟ ⊞ ⊞   None   Scale: 1/2"   Inches

Layers Configuration

Ac...	On	Lock	Name	N
	☑		text	1:
	☑		outline	9
	☑		shadow	1:
	☑		shingles	2
	☑		Paper	5
☑			siding	4

Flatten

Layer State
On

Color Modification
Opacity: 0.50
Tint: 0.50

Enabled Actions
Select Others
Active Above
Hide Dimensions

Color Space
Various

166%   siding

Roof replaced June 6, 2019

RENOVATION NOTES
1) All aluminum siding and trim to be removed.
2) Damaged siding and trim boards shall be replaced only as necessary, and with like design elements.
3) All existing windows shall replaced with new double pane replacement units by Air-Light

Zoom Menu

Layers Menu

Attributes Bar

Toolbar : icon, small icon, icon.

Drawing Ruler

Horizontal Scroller

Vertical Scroller

Resize Area

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Drawing File Name: This is the system filename associated with the drawing. Control click to get popup menu that shows the containing folders indicating the file system location of the drawing.

Title Bar: The top of the window is called the title bar. This is the area of a drawing window that is used to click, drag, and move the position of the window on the system desktop. To move a window, click in a free area of the title bar, away from any of the buttons, and drag the window to the desired position.

Full Screen Mode: (Lion and newer) Use this button to switch to Full Screen mode. The current drawing is expanded to fill the screen, the menu is hidden, if necessary a margin (Page Layout parameter) is added to the screen display format.

Toolbar: Each drawing window has a toolbar. All of your drawing windows will have the same toolbar, if you change the toolbar for one drawing, all the others will change too. This toolbar is fully user configurable, use the Customize Toolbar menu command (Bottom of View main menu) to remove a tool or add others, from a selection of well over a 100 available tools.

A toolbar configuration may be saved to a file for future use or a quick change of toolbar setup. The menu commands for this are found about half way down on the View main menu. A submenu of recent or favorite toolbar configurations is available from the View main menu.

Overflow Tools Menu: If all of the tools do not fit in the available window width, the overflow tool menu is available to access tools by menu name. Toolbar tools that are themselves pull down menus will have submenus on the overflow menu. If all the tools fit, this icon is not shown.

Tick Mark Stepper: (upper left corner of rulers) If drawing rulers are present this stepper button is available to change the tick-mark pattern for the rulers. Use this stepper to quickly change the format for the ruler intervals, half & quarters, or fifths and tenths for example. This is especially useful if minor grids are enabled and the link grids to rulers option is in use. In this situation the stepper will conveniently change minor grid spacing.

Zoom and Layers Menu: These are provided at the lower left of the drawing window, when a drawer (Graphic Details, or Layers) is open on the left side of the drawing. If there is no drawer on the left they are not shown, this in conjunction with hiding scrollers provides a clean uncluttered drawing area.

Drawing Ruler: The drawing ruler is an option, it is enabled or disabled from the Tools main menu (near the bottom). The Page Layout palette provides a checkbox that may be used to control the display of rulers. The Page Layout palette provides control of the default setting for displaying rulers.

The scale and units of the ruler are those of the drawing and possibly the active layer. These are selected on the Scale parameter palette found on the Format main menu, near the top.

The colors, text font, and other style aspects of the ruler are set on the Ruler Style palette, accessed from the Tools main menu near the bottom.

Horizontal and Vertical Scrollers: These controls are common on nearly all macOS drawing windows. They are used to move the viewing portion of an enlarged (or zoomed) drawing. Normally they are only shown when scrolling is activated.

Click and drag these scroller buttons to move (or pan) the working area of the window over the full drawing area.

The Hand tool (main tool palette, second from top on the right) may also be used to pan a drawing. Option click and drag with the hand tool to move (or pan) the active viewing area of an expanded drawing.

Resize Grabber: The bottom right corner of the drawing is used to set the size of the drawing window. Click and drag to set the window's size.

Active Drawing Area

The remaining interior area of the drawing window is your active drawing area. The size and makeup of this area is a representation of the final output medium of your drawing. This output medium is, in a general sense, a piece of paper. More precisely, a piece of paper of a size supported by an active printer known by your macOS operating system.

This seemingly intimate connection of a printer and real paper size to your drawing's active area relates to the core design of macOS and a great deal of the imaging technology required to provide a "graphics" drawing area. In many ways, PDF is the core description format for your drawing, and a PDF document is built of individual pages of a defined width and height.

The EazyDraw user interface tries to minimize your need to understand these details, but it can help if you understand a little of what is going on behind the scene of your window's view on your display.

If you are preparing content for use on the Web or for electronic publishing, there may not actually be a printer and piece of paper in your work flow. EazyDraw provides a setting, on the Page Setup palette, that allows you to choose a virtual electronic publishing printer. This ability helps lift some of the connections of your drawing to a physical piece of paper.

However, if your work flow is destined to a real printer and paper - do not try to circumvent the hard connections imposed by macOS and EazyDraw. In this case we will be holding firm the connection to your physical output so that the final printing will be the right size and have the best appearance. More on this as you work your way through the next few sections. But if you find yourself requiring a custom paper size, slow down, back up, and think about the requirements.

Pages

Your active drawing area will have a defined physical size. It is made up of 1 or more pages, each of which has a defined physical size. All pages of an EazyDraw drawing must have the same size, width and height. The individual pages are arranged in a rectangular fashion, with a defined number of pages across and down. The number across and down may be different. There is no artificial limit on the size of the drawing, in other words no limit on the number of pages across and down.

Unlike a bitmap format, a large physical size drawing does not require a large file storage size. It is only the content of the drawing that requires storage. So a 100 page by 100 page drawing is no greater storage size than a 1 page by 1 page drawing . . . if the drawings have the same content. Of course, a 100 page by 100 page drawing with content on each page will require lots of memory to save the file on your hard drive.

Just because there is no limit on a drawing's size does not mean that a large project should be built in a single drawing. It is best to provide project organization using the Finder and the file system. Use several individual smaller drawings and organize them in folders on your desktop.

If a project will involve more than one physical paper size, use one drawing file/window for each of these. For example, if you are doing stationary and will have a

standard letter, envelope, and a business card - go with the macOS/EazyDraw flow and do the project with three files rather than contort three paper sizes in one EazyDraw drawing.

EazyDraw has no limit on the number of windows that may be open at one time.

Drawing Setup Sequence

When starting a drawing it is wise to first select your printer, then your paper size, and finally the number of pages across and down. You should do this before a great deal of time is invested in your drawing. You do not want to work for days on a drawing and then try your first "printing" after it is all done.

It is also strongly advised to begin a drawing project with a test print. A large rectangle will test that everything will fit on the paper. A small bit of text will insure that the font and font size chosen will look good and have the right orientation on the paper. And a few color swatches will assure that all settings are correct for representing your colors - they will likely look different on the paper than on your screen. After testing, save the drawing and all these important settings will be safely stored with your drawing content. Then you will not have any unpleasant surprises when you are ready to print out the final result.

Page Setup

The Page Setup palette is accessed from the File main menu, near the bottom. It provides an interface to define the size of one page of your drawing. The two primary selections found on this palette are the Printer and Paper.

Printer

The process of setting up the page setting for your drawing begins with the printer. The printers shown in the Printer popup are derived from macOS, and are not under the control of EazyDraw.

Printers are added using the Print and Fax option found on the System Preferences panel, or other utilities provided as part of macOS or supplied with your printer. These may change from release to release of macOS. The Print and Fax application is accessed from the main system preference panel via your Apple menu (the left most menu). The Printer Setup Utility is found in the Utilities folder of the Applications main folder.

If there is no printer available, a generic selection will show on the menu. With this selection you can still prepare a drawing and define a drawing size. If at all possible you should install your printer driver and select the printer before investing a great deal of time in your drawing.

Electronic Publish

You may need a different page size that perhaps is not related to an actual printer or physical paper size. Perhaps you need a 460 x 60 point drawing size for a banner ad. There are two selections for virtual electronic publishing printers, Web Graphics and Buttons and Icons. When you select one of these printers there are a group of standard sizes available on the Paper size popup menu. You may also choose a custom size for your paper, then the size specifier text boxes will be enabled at the bottom of the panel.

Paper Size

The Paper Name popup menu is used to select a paper size by name. The selections provided are physically linked to an actual printer by the operating system. You first select a printer and then the paper. Your
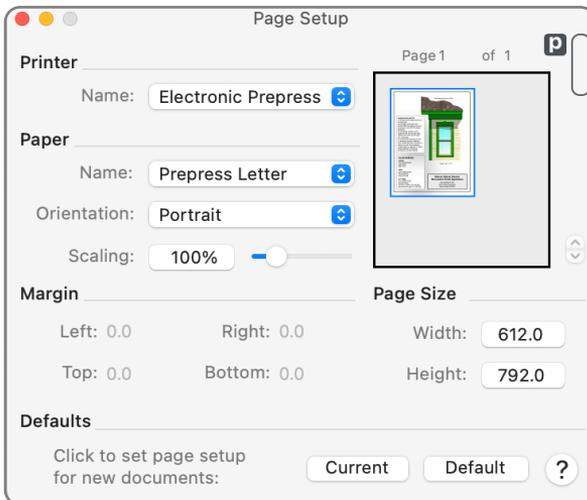
selection with this popup menu will determine the actual page size available for margin and content of the drawing.

The paper sizes shown in this menu are derived from the printer and printer driver software. EazyDraw does not add or control these selections. If a needed size is missing, don't immediately resort to a custom paper size. Instead revisit your printer installation and try to determine why the paper you need is not present. There is usually a true physical reason when you cannot find a certain size paper.

Also make sure you actually have the paper that you will be using for the final printing of your drawing. You may do a perfect layout on legal size paper, everything will look good on the screen, the printer may support legal size, but if you don't have any legal size paper your print out will be chopped and you won't see the full drawing on normal letter paper.

Scaling

The scaling specified on this panel is used to expand or shrink the apparent size of the physical piece of paper. These scalings can be difficult to follow. The preview box on the upper right of the Page Setup palette provides a useful visualization of these interactions.

If you are preparing a technical drawing and need to draw to a specific scale, for example 1 inch corresponds to 4 feet, do not use this scaling parameter (on Page Setup) to achieve your drawing scale. Use the Scale palette accessed from the Format main menu to set your drawing's scale. Since you are creating your drawing, you should not normally need to use this scaling parameter. You can zoom in or out on your drawing window, and you may scale any content inserted into your drawing. So the need to scale the output is not normally needed. Applying a scaling here does add complexity to your work flow and should therefore be avoided unless actually needed.

If you have a full complex drawing ready to print, and find that it doesn't fit on the paper available; then this scaling parameter is available to expand or shrink the virtual paper size of your drawing. The preview box will show how the graphics will appear on a given page of your drawing. You can use the small stepper found at the lower right corner of the preview box to step to other pages of a multiple page drawing.

Margins

Use these text boxes to specify the size of the margins of each page of the drawing. The Page Size values, shown to the right, reflect the available

drawing size of each page as determined by the paper selection. The page dimensions shown are those available after margins are subtracted.

The page size dimensions are those of the page derived by subtracting the appropriate margin values from the physical size of the paper and applying the Scaling selection. The reddish background provides a visual clue that these dimensions are derived and may not be entered directly.

The dimensions shown are specified in the Fine Scale Units for the palette. The palette measurement units are indicated by the small gray units button found at the upper right hand corner of the palette. Available units are inches (i), points (p), and millimeters (m). Click the small units button to change palette units. Control click the units button for a popup menu and other options, such as decimal point precision. A full explanation of these settings and controls is provided with the documentation of the master Fine Scale palette.

Page Layout

The Page Layout palette is accessed from the File main menu, near the bottom. It provides an interface to define the overall drawing size. A drawing is built with a defined number of pages across and down. The two text boxes provided are used to specify these defining values.

You have control over the printing order and page numbering. The checkbox at the top right determines if pages are counted across then down or down then across. This parameter normally works as expected, but if a printer driver is not fully macOS compliant, the printer driver may not respect your setting in EazyDraw, testing may be required to fully understand how page numbering is handled with your printer.
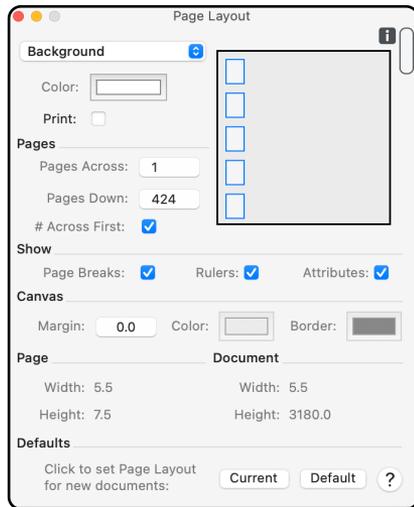
Drawing Background

Normally, on Mac computers the drawing background is transparent and shown white on the display screen. You have control over this background color with the checkbox and color well provided on the top right of this palette. Click the color well and use the macOS color picker to select any color that you would like to have for the drawing window background. If the print box is checked this color will be applied as a background color upon printing, if not checked the printing of your graphics will be over a transparent backdrop.

Drawing Size

These values are shown with a faint red background because they are derived values you cannot enter a value to set the page for drawing size. Page size is set on the Page Setup palette, see above, and the drawing size is determined by the number of pages across and down.

Zoom & Drawing Size On Screen

Your drawing has a physical size as defined by the page size and page layout and perhaps the scaling of your print out. The drawing and drawing window combine to provide you with a view of the drawing or a portion of the drawing. The size of your drawing and its content on the screen is roughly defined by a very dynamic value, the zoom. This concept is borrowed from the camera viewer concept of zooming in on a portion of a scene, or zooming out to provide a broader view of a scene.

Note that EazyDraw does not maintain a real physical definition of a size or dimension as seen on the screen. This is true even if your zoom value is 100 percent. The size of elements on the display depends on the physical properties of the display and your resolution settings in the system preferences. So don't place a ruler on your screen to check that a 2 inch line is actually 2 inches long, it really has no meaning and you'll just scratch your screen.

Conversely, the zoom of a drawing on a screen does not affect the actual size or presentation of the drawing when printed. Printing size is completely independent from your screen view of the drawing.

Zoom with "i" and "o"

EazyDraw provides keyboard shortcuts for the "Zoom In" and "Zoom Out" functions. Type the letter "i" to zoom in. Type the letter "o" (the letter, not

zero) to zoom out. Caps or small letter, it doesn't matter. This is convenient because it does not involve the mouse, which is usually being used for drawing and selection actions. The keyboard zoom action is centered on the cursor location, if the cursor is on the document. If the cursor is off the document the zoom is centered on the center of the drawing window.

To zoom in on a particular feature of your drawing, float the cursor over the point of interest and hit the "i" key. You need not click the graphic, the current state of selections has no affect.

Zoom Tool Palette

EazyDraw provides a tool palette with a full selection of zoom tools. This palette is accessed from the View main menu, about 1/3 of the way down. It provides tools for managing the zoom view of a drawing. The number at the bottom indicates the current zoom factor. You can type in a new number to change the zoom.

If an inspector (Graphic Details or Layers) is visible on the left side of the drawing, the zoom amount is displayed lower left of the drawing along with a popup menu for access to many of the zoom actions.

The Z100 button (lower right) will return the drawing to the nominal natural size.

The top right zoom button will zoom the drawing, focused on the current selected graphics. The zoom is adjusted to show the selected graphics fully filling the active drawing area.

The bottom left button will zoom to show the full drawing in your drawing window's active area. The top left button provides a click and drag mechanism. Click the button and then click and drag on your drawing. The area selected by your dragging action is then zoomed to the size of your drawing window and centered on the active drawing area.

Zoom Calibrate computes a zoom factor that will present elements on screen at their natural size. This computation depends on specifications for the actual display (screen) in use.

Zoom Interactive (bottom right) provides interactive zoom, click down on the drawing the drag up to zoom in or down to zoom out.
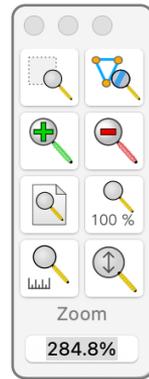
Zoom With Number Keys

Typing a number, no command modifier key, will adjust the zoom of the drawing. The number 1 will zoom to 100%, 2 to 200%, and so on up to 600%. This is a handy way to quickly get back to zoom 100, just type the number 1.

Zoom Window Menu

The drawing window has a small zoom indicator and menu. This is found at the lower left corner of the drawing. This is present at the lower left corner of the drawing when Graphic Details or Layers are in use on the left side of the drawing.

The menu may be used to change the zoom amount. It has selections for several standard zoom amounts. At the top there are selections to zoom out to the whole drawing, zoom in to the current selection, or begin an interactive zoom by dragging out a rectangle.

NOTE: this is only present when Graphic Details or Layers are showing on the left side of the drawing.
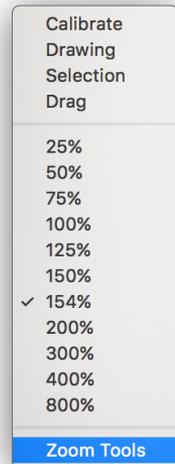
Toolbar

Each drawing window has a customizable toolbar that may be shown at the top of the drawing window. The toolbar may be configured with large or small icons, and tool names may be used if desired.

The toolbar is designed to be customized - by even the most novice of users. There are over 250 tools to choose from. The order and whether or not to include a tool is determined by simple arrangements made with the Customize Panel. The Customize menu command is found on the View main menu, at the bottom.

All drawing windows are presented with the same toolbar arrangement. Any customization will be applied to all drawings. The toolbar may be shown or hidden individually for a drawing window. You may save toolbar configurations in formatted text files, this lets you quickly switch tool setups for different activities. Support for this feature, including a recent toolbars convenience menu, are found on the View main menu about half way down.

A Contextual menu is provided for managing the toolbar appearance. Control click on the toolbar to access this menu.

Each drawing window is provided with a small oval button on the right hand side of the top title bar. Click this button to "show" or "hide" the toolbar. Toolbar Show or Hide is also provided on the main menu system at the bottom of the View main menu.

You may customize the Toolbar by selecting the Customize Toolbar menu item from the View Menu found on the Main Menu.

To use a tool on the Toolbar just click it. Most tools are also present in other locations in the user interface, either on a tool or inspector palette.

If the tool is a menu tool there is a small disclosure triangle present on the lower right area of the icon. If one of these tools is clicked - just a simple quick click - the action shown by the tool icon is executed. To access the full tool menu, click down and hold for a brief second or two, the pop-down menu will open for selection of an item on the menu.

If the window is too narrow to display all the chosen tools, an extended popup menu is provided as the rightmost tool. Use this menu to access the tools that don't fit on the window.

Customize Toolbar

There are over 250 tools available for the user configurable toolbar. The customize toolbar panel is provided to arrange and select which of these are included on the drawing toolbar.

The Toolbar is customized by dragging selections from the Toolbar palette and placing them on the Toolbar at the desired location. To remove an item click and drag it off the document Toolbar, it will go away. To move an item just click and drag to the desired location.

You may return to a default Toolbar by dragging the sample Toolbar from the customize Toolbar palette to the document window's Toolbar.

The popup menu near the bottom of the Toolbar palette allows the selection of the display format of the Toolbar. The selections possible are icons, names or icons and names.

There are icons for Separator, Space, and Flexible Space which may be used to format the layout of the Toolbar. They can help make the Toolbar visually appealing and more functional by grouping buttons according to use.

It is possible to have duplicates of tools on the toolbar. This is not meaningful for all tools, but for several tools such the color picker or drawing tools this is very useful.

The use of duplicate tools introduces a dynamic aspect to your toolbar. Use different instances for different individual shape selections and the toolbar will evolve with the work flow, presenting your most frequent actions for single click access. As you become more familiar with powerful feature, a custom toolbar can be designed to reduce the number of floating palettes on the screen workspace. The use of small icons, without tool names, will provide room for 20 - 40 tools on the toolbar, depending on screen size.

Color Picker

Toolbar tools for color picking of Fill Color, Stroke Color and Text Color are available on the toolbar customization panel. These can provide an alternative to the system color picker for managing fill and stroke colors in a convenient one or two click fashion.

A color picker tool is a "smart" tool, it will remember the last color chosen. This most recent color is shown in the color swatch on the tool icon. The shown color may be applied with a simple click of the tool.

There are separate toolbar color picker tools for picking Fill color, Stroke (or line) color, and Text color. The desired form of the tool must be overtly added to the toolbar with the toolbar customization panel.

This method of color selection is limited to a very few of all possible colors. These are provided on the color samples array. The Color and Style palette used in conjunction with the macOS color picker is used to access the full range of colors available for your drawing. The Color and Style palette is accessed from the Tools main menu, near the top.

The color picker tool is NOT an inspector of colors. Selecting a graphic will not cause the active color of the tool to change. The active color will change only by holding the click on the tool until the pop-down color selection menu is presented, then selecting a new color.

To apply the current active color for the tool to a graphic(s), select the graphic and perform a simple - quick - click of the tool. The color of the graphic will change. The active color is shown on the tool icon.

The current active color is changed by clicking and holding down on the color picker tool. A palette of a colors is presented as a pop-down menu. Move the cursor over the desired color, click and the active color will change. This active color is shown in the large color swatch at the bottom

of the pull down view. Repeated clicks are allowed, to select and view the larger swatch.

When a color selection action is complete, slide the mouse off the pull down view and it will close, or click on the lower color swatch, a double click will also close the menu.

It is possible to have duplicates of color picker tools on the toolbar. This can be useful to provide quick access to a few colors. Add the desired number of color pickers to the toolbar using the customization panel. Then use each picker pop-down menu to select a different color. Then proceed with drawing activity, each color is conveniently available with a single click of the appropriate individual color picker tool.

The colors shown on the pop-down menu are derived from a macOS color list. These are found in the Colors folder in the user home Library folder. Any color list may be used as the set of colors provided by the toolbar color pickers.

The color list used is determined by the selection of "Toolbar Colors" on the main EazyDraw preferences panel. The default list is named "EazyDraw" which provides a sequence of 256 colors varied by Hue, Saturation, and brightness.

Gradient Fill

A Gradient Fill tool is available on the toolbar customization panel. This tool can provide an alternative to the Gradient Fill palette for specifying gradient fill and gradient colors in a convenient one or two click fashion.

The Gradient picker tool is a "smart" tool, it will remember the last gradient fill and color pair selected. This most recent Gradient Fill is shown on the tool icon. The active tool gradient may be applied with a simple click of the tool. The Gradient Fill picker
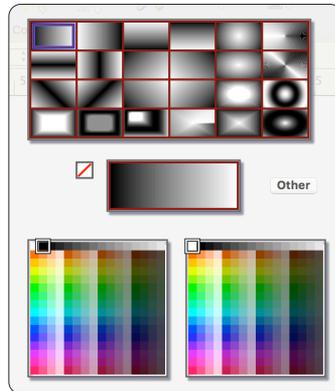
tool is NOT an inspector of gradients. Selecting a graphic will not cause the active gradient of the tool to change. The active gradient for a tool will change only by explicit user actions with the pop-down menu.

This method of gradient selection is limited to the very few of all possible two color gradients and colors, as provided on the pop-down menu. The Gradient Fill palette is used to access the full range of gradients, colors, and geometries available for your drawing.

To apply the current gradient fill for the tool to a graphic(s), select the graphic(s) and perform a simple - quick - click of the tool. The fill of the graphic will change to the active tool gradient. The active gradient is shown on the tool icon.

The current active gradient is changed by clicking and holding down on the gradient picker tool. A palette of a gradients and two palettes of colors are presented as a pop-down menu. Move the cursor over the desired gradient, click and the active gradient will change.

Clicking on one of the two color arrays will change the start and end colors of the gradient. The resulting active gradient is shown in the large gradient swatch at the center of the menu.

When a gradient selection is complete, slide the cursor off the menu and it will close, or click on the gradient swatch, a double click will also close the menu.

The gradients shown are derived from a special hidden resource file that is contained in the EazyDraw application package. Access this file by "Show Contents" of the EazyDraw application. A file called "ToolbarGradients.ezdata" is found in the package resources folder. The master gradients for the pop-down menu are derived from the gradients present in this file.

The colors provided on the two color arrays are the same as those used for the toolbar color picker. The color list used is determined by the selection of "Toolbar Colors" on the main EazyDraw preferences panel. It is a standard macOS color list, found normally in the Colors folder of the main user library folder.

It is possible to have multiple gradient picker tools on the toolbar. The advantages and use of duplicate tools was described above in the Color Picker section.

Pattern

A Pattern tool is available on the toolbar customization panel. This tool can provide an alternative to the full Pattern palette for specifying pattern fill in a convenient one or two click fashion.

The Pattern picker tool is a "smart" tool, it will remember the last pattern selected. This most recent Pattern is shown on the tool icon. The active tool pattern may be applied with a simple click of the tool. The master patterns are in black and white. The black and white pixels of the pattern may be assigned to any color available in the color picker array. Two arrays of colors are provided for this selection.
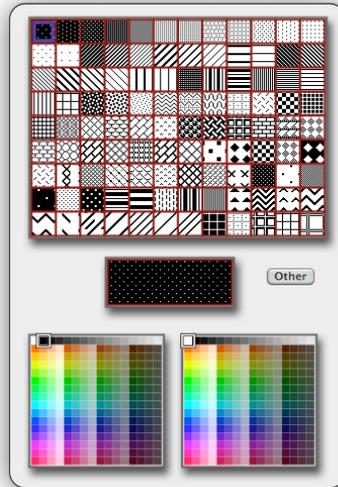
The Pattern Fill picker tool is NOT an inspector of patterns. Selecting a graphic will not cause the active pattern of the tool to change. The active pattern for a tool will change only by explicit user actions with the pop-down menu.

This method of pattern selection is limited to the very few of all possible patterns, as provided on the pop-down menu. The Pattern palette used in conjunction with images or the macOS color picker is used to access the full range of patterns available for your drawing.

To apply the current pattern fill for the tool to a graphic(s), select the graphic(s) and perform a simple - quick - click of the tool. The fill of the graphic will change to the active tool pattern. The active pattern is shown on the tool icon.

The current active pattern is changed by clicking and holding down on the pattern picker tool. A palette of a patterns and two palettes of colors are presented as a pop-down menu. Move the cursor over the desired pattern, click and the active pattern will change.

Clicking on one of the two color arrays will change the black or white colors of the pattern. The resulting active pattern is shown in the large pattern swatch at the center of the menu.

When a pattern selection is complete, slide the mouse off the menu and it will close, or click on the pattern swatch, a double click will also close the menu.

The Patterns shown on the pop-down menu are derived from a standard macOS color list. This color list is found in the Colors folder of the user home Library. The name of the color list is "Toolbar.ezdraw" and this name remains fixed.

Patterns may be edited, added, or removed from the color list "Toolbar.ezdraw" with the EazyDraw Pattern Palette. While easy to do, this is probably not something a new or novice user should attempt. The factory default patterns may be restored by removing the color list file from the Colors folder and restarting EazyDraw.

The colors provided on the two color arrays are the same as those used for the toolbar color picker. The color list used is determined by the selection of "Toolbar Colors" on the main EazyDraw preferences panel. It is a standard macOS color list, found normally in the Colors folder of the main user library folder.

It is possible to have multiple pattern tools on the toolbar. This can be useful to provide quick access to a few different patterns. Add the desired number of pattern tools to the toolbar using the customization panel. Then use each picker pop-down menu to select a different pattern or color pair. Then proceed with drawing activity, each pattern is conveniently available with a single click of the appropriate version of the duplicate color picker tools.

Texture

A Texture tool is available on the toolbar customization panel. This tool can provide an alternative to the full Pattern palette for specifying expansive colorful patterns. These "textures" are actually normal EazyDraw patterns.

The Texture picker tool is a "smart" tool, it will remember the last texture selected. This most recent Texture is shown on the tool icon. The Texture picker tool is NOT an inspector of patterns. Selecting a graphic will not cause the active texture of the tool to change. The active texture for a tool will change only by explicit user actions with the pop-down menu.

This method of Texture selection is limited to the very few of all possible textures, as provided on the pop-down menu. The Pattern palette is used in conjunction with TIFF images to incorporate any image as a texture for graphics.

To apply the current Texture for the tool to a graphic(s), select the graphic(s) and perform a simple - quick - click of the tool. The fill of the graphic will change to the active tool texture. The active texture is shown on the tool icon.

The current active texture is changed by clicking and holding down on the texture picker tool. A palette of a textures is presented as a pop-down menu. Move the cursor over the desired texture, click and the active texture will change.

When a texture selection is complete, slide the mouse off the menu and it will close, or click on the pattern swatch, a double click will also close the menu.

The Textures shown on the pop-down menu are derived from a standard macOS color list. This color list is found in the Colors folder of the user home Library. The name of the color list is "ToolbarTextures.ezdraw" and this name remains fixed.

Textures may be edited, added, or removed from the color list "ToolbarTextures.ezdraw" with the EazyDraw Pattern Palette. While easy to do, this is probably not something a new or novice user should attempt. The factory texture patterns may be restored by removing the color list file from the Colors folder and restarting EazyDraw.

Attributes Mini Toolbars

Each drawing window has a context sensitive mini toolbar available at the top of the drawing. This is positioned above the horizontal ruler (if shown) and below the main window toolbar (if in use).

This toolbar is actually a family of toolbars, it changes when graphics are selected or deselected on the drawing. The set of tools provided are chosen to be relevant to the graphics selected, or not selected, on your drawing.

The tools shown are not the primary user interface points for their functionality. They are very small and not as descriptive as their corresponding primary user interface elements. Think of them as visual short-cuts or convenience elements.
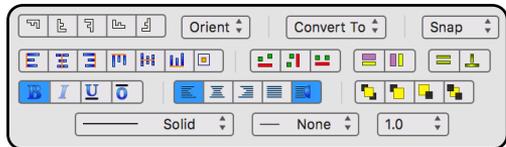
This toolbar may be shown or hidden. The primary choice is specified on the Page Layout palette. You may also turn the Attributes toolbar on or off with the item found near the bottom of the View main menu. The "preference" for showing the Attributes toolbar is controlled by the Page Layout selection.

Contextual Toolbars

The Attributes toolbar will change when a graphic is selected or de-selected. It is contextual. The tools provided are chosen to be the most relevant and frequently used for the type and number of graphics selected.

When no graphics are selected the toolbar shows elements pertinent to the drawing, such as grid status and grid snapping state. To access this toolbar, perform a de-select-all (apple-cmd-shift-A). Tools are provided to show or hide rulers, manage grid display, a set of tools to control graphic snapping, and access to the drawing scale and units.

If text is selected the toolbar shows tools relevant to typeface, typesetting, and paragraph alignment. Text tools are provided to select font and typeface, paragraph alignment, subscript and superscript selection, and kerning (character spacing).

A vector graphic selection provides the attributes for interaction with line style, interaction level, painting order, a conversion convenience menu, buttons to access the rounding-shaping actions, a set of flip transform tools and a menu to access the grid snap point for the graphic.

When multiple graphics are selected you will find tools relevant to alignment, spatial distribution and grouping actions.

The individual tools will enable and disable as appropriate. The disabled state is shown in a lighter gray. In most cases, the contextual aspect of this toolbar means that tools are enabled, tools and interface elements that would be disabled are generally simply not present in the toolbar.

The toolbar is useful to provide feedback as to the state of the drawing or selected graphics. For example the snapping state of a drawing does not normally have a visual clue (off, on, vertices, or grid), but the attributes toolbar provides a place to display this state as a visual clue.

Missing Components: There are some elements that one might think are missing from these toolbars. For example fill, stroke, and text color, or gradient fill. The overall user interface design has provided these commonly needed tools on the main toolbar. They are provided on the main toolbar as smart tools which is a more advanced capability the requires a bit larger size than is available on this mini-toolbar. The Main Toolbar is fully customizable so you will want to configure the main toolbar to compliment the tools provided in the Attributes toolbar. When used together a great deal of convenient functionality is provided in an efficient fashion.

Drawing Rulers

You may add rulers to the drawing window. They indicate the coordinates of the drawing as they appear on the printed page or display window. The rulers also contain tick indicators that mark the vertices of all selected graphics.

The stepper control in the upper left corner of the ruler is used to change the intervals of the intermediate tick marks. This makes it easy to click and view the tick format until the best one is found. These formats may also be selected by name on a popup menu on the Ruler Style panel.

Use the "Show Rulers" command near the bottom of the Tools Menu to turn rulers on or off. The units used on the rulers are selected on the Scale parameter panel.

If "Multiple Scales" are in use for the drawing (using the Independent Layers check box on the Scale parameter panel) the ruler shown for the drawing reflects the scale of the Active Layer, which is defined using the Layers drawer.

The origin, the point on the drawing (paper) where both axes are zero, is defined on the Scale parameter panel. The origin may be moved just by clicking and dragging a ruler (Horizontal or Vertical). This will move the origin, the ruler and all graphics on the drawing. Moving the origin doesn't move graphics, their coordinates hold constant. It does change where the graphics are drawn on the page or pages of a drawing.

Tick marks are shown with the same Fill Color as the graphic. You cannot move a graphic or resize a graphic by moving the tick mark. It may appear that the graphic is being moved, but actually all graphics are moving with the ruler and origin.

Ruler Font, Font Size, and Style

The font family (size, style, ...) may be accessed and changed by double clicking the first (left most) label on the X axis. The double click will select the text of the left most ruler label. Then you may open the main Font Panel, Text main menu at the top. With this ruler text selected, changes on the font panel will apply to the style of the ruler.

Tick Mark Intervals

There is a stepper control in the upper left corner where the rulers meet. Use this stepper to select the interval for the tick marks. The stepper sequences through the various tick interval options, like quarters, tenths, or fifths. Sequence through to find the sequence that best suits your needs.

Ruler Style

The appearance including, size, color, background, and several other characteristics of the rulers may be changed using the Ruler Style parameter panel. This panel is opened from the Tools main menu, the selection is near the
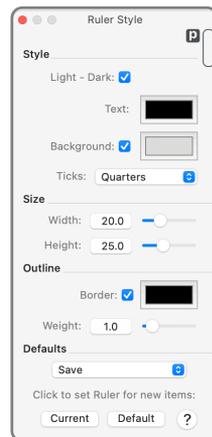
bottom. The background color and text color of rulers may be selected with these parameters.

In order to see the changes made to the rulers they need to be shown in the top window of EazyDraw. Showing rulers is a drawing specific selection, some drawings may have rulers showing and others may not. Changes to these parameters will change to the top window only. The Background check box, determines if a background is drawn for the rulers. If the check box is checked the color selected with the color well will be the background color for the rulers. If not checked the rulers will have the same color as the document background which is selected on the Page Layout Panel.

The color of the ruler text, background, and border are selected with the three color wells provided. Click on a color well to bring up your macOS system color picker and select a color for the noted attribute.

The intervals of major and minor tick marks is selected with the "Ticks" popup menu. These may also be changed using the stepper control found in the upper left corner of the drawing window when rulers are shown.

Graphic Details

Graphic Details presents definitive numeric information for any graphic on a drawing. Use the top menu command on the Tools menu to open the Graphic Details Drawer. Or the "Details" toolbar button may be used to open or close this drawer.

The information drawer appears to the side of the drawing window, outside the active drawing area along the right or left edge of the drawing.

EazyDraw tries to make an intelligent decision about which side to use. You may control the side used with menu commands provided on the View main menu. There is a Drawers submenu near the bottom of the View main menu. Use the selections there to set a specific side for either this Graphic Details drawer or the Layers Drawer.

The defining information for a graphic is viewed by selecting the graphic, the details drawer will change to present information tailored for the kind of graphic selected. The information may be viewed while moving or resizing a graphic. The graphic may be altered by entering new digital data. All parameters pertinent to the drawing of a graphic may be accessed using this information drawer.

Each Drawing window has its own Graphic Details drawer. When a graphic is selected, this drawer displays all defining information for the graphic element - the same numerical values that are used by EazyDraw to construct the graphic element. There are no hidden variables, the numeric information provided on the Graphic Details drawer is complete, all metrics that EazyDraw uses to define a graphic are available for user inspection and input.

The numeric values used on the Graphic Details drawer are fully scaled and defined in the units of the drawing. This means that you enter values naturally, no need to perform "off sheet" multiplications or additions. Any changes of units, scale, or drawing origin are reflected immediately in the numeric values displayed.

The drawer's area is shown with a light cream gray background to distinguish its function from the active drawing area. The background color may be changed as a preference setting. Use the user interface theme button found on the main EazyDraw preferences palette to make a different selection.
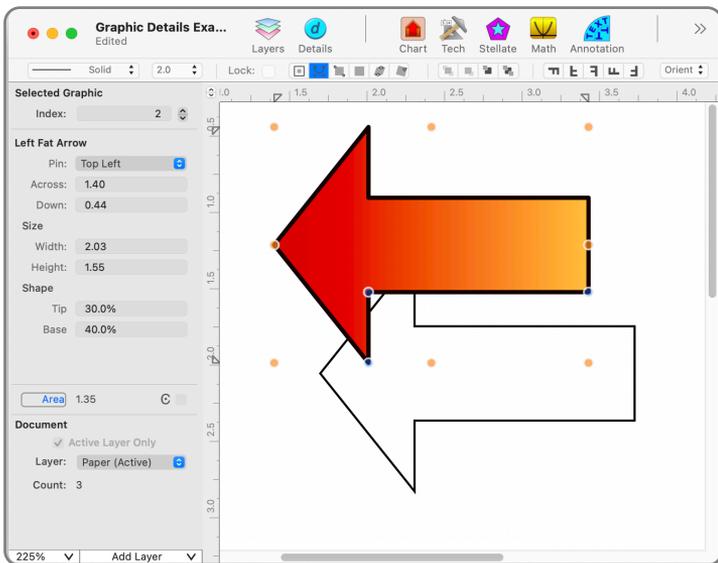
Decimal Precision

The graphic details drawer is used to display and accept numerical data. You have a great deal of control over the format of the numbers. The precision, the use of decimals or fractions, and the inclusion and format of units are all configurable. These selections are made on the graphic details drawer. They are available when there are no graphics selected.

One might ask why a preference setting such as these settings are not found on the main preferences panel. The reason they are not is that they apply individually to a drawing. Think of the situation as a house design - the floor plan will have settings for fractions, feet, etc. At the same time the application to the zoning commission is open on the desk top, this is primarily a text document and the settings for these values will be quite different. Again one sees the advantage of a graphic details drawer closely associated with an individual drawing.
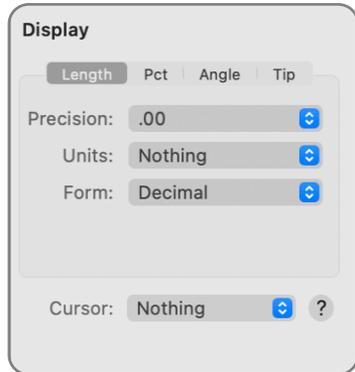
The settings made here also determine the format for the live cursor when the Tape Measure tool is used. This applies for all display values including lengths, positions, and angles.

Keep in mind that the values shown and entered in the graphic details drawer are relative to the scaling of the drawing and defined in the units of the drawing. The scale and units selections are made on the Scale parameter palette accessed from the Format main menu.

Settings for decimal precision only apply to the presentation of the values, not how they are defined. Internally values are represented as 32 bit floating point numbers. 64 bit internal values are planned for future versions of EazyDraw as macOS transitions to 64 bit technology.

Value Tabs: There are four tabs of information concerning the display of numeric information used to define the geometry of an individual graphic.

When the Graphic Details drawer is open and there is no selected graphic the Graphic Details drawer will show the parameters available to define the formats used to present different forms of numerical information.

The display parameters apply to the display of information for the associated drawing. They are drawing specific - other drawings may have different settings. These display settings are saved with the drawing.

Sample Field: Above the value tabs there is a sample field. This numeric text field shows how a typical value is presented with the current settings. The actual value shown here is a random typical number chosen by EazyDraw. You may enter any value, without fear of changing something on the drawing, to test the appearance and presentation of a specific numeric value.

The slider above the sample field is used to adjust the width that is used to display values. Wider field width will be required if more expressive settings are used that might include units and fractions or higher precision.

Lengths Display Format: The Lengths tab provides settings to control of the format of numeric information provided on the Graphic Details drawer for lengths and positions.

This input selection is accessed by opening the Graphic Details drawer, top item on the main Tools menu, and de-selecting all graphics (Cmd-Shift-A). With the drawer open and no graphics selected, the Lengths tab is clicked to present these parameters.

The precision value defines the number of decimal digits shown, after the decimal point. If fractions are in use, decimal precision is used to define the precision of fractional intervals. For example, a precision of 2 rounds to the nearest 1/4 while a precision of 4 rounds to the nearest 1/16th.

The Units popup specifies the format of the suffix of a length value. You may choose None, Units, Abbreviation, or Punctuation. Punctuation applies only to feet and inches.

The Form popup specifies how numbers should be displayed, Decimal, Fraction, Feet/Inches or Alternate. Alternate provides for decimal representation showing the primary units as specified on the Scale palette for the whole drawing and the metric/inches value in parenthesis.

The Form popup has a submenu at the bottom which is used to specify the form for the area measurements found at the bottom of the Graphic Details drawer. When one graphic is selected, and that graphic has a defined area, this area is reported in the Area text field below all other reported details for the graphic. This area value is not editable, it only reports the value. The precision and units settings follow those defined for lengths on the Graphic Details drawer.

The Width numeric text field defines the width provided for the numeric text fields used to display lengths on the Graphic Details drawer. Interactive control for this parameter is provided directly above the Length tab view, adjust the slider to provided the desired space to display and input length values with the chosen format. This value is always shown and entered in Points, there are precisely 72 points to an inch.

Percentages: Measurements are sometimes unit-less ratios, such as the scaling of a photograph. The "Pct" tab provides inspection and input of these values as percentages or ratios on the Graphic Details drawer.

These values may be displayed and entered as either ratios or percentages. The parameter settings on this tab view apply only to these parameters, the format used for lengths measured in defined units are controlled described just above.

The parameter's precision, units and form apply just as explained for the lengths tab. The percentages tab has a menu entitled Basis. The Basis menu specifies the choice for displaying as percents or ratios. Percents are calculated by multiplying a ratio by 100.

Notice that the Basis setting will have a significant impact on values entered. For example, if percent is the defined basis a value of 100 would return a photo to the actual size. If ratio is the defined basis this same entry of 100 would make the photo very large.

Angles: The Angles tab provides full control of the format of numeric information provided for angles on the Graphic Details drawer. The primary choice is the use of degrees or radians for angle values. Other selections allow user definition of the direction for zero degrees and the direction of positive rotation.
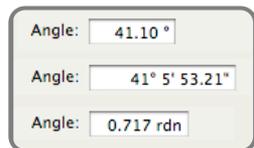
The Units menu specifies the format of the suffix of an angle value. You may choose None, Units, Abbreviation, or Punctuation. Punctuation implies the use of the small superscript circle as the degrees indicator. If minutes and seconds of arc are selected the single quote and double quote characters are designate minutes and seconds respectively.
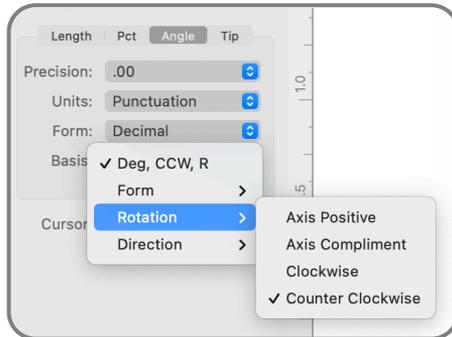
The Form menu specifies how numbers should be displayed, Decimal, Fraction, Degrees-Minutes-Seconds or Alternate. Alternate provides for display as both degrees and radians, the alternate value shown in parenthesis after the selected form.

The Basis menu is used to select three settings needed to define how angles are measured on the drawing. The menu value displayed shows the settings as selected in a short-hand format. When the menu is clicked and popped up fully explicit selections are presented.

The Basis-Form selection is used to define Degrees or Radians as measuring method. If Degrees is the chosen measurement form, a full circle of arc is defined as 360 Degrees. If Radians is the chosen measurement form, a full circle of arc is defines as $2 * \pi$ Radians (about 6.28 Radians).

The Basis-Rotation selection is used to select the orientation of a positive angle. The primary selection is Clockwise or Counter-Clockwise. The other two choices are Axis-Positive and Axis-Compliment. These last two selections respect the defined orientation of the two Cartesian axes of the drawing, as defined on the scale palette.

The Basis-Direction selection is used to select the direction from which angles are measured. The choices are Right, Down, Left, or Up. This defines the direction of the zero or 360 degree angle.

Tips: The Tips tab provides control of the format of the "Help Tip" that is associated with numeric values found on the Graphic Details drawer. Help Tips are a familiar feature on macOS. They are small, usually light yellow, pop-up floating notes that appear if the cursor pauses over a user interface element. They usually have a helpful tip or hint relating to the associated item.

The "Help Tips" associated with numeric values on the Graphic Details drawer are available for user definition. In this context the tip can provide additional information for the value shown, perhaps a higher precision value or an alternate choice of units such as metric measurements to compliment a drawing's primary English measurement value.

The best method to select these settings is to use the example entry field found just above this tab view. Pause the cursor over this field and wait for the Help Tip to appear. This will show the actual Help Tip for the example value, as formatted with current selections on the other tabs. These interactions may quickly become confusing, so this test/example method is probably the easiest way to finalize selections for the tip's parameters.

Units and Scale: Notice that the values here are in the units of the full drawing, as set on the Scale palette. In contrast, parameter palettes use Fine Scale units that are likely different from those of the drawing. For example, you may have a drawing that is using feet, so a rectangle is defined as so many feet wide and high on the Graphic Details drawer while Points are used for line width units on the Color and Style palette.

You may use basic mathematical expressions with numeric input on the graphic details drawer. You are able to add to or subtract from base values or scale with a multiplier while specifying position and lengths numerically. Fractions are allowed as input, even if decimal display is in use. Feet and inches are allowed as input when the drawing scale is using feet, inches, or yards units. Feet and inches are indicated on input by the "punctuation" indicators (' and ").

When you interactively edit a graphic, the numeric values shown on the Graphic Details drawer are updated in real time. This is a great way to view your drawing and the precise metrics of a graphic as it is changing. The values shown for each different graphic form are largely self-explanatory. We will not provide detailed definitions for each parameter of each graphic in this manual. However, text information is so frequently used and valuable that we will provide the detailed documentation for text later in this chapter. The live EazyDraw help documentation does provide detailed documentation on the numerous forms of the Graphic Details information. Refer to that documentation if more information is needed.

Graphic Index

At the top of the Graphic Details drawer you will see a numeric field labeled Index. Each graphic of a drawing is identified by a unique index. These indices always start at zero and progress sequentially. If a graphic is added or deleted the indices are adjusted, they always number from zero to N - 1, where N is the total number of graphics. There are no missing numbers. Graphic with index 1 is the second graphic in sequence.

A graphic's index is more precisely termed its painting order index. Graphics are painted on the drawing beginning with index 0, progressing through each graphic according to its painting order index. This means that for two overlapping graphics the one with the larger index is painted over a graphic with a smaller index.

The index rule just described is modified if a drawing has more than one layer. In the case of multiple layers, the painting index is assigned on a per-layer basis. Each layer has graphics with painting indices starting at 0 and progressing through the total number of graphics on that layer.

The index of a selected graphic, its index on a particular layer, is shown. A particular graphic may be selected by entering its layer index in the numeric text box provided at the top of the graphic details drawer. The stepper control is used to step sequentially through all graphics on the active layer.

The graphic stepper is a good way to find problem graphics that sometimes get buried or lost on a drawing. This can happen if a graphic is inadvertently placed far off the active drawing area, or perhaps hidden behind a larger opaque graphic. Or a graphic's size could inadvertently be made very small so it's not easily seen on the screen. In all of these cases the problem graphic can be located by stepping through the graphics of a drawing and noting the type, size, and location details as shown in this inspecting drawer.

If an errant graphic is located, perhaps it is far off the active drawing area, you may return it to your viewing area by changing its X and Y (across and down) location values. For example, enter 0,0 for its Cartesian coordinates and the scroll to the top left of your drawing and you will be able to see and work with the graphic.

Group Index

Graphics in groups also have indices. They are indexed in a nesting manner. The Group graphic has a defined index, then each graphic of the group is indexed starting at 0. This nesting allows a unique point in the total painting order to be assigned each graphic on a drawing. The index of each graphic of a group is shown in the Graphic Details drawer's group specific information view.

Layer Information

At the bottom of the Graphic Details drawer you will see information concerning the layer that contains a selected graphic. The popup menu will show the name of the layer of a selected graphic.

The Active Layer checkbox is used to expand or limit the scope of the Index stepper found at the top of the Graphic Details drawer. If checked, only the graphics on the Active layer are sequenced by the Graphic Index stepper. If not checked the stepper control at the top of the drawer will sequence through all graphics that are enabled for selection, passing across the graphics of each layer in sequence. Note, this is all graphics enabled for selection, not all visible graphics. See documentation on layers, later in this chapter, for more on this distinction.

The count at the bottom of the drawer shows the total number of graphics available for selection. This is the number of graphics on the Active layer if the Active layer checkbox is checked, or the total of all graphics on all Layers available for selection if the Active layer checkbox is not checked.

The Layer popup can be used to move a graphic from one layer to another. The popup is enabled if multiple layers present. If enabled, a change of selection layer via this popup will move the graphic to the newly specified layer. Note that if the destination layer is not visible, the graphic will disappear.

Graphic Details Text

There are four tab views with information concerning text graphics. Each tab view provides access to different aspects of the text. When a text box is selected this view of the graphic details drawer becomes active. It is also live and active when editing the text content of a Text Box graphic. In this case the selected text range is inspected and reflected in the information. When not in the editing mode the full text content is reflected in the information shown.

Text Size Details

The four numeric input's at the top of this tab's view provide access to the size and position of the text graphic. The values are entered in the Units of the drawing. A value is changed by selecting the number and typing in a new value.

The Across and Down stretch values apply scaling to the text graphic along the axis indicated. The values are entered as percentages with 100% indicating normal unmodified scaling, or no stretch. The stretch extent may be entered here numerically, or with the sliders provided. On-screen blue handles are provided in the lower right corner of the on-screen text box for interactive stretching of the text, with the resulting numeric values shown here. Expand is similar to across stretch, except the scaling is applied on a character by character basis. A value of 0 indicates no expansion, a positive number indicates stretching to a larger width, and a negative number implies compression of the width of each character.
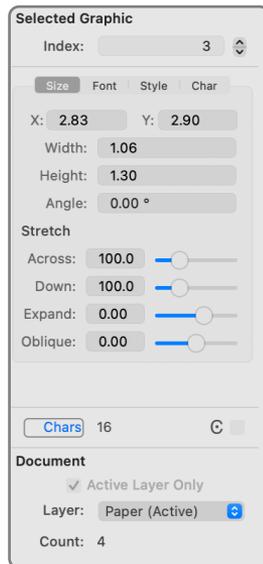
Oblique applies a tilt to each character, similar to Italics but adjustable and the characters may tilt forward or backward. A negative value will tilt the characters to the left at the top, and positive to the right. Enter a numeric value or use the slider. If a value larger than the range of the slider is needed - use numeric entry.

Oblique may be applied to any text. The characteristic can be used to achieve an italic appearance with a font family that does not have an italic typeface.

These X (across), Y (down), width and height values are shown in the Units (cm, inches, points, ...) defined for the document on the Scale parameter panel. Each coordinate is the distance from the origin which is defined on the Scale panel and may be adjusted by dragging a Ruler.

Text Font Details

The Font tab view provides access to the detailed information concerning the font family and typeface of a text graphic.

The total number of characters in the text graphic are shown in the gray text box - upper right. This detail view will indicate the extent of a "Range" of a text style. A range is a string of characters that have the same font and font characteristics. The total number of ranges are indicated by the blue number in parentheses. The starting character and ending character of the range are shown in the two numeric displays below the range heading. The stepper will advance to the next (previous) range.

The Font characteristics apply to the range indicated. The inspecting range is also indicated by a light gray box highlight visible directly on text on the drawing.

When editing text, if a range is selected, the range indicator and stepper will apply only to the selected text. To work with all the text of a graphic, simply select the graphic (one click) and do not edit the text.

Padding is a bounding margin that the typesetter applies around the area where text is allowed. In most cases this padding is desirable for pleasing appearance. In the case of very small font size (1 or 2 Points for example) the default value of 5 Points will be too large and a smaller value is used.
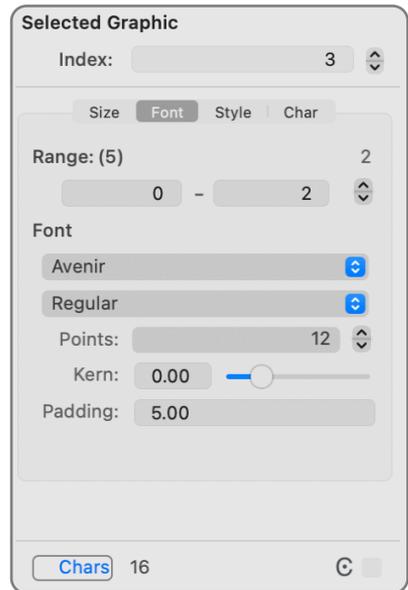
Padding is a Paragraph Form property and is also found on the Paragraph palette.

The Font popup menu indicates the font family of the inspecting range of text. The menu may be used to change the font family. The top entries (above the dotted line) indicate the font families used in the inspecting text graphic (other ranges).

The next menu is a convenience menu providing access to some of the more commonly used typeface selections. A more exhaustive list of selections is available from the Text main menu.

The Points menu indicates the point size for the inspecting Range. The menu and stepper may be used to change the point size.

The Kern numeric entry will indicate the precise kerning value for the inspecting range. Kerning is a term indicating how much the following character is shifted from the normal spacing used with a particular character. As demonstrated with the following text: a larger Kern value will space out the characters, a smaller value will tighten and close the space between characters.

Close inspection of the Range indicators can be useful in understanding the exact contents of a string of text. Sometimes a copy / paste operation will insert unexpected font traits that might appear as minor printing nuances. It can be difficult to locate these situations. By selecting the text and noticing the number of ranges, the position and characteristics of the unexpected content can be found and corrected.

The top items on this font menu are the font families actually used in the inspecting text graphic. If a "favorites" or "recently used" font selection is needed use the convenience popup menu found near the bottom of the main System Font Palette.

Text Style Details

This tab view may be used to apply special styling effects to text. Most of these parameters are also available on the Text Menu or the System Font Palette.

The details shown will apply to a selected range of editing text. If a text graphic is simply selected but not in the editing mode, the inspecting details and changes will apply to all the text of the text graphic.

Bitmap Drop Shadow Outline

The top group of parameters may be used to stylize text. Normal text is shown as black - filled - paths. With these parameters it is possible to Stylize the text; change the color or use an outline or stroke and fill appearance. The popup menu is used to choose the stylize format for the text. The left color well determines the fill color (or simply the color) of the text. The right color well controls the stroke or outline color of the text.

The Stroke numeric entry determines the weight of the outline for Outline and Stroke styled text, larger numbers (4-5) indicating a heavier weight.

The underline popup menu provides several options for underlining text. The color of the underlining is defined using the color well to the right of the menu.

The Shadow parameters provide the ability to apply a drop shadow to text. Click the check box to apply a shadow to the inspecting text. The color of the shadow is chosen with the color well. The position of the shadow is defined relative to the characters by the Angle control and Offset numeric value. The shadow may be *softened* by applying a blur with the numeric inputs provided. The offset and blur values are defined in Points, rather than drawing units.

There are actually two types of drop shadows available for use with text. The one controlled here can be thought of as a bit map drop shadow. The other, a vector shadow, is accessed from the Shadow Palette found on the Tools main menu. The bit map shadow provides better softening characteristics and is drawn much faster. The vector drop shadow offers affine transform effects and will scale in accordance with the zoom of an on screen view. The bit map shadow does not scale as you zoom in or out on screen, that is why it is more efficiently drawn (faster), and does not support the skew and stretch effects of the affine transform.

To view the bit map text drop shadow, as it will be printed, you need to set the view's Zoom to 100 percent.
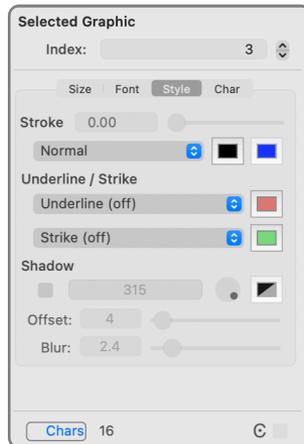
Text Character Details

This view may be used to investigate the characteristics of individual characters of a text graphic.

Each character is identified by count starting with 1 indicating the first character of the full text graphic. The stepper may be used to move to the next (previous) character. The selected character is indicated with a gray highlight and underline directly on the text on the drawing.

The details shown will apply to a selected range of editing text or the full text range of a selected text graphic. If the text graphic is in the editing mode (indicated by a brownish gray background highlight) and a range of text is selected, the index stepper will only access or move along the selected characters. Each character of text is represented by a "code" number. The macOS operating system uses Unicode to assign numbers to corresponding characters. Unicode is an international, system independent (Apple, IBM, HP, Microsoft, etc.), standard that provides a unique number for every character; no matter what system, language, or application program.

The unicode number for the inspecting character is shown in the text box just above the popup menus. You may change the character by entering a unicode hexadecimal number in the text box.

The three popup menus show the unicode and character representation, (provided by the font family) of the inspecting character. The three menus are provided just to make the access to the large numbers of characters more manageable. The base menu will show the basic alphanumeric characters, the Ext menu the extended set of characters which might be symbols or Greek characters, and the Ctrl menu has the non-printing characters like carriage return or beep.
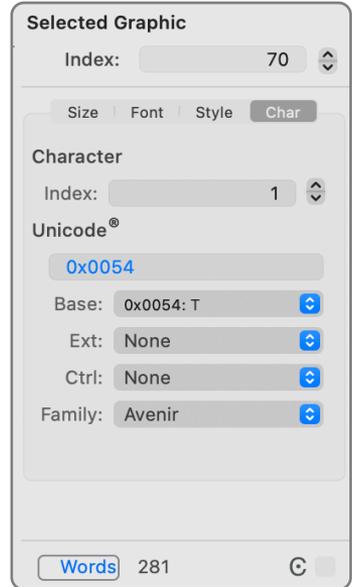
The three popup menus may be used to find and enter any character available with the font for the inspecting character.

The font family popup menu is provided as a convenience menu, it indicates the font family of the inspecting character. This menu may be used to change the font family. It is an abbreviated menu showing only the most recent fonts that have been used on the drawing.

As you might expect, it takes a bit of cpu time to sort out the details provided on this view. It is not a problem while inspecting a particular character. However if you move on and are entering text (i.e. typing away), and this view is active (-- visible) you may notice a degradation in system performance. This happens as the CPU tries to keep up with your typing and investigate the details of each character as it is entered. In this case either close the Graphic Details drawer or select a different text tab view (Size is the best) to prevent the unnecessary load on your CPU.

This character view is good way to enter symbol or extended characters that may not be accessible from the keyboard. The popup menus will allow you to choose from all the characters available for the active font.

If you plan to copy/paste or export text back to a Classic Carbon application (like MS Word, or Powerpoint), keep in mind that these older applications do not support Unicode. This means that if you use characters from the extended character sets, they may not paste into the Carbon application. EazyDraw does reverse map some of the common keyboard accessible characters for Symbol, and Dingbat fonts. However you should test the desired characters before using them extensively.

Layers

Drawings may be organized with layers. Each graphic is drawn on and resides on one layer of the drawing. Even if layers are not used in a drawing, all items are drawn on the default layer which is named "Paper." Layers apply an added hierarchy level to the Drawing Order. All graphics on each layer are drawn according to their drawing order. The layers are drawn according to their drawing order which is defined by their position on the layers table, shown in the layers drawer.

The information is shown on the left or right using menu item found at the top of the Format menu on the Main menu. This allows multiple drawings to present their layer information for examination or modification. This also allows an entire layer of graphics to be copied to another drawing with a mouse drag and drop operation.
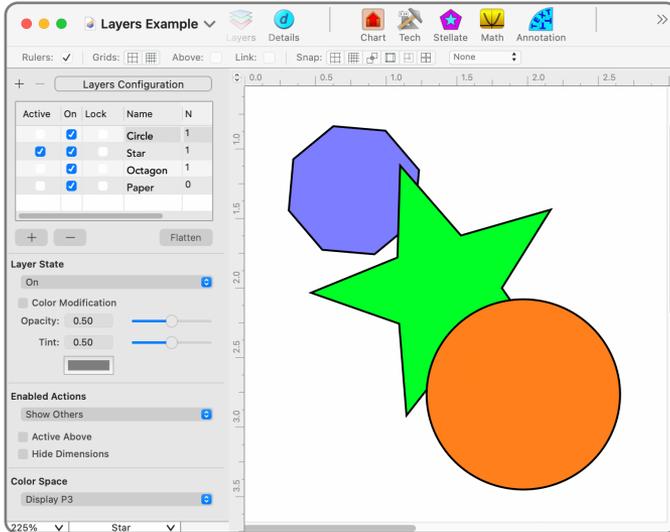
There are several ways to use layers to organize drawings. One use is for drawing projects that have a natural layering to the information. An example of this use would be a floor plan of a house, the layers would be basement, first floor, upstairs and attic. Graphics could be drawn on the applicable layers, one could view them as overlays or individually. Layers can also provide organization as "File-Like" containers. In this case the drawing order aspects may not be important, but grouping related drawing projects in one file (or document) may be more convenient than using several files to hold the information. An example might be a project to draw a tool palette of icons, each icon could be on different layer, all stored in one file.

Secondary layers may be used for construction marks, notes, template graphics or styles. These are conveniently available but can be turned off to publish the final work.

Drawings with several overlapping graphics may present problems for selecting individual graphics. Perhaps there is a background scene or color that is frequently unintentionally selected while working on the foreground details. Moving the background scene to a different layer can prevent those elements from getting in the way of your work process.

The word of caution is, if you don't really have a need for layers, don't add the complexity. If it is not clear how to apply layers to your project-don't apply them at all. They are useful but this utility comes with a price. There will be extra mouse clicks to access target graphics. And they offer one more thing to go wrong, it is easy to be drawing away only to find that you're on the wrong layer.

Layers Table

Each drawing may contain multiple layers that contain the graphic items on the drawing. The Layer Table is used to create and manipulate these layers. The layers have a drawing order that is defined by their position in the table. Layers at the bottom of the table are drawn first, those at the top are drawn last. This means that objects on the bottom layers will be eclipsed (obscured) by overlapping objects on the layers at the top of the table.

EazyDraw uses a "Painter's" algorithm when drawing graphics. Each individual graphic of a drawing is drawn in its entirety, one after another. Each graphic is drawn without regard for other graphics. If graphics do not overlap this drawing method is of no consequence. If graphics do overlap, the ones drawn first will be eclipsed by the ones drawn later. This drawing order applies to all graphics on a layer, then to each layer in sequence as defined on the layer table.

The Layer Table is shown by opening the Layers Drawer for a drawing window. This is accessed from the "Layers" menu item found on the Format menu on the Main menu. Each EazyDraw drawing window has its own Layers Drawer and unique set of layers.

New layers are created by clicking the Plus button or selecting the first (top-most) empty row of the drawing table and typing in a unique (to the drawing) name for the new layer. If multiple layers need to be created just type return and continue typing in the name for the next layer. Layers may be deleted by selecting the layer and typing the "Delete" key or clicking the minus button found just below the layers table. A confirmation sheet is presented to confirm the deletion because all graphics on the layer will be deleted. Double click a layer name to change or edit the name of the layer.

Layers may be moved in the drawing order by a single click and drag on a layers name. Move the layer to the top of the list to place the layer's graphics toward the "Front" of the drawing order.

A layer, and all of its graphics, may be moved to another drawing by click and drag with the mouse. Click on the layer's name and drag the layer off the drawer. The cursor will show the layer's name and a plus will appear

when over another EazyDraw drawing window. When the mouse is released, the layer, and all its graphics, are added to the new drawing. The new layer is added to the "Back" of the drawing, first in the drawing order. If the receiving drawing has its layers drawer open the layer may be dragged to a specific location on the layer table. When dropping on another table you need to drop the layer either on the top empty table entry, or somewhere in the existing layers order. Dropping on the open blank area doesn't work, you must drop on the topmost empty table entry or between two existing layers.

The state of each layer is shown on the Layers Table. The possible values for the state are "On," "Off," and "Active." The layer state and the Visibility selection determine which graphics are visible and which are available for selection. The state of the layer may be changed by clicking the appropriate checkbox. The state may also be changed by selecting the layer and using the popup menu found at the bottom of the drawer under the Visibility selection.

The Cut, Copy, and Paste menu selections (and short cuts) work with layers. When the drawer is open and a layer is selected a Copy operation will copy the entire layer. A paste to a layer drawer on the same drawing or another drawing will add the layer to the drawing.

All of these actions may be applied to multiple layer selection. This includes drag and drop as well as Cut-Copy-Paste. Cut-Copy-Paste or drag and drop works across drawings, open the layers drawer on each drawing and move entire layers among your the open drawings.

Only one layer may be active for a drawing. Drawing actions are made on the active layer. The Active layer is the layer with the Active checkbox in the first column of the layer table. A layer is made active by checking its checkbox or selecting it on the table then changing its state with the popup menu below the table in the Visibility section.

There is an important distinction. Selecting a layer on the Layers Table selects that layer but does not make it the "Active" layer. Only the state Active checkbox controls the active layer. For example, a given layer can be active and the target of drawing operations; a different layer can be selected on the layers drawer and is then the focus a color modification change or a copy and paste action from the layers drawer.

Layers Visibility

The visibility state of each layer depends on the state of the layer (ACTIVE, ON or Off) and the Enabled Actions for the drawing. The names for the visibility states are self-explanatory if one understands that "others" applies to all layers that are ON or ACTIVE and that "all" applies to all layers even if they are OFF. The term Above means that a layer is nearer the top of the Layers Table list and that in turn implies that the graphics on a layer nearer the top of the table are drawn over those of layers below or nearer the bottom of the list of layers.

The Hide Dimensions check box is used to turn off the drawing of all Dimensions for a given layer. When checked all Dimensions for the layer are not shown on the screen or printed page. In all other respects the Dimensions remain present in the drawing, they may be selected and deleted, so care must be taken when this hiding is in use.

The Advance Duplicate sheet, found on the Edit Menu, allows graphics to be copied to across layers. This action will copy a selected graphic(s) to all other layers, all other On layers, or to a specific layer.

Layers may be Cloaked from inclusion as snap guides or vertices. Cloaking is a menu action accessed from the Format main menu. Cloak states and settings are not present in the Layers drawer.

Lock (Layer)

The Lock column has a check box that will lock the contents of a layer. The lock applies to move, delete. Check this check box to prevent changes to the associated layer.

Color Modification

Each layer may have an overriding color modification applied to all graphics on the layer. Opacity may be used to fade out a layer. Tint can be used with or without opacity. For example, a Gray tint could be used to "gray-out" a layer.

This can be a handy feature when working with layers. In some cases you may want to gray out other layers to provide a ready visual clue to each object's host layer.

Check the Color Modification check box to apply color modification to the selected layers. Then the Opacity and/or Tint selections will apply.

The color modification applies to the selected layer or layers found on the Layers Table. Note the color modification does not apply to the Active Layer, unless that happens to be the selection on the Layer Table. The selection(s) are highlighted. You can change the Color Modification for any layer, regardless of its state.

The Color Modification check box controls application of the specified color modification to the selected layers. When checked the Tint and Opacity are applied to each graphic on the layer. Tint is applied first then opacity. So a Blue graphic with Gray Tint and 25% opacity with become a faint blue-gray transparent color.

Tint is specified by a color and degree. The color is chosen with the Color Well located in the Color Modification portion of the Layer Drawer. The degree is set with the Numeric Text box or the slider. A degree of 0.0 will not modify the color, a degree of 50% will blend the graphic color and the tint color equally, and a value of 1.0 will draw the layers graphics using the tint color with no regard to the graphic's color settings.

Opacity is set by the Numeric Text box or the slider. A value of 1.0 indicates fully opaque color and 0.0 a completely transparent color.

Please note that Layer Color Modification is not the method to use when creating a graphic with transparency. Transparency is applied to a graphic by using a color with opacity as provided on the Color Picker palette. Any color used to render a graphic has an individual transparency value.

Color Modification may impact performance or responsiveness of editing of graphics. This will apply to all graphics in a region of the drawing, not just those with color modification. This will be especially true when color modification is applied to complex objects with elements like Text Annotation (contoured), shadows, blends, or combinations of these effects. If Color Modification is not checked-there is no performance impact.

If you require a layer to become fully transparent - turn it off with the Layer State selection. This approach will actually improve responsiveness. Don't use Color Modification and 0 % Opacity as this will use valuable CPU capacity every time something is changed on the drawing.

Color Space

Color Space defines how a color is specified. The new macOS supports several methods (or Color Spaces) for specification of colors. The macOS system color

picker provides a component slider view that allows color specification for a specific Color Space.

> *Computer monitors emit color as red, green, and blue light. For computer monitor drawing, a color is specified by summing of these 3 components.*

> *Inked paper absorbs light, leaving the remaining components reflected to generate a color. Cyan, magenta, yellow, and black (K) pigments serve as the absorbing filters of the printed page. Each subtracts varying degrees of red, green and blue from white light to produce a gamut of spectral colors.*

CMYK color mapping is commonly required when submitting a drawing electronically for printed press use. RGB is required for Web graphics.

Each of these color generating techniques will generate millions of shades and hues of colors - but not all possible colors. Contrary to intuition, the possible colors generated by additive (RGB) and subtractive (CMYK) techniques are not the same. The differences between colors generated by the two techniques are subtle but conversion from RGB to CMYK will produce quite noticeable color shifts on the viewed artwork.

To check the color space(s) used on a layer, select the layer. The color space popup is changed to reflect the current color space or spaces used on the layer. If all graphics on the layer do not use the same color space, the "various" selection will be shown on the popup menu.

NOTE: This popup menu reflects the status of the layer or layers selected (highlighted) in the Layer List. It does not reflect the current status of a printed drawing which includes all visible layers. This is a bit confusing, but when considered carefully you will understand that this provides the best inspection logic for indicating and managing the status of a drawing.

Changing a layer to a specific color space does not define the color space used for new elements added to the layer. Further drawing will likely cause different color spaces to be used and the "various" state to return. For example text drawn in black will likely use Gray-Scale as the color model.

It is possible to determine the "Color Space" for a specific color from the associated inspecting color well. Pause the cursor over a color well and a tool-tip display will indicate the exact details of the color on your drawing. This tip will indicate CMYK, or RGB and the specific component values.

Chapter

7

Measurements

Scale and Units Introduction

Each drawing has a defined drawing Scale. By Scale we mean that a drawing length is used to represent a different real length. For example, in a landscaping drawing, a line 1 inch long might represent 3 feet of length; a map maker might use an inch to represent a mile; or a watchmaker's drawing might use a length of 1 cm to represent a tenth of a millimeter. All of these situations are handled with EazyDraw's scale and units capability.

Each drawing has defined measurement Units. The Units define the measuring system (e.g. English or Metric) and the basic or unit length (e.g. inches or feet / centimeters or meters) in that measuring system. Examples of Units are: inches, centimeters, feet, miles, or microns. The Units are completely independent of the drawing's scale. For example, a drawing without scale (1 to 1 scale) will still have a defined measuring system and units of measurement.

A drawing typically has only one Scale. However, it is possible to use more than one scale in a single drawing file. EazyDraw provides a way to use a different drawing scale for each Layer of a drawing. So, more precisely, each Layer of a drawing has one defined Scale.

Each drawing has only one defined measuring Unit. All objects, measurements and rulers on the drawing are reported in the single defined measuring system and Units. It is easy to change the drawing units of an existing drawing. This can allow one to, for example, create a drawing in Metric and then switch the units to English to check approximate sizes, then switch back to Metric for final print out. By comparison, it is not always easy to change the scale of an existing drawing. As with the scale, units may be defined on a per layer basis if necessary.

A drawing has a defined natural scale, for example, a drawing of a house will contain graphics such as walls and rooms and doors; they will all have dimensions of several feet or perhaps at least few inches. However, the pen width used to draw these graphics needs finer measuring units and should be reported without scale with values such as 1 mm or .04 inches. EazyDraw provides for this situation by allowing all inspection palettes to work without scale and to use defined units different from those of the main drawing. We call these palette settings the Fine Scale, to differentiate from the main drawing Scale.

Drawing Scale and Units define display and entry of lengths in the Graphic Details drawer, the values reported by the main rulers for the drawing, and the Tape Measure cursor tool. They also impact the values reported by automatic Dimensions placed on the drawing and attached to graphics.

By Dimension we mean an actual call-out graphic that reports lengths on a drawing. More about these later. The Dimension inspection palette provides ways to independently choose display units and their format for an individual Dimension graphic. For example, an architectural drawing with base units of feet may still have a dimension for a wall thickness reported as inches. In contrast an individual Dimension must use the common drawing scale for the drawing or the layer containing the target graphic.

Cautionary Note

The scale of a drawing can be a confusing concept. If it is possible try to use a scale of 1:1. Before the use of computers scaling a drawing was more likely to be needed, for example, to show details of a small object. However, if your drawing will be read by others on a computer display they may use Zoom to view the details as close as desired. In this case it doesn't matter that the whole drawing spans 2 cm, just zoom in, all the detail is there.

Page Layout defines the size of the drawing. This provides the "room to work" by defining how many pages of paper make up the drawing. The size of a page of paper is defined by the Page Setup parameters. These parameters interact with your choice of scale to determine the size of the drawing on paper. This additional flexibility may allow a scale of 1:1 to be used in a wider range of circumstances. For example a drawing of a bread box could still be done at a scale of 1:1. Computer screen users of the drawing would zoom out to view the whole bread box. In Page Setup this drawing could be printed with a scale of 50% in Landscape mode and the bread box would fit on an 8" x 11" page of paper.

Scale Palette

The drawing's Scale and Units settings are defined on the Scale Palette which is accessed from the Format main menu,

The values reported and entered on the Scale palette apply to the front most EazyDraw drawing window. If no drawing window is open, the values reflect the current defaults for a new drawing. This rule applies even if the front window is miniaturized and shown in the system dock.

Each document may be drawn to a selected scale. This scale defines the size of objects as they are drawn on paper. The scale is specified as a pair of dimensionless numbers in the form "Np to Nr." A scale of "1 to 1" implies no scaling; graphics are drawn and printed their true size. A scale of "1 to 12" means that a graphic 1 foot across would appear 1 inch across on paper. The two numbers may be thought of as "Number-(on paper) to Number-(real world object)."

The final size of objects on a printed page depends additionally on the "Scale" defined on the Page Setup parameter panel. The scale parameter defined by the drawing scale on the Scale palette defines the drawn size of objects but not the size of the drawing. The scale parameter on the Page Setup panel defines the size of a page of paper and hence the size of the drawing which indirectly impacts the size graphics when drawn on the paper.

The scale parameter applies to a drawing (document). Several drawings may be shown on the desktop with different scales. The scale shown on the panel applies to the drawing presented in EazyDraw's top window.

The pair of scaling numbers shown near the top of the palette define the drawing scale. The scale may be changed by changing either number with a new entry in the appropriate numeric text box. The scale is defined by a ratio, so either number may be changed to define a particular scale. Since it is a ratio, measurement units do not apply and the same measuring unit should be used for both numbers. As an example let us examine a commonly used architectural scale that has a common usage English name written as 1/4" and read as "quarter scale." This name means one inch on paper represents 4 feet at the project site. To get our two scale values to have the same units multiply the 4 feet times 12 inches to attain a scale value pair of 1 to 48.

The target drawing's scale is changed upon entry of a new number followed by the Enter key, typing the Enter key is required.

The popup menu is provided as a convenience. It provides several standard scales that are useful for specific kinds of drawings, such as English or metric architectural. A selection made from the popup menu will cause the pair of scaling numbers to be set appropriately.

If a newly entered scale corresponds to a standard scale found on the popup menu, the popup menu will be updated with the correct selection when the scale is changed.

Any scale desired may be use with EazyDraw. Type in the desired scaling pair to define a non-standard scaling. In this case, the popup menu will simply show "other" as the selection.

The scale may be changed at any time. Upon scale change, you are provided with a decision panel. You may instruct that graphics be re-sized to maintain their natural (real world) size at the new scale, or to simply change the scale which will result in a change of the represented real world size of your graphics. The decision panel is verbose, read it closely for a clear understanding of the choices. This decision panel is not often encountered so it always retains the large detailed wording.

Scaling Graphics will normally apply when a project out-grows the paper size in use. Then the same size paper is required to represent a larger size physical project.

Scale Design

The scale popup menu has a selection to access a work sheet which is useful when trying to determine the correct scale for drawing and project. The work sheet shows clearly the size of paper that is needed to draw a project of a given size.

The scale popup menu of common scales is found top left corner of the work sheet. When a selection is made here nothing changes on the drawing. This allows one to try different scales to see how the project will fit on different print out paper sizes.

While you are working on the Scale Design work sheet, Page Setup accessable. This makes it easy to experiment with different paper sizes and margins while designing the scale.

Notice the work sheet has all project lengths on the right side and printing / display lengths on the left. All entries, not highlighted in red, may be changed freely without an affect on the actual drawing or printer settings. Think of this sheet as a sandbox where you may play with relevant setting without messing up your drawing.

The work sheet is designed to be self-documenting. Most of the parameters interact strongly; this is the nature of this activity. The process is to make a selection or tentative change and see the corresponding changes to other related values.
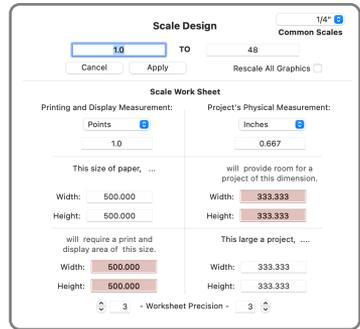
From Known Length

From-Known-Length is a convenient method to calibrate a project based on an imported existing drawing or photo. For example, when importing a screenshot from a web-based map utility. Easily calibrate the EazyDraw project to match physical dimensions. All that is needed is one known length on the imported graphic.

Draw a line on the drawing to the front of the imported image. Adjust the line to match the known length physical element. Select Known Length on the Scale popup menu. Enter the known physical length and click Set. EazyDraw computes and sets the drawing scale - you are ready to go.
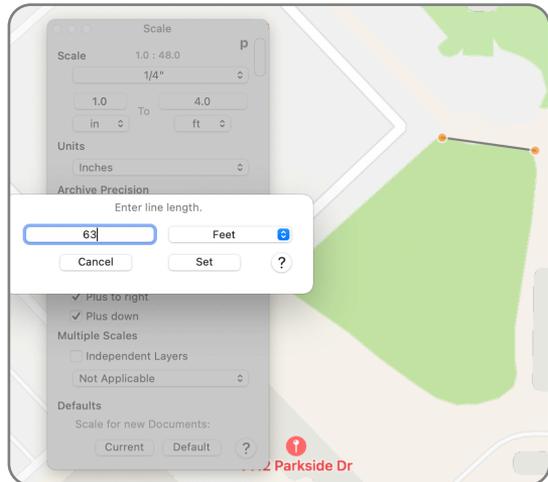
Scaling Instructions

When a scale change is requested, there are two possible intentions: simply change the scale of the drawing or change the scale of the drawing and apply the new scale to all graphics. The scale work sheet has a check box to manage this choice; if the work sheet is not used a large explicit pull down panel is presented on the target drawing (in case multiple drawings are open) with the choices clearly explained. This large sheet can be a bit annoying but scale changes should be a rare activity and the actual meaning of a small cryptic pair of selections would be problematic in this situation.

If you simply change scale of the drawing, graphics will remain the same size as drawn on the screen (or paper) and their corresponding represented size (as reported in the Graphic Details drawer) will change.

Change Scale Only will normally apply when importing elements such as an aerial photo or a scaled drawing from a web site or an imported drawing with a defined scale.

Units	Inches
Feet	1 : 12
Inches	1 : 1
Yards	1 : 36
Rods	1 : 198
Miles	1 : 63360
Kilometers	1 : 39371.48
Meters	1 : 39.37148
Centimeters	2.54 : 1
Millimeters	25.4 : 1
Microns	25400 : 1
Nanometers	25400000 : 1
Mills	1000 : 1
Points	72 : 1
Picas	6 : 1
Kyus	101.6 : 1

| Units	Centimeters
Feet	1 : 30.48
Inches	1 : 2.54
Yards	1 : 36
Rods	1 : 502.92
Miles	1 : 160938
Kilometers	1 : 1000
Meters	1 : 100
Centimeters	1 : 1
Millimeters	10 : 1
Microns	10000 : 1
Nanometers	10000000 : 1
Mills	394 : 1
Points	28.3 : 1
Picas	2.4 : 1
Kyus	40 : 1

Drawing Units

Each document has a common set of "Units" used for all digital representations of size and location of graphic elements. The units do not impact the size of objects as they are drawn on paper. The units only apply to numeric reporting of information and numeric entry of drawing data.

The Units parameter applies to a drawing or more precisely to a layer if independent layer scales are in use. Several drawings may be shown on the desk top with different units. The units parameter shown on the panel applies to the drawing shown in EazyDraw's top window.

The tables on the previous page define the conversion factors for the Units supported by EazyDraw. The first table defines the conversions for the English measuring system, the second for Metric. Units are defined by the popup menu found below the Scale settings. The popup menu shows the current units of the top EazyDraw window on the desk top. The units may be changed by making a new selection with the menu.

The units may be changed at any time. The choice of units does not affect the size of a graphic. If a 1 inch square is drawn and the units are changed to millimeters, the square will remain the same size in all respects but its reported size in the Item Details drawer will become 25.4.

When working with the scale parameters it may be useful to show Rulers on the drawing. The rulers are drawn in accordance with the specified scale and units. They can provide valuable feedback concerning a drawing's size and the results of scale changes. In the example above, after the units change the square remains the same size and nothing on the drawing will change. But the Ruler will change to reflect the new dimension of 25.4.
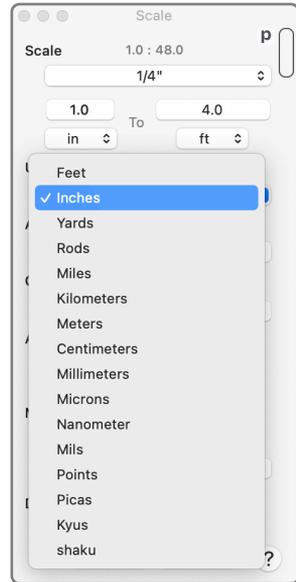
Drawing Reference Origin

Each document has a defined origin. The numeric position of all items on the drawing are measured relative to this origin. You may set the origin using the

numeric text boxes on the Scale palette. Or the origin may be moved by dragging a Ruler with the mouse. In this case the applicable origin parameter is updated to reflect the change.

The origin defined here will be the starting point (or origin) of Grids. The Grids will move with any change of the origin.

The origin for a drawing is defined by the horizontal "X" distance from the left of the drawing and the vertical distance "Y" from the top of the drawing. The origin is moved by changing either number with a new entry in the appropriate numeric text box on the Scale palette. The distances are measured "Plus to Right" and "Plus Down," this definition of direction convention is fixed by design, a change in an axis direction will not change the measurement to the axis origin.

The distances are measured in the Fine Scale units of the Scale palette, inches, millimeters or points. These lengths are not scaled; think of them as a measurement on the paper, not at the project site.

The origin may be changed at any time. If the origin is moved by a click and drag of a ruler, all graphics will move with axis. Hold down the command (Apple) key then click and drag a ruler to change the origin and leave the graphics stationery on the paper, as in the "change scale only" choice discussed above.

Axis Direction

The direction of each axis is selected using the two checkboxes found on the Scale palette. The directions may be plus to right or plus to left and plus down or plus up. Up/down and left/right directions are independent.

Multiple Scales

It is possible to use different scales on a single drawing. A unique scale may be applied to each individual layer of a drawing. This technique might be used to draw a detailed - close up - view of a portion of a drawing, or to provide a appropriate scales for an elevation and plan view. The drawing must have more than one layer before these controls are enabled on the Scale palette. Check the "Independent Layers" checkbox to enable multiple scales for a drawing.

When the Independent Layers checkbox is checked, the popup menu found in the Multiple Scales section of the Scale palette will list the available layers for the drawing. The selected layer indicates the focus or target layer for the parameters shown on the scale palette. This also indicates which layer will receive changes for a scale parameter.

If different scales have been used for different layers in a drawing, and the Independent Layers check box is "unchecked;" all layers will be changed to the scale of the current active layer.

When graphics are copied and pasted between layers or documents of different scales, the "real" size is maintained. In this case the graphics are redrawn at a size that corresponds to the scale of the destination drawing layer. This can lead to strange results if the scales of two drawings are vastly different, for example, if a scaled map drawing has a rectangle one mile across and this rectangle is copied to a drawing with a 1 to 1 scale, the rectangle will be very, very large indeed.

If a full layer is copied and pasted or moved to a different drawing by a drag and drop action, and the destination drawing has independent scales allowed, the scale of the layer remains the same as in the source drawing. If independent scales are not allowed, all graphics on the layer are scaled and redrawn at the scale defined for the destination drawing, holding each graphic's physically represented size constant.

The target layer for inspecting or changing scales is selected with the popup menu on the Scale palette. This selection does not need to be the Active layer, or even a visible layer. Therefore care is advised, changes may not be directly visible on the drawing. If rulers are shown, and changes are made to the scale of a layer other than the Active layer, the change will not be reflected in the rulers for the drawing. In order to reduce the chances for confusion, if the Active Layer is changed by using the popup menu on the Layers Drawer, the target layer on the scale panel is changed to the new Active Layer.

If independent scales are in use, and rulers are shown, the rulers reflect the scale of the Active Layer. They do not necessarily reflect the scale of the layer chosen on the Scale palette.

Keep in mind too that the scale of the Active layer may not be the scale reflected on the Scale palette. The scale values shown on the palette are defined by the Multiple Scales popup menu.

Archive Precision

This setting controls the number of decimal points used when your drawing is saved to a disk file. More decimal points will provide better accuracy, but the file size will be larger. File size is not that important in most situations therefor 12 decimal precision is recommended.
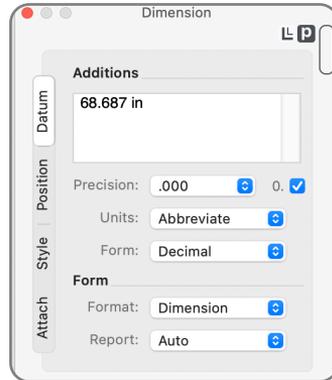
Dimensions

Drawing dimensions are multi-element graphics that are attached to other graphics and annotate their represented physical size. The dimensioning tools are found on the Technical tool palette accessed from the View main menu. These dimensions are naturally related directly to the Scale of the drawing, or more precisely the scale of the layer. Length Dimensions are used to call out lengths of other graphics. They are an extension of Connectors since they attach to defined locations on other graphics.

The units used for the dimension are those of the drawing as defined on the Scale Parameter Panel accessed on the Format main menu. The Dimension parameter palette, which is accessed from the Tools main menu, allows selection of many format and display parameters, but the actual measuring units (mm, inches, points, etc) are defined by the global drawing scale. If the units are changed on the scale panel all dimensions will change to reflect the new units.
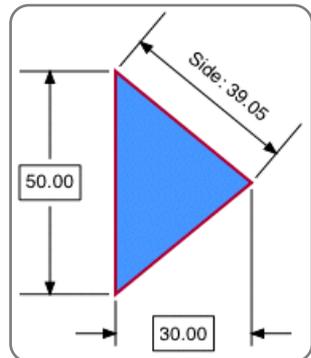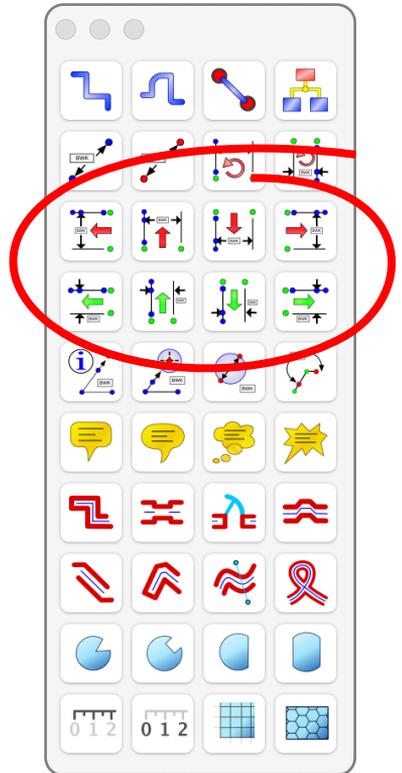
Datum Tab

The Dimension Panel provides parameters for Dimensions and Auto-Lines which are found on Technical Palette on the View main menu. The panel provides four groups of parameters organized as tabs on the Dimension Palette. Click the tabs to the left to inspect or input parameters for each of these 4 groups. The Datum tab view provides access to the primary parameters of a Dimension Graphic. The actual dimension text is shown in the partially editable text view near the top.

You may enter text before and after the dimension text. You cannot alter the dimension text, it is linked to the reported parameter of the target graphic.

You must select the actual dimension graphic to work with its parameters. Selection of the target graphic doesn't provide access to the dimension. This is because a particular target graphic may have several dimensions attached to it, and note that the dimension object is itself a graphic.

The text view at the top shows the actual dimension text. It may be edited, before or after the dimension values and unit labels.

The Precision numeric text field allows the specification of the number of decimal places shown. Dimensions use a standard fixed numeric format. If Fraction form is chosen, the precision value controls the rounding to nearest fraction (1/2, 1/4, 1/8, ...) as well.

The Units popup specifies the format of the suffix of the dimension text. You may choose None, Units, Abbreviation, or Punctuation. Punctuation applies only to feet and inches.

The Form popup specifies how numbers should be displayed, Decimal, Fraction, Feet/Inches or Alternate. Alternate provides for decimal representation showing the primary units as specified on the Scale palette for the whole drawing and the metric/inches value in parenthesis.

The Format popup is just like the Format on the text annotation palette - with one addition. The Dimension option places the dimension text in a little box that interrupts the dimension-arrow line. This is a traditional

format common on engineering drawings. If the box is not desired, uncheck Line on the Style tab. You may also select any of the other Annotation formats such as Along or Contoured if desired.

The Report popup is most useful for the Comment Dimensions used to annotate attributes such as a radius or angle. After a Comment Dimension is attached to a graphic you can use this menu to select the reporting of a particular variable. In the Auto mode the reported parameter is selected automatically by context.

The units used for the dimension are those of the drawing as defined on the Scale Parameter Panel accessed on the Format main menu. The Dimension parameter palette allows selection of many format and display parameters, but the actual units (mm, inches, points, etc) are defined by the global drawing scale. If the units are changed on the scale panel all dimensions will change to the new units.

If a purely comment dimension is needed, one with no measurement, use the Form selection Nothing. This clears the dimension entry. Text is added by typing in the text view on the Datum tab.

Text View: The text view at the top of the palette provides access to font and font style attributes. Select the text on this palette (not on the drawing) then make any changes to font family, font size, or any other attribute on the primary system font panel. This panel is opened from the Font menu on the Text main menu. The Font panel is the only access to this formatting information for dimensions, the graphic details drawer and other text menu commands are not available when inspecting a Dimension.

A prefix and / or suffix to the dimension value may be entered directly on this text view. Double click and edit in the normal fashion to enter the desired text comments. These comments will remain static as entered, the numeric values will vary as target graphics are resized. The units portion will vary with selection of units form as discussed above.

If static entered text is all that is desired in the dimension, no measurement value, choose "Nothing" for the Form popup menu selection. In this case the dimension is completely under user control, only typed text is shown.

Position Tab

The Dimension text may be positioned relative to the other components of the dimension graphic with these parameters. Not all the parameters apply to all Formats. Which parameters are enabled depends primarily on the

choice of Format found on the Datum View. Position is measured in percent along the dimension reference line. Use the text entry or slider to interactively place the report as desired.

Shift is used to move the text entry in a direction perpendicular to the dimension reference line. The Slide parameter moves Annotation style dimensions in a direction perpendicular to the Shift line. Angle and width apply for formats that perform a full text layout, the Box format. This combination can be used to display the dimension text at any desired angle.

Space applies to the contour formats, it adds extra space between characters. Void applies only to the Box format, it adds extra space between characters and the box--makes the box bigger.

Style Tab

These parameters provide control of the color and style of the dimension Box. The Fill color applies to the background color for the dimension text. A few duplicate convenience Arrow parameters are provided at the bottom of the view.

The color wells at the top can be used to specify the Fill and Line colors for the text box area. They apply only when the Dimension format is selected as the Format, on the Datum view. The Width and Join parameters apply when Line is selected for a Dimension format. Use these to change the drawing attributes of the Box.

The Arrows check boxes and Offset parameters control the drawing of the arrows on reference line.

The Arrow palette also applies to Dimension arrows. This palette, found on the Tools main menu, provides management of the other Arrow control parameters, form, angle, size, etc.
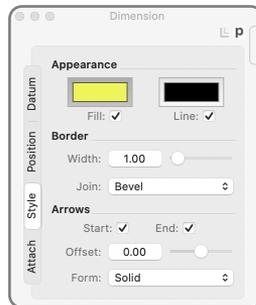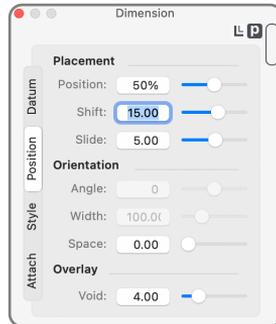
Attach Tab

The Attach parameters control the linking characteristics of the Dimension graphic. The Dynamic check box lets the Snap distance vary with Zoom. When checked the units for Snap are defined as multiples of the size of the Control Handles. This is usually the best method to define the Snap distance. When checked the Snap responsiveness will adapt as you zoom in or out. When not checked the distance is specified in the units of the drawing.


The Steps parameter determines how many target points there are on a single line (or curve) segment of a potential graphic. The popup menu is used to select halves, thirds, quarters, and tenths. Each line segment of a graphic is divided into this many sub-segments. A dimension may be attached at any vertex (segment end) and at the specified intervals along a segment. For example, a rectangle would offer a total of 12 attach points if resolution is set to thirds.
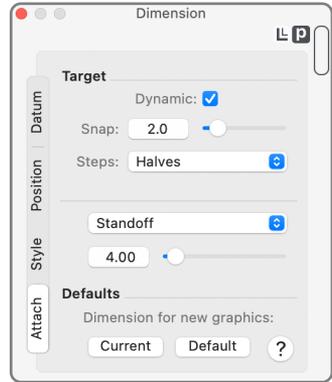
Comment and Report Dimensions

Comment Dimensions are used to annotate various properties of other graphics. They are linked to a target graphic. The appropriate comment is anticipated in an automatic fashion. For example, point to a radius corner and the Radius attribute is reported. You can use the Dimension palette to specifically select other attributes to report. Use one of the circled tools to create a Comment Dimension. Begin the click-drag creation sequence by clicking on or near the desired target feature.

The left-circled tool will create free form comment dimensions. Use it to report one of the numerous attributes (length, position, radius, diameter, area, perimeter, ...) available on the
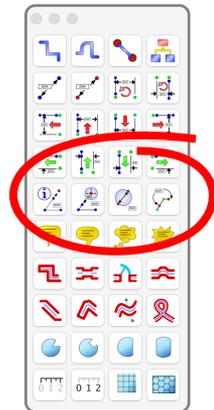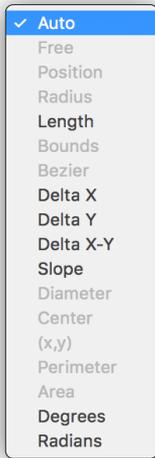
Report popup menu found on the Dimension Palette. The next two tools are used to report Centers and Diameters of Graphics. Point to the graphic, or its center when creating. You can also create the Dimension graphic then drag the pointing tip to the desired target, it will attach in the normal connector fashion.

The rightmost circled-tool is used to report angles of lines, angles at vertices, or tangents to curves. Attach to a vertex and the angle defined by the joining lines is reported. Attach to a curve or path and the angle between the dimension's reference line and the path or tangent to the curve are reported. For angle dimensions the units, degrees or radians, are selected with the Report popup menu found on the Dimensions parameter palette.

There are several control handles provided by the Angle Dimension graphic. They can be used to indicate Clockwise or Counter-Clockwise for the defining angle.

Area Dimensions

Area may be reported in units other than those of the drawing layer. The units used to report an area are selected using the Form popup menu found on the Datum tab of the Dimension palette.

First set the Report Dimension using the Report popup menu at the bottom of the Datum tab. Then select the Area form from the submenu found at the bottom of the Form popup menu.

These may be selected independently of the drawing's units. For example, the drawing may be in units of feet and the area reported in acres.
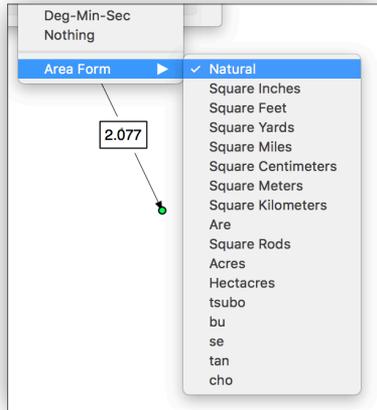
Grids, Snapping & Guidelines

Grids are a background mesh, similar to preprinted graph paper, that can be shown as a reference guide for visual feedback or the placement of objects. If "Snap to Grid" selections are checked, drawing actions are forced to the grid intersections. The Snapping action is used to conveniently keep graphics positioned in aligned locations.

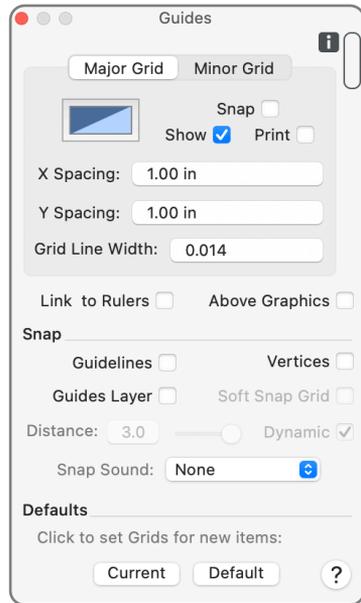Each drawing is allowed to have 2 grids that are referred to as Major and Minor. Grids are managed with the Guides palette found on the Format main menu, Grid and Guides submenu. This palette has a two tab view to access the Major or Minor grid's color, spacing, show, and snap selections.

The Guides palette provides control over Snapping actions. Snapping may be applied to the grid in a strict or lenient *soft* fashion. Snapping may also be applied relative to other graphics (line ends for example) or intersections of curves by selecting the Snap Vertices check box.

Several of the grids and guides frequently used options are mirrored as menu actions accessed on the Grids and Guides submenu. They are also provided on the Attributes bar discussed in chapter 06. All access actions do the same thing as the corresponding palette functions. They are provided as a convenience and to allow command key short cuts.

Two exceptions on this Grids and Guides submenu may be confusing; these are the Snap Graphics To Major and Snap Graphics To Minor selections. Their actions, which are apparent when read closely, are to perform a one-time move and snap of the selected graphic or graphics. This may be executed even if grid snapping is disabled. A close read of the wording will help avoid this potential confusion.

Grids, snapping, and guidelines apply individually to drawings. The grid settings shown on the Guides palette apply only to the top EazyDraw drawing window. New drawings begin with the default grid style. The grid settings are saved with the drawing's document file; they persist for the individual drawing when it is next opened. To change the settings for a new window, close all windows and set up the grids as desired. If a grid style is desired as the default, use the Defaults management panel accessed from the EazyDraw menu, Preferences selection.

The tabs labeled Major and Minor are used to select a parameter view for each of the grids. Clicking a tab will present the corresponding parameters.

Normally the grid is behind the graphics and hence obscured by opaque graphics. Click the Above Graphics checkbox to bring the grid to the front. This has no affect on snap actions of the grid. Adding transparency to the grid may be useful if the grid is shown above the graphics.

Major Grid

The Major Grid is an array of perpendicular lines drawn at uniform intervals as a drawing aid. The Major grid has a larger interval than the Minor Grid. It may be shown and/or used as snap points for graphics and drawing actions. The grid is usually drawn in a faint color that is visible but doesn't compete with the graphics of the drawing.

The "Show" checkbox is used to turn the Major Grid ON or OFF. If checked, the grid is shown; if not checked, the grid is not shown. The grid does not need to be shown to use the Snap feature.

The "Snap" checkbox is used to turn the snap aspect of the Major Grid ON or OFF. If checked, a moving or newly-drawn graphic is forced to the intersections of the grid lines. This snap action will not affect graphics previously drawn or positioned. If you need to perform an immediate "Snap" action on existing graphic(s) use the Snap Graphics to Major menu action.

The numeric parameter "Spacing" determines the spacing for the Major Grid. It is specified in the Units of the drawing. You may change the value by selecting and typing a new value. If Link to Rulers is checked, this value is set automatically and is not changed on this palette. Selecting Link to Rulers checkbox will set the value in accordance with the ruler's settings.

Grid spacing may be different for the x (across) and y (down) directions. The color of the Major Grid is changed by clicking the Color Well found to the left of the checkboxes. Any color may be selected using the color selection panel. Opacity may be used with this color, this may be applicable if the grid is placed above the graphics.

Grid line width is specified in the palette's Fine Scale units. When doing close work such as icon design you will likely wish to make this value smaller than when working on larger scale architectural drawings.

Link To Rulers: If "Link to Rulers" is selected the minor grids will sequence with the ruler tick stepper. This stepper control is found in the upper left corner where the rulers meet. Use this stepper to select the interval for the tick marks. The stepper sequences through the various tick interval options, like quarters, tenths, or fifths.

Link to Rulers provides a dynamic grid, dynamic with respect zoom. In this case as you zoom in or out, the ruler naturally changes to show finer or more coarse divisions. If the grid is linked to the rulers it too will follow the zoom actions and the corresponding intervals will change. If this feature is not in use, grids remain constant and independent of the drawing windows zoom level.

Minor Grid

The minor grid is managed from the Minor Grid tab view. The parameters are similar to those of the Major Grid, with the exception that the grid spacing is specified as the number of intervals per Major grid space. The Minor grid may have a different color and line width than the major grid.
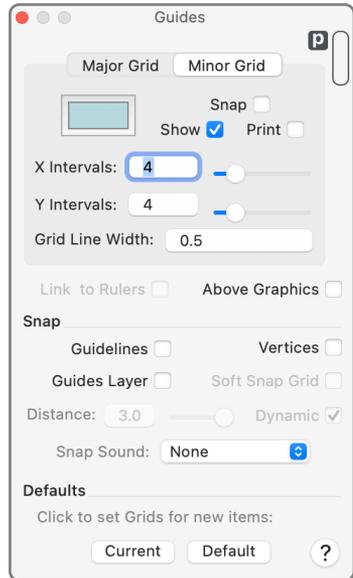
Snapping - Grids

The Snap section of the grid panel provides drawing aids for precisely positioning graphics relative to the grid or other graphics.

The snapping action may be applied relative to the grid or the vertices of other graphics. Only one of the snapping methods is used at a time. If snapping to the major or minor grid is selected snapping to vertices is not allowed.

When snapping to the grid the snapping may be applied as Hard Snap or Soft Snap. The Hard Snap will strictly place objects on the grid intersections. The Soft Snap method places objects exactly on the grid only when they are positioned close to a grid intersection. The definition of close is controlled by the snap distance. Hard Snap only applies to grid intersections, snapping to vertices is always a soft snap.

If Snap is selected on the Major or Minor Grid (near top of the palette) then Soft Snap Grid is enabled. If Soft Snap is not selected graphic handles will be constrained to grid intersections only. Each move of a graphic handle will place the handle exactly (and only) on a grid intersection.

Snap Distance applies when Soft Snap or Vertices Snap is selected. This distance is a radius that defines how close an object needs to be placed to a snap point in order for the object to be placed exactly at the snap point. The distance is entered as an absolute value given in the current Fine Scale units for this palette or dynamically as a distance that varies with the zoom state of the drawing.

The Dynamic check box defines the specifying units for the snap distance. If checked the snap distance is entered as a multiple of handle widths. Handles are the small colored squares that are used to move and modify curves and other graphics. You will notice that the size of the handle is not absolute, as you zoom in or out they do get larger or smaller but not in a fixed proportion. In most cases using the Dynamic method is the most convenient and will provide smooth consistent feel for the snapping action. Notice that if Dynamic Snap distance is used you may easily place objects very close to a snap point by zooming in. To zoom in quickly place the mouse cursor over the area of interest on your drawing and type the letter i (for in) a few times. After zooming in the absolute size of the handle is much smaller (even though it appears a little larger). Since the snap distance is determined relative to the size of the handles you can now place something very close to a snap point in an absolute measure. Then type o (for out) a few times to zoom back out to the previous viewing zoom.

Snapping - Vertices

If grid snapping is not in use, Vertices snapping may be selected. In this case the snapping action is performed relative to other graphics. This is useful to exactly join the ends of lines or curves. This snapping is always applied in the "Soft" fashion under the control of the Snap Distance.
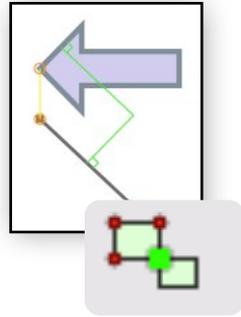
Snap vertices will automatically seek and position coinciding end points, mid points, corners, centers and other geometrical unique positions associated with a graphic. Vertex snapping will also locate and position at intersections of both lines and free curves. This is highly optimized and performed "live" as graphics are moved or edited.

Snapping - Guidelines

Snapping to guidelines provides precise orientation for interactive editing and moves of a graphic. Visual on screen clues are provided when a snapping orientation action occurs.

Interactive editing guide snaps are shown on screen with light yellow lines, rectangles and circles indicating a horizontal or vertical alignment position. Alignment to the horizontal and vertical edges of the bounding rectangle of graphics is indicated with a yellow line terminated with a blue corner indicator.

Orientation guides are provided when editing the shape of a graphic. The guides are derived from straight line segments of graphics. Parallel and Perpendicular orientations are found. They are shown with light green constructs indicating the controlling master graphic for the match.

Guideline actions provided for a moving graphic are different than those performed when editing a graphic. Guide snapping when moving will provided precise oriented positioning of a graphic. This may be horizontal, vertical, or oriented. If two graphics have segments whose orientations precisely match, (for example two segments that are parallel) they will "snap" when these segments are placed on the same extended line. These matches are shown with light blue dashed lines.

Cloaking

When snapping to vertices (or guidelines) it is common that too many snap references are present and they interfere with positioning relative to the proper master graphics. A Cloaking submenu located on the Format main menu provides a method for excluding graphics from presenting their vertices or acting as guidelines. This can eliminate snapping clutter.

The cloaking is applied independently to Vertices and Guidelines. You will see the two independent menu selections for Vertices or Guidelines.

Cloaking may be applied to individual graphics, groups of graphics or an entire layer. The layer must be visible to be enabled on the Layer Vertices or Layer Guidelines cloaking submenus. There must also be more than one layer in the drawing for these layer submenus to apply.

An individual graphic or group is cloaked from the snap process by selecting the graphic or graphics and executing the Vertices or Guidelines cloaking menu command. If the focus selected graphic is cloaked a check mark is shown for the corresponding menu item. If more than one graphic is selected and these graphics have differing cloaked states, a dash is shown by the corresponding menu item.

An entire layer is cloaked by selecting the menu item with the corresponding layer name. The check-mark by the layer name indicates the current cloaking state for the corresponding layer.

The following technique allows the selection of a few graphics to be used as overt guidelines. First perform a "Select All" and execute the Cloak menu command. This will eliminate all graphics from the guideline seeking process. Then select the desired master graphic or graphics and perform the Uncloak menu command. Now the few selected graphics are the master guides for the drawing. It is common to color them red or blue and give them a very light pen weight, this would be applied from the Color and Style Panel palette. This technique might be used to define a "guides" layer. If all layers but one are Cloaked, the remaining layer becomes the master guides layer. Then the quick process of showing or hiding the layer will "turn of-off" the guideline process. Color modification may be applied to the guideline layer to diminish the visibility of the guides layer and avoid visual clutter.

The concept of a reference bounding rectangle is associated with each graphic. These are used to form neat rows or columns of graphics. This bounding "box" is a virtual rectangle not actually shown on the drawing.

The corners of the box are defined by infinitely thin lines that follow the center-lines the defining shape of the graphic. This means that finite line width is not taken into account for the specification of these bounding rectangles.

All graphics visible on the drawing screen are used as possible matches for vertex or guideline snaps. It is often the case that a drawing of any size will have too many graphics contributing guidelines thereby preventing the desired graphic from presenting the definitive snap match. This situation can be improved by zooming in to the location of interest, which will naturally exclude distant graphics from the guide seeking process.

The seeking process favors proximity between the moving or editing graphic and potential guide graphics. If two guide graphics are close in their respective snap positions, slight further movement of a snapped graphic may or may not shift the actual snap metrics. In any case the defining reference graphic is shown by the on screen visual alignment clue.

Snapping distance and the dynamic snapping setting control the snap action for vertices but not guidelines. See Snapping Grids above for detailed discussion of these controls.

Snap Persistence and Scope

The snap and guideline selections are automatically remembered when you quit and restart the EazyDraw application. The selections are also saved and restored with each drawing. The value saved with a drawing takes precedence over the automatic default that is derived from your last overt choice for one of the snapping selections.

Align To Grid

The Align to Grid Palette provides a method for assigning a particular position, of a graphic or symbol group, as the grid reference point. This palette is accessed from the main Tools menu, Align To Grid selection which is found about half way down on the menu.
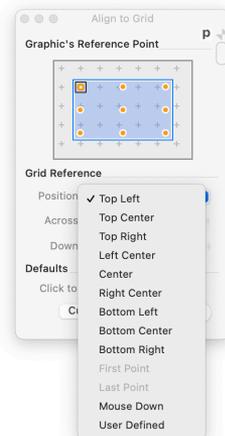
As described above provision is provided for Snapping graphics to the drawing grid. This gives rise to a problem: what point on the graphic should be snapped, or aligned to the grid. For example, even a graphic as simple as a rectangle does not have a clear snapping point, should the reference be the center or perhaps the top left corner.

This problem is even more important in the case of a complex group of graphics that are used as a single symbol, such as the NAND gate electronic symbol shown on the Align To Grid reference view below. For this symbol to work properly with the grid snapping drawing aid, a particular point "on the nand gate" needs to be defined. This palette provides a full graphic interface for inspecting and assigning a specific grid reference point. The small view at the top of the panel shows graphically the position of the grid snap reference point. A blue circle is shown at the reference point. If a graphic is selected a scaled green outline of the graphic is drawn in a dark gray bounding rectangle. The specific position of the reference point is defined as a percentage across and down, relative to the bounding rectangle.

The reference point may be assigned interactively by clicking in the gray bounding rectangle of the inspecting view. The result of the click is shown in the numerical text fields for Across and Down. The Position popup menu provides a method for setting the snap reference point precisely at one of several defined points of the bounding rectangle. The top several selections are self explanatory. The First and Last point selections apply to Bezier Paths, these assign the snap reference point precisely to the first or last vertex of the Bezier Path.

If the Position popup selection is assigned to "User Defined" the Across and Down numeric text fields and sliders are used to precisely position the snap reference point relative to the bounding rectangle of the graphic or group.

The selection for Mouse Down on the Position popup menu is actually the same as User Defined. The selection is provided as discovery clue indicating that a mouse click on the inspection view may be used to define the position of the grid reference point.

Measuring Tape Tool

The Measuring Tape Tool adds live on-screen readout of the exact cursor position, key graphic measurements, or various distances. The readouts are performed at the true drawing scale. Activate the Measuring Tape cursor by clicking the Tape tool. This will enable the live coordinate readout for all drawing windows.

Graphics that are NOT selected are not specifically reported by the Tape Measure cursor. Select graphics of interest to obtain relevant measurements. This helps to avoid point and curve clutter which often interferes with obtaining measurements for specific graphics.

Detailed measurements specific to a graphic are obtained by selecting the graphic while the Measuring Tape cursor is active. In this situation various coordinates and dimensions of the selected graphic are shown according to the position of the cursor. For example, the precise coordinate an editing handle is shown when the cursor is positioned close to the handle.

In some cases different metrics are shown depending on the actual position
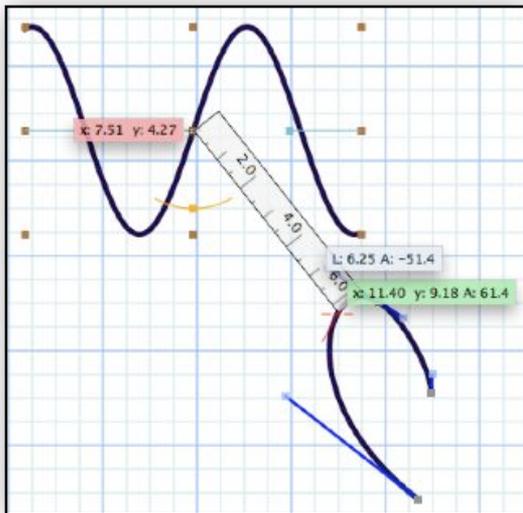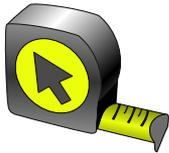
of the cursor relative to the Bezier path of a graphic. For example, the length and angle of a line is shown when the cursor is just to the right (when facing from start to end) of the line, but the precise coordinates of the line are shown when the cursor is just to the left of the path of the line. Different types of graphics provide on screen readout of various defining metrics. The Option Key is used provide an actual on-screen measuring tape. Option-Click-Drag will drag out a measuring tape that may be used to interactively measure distances on the drawing. If the cursor is "snapped" to a particular point on a selected graphic, the Option drag will anchor the tape precisely at the snapped point on the graphic. In this snapped state exact distances to other snap points on the same or different graphics may be obtained. For measuring exact distances between graphics, both graphics need to be selected before initiating the measuring tape action.

In many situations the command keys will provide different measurement formats. For example, the tape measure tool will show the length and angle between two points on the drawing, if the Ctrl key is held down the distance is represented as delta-X (across) and delta-Y (down) values.

The live cursor readout is de-activated by clicking the primary Arrow Tool. Using other tools does not clear the live cursor readout, this must be performed explicitly.

Palette Units

EazyDraw palettes have a small gray icon found on the upper right hand corner of the palette. This small button will have a "m," "i," or "p" as its label. This control provides convenient access to the Units used to report and enter values on the associated parameter palette. The Palette Units button is gray, located next to the Mini Palette mode arrow and Window Shade control.

These units do not need to be the same as the primary units for the drawing. Nor do all palettes need to use the same units. For example, a drawing may have Feet for the primary units, the Page Setup palette may use inches, and the Color and Style palette may define line width in units of Points.
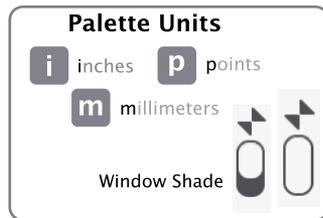
It is easy to change the units for a given palette, just click the small gray button. With each click you will sequence through the 3 choices of units.

If you are unsure of the Units in use for a given palette, glance at the button and note the label: "m" for millimeters, "i" for inches, or "p" for points. Control click the Palette Units button to access several other control settings for decimal precision and measurement formatting for the associated palette. See example to right.
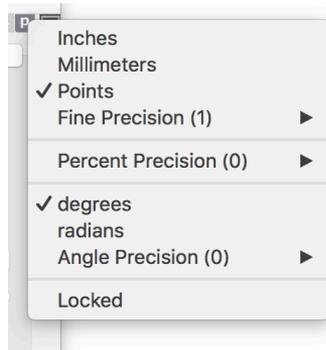
The Fine Scale Palette is used to inspect and set the measuring units and display precision for other parameter palettes. The contextual menu associated with this button is provided as a second, convenience shortcut method. The popup menu reflects the context of its parameter palette. For example, if no angle parameters are present on the palette, the degrees-radians-angle precision portion of the menu is not shown.

Inches, millimeters, or points may be selected as the measuring units for lengths found on the parameter palette. Points are defined as 72 per inch, and millimeters as 25.4 per inch. The current setting for the palette is reflected by the check mark shown on the contextual menu.

The display precision for lengths found on the parameter palette is selected with the Fine Precision submenu. The current setting for the palette is shown in parenthesis.

The display precision for percentages found on the parameter palette may be selected with the Percent Precision submenu. The current setting for the palette is shown in parenthesis.

Degrees or radians are selected as the measuring units for angles found on the parameter palette. 2 * π radians make up the full 360 degree angle of a circle. The current setting for the palette is reflected by the check mark shown on the contextual menu.

The display precision for angles found on the parameter palette is selected with the Angle Precision submenu. The current setting for the palette is shown in parenthesis. A parameter palette's fine scale settings is locked

using the corresponding menu item. Changes from this contextual menu are still possible when locked. The locked state only applies to multi-palette changes applied from the master Fine Scale Palette.

Up to six of decimal places may be used for numeric entry of a parameter value. The precision settings control the display precision of numeric entries. This has no affect on actions of sliders or other interactive controls.

The choice of fine scale units does not associate with an individual drawing. These selections apply to all drawings and are associated with an individual palette. The settings are saved and restored with palette layout actions. Saving and reloading an individual drawing has no affect on fine unit settings. But saving and restoring a palette layout with the menu selections found on the View main menu will define and restore all elements of the Fine Scale associated with a palette. Palettes not on-screen at the time of the palette layout do not have their Fine Scale settings saved nor restored with the save palettes layout action.

When working with Rulers note that the choice of fine scale units is not associated with or reflected in the measuring units shown on the drawing rulers. Rulers are associated with the Drawing units and scale, independent of an inspecting palette fine scale units setting.

Fine Scale Palette

The Fine Scale palette provides parameters that determine the units and display precision used for defining fine elements of drawings. Fine Elements are attributes such as line widths, dash lengths, or shadow offset. Different units of measurement (inches, millimeters, or points) may be assigned as the defining units for a particular palette such as the Dashes, Arrows, or Color and Style palette.

This palette provides a user interface for setting the number of decimal points of precision displayed on a parameter palette. Each EazyDraw parameter palette has a specific set of measurement units assigned for display or input of variables such as lengths, angles or percentages.
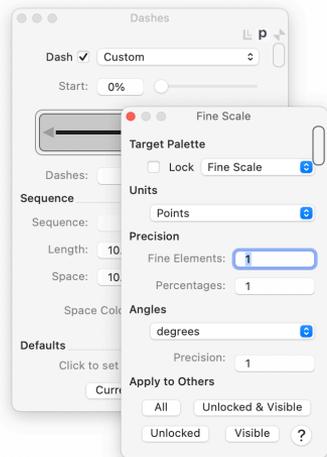
This Fine Scale Palette provides a central interface to inspect or set the measurement units used by all other EazyDraw parameter palettes. This central control palette is accessed from the Format Main menu, Fine Scale selection which is found near the top of the menu.

These parameters are independent of the drawing scale or units. For example a drawing could be drawn in units of feet, with a scale of 1 inch to 1 foot; but line widths are measured directly in millimeters. The scale for entering and inspecting the "fine scale units" is always 1 to 1.

It is equivalent to change a palette's settings from its associated Palette Units button, the Palette Units contextual menu, or this, the central Fine Scale palette.

The Target Palette popup menu is used to select a target parameter palette. All settings displayed on this palette are those of the target palette selection of this popup menu. To inspect or change fine scale units for another palette, select the desired palette with this popup menu.

The Lock check box is used to prevent further changes to the fine scale settings of a palette. When checked, changes made on the fine scale palette for another palette are still possible. The "locked" state applies when making changes to a group of palettes using the buttons at the bottom of this palette. When locked, the small units button icon on the target palette is drawn with a discernible solid gray border to indicate the locked state.

The Units popup is used to select the display units for fine scale lengths on the target palette. Possible values are inches, millimeters, or points. Points are defined to be 72 per inch and millimeters are defined at exactly 25.4 per inch.

The Fine Elements precision numeric entry defines the number of decimal points used to display lengths on the target palette.

The Percentages precision numeric entry defines the number of decimal points used to display percentages on the target palette. If a palette does not use percentages, this entry is disabled. The popup menu under angles is used to select the units used to display the size of angles. Choices are degrees or radians.

The Angle precision numeric entry defines the number of decimal points used to display angle values on the target palette.

The Apply to Others buttons are used to set multiple palettes to a common group of fine scale settings. For example, switching all settings to metric is accomplished with one action, rather than visiting each palette and changing the settings individually. The button names are self-explanatory, each providing a method of choosing a group of target palettes.

The target palette may actually be chosen as the fine scale palette. In other words, the Fine scale palette applies settings to the Fine Scale palette. With this setting you may arrange a group of fine scale settings without changes on any actual palette. A group of settings organized in this fashion is then applied to another set of palettes - using one of the Apply To Others buttons at the bottom of the palette.

Tool Usage

Drawing with EazyDraw is a simple process of point - click - drag.

Move the mouse to one of the shapes on the tool palette, such as a Rectangle (4th down on the right side of the Primary tool palette). Click to select the tool, the selected tool icon will show a darker gray to indicate that it is active. Then move the mouse over the front most EazyDraw drawing window. The cursor will change to one of five different forms that provide a visual clue that a tool is active and what the dragging options might be. Then click down and drag to create the shape. Different shapes provide different dragging behavior to enable you to create the shape in the desired form.

Finally lift the mouse to complete the creation task. Some graphics are constructed with multiple sequences of click and drag. These will remain in the creation mode after the mouse button is released. For these the creation sequence is completed with a double click or by sliding the cursor off the active drawing area. Both of these will add the graphic to your drawing and select it for editing.

These tools are normally single use in their nature. If a tool is clicked and a graphic is created, EazyDraw will revert to the default Arrow tool for selecting and editing. In this mode you need to click one of the creation tools each time you need to create another graphic.

The single use behavior is suspended with the double click of a tool. Double click and EazyDraw remains in graphic creation mode after each new graphic is drawn. Use this approach if several instances of the same shape are needed. To revert from the creation mode, click the Arrow tool, or any other tool, and EazyDraw will return to the standard select and edit mode with the Arrow cursor.

It is common that users will try to create a graphic perfectly, attempting to get it on screen at the exact final position and shape that is needed. This might be OK in some cases but normally it is best to get the graphic created with the approximate position, size

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and orientation needed. Then use EazyDraw's powerful interactive editing or numerical entry with the Graphic Details drawer to tweak the graphic and obtain the precise look needed.

Bounding Rectangle Graphics

Forming a bounding rectangle for the shape creates many shapes. Rectangles are drawn this way and many other shapes, several of those found on the Charting Tool palette exhibit this behavior.

If you click on a rectangular creation graphic tool and move the mouse over the active drawing area, you will see the cursor change from an arrow to a small rectangle-like shape. This indicates that EazyDraw is in the creation mode and your next actions will result in the creation of a new rectangle-like graphic.

A rectangle-shaped graphic is drawn with the mouse by a single click and drag sequence. The new rectangle is shown as you drag the mouse. The first corner is placed at the point of the mouse down click. The opposite corner moves with the mouse drag action. The opposite corner is positioned when the process is completed by releasing the mouse.

The new rectangle becomes the only selected object after creation. You may move or resize the rectangle by clicking inside the rectangle or on one of the handles. If you need to place the rectangle at a particular position or make it a certain size this is accomplished after the creation step by using the Graphic Details Drawer to modify the specific coordinates and size of the rectangle.

If several rectangles are needed, double click the rectangle tool. The rectangle tool selection remains in effect after creation so that further rectangles may be easily added to the document. Clicking another tool or the Arrow tool will release the rectangle creation activity.

If rectangles are needed frequently, the rectangle tool may be added to the Toolbar. If you prefer this convenience use the Customize Toolbar item found under "View" on the "Main Menu." There you will see the "Rectangle Tool" button; just drag it to the position you prefer on the Toolbar.

If the "Tools" menu is added to the main toolbar, rectangles may be drawn by accessing the pull down menu associated with the button. The Tools menu button then transforms to become a "rectangle" tool; you will see the rectangle icon and a single quick click of the button will start the process for creating a rectangle. Double clicks work here too, for creating several rectangles in sequence.

N-Sides Graphics

Several shapes are defined by a virtual circle and a given number of sides. An Equilateral Polygon or a Star are good examples of this type of graphic. All of the graphics found on the Stellate (star-like) palette exhibit this behavior. These graphics are all created in the same fashion. The cursor shown to the right is shown when the mouse is over the active drawing area and creation of one of these graphics is in progress. The mouse down click in this mode defines the center of the graphic to be created. Keep the mouse button down and drag a line that will define a radius and initial angle. The graphic is inscribed in the virtual circle defined by the drag operation.

The number of sides of the new graphic may be changed by typing a number while the mouse drag operation is in progress. You may change the number of sides several times, all number entries are accepted until the process is completed at the end of the drag operation.

Don't be concerned if the shape is not placed and sized exactly as desired during the creation procedure, or if you can not get the needed number of sides typed in as you draw. Use either the Stellate palette or the Graphic Details drawer to inspect and/or input the desired number of sides. You may easily move and resize the curve after creation. Undo and redo always works but not during the creation operation, only after each creation procedure is complete. If you need to change the number of sides or set the defining radius use the Graphic Details Drawer to modify the parameters for the newly created shape.
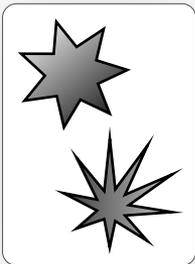
The drawing always starts with the number of sides showing on the Stellate palette. If a particular radius or number of sides is required, create and modify one graphic, then make copies or duplicates to create several of the desired shapes.

Angle Defined Graphics

Several shapes are defined predominately by angles. The obvious ones are Arcs and Pie or sector shapes. Rotated rectangles and rotated ovals also fall into this category. All of the graphics found on the Math tool palette are based on this creation and editing form. For all but the Arc and Pie shape, a virtual rotated rectangle is created to define the graphic's axis and specify its axial and perpendicular lengths. These graphics are all created in the same fashion. The "plus" cursor shown above is presented when over the active drawing area and creation of one of these graphics is in progress.
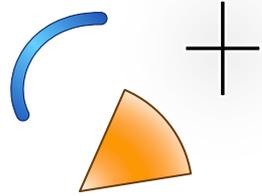
The mouse down click in this mode defines the center of the graphic. Keep the mouse button down and drag a line that defines a radius and start angle. When the mouse is released the second step of the procedure is initiated. You will note that the Angle Cursor remains in effect. At this point the swept angle is defined with the mouse cursor position.

Move the mouse around the circumference to define the desired swept angle. The next mouse click completes the process and defines the end angle of the graphic. If the mouse moves off the document window this will also complete the process and create the new Arc or Pie shape.

For Arcs and Pies, the swept angle is drawn clockwise. If you need a counterclockwise swept angle hold down the Shift to switch the direction of sweep of the angle. These graphics are drawn with a minimum limit of 10 degrees of sweep. This is done to prevent the inadvertent creation of a very small swept angle, in this case it appears that one has created a line, or just a dot which can cause a great deal of confusion. If you need smaller angles, simply create a 10 degree angle, then use the editing handles or Graphic Details drawer create the small angle.

For all other angle defined graphics the mouse click and drag action is defining first the major axis of the rectangle and then the width of the rotated rectangle on a line perpendicular to the rectangle's major axis. First click down and drag to define the rectangle's axis and lengthwise extent. Next lift the mouse and drag at 90 degrees to your first motion, move the cursor with the mouse button released until the desired rectangle width is attained. Then click down once more to complete the process. The new graphic will appear, it is selected and is ready for editing and final touches.

Multi Segment Graphics

The more complex graphics such as paths, polygons, and curves are constructed with multiple segments. Creating these graphics is a little more involved, but is still a simple mouse driven process of click - drag - lift. The first steps are the same as described above, the tool is clicked and the multi-segment cursor, which we call the Tab Cursor, appears when moved over the active drawing area. In this case the multiple segments are created with a basic sequence of mouse actions: click down and hold, drag a path, lift to assign a node (or vertex), then repeat for the next segment. The process is finished with a double click, or more conveniently by flicking the cursor off the active drawing area.

There are two ways to create multiple segment paths. The first is a combination of click and drag that uses the Tab key to advance to the next segment of the path or curve. The second method uses multiple sequences of click and drag, one click and drag sequence for each segment of the curve. There are no settings or preferences that control which method is used. The appropriate method is automatically determined by your actions.

The Tab key method requires 2 hands but may be more convenient in some cases. To use this method keep the mouse key down and continue the drag operation until the curve is completely drawn. As you drag the mouse, click the Tab key whenever a new segment is needed. A vertex is placed at the mouse location at the time of the key click. The drawing operation is completed when the mouse is lifted at the end of the drawing sequence. In some cases it may be more convenient to use a sequence of individual click and drag mouse motions to specify the segments of the curve. In this case when the mouse key is released at the end of the first segment you will note that the Tab Cursor remains in effect. This is your visual clue that the curve is not complete.

The next mouse down will begin a new drag sequence that will add the next leg of the curve. This cycle of click-drag is continued until the desired number of path segments have been created. The process is completed
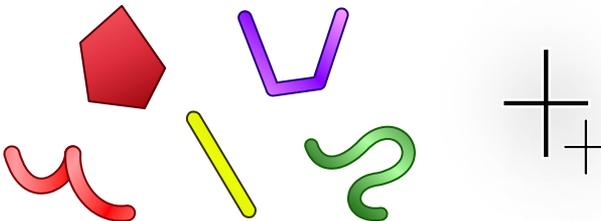
with either a double click of the mouse or when the mouse moves off the window that contains the drawing. Sometimes flicking the cursor off the window is a convenient way to complete a curve and there is no chance of getting another micro segment if your double click is too slow.

Left handed users will find it more convenient to use the "Enter Key" instead of Tab. Enter is usually found on the right side of the key board. There is no preference to set for this feature. Either key will work. The first one clicked will be used for the rest of the creation procedure. The next time the other key may be used if desired.

At any time you can step back one segment by using the Delete Key. Each click of the delete key will remove one vertex of the curve.

Polygons: Polygons are drawn by clicking the Polygon Tool Button on the Primary Tool Palette. The Tab Creation Cursor (shown above) will reflect the tool selection when the mouse is over the front (top) drawing window. The polygon is drawn with the mouse. There are two ways to accomplish the drawing. You may use the "Tab Key" ("Enter Key" for left handed users) to advance to subsequent segments. The second process accepts a sequence of mouse clicks ending in a double click to define the vertices of the polygon. Either method will work, no settings are required, EazyDraw recognizes your preference by your drawing actions.

The tab entry method defines the first vertex of the polygon with the initial mouse down. Each subsequent vertex is defined by the mouse position when the tab key is pressed. The polygon is drawn by the process of drag - tab - drag - tab. Don't lift the mouse button, just click tab and continue with your drag motion. The final end point of the path is defined when the mouse button is released.

The second method starts the same way with a mouse down and subsequent drag operation to define the first side of the polygon. Then subsequent vertices are defined by lifts of the mouse button. Each lift and click down will cause a new side to be added to the polygon. Double click or flick the cursor off the active drawing area to finish.

Lines and Paths: Lines are used so frequently that they have their own tool and simplified method for creation. The process is as follows: click the Line Tool, move the cursor over the drawing, click down and drag to the end point, and finally lift the mouse button which completes the process.

If you start to draw a line and decide that you need a path (multi segment line) instead, click the Tab key and EazyDraw will switch over to the path / tab creation mode.

The key to drawing a line is to click and hold down the mouse button, and drag out to the desired end point.

Paths are drawn in the same manner as described for polygons above. The only difference is that the path is not automatically closed at the completion of the process.

Bezier Curves: A Bezier curve is created with 3rd order Bezier curve segments joined at a sequence of vertices or nodes. Two forms of Bezier curves are supported by EazyDraw, continuous and free. The first form is smooth at each node, the slope or first derivative of the curve is continuous across the point of a node where two segments join. The second form has fully independent segments. Each segment is itself smooth with a continuous first derivative, but the point where two segments join may have a sharp change of direction, or described mathematically, a discontinuity of the first derivative at the node.

Use one of the two Bezier tools found on the Primary tool palette to create these free-hand curves. If the palette is not visible open it by selecting the Tools item from the top of the View main menu.

The Bezier path is drawn with the mouse. There are two ways to accomplish the drawing. You may use the "Tab Key" ("Enter Key" for left handed users) to advance to subsequent segments. The second process accepts a sequence of mouse clicks ending in a double click to define the Bezier path. Either method will work (no settings are required). EazyDraw recognizes your preference by your drawing actions.

Click, hold down the mouse button to drag out one Bezier segment, lift the mouse button to "drop" a node, click down again and continue. As you drag out the shape of a curved segment, EazyDraw follows the path of the mouse across the screen. With each move of the mouse EazyDraw re-computes an optimum 3rd order Bezier segment that best fits the full path of your drag action originating at the previous node (or vertex).

The curve creation method is actually quite natural, a smooth curve will follow your mouse motion across the drawing window. Unlike painting programs and the common pencil action, this curve is very smooth, not at all jagged. Unlike older Bezier drawing applications, you are not doing 3rd order math in your head and tugging on a control string. Just trace out the sweep of the desired curve.

You can also back up, to a certain degree. EazyDraw's creation algorithm senses when you retrace with the mouse. This naturally means that the curve did not place as desired and an erasing action is desired.

The smoothing tendency of a curved Bezier segment means that the curve can only twist so much. One segment may only cross itself once, and this much of a twist in a single segment is not advisable. There is no limit on the number of segments, so there is no limit to the number of twists and turns allowed for a multi-segment curve. The only limitation is for each segment. This means that as one draws, a multi-segment curve nodes or vertices need to be added to allow twists sharp bends and reverses.

This adding of nodes is quite similar to adding sides to a polygon. It takes more than two sides to close a polygon back on itself. Think of a full Bezier curve in the same way - it takes more than two segments to turn and close back on itself. You add nodes to the curve in the same manner as adding sides (or think corners) to polygons. Lift the mouse, click back down, and continue the drag action each time you need another node.

This is all quite a natural progression. You can teach yourself the motor skills needed to create Bezier curves by starting with Polygons and Paths, then progress to the free form Bezier (discontinuous nodes) and finally smooth Bezier curves.

If you are an artist learning computer drawing, this process will not at first seem natural. But it must be learned. EazyDraw does not try to simulate a brush or pen. Computers, vectors, and curves are what they are. EazyDraw makes these easy to use but we do not try to simulate brush strokes or other effects associated with another medium. Just as different techniques and skills are required to draw with charcoal versus acrylic and brush, vector computer drawing is a unique medium requiring certain skills and techniques. The better these are learned the better one is able to creatively express oneself in this realm.

Freehand Tools: Pencil, Brush, Silhouette

The Pencil, Brush and Silhouette tools are used for freehand drawing. They work well with a Pen and Tablet accessory. But a Pen and Tablet are not necessary, they will work fine with a normal mouse or any other pointing accessory.

The path is fitted and smoothed to your general mouse movements. It will follow your exact mouse positions rather closely. The individual positions are stitched together with a smooth continuous bezier curve. The smoothing software minimizes the complexity of the Bezier curve, fitting to your movements with as few vertices as possible.

The degree of smoothness is adjustable. The parameters are found on the Tablet palette which is accessed from the Format main menu. There are two parameters one for the Pencil and one for Brush.

The Brush tool generates a Continuous Bezier (no sharp peaks) and the Pencil tool generates a free Bezier curve. The form is easily changed after creation with the Convert To submenu on the Tools main menu, Cmd-Shift-B is the factory default command key short cut .

The fit algorithm provides one user parameter to manage the tightness of the curve fit. This is the Fit setting found on the Tablet palette. A small value for the Fit setting will cause the resulting Bezier path to more closely follow each nuance of the drawn path, this will require more Bezier control points. A larger number generates a smoother curve, fewer Bezier control points, with larger deviations between the result Bezier and the actual drawn path.

Check the Dynamic with Zoom check box to have EazyDraw adjust the Fit parameter to reflect the zoom percent of the drawing. When zoomed in the Fit setting is decreased for a tighter absolute fit that will appear constant with respect to the working view of the drawing.
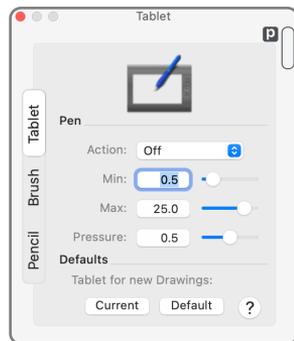
The Brush tool should not be confused with the Brush augmentation designed and used with the Brush Palette. Although they are often used together. But the Brush tool may be used to draw with any stroke setting, solid, dashed line, or perhaps a wall. The Brush tool does not need to be used only to draw Brush strokes. And the reverse is true, if you are an artist using an Artistic Brush and need to draw a perfectly straight stroke - don't use the Brush tool, use the Line tool. Or if your artistic stroke a simple smooth curve segment, use the Bezier tool and create directly a single Bezier segment with only two ends and two control points.

Silhouette

This tool is very powerful, especially when used with a stylus and tablet. It is "free hand" like the brush and pencil but it does not draw a simple path or curve. This tool draws a filled, closed shape. The power of the tool is derived from a second "built-in" capability, successive shapes are automatically combined as a Union graphic. Actually successive applications of the tool works in two modes - applying (in a fluid motion) additive and subtractive logical union of drawn filled shapes.

The tool is used with rapid fluid drawing motions. The silhouette of a graphic is built by adding (or removing) successive detail to the shape. For example, starting with an oval for a "head" next a swooping-el-shape would add the "nose," then subtractive triangle sweep above the nose would indicate the bridge-of-the-nose.

The Shift key is used to execute a subtract, no modifiers are used to build-and-add to the silhouette. Undo works robustly with the technique, this allows fluid visual experimentation and refinement of the design.
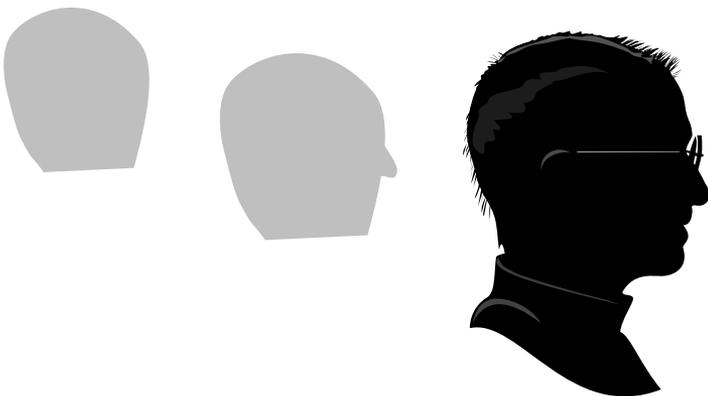
The Silhouette tool is "sticky," once clicked it remains active until a different tool is clicked (such as the generic Arrow-selection tool). This happens even if the tool is only single-clicked. This characteristic is necessary for the intended use.

A fun exercise with the Silhouette tool "cloud watching." Turn on the Silhouette tool with a large blank page ready for drawing. Start scribbling - the more random the better. As you scribble, the union building will generate clouds similar to puffy clouds on a warm humid afternoon. Relax your vision and look for "shapes in the clouds." Once something interesting is spotted, progress to more overt additions and subtractions to build, refine, and "pull" the silhouette image out of the clouds.

User Tools

EazyDraw has several built-in tool palettes. They are accessed from the View Main menu, at the top. Each of these palettes provides what should be thought of as a "permanent home" for each tool. While these tool palettes work fine for general usage, your specific drawing activities will probably be more efficient different tool palette arrangements.

User Tools provides a way to easily (very easily) construct personal or project specific tool palettes. It needs to emphasized that this is an easy task, even if you do not consider yourself a power user you should consider building you own tool palettes instead of using the basic built-in tool arrangements.

User Tool palettes work exactly like the built-in tool palettes. Each tool will click and activate in the same fashion whether accessed from the home-base tool palette or a custom built User Tool palette.

Users Library Comparison: User Libraries provide another method for creating a custom tool palette. These two are similar with a few complimentary differences. A User Library palette does not support Editing tools such as the Rotate tool or the Knife. The User Tool palettes found on the User Tools submenu do support the Editing tools but they do not support creation of a user designed shape or graphic.

User Library tool palettes will interface with the menu system and Cmd-Key short cuts. User Tools have no mechanism for assignment to a menu. The tools associated with a User Tool palette do interface with the Hot Keys mechanism, and User Library tools do not interface with Hot Keys.

Less experienced users will want to create and manage custom tool palettes with the User Tools submenu. This is the easiest approach and quickest to learn.

User Tools Submenu: The User Tools submenu is located on the View main menu, near the top, at the end of the first section of menu commands.

The top portion of this submenu presents all currently available user tool palettes. The menu and the tool palettes have the same behavior as the master EazyDraw tool palettes. If a tool palette is open a check mark is shown on the corresponding menu entry. Tool palette position and open state is preserved when EazyDraw quits and restarts.

The New command opens the User Tool palette design palette. This is the access point for designing a completely new User Tool palette.

Remove, this sub-submenu has the same items as the top menu. This command will remove the selected User Tool palette from the system. Warning: there is no undo support, and EazyDraw executes as instructed. Use the Export command to archive and backup your personal tool palettes.

Edit, this sub-submenu will be the same as the top menu items, this command opens the Use Tool Design palette for an existing User Tool palette. This interface point provides access for editing, archival and restoration of User Tool palettes.

Edit User Tools: Edit (and New) User Tools provides a design palette that is used to create or edit an individua User Tools palette.

As an overview: Drag and drop tools from the built-in tool palettes to the Edit palette's tool matrix then perform Save. It really is as easy as that to create your own tool palette.

Name the tool palette using the top text box on the Edit palette. This is the name that is shown on the User Tools submenu, it will be the menu entry that is used to open or close the User Tools palette.

The Across and Down parameters define the layout geometry for your tool matrix. A User Tools palette may have a vertical or horizontal geometry. The Edit/New User Tools palette reconfigures its size to match the target palette's size and geometry.

The rectangle on the left (this will be across the center of the palette when working with a predominately horizontal tool bar geometry) is the working representation of the layout of your tool palette. Each box represents a

tool location. Drag a tool from an EazyDraw tool palette to one of these squares to install the tool in that location on the palette The icon graphics shown will indicate the tool installed on each button. The blank display indicates that button is open, it will have no action when in use. The red bordering rectangle indicates the specific tool that is selected for inspection. in the inspection elements on the right (this will be "below" for a horizontal toolbar).
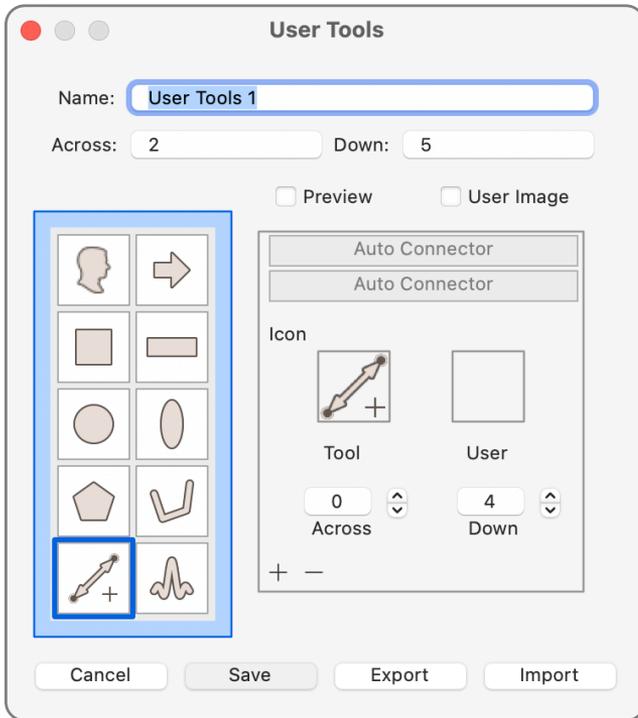
Inspect Individual Tool: The individual tool inspection area on the palette has a bounding rectangle. Elements in the area relate to an individual tool (not the full tool palette). Use the Across and Down stepper to navigate through the installed tools. Or click on a specific tool to select the tool. The red border indicates the tool in focus for inspection.

The two text boxes at the top of the inspection area are the tool tips for the tool button. The top text is the fixed internal EazyDraw tool tip, this is shown in the current language, this text is not editable. The box below provides input for a customized tool tip. Enter your own wording, in the language of choice. The entry here will be the tool tip for this tool on this User Tools palette. Tool Tips are the short descriptive phrases that appear (usually with a yellow background) when the cursor is paused over a tool.

The two Icon squares provide inspection for the graphic icon that represents to the tool on the tool palette. The one on the left is the built-in EazyDraw icon (not editable). The one on the right is for a custom icon of your own design. Drag and drop your graphic on the box to the right to install a custom icon. Of course you may draw the icon using EazyDraw, simply drag and drop a grouped graphic from a drawing to the icon rectangle. Or the icon may be any standard graphic format, you may even drag an icon from a web page directly to the install rectangle.

The Minus button is used to remove a tool from the tool palette. The Selected tool is the one removed. No Undo
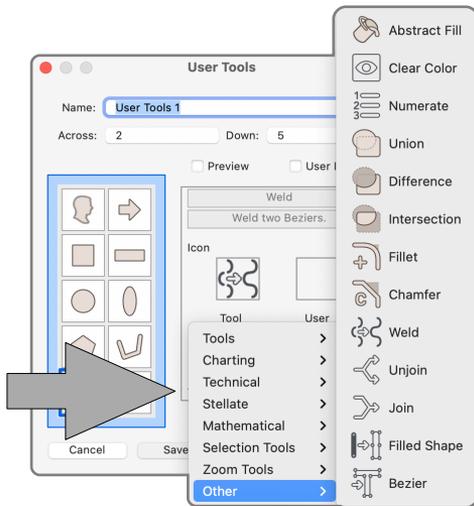
The Plus button popup menu provides access to additional tool-like actions. These are menu actions not found on any EazyDraw tool palette. These are available for customization to the drawing window toolbar. The Other submenu provides access for these tools to be used on a User Tool palette.

Install and Archive: The Cancel button (lower left) closes the User Tool editing palette, with no changes to palette. Note that this palette has no undo support. Use the Cancel button in situations where a set of changes is not working out.

The Save button is key - **nothing really happens unless you do a Save**. If a full editing session creates of modifies a user tool palette, this palette with the changes is not installed until Save is executed. If the window is closed with a Cancel, all changes evaporate.

Export and Import are used to archive and retrive a permanent representation of a User Tool palette. Export presents a file save dialog for selection of a name and location on your system (or iCloud) to save the User Tool file. The information is saved in a normal text file, formatted as XML as a macOS property list (pList). These files may be inspected with a text editor or the pList App.

The current set of installed User Tool palettes are saved in the system Applications Support folder assigned by macOS for EazyDraw. They are of course persistent when EazyDraw quits and restarts.

But you should maintain a separate archive, using the Export button, of important User Tool palettes. You may need the persistent text archive for a new installation or recovery in case of a hard drive failure. Export your User Tool palettes so they are recorded in your file system (or iCloud) and backed up by Time Machine.

User Tools and Quick Keys: You may not drag a tool from a User Tool palette to the Quick Keys palette. The originating master tool is used with the Quick Keys palette. But, when a Quick Key shortcut is used, and a User Tool palette with the associated tool is open, you will see the tool darken on your user tool palette.

Selecting Graphics

The act of selecting one or several graphics for inspecting, editing, or moving is probably the most frequently performed action when drawing with vector graphics. Every action, after the initial drawing of a graphic, is preceded by selecting the desired target graphic element(s).

For a simple drawing, or one with very few overlapping graphics, selecting is a trivial action - just click near the target graphic and it is selected and enabled for

editing or inspecting. However in most cases a drawing quickly becomes complex and layered with overlapping elements and small objects that difficult to "hit" with a click.

The situation of overlapping graphics can be quite problematic. EazyDraw has several methods for selecting and targeting graphics for selection to aid in these more complex situations.

Arrow Tool

The Arrow Tool is the default tool for EazyDraw. If there is no other specific action selected the mouse cursor reverts to Arrow Tool which is the tool used most often to select a single graphic or particular set of graphics.

A mouse click may select or deselect a graphic. Selected graphics are shown with their Control Handles, the small colored boxes. Deselected graphics have no handles. A selected graphic's shape may be modified with a click and drag on one of these handles, but first it must be selected.

The Arrow Tool performs a selection, de-selection or a combination of the two with mouse clicks or clicks and drags. Its behavior can be modified using the Command (Apple) Key or the Shift Key.

Use the Shift Key to add a graphic to the current selection. If several graphics are selected, the shift key will deselect one of the selected graphics with a mouse click.

When there are overlapping graphics mouse clicks will select only the top graphic. Normally further clicks will not pick an underlying graphic behind the selected graphic. The Command (⌘) key overrides this functionality so that underlying graphics may be selected. When the Cmd-Key is held down, subsequent clicks in the same area will deselect the top graphic and select the next underlying graphic. The procedure may be continued to sequence down through the stack of overlapping graphics. If the Cmd Key is released this functionality stops so that the selected graphic may be moved with the next click and drag. The Shift Key may be used to add multiple overlapping graphics to the selection.

Many times when working with a large complex drawing very specific selection and de-selection capabilities are required. If the Arrow Tool doesn't provide the necessary functionality there is a Selection Tool Palette that provides six additional selection and de-selection tools such as free form "Lasso." The Hand Tool on the main tool palette is available for moving a graphic or set of graphics after they have been selected.

Undo: Undo works with the graphic selection action. Most macOS applications do not have this behavior. Apple's user interface guidelines advise that undo *not* be applied to selection/deselection actions. This is not the best practice for a drawing application. Imagine the situation where several graphics need to picked out and selected for a change of color, you have managed to click and select all but the last one and - "whoops" a click is made in the wrong place and all are deselected - you must start over. With EazyDraw a single undo will bring back the selection and give you another chance to select that crucial last graphic.

Touch or Enclose: The View main menu, Select submenu provides two choices for Arrow tool drag selection behavior. Touch will select a graphic if it is merely touched by the dragged-selection rectangle. Enclose select requires a graphic to be completely enclosed. This setting applies to the default Arrow tool behavior.

Use the Select submenu to manage this behavior. These selections are at the bottom of the submenu, the choices are "Drag Touch" and "Drag Enclose." Changes are persistent when quitting and restarting EazyDraw.

Node Edit (white arrow): The Node Edit tool is used to adjust multiple graphic handles in unison. Most commonly it is used for editing Bezier control points but it works with all interactive editing Handles. This is tool is often called the White Arrow tool in Vector drawing applications.

The selected set of Nodes may belong to multiple individual graphics. They do not need to be all associated with the same graphic

Click on a graphic to activate the graphic and present the available editing handles. This behavior is active while the Node Edit tool is active, there is no need to change back to the normal Arrow tool to perform graphic selections. With respect to graphic selection and deselection the Node Editing tool behaves the same as the Arrow tool. Shift click to activate additional graphics.

Click down on a selected node, hold the click (down) and begin the drag operation. This will move all handles in the current set. The beginning of

the motion distinguishes the click from a deselect action.

The node selection activity is included in the Undo / Redo stream for your drawing. Some might find this "non-standard" but for a drawing application selection and deselection is an important process. For example a carefully chosen set handles might be selected, then one additional click might be unintended. In this case the work of creating the selection set is not lost - simply perform Undo and proceed anew.

Selection Tool Palette

The Selection Tool Palette provides specialized tools and modes for selecting graphics. These add to the basic capability of the default Arrow Tool for selecting and deselecting graphics. Situations arise where a certain set or group of graphics must be selected, separate from other graphics tightly woven together. In these situations it can happen that even very careful attention to click spots and sequences with the default Arrow tool just cannot provide right combination of selecting and avoidance. In these cases the specialized

selection tools found on the Selection tool palette are used. This palette is accessed from the main View menu.
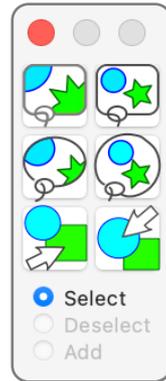
The set of radio buttons at the bottom of the palette are used to modify the normal selection function of the selection tools found on the Selection Tool Panel. To use these buttons the Selection Tool Palette must be visible on the desk top. The state of the radio buttons at the bottom of the selection tool panel determines the actual action of these tools.

Select: The selection state is cleared and any graphic clicked becomes the new selection set. Multiple selections are possible using the Shift Key. This is similar to the normal default Arrow key selection mode.

Deselect: The selection state is not cleared and any graphic clicked is removed from the selection set.

Add: The selection state is not cleared and any graphic selected is added to the current selection set.

The radio buttons have no affect on the default select function of the Arrow Select Tool. If you need these features use the Front Select Tool or Back Select Tool of the Selection Tool Palette.

The tool buttons found at the top of this panel each change the mode for a click and drag of the mouse on the active drawing area. Each are similar to the click and drag out a rectangle method of selecting with the normal Arrow tool, but with a different twist for each.
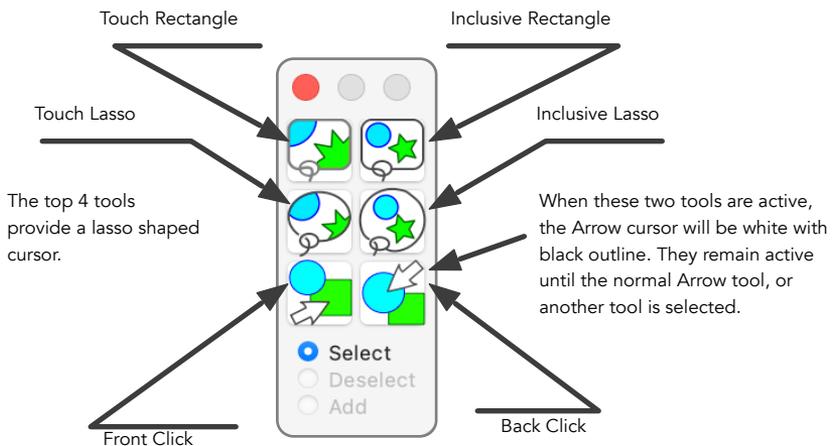
The select tool buttons remain active after a select. A click of another tool or the default Arrow tool is required to clear these buttons' action state.

Touch Rectangle: Select by dragging out a rectangle. Any graphic that is touched by the rectangle is selected. Similar to the default Arrow tools action.

Inclusive Rectangle: Select by dragging out a rectangle. A graphic must be completely enclosed by the rectangle to be selected.

Touch Lasso: Select by tracing out a free-form lasso shape. Any graphic that is touched by the lasso is selected.

Inclusive Lasso: Select by tracing out a free-form lasso shape. A graphic must be completely enclosed by the lasso shape to be selected.

Touch Rectangle

Inclusive Rectangle

Touch Lasso

Inclusive Lasso

The top 4 tools provide a lasso shaped cursor.

When these two tools are active, the Arrow cursor will be white with black outline. They remain active until the normal Arrow tool, or another tool is selected.

Front Click

Back Click

Front Click: Select by clicking, this tool favors graphics that are in the front of the drawing scene, or above other graphics.

Back Click: Select by clicking, this tool favors graphics that are to the back of the drawing scene, or behind other graphics.

There are individual customizable toolbar tools for each of these selection tool buttons, and there is a customizable toolbar smart button that provides a pull down menu including all of these buttons. If a situation arises where this palette is used frequently, it may be helpful to include a button, the pull down menu, or even a couple of the pull down menus in your toolbar.

Move, Resize and Edit

You may interactively edit the shape of any graphic with the on-screen handles. The "Handles" are the small colored circles that appear when the graphic is selected. In most cases these are colored red and green, but other colors are used to indicate different uses and actions for the handles. Colors, size, and shape (square, triangle, diamond, etc.) of the handles are specified on the user interface theme panel accessed from the main EazyDraw preferences panel.

You may interactively move any graphic with a simple click and drag when the default arrow tool is active.

The graphic must first be selected, usually with a simple mouse click, to enable the move or edit action.

All possible interactive editing and moving actions may be performed in a precise numerical fashion using the Graphic Details drawer.

A graphic is moved interactively by first selecting the graphic with a click of the mouse cursor. A "Selected" graphic is indicated with small circular colored handles. A selected graphic is moved with a click and drag motion of the mouse cursor. Lift the mouse when the desired position is attained.

A graphic is edited or changed interactively by first selecting the graphic with a click of the mouse cursor. Each indicated handle provides control to edit the shape of the graphic. Click down on the handle and drag to move the control point to a new location. The shape of the graphic will evolve to follow the control point as it is moved.

Duplicate: The action "Option Drag" will duplicate a graphic before it is moved. This is a convenient method for creating a duplicate of a graphic that is present on the drawing. Select the graphic, then hold down the Option key and drag the new copy of the graphic to the desired location on the drawing.

A copy of an existing graphic may transferred to a new drawing with the "Drag and Drop" technique. Both the drawing containing the graphic and the destination drawing need to be open and visible on the screen. Select the graphic with a mouse click. Drag the graphic off the source drawing, when you "leave" the drawing the graphic will snap back to the original location on the drawing. An image of the graphic will appear floating over the desktop. Drag this image to the desired position on the destination drawing window and lift the mouse button.

The Drag and Drop technique may be used with other software applications running on your system and the desktop. The same steps are used to pull the graphic off the EazyDraw drawing. Move the floating image of the graphic over the destination application window, if the destination application has the capability to accept the graphic a "Plus" indicator should appear next to the cursor. When moving between applications, the graphic is converted to a common graphic interchange format. Actually several formats are provided by EazyDraw so that the best possible representation is used by the other application. These formats are arranged by the Copy Paste Order setting on the EazyDraw preferences panel.

The degree of editing allowed for a graphic is controlled by the Interactive setting chosen on the interaction menu. This setting will determine the number of resize and editing handles provided for the graphic. This is often used to constrain a graphic to uniform resizing. The uniform interaction level provides only two resize handles, these are used to set the size of the graphic while holding all proportions constant.

Bezier curves have control handles at each vertex and two additional control handles for each segment of the curve. These are referred to as the Bezier control points. The controls at the vertices define the points that the curve passes through. The editing handles at the Control points are used to define the shape of the Bezier path, in particular they define the slope of the curve at the end points of the segment

Move Image

When moving a graphic or several graphics you have several choices for the image that is used during the move process. Some users and projects need a simple dashed rectangle to provide visibility, in other situations it's better

to be able to see the moving graphics in full detail. This user preference is provided on the main Preferences palette, found near the top right.

The selection depends on the graphics being drawn and personal preference. The best way to choose this parameter is to change the setting and return to a live drawing and move an assortment of graphics.

The setting is automatically persistent (remains the same after quitting and restarting EazyDraw) and applies to all drawings.

The popup selections are descriptive and involve using an actual image of the selected graphics and or a bounding dashed rectangle. If the image is selected a full or partially transparent image of the selected and moving graphics is generated.

If a choice elects the dashed rectangle, the move image includes a partially transparent dashed rectangle that just encloses the graphic or graphics selected.

The dashed rectangle can enhance responsiveness when working with a large drawing and an older CPU. This is because the rectangle may be generated more quickly than the full image of all the selected graphics. This is not normally an issue with today's processing speeds.

The dragging image is abbreviated (chopped - off) when the moving graphics extend off the visible portion of the drawing window. When moving a short distance this affect will not be noticed as an extra perimeter of the drag image is included in the image. The limit of the chopped image is shown in the case of larger movements, or when dragging the image off the drawing to drop onto another drawing or document.

Editing Bezier Curves

Bezier Curves are edited by moving an individual vertex or a control point. The curve needs to be selected to present the vertices and control points for modification.

EazyDraw provides two flavors of Bezier Curve, free and continuous. These are discussed above.

Handles are used to move vertices and control points. The "Handles" are the small colored circles that are drawn on a Bezier Curve that is selected. The vertices Handles are red or purple colored. The control point handles are blue.

Modifying a Bezier curve is performed by moving vertices or control points. These points are moved with a mouse click and drag of a Handle. You need to click very close to the handle to "pick" it up for movement. The curve is redrawn as the picked point is moved. The operation is completed with the release of the mouse button which terminates the drag operation.

If a curve is selected and a click and drag is performed without hitting a Handle, the whole curve will be moved with the operation.

Each control point is associated with a particular vertex. When a control point is selected and moved a red line is shown connecting the control point to its associated vertex. This is useful for complex curves when the association of a control point to a vertex might not be obvious from their positions on the drawing.

A Bezier segment is defined by the two end points and two control points. The curve locus and slope transitions smoothly from the start to the end with the starting and ending slope determined by the line to the associated control point. You may visualize the control of the curve by noting that the slope at the midpoint of the curve is parallel to the line connecting the control points, and that the curve is pulled toward the control line. This control line is shown in blue, connecting the two control points (blue or yellow).

If the Bezier curve is a smooth Bezier curve, the slope of the curve must vary in a smooth continuous fashion at each purple vertex. This means that when a control point is moved the control point on the opposite side of the associated vertex must move too. This constraint is depicted by a light blue line connecting the two control points and pivoting at the vertex. As you move one control point the control point line pivots about the vertex or node.

See Arrow Tool topic above for a discussion of the Node Edit or "white arrow" tool. This is tool provides a way to select sets of Bezier vertices and control points for movement in unison.

Primary Editing Tools

The top six tools provided on the Primary tool palette are used for selecting and modifying or editing graphics. They are used frequently, especially the default Arrow tool found at the top left of this tool palette. The Arrow tool is discussed with the selecting graphics topic above.

Tape Tool

The Measuring Tape Tool has the same behavior as the Arrow Tool with the addition of a live on-screen readout of the exact cursor position, key graphic parametrics, or various distances. These measurements use the scale of the drawing in the units defined for the drawing on the Scale palette.

The tape tool adds a numeric information box to your cursor, this is a live readout which indicates the position of your cursor on the drawing. As you move the cursor the numeric information is continuously updated to reflect your movements.

The tape tool cursor seeks out selected graphics, when near a selected graphic the numeric readout will switch to report specific numeric metrics pertaining to the graphic's size and position. As you float the cursor over a graphic the information reported may change, each graphic shape has different metrics of interest that this cursor will sense and report. For example, if the cursor is near a graphic's center, the cursor will snap to the center, show a red cross hair, and report the exact location of the graphic's center.

The metrics reported are too numerous and dynamic to explain in a written manual. In general any point of geometric interest will likely be sensed and reported by the tape measure cursor. Some examples are: an intersection of two lines or curves, the slope and coordinates of a line, the slope of the tangent of a curve, radius of an arc or circle, length of a line.

Some of the metrics are snapped and shown as fixed points. Others exhibit a constrained behavior rather than a

hard snap; for example a, moving indicator will show on a curve and it is constrained to the curve, showing the tangent of the curve as you move along the curve.

The backdrop color of the floating cursor provides several visual clues to indicate the form of the information being reported. Soft yellow indicates the simple free cursor readout, where red indicates that a specific fixed point of interest is snapped and reported.

We repeat that a graphic needs to be selected to enable the reporting of interesting metrics. It is possible to miss the true power of this tool if you simply pass it over a drawing with nothing selected. Select a graphic of interest then move the cursor all around it. In some cases you can get different information just by moving from the inside to the outside edge of a graphic. Note that an intersection is not sensed, snapped, and reported unless both intersecting graphics are selected.

On Screen Ruler: When the tape tool is active, Option click and drag will provide an on-screen movable ruler. This allows measuring distances in a natural way, just as you might do at a job site. If you begin a measurement with the Tape cursor snapped at a point of interest; for example, an intersection of two graphics, the ruler is anchored at this unique point on the drawing. Points of interest and curve constraints are still active when the live ruler is active. This means that it is easy to measure exact distances between particular locations on a drawing, such as the distance from a point to a curve, and various points along a curve.

Tangent and Normal: To obtain a tangent and normal line at a single point on a shape: first enable the Tape Cursor, move the cursor to the point of interest on a selected graphic, stop all mouse movement by taking your hand away from the mouse (or touch pad), review the values shown for the tangent, finally: type "t" and or "n" to obtain a tangent or normal to the curve. This action will add the tangent and or normal to your drawing. Use one of the Pin actions (Format main menu) to fix desired aspects of the new additions to your drawing.

Moving With the Hand Tool

The Hand Tool is for moving graphics. It is provided as an alternative to the Arrow Tool. Use this tool to move a graphic or group of graphics after they have been selected by the Arrow Tool

or one of the tools on the Selection Tool Palette. The Hand Tool is us sole purpose of moving graphics. The graphics are selected with other
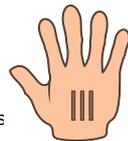
tools. The graphics are moved with a click and drag of the mouse. Multiple click and drag sequences may be used without fear of changing the makeup of the set of selected graphics. The move process may be repeated until the graphics are in the desired positions.

Another tool must be clicked to finish the use of the hand tool.

Shift Key: The Shift modifier key is used to add a graphic to the set of selected graphics. It won't allow de-selection of graphics. The Shift Key can't be used to add a graphic that overlaps with the selected set.

Cmd Key: The Apple Command modifier key is used to remove a graphic from the set of selected graphics. Use this to deselect a graphic.

Space Bar Panning: The space bar or the Option (alt) modifier key will change the Hand Tool to a panning tool for the whole the drawing. Hold down the space bar then click and drag to reposition the active viewing area of the drawing.

There are two main uses for the Hand Tool. It is useful to avoid losing a particular selection arrangement with an inadvertent mouse click when using the Arrow Tool. It is also useful to avoid modifying graphics with unintentional clicks on a Resizing Handle. This latter situation can be a problem for very small graphics when an attempt to move might result in an unintended editing action.

Rotate Tool

The "Rotate Tool" is for rotating existing graphics. It may be applied to any graphic. The graphic does not need to be selected, but selected graphics are chosen by EazyDraw over others in case of overlap. Visual feedback is provided so that you may be certain how the action will effect your drawing. Undo works, in case the resulting rotation turns out different than desired. Rotating many of the charting graphics requires that they are converted to Bezier paths. This conversion happens automatically.

Start the operation with a mouse down click. The point of the mouse down becomes the pivot point for the rotation. Next drag out a rotation line, this will extend away from the pivot point, drag this line across the graphic to be rotated. A circle appears when the line overlaps a target graphic. The circled intercept point is

the point that will be rotated about the pivot point. Next lif the target graphic by sweeping an arc

from your initial mouse down pivot point. A faint copy is shown interactively rotated with your mouse motion. The final mouse click applies the rotation.

Don't worry if you do not initially obtain the exact desired result, undo (Cmd z) will return the graphic to its initial position and orientation.

An extra handle appears at the centers of selected graphics when the rotate tool is activated. If the first mouse down click is near one of these marked centers, the exact center will become the pivot point for the rotation. This technique allows convenient rotation of graphics about their center.

If the shift key is pressed, during the rotation phase, the rotation angle is constrained to 15 degree increments.

The graphic's form may change with rotation. For example, if a Rectangle is rotated its form will change to a Rotated Rectangle. This is done automatically. The changed form may be evident with different style editing handles, or a different reporting format in the Graphic Details drawer.

Knife Tool

The Knife Tool is for trimming, cutting or removing vertices. It can be used to cut any graphic except a Text Area or an Image. The graphic does not need to be selected.

The knife tool actually provides two rather distinct capabilities. First, it is used to cut a line or curve into two separate segments. Second, it may be used to remove a node or vertex from a Bezier path or curve. The knife is the only way to edit out a node of a curve, so it is important to remember this second capability. Notice that the second function does not actually cut the target graphic.

Visual feedback is provided to indicate how the cutting action will change the drawing. Undo works, in case the results are different than desired.

The knife will trim two graphics with overlapping curves, exactly at the intersection of the curves.

Start a Knife operation with a mouse down click. Then a drag operation will produce a red line attached to the mouse cursor. The cut points are specified by dragging this cut line over target graphics. An open red circle will indicate the positions of the cutting action. Nothing happens until the mouse is released. At that time the graphic(s) is cut at the indicated points.

Remove Vertex, or Node: If the cut target spot is moved close to a vertex of a graphic the cut point indicator changes to a filled blue square. This indicates that cut action will not cut the curve, instead the action will remove the targeted vertex. For example this process could be used to convert a square into a right triangle.

Intersection Trim: If a pair of cut target spots are positioned close to the intersection of two graphics, the cut points merge and show a green hue with a cross mark. If a cut is made in this situation, the two overlapping graphics will be cut at the precise intersection point.

Note that most times after the cut there is no visual change to the drawing. A line for example when cut still appears as the same line. The difference is only noticeable when you select the line and see the new end point handle at the cut point. Or in the case of trimming, a second step is needed to select the unwanted segment and click the Delete key. Cutting intersecting graphics at an intersection may be use to trim ends at an intersection. The precise intersection cut may be used in preparation for welding the remaining curve sections to form a new path. The Welded path is formed using the Convert Menu or the Welded Group selection found on the Grouping submenu.
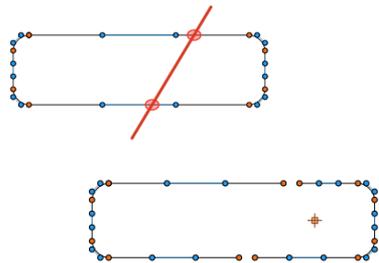
The definition of "close" for snapping to a vertex or an intersection is dynamic with respect to the degree of zoom for the drawing window. The distance is approximately the size of the control handles. If a cut needs to be made close to a vertex or intersection, zoom in, this will make the effective snap distance smaller and the cut point may be positioned more precisely - due to the higher zoom - and will avoid the nearby vertex.

In some cases a vertex may be located at just the place where a cut is needed. The vertex may be first removed, without much alteration of the path, then the actual cut made with a second use of the knife.

Multiple Cut Points: The knife will cut at more than one point, all indicated cut points are cut at the completion of the operation. This is useful because all cut points lie on a single line, so a clean cut is possible with a single use of the knife. Cutting some graphics will change the form of the graphic. For example, cutting a circle will not only add the cut point, this action will transform the Circle to a

Smooth Bezier Curve. You may ascertain these side effects by using the Graphic Details Drawer, or notice the change of the form of the editing handles.

Option and CMD keys: The option and command (apple) keys may be used to suppress finding vertices or intersections. The keys may be depressed or released while adjusting the knife line; changes apply interactively. A small motion is needed to initiate a change in the key Depress Option key to suppress finding vertices. Depress Command key to suppress finding intersections. Both keys may be pressed together; in this case the user has full control of the placement of the cut point.

Insert Tool

The "Insert Tool" is for adding vertices or nodes to graphics. Visual feedback is provided so that you may be certain how the action will change your drawing. Undo works, in case the results are different than required. And the Knife Tool may be used to remove the added vertex at a later time.

The "Insert Tool" is used to add a vertex to a segment of a graphic. Start the operation with a mouse down click. Then a drag operation will produce a line attached to the mouse cursor. The pivoting line naturally provides increased accuracy and precise visual feedback for interactively positioning the precise position of the new node. If the initial click is positioned further from the target point, more leverage is provided to finely position the insertion

The segment and insertion point are specified by dragging the insertion indicator line over the target segment. An open green circle will indicate the position of the new vertex. Nothing happens until the mouse is released. At that time the graphic is modified and the vertex added.

Note that most times after the insertion there is no visual change to the drawing. For example, a line with an added vertex will appear as the same line. The difference is only noticeable when you select the line and see the new vertex's handle at the insertion point.

Inserting a vertex on some graphics will change the actual graphic. For example, inserting a vertex on a circle will not only add the vertex, this action will transform the Circle to a Bezier Curve. You may view these side effects by using the Graphic Details Drawer.

Quick Keys

The Quick Keys palette provides a method to assign any of the EazyDraw tools to a key on the keyboard. The drawing tool may be invoked quickly with a touch of the assigned key.

This applies to all the built-in EazyDraw tools including both the editing tools and graphic creation tools.

Quick Keys do not use a command key. This makes them very efficient for fluid interactively drawing. These function without keyboard modifiers such as Command, Option, Shift, or Control. This allows Quick Key use without interference with menu keyboard shortcuts.

Assignments are inspected and edited with the Quick Keys assignment palette. This palette is accessed from the EazyDraw main menu.

Quick Keys are normally assigned with a drag and drop. Drag the tool from the "home" tool palette for the tool. Drop the tool on one of the keys of the keyboard schematic on the Quick Keys panel. You will then see the tool's icon on the assigned key.

The "Factory" button clears all the keys and loads a default set of assignments.

Clear All removes all assignments. Leaving nothing assigned to any key. Caution, there is no undo or warning for this.

Click on a key to select the key. Selected keys show with a red box border. The "Minus" key is used to delete an assignment. All selected keys with assignments are cleared (no - assignment) when you click the Minus key.
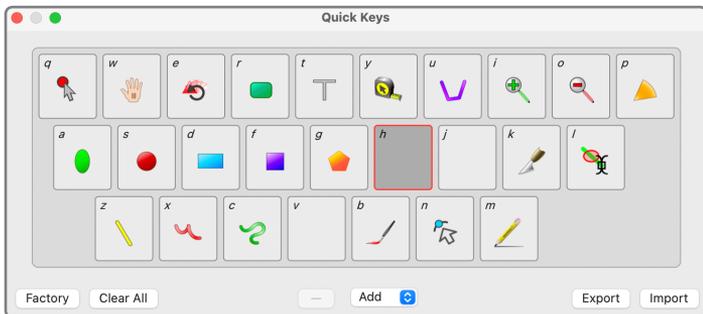
Hold down shift key while clicking to select multiple keys. Click on a selected key to deselect the key.

The Add popup menu provides an alternative to drag-n-drop for assigning an action to a key. First a key is selected, then the popup menu and the associated submenus to assign an action to the selected key. The "Other" submenu on the Add popup menu allows a few menu commands that are sometimes needed for fluid creative drawing.

Export and Import are used to save or load a set of assignments. The assignments are recorded in a standart Property List XML text file. The assignment arrangement may be saved for future use, archival, or exchange with other users.

This panel is fully resizable. Adjust the size with the lower right corner of the panel. The panel can remain open and used as a visual reference for current assignments.

There are no standard assignments for these quick keys. You will design an arrangement that makes efficient use of your free drawing hand (non mouse, or tablet pen hand). The keys are not generally assigned according to a naming convention (like "p" for pencil). Assign them totally for efficiency. One approach is to place 3 related assignments on 3 adjacent keys, see how brush, node edit, and pencil are assigned in the illustration example above.

The assignment information is exported to a normal text file which may be viewed with any text editor. The information is human readable in the form of a property list dictionary. The macOS application, Property List Editor is used to view and modify these files. Of course care must be taken when modifying a file in this fashion.

Quick Keys information is saved with EazyDraw defaults, in the system library folder. This information is not found in the Applications Support folder.

Chapter

9

Graphic Shapes

Tool Palettes

EazyDraw provides over 150 unique defined graphic shapes. They are roughly organized by tool palette according to drawing activity. But this is only a loose organization to aid in locating the associated creation tools; shapes from the various palettes are used for nearly all drawing activities. One should not exclude using shapes based on drawing activity; for example, a curved wall for an architectural drawing could be a road on a map, or a ribbon on a birthday card.

The graphic creation process described in detail in this chapter is not the only way to add graphic elements to a drawing. A common short cut is to create by duplicating similar elements. The master element may be another graphic on a drawing, or a graphic from a different drawing, or a master graphic from a master template drawing or graphic library.

This section will document creating and editing of the various graphic shapes. Attempts are made to categorize shapes with common characteristics to avoid unnecessary repetition of documentation.
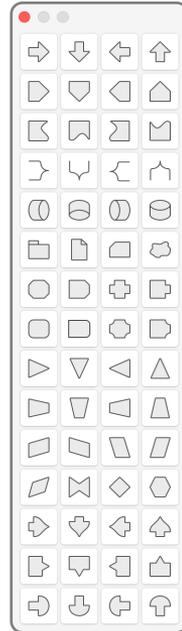
Toolbar Variants

Drop-down menus for all drawing tools may be added to the toolbar. This can provide a quick and convenient method to access shapes that are used frequently or an alternative to numerous floating palettes occupying screen real estate. There is a tool access button for each of the main drawing tool palettes: Tools, Charting, Stellate, Math, and Technical.

These tool buttons are "smart" and will remember the last shape chosen. This most recent shape is shown as the the tool icon. The tool shown may be used with a single quick click of the mouse.

Use the customize toolbar panel, which is accessed from the bottom of the View main menu, to add these tool menu buttons to the toolbar.

It is possible to have duplicates of these menu tools on the toolbar. This arrangement introduces a dynamic aspect to your toolbar. Use different instances for different individual shape selections and the toolbar will evolve with drawing activity, presenting frequently used shapes for single click access. Click and hold one of these pop-down menu buttons to access a hierarchal menu of all the shapes found on the corresponding tool palette. The menu is organized by row, as the tools appear on the represented palette. Selecting a tool will make it the represented action of the toolbar button, and will initiate creation of the corresponding shape. To reuse the last tool selected by the button menu, simply click the tool in the toolbar, this will initiate creation of the corresponding shape.
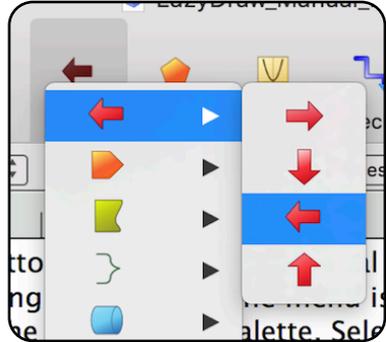
Each row of the hierarchal menu will evolve to present the last used tool of that row. The icon shown for the row will represent this last used selection. To reuse this shape it is not necessary to navigate the sub-menu, just select the element on the primary menu.

Double clicking the main toolbar button will "stick" the tool. In this case you may repeatedly draw the selected shape. To clear the "sticky" state, click the main selection (arrow) tool, or any other tool. You may also clear a sticky state with a double click on the drawing canvas.

The figures above show the full Charting tool palette and how these tools are presented as pull down menus in the drawing window's customizable toolbar.

Convert Menu

While any desired shape may be drawn using one of the Bezier free-hand tools and some care and patience, this is not the most practical method for creating vector graphic drawings. For efficiency and appearance's sake, it is best to try to use one of the provided graphic shape tools to start with a canned shape then edit and modify the form, if necessary.

The convert submenu, found on the Tools main menu, is used to change the form of a graphic. All graphics except bitmap images are based on Bezier paths. This is true even for typeset text; each character of a text graphic is an individual Bezier path constructed or drawn in the same manner as other graphics found on a drawing. More on this topic is found in the Text chapter.

The convert submenu provides a way to change the editing form of a graphic. The new form may or may not have a different visual appearance; in most cases there is no discernible change to the outward appearance of the graphic. But the new form will have different characteristics and provide different modification possibilities. For example, a Rectangle is very restricted in the allowed modifications. Its sides are held orthogonal, horizontal, and vertical. The rectangle may be converted to a polygon. It appears exactly the same after the conversion. However, after conversion each vertex of the polygon may be moved independently.

A graphic(s) must be selected before any of the conversion options are enabled. Each initial graphic will have a particular set of forms for which a conversion is possible. The allowed forms are enabled and the ones that are not possible are disabled.

This technique will convert typeset text to Bezier outlines. This is useful to apply advanced effects to text, prepare a document for press, or to stretch and alter the size of the text with more degrees of freedom than a change of font or layout rectangle. Converted text may not be edited as text after
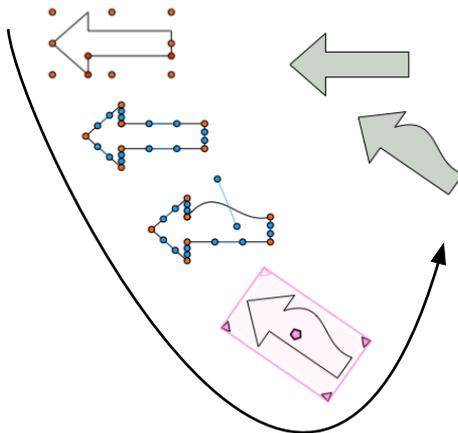
conversion, the conversion changes each character to a Bezier path with the corresponding geometric editing characteristics.

The convert to "Lines" menu selection is unique. This command will create several new graphics (not one). The starting graphic is broken into multiple line segments and a new independent line is created for each segment.

Filled Shape(s) will convert a graphic, that has an outline, to filled graphic counterparts that do not have an outline. For example a line is converted to a rectangle. A rectangle with an outline and fill is converted to two rectangles-one somewhat larger than the other both rectangles have fill but no outline. This conversion will have several uses, one is to convert a graphic to be drawn with fill-only-no-outline which can have advantages for when scaling by large amounts as there is no need to specify how line widths will scale with size changes.

The Close menu selection adds a straight path segment that joins the end of curve to the start of the curve. A closed path is drawn with a clean joint at the start/end vertex. The Join Style is applied at this vertex in the same manner as all the other vertices of the shape. If a shape is drawn by simply positioning the end of the curve at the point of the start of the curve, close inspection will show a rough joint that is actually defined by the Cap Style at the start/end vertex.

Welded Bezier and Joined Bezier will form a new path that is the composite of a set of selected multiple paths. The Welded action will form a new path by connecting each selected path with a straight line segment. The Joined Bezier connects each of the selected paths, but the connecting segment is invisible. For the Joined path a Move-To segment rather than a Line-To segment is used to connect the segments.

Image	
Vector Graphic	
Annotation to Bezier	
Filled Shape(s)	
Path	⌥⌘B
Bezier Path	⌘B
Continuous Bezier	⇧⌘B
Hybrid Path	⌃H
Separate Effects	
Closed	
Welded Bezier	
Joined Bezier	
Unjoined Bezier	
Lines	⌃⌘B
Wall	
Ribbon	
Square	
Rectangle	
Rotatable Rectangle	
Rounded Rectangle	
Radius Rectangle	
Polygon	
Equilateral Polygon	
Star	
Cross Star	
Connector	
Orthogonal Connector	
Orthogonal Path	
Orthogonal Radius Path	
Circle	
Oval	
Rotatable Oval	
Arc	
Pie	
Text to Annotation	
Annotation to Text	

Conversion can be very useful for creative drawing. For example, a circle may be a good starting point for a shape. To draw the shape, start with a circle then convert to a Smooth Bezier. Add vertices using the Insert Vertices tool. Then deform the Bezier to attain the desired shape. Starting with the circle is much easier than trying to construct a free-hand circular Bezier Path.

Converting text to a Bezier Path (or Continuous Bezier Path) is useful for adding style to individual characters. After conversion you may add Stroke and Fill or other fill effects such as Gradient Fill or Pattern Fill. You may want to modify Stroke Position Stroke Position for best appearance.

Converting with the Weld action takes a group of graphics (all must have a Bezier Path - no Text objects) and merges their paths into one Bezier path. The topmost graphic, in the painting order, is used as the master for specifying the stroke and fill style of the graphic. The paths are automatically ordered in an end-to-end fashion.

Joined Bezier is useful for cutting holes, transparent voids, in graphics. To obtain the hole cutting affect the Even Odd winding rule is used, after the paths are Joined. Or reversing the inner path before the Join might provide the desired interior hole.

Smooth, Shape, and Round

These commands will smooth or round off the corners of a polygon or path. The commands are found at the bottom of the Transform submenu, of the Tools main menu.

These are simple menu commands. Select a graphic then execute the menu command. The graphic is transformed.

The difference between the three commands is the degree of smoothing applied to each corner of the shape. Round provides the least shape change by only rounding off the corner. Smooth alters the path to a greater degree with a more gradual transition from one leg of the path to the next. Shape is intermediate to the two.

The details of the algorithm are: The new path passes precisely through the center of each leg of the originating path, and the slope of the new path at this center is equal to the slope of the leg of the originating path.

These are useful for creating free-hand shapes. It may be easier to draw a straight lined approximation to the desired shape then have the computer perform the shaping in a precise mathematical manner.

Rectangular Shapes

Several graphic shapes are based on a common user interface centered on the creation and editing properties of the basic rectangle. Most of these are found on the Charting tool palette and they include the basic shapes of the oval, rectangle, circle, and square.

For shapes other than the rectangle, there is an imaginary enclosing rectangle that exactly encloses the actual shape. This is normally referred to as the bounding rectangle.

All of these shapes are oriented square to the Cartesian axis of the drawing. There is no rotating or other defining angle for these shapes. The shapes are created in the same manner that rectangles are created.

These shapes have the same editing handles that are provided for a rectangle. Some shapes will have additional adjustments provided by additional editing handles, while others are defined fully by the virtual bounding rectangle. The basic rectangle handles are drawn with a brown color and the additional handles are normally a dark blue. The size of these shapes are adjusted with a click and drag of one of the provided editing handles. If a corner is adjusted, both the width and height is edited simultaneously. If one of the handles on the center of a side is adjusted the width or height may be adjusted without change to other dimension.
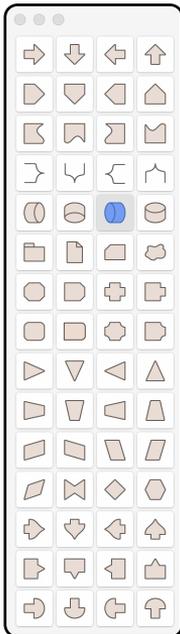
Uniform Resize

The Option key is used to adjust the size while locking the aspect ratio (width as a percentage of height) constant. To resize in this fashion, use the

Option key, depress the key before clicking down on one of the resize handles. In this case width and height will vary as you resize, holding the ratio of width to height constant.

Images are also bounding rectangle graphics. They are resized in the same fashion. There is no tool button for creating images; they are always created for you when brought into a drawing, for example, as the result of a drag and drop operation.
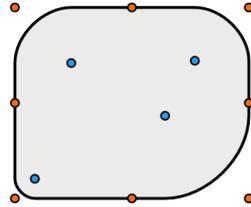
There are 8 forms of rounded rectangles. In general each form has different geometry that *cuts-the-corner* of the rectangle. Their creation tools are found about halfway down on the charting tool palette. As explained, they all have the standard rectangle resizing characteristics. They have 1 or 4 additional blue adjusting handles to set the radius of cut corners, either all together or individually.

Graphic Details

As is the case with all graphics, these forms are inspected with the Graphic Details drawer. All will have a common specifier for the bounding rectangle. The top left corner is defined by the X (across) and Y (down) Cartesian coordinates, measured to the scale and in the measuring units of the drawing. Move the graphic numerically by entering new position coordinates in the text boxes provided. The move does not take place until the Enter key is typed, after typing a new number.

The width and height of the bounding rectangle are shown again to the scale and in the measuring units of the drawing.

Graphics that provide additional adjusting control handles have additional information available in the Graphic Details drawer. This is in keeping with EazyDraw's design philosophy of no hidden variables. This means that any adjustment provided interactively on screen will have a corresponding numeric entry on the graphic details drawer.

These adjusting values are generally self-explanatory. In some cases, an additional selector is required to provide access to various control values in the limited space available on the Graphic Details drawer. The Shaped Rectangle shown in the example on the previous page uses this approach; note the stepper provided to sequence through the independent radius values for the 4 corners of the shape.
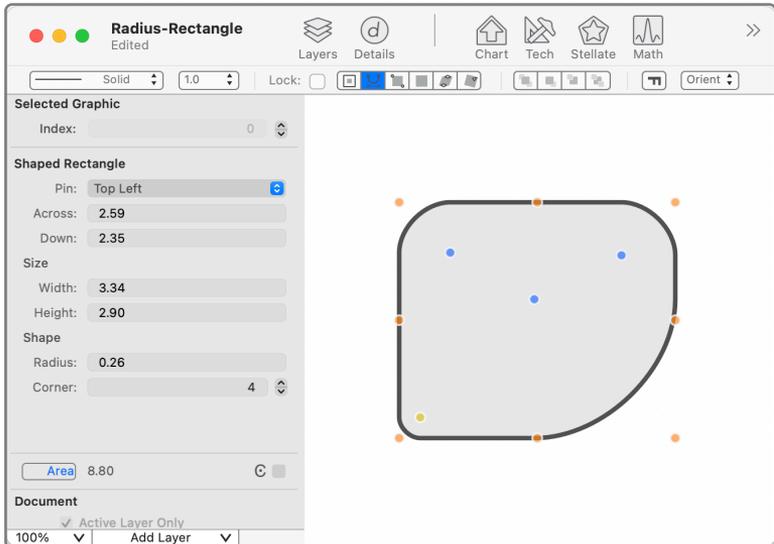
Rotated Rectangular Shapes

Several graphic shapes are based on a common user interface centered on the creation and editing properties of a rotated rectangle. Most of these are found on the Math tool palette and they include the basic shapes of the rotated oval, and rotated rectangle.

For shapes other than the rectangle, there is an imaginary enclosing rectangle that is drawn with a defined angle with the rectangle's two axes aligned with respect to the angle.

All of these shapes are defined by a width and height, the width dimension being along the defining angle and the height perpendicular to this imaginary line.

The shapes are created in the same manner as rotated rectangles are created, this is described above in the tool usage section. The creation cursor is always the Angle creation cursor, shown to the right.

These shapes have the same editing handles that are provided for a rotated rectangle. Some shapes will have additional allowed adjustments provided by additional editing handles, while others are defined fully by the virtual bounding oriented rectangle. The basic rectangle handles are drawn with a red color and the additional handles have a different color. The size of these shapes is adjusted with a click and drag of one of the provided editing handles. If a corner is adjusted, both the width and height is edited simultaneously. If one of the handles on the center of a side is adjusted the width or height may be adjusted without change to other dimension. The width and height adjustments apply along the defining axis.

Rotate Handle

A yellow handle with a small arc indicator is provided for adjusting the defining angle for the graphic. Click and drag on an arc referenced at the graphic's center to adjust the angle of rotation.

Shift for Compass Points: If you hold down the Shift key while rotating the angle will lock at the primary compass points, 0, 90, ... 15, 30, 45, 60,.. degrees. The shift key may be pressed during the rotation, no need to apply before starting the procedure.
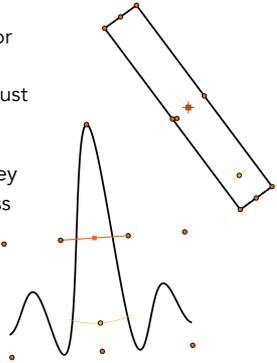
Numeric Specification

As is the case with all graphics, these forms may be inspected with the Graphic Details drawer. All will have a common specifier for the width and height of the defining rectangle. The center is defined by the X (across) and Y (down) Cartesian coordinates, measured to the scale and in the measuring units of the drawing.

You may move the graphic numerically by entering new position coordinates in the text boxes provided. The move will take place when you click the Enter key after typing in a new number.
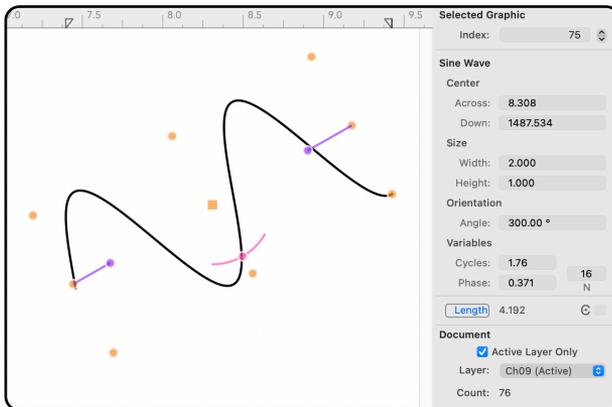
Star-Like Shapes (Stellates)

Several graphic shapes are based on a common user interface centered on the creation and editing properties of an equilateral polygon, and a star. Most of these are found on the Stellate tool palette and they include the basic shape of the equilateral polygon.

All of these shapes are defined by an angle of orientation, an enclosing circle or radius, the number of sides, and in some cases an inner circle with a second and smaller radius. The shapes are created in the same manner as the Equilateral polygon. The creation cursor is always the N sides creation cursor, shown to the below. During the creation process the keyboard is active and a number may be entered to change and set the number of sides, or points of a star.

These shapes all have the editing handles that are found on an equilateral polygon. These handles all offer the same basic adjustment capability. Click on any one of the handles and adjust the bounding circle radius of the shape. Simultaneously the orientation of the shape will follow mouse movements. If the shape has an inner radius, such as a normal star shape, click on any of the inner handles to adjust the interior radius. Just as for the outer controls, these provide simultaneous adjusting of the orientation of the shape.

The number of sides for these shapes may be entered on the Graphic Details drawer or at the top of the Stellate palette. There is no interactive on screen interface for changing the number of sides or star points.
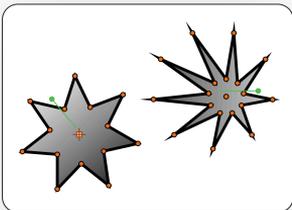
If a star-like shape is selected, changing the number of sides on the Stellate palette will change the number of sides or star points for the graphic. If no graphic is selected, changing the number of sides on the Stellate palette will change the number of sides or star points when drawing new star-like shapes.

Resize Constraints

If you hold down the Control key while adjusting a stellate, the orientation angle will lock and your drag motion will only vary the radius of the shape.

Numeric Entry

As is the case with all graphics, these forms are inspected with the Graphic Details drawer. All will have a common specifier for the center as defined by the X (across) and Y (down) Cartesian coordinates, measured to the scale and in the measuring units of the drawing. The number of sides and inner and outer radius are also used to specify all star-like shapes. You may move the graphic numerically by entering new center coordinates in the text boxes provided. The move will take place when you click the Enter key after typing in a new number.

The angle specifies the angle of orientation, which is a common attribute for all the graphics of this type.

Then there will be other variables that are used to specify the characteristics of the associated predefined mathematical equation. The values are generally self-explanatory and selected by a choice for the popup menu found below the other parameters.
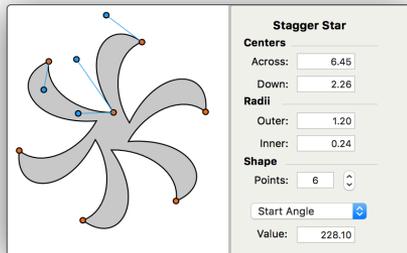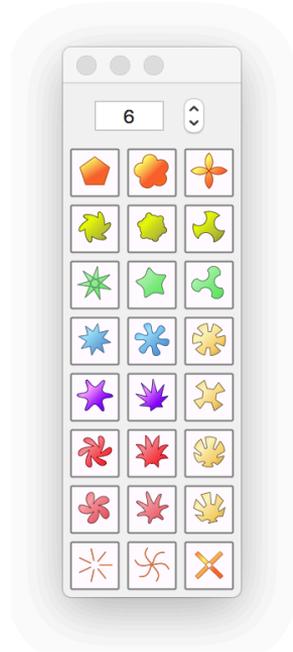
Arc and Pie Shapes

There are three forms of the arc of a circle (more precisely arc of an ellipse), one is a simple arc, the other is the arc plus the radial lines to form a closed arc or Pie shape. The third is the Corner tool.

These arcs may be section of a circle or an ellipse. The specification of an arc shape involves specification of a total of three angles, starting angle, ending angle and the angle of the major axis for the defining ellipse. Specification continues with the definition of the master radius and the percentage of this radius to apply to the actual major and minor axes of the defining ellipse. Clockwise or counter clockwise choice finishes the specification for an arc or pie shape.

Arc shapes are always created as an arc of a circle. This removes the complexity of the major and minor axis unless required. An arc of an ellipse is always added as an editing step unless the original arc is created by a copy action or derived from a library graphic.

Clockwise & Counter Clockwise: During initial drawing the Apple command key changes the direction of the arc, Cmd down provides a clockwise direction and no Cmd key modifier for counter clockwise. The key may be pressed or released during the creation process and the shape will reverse direction. The shapes have two sets of editing handles. The light blue controls, the ones shown on the faint axis lines with 90 degree arc, are used for adjusting the elliptical variables. The more predominate standard brown controls adjust the standard circular variables of starting angle, ending angle and radius.

The simple circular limit angles are adjusted by clicking one of the brown control handles and dragging it on an imaginary circle around the center point. The handle located on the middle of the arc is used to swing the arc around the center pivot point, without changing the subtended angle.

The radius of the arc is adjusted with the control handle shown at the center of the defining circle (or ellipse). Click and drag this control to change the radius of curvature of the arc. Move the center along an imaginary line that extends from the center and splits the angle. Just slide the center up and though or away from the mid point of the arc.
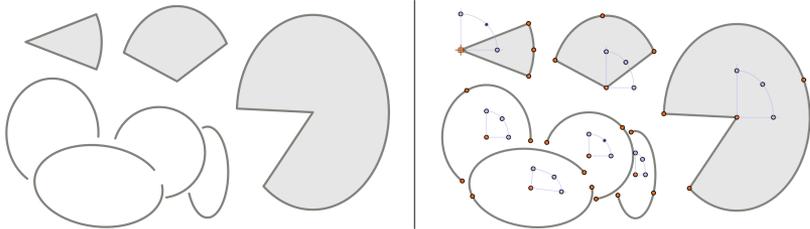
Radius Adjust

The Apple command key modifier changes the behavior of the mid-arc control handle. When the modifier key is depressed the radius of the arc is adjusted rather that the starting and ending angles.

Each of these defining variables are found on the Graphic Details drawer when an arc is selected. The major and minor axes are specified as percentages of the defining radius. The two light blue inner arc handles are used to interactive adjust these settings. Click and drag these handles, along the light blue lines depicting the axes, away from the center or toward the center.
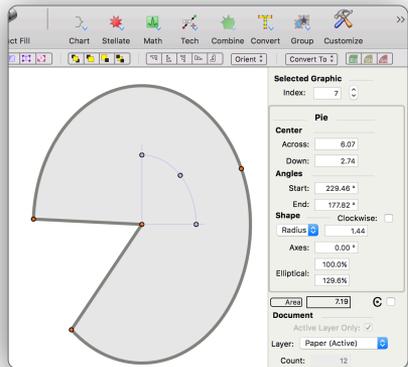
The light blue handle on the center of the faint ellipse arc is used to adjust the orientation angle of the defining ellipse. Click and drag this control around the center point to swing the defining major and minor axes of the ellipse.

Spiral

The spiral is a special case tool. This shape is provided because it is difficult to draw this shape free hand with a Bezier graphic.

The spiral is created in the fashion of an angle graphic. The initial mouse click defines the center and the drag action defines an ending point for the spiral.

Spirals are defined by the center, and the number of turns to an end point defines a radius and ending angle. The inner starting point is specified as a number, fractions allowed, of turns.

Spirals have several other variables that provide different interesting distortions. The radius is allowed to distort which creates a *conch shell* look. Elliptical characteristics provide a *spiral galaxy* appearance.

Clockwise: During initial drawing the shift key changes the direction of the spiral, shift down provides a clockwise direction. The key may be pressed or released during the creation process and the spiral will reverse direction.

The editing handles are somewhat empirical, best learned by experimenting. The description here should be viewed only as tips and starting pointers.
T
he handles at the end points of the spiral allow an interactive winding or unwinding of the spiral. Click and drag, following along the spiral to add or remove turns to the inside or outside of the shape.

One of the outer handles is brown, the other a light purple. The brown one adjusts the defining radius. The other is used to flatten the spiral, giving the spiral a degree of elliptical shape.

The two remaining handles lie on an imaginary line from the end point of the spiral to defining center. Move these handles perpendicular to the imaginary line, to vary the instantaneous radius of the spiral along the

spiral. If the spiral is thought of as a spring, these controls will tighten or loosen the spring.

Each of these defining variables are found on the Graphic Details drawer when a spiral is selected.

The popup menu near the bottom provides access to the various defining variables. The values are all edited with one text field. Select the variable with the popup menu then inspect or enter the value in the text field.
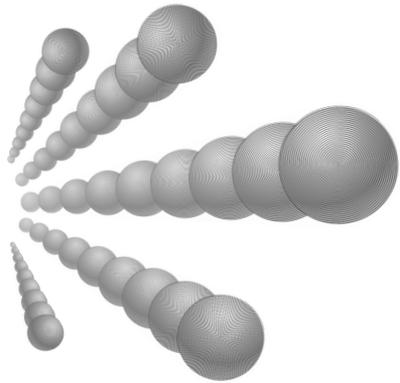
Shift for Circular: The shift key will return the spiral to circular, hold this key down while adjusting the light purple control (flatten control) and the spiral will return to a simple circular shape.
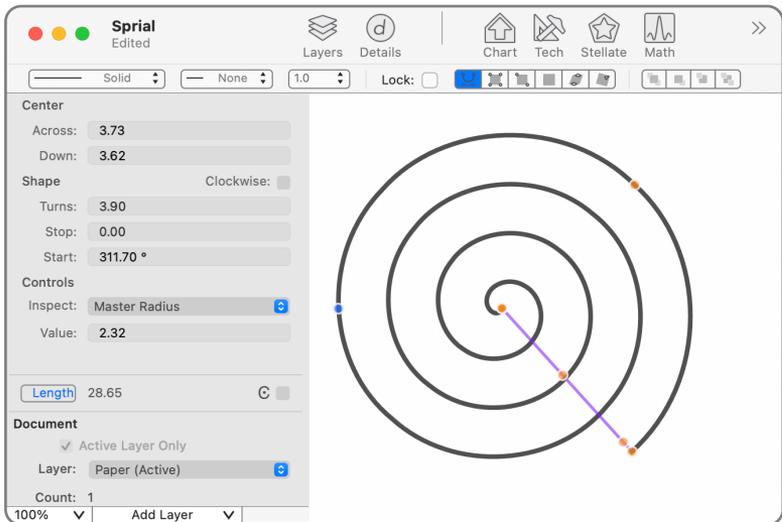
Text Box

There are two forms for text provided by EazyDraw, the Text Box and Annotation. Here we provide a brief description of manipulation of the Text Box form, the chapter on Text discusses these issues in greater detail.

Before text is typed on a drawing, a Text box is required. This rectangle may be thought of as a container to hold the text. The Text box is created in the same manner as a rectangle, click and drag out the defining corners.

Immediately after creating a new text box, text needs to be entered. Typing or a text paste operation is required to provide text content for the text box. Any text box that has no text is cleared from the drawing. This prevents problems from invisible empty text boxes that could end up in your drawing.

Editing Mode

Text boxes have a selected mode just like other graphics, they have another distinct selected mode for text editing. Click to select as with other graphics. To access the text editing mode, first click and select - pause just a second - then double click to enter text editing. There is a menu command, at the top of the Text main menu, for entering the text editing mode. Use the menu command if you have trouble using the three click sequence.

The resize handles are the same as provided for a normal rectangle. These will resize the text's container rectangle. Text in the container is fully typeset. As you resize the containing rectangle, text will reflow and typeset, in a live fashion, in accordance with the area made available for the text. If the rectangle is too small to contain all text, a red square is shown at the lower right corner to indicate that some text does not fit and is not shown.

The light blue handles found in the lower right corner of a selected text box are also used to change the size of a text box. These are used to stretch or resize the actual printed size of the text. For example, making the text box bigger in this fashion is be similar but distinct to an increase of font size. Double click one of these blue handles to return a stretched text box to the un-stretched mode.

This is a Text Box in editing mode. The background is a solid color, normally a light gray.

This is a Text Box simply selected, NOT in editing mode. Handles are shown and the background is clear unless you have provided a explicit background color. (fill, gradient, etc.)

The text editing mode can apply to only one text box at a given time. Selecting another graphic or another text box will end a text editing session.

The text editing mode is a standard macOS text entry and editing user interface. The cursor is the normal text insertion bar cursor. It shows when the cursor is over an active text editing session.

An active text editing session provides the ability to select ranges of text with a click down and drag over the text. Double click to highlight a word, triple click for a line or paragraph, click again to select all text in the given text box. When a text editing session is active the Select All menu command selects all of the text, not all graphics on the drawing. Selected text is highlighted with the system text highlighting color as set in the macOS preferences.
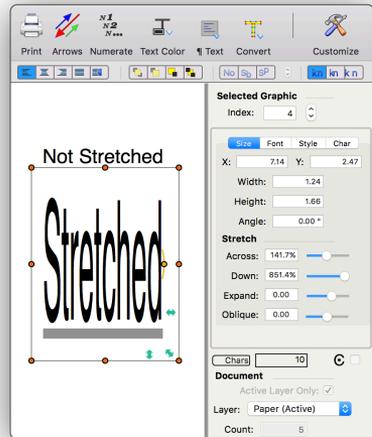
Font panel actions and other text formatting and style actions from the text menu apply to just the selected text of an active editing session. If no text is selected these actions apply to all text of the text box. If a text box is selected but not in the editing mode these actions will apply to all text of the text box.

Chapter

10

Technical Tools

Technical Tool Palette

The Technical Tool palette provides drawing and dimensioning tools useful for creating dimensioned technical drawings. Connector graphics are also found on this palette. Tools for drawing walls and ribbons are on this palette too.

Toolbar Variants

Several of these tools are provided for customization on the drawing window's toolbar. A Drop-down menu with all of these tools grouped together may be added to the toolbar. These toolbar buttons can provide a quick and convenient method to access these graphic forms that are used frequently or an alternative to numerous floating palettes occupying screen real estate.

The Technical tools drop down menu button is "smart," it remembers the last tool used. This most recent tool is shown as the icon for the pull down menu. The tool shown may be used with a single quick click of the mouse.

Use the customize toolbar panel, which is found at the bottom of the View main menu, to add this drop down menu tool to the toolbar.

It is possible to have duplicates of these menu tools on the toolbar. This arrangement introduces a dynamic aspect to the toolbar. Use different instances for different individual tool selections and the menus on the toolbar will evolve with the work activities, automatically holding frequent and recent used shapes for single click access.
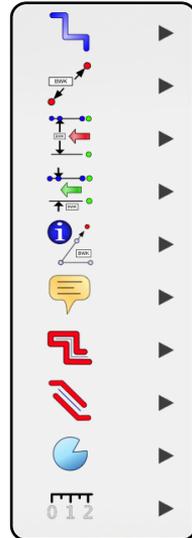
Orthogonal Paths: These tools create lines that are useful for flow charts or schematic drawing. Orthogonal paths are paths constrained to the horizontal and vertical directions, various corners are provided.

Connectors: Connectors are provided in two forms. They attach to other graphics at predefined intervals. Once attached the host graphic may be moved and the connected line will move to maintain the connection.

Auto-Line and Auto-Connector: The Auto-Line is the simplest form of a dimensioning graphic. It is just a line with a dimension inserted along its length. It is useful as a simple free form ruler too. The Auto-Connector is the same except the line is a connector and may be attached to other graphics to provide an automatic measurement between graphic elements.

Length Dimensioning Tools. The next degree of capability is provided by the Dimension graphics. They are connectors with added dimensioning components. The connector feature is used to attach to specific positions on a graphic or between two graphics. The dimensioning feature then displays the measured length.

Comment Dimension: The comment dimension group provides automatic notation of numerous parameters that may apply to a graphic. They are used to dimension angles, diameters, radii, and many other geometric parameters. The comment dimension has a "none" mode providing a method to attach a user defined comment to a graphic.

Wall Tools: The wall tool group provides double path graphics used to denote walls and windows on architectural drawings. These tools are also useful in map drawing for depicting roads and intersections.

Walls exhibit an advanced snapping behavior. When the ends of two walls are snapped to an abutting position using snap vertices on the Grids and Guides palette, the joint of the two walls is formed automatically. The shape of the joint may be square, miter, or a round element.

Ribbons: Walls are available in a fully generalized form defined as a curved Bezier path. This form is best described as a 2 dimensional ribbon. The ends of ribbons will automatically mate to other walls or ribbons.

Cut Circles: These tools are are derived from a circle with a cut portion. They are shapes that are quite commonly required and trivial to visualize but difficult to create and adjust from scratch.

Axis Tools: These are repetitive shapes useful in the construction of charts. They provide components to use in creating a chart, an axis with tick marks, a sequence of numeric labels, and an adjustable grid. A hex adjustable grid is provided as well.

Orthogonal Paths

Orthogonal paths are multi-segment lines that are constrained to be horizontal or vertical. They are the sort of graphic elements that might be used in a flow chart or perhaps an electronic schematic.

There are 4 forms; square, mitre, smooth, and radius. The names describe the manner in which the 90 degree corners are drawn.

Tab Entry

These graphics are created with the Tab creation cursor technique. Click drag and lift or tab to set a corner, there is a node or vertex at each change of direction for example from horizontal to vertical.

One may get out of the habit of using the tab key to advance vertices during a Bezier path creation. However this is a good method for these graphics, the keyboard entry is a convenient independent input to signal your intention to change direction for the path.

Editing handles are provided at each corner of the path. Click and drag to reposition the corner, your motions are constrained to maintain the 90 degree corner and normal path segments.

If the path is a form that provides a corner shape, there will be a blueish handle at each corner, these are moved toward or away from the corner to adjust the smoothness of the corner shape. The defining radii may be different for each corner.
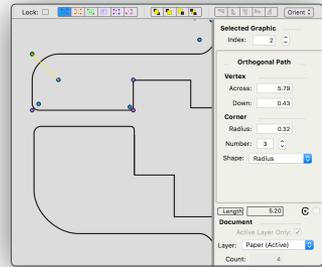
Two tools are provided for creating orthogonal paths. One draws a simple 90 degree sharp corner version. The other provides a radius corner version. The mitre and smooth corner versions are selected by changing the form on the Graphic Details drawer or from the Connector tool palette accessed on the Tools main menu.

These shapes are also provided as connectors. The simple orthogonal path tool is duplicated on the main tool palette; both instances provide the same functionality.

Connectors

Connectors are lines or paths with multiple segments whose ends may be attached to other graphics. If the target graphic is moved or resized the attached end of the connector moves too. Connectors are useful in flow charts or schematics.

The target graphics are usually drawn first, then the connector is attached and drawn. This is not a hard and fast rule. The connector can be drawn free form; it has the behavior of a normal line or path. Then after the target graphics are created the connector ends are attached by moving the desired end near the target spot. Use one of the three Connector Tools found on the Technical Tool Palette to create connectors.

The connector creation cursor is a small *chain link;* it is shown when actively creating a connector. Connectors are drawn in the same fashion as their normal non-connector counter parts, either as a line, multi-segment Bezier path, or an orthogonal path. During creation and when selected for editing the active connector endpoints have different color editing handles. Normally these

are light brown or gray, but a connector's end handles are green or red. They are green when not attached to another graphic and they are red when connected. When connected, a move or resize of the target graphic (the *connected to graphic*) will cause the connector's end to move with its target.

Connectors may attach to other connectors; this is allowed.

Caution: Don't use connectors unless the permanent connection aspect is actually needed. If you just need a line or path to snap to the end of another line; use vertex snapping, found on the Grids and Guides palette. Connectors can be CPU intensive - if large numbers are present there may be a performance penalty and there is just more to go wrong. Consider the alternative method of constructing a multi-graphic shape using vertex snapping and then group all the elements to glue them together, rather than relying on the connection attribute to hold the elements together.

Connector Palette

Connectors have a set of parameters that control the snapping behavior and relationship between the connector's end points and potential target graphics.

The Connector palette is accessed from the Tools main menu, about half way down.

Range Specification

The Snap parameter defines how close a connector's end point must get to a potential target point before it will attach. This applies when drawing during the creating step, or when editing a connector by moving an end point. The range also determines how far a connector end needs to be pulled away from an attached target to release the connector and allow it to freely follow the cursor. This length is measured in Fine Scale Units (inches, mm, or points) as shown by the Units Button found at the upper right hand corner of the palette.
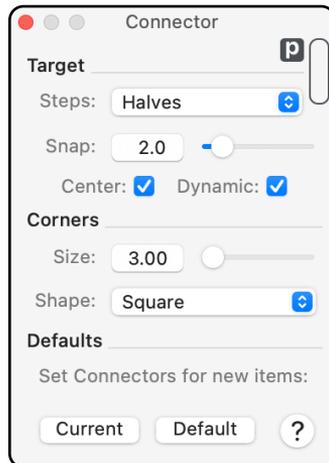
If the Dynamic checkbox is selected the snap units are defined as multiples of the size of a standard vector editing handle box (the little boxes drawn at the vertices when selected). This size changes in terms of absolute units depending on the amount of zoom applied to the drawing. Normally the dynamic setting is best; this setting naturally follows your drawing activities. If you zoom in very close the snapping behavior will read the situation and use a much smaller snapping range, just as you would expect.

The Center checkbox is used to attach connectors to the geometric center of the graphic.

Steps

This parameter determines how many target points there are on a single line (or curve) segment of a potential target graphic. The popup menu is used to select halves, thirds, quarters, and tenths. Each line segment of a graphic is divided into this many sub-segments. A connector may be attached at any vertex (node or segment end) and at the specified intervals along a segment. For example, a rectangle would offer a total of 12 attach points if resolution is set to thirds.

Corner

This parameter determines the shape and size of the corner of Orthogonal Connectors and Paths that allow a shape parameter. The popup is used to select the shape, Square, Miter, Smooth or Radius. Square implies no corner shape. Miter creates a straight line cut corner. Smooth is a cubic blend at the corner. Radius provides a 90 degree quadrant of a circle to create the corner.

The size parameter determines the radius or other length used to create the corner. Some Paths or Connectors allow individual control of the size at each vertex; others use the same size for the all corners. The style depends on the tool used to create the path.

Fillet and Chamfer: There is another method to create two lines joined with a fillet or chamfer. This is found on the Tools main menu, combine submenu. This combining approach will work for lines that are other than orthogonal. With this method one first draws the two lines, selects the two lines, executes the menu command specifying a radius. A fillet is the joining of two lines with a portion of a circle of defined radius.

Auto Lines, Auto Connectors

Auto lines are lines that contain an automatic length annotation. There are two forms, a free line and a connector. The connector version can be used to denote or measure the length between defined reference points of graphics. The simple line version does not attach, the length dimension shown is just the distance between the ends of the line.

The form of the length annotation is controlled by the parameters found on the dimension parameter palette, on the Tools main menu. There is a wide selection of formats including color, fill, units, precision and many others. The left tool highlighted is the Auto-Line tool, the other is the connector version. The line is drawn in the normal fashion, all elements used to draw normal lines apply to these graphic forms.

The connector variant attaches to defined points (1/2, 1/4, etc) along path segments of any graphic. When attached the length shown is the distance between the two connected reference points. If not attached the length is the distance between the end points of the line.

The Auto-Line graphic is useful as a simple free floating ruler. Just add one (or more) to your drawing. Then move it around to establish length references right on the drawing. The Tape Measure tool is another option for a more temporary on screen ruler, see the chapter on drawing measurements for more information on this tool.

The units used to show the length of the Auto Line are those of the drawing as defined on the Scale parameter palette accessed on the Format main menu. The Dimension parameter palette allows selection of many formats and display parameters, but the actual units (mm, inches, points, etc) are defined by the global drawing scale. If the units are changed on the scale panel all dimensions will change to the new units. To learn more about Dimensions refer to Chapter 7 of this manual.

The format of the length text is managed in a manner similar to text annotations. If you have learned how these are formatted and displayed you will find that Auto Lines have many of the same properties.

Length Dimension Tools
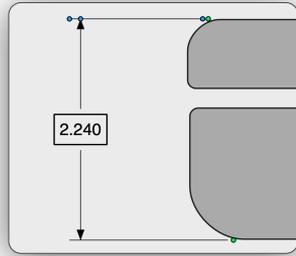
These tools provide a complete automatic dimensioning graphics. These are connectors, similar to Auto Line connectors, with a more elaborate arrangement of relief lines, extent arrows, and a formatted numerical value.

Just as with Auto Lines these elements are connectors that attach to other graphics. The connect point may be line ends, corners, vertices, mid points, and other defined sub-intervals along a path segment. They respond to the parameters provided on the Connector palette. The connector target attributes apply to these tools. These parameters and their use have been documented above and in Chapter 7.

When selected interactive editing handles are provided for placing the connector ends or attach points and for adjustment of the relief line and placement of the labeled text. The connector handles are green when not connected and red when connected. The appearance adjustment handles are a bright blue.

The appearance and formatting of the reported numeric values are controlled by a host of parameters found on the Dimension palette, accessed from the Tools main menu, about half way down.

The measuring units and various formatting arrangements are documented in Chapter 7. The dimension palette provides a text view that can be used in much the same manner as a text annotation. Text annotation is
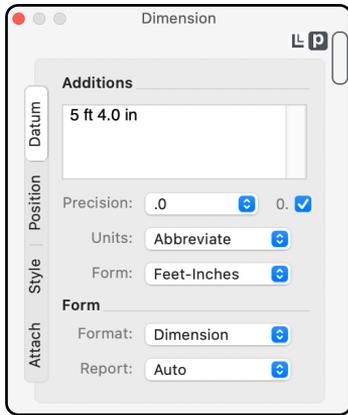
documented later in the Text chapter. Many of the details discussed there apply to dimension text.

Dimension Palette: The Dimension palette's off drawing text field is fully editable, except for the actual automatically derived dimension number and possible units associated with the measurement. Text may be typed before or after the fixed numerical phrase. There are no limitations to text entered in this fashion. This allows the addition of notes and other information to a dimension.

The Dimension palette's off drawing text view accepts all supported typesetting and text style attributes. Use the EazyDraw menu system or the full Font panel to select font and text style attributes. These editing actions will apply to added text, if any, as well as the automatic numeric measurement and units label. The system Font panel is the preferred method for formatting and stylizing the Dimension text.

Eight of these full dimension graphics are restricted to measuring and reporting horizontal or vertical distances. Notice the "30.00" dimension shown attached to the triangle below. The attach points may be located anywhere on the 2 dimensional drawing, but the distances reported are purely horizontal (X) or vertical (Y).
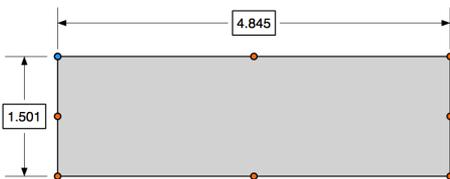
The horizontal and vertical dimensions are provided with 4 orientations, left , right, above and below. The orientations describing the position of the dimension relative to the graphic being documented.

Each orientation is then provided with an external variant. External indicating that the arrows are placed outside the relief lines and the dimensioning number is placed

between the lines. These are used to dimension smaller lengths where both the arrows and text might not fit between the relief lines.

There are two other forms of length dimensions, these measure lengths in any direction, and are not constrained to reporting horizontal and vertical lengths. The side measurement shown is an example of one of these free dimensions. This form also is provided in an internal and external form.
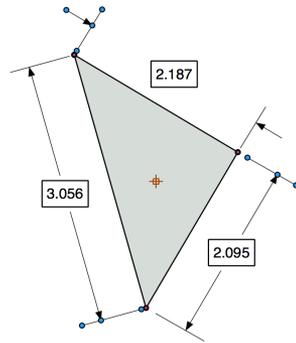
A common problem when dimensioning is the positioning of the numbers and arrows. As a drawing grows in detail, and more distances require documentation it becomes difficult to find room for all the information. There are many ways to adjust the exact position of the reported value with respect to the dimensioning arrows. The different formatting options are accessed on the Dimensioning palette. The Format popup menu on the Datum tab is used to gain full interactive control over position and typesetting of the dimension text. The Box and Along formats offer much more freedom to manually position the text.

Dimension Style

The arrows used to construct the dimension graphic accept input from all of the parameters on the Arrow palette which is accessed from the main Tools menu. Use this palette to choose a different form or style of arrow, you may even create your own custom arrow shape.

Color and style of the lines used to construct the dimension accept input from the Color and Style palette. Set line width and color on this palette. The Style tab on the Dimension palette has control over the box and background of the numeric area of the dimension. The Color and Style palette has control over the relief and arrow lines of the dimension graphic.

This can get complicated, so experimentation is the best way to get a handle on these various controls. Once you succeed in designing a particular Dimension format, the best method is to copy the dimension and save it on a template style drawing for later reuse. You can also place the dimension in a graphic library for future use. Copy and Paste Special supports dimension attributes, use this capability to apply a specific style to several dimensions.

The Dimensions palette's default settings define user preferences for new dimensions. The default system includes all aspects of the dimension's default settings, those found explicitly on the Dimension palette and the others managed on the Color and Style and Arrows palettes.
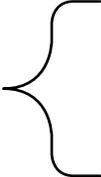
Hide Dimensions

Dimensions can clutter a drawing. It is often necessary to conveniently turn off the dimensions so the essence of the drawing is seen or cleared for further design work. EazyDraw provides a mechanism for this on the Layers drawer. There is a checkbox to Hide Dimensions, found near the bottom of the Layers drawer. The layer selected in the layer table, not necessarily the Active layer, will reflect the Hide Dimension state of the checkbox. Check the box to temporarily hide dimensions.

Another drawing technique to manage showing and hiding dimensions is to place dimensions on a layer separate from the target graphics. This technique is supported by EazyDraw. Dimensions need not be on the same layer as the targeted, attached-to, graphics. One of the Select Others options needs to be enabled on the Layers drawer. Candidate target graphics for connectors and hence Dimensions are all graphics that are selectable. With this approach, if dimensions are on their own layer, the layer may be turned off to hide dimensions.

Set Scale Before Dimensioning

It is always wise to determine and set the drawing scale before adding a great deal of content to a drawing. EazyDraw allows you to change the drawing scale of an existing drawing, and have all graphics redrawn with the same represented dimensions at the new scale. So it is possible to re-scale an existing drawing. However if the drawing contains Text this can be a problem. The issue is: should the text re-scale, if so it will likely not have an appealing appearance it will likely be too big or too small. Since Dimensions contain text and are difficult to place in and around your drawing content, a re-scale will very likely come out as a jumble. So get the scale set correctly early in a design project, and definitely before a great deal of time is spent in dimensioning.

**Comment Dimension Properties**
(see next page)

Point	Delta X	Perimeter
Position	DeltaY	Area
Radius	Delta X-Y	Degrees
Length	Slope	Radians
Bounds	Diameter	
Bezier	Center	

Comment Dimensions

Comment Dimensions are used to annotate various properties of other graphics. They are linked to a target graphic. The appropriate comment is anticipated in an automatic fashion. For example, point to a radius corner and the Radius attribute is reported. You can use the Dimension palette to specifically select other attributes to report.

Report

The left tool creates a free comment dimension. Use this form to report one of the many attributes that may pertain to a graphic; length, position, radius, diameter, area, perimeter, etc. Above is a list of the various attributes available.
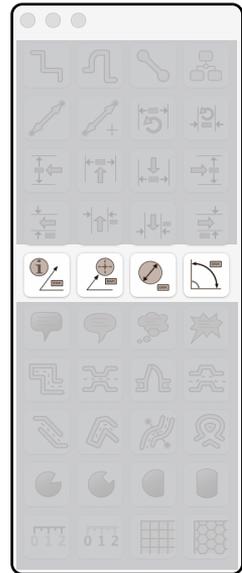
Area: Report dimensions will report perimeters and areas of shapes. The shapes need not be simple rectangle. Eazydraw performs a detailed analysis to compute the precise area of any irregular shape.

The units for reporting area are independent of the units for measuring lengths on the drawing. The units are selected on the Dimension palette, Area Form submenu found on the Form popup menu which is located on the Datum tab. Scaled drawings such as might be used for a landscaping or farming drawing can report area in Acres or Hectares.

Center and Diameter

The next two tools are used to report Centers and Diameters of Graphics. Attach to a curved segment of a graphic with a well defined radius. These forms also work when attached to the center of

X: 3.416 Y: 12.723

R: 0.245

cX: 4.443 cY: 13.331
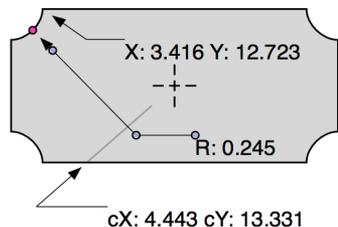
a circle, attach at the center and drag to the edge of the circle, then the center mark and diameter mark are drawn.

The diameter tool will work for ovals as well as circles, in this case two diameters (D and d) are reported as the major   a nd minor diameters.

Angle Dimension

The tool on the right is an angle dimensioning tool. This dimension first attaches to a vertex, or end point of a straight path segment - a line. The angle reported is then measured from this line. The other attach point of the dimension will also attach to a vertex or end point. The angle reported is that subtended from the initial reference line to the second attach point.

You can identify the two connector attach points by the green or red editing handles.

The tool can be tricky to get attached and report exactly as needed. In some cases an invisible reference line may be appropriate, draw the reference line, attach the dimension, then make the reference line disappear by checking no outline on the color and style panel.

The dimension will report angles relative to the major compass points when there is no reference line. In this case the base reference axis is free form, used to show angles relative to horizontal for example.

There is a small editing handle shown on an arc, light brown in color, found on the main connecting line of an angle dimension. This is used to control reporting the interior clockwise or counter clockwise angle. Move the control handle along the arc, the side of the reference with the control determines the interior / exterior angle that is reported.
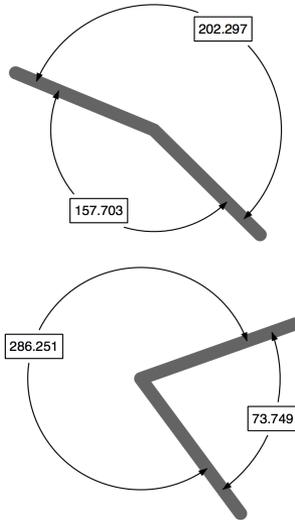
Walls, Ribbons, Windows & Doors

These tools are used to create double path graphics to depict walls windows and doors on architectural drawings. They are also useful in map drawing for depicting roads and intersections. Or they may be thought of as decorative ribbons, especially when filled with interesting gradient fills.

The key aspects of a Wall graphic are the thickness and the shape of the ends. Wall elements will "snap" together and automatically adjust these key aspects to form corners and intersections in a logical fashion.

It is important to understand and utilize Snap Vertices when working with these elements. Selecting this option or drawing with grid snapping on is useful when combining these graphics in a drawing.

The orthogonal wall tool (top left of the wall tool group) draws only horizontal and vertical wall objects. The other wall tools provide methods for straight walls at angles, multi-segment straight walls, Bezier path curved walls, and smooth ribbons.

Walls will auto-join at coincident ends - unless the Auto-Join parameter is turned off on the Wall Parameter panel. Closing the wall end with the closed or butt shape will also prevent walls from snapping and matching up. Either of these methods may be used to prevent auto-mating of wall ends.

These graphic elements have two paths, one is a master path defining the center line of the wall or ribbon. The other path is an outline of the wall or ribbon which draws the two sides and ends of the wall or ribbon. The stroke and fill parameters have a necessary duplicity that may become confusing.

Two points of advice. First, if you are not using the walls stroke or outline path (the stroke checkbox on Color and Style palette is off) then it is probably not necessary to introduce the complexity of a wall graphic - just
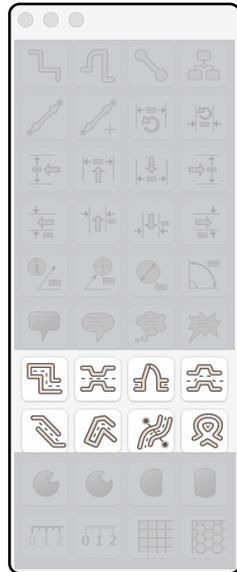
use a fat line. Second, if you are new to eazydraw or inexperienced to computer drawing, it may be wiser to avoid wall graphics and use simple lines and Bezier paths for initial drawing projects.
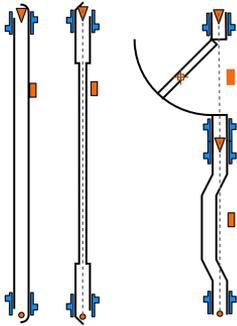
Simple Wall: The top left wall tool draws a simple wall element. This is a double lined graphic with a thickness and 4 independent elements defining the shape of the end. The thickness is adjusted with the orange rectangular resize handle that is provided when the element is selected. The shape of the ends are adjusted with the 4 blue handles (see figure to left) provided near the end of the wall element. Using these handles an end of a wall may be closed, opened or prepared to join another wall(s) to form a corner or intersection. As with all other wall graphics, the thickness and end parameters are inspected or entered using the Wall Parameters palette found on the Tools main menu.

Window: The next tool is used to draw the architectural schematic representation of a window. This is just like a simple wall but has a thinner (normally) center section. The Thickness and end shape of the window are adjusted in the same fashion as a simple wall. The thickness of the window section is set numerically on the Graphic Details drawer as a percent of the wall thickness. As with all other wall graphics, additional parameters may be inspected or entered using the Graphic Details Drawer which is opened using the command at the top of the Tools main menu.

Door: The next tool is used to draw the architectural schematic representation of a door. This is a more complex shape showing the opening, the door and a sweep arc. The thickness of the "door" section is adjusted on the Graphic Details drawer as a percent of the wall thickness. The Graphic Details drawer provides input for the angle of the door, the extent of the sweep arc, and the orientation of the hinge.

Bay Window: The next tool is used to draw the architectural schematic representation of a bay window. This is just like a simple wall with a jog extension. The thickness and end shape of the window are adjusted in the same fashion as a simple wall. The form of the "jog" may be adjusted by two parameters found on the Graphic Details drawer.

Wall at Angle: The bottom left tool is used to draw a straight single wall segment at any angle. This is just like an orthogonal wall but with the behavior of a simple line with two end points.

Wall Path: The next bottom tool is used to draw straight multi-segment wall paths. These paths are drawn in the same fashion as a multi-segment bezier path. The ends of this form of a wall are defined in the manner common to all walls. This form has an additional shape parameter to define the form of the nodes (or vertices, joints) of the wall path. Exterior obtuse angle nodes may have a Beveled, Round, or Miter form. Set the form interactively with the handle provided at the first node of the path, or with the Geometry tab of the Wall parameter palette.

Curved Wall: The next bottom tool is used to draw curved multi- segment wall paths. These paths are drawn in the same fashion as a free form bezier paths. The ends and nodes of this wall form are defined in the same fashion as for the straight multi-segment wall paths (see previous paragraph).

Smooth Wall or Ribbon: The bottom right tool is used to draw fully free form smooth ribbon shapes. These smooth wall shapes are multi-segmented and are drawn in the same fashion as a Continuous Bezier. The slope of these paths is constrained to be continuous at each node of the the path. This constraint means that a defining shape for the node-joins does not apply. The ribbon path at the joins may not be Miter or Beveled, as they are drawn with a constant ribbon width - through each node or vertex of the wall path.

Walls have a defined start and end which defines a right and left side. This is important for Doors and Bay Windows. Most importantly this defines the direction of the swing of the door. Eight combinations are required for all orientations of a door. These are provided on the Graphic Details drawer.

Adjusting the thickness of one wall element section will automatically adjust all other wall elements "snapped" to the element being adjusted.

To control the use of a normal corner or a beveled corner representation: use the end handle to adjust an unsnapped wall element to the beveled configuration (the one with a 45 degree end component). Then bring another wall section up to the prepared element and let them snap - the corner will then be beveled.

Duplicating prototype wall elements is a useful technique. Create one wall element and adjust the ends' parameters, if appropriate. Then duplicate or copy-paste this element to create new wall sections. This is easier than creating a new wall element and adjusting each time. User preferences for these settings are managed by the Wall parameter palette, discussed in the next section of this manual.

Joints

The Knife tool is useful for forming a T-section or full intersection. Cut an existing wall with the knife - the break will not be noticeable as the ends are automatically adjusted after the cut. Create another perpendicular wall section, then bring it to the cut point. The new element will auto-snap and the end shapes will automatically adjust to form the T shape joint. Repeat with another perpendicular element to form full intersection.

A Gradient Fill may be applied to all of these graphic forms. Only two of the Gradient styles are defined for a wall, Horizontal and Vertical. Vertical gradient is applied across the path, perpendicular at all points to the center line of the path. Horizontal gradients are defined along the path, parallel at all points of the center line of the path.

Note that the two free form Bezier wall shapes can have anomalies at vertices or other points along the path. This occurs at points of sharp bends and abrupt direction changes of the paths. These ribbon shapes are drawn and constrained to two dimensions. In a full three dimension world the ribbon would pinch and curl when twisted to conform to the defining path. To form these shapes in only 2 dimensions, EazyDraw must apply approximating "fuzzy" logic that is NOT precisely defined for all possible distortions of the ribbon. We have attempted to make certain the ribbon is drawn in an expected well defined manner for normal non-extreme bends and curves. But if extreme twists and turns are used, small artifacts or kinks may appear. In this situation small adjustments of the curve will remove the unwanted artifact or kink. It may help to manually insert vertices near problem intersections.
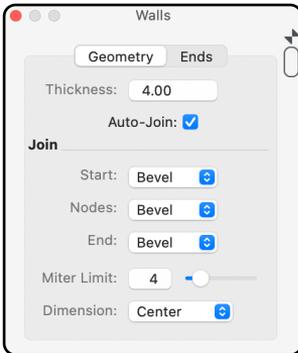
Wall Parameter Palette

The Wall palette provides parameters for walls and ribbons. The palette is accessed from the Tools main menu, about halfway down.

Some of the Wall or Ribbon constructs have several additional parameters - for example, Doors require many more defining parameters are not found on this parameter palette. These additional parameters are inspected or entered using the Graphic Details Drawer which is opened using the command at the top of the Tools main menu.

Geometry

The Geometry tab view provides access to the primary parameters of a Wall or Ribbon Graphic. Walls have a distinct thickness and an independent border path.

Wall graphics may be snapped and joined or mated to other wall graphics. When a joint is formed this palette provides control over the shape of the joint. This palette tab view is accessed from the Tools Main menu, Walls menu selection. Click the Geometry tab to access these parameters.

Thickness: A wall has a defined thickness or width. The Thickness parameter is used to inspect or enter a defined thickness. The numerical thickness value is shown in the Palette Units as defined by the palette fine scale. A resize handle is provided to change wall thickness interactively on the drawing; it is the larger brown rectangle shaped handle found near the start point of the wall graphic.

Auto Join: This controls the behavior when the ends of two walls are snapped together. If this parameter is checked the two walls will form a defined joined corner. The automatic join action will properly form the mating wall corners and match the thickness of the joining walls. EazyDraw's automatic joints are only defined when adjoining walls have the same thickness. Uncheck the parameter to prevent this action. Turning auto-join off is important if two different size walls (thickness) are to be mated.

When two walls are mated the shape of the formed corner is defined by the Start and End Join parameters. There are 3 choices: Bevel, Round, and Miter. The figure below shows these three forms. Use the popup menu to select the desired shape for a joined wall end. The end of the selected wall needs to be joined to another wall for these parameters to apply. Setting the parameter for a joined wall will also set the corresponding join shape for the other wall.

Join Shape: The Join shape for nodes applies to multi-segment wall paths, but not to smooth walls. The shape of the corners at the nodes is controlled with the Nodes popup menu. This parameter does not apply to smooth walls because the shape at their nodes smoothly transitions across the curve vertices.
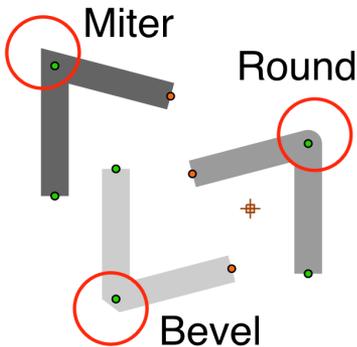
Miter Limit: Miter Limit applies to mitered joint ends and nodes. The miter joint for a sharply acute angle can protrude a great distance. They would extend an infinite distance for fully acute angle. Therefore a method is provided to prevent this divergence. The limiting method is the Miter Limit. It is a unit-less ratio of the protrusion length divided by the thickness, or width, of the wall graphic. If this ratio exceeds the Miter Limit parameter value the shape of the corner is changed to a Bevel shape. The Bevel shape algorithm is well-defined for all acute angles.

When dimensions are attached to drawings constructed of walls, the detail of the actual dimension measuring positions needs to be considered. A Center dimension will measure from the centerline of the wall. Sometimes Inside or Outside dimensions are required. If inside or outside dimensioning is to be used, drawings are constructed in an clockwise fashion. Drawing in this defined manner allows the software to distinguish the inside of the composite shape from the outside. The Thickness and Join parameters are manipulated interactively with the small light blue resizing handles provided on a selected wall graphic.

Only two of the Wall forms have Nodes, so this popup is often disabled. The two forms with Nodes are the Wall Path and Bezier Wall. Other wall forms have shaped joins but only at their ends - when mated with another wall graphic. These two wall forms have one resizing handle at the first node of the path, this handle is used to interactively change the Join Node shape setting for all nodes.

Auto Joining of wall ends does not apply if either corner of the wall end has the closed or Butt setting. A closed end will not auto-mate (or snap together). It is often useful to "close" an end if auto-mating is not desired; as just resizing or moving the end of a wall on a drawing will often inadvertently touch another wall and alter the end parameters.

Joints of more than two wall ends are supported by the auto-joining capability. In these situations, one joint angle of more than 180 degrees is possible (but not necessarily present); in this case the Join style applies to this one angle and all others are drawn as Relief interior mated wall ends.

Ends

These parameters provide control of the shape of the ends of a Wall (or Ribbon) graphic. Fine control of each of the 4 corners is explicitly provided with these parameters. Each Wall End is drawn as two independent segments, an outside and an inside portion. These ends are defined relative to a path drawn from the start to the end and back to the start of the wall path - in a clockwise fashion. When oriented from the start of a path - facing toward the end of the path - the Start Left is the first corner drawn which is defined as the Start-Outside corner.

There are 6 possible shapes for a wall corner: Relief, Open, Extend, Miter, Round, and Butt. An independent shape may be defined for each of the 4 corners of a wall graphic using the 4 popup menus found on this palette tab view. If a wall graphic is not joined to another wall graphic, these parameters will specify the shape of the ends.

An appropriate join or mating of two wall ends is accomplished with a pair of complimentary (different) end settings. For example, if two walls are joined at an acute angle - the two inside corners will be drawn with "Relief" setting. In this example the possible settings for the other half of the joined ends would be Extend, Miter, and Round. Open and Butt have no meaning for a joined wall.

Relief

Open

Extend

Miter

Round

Butt
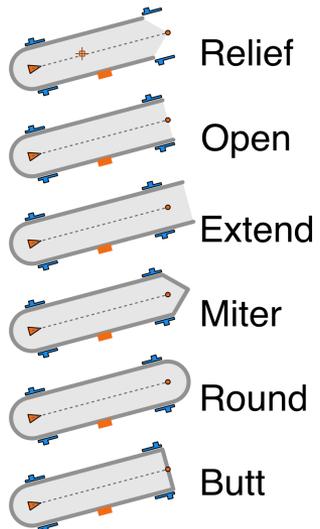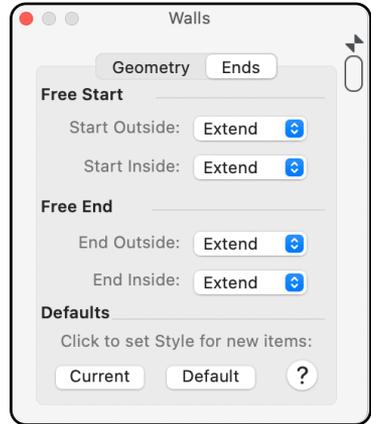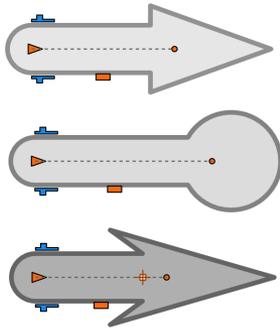
...ns provide support for quickly defining or using an existing wall graphic as a definition for the drawing parameters for newly drawn wall graphics. Specifying the exact form of each of these parameters is normally performed automatically when one wall mates with another. The settings may also be applied interactively on the drawing with the light blue resizing handles visible on Wall graphics when selected. Walls have a defined distinct Start and End. This convention is used for identification and correlation of the parameters on this panel with respect to the wall graphic shape.

When selected the start of the wall path is clued visually with a triangle shaped brown resize handle. The triangle handle is drawn at the defined Start of the path and points away from the Start.

If an Arrow is applied to the end of a wall graphic, these parameters are overridden and do not apply. All of these popup menus are disabled for the end(s) with the arrow shape. The use of an arrow on an end will prevent Auto-Join.

Slots, Keys, and Notches

Four tools are provided to create shapes that are a cut portion of a circle. These shapes are commonly needed when drawing but are difficult to create by combining other elements such as circles and lines. These shapes and their convenient on-screen adjustments make it easy to create cut circle shapes.

Each shape is drawn from the center out, the direction specifying the orientation of the cut portion of the circle.

Handles are provided on each graphic to adjust the orientation and size of the notch or key.

When adjusting the orientation, hold down the shift key to precisely lock the angle to even degree intervals (0, 15, 30, 35, ...).

The parameters of the cut and orientation may be specified numerically on the Graphic Details drawer.

Graphing Tools

These tools are used to create the component elements of a graph or chart. Each tool provides convenient design and adjustment of the axes, labels, and grid of a graph.

The components are provided individually to allow a greater degree of flexibility in the design and appearance. EazyDraw is not a charting application, so we are not providing a "canned" chart and there is no mechanism in EazyDraw to enter a table of date and automatically generate a graph or chart. Other applications are available for these tasks.

These graphics normally appear on a larger scale. It is advisable to zoom-out before drawing. This will allow the default settings to show something reasonable as you create the element. This is only advisable when starting out, these elements are fully vector graphics and may be drawn as large or small as desired.

Tick Marks. The tick mark tool draws a set of lines of varying length along a straight path. Handles are provided, when selected, to adjust the spacing, length and appearance of the tick-lines. Experimentation is the best way to learn all of the options available with this graphic. Be sure to adjust the purple interval handle; this is used to select the appearance of the tick-sequence. For example, even-tenths, quarters, halves, and so on.
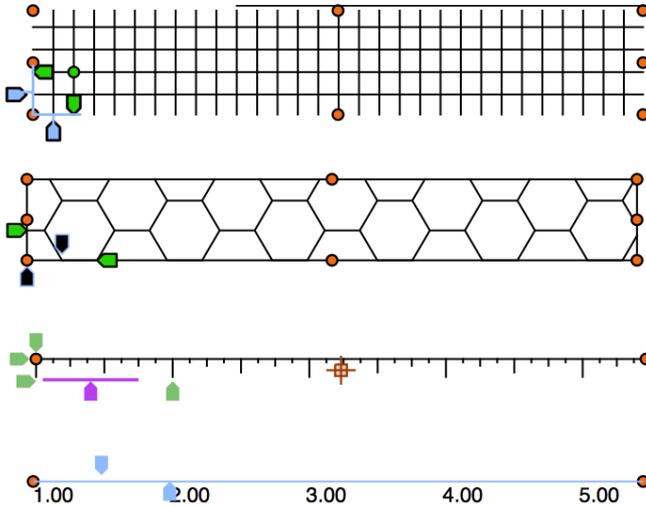
Logarithmic Scale: Slide interval handle fully away from the start of the sequence to access the logarithmic selections. Extend the "back side" of the tick to create half of a chart grid, associated precisely to the axis ticks. This technique provides a means to easily create log an log-log graphs.

Label Sequence

The second tool is used to draw the labels or text / numeric portion of a chart axis. Simply click and drag out a line; the labels are drawn along this defining line.

The numeric labels will follow a sequence, with a starting value and additive numeric interval. The sequence can be defined on-screen by double clicking the graphic and entering the standard text editing mode. More control of the sequence and appearance is provided on the Graphic Details drawer. While this graphic initially appears very simple, the extended flexibility is actually quite significant: the full macOS typeface and font capability applies to these labels, static prefix and suffix text is allowed, and colored or stylized effects may be used.

Adjusting Labels: A Label Sequence may be adjusted on-screen. Click the Label Sequence once to select; you will note an additional text block appears. This text box has a number followed by a colon and a second number. The first is the starting numeric value; after the colon, the step amount or delta value of the sequence is shown. This specifier text box behaves as a normal EazyDraw Text Box; double click it to enter the editing mode.

In the on-screen editing mode you may edit both the starting value and the signed increment. The number of decimal places shown on your labels will mimic the number of decimal places that you include; use zeros if necessary to specify this. The typeface (font), size, color and other attributes of the text you enter for the starting number are mimicked in the labels. These need not be the same for full number, for example, a smaller font size might be used after the decimal point. A prefix and/or suffix may be included. Just type the desired text; for example, the units of the values could be entered after the starting number, specifying it as a suffix.

While most aspects of the label sequence may be entered as edited text on screen, the somewhat cryptic nature of this technique is not necessary. Use the Graphic Details drawer for a more descriptive interface to the full functionality of the label sequence.

Using these graphics, especially the Label graphic, will provide improved speed and drawing responsiveness. These complex elements are highly optimized by EazyDraw. One reason these were added to the EazyDraw tool suite was to simply improve speed. It was common to find hundreds of 2-3 character text elements and short lines when drawing charts. Each of these seemingly simple text blocks fully invoke the powerful typesetting machinery of macOS and this would place a significant load on the CPU and memory of the system. With the use of these compound tools the typesetting, while still available, has been optimized to minimize the CPU load. They are just fast - it is as simple as that.

Grid Tool

The grid tool (third from left) is used to draw a rectangular grid as a single graphic element. Select the tool and draw a full rectangle; the grid is drawn in the enclosing rectangle. After it is drawn, handles are provided to adjust the spacing and initial position of the grid. To adjust the spacing in a precise numerical fashion, use the Graphic Details drawer.

Hex Grid: The last tool is a Hex grid, formed with a set of interlocked equilateral-hexagons. These shapes are very symmetric, the radius is equal to a side length. This symmetry makes a matched honeycomb mesh.

After a hex grid is drawn, handles are provided to adjust several aspects of the grid. It may be orthogonal or oriented at an angle, the radius property is adjustable. The drawn length of each side is adjustable to obtain a hex-grid-tick appearance, or when extended fully this will provide an isosceles triangle grid.

Text Box

There are two forms for text provided by EazyDraw; the Text Box and Annotation. The Text Box form was introduced in chapters 6 with detailed information about inspecting text with the Graphic Details drawer and chapter 9 concerning drawing and resizing text boxes. We'll not repeat the information provided in these previous chapters. Here you will find a brief summary of a few critical points and some additional fine points concerning the Text Box graphic.

An important concept is to understand that text on a drawing is always found in graphic container. Since EazyDraw is primarily a drawing program text is on an equal footing with all other graphics and may be manipulated as other graphics, for example, move, resize, and stretch or scale.

Before text is typed on a drawing, a Text box is required. This rectangle may be thought of as a container to hold the text. The Text box is created in the same manner as a rectangle; click and drag out the defining corners.

The red circular resize handles behave just as those of any rectangular graphic. This action resizes and positions the defining rectangle that is provided for typesetting the text.

The bluegreen arrow handles, found in the lower right hand corner of a Text Box, will shrink, expand or stretch the text. These editing handles treat the text as graphic element rather than a text element. This action does not change font size.

Text in Text Boxes is edited on screen. The Text Box is selected to edit its graphic properties (size, position, scale, stretch, etc.). If a selected Text Box is double clicked; the editing mode changes to text editing mode. In this mode a temporary solid contrasting background is applied to the text, and standard full text editing is enabled. The background for text editing mode is normally a creamy gray but may be different if the contrast of text color to the standard background is low, in other words: if your text is colored you may have a color other than gray for the text background when the Text Box is in the editing mode.

Text in a Text Box is fully typeset; even advanced typesetting features such as Kerning and Ligatures are supported and always in play. This means that normally you would not enter carriage returns to provide line breaks. It is best to let the defined text area control line breaks.

Text Stamps

Text Stamps are special forms of a Text Box. They are accessed from the Text Stamp submenu found on the Text Main Menu. These are used for automatically synchronized text messages such as a time stamp of the last saved change to a drawing, or a page number.

Page Stamp

Page Stamps are added to drawings using menu commands found on the Text Stamp submenu. There are 2 versions of page stamps available, "Page" and "Page_of_." A Page Stamp is created by selecting the appropriate menu item. The new Page Stamp is created and initially placed in the middle of the screen. You then move the page stamp to the desired location on the drawing. When the page stamp is moved to a different page, the number shown reflects the position of the upper left corner of the Page Stamp's text box. The number of pages used for a drawing are specified on the Page Layout parameter panel. On this panel you specify the Pages Across and Pages Down used for a drawing. The Numbering Order, "across then down" or "down then across" is also specified on the Page Layout panel. Changes to page layout will dynamically alter page stamps as appropriate.
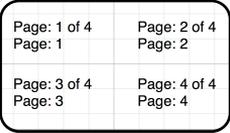
Page: 1 of 4	Page: 2 of 4
Page: 1	Page: 2
Page: 3 of 4	Page: 4 of 4
Page: 3	Page: 4

Page stamps are fixed; editing the text is not allowed. Double clicking a page stamp will not enable text editing.

Time Stamp

Time Stamps are added to drawings using menu commands found on the Text Stamp submenu. There are 4 forms of time stamps available, "Now," "Last Change," "Last Save," and "Create."

A Time Stamp is created by selecting the appropriate menu item. The new Time Stamp is created and initially placed in the middle of the screen. You then move the page stamp to the desired location on the drawing.

Now: The "Now" selection creates a "User Time Stamp" like the first example shown below. The time placed in the time stamp is the instant that the user created the time stamp. This time remains static - does not change - and cannot be edited with standard text editing activities.

Last Change: This selection creates a "Change" time stamp like the second example shown above. The time shown will change automatically every time the drawing is changed in any way. The text cannot be edited with standard text editing activities.

Create Time Stamp: Oct. 6 2012 05:02:23 PM

User Time Stamp: Oct. 6 2015 05:24:49 PM

Save Time Stamp: Oct. 6 2015 07:30:14 PM

Change Time Stamp: Oct. 30 2015 15:26:19 PM

Last Save: This selection creates a "Save" time stamp like the third example shown above. The time shown is updated each time the drawing is saved to the hard drive. The text cannot be edited with standard text editing activities.

Create: This selection places a "Create" time stamp like the forth example shown above. The time shown is the time that the drawing was created. This is the time at the instant when the initial "Untitled" window was opened. This is a static time stamp, it will not change and cannot be edited.

Time Stamp Format

A drawing pull down panel is provided to specify the format for Time Stamps. The order and wording or numbering of year, month, and day may be arranged and specified with the four sets of popup menus provided. The format of the time phrase is chosen with the controls on the right side of the panel. The Time Format panel is accessed from the Text Main menu, Time Stamp submenu.

The example box at the top of the panel shows the date and/or time as it will appear with the current settings.

The prefix and suffix text fields are used to specify specific text that precedes and follows the date and or time.

The two checkboxes at the top are used to include or exclude the date or time. At least one must be selected. The next checkbox below determines which of these components is shown first.

The four pairs of popup menus determine which components of the date are shown in order. The top pair specify the first component; the next pairs down determine the next component to the right of the date in sequence. A separator text string may be entered into the text field immediately to the right of the pair of popup menus.

The Factory Default button is used to return the format to the starting conditions. There is no undo for this action. The action only applies to the current Time Format for the panel. Nothing on the drawing is changed with this action.

The Selected button applies the panel's Time Format to all Time Stamps selected on the drawing.

The Existing button applies the panel's Time Format to all Time Stamps on the drawing. The new Time Format will also be used for subsequent Time Stamps created for this drawing.

The Drawing button applies the panel's Time Format to the drawing. The new Time Format is used for subsequent Time Stamps created for this drawing. Existing Time Stamps on the drawing are not changed.

Changes made with this panel are persistent. New drawings will start with the last Time Format applied with the Existing or Drawing buttons. This applies for future launches of EazyDraw after quitting.
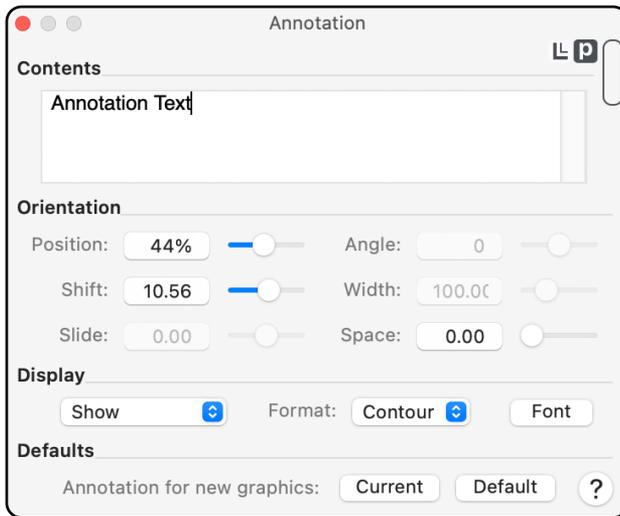
Annotations

The Annotation palette provides management of rotated or contoured text. Annotations are associated with a graphic shape. The annotation may be an off-screen memo or comment attached to a graphic; they do not need to be shown.

Abbreviated instructions for using an annotation are: select the graphic, open the Annotation palette, type the text in the Contents text box found at the top of the Annotation panel.

Annotation provides a method for displaying text at angles other than horizontal. These capabilities allow a text message to layout with full typesetting capabilities such as justified, and the resulting layout may be positioned at any angle. The text may also be contoured along a curve or path. If simple rotated text is needed, use a normal text box and the rotate handle of the text box.

Since annotations may be shown at various angles or on a contour, the text is entered and edited in a separate panel. You do not select or edit the text directly on the drawing. The text is entered and edited using the Annotation floating parameter palette. This palette is accessed from the Main Text menu, about halfway down. The toolbar button shown to the right also provides access to the annotation palette; it is included in the default toolbar, on the left side of the toolbar. Full editing, layout, and text styling is permissible with
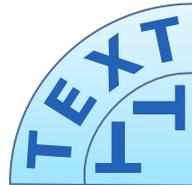
annotation text. Font palette and text menus are used for text styling. There is no interface on the Graphic Details drawer for inspection of Annotation text.

Enter

Text is entered by opening the Annotation Panel, selecting a graphic(s), and typing new text in the Text Editing box at the top of the panel. The text will appear on the graphic as you type, the "show" selection is automatically selected when you start typing. Text is edited in the conventional manner, in the text box on the panel. Cut, Copy, and Paste may be used with the Contents text view on this palette.

Font

To modify the Font, select a range of text in the Text box on the Annotate palette. Then use the Font panel (accessed from the Text main menu) to make the font modifications. The annotation uses the Rich Text Format so fonts and sizes may be freely mixed.

Text Color

The easiest way to change the color of annotation text is with the Text Color toolbar button. If this button is not on your toolbar, add it with the Customize toolbar menu command (bottom of View main menu).

The color of the text is changed with standard color picker. If the color picker is open for other activities, it is available for use with annotation text. If the color panel is not visible it may be accessed from the bottom of the Font submenu found at the top of the Text main menu or the Font Panel, Extras popup menu.

To change the color of the text, it must be selected in the Annotation palette's Contents text box, found at the top of the palette. Color changes apply to a range of text selected in the Text box on the annotation panel.

Some care is required since the same color picker is used for many coloring actions. More information on Color picking is provided in chapter 15. If you are not familiar with using the color picker, stick to the more straight forward Text Color toolbar button.

Layout

Text layout options are found on the Text submenu of the Format main menu. These selections apply to all text of an annotation. If contour is NOT selected the width parameter defines the width used for the layout of the text. The height of the text area on the drawing is determined by the amount of text entered.

The text content of an annotation is somewhat limited; it is not designed to contain a full book. The size will be that of the font size; zooming in is not possible. If the text font size is very small, use a temporary EazyDraw Text Box to prepare and edit the text content. When finalized, copy and paste the text into the Annotation Contents view.

Think of the annotation as one paragraph. Line returns are not accepted in this text view. Typesetting parameters are used to break lines and fully format the text. Use the Width parameter found on the Annotation palette (right column, center) to specify the layout width of the text and define the line breaks.

Orientation

The parameters found in the middle section of the annotation panel control various aspects of the orientation of the text layout. Each of the parameters may be changed by entering a number or using the slider found the right of the entry text box.

Shift, Width, Slide and Space are in the Units (mm, points, or inches) defined for the palette by the Fine Scale settings.

Position: Position determines the place along the curve or path of the graphic where the annotation is anchored. The value is entered in percent and interpreted as a percent of the total length of the graphic's defining path.

Shift: Shift is used to position the annotation text along a direction perpendicular to the curve or path at the anchor point. If shift is non-zero a red bar is shown when the graphic is selected, this indicates the anchor point on the graphics defining path and the top left reference point of the annotation text.

Slide: Slide is used to position the annotation text along a direction parallel to the curve or path at the anchor point. This control provides movement orthogonal to the Shift control.

Angle: The angle parameter defines the angle of the annotation text. The value is entered in degrees. Zero degrees is defined as that of normal horizontal "left to right" text layout. If Along Path or Contour are selected then the angle is defined by the graphic, in this case the Angle parameter entries are disabled.

Width: Width defines the width of the annotation text paragraph. Text is drawn and typeset across a rectangle whose width is controlled by this entry. When contour is selected the text is drawn along the graphic's defining curve in a single line. Width is not used and the entries are disabled for the contour formats.

Space: Space is used to add or remove space between characters when the annotation is shown on a contour. Spacing of characters is normally defined by Font selections, but when placing text on a curve you may need to add or remove space as the writing path may be stretched or compressed when proceeding around curves. Positive and negative values are meaningful and allowed. This parameter is only enabled when Contour is selected.

Display

The parameters found near the bottom of the annotation panel provide 3 possibilities for the display of the annotation. The states of the checkboxes determine if, where, and how the annotation is shown on the drawing.

Show: Check this box to show the annotation on the drawing. If not checked, the text message is retained as an off screen annotation that is attached to the corresponding graphic on the target drawing. If this box is checked the annotation is displayed on the drawing as defined by the corresponding parameters.

Box: If Box is selected on the popup menu, the text is shown in the normal horizontal left to right fashion. The width of the text layout is determined by the width text entry.

Along: If Along is selected on the popup menu, the angle of the layout of the annotation text is defined by the path or curve of the parent graphic. The display angle is parallel to the controlling curve at the anchor point. The width of the text layout is determined by the width text entry.

Contour: Make this selection from the popup menu to have the text follow a curve or path. This option displays the text message in a single line that flows along the attached graphic. If the message is longer than the curve, the end characters are "piled up" at the end of the curve. To avoid this you need to make the curve longer, the text shorter, or position closer to start of the curve.

Reverse: This selection is the same as contour but the line of text flows from the hook point to the start of the curve. If the hook point is at the start of the curve, all the characters will be "piled up" at the start of the curve. To fix this move the position down the curve.

Flipped: This selection is another contour display, but each character is flipped top for bottom. You may need this setting to have the text read properly in some cases. The layout may not always "look" perfect. It is better to change the host graphic and use the Contour method, if possible.

Mirror: This selection is the combination of Reverse and Flipped display. It is used when necessary due to the orientation of the host curve. Or it can be used to present a mirrored image of the text. If an explicit mirrored appearance is not necessary, it is better to change the host graphic and use the Contour or Reverse method, if possible.
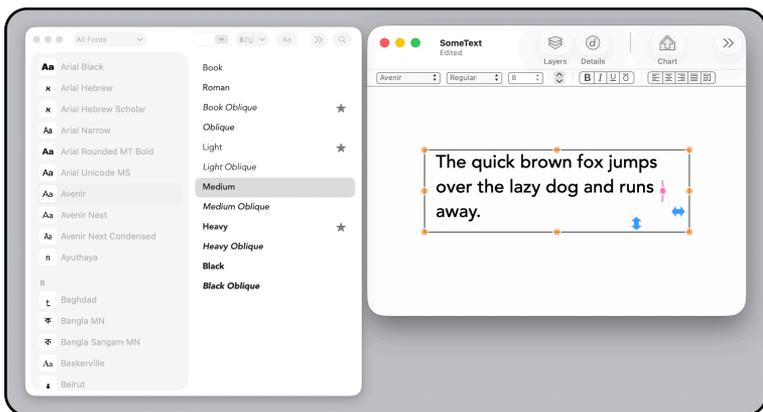
Fonts

There are several ways to select and manage Font selection and other text style attributes. The Graphic details drawer provides a straight forward focused method to inspect and select all defining characteristics including font, font size and text style. This was described in chapter 6 with the discussion of the workings of the Graphic Details drawer.
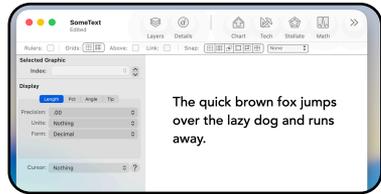
Above you see Graphic Details inspector. Use it for a more compact user interface.

The definitive complete interface with the macOS font system is accessed with the Font panel found on the Font submenu at the top of the Text main menu. Beginning with macOS Tahoe this system palette has a simplified user interface without a comprehensive live preview. This is not a problem because your EazyDraw drawing is available to provide an easily customized live preview to aid in selection of font family and typeface. See example below.

The popup menu found at the top left corner of the Font panel has a selection for Manage Fonts. This selection opens the Font Book user interface panel. This is the new home of the full featured system Font user interface. The new Tahoe version of Font Book has many new features and a beutiful new design. Be sure to discover Font Book panel when looking for the exact right font for your EazyDraw text content, logo text, or scientific presentation fonts.

Collections

The collections table is a method for applying some organization to the wide selection of Fonts that are typically available. The latest macOS ships with some basic collections and you may remove these or add build your own collections that may be relevant for certain projects or personal favorites. The plus and minus buttons, lower right are used to add or remove a collection.

Drag a font family from the Family column over to a particular collection row of the collection column. Drop the font there and it is added to your collection. Use the minus button to remove font collections from the list of collections. This is the technique to use to populate your Favorites collection.

Font Book

The bottom selection of the Font Workings pull down menu, entitled "Manage Fonts," will open the Font Book. This provides a way to manage the fonts available on your installation. If you purchase additional fonts or want to deactivate fonts this panel will help with that task.

The Font Book provides several ways to preview and sample fonts appearance and characters. Use the Font panel's settings menu (top left on the panel) to access the Font Book panel.
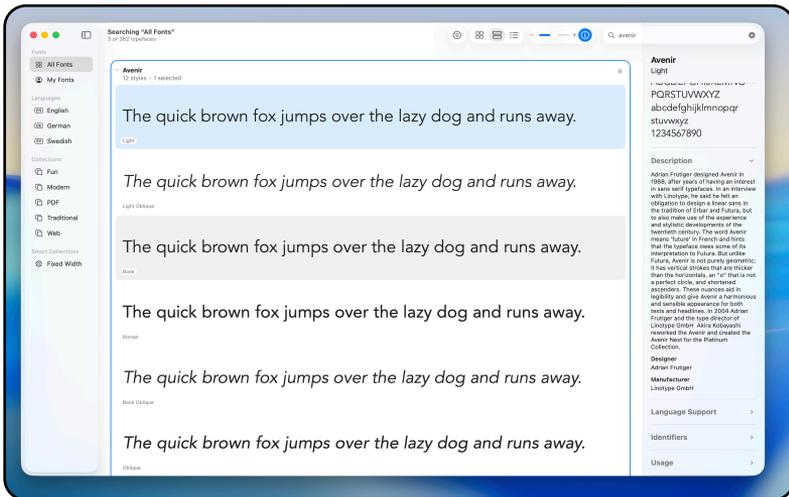
Emoji and Symbols 😌 *&* ℏ

The Text main menu provides access to the Emoji and Symbols palette. This palette provides several ways to view, select, and locate specific characters and identify which font families support various characters. This palette has two modes, Emoji and Character. The button at the top right corner switches between these modes.

The Characters palette provides access to the vast extended Unicode character sets. Use the palette and the numerous inspection or search features to locate the needed character, select the specific entry in the desired font, then insert that
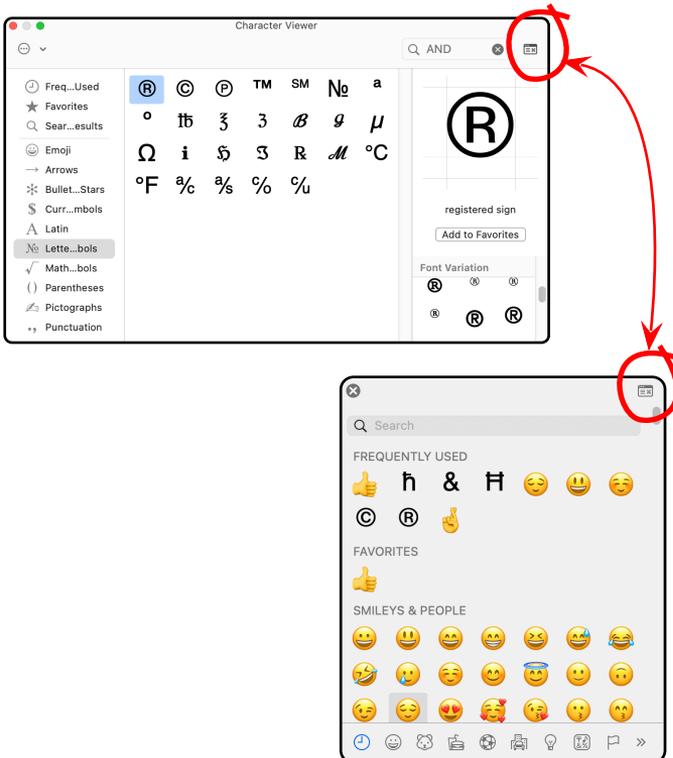
character into your design.

Note that copy -> paste does not work from the Character palette to editing EazyDraw text content, but all the other typical methods work including drag and drop does, double click, click and hold. Drag and Drop provides one way to add non-standard characters to your text.

Greek Characters & Math Symbols

problematic when moving documents between operating systems, the web, and between current and old technology programs on macOS.

The Graphic Details drawer provides access to every character available in a font. Select a character, open the Graphic Details Drawer, select the "character" tab on the inspection view. You'll note three popup menus that show and provide selection of all the characters of the font. Just pick the desired character from the menu.

If necessary use the "gear" popup menu to customize and add Greek to the list of character categories.

There is a tutorial on entering Greek characters provided with your EazyDraw installation. This is a normal EazyDraw drawing. It has a handy table of the Greek alphabet in the Avenir, unicode encoding. Copy and paste from this drawing, or move the whole alphabet to your working drawing or template file. The table is then a convenient source to quickly access these characters.

Don't forget: iPad and iOS

EazyDraw mobile version is able to provide additional user interface capability that is often helpful when dealing with emoji and extended character sets. Use your Apple technology to the fullest by closely integrating your touch screen devices with computer. You can literally: select an extended character or symbol, insert it into a text box on the iPad, copy the text box, paste it into your drawing on your main Mac computer.

Mobile EazyDraw's keyboard is fully programable. And you have convenient access to multiple keyboards, fully user configurable. The mobile keyboards can be a very productive addition to your workflow.

Text Color, Text Box Color

There are several color attributes that are associated with a single bit of Text Box content. This can become confusing but once one understands each of the things that can be colored these issues should be easy to master.

The text color can be inspected and changed using the color well found at the bottom of the Font panel. There are more convenient places to manage text color, this color well on the Font panel is used primarily to manage the Default text color. This is accomplished by setting a color on the Font panel color well then click the "Set Current as Default" button.

The actual text container or text box itself may have a background or fill color, an outline and outline color. The text too may have a color, it may even have two colors, a fill and outline.

The text container's fill and outline attributes and their color is managed with the Color and Style palette. This works in the same fashion as any normal graphic. The Fill, Outline and associated colors on the Color and Style palette do not control the color of the text.

The Text color and style are managed from the Graphic Details drawer - Style Tab. The colors on this Style tab control text and do not interact with the graphic aspects of the containing Text Box.

Finally there is a special text color toolbar button. This is the most direct way to set the color of text without confusion with the fill and stroke colors of the text box rectangle.

Superscript and Subscript

These often needed attributes are found on the Baseline submenu accessed from the Text main menu's Style submenu. First type the characters that are needed in a normal fashion, just to get them entered in the text content. Then select the character(s) that make up the superscript or subscript. Then execute the associated menu command. They may also need to have a smaller font size, change that from the main Font palette or use the menu command to increase or decrease the font size.

The Attributes bar (see chapter 06) has convenient buttons for applying superscript and subscript. When in the editing mode with text selected these button are available. A simple click of the button changes font size and adjusts the baseline accordingly. The "No" button stands for "normal."

Typesetting

The Text main menu and the Font, Style, and Paragraph submenus provide access to several formatting and style options for text.

Most of these text characteristics may be examined and altered using the Graphic Details drawer. Some of them are supported on the main Font palette. All have a corresponding toolbar button available to add to your drawings main toolbar. And a great deal of the functionality is provided on the Attributes toolbar when text is selected. This duplication lets you choose the best user interface method for the project at hand. Generally speaking, the various interface methods have the exact same behavior. For example, setting a word to Bold with the Text menu, the Graphic Details drawer, with the Attributes bar, or the in the Typeface column on the Font Palette are all equivalent actions.

The menu system interface allows command key shortcuts for these actions. Keep in mind that the choice of menu keys is under user control. Changes are made with the Menu Keys palette found on the EazyDraw main menu.

Some of typeface characteristics may not be applicable to a given font. For example, Arial Black does not have an italic typeface. Hence this item would be disabled if Arial Black text is selected. If the enable states of these menu elements does not seem correct, use the main system font palette to investigate the issue.

Kerning: A submenu is provided for adjusting the Kerning of a run of text. Kerning is a term indicating how much the following character is shifted from normal offset for a particular character.

The standard amount of spacing between characters is provided by the font information. Font designers specify the spacing appropriate for each character of the font. The spacing is defined for the space after the character. This spacing is called the Default spacing.

Tighten will decrease the inter-character spacing. This translates to decreasing the kerning number. Loosen increases the inter-character spacing. Use Default will return inter-character spacing to the values defined by font design information.

The amount of kerning is defined by a number, zero meaning use the default kerning. The numeric value may be examined and changed using the Graphic Details drawer.

Italic: Oblique is provided as an alternate to Italic. Some typeface families do not have an italic variant, in this case the Oblique transformation may be used to obtain an Italic affect. Oblique applies a right tilt of 20% to the selected text.

Italic: Italic will apply an italic typeface to the selected font, provided the font has an italic typeface. If an italic typeface is not available this will apply an Oblique slant to the text.

Bold: Heavier and Lighter is used to increase the weight of the typeface. For many fonts this is the same as applying Bold or Unbold to the font. If a font accepts differing weights of typeface this interface will apply these characteristics.

Ligature: The ligature submenu provides control over selection of one of 3 possible ligature applications, none, standard and all or fancy. Ligatures apply primarily to non-English character sets. English text has no essential ligatures and only two standard ligatures - for "fi" and "fl" -- all others being considered more advanced or fancy.

Leading: The baseline submenu provides control over selection subscripts and super scripts. Don't use this to adjust line spacing. Line spacing is specified with parameters on the Paragraph Form palette. Leading (l'ledi ng l rhymes with heading) is the professional typesetting term for the baseline parameters.

Copy Face & Paste Face: These copy and paste font selections are used to copy or paste just the font and text style aspects of a selected group of text.

If a range of text is selected these actions apply to the selected text. If a text graphic or other graphic with an annotation is selected these commands apply to all the graphic's text.

Ligature: The ligature characteristic determines the use of combined characters. A font family may contain special combined characters to be used when two characters appear next to each other. The text system provides control to not use ligatures, or use the standard ligatures, or all available.

Which ligatures are standard depends on the script and possibly the font. Arabic text, for example, requires ligatures for many character sequences, but has a rich set of additional ligatures that combine characters. English text has no essential ligatures, and typically only two standard ligatures, those for "fi" and "fl" -- all others being considered more advanced or fancy. However a stylistic script font may require several ligatures for proper appearance.

Padding: Padding applies to all text in Text boxes. It is a bounding margin that the typesetter applies around the area where text is allowed. The historical default is 5 Points. This places a small "out-set" for the bounding Text Box relative to the contained text. In most cases this padding is desirable for pleasing appearance. In the case of very small font size (1 or 2 Points for example) the default value of 5 Points will be too large, use the Padding parameter adjust accordingly.

Padding is accesible on Graphic Details and on the Paragraph Form palette. Default management of this parameter is accomplished on the Paragraph Form palette in the normal fashion.

Stylize Text

This submenu is used to apply special effects to text graphics.

Bezier and Punch changes the text graphic to a group of Bezier Paths. After the conversion the graphic still looks like text. But the converted graphic is not text and may not be edited as text. It is wise to complete all revisions of wording and spell checking before applying these special effects. Reverse, outline and stroke effects are text effects that are applied directly to the text. Text editing is still possible after these conversions are applied. Undo will return the original text.

Normal
Punch
Reverse
Bezier
Outline
Stroke
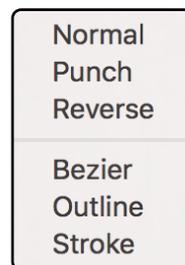
The colors and style attributes used with the Outline and Stroke special effects are accessed on the Graphic Details drawer on the Style Tab. It is necessary to use the Graphic Details drawer if different colors are desired for the stylized text. For the actions that change the text to Bezier paths, the Color and Style palette is used, not the Graphic Details drawer.

The Normal menu command will return stylized text to the normal state, black solid letters. This does not apply to text that has been converted to Bezier paths with the Bezier or Punch menu command.

Punch: Punched text is like reversed text except the characters are fully transparent - not colored. This gives the striking effect of being able to see through your text.

The Punch command creates a black background and punches the text letters out of the background. The punched text becomes a clear or voided area of the background and allows other graphics behind the text to be visible through the text. The result is a Join Group with an Even-Odd winding rule. Winding Rule is explained under the Color and Style palette documentation in chapter 15.

Reverse: The Reverse menu command will convert the text to white letters on a black background. The background color is controlled with the Color and Style palette - fill color. The text color is changed with the Color Well or any of the other text color tools discussed above in this chapter.

Bezier: The Bezier menu command converts the text to a group of Bezier paths. Details of this process are provided in the next section titled Outline Text . This command converts the individual text glyphs (characters) to Bezier paths and forms a Group with these paths.

Outline: The Outline command changes the style of the text to apply a black outline stroke and white fill to the individual paths. Unlike the Bezier command, the text remains a text graphic capable of text editing, spell checking and other text actions. This command and special text affect is not possible on Jaguar, Panther (version 10.3) or newer is required. The stroke width and color of the text may be changed using the Font Palette or Graphic details drawer.

Stroke: The Stroke command is similar to the Outline command, except that different colors are used for the stroke and fill of the text.

Bezier or Punch text conversions may be ungrouped to work with the individual paths. If the group is reformed, the Join form of the group is required for the Punch affect, and the even-odd winding rule must be applied to achieve this affect.

The graphic details drawer - style tab provides access to the effects as applied to the conversions that do not convert the text to Bezier paths, these are Reverse, Outline, and Stroke.

Colors other than black may be applied to any Text Graphic. The text does not need to be converted using these commands in order to change the text color. The system color picker is used to directly change text color of any selected editing text. See the discussion above on Text and Text Box colors.

Punch and Bezier commands collect the converted characters as a normal graphic Group. This allows resizing of the text group as a single graphic. Each character is available for individual editing, use the Ungroup command found on the Format main menu to separate the group of characters.

Outline Text

The Bezier command on the Text stylize submenu is the same as Convert to Bezier selection on the convert menu when applied to Text. Converting to Bezier, sometimes referred to as Outline Text is useful for applying advanced coloring effects to text, preparing a document for press, or to shape and alter text with more degrees of freedom than a change of font or the layout rectangle.

The conversion creates a group of Bezier paths that precisely outline each character of the typeset text, in this context the characters are referred as glyphs. The Bezier paths are the same in all respects as those created by other drawing actions with EazyDraw.

Note that once the conversion is applied, the text content may no longer be edited as text. Outline conversion is a very useful technique but is decidedly unidirectional. It is important to complete the editing, word selection, spell checking, typesetting, kerning, font selection, and font size before converting to Outline paths. It is also a good idea to independently save the text content, prior to conversion, by duplicating or placing on another holding layer of the drawing. This will allow future changes to the content if necessary.

Select a Text Box(es) and then select Convert to Bezier from the Convert Menu. This converts all the typeset text to individual Bezier Paths.

The Line (stroke) and Fill options are set to No-Stroke with Fill. This is the method used when fonts are rendered to the screen or print. With these settings the text will initially appear the same as when drawn as text before the conversion. Note that there is normally no visual change to your text or drawing with this conversion.

One use of this technique is to stylize text by applying other coloring or Fill effects with Gradient Fill or Pattern Fill. All of the fill techniques discussed in chapter 15 may be use with converted text.

Another use of this technique is to stretch and resize the text. For example in laying out a News Print Ad it may be important to very precisely size the headline or other text. The precision needed for a professional appearance is often not possible by simply selecting font size, and adjusting kerning. Text stretching and re-sizing can be problematic with the automatic typesetting getting in the way as you try to get the exact appearance needed. With this technique the resulting group of text may be resized interactively by adjusting with the group resize handles, or numerically with the Morph panel.

Electronic Prepress Preparation

An important use of the text Bezier outline technique is to prepare a layout for electronic prepress. In this case Fonts can be a particular problem. The production technology may have problems properly reproducing the text because of font translation issues. The font may not be available on the typesetting equipment or different typesetting technology may introduce minor differences in line endings or other layout issues.

Postscript file formats, PDF and EPS, address these issues by embedding the font in the drawing document. This solves the first issue but not always the layout problems.

The professional approach is to convert all text of your layout to Bezier Paths, sometimes referred to as Hollow Outlines or Outline Text. After conversion the paths will be communicated and reproduced with high fidelity independent of any font information. Each individual text character is drawn - just as the graphic vector content of the document are drawn.

Rotating Text

Text is rotated on screen with the rotation handle. This is the small editing handle with an arc, found near the right hand side of the text box. Simply click the handle and drag to rotate about the center of the text box.

If the text needs to be rotated about a point other than the center of the text box, use the Rotation tool found on the main tool palette. Or in this case it is easy to accomplish with two steps, rotate with the editing handle and move free hand or use one of the orient buttons to translate the text to defined point relative to another graphic.

As Annotation

Another method for creating rotated text is to add the text as an annotation to a graphic then orient the graphic at
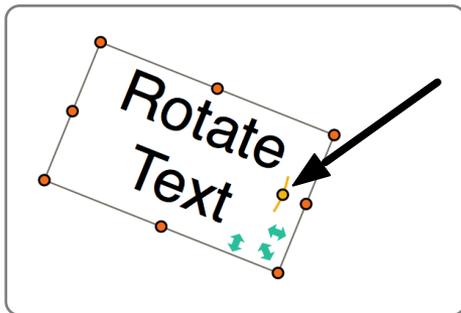
a desired angle. This is useful if the text needs to be tangent or oriented specifically relative to a graphic on the drawing .

Free Transform

The third way to rotate text is to change the interaction level of a Text Box to Free Transform. In this case you do not use the Rotate tool or the Transform submenu. The interaction level is changed on the Format main menu, Interaction submenu.

Free Transform graphics have interactive rotation handles found at the 4 bounding corners when selected. A Text Box will accept the Free Transform menu command. In this form you can rotate the text with the rotation handles. Free Transform also allows text to be skewed and distorted in interesting ways.

Tabs

The Tabs palette provides control and inspection of tab stops in a Text Box. Parameters are provided for specification of position, spacing, alignment and leaders. It is accessed from the Text main menu, Paragraph submenu.

The full Tabs palette with leader specification provides several parameters to manage intricate tab styles. In most cases this full capability will not apply. Use the Window Shade button, top right of the palette to shorten the palette to show only the frequently used parameters at the top of the palette.

Tab Stops

The table at the top of the palette is used to numerically enter the positions of, or space between tabs. Click on the palettes title bar to make the Tabs palette fully active, then double click on an entry to edit. Use the plus and minus buttons right below the table to to add or remove entries.

Click the On-Screen check box to show tab markers at the top of the text box. These are shown only when the text is in the editing mode, they are not shown when the text box is simply selected but not editing. The tab marks are small box-arrows shown at the top of the text box. The on screen tab markers may be used to interactively adjust tab stops, simply click and drag.

The "Run Space" parameter is the spacing of all tabs after the specified tabs. This may be thought of as a "default" spacing used when a line of text has more tabs than are specified in the Tabs table.

Alignment

The Align popup menu provides 4 selections for alignment position of the individual selected tab stop. The choices are left, right, center, and decimal.

To set alignment, first activate the palette with a click to the title bar. Next click and select an individual tab stop, a row in the table making sure it is highlighted. Then make the selection from the popup menu. Selections from the menu apply to all rows selected.

Leaders

A Leader is a filling character or line like graphic used to mark the open space of a tab. Such as one finds in accounting sheets to help aid the eye to follow a line entry. See the example below, the Leaders are the black and colored lines connecting the two right columns.

The popup menu below the Leader title is used to enable or disable a leader line for a specific tab stop. "None" turns off leaders, and all parameters below. Several selections are provided for a solid leader line, a sequence of dots, or a dashed line pattern.

Shift: A vertical shift may be applied to the baseline position of the leader. This value is measured as a percentage of the Font Size. The zero position is the baseline for the font in use.

Weight: The weight parameter specifies the line thickness or dot radius of the leader line. These values are also measured as a percentage of font size.
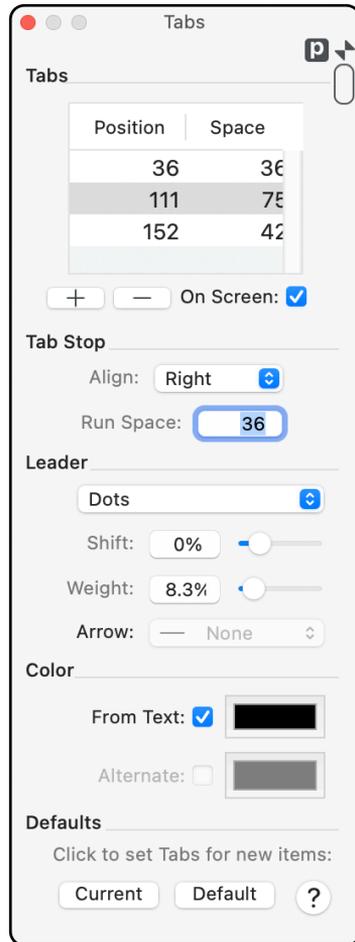
Arrow: The arrow popup menu is used to specify an arrow for either or both ends of the leader line. The entries here are the same as found on the main Arrows palette.

Color: A leader is normally drawn with the color specified for the text. Explicit control of the leader color(s) is enabled if the From Text checkbox is unchecked. In this case the associated color well is used to specify a color for the leader line. Check the Alternate check box to provide a two color alternating coloring scheme.

When using the leader color wells careful attention needs to be made to the state of each color well. This is because text is necessarily selected when working with tab stops. If the color wells are deactivated (they toggle on and off when clicked) color changes will be directed to change the color of the text, not the leaders.

Spell Checking

Spell checking utilities are found on the Spelling submenu near the bottom of the Text main menu. Commands are provided to check the spelling of a complete document or a selected Text Box.

Spell checking may be managed by the menu commands provided or from the spell checking panel. The spell checking panel is used to interactively

manage spell checking and correction. Grammar checking and correction is supported on macOS version 10.5 (Leopard) and newer.

The spell checking technology is a system wide resource. If other dictionaries are added to your system they are then available to EazyDraw.

The top left text field is the key focus of spelling (and grammar) correction. This field will show a suspect word and your choice for the correction. Directly below this field a comment is provided explaining the issue related to the word or phrase shown. The list below the comment area presents suggestions for correction. Corrections need to be entered in the top text field before replacing the suspect word or phrase. You may type in a correction or select from the suggestions list with a mouse click.

The command buttons on the right mirror the commands found on the spelling submenu. They are documented in a list that follows in this section.

The popup menu below the suggestions list shows the current dictionary. All dictionaries available on the system are found on this menu.
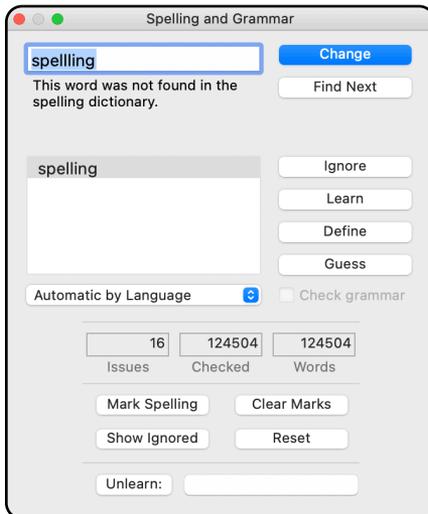
The word count elements provide feedback to indicate the state and results of a spell check. It is easy to think you have just spell checked your whole drawing when only a small text box was checked.

Sometimes you may click the change button before actually changing the suspect spelling in that key top left text box. This results in replacing the misspelled word with itself. EazyDraw will alert you when this happens and provide an opportunity to back-step and check the same word again.

Notice the interrelation of the Ignore, Learn, and Find Next buttons. All allow the suspect spelling to remain, they just differ in the degree to which the suspect spelling is over-looked or not for future spell checks.

Note that "Unlearn" does not clear "Ignored" words, these are two separate components of the spelling technology. To remove "Ignore" words for a drawing, click the Show Ignored button and use the pull down panel to manage ignored words for the individual drawing.

It is sometimes confusing managing the spell check panel and your main drawing window. Notice that to get the full blue highlights on the suggested spelling lists that the spelling window needs to be "in focus," click the title bar of the spelling panel, it will darken indicating focus has moved to the spelling panel.

Spelling: The two menu commands, selection or document, will open the spell checking palette. The buttons on the palette are largely self explanatory. The Guess list shows possible correct spellings from the Dictionary. If there is more than one guess, a particular guess is selected to enable the Correct button. Find Next will do nothing to the identified misspelled word and move on to the next. Correct will swap the Guess spelling for the misspelled word.

Ignore will add the identified word to a behind the scenes list for the drawing. After Ignore is clicked the identified spelling is flagged as acceptable for this drawing, no others. After Ignore, future spell checks will not show this word as misspelled. This is persistent for the drawing, when saved, closed and re-opened, a spell check will still not flag the word.

Spellings Allowed For This Drawing.

3rds
ArrowShapes.
ezdrw.gz
AuotCAD
BBedit
EazyDraw
EazyDraw.clr

Clear

Clear All

OK

Add word:
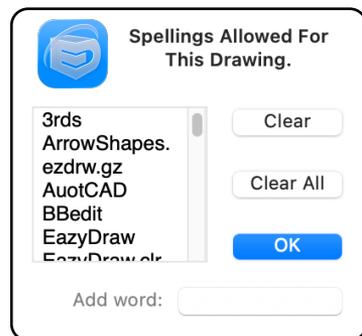
The Ignored spellings list for the drawing is accessed from the menu command found at the bottom of the Spelling submenu. This command opens a small panel at the top of the drawing. The panel allows inspection of the current accepted questionable spellings. Changes and specific additions are made with this panel.

The accepted spellings apply only to a specific drawing file. They do not interact with a Dictionary.

Control Click To Correct: Quick access to the guess list for a potentially misspelled word is provided with a Control Click. This brings up a contextual menu that provides convenient access to the Spelling submenu actions. This contextual menu will have the "guess" list of correct spellings right at the top of the menu. Click and make a selection to correct the word.

The target text needs to be in the editing mode for control click access to spell correction. It doesn't work on text in a Text Box that is not selected or is selected but not editing.

Mark Misspellings: These commands, one for selection the other for the full document, will check the target text and add a red highlights to potentially misspelled words. Unlike the Mark As You Type marking, these highlights are semi-permanent. They persist when editing is not active for the text.

There is a menu command to clear these marked misspelling highlights. Be sure to use this command before printing if Mark Misspellings has been used.

Meaning from Dictionary: To look up the full meaning of a word, highlight the word in the text editing mode, control click the highlighted word, select "Look up in Dictionary" from the popup menu.

| Look Up "selection" | |
Translate "selection"	
Search With Google	
Cut	
Copy	
Paste	
Share	>
Font	>
Spelling and Grammar	>
Substitutions	>
Transformations	>
Speech	>
Layout Orientation	>
Services	>
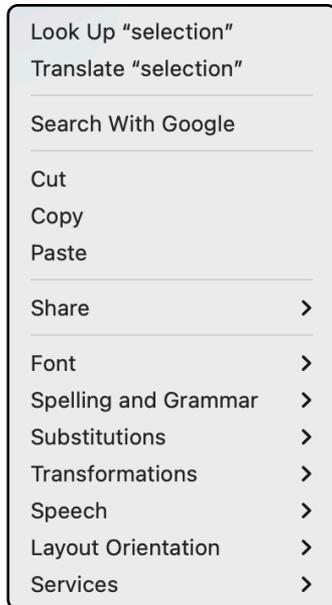
Find Replace

Find and replace utilities are found on the Find submenu near the bottom of the Text main menu. The top command here provides access to a drawing's Find panel. If a Find has been executed and results logged, the other menu actions will enable as appropriate. Normally they are all (except for the Find... selection) disabled.

Find...: The find panel is associated with an individual drawing, it opens down from the title bar of the drawing. There are two text entry fields, one for text to find the other for text to replace. Recent entries in these fields are remembered, these entries are accessible from the two stepper buttons to the left of the text entry field.

The controls and buttons are largely self-explanatory. Search and replace focuses on the text characters, not the font and text style attributes of the text.

Show - Highlight: This option will highlight all found instances of matching text. The highlight color is the system highlight color. Highlights are cleared with the menu command found at the bottom of the Find submenu.

Show - Select: This option will select the container of the found instances of the matching text. The full container, the Text Box or Annotation, is selected and the matching text is highlighted.

Show - Center: This option will not only select and highlight matching text, just as performed with the Select and Highlight options, the drawing is panned to place the found text container near the center of the drawing window. A great way to find or quickly access elements of a large multi-page drawing.

Show - Focus: This option will not only select, highlight and center matching text. The identified text is made the focus for inspection on the Graphic Details drawer. This locates the desired text and readies it for changes.

Show - Zoom: This option performs all of the above actions plus the drawing is zoomed in so that the targeted Text Box is in full focus.
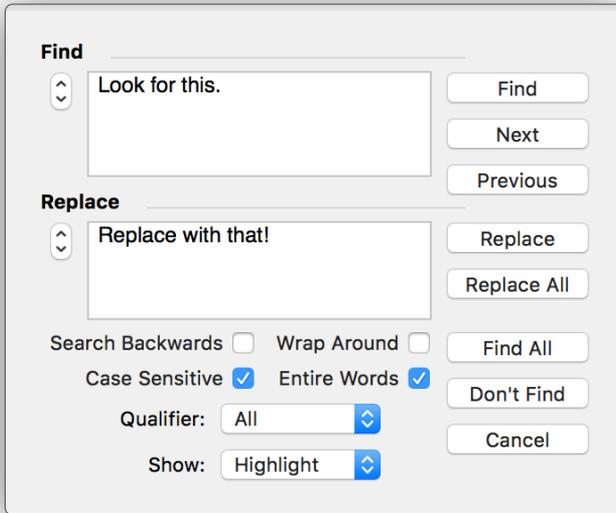
Qualifier: The search may be focused on particular text content, either Text Boxes, or Annotation Text only. The other selections are All text or Selected text only. Selected text means selected Text Boxes, the text does not need to be in the editing mode to be included in the search. In fact text should not be in the editing mode when using find.
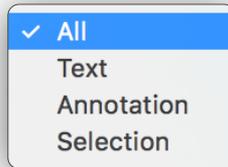
Show: There are several options available to indicate found text. These are chosen from the Show popup menu found near the bottom of the palette. These options are built one upon the other, the selections near the bottom of the popup menu perform all the actions of the selections above the menu entry.
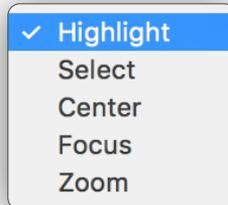
Default Font Palette

The Default Font palette defines the font settings used when creating new text in EazyDraw. It provides a central place to control the base font, text color, and background color that will be applied automatically, without requiring manual setup for each new text object. Access this palette from the Text main menu, Font submenu. Click "Set Current as Default" to apply.

Additional typographic attributes not present on the parameter palette—such as size, weight, alignment, spacing, and advanced text styling—are derived from the current text selection on the drawing.

The Default Font palette is designed to establish a consistent starting point for new text, while preserving full flexibility and precision when editing individual text objects.

Typical Workflow

A common workflow when using the Default Font palette is to first choose the scope—App, Drawing, or Layer—depending on how broadly the defaults should apply. For example, setting the scope to Drawing allows you to establish consistent text styling for a single document without affecting other drawings.

Next, select the Font, Text Color, and Background Color in the Default Font palette. These settings define the initial appearance of any new text objects you create. Existing text objects are not altered.

As you work, you can refine typography by selecting text directly on the drawing. All advanced attributes—such as font size, weight, alignment, spacing, and other typographic details—are taken from the selected text and edited using the standard text tools. This approach combines a simple, predictable default with full control over detailed text styling where needed.
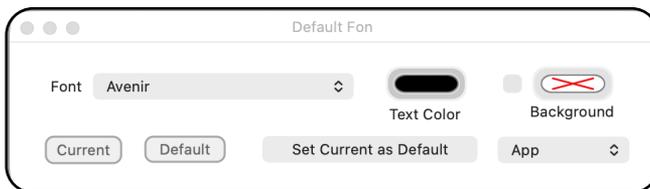
Linking Text Boxes

Text links allow text to flow from one text box to another. Text links are managed interactively on the drawing. A menu command on the Text main menu, near the bottom, enables/disables the text linking capability.

If text links are enabled for a particular text box two green boxed arrow handles are shown when the text box is selected. These are a small box with an enclosed arrow head shape indicating where text logically flows into or out of the associated text box.

Two text boxes are linked by clicking and dragging from one of the two text link handles. Drag the text link connecting line to an open area of the drawing to add a new text box that is linked to/from the originating text box. Drag from a text link handle to   another text box to link two   existing text bo xes .

Text can flow to

another text box

when linked together.
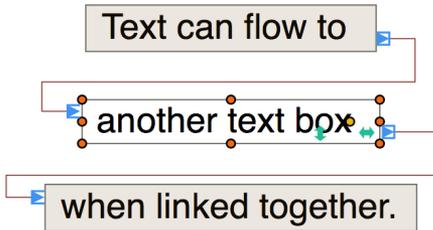
There is a specific direction component to the text link connecting line. Text flows "to" the upper left text link handle and "from" the lower right text link handle. As explained above, the inner arrow shapes provide a visual clue for this direction of flow.

Text Link Connectors: A text link is shown on the drawing with a light red pseudo connector path that joins the two text link handles. The path is only shown when one or both of the connected text boxes are selected. When the associated text boxes are not selected the path is not shown. The text link connector cannot be selected directly, and there is no "editing" capability. When a connected text box is moved the connector link follows automatically. If the the text link becomes jumbled, disconnect then reconnect the text link.

Removing a Text Link: Text links are removed with the menu command. Select one or both associated text boxes then uncheck the Allow Link menu command on the Text main menu. Text links are not interactively editable on the drawing.

When a link is removed the text content is "frozen" in the two associated text boxes. The text is not pushed to one or the other of the two text boxes. To push all text out of one box and into the other resize one of the text boxes to a very small height before deleting the link.

Only one link "from" and one link "to" a text box is allowed. If a text box already is linked (from or to) another text box, the text box will not enable when creating a new text link path that would result in a duplication of links.

The actual positioning of the text link path is not relevant, it is just an indicator. When a linked text box is moved, the text link path simply follows the moving text box, no automatic routing or insertion of vertices is provided.

When text editing is complete it is a good practice to select all text and remove text links. If a large number of text links are present in a drawing a small, perhaps unnoticeable, change might cause unseen undesirable changes far off screen.

Flowing Text

There are two methods for flowing text in and around graphics. Text may be inserted into a graphic causing text layout to conform to the shape of the boundary of the graphic. Text may be assigned a Flow alignment attribute (similar to right or left justify) which causes text to flow around other graphics that are in front of the text as defined by painting order.

Text may flow around other graphics. The text is typeset to follow the contour of the outline of other graphics.

The "other graphics" need to be in front of (Send Menu) the text. Graphics behind the text are drawn over by the text. The text does not flow around graphics behind the text.

The menu item "Text Flow" is checked to enable this behavior.

Insert Text

Text is inserted in a graphic with the menu command found on the text main menu, or by double clicking a graphic that is already selected. Any graphic will accept text insert, except images and text of course. An existing text box may be inserted with the menu command, select the graphic and the text then execute the command.

Text may be typed into a graphic with the double click method or by selecting the graphic then executing the menu command, typing must immediately follow the insert text command.

Inserted text is removed from the interior of a graphic with the disconnect command found on the text main menu.

Inserted text will follow the interior contour of the graphic. Reshaping and resizing the graphic will reflow the text to conform to the resulting interior.

Text inserted into a graphic is typeset to follow the contour of the graphic. As the graphic is resized, the text is re-typeset to conform to the interior.

Editing inserted text is handled just like a text box. Select the graphic, then double click, the text editing view is provided over the graphic.
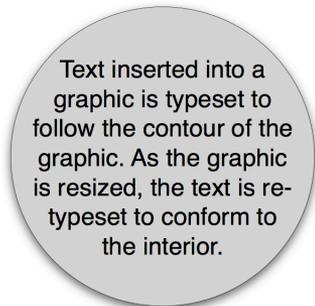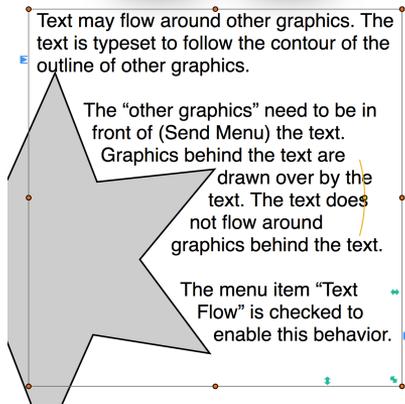
Typesetting to contours is a complex process. It is likely that the shape will need tweaking and typesetting parameters may need adjustment to get the exact look that is desired. And it may be that automatic typesetting to the interior contour may never achieve a desired aesthetic appearance. For more precise control the text can be converted to Bezier paths (see discussion earlier in this chapter) then each character may be positioned as needed without the interference of the automatic typesetter.

Centered Text

The centered text menu command works similar to insert text, except the text is centered on the interior of the graphic. Centered text is typeset in a simple rectangle, it does not flow with the shape of the graphic.

Cautionary Note: If you just need a visible box around your text, or a perhaps a background color - don't insert the text in holding rectangle. A plain Text Box accepts the color and style attributes of fill, outline, gradient fill, and pattern fill. Select the Text Box, open the Color and Style palette and apply a Fill color for the background or turn on Outline and select a color to add a visible border to the text. Note that the plain text box also accepts Gradient Fill and Pattern Fill, no need to add the complexity of inserted text in a simple rectangular shape. Of course you may insert text in a rectangle, but you will find that this requires annoying extra double clicks and unnecessary added editing steps.

Paragraph Submenu

There are 5 menu items that control alignment and typesetting of text. Text may be aligned with an even margin on the left or right. Centered alignment will center each line vertically in the enclosing text box. Justify will adjust typesetting spacings to provide an even text margin on both the left and right side.

Text Flow: The Flow selection for alignment will cause text to flow around other graphics on the drawing. Text flows around graphics that are "in front of" the text. Graphics that are "to the back of" the text will not impact text flow. The Send menu (on Tools main menu) is used to control the front/back relative positioning of graphics.

Insert and Flow: Text that is inserted in another graphic may also flow around other graphics. Geometric logic is applied to combine the solid content of other graphics and the bounding path of the containing graphic.

Chapter

12

Groups

Group Characteristics

Graphics may be combined in groups. Grouping provides several functionalities to aid drawing activities. The resulting "Group" graphic is manipulated as a single graphic. The grouping commands are found on the Format main menu. A shortcut version of the grouping commands is provided on the Attributes toolbar, when multiple graphics are selected. Groups may be nested without limit.

More than one graphic must be selected for these menu selections to apply, the selections are disabled unless multiple graphics are selected.

Grouping may change the relative drawing order of graphics. There is a Group Information Panel on the Item Details drawer for managing the group relative drawing order.

The degree of editing allowed for a group is determined by the Group Edit selection for the drawing, this menu selection is found on the Group Edit submenu on the Format main menu.

Selecting the Group menu action places all selected graphics in a new group. The individual graphics are not moved or modified by this action. The drawing order of the group is that of the last graphic selected in the group. Visual changes may be noticed, they would be caused by shifts in the drawing order.

Note that Ungroup may not be exactly the same as an Undo of a Group. Undo will restore each member to its original position in the drawing order. Ungroup will place each member at the drawing order position of the group.

Selecting the Ungroup menu action removes the group hierarchy. This returns all graphics in the group to their individual state. The graphics are not moved or modified by this action. Each graphic is inserted into the drawing order in their group relative order at the drawing order position of the group.

A group is moved or resized using the handles shown when the group. If all graphics in the group allow resize in two dimensions (like rectangles) the group is shown with a green shade and handle for rectangular resizing. If any (even one) graphic in the group is "Square Like" then two axis resize is not possible. In this case the group is shown with a blue shade and handles appropriate for equilateral resizing. Note that Stars and Equilateral Polygons are restrained geometrically to uniform scalings, hence only

"Square" style resize. Groups may contain other Groups. There is no limit to the nesting depth of groups. Ungroup releases only one level of nested groups. Further Ungroups are needed to separate more deeply nested groups.

The Group Panel on the Graphic Details Drawer (shown at the right) removal of a single element from a group.

Graphic Details

The Graphic Details drawer is used to step through all the graphics in a group. As each member of the group is highlighted, its drawing order index is displayed in the text box. The buttons are self-explanatory, the actions may be used to move the group member's drawing order position. EazyDraw uses a "Painter's" algorithm when drawing graphics. Each individual graphic of a drawing is drawn in its entirety, one after another. Each graphic is drawn without regard for other graphics. If graphics do not overlap this drawing method is of no consequence. If graphics do overlap, the ones drawn first will be eclipsed by the ones drawn later.

Each individual graphic on a drawing has a specific position in the drawing order. The terms "back" and "front" are used to describe a graphic's relative position in the drawing order. The numeric value of the drawing order is shown in the text boxes.

A group has a specific position in the drawing order. Then each member of the group has a drawing order position in the group.

Drop shadows apply to the group as a unit graphic. If individual shadows are needed, these must be applied before grouping. These two variants will produce different appearance in most cases. Using the group as unit graphic prevents drop shadows showing up in between the group elements.

Group Edit

EazyDraw provides a mechanism to vary the degree of in-place editing allowed for group members. This concept is called the Group Edit level.

The Group Edit level controls editing of groups and the graphics in the group. In some cases you will want a group to be rather fixed; perhaps it is a completed symbol in your drawing. In this situation you will want the graphic to hold its shape and behave as a single graphic element.

In other situations you may need to tweak one element of a group. This can be a problem, if you ungroup to access the one graphic the group falls apart and the individual elements are cluttered into your drawing. It may then be quite tricky to put the group back together, the problem being the re-selection of just the right graphics that make up the group. To solve this problem EazyDraw lets you keep the group in place and change the Group Edit level to allow individual editing of elements in the group.

Group Edit is managed both individually on a per-group basis and as full drawing. The menu on the Format main menu has selections to manage the degree of interactive editing possible within grouped objects. Four levels of edit-ability are provided, Free, Rigid, Fixed, and Solid. The selection applies primarily to the drawing as a whole and all all groups on the drawing.

The Graphic Details drawer has a menu that manages the Group Edit level of an individual graphic.

The setting for the Drawing takes precedence over the individual graphic's selection. You'll see this limitation by noting that some of the selections on the Graphic Details drawer are not allowed and shown in red. This is the level indicator that shows the current limit of editing allowed for groups on the drawing.

This is powerful feature when needed. But most of the time the Group Edit level remains at Fixed for the drawing and all graphics. This is the Factory default.
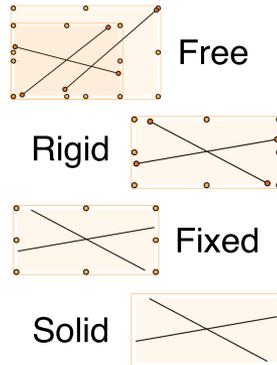
There is a Group Edit preference setting on the master EazyDraw Preferences panel. This value determines the initial Group Edit level for new drawings. New Groups are created with the Group Edit level of the drawing at the time of creation.

Free

Setting the Group Edit Level to Free allows full in-place editing of all group graphics. The content graphics may be resized, or moved relative to one another. And the group may be resized as a whole using the handles provided. The Free state is indicated by the shaded green areas internal to the group.

Rigid

Setting the Group Edit Level to Rigid prevents movement of the group's content graphics relative to one another. Resizing by moving individual handles is allowed at the level.

Fixed

Setting the Group Edit Level to Fixed prevents all editing of individual group graphics. The group as a whole may be interactively resized using the handles provided.

Solid

Setting the Group Edit Level to Solid prevents all editing and resizing of the group. In this case a selected group will have an outline border with no resizing handles.

The Group Edit level actually used for a group depends on the current settings for the drawing as well as the individual setting for the group.

The Graphic Details drawer provides a popup menu that indicates the interaction of the two settings by showing the individual selection with the check mark. The red labels indicate the levels which are limited by the current Group Edit for limit for the full drawing.

A Free Edit group is indicated by a shaded region interior to groups with a clear border region inside a green border. The border annular region is provided as a clear area, safe for a click and drag operation to move the whole group. Clicks in the interior, of a Feed Edit group may pick an individual graphic and cause movement of just the graphic.

When Free Edit group is in effect only one of the group members is free to move relative to the others. This focused member is indicated by a darker highlight region. The focused member is changed by clicking on another member of the group. The last member to receive a click is the focus graphic. The Graphic Details Drawer may also be used to change the focused member; use the numeric entry or the stepper button on the Members tab view. One use of Fixed and Solid groups is to remove the editing handles of the selected graphics. Groups of large numbers of small graphics, for example, text converted to Bezier curves may be obscured by the all the blue and brown handles. Use Fixed or Solid Group Edit to prevent this annoyance.

The Group Edit value in effect for the document is indicated by the menu checkbox. This limit applies to all groups on the document. Individual groups have an individual Group Edit level, which is determined by the Group Edit level when the group was created. The individual level may be changed using the Graphic details drawer. The Group Edit level for a group will be the "most restrictive" level of the of current document level and the individual group level.

If this form of control over interaction is desired for an individual graphic (not a group), use the Interaction submenu to achieve this form of control over an individual graphic.

Interaction

Where Group Edit is a rather advanced feature and may be used only rarely, interaction level is often needed and used. It applies especially to groups but also to individual graphics.

The Format main menu has a submenu that provides selections to manage the degree of interactive editing possible for a graphic. Five levels of editing are provided. Their menu names and appearance of a selected graphic are shown below.

This setting is used to enable interactive scaling of complex graphics. For example, a complex Bezier curve may need to be resized. This would be difficult to do by editing each vertex.

A decrease in the level of interaction for a graphic will provide fewer editing handles to be drawn. This is useful when a drawing contains numerous small graphics that are complete. In this case when selected they are not obscured by numerous editing handle details. The more restrictive setting may be used to prevent inadvertent resizing.

Edit

Edit is the normal default interaction level for a graphic. In this case the editing behavior of the graphic is not modified.

Scale

Setting the Interaction Level to Scale provides the resizing handles of the Scale and Edit setting, but omits the normal resizing and editing handles. In this case the graphic may be interactively resized but not reshaped.

Free Transform

Setting the Interaction Level to Free Transform provides resizing, orientation and shear handles for distorting, rotating and scaling the graphic. All of these actions may be applied interactively - on screen - to the graphic by using these handles. The Free Transform inspector palette (found on the Tools main menu Distort submenu) is used to adjust the distortion parameters in an numerical inspection manner. The outer set of handles provide Scaling control. The inner corner handles provide rotation. The inner centered handles provide shear.

Pivot

Use Pivot to rotate a graphic. Handles are provided at the corners, use these to rotate the graphic. A pentagon icon is shown (initially at the center) this defines the pivot point for these rotations. Drag this icon to position the pivot point. The pivot point may be placed "outside" the bounding box of the graphic.

Uniform Scale

Setting the Interaction Level to Uniform Scale provides only two resizing handles and none of the normal resizing and editing handles. In this case the graphic may be interactively resized while maintaining the aspect ratio of the horizontal and vertical dimensions of the graphic. This setting is common for imported bitmap images and photographs. The constraint insures that the image is not distorted when re-sized.
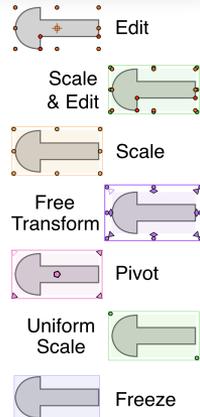
Freeze

Setting the Interaction Level to Freeze eliminates all scaling and resizing handles. The graphic may still be moved with a click and drag but not reshaped. This is a complimentary action to "locking" the graphic, in that case the graphic may be reshaped but not moved.

These settings are in no way permanent. A graphic that has a Freeze interaction level may be reshaped by using this submenu to change the interaction level back to normal - Edit.

The graphic needs to be returned to the Edit state for viewing and editing with the Graphic Details drawer.

If the graphic of interest is a Group, the Group Edit submenu may be used in a manner similar to Interaction Level. Interaction Level is easier to understand and use, Group Edit is more powerful with global document wide features and the added capability can make this method more difficult to master.

The Group Edit setting for the document has no affect on the Interaction setting for individual graphics. Group Edit and Interaction Level are similar functions but completely independent of each other.

Shear, Rotate, Skew

The Free Transform interaction level provides interactive and numerical methods to re-size, rotate, and distort the graphic.

The Free Transform palette provides a numeric, off drawing, interface to inspect and enter numeric values for the Free Transform Interactive level. Parameters are available to scale, rotate, skew, or shear a graphic.

The Free Transform palette is called from the Distort submenu found on the Tools menu of the Main menu. The command opens this parameter palette. If a graphic with a Free Transform is selected, the parameters on this panel will reflect the graphic's orientation and distortion.

Images such as photographs or web graphics will respond to the Free Transform settings, in a direct fashion. Scaling and distortion may be applied to these graphics without an explicit Free Transform interaction level. However, if the on-screen handles are desired, a Free Transform must be added to the image.
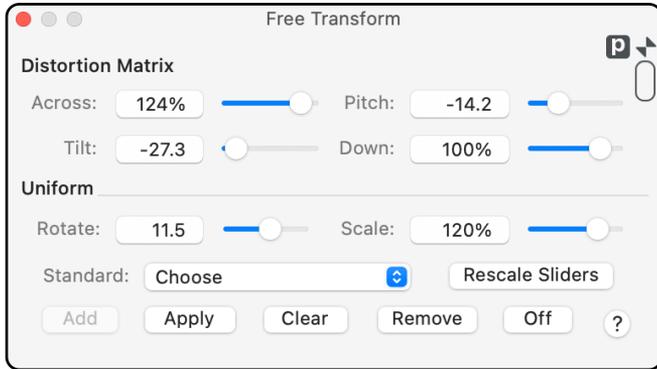
Distortion Matrix

The four Distortion parameters, Across, Pitch, Tilt, and Down are the "raw" Affine transform matrix. You don't need a math degree to use them, experimentation is the best method. In general, but not precisely, their control aspects are as follows: Across controls width scaling which is the "x" axis but after rotation. Down controls height scaling which is the "y" direction, again, after rotation. Pitch and Tilt used together provide rotation, if they are equal in magnitude this will be a simple rotation.

Free Transform - Shear: Shear is accomplished with Pitch and Tilt - when they have non-matching values. Pitch and Tilt are specified as angles, Across and Down are specified in scaling percentages. More precisely, Pitch and Tilt are the arctangents of the m12 and m21 matrix values.

Free Transform - Rotate: Rotate is a value that will spin the graphic shape around the geometric center point. The parameter is provided as an angle, under control of the Fine Scale angle settings for the palette. Note that if there is Pitch or Tilt (shear) present in the transform, the rotation angle does not have a precisely defined absolute meaning, in this case an approximate value is shown. Even if Pitch or Tilt is present, changes in rotation will perform the expected incremental rotation.

Free Transform - Scale: Scale is a value that will change the graphic size. The parameter is provided as a percentage, under control of the Fine Scale angle settings for the palette. Note that if there is Pitch, Tilt, or non-uniform scaling present in the transform, the scale does not have a precisely defined absolute meaning, in this case an average value is shown. Even if distortion is present, changes in scale will perform the expected incremental size changes.

Free Transform - Add: The Add button is used to add a Free Transform to a graphic. This button is only enabled if a graphic without a Free Transform is selected. You must Add a Free Transform to a graphic before using any of the parameters on this palette.

Free Transform - Apply: Use the Apply button to morph the graphic. When clicked, the Free Transform is removed from the graphic. The graphic is then morphed by the Free Transform that was removed. In some cases the form of the graphic, as well as the shape, is changed by the morph action. For example, a square must change to a rectangle or Bezier path if the transform has non-uniform scaling or shear. Free **Transform - Clear:** The Clear button will return the Free Transform to the Unity, or "No Change" transform. So the graphic returns to the original shape, but the Free Transform interaction remains in place.

Free Transform - Remove: The Remove button removes the Free Transform, the graphic will "pop" back to the original shape.

Free Transform - On/Off: The lower right button will toggle between "On"and "Off." If the graphic has a Free Transform, that is non-unity, you may turn Off the transform. In this case the graphic goes back to the original shape and orientation, but the transform is "remembered" by the graphic. If the selected graphic has a remembered Free Transform, the menu will show "On" and may be used to return the graphic to the transformed shape and orientation. This is useful for editing graphics in their original orientation and shape then returning easily to the transformed state, such as the editing of distorted text.

Named Transforms, Standard menu; The Standard popup menu is used to access defined and named transforms. You may use the menu to save a given transform with a name, for future use. You can save transforms as "Absolute" which is a simple archive of all the transform parameters. If you save the transform as incremental, it applies as a delta, or addition to the target Free Transform.

Setting the Interaction Level to Free Transform provides resizing, orientation and shear handles for distorting, rotating and scaling a graphic. All of these actions may be applied interactively - on screen - to the graphic by using these handles. The Interaction Menu is used to Apply a Free Transform to a graphic. The action is the same as the Apply button on Free Transform palette.

On-screen interaction handles are used as follows: The outer set of handles provide Scaling control. The inner corner handles provide rotation. The inner centered handles provide shear.

Note that the Rotate Tool (main Tools palette, chapter 08) rotates a graphic in a direct sense. The graphic is morphed directly with this tool, there is no Free Transform involved in the direct rotate action. The rotate tool is useful when it is necessary to pivot the rotation about a point other than the center of the graphic.

The named transforms are saved in a disk file in the Applications Support folder of your home Library folder. So the path is "Tilde_for Home"->Library->Application Support->EazyDraw->FreeTransforms.plist. The file is a human readable text file. It may be edited with any text editor or the Apple supplied pList editor.

You may back-up the current set of named transforms by duplicating and archiving the FreeTransforms.plist file discussed in the above paragraph. This is suggested if any amount of time has been invested in creating new custom transforms.

The default set of EazyDraw Free Transforms may be re-generated by moving the FreeTransforms.plist file out of the EazyDraw applications support folder and re-starting EazyDraw. The default set of Free Transforms is derived from an EazyDraw drawing that is included as a resource file in the EazyDraw application Bundle. As a reference for expert users or language translation engineers: the file is FreeTransforms.ezdraw.gz; the format is a simple set of group graphics that contain a Free Transform and Text Area graphic with the associated shape name plus the text phrase "Absolute" or "Incremental."

Distort Submenu

This submenu, found on the Tools main menu, has menu command access to the button actions found on the Free Transform palette. The menu versions perform the same actions as described above. The menu form of the commands may be more convenient to use, and they may be assigned to Command Key short cuts. Use the Menu Keys... command found on the EazyDraw main menu, left most EazyDraw menu, to choose convenient short cut keys for these actions.

Join

A simple Group of several graphics is a loose affiliation of the member graphics. The members each maintain their individual attributes such as fill color, outline color, line weight and there are other aspects of the Bezier path.

Many times when drawing, a closer binding of the elements of the group is needed. When you want the group to behave more as a single Bezier graphic a Join Group is used instead of a simple Group.
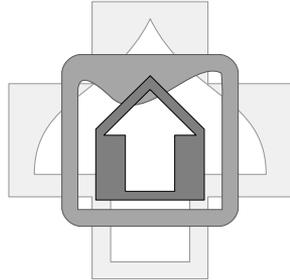
A Join Group is still a Group in all aspects. All the above documentation applies equally to Joins and simple Groups. In addition, Join groups behave as a single Bezier path, only one Fill color applies, one outline color, one line width, etc.

Use this action to combine a group of graphics in a manner that merges the individual Bezier paths and curves into a single Bezier path.

Two or more graphics must be selected for this menu selection to apply. All selected graphics must have a defined Bezier Path. This requirement means that text graphics and images cannot be included in a Join group.

The combining order for the Joined paths is the painting order. This gives explicit control over the sequencing of the merged path. Attention needs to be given to order, the start and end of each of the paths in order to predict and understand effects that may be generated. You may need to modify the painting order (move forward, back) and reverse path direction to attain the desired filling effects.
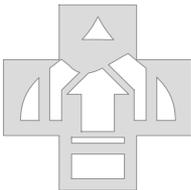
EazyDraw provides a similar grouping action called a Weld group. This action makes some automatic decisions on the ordering of the merged paths. Welding arranges the paths end-to-end and coordinates the directions of the paths to provide a more continuous circuit. You may want to use this method as an alternative to Join.

EazyDraw provides method for merging paths. This is the Joined Bezier conversion action found on the Convert Menu on the Tools main

menu. This conversion can be more convenient in some cases, it generates a new Bezier curve from the several curves. Similar to Join Group, but the combined single path may be more suitable in some cases.

Winding Rule

A primary reason to use a Join Group is to create graphics with holes. In order to understand this aspect we need to introduce the concept of Winding Rule. This parameter is found on the Color and Style palette, accessed from the main Tools menu.
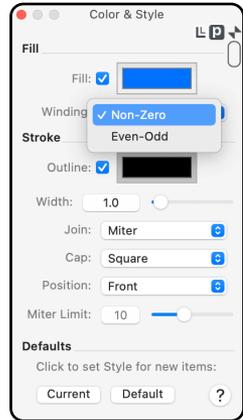
Both of these are "Join Groups" containing 2 elements, the "house" and the "window." They are grouped using the Join selection (found on the format menu under grouping).

Both are drawn clockwise
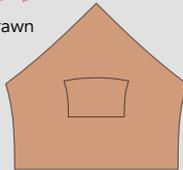
Non-Zero
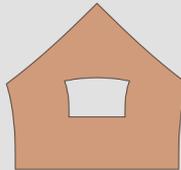
Even-Odd

The difference is the selection of "Winding Rule" on the Color and Style palette.

The Even-Odd selection for winding rule determines that the inner path generates a non-filled region, or "window."

Simple paths like an oval or rectangle are filled, or colored in a straight forward manner. However, there are several ways to fill complex paths that contain intersecting line segments or a sub-path enclosed by another sub-path. You can specify how complex paths are filled using the winding rule parameter. There are two choices for the winding rule parameter. The "Non-Zero" method is usually the simplest. This selection will generally fill in the enclosed path of a graphic. The "Even-Odd" selection can generate interesting open areas internal to complex shapes. This method is used when you create a Frame graphic.

The "Non-Zero" Rule: A point is not filled (is outside) if drawing a ray from that point in any direction results in a crossing count of 0, where crossing a left-to-right path adds 1 and crossing a right-to-left path subtracts 1. Otherwise, the point is inside and colored or filled.

The "Even-Odd" rule: a point is inside and filled if drawing a ray from that point in any direction and counting the number of path segments that the ray crosses is odd, otherwise the point is outside and not filled.

Every curve or path has a beginning and end which in turn define a direction for the path. Direction has an impact on the "right - left" determination. You can use the Arrow panel and enable an arrow at end of the curve to add a visual indicator for path direction. The direction of a path may be reversed with the menu command found on the Tools, Transform menu.

Weld

Use this action to combine a group of graphics in a manner that merges the individual Bezier paths and curves into a single continuous Bezier path.
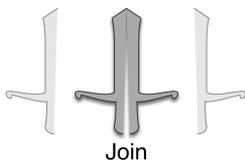
Join

Weld

Two or more graphics must be selected for this menu selection to apply. All selected graphics must have a defined Bezier Path. This requirement means that text graphics cannot be included in a Join group.
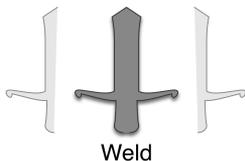
Selecting the Weld menu action places all selected graphics in a new weld group. The top graphic of the group is used to define the style of the new path and defines the beginning of the path. The member paths are automatically ordered and possibly reversed

to form a continuous circuit for the merged path. The path sequence is determined by finding the next path termination (start or end) that is closest to the previous path end.

The top most path in the painting order determines the color and style for the welded group path. The lead path will determine the circuit direction of the merged path. The subsequent order of paths is determined by closest proximity of any end point (start or finish of a path) to the end of the previous segment.

If adjoining ends are in close proximity, the vertices are merged to a single vertex, the end point of the previous segment. If they are spaced apart an additional straight line segment is inserted to make sure the full path is a closed path.

This method of grouping is useful for combining a group of paths into a single closed graphic. The automatic ordering makes it easy to simply form the group in a fashion that would seem obvious to the observer of the static group of paths.

EazyDraw provides a similar grouping action called Join, described above. The Join action does not make automatic decisions on the ordering of the merged paths. This allows the user to control the merged continuous path using curve direction and painting order.

EazyDraw provides an alternative to this grouping action for merging paths. This is the Welded Path conversion action found on the Convert Menu on the tools main menu. The welded conversion can be more convenient in some cases, it generates a new Bezier curve from the several curves. Similar to Join or Weld, but the combined single path becomes a new Bezier path, not a group.

Crop

One graphic may be used to "Crop" other graphics. The Crop action is managed as a Group by EazyDraw. A Crop Group is still a Group in all aspects. All the above documentation at the beginning of this chapter applies equally to Crop Groups. This menu action is found on Format main menu, Images submenu.

Selecting the Crop menu action places all selected graphics in a new group. The front most graphic of the group is used to define a drawing area that acts as a "window" through which the other graphics are viewed. Only the portions visible through this "Window" are drawn. The portions of the other graphics that lie outside the cropping window are not shown.

Selecting the Uncrop menu action removes the crop group. This returns all graphics in the cropping group to their individual state. Each graphic is inserted into the drawing order in their group relative order at the drawing order position of the group (before the action).

Frame

A pair of graphics may be used to "Frame" other graphics. One graphic, the front most, punches a hole in the second graphic of the frame pair. The Frame group can be thought of as the frame and matte of a framed picture. If there are other members of the group, they form the picture of the frame/matte analogy.

Three or more graphics must be selected for this menu selection to apply. The front most selected graphic forms the punched hole of the frame, the next graphic behind in the painting order forms the outer portion of the frame. This menu action is found on Format main menu, Images submenu.

Selecting the Frame menu action places all selected graphics in a new framing group. The top graphic of the group is used to define a drawing area that acts as a "window" through which the other graphics are viewed. The second graphic of the group acts as a frame around the window. All other graphics in the group are visible though the window and they are cropped by the window element.

All graphics in addition to the two framing elements, in the frame group, are fully cropped by the window (or punch-hole) portion of the frame.

Other graphics (ones not in the group) on the drawing are not cropped but are visible through the hole punched in the frame by the cropping graphic. In the example to the left a red star is part of the frame group and the blue shape is not part of the frame group.
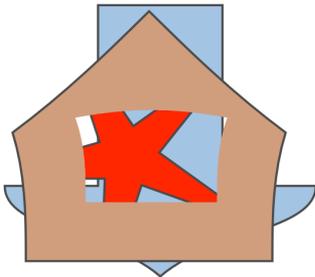
Gradient Fill may not be applied to a Frame. It may be applied to any of the other graphics visible through the frame, but not the frame's annular region. A gradient fill may be applied to an annular region by Welding the crop path (inner frame border) and frame path.

Blends

Blends are groups of graphics that are drawn with a series of intermediate blended transition graphics. The best example of a blend would be a rainbow. You would draw a rainbow with a series of controlling Bezier curves that have the primary colors of the rainbow. The blend can be specified to smoothly transition across the colors generating the rainbow. Of course there are many other applications for this capability.

A Blend is a Group in all aspects. The documentation at the beginning of this chapter applies to Blends. However, Blends are far more complex than a simple Group. A full parameter palette is provided to manage the added elements of a Blend Group.

A Blend Group is formed by selecting the family of Bezier graphics (that will make up the group) and executing the Blend command found on the Format main menu.

The Blend palette is accessed from Format main menu. The palette inspects and accepts input for a selected Blend Group.

The Blend Specification parameters found at the top of the Blend palette focus on individual graphic components of the blend group. Each graphic of the blend group is denoted by a numeric index which is shown in the Position numerical text box. The method for ordering the indices may be something other than painting order; for example, left to right ordering is allowed. The ordering is controlled by the Order popup menu near the bottom of the palette.

The painting ordering of the graphics in the group are inspected or changed using the Graphic Details drawer. This was explained at the beginning of this chapter. The color wells and line width controls are provided as a convenience short cut for modification of individual blend
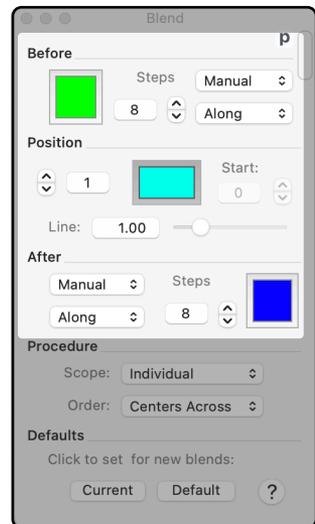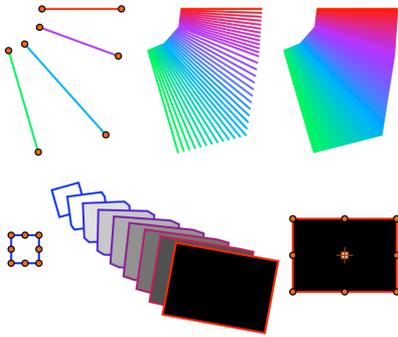
components. The Color and Style Palette can be used in conjunction with this palette. Full access to both line and fill color as well as other style parameters are provided by the style palette for the focus blend component. The blend graphic that is connected to the Style palette is the one defined by the Position indicator.

The steps parameters are used to define the number of intermediate curves generated between the component blend graphics. Since they apply to an interval there are two available, applicable to the intervals adjacent to the focus graphic - the one defined by the Position parameter.

The top right popup menu defines the method for determining the number of intermediate curves to generate. Automatic will attempt to just fill the intervening space with a continuum of curves. The Manual selection places the number of curves under user control. Space lets the user specify a filling percentage. The generation of these curves is highly optimized, so it is feasible to use 50's or several 100 intervening curves. Using just a few curves will generate interesting "Slinky" effects.

The Vertex or Along section defines how adjacent curves are blended. Along attempts to match intermediate curve locus relative to the percent length along the curve. Vertex attempts a one-to-one match of vertices. The best way to visualize the two methods is to blend a square with a rectangle. Change the aspect ratio of the rectangle and watch how the intermediate curves are generated, use just a few intermediate curves.

The Start parameter applies to the vertex/along matching of closed curves. This controls which vertex is taken as the start of the path. Adjusting this variable can be used to create (or eliminate) a "rolling" affect for the transition curves. The matching of intermediate curves can generate interesting effects, or interesting problems. For this issue you might think of how a rectangle is blended with a pentagon. For best control you may want to overtly insert vertices to make sure they match up in the desired fashion. Also it is wise to generate a family of component curves by duplicating and scaling to hold aspect ratios constant. This insures that length matching performs as you might expect.

The lower portion of the Blend palette is controls the overall scope of the blend interval parameters and how blend graphics are ordered.

If you choose All for the scope parameter, only the top set of interval parameters are enabled. Otherwise both adjacent sets of parameters are enabled to provide convenient access to both intervals and components adjacent to the focus graphic blend component.

The Scope parameter has two selections, Individual or All. If All is chosen, the interval parameters such as Steps are the same for all intervals. The Individual selection allows individual specification. It is sometimes convenient to get the appearance close by using All, avoiding the need to step across all intervals and make adjustments. Then change to individual control and fix up the appearance of just a few intervals.
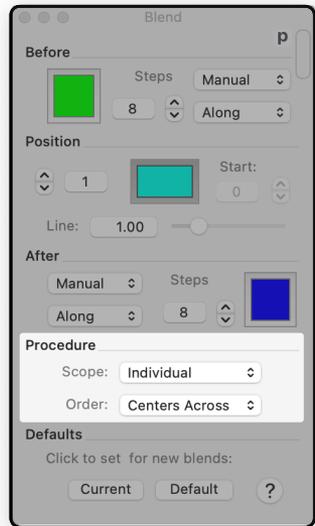
The Order popup menu provides specification for the determination of the sequence ordering of the graphic components of the Blend. The method chosen determines which components will be adjacent blend pairs, and which will be above and behind in the Painting order of the Blend. The choice of order may significantly alter the appearance of the blend.

Specific order can always be accomplished by careful adjustment of the painting order of each component graphic before the Blend group is formed. The other ordering selections sometimes provide a convenience shortcut to attain a desired affect.
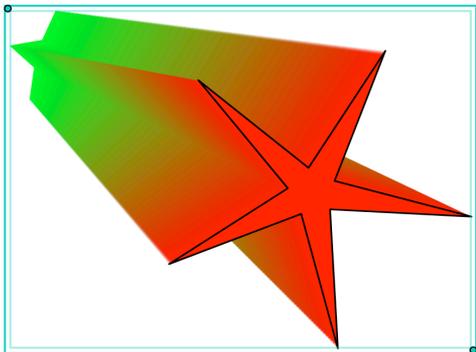
If you edit the shape of individual components of the group, the ordering might change. This can cause big "Jumps" in the appearance of the group. Taking note of the selected ordering method and the relative positions of the graphics will indicate the cause of the jumps.

Chapter
13

Parameter Palettes

Palette Controls

EazyDraw palettes have a small icon pair found on the upper right hand corner of the palette. These provide a user interface for a set of common traits that apply to most EazyDraw palettes. Here is a brief description of these capabilities.

Units Button: The Units Button, found near the top right of most EazyDraw parameter palettes, indicates the current measuring units for lengths on the respective palette. A Control Click on this button will show the current settings of all fine scale parameters and allow direct changes to these settings. The Fine Scale palette provides a central place to manage the measuring units of all parameter palettes.

Window Shade: Each parameter palette has an aqua blue Window Shade control in the upper right corner of the palette. Use this control to quickly shorten the window to minimize screen area of the palette. Clicking on the Window Shade icon will shorten the parameter palette to one of 3 preset window heights.

Cmd Click Right Border: Command Click on the right border of a palette to shorten the palette to the click point.

Mini Palettes: Several EazyDraw parameter palettes have a mini - form. If this is available the aqua blue Window Shade control will have a small dark blue disclosure triangle at the top. Clicking on this disclosure button toggles the palette between the the miniature size and full size.
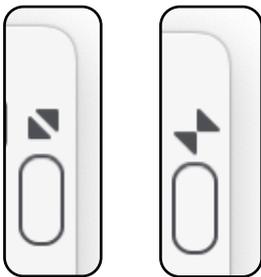
Window Shade
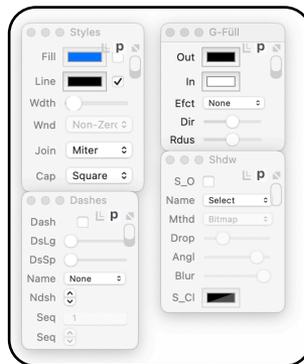
Palette Values

EazyDraw palettes have a small gray icon found on the upper right hand corner of the palette. This small button will have a "m," "i," or "p" as its label. This control provides convenient access to the measurement units used to report and enter values on the associated parameter palette.

A detailed description of the palette values button is found at the end of the Measurements chapter 07. Here we briefly review this topic.

Palette Units: The Palette Units button is gray, located next to the blue Mini Palette mode button and Window Shade control.

These units do not need to be the same as the primary units for the drawing. Nor do all palettes need to use the same units. For example, a drawing may have Feet for the primary units, the Page Setup palette may use inches, and the Color and Style palette may define line width in units of Points.

It is easy to change the units for a given palette - just click the small gray button. With each click you will sequence through the 3 choices of units.

If you are unsure of the Units in use for a given palette, glance at the button and note the label: "m" for millimeters, "i" for inches, or "p" for points.

Decimal Precision: Control click the Palette Units button to access a popup menu that controls decimal precision and measurement formatting for the
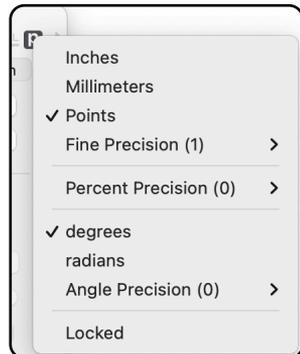
Fine Scale Palette: This is a separate palette that controls units and precision settings for other palettes. It is accessed from the Format main menu. The contextual menu associated with the units button is provided as a second, convenience shortcut.
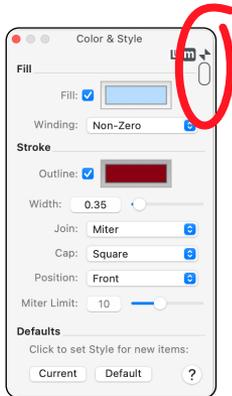
Window Shade Control

Each parameter palette has a Window Shade control in the upper right corner of the palette. Use this control to shorten the window to manage valuable screen real estate.

Eazydraw's parameter palettes have been designed with the most important or frequently used parameters near the top of the palette. This helps when you are looking for a particular control. This design allows one to save screen real estate by shortening the palette to display only these most important parameters. Each palette's preset window shade heights show specific sets of parameters - in accordance with their importance or frequency of use.

Clicking on the Window Shade icon shortens to one of 3 preset window heights. The shortened height of the palette depends on which of the three shade segments is clicked. The topmost segment provides the shortest palette.

If a palette is in a shortened state, click on the window shade icon to restore it to the full length.

A Command Click near the top of the palette, just under the title bar will roll up the palette to its shortest window shade minimized length.

Another way to shorten a palette is to Command Click the border along the right side of the palette. This will shorten the window to the click point.

Control click the window shade icon to access a descriptive menu form of these window shade options.

Main Window Shade Menu

A master set of Window Shade Menu Commands are provided for managing the window shade state of the palettes open on the desktop. These are found on the View main menu.

The menu interface provides a method to assign palette-shortening actions to keyboard shortcuts. You may select your own key assignments using the Menu Keys palette accessed from the EazyDraw menu.

The Window Shade submenu provides commands that override the individual palette settings. For a clear understanding of the menu titles (Furled, Rolled Up, Shortened, and Unfurled) see the examples below. The menu combinations provided are self-explanatory.

Reverse Cycle	⌥⌘3	Furl All	⌃⌘1
Window Shade	**>**	Roll Up All	⌃⌘2
		Shorten All	⌃⌘3
Save Toolbar...		Unfurl All	⌃⌘4
Load Toolbar...			
Recent Toolbars	>	Furl Others	⌃⌘5
		Unfurl Others	⌃⌘6
Save Palettes Layout...			
Load Palettes Layout...		Furl Front	⌃⌘7
Recent Layouts	>	Roll Up Front	⌃⌘8
		Shorten Front	⌃⌘9
Inspectors	>	Unfurl Front	⌃⌘0
Hide Attributes			
Hide Toolbar			
Customize Toolbar			
Enter Full Screen	fn F		
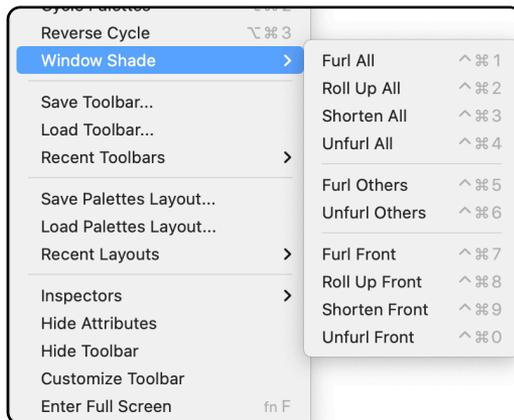
Mini Form

If the window shade control has a small dark blue disclosure triangle at the top, the palette has a miniature form. Click the disclosure arrow to switch to this smaller form of the Palette. The miniature form is user configurable and much smaller in size. This is discussed in detail below.

Hide Default Buttons

The default specification buttons are always found at the bottom of the palette. The longest window shade point is chosen to just cut off these buttons, see dashed green line on the examples above. These are important buttons to have conveniently on each parameter palette, but they are not frequently used.

Library Properties Button

The Library Properties Button, found near the top right of several EazyDraw parameter palettes, provides a mechanism to add the palette's parameter set to a user library. For example, a Gradient Fill may be a user library element. To add the current gradient fill to a user library drag the "Lʟ" button from the Gradient Fill palette to the desired library.
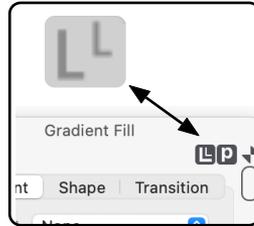
First thing to note is that at least one library must be open for these buttons to enable.

This simple button encompasses and simplifies some advanced concepts such as scope and transfer. The details are documented fully in the EazyDraw help documentation. The reader is directed to the topics Transfer Scope and the Transfer Palette for in depth study. More information is provided in chapter 17. This section will focus on the simple use of this button.

Drag the Library Properties button from a parameter palette to a user library. All parameters associated with the originating palette are included in a parameter set which becomes an element in the user library. Only parameters associated with the originating palette are included.

The parameter set is represented in the user library by a container graphic, a rectangle with a rounded top right corner.

In most cases, the parameter palette must have the associated parameter set in the "On" mode. For example, the dash palette will not enable the button unless the dash checkbox is checked and the dash parameters represent an actual dashed line.
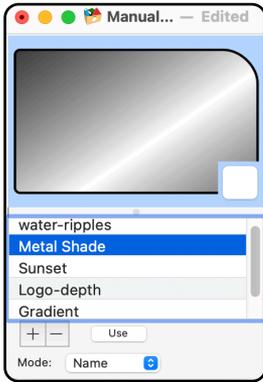
Dragging a properties button to an EazyDraw drawing is not permitted. The properties must first go to a user library, then they may be dragged to a drawing and applied to a graphic.

Typical Application

The following would be a typical use of this feature. First a specific gradient is designed and applied to one graphic in a drawing, this design involves specifying all the colors, angles, transitions and other details that are found on the Gradient Fill palette.

Then it is desired to use this gradient fill for other graphics in the future, on this drawing and others. Select the graphic with the gradient fill, drag the Library Properties Button (the one on the Gradient Fill palette) to a user library, give the gradient a name in the library.

Now this gradient is available for quick application to other graphics: put the library in button mode, select a graphic on any drawing, click the library button - done.

This gradient could even be added to the main menu and assigned a short-cut key, by using the Manage Menu feature found on the Libraries main menu.

Mini Palettes

Most EazyDraw parameter palettes have a miniature form and a normal full form. If the two forms are available the Window Shade control will have a dark blue disclosure arrow at the top right of the palette. Clicking on this arrow will toggle the palette between the two forms.

The parameters included, their form such as numeric or a slider, and the order of appearance are all user configurable for a mini palette.

The Window Shade control works the same for a full palette or a mini palette. However the contextual menu (Control click on the window shade icon) has more options for configuring a mini palette.

Contextual Menu

It is very important to discover the contextual menu accessed from a mini palette's window shade button. Unlike the full palette form, mini palettes are fully user configurable. No offense, but this means they can get messed up. This contextual menu is the method to recover lost parameters and to fully tailor the palette to suit your needs.

The Contextual menu is used to add or remove parameters from a mini palette. All available parameters are shown on the contextual menu. The corresponding submenu is used to configure a parameter element.

Drag and Drop Labels

A mini palette is reconfigured by dragging and dropping a parameter's label. Click on the label and move the parameter up or down on the mini palette, release the mouse to place the parameter in the location best for your needs.
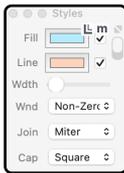
Mini
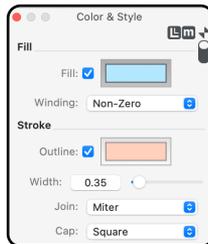
Window Shade
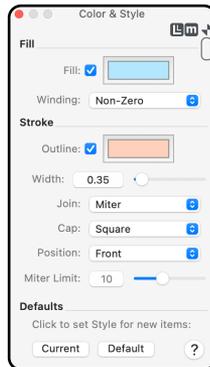
Shown in actual proportion.

Full

If you do not want the parameter on the mini-palette, drag it off the palette, release the mouse and it will *poof* and no longer be on the palette. Removing a parameter will make the mini palette even smaller.

To recover a removed parameter, use the contextual menu, control click the upper right window shade button for a menu of all parameters available for the palette. This menu has a selection to add a parameter back to the visible list of selections on the palette.

When you quit and restart EazyDraw the palettes are restored to their exact Window Shade states and the full or miniature form. If you close a fully rolled-up palette, it is unrolled when reopened from the menu or toolbar. This is done to make sure you quickly see the palette. Any other state is conserved on close / reopen.
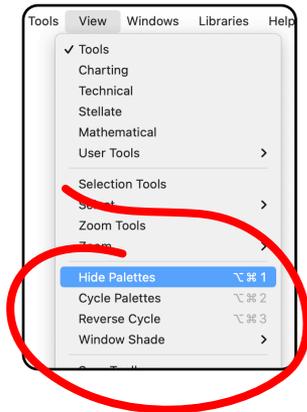
Palette Utilities

The main View menu has several selections for managing the numerous parameter palettes that might be involved in a drawing project.

Cycling and Hiding

Hide, Cycle, and Reverse cycle palettes. Use these to hide all palettes, or show them again if hidden. The cycle actions will bring each open palette to the front in succession.

The Hide Palettes menu command is used to temporarily hide all visible palettes. The same command is then used to again show the palettes that were hidden, in their same screen positions.

The Cycle Palettes command is used to move the top or front most palette behind the other open palettes. This in effect brings the second front most palette to the fore. You may use this command repeatedly to bring each palette to the front in succession.

The Reverse Palettes command performs like the Cycle Palettes command, except the rear most palette is brought to the fore and the front most palette becomes the second from the top. This command only interacts with palettes that overlap, a good method to quickly find a hidden palette.

Saving and Loading

The overall configuration of the palettes may be saved to a disk file, or loaded from a saved file. The window shade states, miniature palette configuration and positions of visible palettes are managed with these save and load menu commands.

The ideal arrangement of palettes changes frequently with different drawing tasks or projects, or working on a different system such as a laptop or the office studio display for example. The layout of palettes on the screen may be saved to a text file. These files may then be used to quickly restore a palette arrangement.

The Save Palettes Layout command will save this information to a disk file with a normal system save panel.

A saved palette layout is restored with the Load Palettes Layout menu command. Use the normal system open panel to locate and select a palette layout file previously saved.

A "Recent Layouts" submenu is provided for accessing frequently used or recent palette layout files. You may "Freeze" the menu to hold a favorite set of layouts. This action locks the menu so that command key short cuts may be reliably assigned, see chapter 14. Commands are provided to clear the menu and to increase the number items remembered.

The layout information is saved in a normal text file which may be viewed with any text editor. The information is human readable in the form of a property list dictionary. The macOS application, Property List Editor may be used to view and modify these files. The files may reside anywhere on your system.
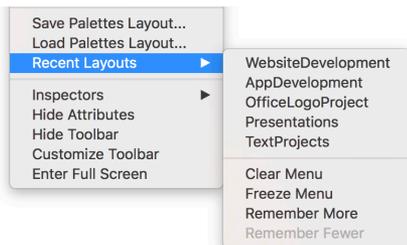
Copy Special

The edit menu has a submenu for pasting Bezier paths as text. There are 3 options for separator indicators (commas, tabs, or spaces), use the submenu to make your selection. Since the output is readable text the format is self documenting. Paste from the clipboard to a text editor to investigate the details of the formatting.

Paste Special

This submenu allows application of specific attributes of a graphic on the system Clipboard.

When you use the Cut or Copy command in the Edit menu the selected graphic is placed in a holding area called the system Clipboard, where the item(s) remain until you choose Cut or Copy again. The Clipboard holds the contents of only one Cut or Copy, it has no memory of previous copies. After the Copy of a graphic that has a set of attributes (e.g. dashes) the corresponding Paste Special -> Dashes applies the dash pattern to the target graphic(s).

Copy and Paste Face (Font) are found on the Text main menu, at the bottom of the Style submenu. Not on the Copy and Paste special menus on the Edit menu.

One Pasteboard applies to all open drawings. Copy from an item on one drawing may be pasted-special to items on another open drawing.

The common Clipboard applies to all applications, not just EazyDraw. Elements from other Applications will not provide isolated specific EazyDraw attributes. This fact is usually the reason a Paste Special menu selection is unexpectedly disabled.

Copy Special is useful for managing attributes. A particular shade, or dash pattern can be applied with these menu commands. One way to do this is keep copies of graphics that are holding Styles, Dashes or other attributes. The attribute can be obtained with a Copy then Paste Special.

Color Wells

The color panel, shown to the below, is used in conjunction with color wells, to change and inspect colors of objects. You open the Color panel by clicking on a color well, selecting the extras popup menu at the bottom of the font panel, adding the color button to the Toolbar, or from the Font main menu. All of these actions open the same Color panel.

A single color panel is used for all color changes and selections. This is actually a system provided panel so it may change with future releases of macOS or appear differently on different systems. All color wells and font color selections are tied to the color panel. The panel shows the current color as a clue to confirm the panel is connected to the item of interest.

For the palette shown below, the Fill color well, (top one on the left palette) is the active color well. The Color Picker on the right is reflecting the state of the Fill color. Notice that the active color well has a darker border. The Outline color well has light border and is not active in the snap shot below, its color is not shown on the Color Picker.

It is important to learn to notice the change in appearance of a Color Well when it is active and connected to the Color Picker. Only one Color Well is active at any given time. The active color well has a darker border to indicate its state. Deactivate a color well by clicking it when it is active. This means it is possible that no color well is active. This can be confusing, as changes to the color are not reflected on the drawing. This is useful for making up new colors or experimenting with colors without modifying elements of a drawing.

There are many ways to chose colors, the buttons at the top of the Color panel (the one on the right) are used to select the method. Selections can be the color wheel or sliders for different color components and possibly

These are Color Wells

many other methods. These methods are supplied by the system and may be expanded and shared by other applications or plugins. Notice that the left example is using Hue-Saturation-Brightness sliders to pick colors and the example below is using the color wheel for color selection.

You may change the color of a selected target object by using the current color selection method presented by the panel. Use the buttons at the top of the panel to specify a selection method.

The target of the changes will be either a selected color well, or selected text. If a color well is selected the changes will affect both the color well and the associated object of the color well (e.g. the fill of a graphic). If no color well or text is selected the panel may be used to manage the color swatches on the panel. If no color well is selected but some text is selected a change of color is applied to the text.

EazyDraw has numerous color wells for everything from grid and background colors to blended gradients and shadows. All the color wells behave the same. But only one is active at any given time. A common problem is to click the color well, and deselect it (border will lighten). Normally the target color well follows your actions and will be selected and automatically targeted for the actions of the color panel. But there are several color wells pertaining to a drawing or even a single graphic so confusion can arise.

Eyedropper (Magnifying Glass)

You may use the Eyedropper (bottom left) to grab a color from any point on the screen. When this action is clicked on a color, that color is copied to the large color swatch at the top of the panel indicating that it is the new target color. If a color well or text is selected, the color of the target is changed as well.

Hitting the space bar in Eyedropper mode will show RGB values which should be correct if you are running macOS 10.11 or later.
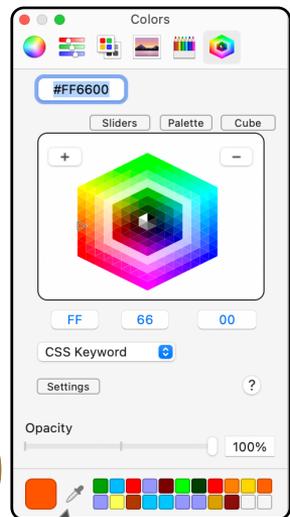
macOS 10.10 or earlier Users only. When working with RGB colors for web use you may notice the values reported by the Eyedropper (Magnifying Glass) tool do not agree with the original color component values. The tool reads the corrected color that is applied to the screen. This color correction is set on the Displays system defaults. EazyDraw accepts and applies calibrated colors, these component values are generally slightly different than those applied by the Display Profile. See Color Accuracy below for more information on this topic.

Opacity

The Opacity slider or numeric entry field, near the bottom of the palette, allows transparency to be applied to a color. Transparency is applied to a graphic by the use of colors with transparency. When transparency is in effect the associated color well will draw both the master opaque color and the transparent color with a diagonal separator.

There is also a way to apply transparency to all graphics on a layer. This is provided by the Color Modification controls on the Layers Drawer, see chapter 06 for details. The layer color modification feature is provided primarily to aid the user when working with layers, i.e. gray out an underlying layer while drawing on a related layer. You should use the Color Opacity trait discussed here, not Color Modification, to draw with transparency.

Transparency may or may not be supported in a particular export format or by another application on macOS or another operating system environment. For example, most Microsoft applications, at the time of this writing, do not support transparency. Also a printer may or may not render a transparency effect. Before investing significant creative time using transparency, one should export a test graphic with transparency effects and view with the target application or medium. That being said, very nice effects may be incorporated into your graphic content and exported seamlessly to new technology applications such as Keynote via TIF export format with both RGBA (the "A" stands for "alpha" channel which is another notation for transparency) and CMYKA color models.

Color Component Values

The numeric value of a color is shown if you pause the cursor over any color well. After a second or so the popup tip note will show an abbreviated message indicating the color space and the precise value of each component of the color.

Color Space is discussed in Chapter 06. The example to the right is showing that the color space for the outline color is CMYK. The top line of the note indicates the color space (RGB, CMYK, or GRAY) followed by a series of packed hexadecimal pairs that indicate the value of each respective component on a scale of 0 to 256 (00 to FF).
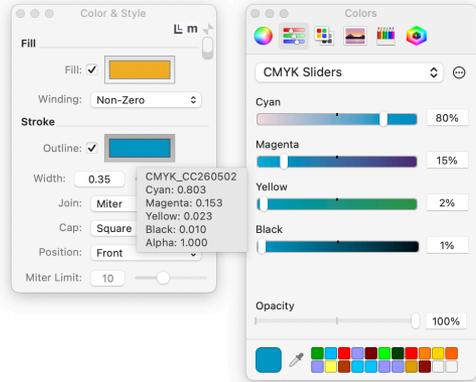
Notice the small darkened triangle in the upper right hand corner of the color well. The presence of this mark indicates that the color is not RGB.

Color Swatches

The small boxes at the bottom of the Color Picker panel are color receptacles or swatches. You may drag and drop to and from these swatches. They are convenient places to hold a set of colors being used in a drawing. If you enlarge the width of the color panel more swatches are provided.

Color Pickers

Be sure to discover the color picker toolbar found at the top of the Color palette. This tool bar is populated with all color picker plug-ins that are installed on your macOS system. Color Picker tools are an open defined interface to the system. The latest macOS ships, at this writing, with 5 color picker tools. If you purchase other plug-ins they will be added to your toolbar and work seamlessly with EazyDraw.

If you lose your color wheel, it is because one of the other color picker tools was clicked. Click the tool button on the left to get the familiar color wheel back. If you have hidden the toolbar by clicking the top right small oval button, click that button again to recover the toolbar.

The third picker tool is an access to installed color lists. There you find color lists that EazyDraw has added to your system. Some of these are provided for Exporting GIF and Windows bitmap formats. Others are pattern colors which have full support on the Patterns palette discussed in Chapter 15. And if you design or import your own patterns or textures, these are saved in the common Color's folder and are shown as available color lists with this picker tool.

Color Accuracy

RGB and CMYK components are faithfully passed to and saved in exported images (such as TIFF, PNG, EPS -- note that small color shifts can be expected with JPG compression). This allows matching of colors for web graphics; for example, saving a web graphic with a particular rgb component set will match the web page exactly when the same rgb components are specified as a CSS or HTML background color.

This precise color matching requires export using the Export menu command (File main menu). If a screen grab is used, the colors captured are those transformed by the system ColorSync technology, they will depend on the current monitor screen.

Help Button

Every EazyDraw palette has a small round light blue button with a question mark icon. It is usually located near the bottom of the palette. Click this button to bring up the EazyDraw help page for the palette. There you will find the definitive documentation for the parameters and actions provided by the palette.

EazyDraw Help documentation is updated with each release of EazyDraw; whereas, the printed manual is not necessarily updated as frequently. If you notice differences between the elements described in this printed manual and what you are seeing with your current version of EazyDraw, refer to the live Help to learn about the changes and additions.

14

Preferences

Preferences

Preferences are accessed from a "Host" window with a fixed Toolbar. This window is opened from the Preferences selection found on the EazyDraw menu. This interface allows you to manage the default selections for EazyDraw's parameter palettes and other user configurable preference selections.

The following is a summary of the elements covered in this chapter.

Default: Discussion of the use of default values for parameters. Brief discussion of the concept of defaults. Definition of terms used when dealing with defaults.

Preferences Toolbar: To access the defaults open the Preferences palette and click the corresponding Toolbar button found at the top of the window. When done either close the preferences window or click another button and grab another palette.

Copy Paste Format: These checkboxes, found at the right of the Preferences Window, allow control of the copy/paste interaction of EazyDraw with other macOS applications. Use these parameters to optimize the appearance of graphics you have created in EazyDraw and pasted into other applications such as MS Work, or PowerPoint.

New Drawings: Provides selection of different desktop sizes and positions for new untitled drawings.

Move Image: Provides choice of the graphic image shown when moving or dragging graphics.

Quick Reference: Condensed - quick explanation of how to save and change defaults with EazyDraw.

Menu Keys: Palette that allows user definition and change of the menu shortcut command keys.change defaults with EazyDraw.

Theme: Pull down panel that manages numerous colors used for EazyDraw user interface elements. For example, the color and shape of on-screen editing handles may be selected here.

Defaults

Defaults and preferences are managed with the Preferences palette, found on the EazyDraw main menu, that is the left most menu with the name EazyDraw. A shorter version of default management is provided on each parameter palette with a pair of buttons titled Current and Default found near the bottom of parameter palettes.

We will use the Dashes parameter palette as an example for this discussion. The concepts and user interface are the same for all of the parameter palettes that have the "Current" and "Default" buttons.

It is easy to follow a parameter's effect on a graphic once it has been created. You select the graphic with a mouse click and palette shows the parameter settings. You change a setting and the graphic changes.

Defaults and preferences involve understanding the parameter setting that is used when creating a new graphic. This aspect of a parameter palette's behavior is not as intuitive as the editing of a graphic. It is often easier to simply create a graphic - parameters be what they may - and edit to get things set properly.

However if you are going to draw several dashed lines, or if you almost always draw dashed lines, then it is easier to set your preference for the appropriate dashed line.

Preferences and Defaults are all about answering the question posed in the example shown to the right. Which dash pattern will be used when the new line is drawn? If you can't answer this question you can either take your chances and fix up the dashes after the line is drawn(often this is the best approach) or study the concepts presented here to learn how to manage your preferences and defaults.
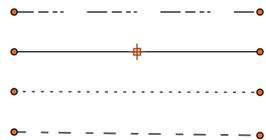
When no graphic is selected a palette shows the parameters that will be used when a new graphic is created. This means that when nothing is selected you may change the defaults for a palette simply by making changes on the palette. These settings will persist until changed again or until you quit EazyDraw. They do not persist (are lost) between EazyDraw sessions. This clearing action why it sometimes seems that quitting and restarting will clear up strange behavior on EazyDraw's part.

Current Button: If an existing graphic has a desired configuration of settings, you may acquire these for use when creating new graphics. Choose the graphic and click the Current button at the bottom of the associated parameter palette.

Default Button: Default settings are those that are in use when you initially launch EazyDraw. At any time you may return to these values by clicking the Default button at the bottom of the associated parameter palette panel. This is much easier than quitting and restarting EazyDraw to reset the parameters.

The actual values of the Default settings are managed using the main preferences window. A specific set of parameters may be installed as the defaults. The Preferences Window allows the "instantaneous creation" settings to be changed, just as when all graphics are deselected and changes are made to a specific parameter palette.

By design it is not very easy to change EazyDraw's persistent default settings, the ones that are held when you quit and restart EazyDraw. Users new to an application often try to immediately customize the application. This can easily lead to problems and unexpected behavior. A quick read of this chapter or review of the EazyDraw help documentation will let you learn how to properly tailor EazyDraw to your needs. A concise review of the actions needed to change defaults is provided right on the Preferences panel; this is found in the blueish box when there is no target parameter palette present.

Most users will only need to learn the use of the Current and Default buttons. You may want to focus on just this bit of the documentation. See the section Defaults Shortcut below.
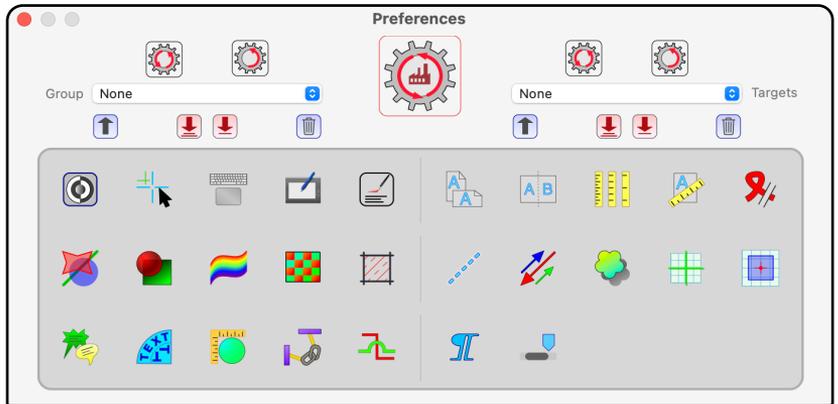
Preferences Palette

The top of the Preferences window has a fixed Toolbar that is used to access each parameter panel. You cannot customize this Toolbar. This Toolbar is not changed when you customize the drawing window's Toolbar. The two tool bars are separate entities.

The popup menus at the right control the content shown when EazyDraw is launched (Show at Launch), the size and location of new drawings (New Drawings), and the presentation of group graphics (Group Edit).

To call up a parameter panel click the corresponding Toolbar button. The panel will be captured by the Preferences window. The captured parameter panel is placed in the target box found on the left area of the Preferences window.

You may then adjust the parameters on the target panel in the normal fashion. These changes do not change graphics or drawings; they only perform preference selections.

When you are done select another parameter panel or close using the parameter panel's close button.

If you drag the target panel away from its position on the preferences window; it will automatically close at the end of the drag operation. The end position will

become the new position of the panel on your desktop. It is closed because all parameter panels remain hidden while the preferences window is open. This is done to avoid confusion with a captured parameter panel and one that is just open on the desktop.

Saving A Named Set

The combo box, text entry and pull down menu, at the top left of the Preferences window is used to assign a name and save a palette's defaults for future use.

The first thing to note is that the text entry of a Combo Box needs a specific click of the Enter key, after typing your input. No action is taken by EazyDraw until you type the Enter key to signal that the name is complete.

After typing a name and clicking Enter, the Save to Named button will enable. If there is no active palette in the "grabbed palette dock," the Save action will apply to all parameter palettes. If there is a palette in the dock, a Save action will set just the parameters associated with the chosen palette.

If you read carefully the note that is shown when no palette is chosen, this will refresh your memory about the precise workings of the actions associated with saving and loading named parameter sets.

Clear

The clear button will remove a named set of preferences from the combo box pull down menu. These are cleared from your available named sets of parameters.

Set From Named

This will read the preferences from the named set selected with the combo box pull down menu. The parameters are then assigned to associated parameter palettes. These settings become the active settings that are used when new elements are created, either drawings or graphics.

Note the difference between Set From Named and Apply as Default. Setting from named is more temporary, the settings apply until you quit and restart EazyDraw. Apply as Default is the more permanent choice.

Save To Named

Go to the Preferences panel, select a palette by clicking the icon in the toolbar, change the desired parameter(s), highlight the Name: (Factory Defaults) and type in a new name, click "Save to Named," click "Apply as Default" - and all is changed.

Notice - you need a named default set to make it the permanent default condition.

Apply As Default

This action reads the preferences from the named set selected with the combo box pull down menu. The parameters are then assigned to associated parameter palettes. These settings become the active settings that are used when new elements are created, either drawings or graphics. AND these setting become the permanent defaults for each associated parameter palette. The new settings become the initial settings when EazyDraw is launched.

Save Location

Saved settings are not to be found on any independent data file in your file system. Saved settings reside in the master preferences file for EazyDraw. This file is saved in your macOS preferences folder that is found in the Library folder in your home folder. This file is named according to a convention established for macOS, based on registered world wide web domain names. EazyDraw's unique preferences name is **com.dekorra.EazyDraw.plist.**

Copy Paste Order

When you execute a Copy from one application (e.g. EazyDraw) and a Paste to a second application (e.g. PowerPoint) the operating system (macOS) facilitates the transfer of information (your EazyDraw graphics) using the system pasteboard.

	Copy	Format	Paste	
Order	Include		Accept	Order
2	✓	TIFF	✓	2
1	✓	PDF	✓	1
3	✓	EPS	✓	3
4	✓	Rich Text	✓	4
5	✓	Plain Text	✓	5
Copy DPI:	72			?

Data can be placed in the pasteboard server in more than one representation. For example, your EazyDraw graphic might be provided both in TIFF and PDF formats. Multiple representations give pasting applications the option of choosing which data type to use.

This topic was covered in detail in chapter 05. The selection panel is fully descriptive, select the formats desired and specify an order for placement on the system Pasteboard.

Defaults Shortcut

This is a shortened, condensed version of the documentation for saving and changing defaults with EazyDraw.

Cmd Key Current

Open any Parameter Palette, make the desired changes, hold down the Command Key, slide the cursor over the Current button, an asterisk will appear, click the button.

This will change the permanent defaults for the Parameter Palette (only this palette) to the values shown. This applies to the current session of EazyDraw, and the settings will persist the next time EazyDraw is launched.

Cmd Key Restore Factory

This will return the factory settings for any Parameter Palette, only the single palette. Hold down Apple command key, slide cursor over Default button, an asterisk will appear, click the button.
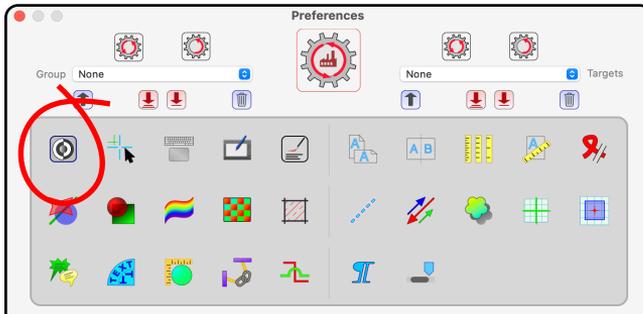
Both of these are very simple and quick to perform. They have the advantage of limited scope so other unintended changes are not a problem.

User Interface Theme

Several elements of the user interface elements and colors are available for customization. These are accessed from the "Theme" button on the left of the second toolbar of the Preferences Panel. These elements relate to how EazyDraw appears as you work with the application on your display screen. Changes here may be simply to choose colors that you prefer, or perhaps a interface theme appropriate for particular projects. In some cases changes are needed by users with different visual acuity, the size of the editing handles can be increased or decreased as part of a custom user interface theme.

Icons: The Icons popup menu, near the bottom of this panel, is an important selection for your overall user experience. There are three choices for the general appearance of all the icons in the EazyDraw user interface. The Color selection provides colorful icons, which many users prefer as they provide strong visual landmarks on the screen. Current app design theory advocates a faded monochrome UI appearance providing focus on the user's project -- not the UI. Choose Monochrome for that appearance. Highlight is an intermediate choice, still largely monochrome but with a highlight focus color. Highlight mode uses the system preferences choice for highlight color to set your EazyDraw UI icon color and UI highlight color..

Editing Handles: Editing Handles are the small indicators that appear when a graphic is selected - the ones used to interactively adjust the position and geometry of a graphic. The user interface theme provides 4 possibilities for the shape and presentation of these elements: circular/square and outlined or simply filled.

The size of the editing handles may be adjusted with the percentage factor provided. Note that the size of editing handles is not absolute, it varies with the current zoom value for the drawing window. And their size is not exactly in inverse proportion to the zoom; as you zoom in their appearance grows slightly
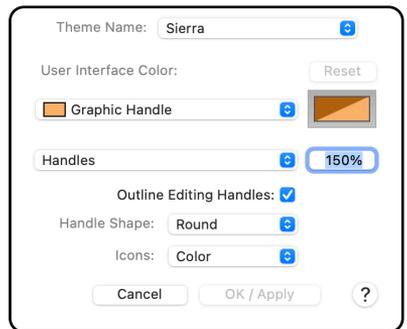
in size to provide visual feedback indicating closer viewing of detail. This dynamic aspect is carried to several other on-screen control elements; for example, the borders and line weight for showing groups will increase or decrease in unison with changes to handle size.

Traditionally editing handles are shown with a fill and an outline of a different color. The use of two colors prevents the handle from disappearing when drawn over a background of the same color. In the early days of computing this was quite important because the number of colors available were limited (2 for black and white, or perhaps as few as 8 colors). With a limited number of colors in use the probability of a color coincidence would be quite high and hence it was important that the icon for the handle have two colors, think of a black handle positioned over another graphic colored black.

With todays millions of colors technology the outlined handles are not absolutely needed so long as a distinguishing shade is used for the handle color, then rarely will a handle match exactly a color on the drawing. Since handles are such small elements on the screen, the two colors of an outline and fill can become distracting or annoying in many cases. On the other hand some users find the detail of an outline pleasing to the eye.

Palette Theme: This popup menu provides two selections for the appearance of tool palettes, the palettes like the charting tools and technical tools. The Apple Theme draws the buttons in the style of the macOS aqua user interface introduced in the 2001 - 2002 time frame. These are common button styles used by many macOS applications.

The "Flat" style draws the buttons in a one/two color scheme that is fully under user control. When this selection is active you will note the colors at the top of the User Interface Color popup are enabled. With these colors the appearance of the tool buttons can be adjusted to taste providing perhaps a newer fresher look for your desktop.

Theme Name: A set of selections for a user interface theme may be saved for future use. The Theme Name popup menu provides access to previously saved theme groups and the ability to save a group of settings as a new named group.

Theme settings are saved in the Applications Support folder, found in the user's home Library folder. All groups of settings are placed in one file using Apple's property list XML file format. These may be inspected with any text editor or the

pList editor provided with some versions of macOS.

If especially involved themes are created it is a good idea to backup the file or the entire EazyDraw Applications Support folder. If Time Machine is in use, this will happen automatically. If you have lost your named themes, and Time Machine was in use when they were created they may be recovered with the Time Machine utility.

Menu Customization

The Menu Keys palette provides user access to the EazyDraw menu system. This palette allows customization of the Names and assigned Keyboard shortcuts for menu items. This palette is accessed from the main EazyDraw menu, just below Preferences. We'll repeat, you may even change the names of items in the menus.

Each menu and submenu are accessed from the outline provided on the Menu Keys palette. Expand or collapse the submenus to reveal a particular menu of interest. The outline lists the current names shown on each menu, and the command key assigned to each menu selection.

User customized settings for menu names and keys may be saved to a disk file for future use, or to share with other EazyDraw users. A saved menu configuration file may be reloaded, using the button provided on the lower portion of this palette.

Access to each menu entry is provided from the outline display at the top of the palette. This outline mirrors the arrangement of the EazyDraw menus. Expand or collapse the outline entries to locate the menu entry of interest. Highlight the entry and click the Change button to view the menu entry in detail. This detail view is used to make changes to the entry. A double click on the highlighted entry opens the change window. Bold outline entries indicate the current menu setting is different than the "Factory" values.

If at least one entry has been customized, the Reset All button is enabled. Clicking this button will clear all modified entries and return the menus to the initial (Factory) state provided with the current release of EazyDraw.

If the selected entry is a modified entry, the Clear button is enabled. Use this button to restore just the selected entry to the factory setting.

The Modify button is used to call up a detailed inspection sheet. This sheet is used

to change the command key or display name of the menu.

Load and Save are used to read and write the current menu state to or from a disk file. This will restore or save all modified menu entries.

The Close button is used to close the palette. All changes are made as they are entered, close just closes the window. The changes are made and the menus are updated when each change to an individual entry is executed.

Modify Menu Keys

Actual changes to a menu setting are made on the sheet accessed by clicking the Modify button. This sheet is shown below. Enter a new menu display name, command key, or command key modifier. The changes are applied when the Change button on this sheet is clicked. Name changes are not allowed for the main menu items that appear in the system menu bar, but all other menu names may be customized.

When applying an alpha-numeric key, the Shift Modifier (second from left) is used to indicate upper case or lower case usage. The menu system always displays the upper case value and the shift key acts as a modifier. For other keys such as the number keys the modifier does not apply; enter the desired character directly (for example enter 9 or "(" directly).
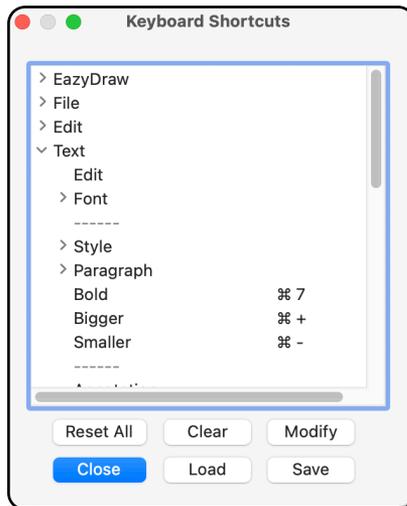
There is no undo support for this palette. If you have a modified key set in use, it is necessary to save it to a disk file to return the old settings.

Changes are applied as they are made. When the Change key is clicked the change is made to the menu and may be viewed there immediately.

The full path and "Factory" settings for menu entry are shown in the reddish text at the top of the Change panel. The last component of this path is the factory name for the menu, this does not change when a customized name is applied.

The menu information is saved in a normal text file, which may be viewed with any text editor. The information is human readable in the form of a property list dictionary. The macOS application, Property List Editor may be used to view and modify these files. Of course, care must be taken when modifying a file in this fashion. Only entries that are different from Factory settings are saved in the file.

Custom changes applied to the menu system are saved in the user defaults. This means that updates to EazyDraw will not require reloading or re-entering the custom menu command keys. Your changes are associated with the appropriate menu entry unless that particular menu entry is removed or moved to a different node in the menu hierarchy.
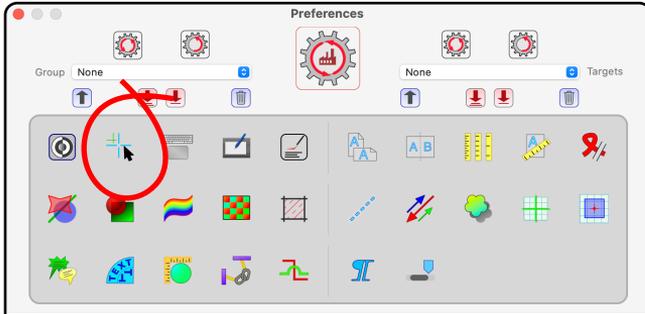
Extended Cursors

This panel is used to configure the appearance of the Extended Drawing Cursor. There are two basic cursor modes for EazyDraw. The first is the standard Apple / Mac simple Arrow Cursor, no frills - just an Arrow Cursor. The second mode provides an Extended cursor with several configurable options. This panel configures the options for this Extended Cursor mode.

The use of an Extended Cursor is selected on the Graphic Details drawer, near the bottom of the contextual area. If "Nothing" is selected there then no additional information is provided with the cursor, the actual cursor (usually the "Arrow" cursor) will be the one provided by macOS and managed by your macOS system preferences settings. None of the parameters on this panel are used in this case. The parameters on this preferences panel apply for all the other Cursor selections (Full Screen, Ruler Edge, or To Ruler).

Extended Cursor selection is made on the Graphic Details drawer Numeric Format area. Open the Graphic Details drawer and deselect all graphics to access this selection.

This preferences panel is accessed from the main EazyDraw Preferences panel, which is opened from the EazyDraw main menu. This panel manages the
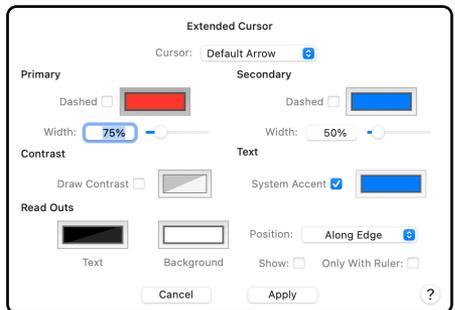
appearance of the Extended cursor -- when selected on the Graphic Details drawer.

The actual Cursor used with any Extended Cursor is selected with the top Cursor selection. Selections here include the Default system Arrow and several others. To repeat for emphasis: The selection made here only applies if a selection other than "Nothing" is made for the Cursor setting on the Graphic Details drawer. For example, to use a Reticle cursor one could select Reticle for the Cursor setting here and Ruler Edge for the setting on Graphic Details.
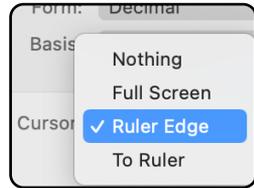
There are situations where multiple cursor reference lines are shown on the drawing. For example, when creating a rectangle reference indicators (guide lines) are shown at the initial and current corner of the rectangle. The Primary and Secondary headings apply to this multiple-cursor situations. The Primary settings apply to the main cursor, the one always in use. Secondary settings apply to other cursors that apply in certain situations. For example, the knife tool will have the primary cursor following your mouse movements and a secondary cursor will mark each of potentially several cut points. The parameters documented below apply to both Primary and Secondary usage.

The Color well sets the color for extended cursor lines or ruler markers. Any color is allowed, including ones with transparency.

The Dash checkbox allows use a dashed line for extended cursor lines.

The width parameter, entered in percent, is used to make the cursor line heavier or lighter. The actual width is derived from screen properties. The live appearance of the extended cursor reference lines will depend on the actual display screen. Use this parameter to increase (values over 100%) or decrease the weight or thickness of the cursor reference lines.

Contrast manages the use of a second color with extended cursor lines. Contrast is needed to keep a cursor graphic from "disappearing" when drawn over a region of the same. For example a black cursor will not show when used with a black drawing
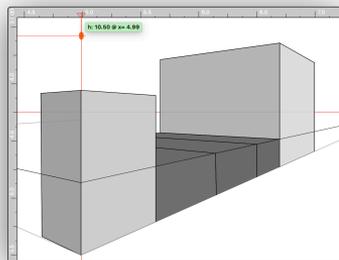
background. Normally a cursor is drawn with at least two colors to guard against disappearance. However in many typical drawing situations the "disappearance problem" is rare and not particularly problematic. On modern high resolution displays when anti-aliasing is in use, this contrast color will often "wash-out" the crispness of a thin reference line. For this reason you have an option to disable the use of a contrast color. Or manage the actual contrast color for your display and typical drawing situations.

When Extended Cursors are in use (something other than "Nothing" selected for Cursor on Graphic Details drawer) numeric Read-Outs for the cursor position may be shown "live" on the drawing. The Read-Outs are shown in small text boxes, the Text and Background colors control the color for these text boxes. The Read-Outs may be positioned dynamically on the edge of the drawing - following cursor movement, or positioned statically in one of the 4 corners of the drawing. This selection is made with the Position popup menu. Read-Outs may show all the time, or only when Rulers are present on the display. Use the two checkboxes to specify the desired behavior.

Formatting for the Read-Outs derives from the Numeric display settings, on Graphic Details. If more decimal places or perhaps fractional notation is needed make the selections on Graphic Details drawer, Display settings.

Tool Tip Delay

This is the time in seconds before tool tips are shown, the time that you need to pause the cursor to trigger showing a tool tip. If set to zero, then the system default time is used. If a change is made, it does not apply until you quit and restart EazyDraw. Experienced users might want to increase the time to have fewer tool tips popping up on the screen.

Tool tips are important for the EazyDraw preferences panel. This panel has a lot of icons and not much room for text labels. The icons do have good tool tips, make use of them when an icon's meaning is not clear.

Chapter

15

Graphic Fill Techniques

Color and Style

The Color and Style palette provides parameters that determine the primary appearance of a graphic. To show this panel select "Color and Style" from the Tools Menu which is on the Main Menu.

Fill: This parameter controls the appearance of the internal region of a graphic. If checked that region is drawn with the chosen color. If not checked there is no color and the enclosed region is transparent.

Outline (or Stroke): This parameter controls the appearance of the border of a graphic. If checked the outline is drawn with the chosen color. If not checked there is no border.

Winding Rule: This parameter controls how more complicated shapes are filled. It doesn't affect simple shapes like rectangles or ovals. Paths that cross or contain internal regions are affected by the choice of winding rule.

Line Width: This parameter controls the size of the border of a graphic. The size shown is the width of the outline (or Stroke) of the graphic.

Join: This parameter controls the appearance of the joints at the vertices of a graphic.

Cap: This parameter controls the detailed appearance of the ends of a graphic.

Stroke Position: This parameter controls the painting order for the stroke versus the fill of the graphic.
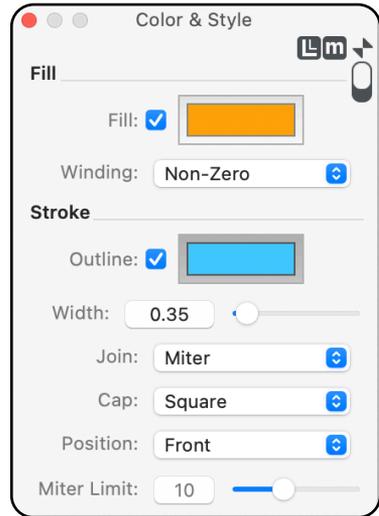
Miter Limit: This parameter limits spikes that can appear at sharp angle path joints when using the miter method to draw joints.

Fill

Colored graphics have "Fill." The parameters that control Fill are found on the Color and Style Palette. In order to change the Fill of a graphic(s), it must be the selected graphic in the top window of EazyDraw. If no graphic is selected the fill on the panel represents the fill that will be used when creating new graphics.

A graphic doesn't need to be formally closed (like a rectangle or circle) to accept the "Fill" parameter. All Bezier Curves accept fill, a virtual straight line connects the start and end points to set the bounds of the fill color. Text boxes accept fill too.

Graphics may be drawn with or without interior fill. The Fill check box determines if a solid fill color is applied to a graphic. If no fill is applied, the interior of the graphic is transparent. If the check box is checked the color shown in the Color Well (the square box to the left of the check box) is applied to the interior of the graphic.

Fill color is changed by clicking the Color Well. The Color Well is disabled unless the Fill check box is checked, when disabled clicking the Color Well does not work.

If a graphic has fill, it will obscure graphics that are in back of the graphic. All graphics are arranged in a stack from Back to Front. Graphics in front of others are drawn on top of those that are further back in the stack. This concept is called drawing with the painter's algorithm. This is explained in detail in chapter 12.

In the example below the Circle is filled, it is the back most graphic. The rectangle is drawn without fill and the star is drawn with white fill (the same color as the background). The pentagon is drawn with a solid fill color. If the fill is the same as the background a filled graphic will look the same as an unfilled graphic. This can sometimes be confusing and inadvertently obscure graphics. Of course a graphic will not cover up another graphic unless Fill is checked.
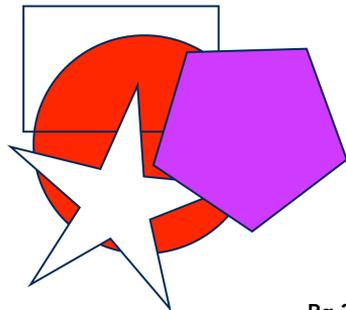
If you need to apply a transitional blend of two colors use the Gradient Fill Panel discussed later in this chapter.

Outline (or Stroke)

Graphics have an outline often times called Stroke.

In order to change the Outline of a graphic(s) it must be the selected graphic in the top window of EazyDraw. If no graphic is selected the fill on the panel represents the fill that will be used when creating new graphics.

A graphic doesn't need to have a Outline component. If no outline is drawn the graphic will consist only of its Fill with no border, or specific outline. A graphic with no fill and no outline is invisible, it remains part of the drawing and may be selected and edited, exists as a normal graphic but is not drawn.

The Outline check box determines if an outline is drawn for a graphic. If the check box is checked the color shown in the Color Well (the square box to the left of the check box) is used to draw the Outline (or Stroke) of the graphic.

If a graphic has Outline checked, it is drawn using the parameters Width, Join, and Cap.

Winding Rule

Simple paths like an oval or rectangle are filled, or colored in an obvious manner. However, there are several ways to fill complex paths that contain intersecting line segments or a sub-path enclosed by another sub-path. You control the way complex paths are filled using the winding rule parameter.

Complex paths are often created with the Join grouping action. This Winding Rule concept was presented in detail in the Grouping chapter, chapter 12. We will recap here.

There are two choices for Winding rule. They are Non-Zero and Even-Odd.

Non-Zero: For the "Non-Zero" rule: a point is considered outside and not filled if drawing a ray from that point in any direction results in a crossing count of 0, where crossing a left-to-right path adds 1 and crossing a right-to-left path subtracts 1. Otherwise, the point is inside and colored or filled.

Even-Odd: For the "Even-Odd" rule: a point is inside and filled if drawing a ray from that point in any direction and counting the number of path segments that the ray crosses is odd, otherwise the point is outside and not filled.

In general Even-Odd is the easiest to use as it does not depend upon careful management of path direction. Use this selection to easily punch a hole in a graphic of a Joined group.

Line Width

All Lines, Curves, and Outlines in EazyDraw have a Width, which could also be called thickness and is sometimes referred to as weight.

The Width is measured in Fine Scale Units (inches, mm, or points) as shown by the Units Button found at the upper right hand corner of the palette. You may change the value by typing in a new number. This was introduced in the Palette Units section in chapter 07 and explained in detail in chapter 13.

You may also change the value using the slider control next the Width text box. As you change the slider bar the value is updated in the text box and the target graphic(s) are updated to reflect the new Width.

If the Width is set to zero, the thinest "hairline" width for a target medium is used. Do not use a zero width if your intention is to have no outline drawn, use the outline checkbox discussed above in this case. If you use zero width for a very fine line appearance be sure to test on your output device. printers and software drivers may use unexpected actual line widths in this case. It is best, if at all possible, to specify a precise line width.

Join Style

Joints at vertices of lines, curves, and outlines are drawn with a specific detail specified by a Join Style. This parameter which determines the shape exact shape of a graphic's outline at the joint.

Join style applies only to the Outline component of a graphic. If no outline is drawn the graphic will consist only of its Fill with no border, or specific outline. In this case the joint has no thickness and Join style does not apply.

The selection for the Join style made with the popup menu. There are 3 choices for Join style, Bevel, Round, and Miter. Miter provides a joint that meets at an extended intersection on the outer side of the joint. Round provides a corner with a radius or fillet. Bevel joins line segments with a straight edge drawn at 1/2 the joining angle (45 degree edge for a 90 degree corner sometimes called a chamfer).

If the Width is small, differences in Join style may not be noticeable. The differences become more noticeable with larger line widths or upon close inspection.
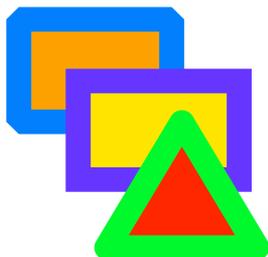
Cap Style

Ends of Lines and Curves are drawn with a Cap Style. One Cap style applies to both ends of a curve.

The selection for the Cap style is made with the popup menu. There are 3 choices for Cap style, Round, Square, and Butt. Square and Butt provide square ends. Round provides rounded ends. The difference between Square and Butt is that Square extends 1/2 a line width around the actual end point and Butt draws the end of the line even with the actual end point. The example below shows different Cap styles. The top line uses Square, the next line uses Butt, and the line at the bottom is drawn with Round Cap style. The example is shown with all the lines "selected" so that the handles show the position of the end points relative to the drawn ends of the lines.

The Cap style is applied to the ends of each dash segment when drawing dashed lines. This can be used for interesting presentations of dashed lines.
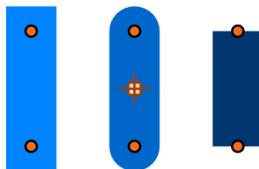
Stroke Position

This parameter controls the relative painting order of the outline (or stroke) verses the fill of a graphic. Control of this order is especially useful when stylizing text that has been converted to Bezier paths.

Ch 15 - Graphic Fill Techniques

Normally, the stroke is drawn over the fill, and the line width is rather narrow compared to the overall graphic. In cases such as text, the line width may be very large relative to the scale of the graphic. In this case a "fat" stroke in front of the fill may not have a pleasing appearance. The bevel or rounded corners of the path cut into or protrude out of the interior fill of the graphic. Sending the stroke behind the fill will remedy this problem.

Use the popup menu shown to define the position of the stroke relative to all other fill effects of the selected graphic. There are two choices, Front and Back.
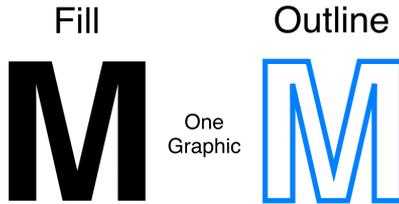
If the stroke is drawn in Back of the fill effects, the width of the stroke will need to be set to twice the desired value as half of the stroke width is obscured by the Fill affect.
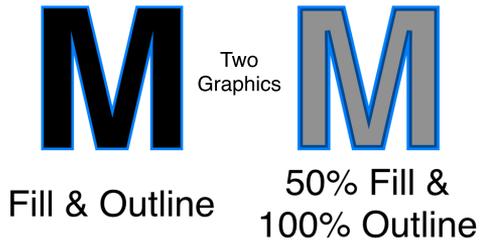
The example to the right shows how this parameter

Fill

Outline

One Graphic

Two Graphics

Fill & Outline

50% Fill & 100% Outline

can be used to add a pleasing outline effect to text. The letter M was converted to a Bezier Path (convert menu) then a black Stroke and gray Fill were applied to the path. The top example has Stroke Position set to "Front" and the lower example uses "Back" to show the more pleasing appearance. The examples at the bottom show the same method used with a Gradient Fill and Pattern Fill.

The actual path or curve of a graphic is an ideal infinitely thin line right down the middle of the Stroke which is a real object of finite width. This ideal curve defines both the precise extent of the fill and the stroke drawn at the specified width. Note that even if you set the stroke width to 0.000 a hairline (smallest possible width on the output device) with a small but finite width is drawn.

Miter Limit

Three methods are provided for precisely drawing the joints of Bezier paths. These are controlled by the Join popup menu. The geometry of the Miter method can produce a long spike-like appearance when the joining angle is acute. The Miter Limit parameter is used to limit these sometimes undesirable spikes.

This parameter only applies to the Miter Join style. The geometry of the other join styles do not require a limiting parameter. This parameter is only enabled when a Bezier path with Miter Join style is selected.

The Miter Length is defined as the diagonal length of the miter. If the ratio of the miter length to the line width exceeds the miter limit parameter, the corner is treated as a Bevel Join instead of a Miter Join.

Note that this parameter is defined as a ratio; drawing units do not apply. Also note that the value is not angle degrees. The need for limiting the miter depends on both the angle and line width - not just the angle of the joint.

Normal values for the limit range from 2 to 20, larger numbers allow longer miters to be drawn. Use smaller numbers to eliminate an undesired spike.

The sample M's to the right show the affect of decreasing the miter limit. Notice the spikes at the top of the M when the miter limit is large. They are eliminated by lowering the limit to 10, but the sharp valley of the M remains until the limit is decreased to 2.
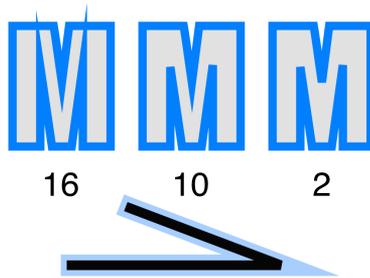
Text drawn with a Stroke Text Style (as set on the Graphic Details drawer, chapter 11) is not controlled by this miter limit parameter. In this case the join style and miter limit are defined by the Font designer. Only Bezier paths are controlled by the Miter parameter on this palette.

Gradient Fill

The Gradient Fill panel is used to fill graphics with a blend of two or more colors. The fill color of the graphic transitions from one color to the next. The transition may follow various contours and mathematical blending functions. The Gradient Fill parameter palette is shown below, it is accessed from the Tools main menu. The parameters are organized with three tab selections.
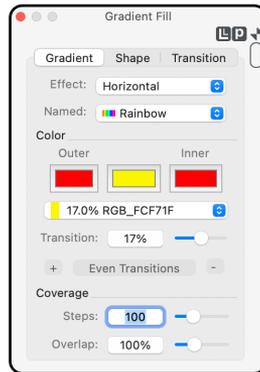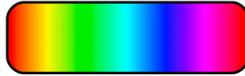
Gradient: These parameters define the primary shape of the gradient and the colors and blend increments that are used in the transition. The popup menu selects the type of gradient to apply, the names are descriptive.

Shape: These parameters control the geometry of the gradient. The radius and direction parameters define a focal point used with some of the shading algorithm.

A burst gradient is based on a shape placed interior to the graphic. The gradient transitions from the burst shape out to the bounding curve of the host graphic. There are 3 predefined burst shapes; rectangle, oval, and rounded rectangle. Any other shape may be defined and used by adding it to the burst view found on this tab.

Transition: These parameters control start, end, and sequence of the color transitions.

Named Gradients

A designed gradient may be saved for convenient reuse. Named gradients are accessed from the popup menu found near the top of the Gradient tab on the Gradient Fill palette. All named gradients are saved in one disk file in the EazyDraw's applications support folder which is found in the users home Library folder.

Named gradients are saved in a disk file in the Applications Support folder of your home Library folder. So the path is "Tilde_for Home"->Library->Application Support->EazyDraw->Gradients.plist . The file is a human readable text file. It may be edited with any text editor or the Apple supplied pList editor.

It is advisable to backup the current set of named gradients by duplicating and archiving the Gradients.plist file discussed in the above paragraph. This is suggested if any amount of time has been invested in creating new custom gradients.

The default set of named gradients are re-generated by moving the Gradients.plist file out of the EazyDraw applications support folder - and re-starting EazyDraw. The default set of gradients is derived from an EazyDraw drawing that is included as a resource file in the EazyDraw application Bundle. As a reference for expert users or language translation engineers: the file is NamedGradients.ezdrw.gz; the format is a simple set of group graphics that contain a Bezier path (rectangle) with a gradient fill and Text Area graphic with the associated shape name.

Gradient

All graphics with an interior, including Text Boxes, may have a Gradient Fill. The parameters that control the colors and their transition are found on the Gradient Fill Panel. A graphic doesn't need to be formally closed (like a rectangle or circle) to accept Gradient Fill.

A Gradient Fill transitions across two or more colors. These colors are referred to as "Inner" and "Outer" colors. You may independently specify the colors using the color wells on this palette.

The effect popup menu is used to select the form of the Gradient Fill. Select the None Value to turn off Gradient Fill. This parameter determines the shape of the constant color contours used to generate the Gradient Fill. There are several selections, the names are descriptive, the examples below demonstrate the effects possible.

Ch 15 - Graphic Fill Techniques
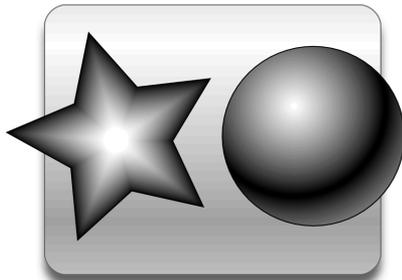
The Plus button is used to insert additional color transitions. There is no limit to the number of transitions. The popup menu is used to select one of the transition colors for editing. When selected the intermediate color can be changed using the middle color well. The transition parameter defines the percentage point along the transitions for the intermediate color selected.

Experimentation is the easiest method to understand the use of this parameter. Intermediate colors are removed using the minus button. Every gradient requires at least two colors, so the end colors may not be removed from the gradient.

If transitions have been adjusted, they may be returned to an even spacing using the Even Transitions button.

The Steps parameter is used to specify the number of unique contours used to generate the Gradient Fill transition from the inner color to the outer color. For a very smooth seamless appearance use a large number like the default of 100. A very small number, like 4, will create a "banding" effect. Larger graphics will need larger number of steps to maintain a smooth appearance. Numbers above 200 may slow down your computer noticeably, and in most cases will not improve the appearance of the fill.

Vertical

Horizontal

Shade

Spot

Egg

Contour

Conical

Burst

The difference between Shade and Vertical or Horizontal is that the angle of the gradient may be specified.

The difference between Spot and Egg is that Egg depends on the aspect ratio of the graphic and Spot does not. Spot transitions from a focal point outwards transitioning the color based on radius alone. Egg begins the same way but transitions independently in the vertical and horizontal directions, the transition depending on length and width of the graphic's bounding rectangle.
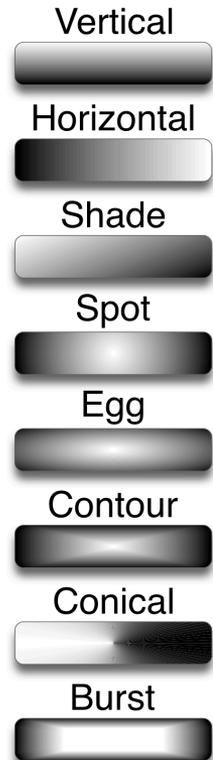
Gradients Fill may be applied to Wall or Ribbon graphics. The creation tools for these graphics are found near the bottom of the Technical tools palette. There are only two of the Gradient Fill geometries that apply to these graphics - Horizontal and Vertical. In this case a Horizontal gradient transitions along the ribbon and a Vertical gradient transitions across the ribbon.

Shape

Some gradient fill effects have a focal point, others a defined direction (e.g. Shade). The focal point is the spot that is colored 100% the inner color. For all shapes except Horizontal and Vertical you may specify the location of this focal point. The focal point is specified in polar coordinates, using a radius and angle value.
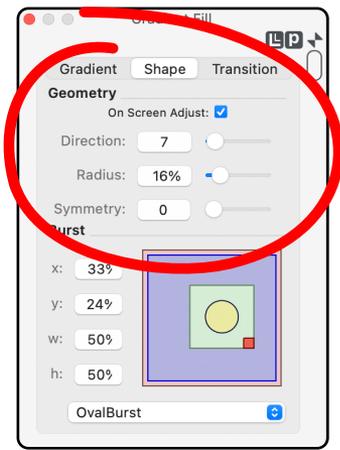
The radius is specified in units that are approximately a percentage of a measure of the graphic's overall diameter. Graphics with rectangular shape do not have a well defined diameter, for this reason the gradient fill location radius is given in approximate arbitrary units. The value is best chosen by experimentation and viewing the attained effects.

The angle specification is well defined and given in the defined palette units. Note that if the radius is zero, changes to the angle will do nothing.

Burst

A burst gradient is based on a shape placed interior to the graphic. The gradient transitions from the burst shape out to the bounding curve of the host graphic. There are 3 predefined burst shapes; rectangle, oval, and rounded rectangle. Any other shape may be defined and used by drawing the shape on an EazyDraw drawing window and dragging it the the shape view found on the Shape tab of this panel.

The relative size and location of the defining burst shape is changed using the numeric values found to the left of the burst view. X (across) and Y (down) define the upper left corner of the burst shape's enclosing rectangle. W and H define the width and height. These values are entered as a percentage of the host graphic defining rectangle.

The relative size and location parameters are adjusted interactively by moving or resizing the bounding rectangle seen on the blueish shape view rectangle. The burst control rectangle is drawn in a light green. It may be moved with the mouse - click and drag. The size of the defining rectangle is changed by clicking and dragging the small reddish rectangle seen at the lower right of the controlling rectangle.
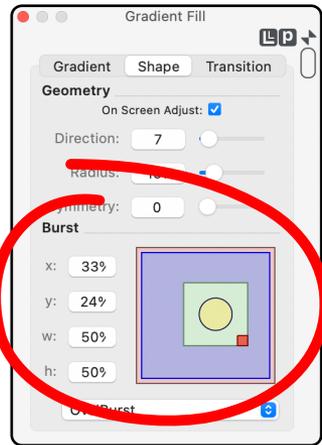
Other shapes may be defined and used by drawing them on an EazyDraw drawing window and dragging the shape to the blueish shape view rectangle. After dropping the shape on the view it will be listed on the popup menu found just below the shape view. The shape is automatically named, and may be renamed or removed using popup menu.

Defining new shapes is a powerful feature but can be a little confusing. The Gradient Fill panel will be looking for a gradient fill in the shape you are defining for use as a gradient fill. So after dropping the shape on the burst view nothing will change - it wouldn't make sense to automatically apply the new burst shape to the
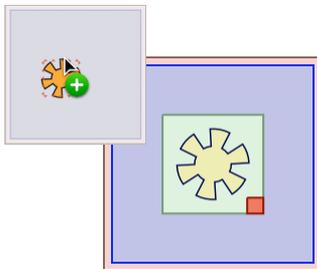
defining burst shape. Your next step is to select a different graphic - perhaps on a different drawing - and apply the newly defined burst to this host graphic using the popup menu.

You must first drag a graphic off its drawing window before dragging over the burst shape area of the Gradient Fill panel. The simplest solution is to place the Gradient Fill palette away from (not over) the drawing window.

You can also "flick" the drag image off the drawing and then over the palette - once this caveat is well understood.

Interesting effects can be obtained by using the same shape for the burst and the host. In this case just drag the graphic to the burst view then select it as the burst. The self-burst effect may be rotated independent of the graphic using the symmetry gradient control. The effect will not rotate with rotation of the host graphic.

The popup menu provides a selection for changing the name of any of the user defined shapes. The shape must be selected before it may be removed or renamed. One way to do this is to draw a temporary rectangle, define the gradient shape for this graphic then rename or remove the burst shape. Then remove the temporary graphic.

The burst graphic may not be edited after being placed on the burst view. You can change the relative size and position as defined above. The orientation may be changed by use of the symmetry control found under the Geometry section of this palette, but all other editing must be completed before placement on the burst view. Color and style of the defining burst graphic are not used in the definition of the burst component, these are derived from the gradient fill colors defined.

Transition

A Gradient Fill transitions across two or more colors. You may select different mathematical functions for progression of the transition colors. Linear is the easiest to visualize, this model generates a simple uniform transition of colors from the inner to the outer. The other available models are listed on the Model popup menu. Use it to select a function for the gradient.

The Start and Finish parameters are used to expand or contract the cycle of the gradient. A normal cycle extends from 0% to 100%, which causes the color
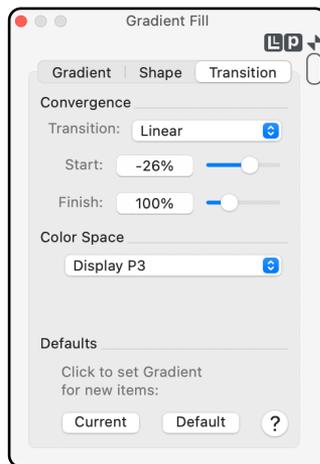
to transition fully and exactly from the inner color to the outer. If the Finish parameter is decreased to 50% the inner color is the same, but the final color of the gradient will be the color that the model computes at 50% of the transition.

Color Space: This popup menu sets and inspects the gradient's color space. In some cases the color space may change automatically, reflecting the color space of an introduced color. Normally an introduced color is changed to match the color space of the gradient. Use this setting for overt specification of color space.

Pattern & Texture Fill

The Patterns palette provides support for the use and design of repeating image patterns as a color. The patterns are used as colors in EazyDraw and other macOS applications. They can be created or edited with the pattern inspection view, which allows precise examination or specification of each pixel of the pattern image.

EazyDraw provides several pre-designed patterns for your use with EazyDraw or other applications on your system. Examples of a few are shown at the end of this section. These are generated when you first access the color lists on this panel. After the first access here, all the patterns are available from the Color Panel's color list picker.

Applying Patterns: The parameters at the top of the palette control how the pattern is applied to a graphic and management of transparency with patterns.
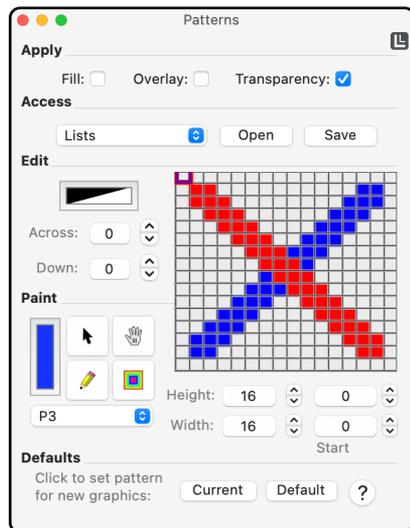
Accessing Patterns and Lists of Patterns: These controls let you access lists of patterns which are a special form of color lists. You can open/save individual pattern images or full lists of pattern families.

Editing or Painting pattern content: The main section of the palette provides painting tools and a close-up view of the pattern's master bit map image. These tools let you inspect or paint individual image pixels. The parameters controlling precise size of the image are near the bottom of this section.

Patterns are actually colors and may be used as any other color that is accessed from a color list. The patterns you install or create with this palette are accessible from your normal Color Picker. If another application doesn't properly support the color picker protocols you can explicitly export a pattern color list and import it to the other application, if necessary. You can apply a pattern as a fill for any graphic. In EazyDraw this is an additional fill effect that may be used independently or in conjunction with color fill or gradient fill. The pattern fill is applied over (in front of) another fill . The controls at the top of the Patterns Palette allow you to manage these combined effects.

In order to be used as an overlay with other coloring, the individual pixel colors need to fully support transparency (Opacity on the color palette), and some of the pixels will need to be at least partially transparent to allow the coloring in back of the pattern to be visible.

Images imported from other systems or certain file formats may not support transparency. If not, the individual pixel colors will need to be converted to support the alpha channel or opacity. This is done with the Transparency checkbox near the top of the palette.

The Fill checkbox is used to turn the pattern on for the selected graphic(s). Check the box to use the pattern as the one and only fill effect for a graphic.

The Overlay checkbox is used to apply the pattern on top of another color fill. The individual pattern colors need to support transparency for this effect to be visible.

The Transparency checkbox can be used as an indicator to verify that the pixels of a bit map can support opacity as a color variable. The checkbox can also be used to explicitly convert the colors of all pixels to include or exclude the alpha channel (opacity value) byte. If the conversion is not possible the action will simply beep and no conversion will take place.

The example to the right demonstrates use of transparency and the overlay attributes. The pattern at the top is just transparent bricks. The next down has the

transparent bricks overlaying a solid fill color. The bottom example has the transparent bricks overlaying a gradient fill.

Transparent pixels are discernible in the close-up view. You can notice that the background color of the palette is seen through the pixels. You may want to apply a white color to a pixel to learn to recognize the difference.
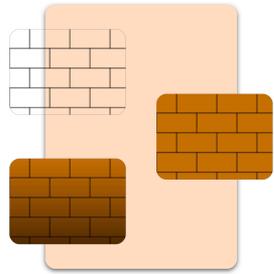
If a graphic that contains a pattern is flipped or rotated, the pattern is flipped or rotated too. This is a convenient way to expand the capabilities of the pattern panel in designing patterns. It is usually a good idea when designing patterns to have them attached to a graphic. This provides the transform capability mentioned here and provides Undo capability.

Accessing Patterns

The access section of the Patterns palette provides methods for opening or saving patterns or lists of patterns in files on your hard drive, local network or the internet. The defining element of a pattern can be any bitmap image, so these controls can be used to read or write the master pattern image. Patterns may also be archived as colors in a color list file (*.clr).

The operating system maintains color list files in various key folders. The primary personal location for color lists is in the Colors folder in the Library folder of the user's home folder (~/Library/Colors). Any *.clr (color list files) found here is available on the Color Picker palette.

The List/Image Files popup determines the method of pattern access. If List is chosen, the patterns are saved or accessed as colors in a color list file. Color list files are identified by the ".clr" extension. If "Image Files" is selected the pattern is accessed as a standard bitmap image file. Any TIFF file may be used.

The Open button is used to read a pattern color or image file. If Image Files is chosen, a standard Open file panel is provided for locating an image to use as a pattern color. If the List method is specified a pair of popup menus is presented to choose a color list and a pattern color from the list. All color lists present in the standard folders are provided by the list popup. There is also a "Read" option that can be used to browse the available file systems for *.clr files. Once a list is selected with its popup, all available patterns in the list are provided for selection on the other popup menu.

If the Image Files mode is selected, the Save button is used to save an individual pattern color's master image in an image file. The standard file save panel is presented, the image is saved in the TIFF file format.

If the List mode is selected, the Save button is used to save an individual pattern color in an existing color list. The current pattern, as shown in the close-up bit map view, is saved to the pattern and list selected with the two popup menus provided. The popup menus also have selections for creating new list and new members of a list.

The Image File methods allow the pattern image editor to be used as a primitive image editor - or pixel paint tool. The close-up view is actually painting/editing a simple bit map image. A bitmap image may be loaded (or use drag/drop) into the editing view, modified and saved back to a permanent file for other use.

EazyDraw provides several pre-designed patterns for your use with EazyDraw or other applications on your system. Swatches of some of these are shown at the end of this section. These are generated when you first access the color lists on this panel. After the first access, all the patterns will be available to other applications from the Color Panel's color list picker.

If a captured image is used as a pattern (perhaps from screen grab) the anti-aliasing algorithms may border the image with faint colored transition pixels. These give rise to horizontal and vertical lines when used as a pattern. To remove them use the hand tool to slide the image up and to left a few pixels, then reduce the width and height of the image by few pixels. Repeat these steps until the lines are no longer visible. If the image is small you can also overtly paint the border pixels with the desired precise colors.

Editing Patterns

The main portion of the Patterns palette is used to closely view and possibly modify the master image that is used to generate a pattern color. A close-up pixel view is used with a few painting tools to accomplish these tasks.

A bit map image consists of a rectangular array of square pixels each having a specific color. These pixels are shown in the close-up view with faint lines indicating the individual pixel boundaries. The color wells and tools to the left of the view are used to examine and change (or paint) the colors of the individual pixels.

Line

Slants

Cross

Dot

Checker

Blocks

Squares

Ripples
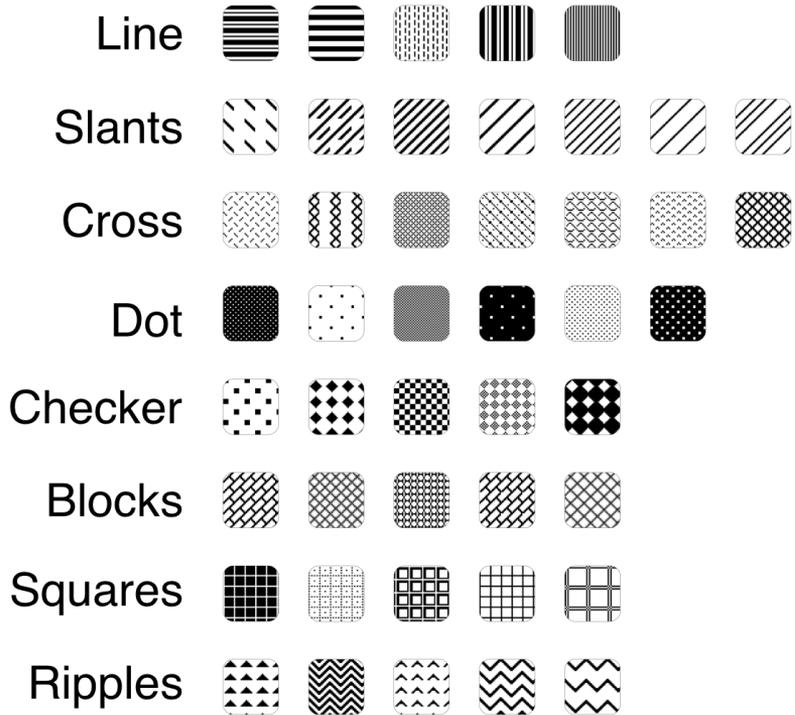
If a graphic that has an applied pattern is selected the master image of the pattern is shown in the close-up view. When nothing is selected the default pattern is shown.

Examining Pixels: The top color well and associated Across/Down controls are used to examine an individual pixel of the color image. You may use the controls directly or point and click on the close-up view to select a particular pixel.

Painting: The lower color well and mini tool set are used to paint pixels. The limited set of tools (plus use of the command key) provide a wide range of traditional pixel painting functionality.

Close-up View: Use the close-up to view and acquire images to use as pattern colors for EazyDraw graphics or as color resources for other applications on your system.

The close-up view supports full pasteboard drag and drop. This is often the most convenient way to move the images and colors between objects on your system.

Transparency can be a problem when dropping a pattern color on other objects (like the color well on the color picker). The transparent regions of your pattern may be rendered as black by the destination object. If your pattern consists of black pixels on a transparent field of pixels this may end up as black on black. The transparency information may not be lost; such an image may actually display as you intended when used by an application that properly supports transparency.

Inspecting Patterns

The across/down values indicate the position of a particular focus pixel on the close-up view. This pixel is highlighted with a bluish border on the close-up view. The color of the focus pixel is shown in the top left color well.

Across - Down: The Across and Down numeric text fields indicate the index coordinates of the focus pixel. Pixels are counted from 0,0 in the top left corner. You can point and click on a pixel to make it the focus pixel, its coordinates are then shown as the Across/Down values. You may also enter a specific Across or Down value to focus on a particular pixel. The steppers may also be used to navigate the focus pixel.

Pixel Color: The top left color well is used to inspect or modify the focus pixel color. The normal color picker is used to examine or modify this

color. A double click on the color well will open the color picker palette. The color well needs to be selected (which will show as a darkened border) to establish the two way link with the color picker's color actions. Changes to the color will only change the single focused pixel.

Width - Height: The Width and Height numeric text fields, shown below the close-up view, indicate the full size of the bit map. If you enter new values, the bit map's size will be changed accordingly. Truncated pixels are lost by this action.

Undo and Redo are managed by the inspecting EazyDraw drawing. This means that some actions applied to the close-up view may not undo as you might expect. It's best to always apply the pattern to a graphic on a drawing. Then you can be sure undo/redo will work as expected, because your changes are recorded as changes to the graphic on the drawing.

The interaction logic of the patterns, images, color, and graphics can easily become intricate and recursive. Frequently you are working on the design of a pattern applied to one graphic which you want to apply to another graphic. But when you select the other graphic the focus pattern changes-ouch. In this case use drag and drop, dragging the pattern from the close-up view to the target graphic. There are, of course, many other ways to accomplish this, but drag/drop is often the simplest.

Painting Patterns

A color well and small set of painting tools are provided for detail painting and modification of the master pattern image. These are located to the lower left of the close-up pixel view.

The color that will be used in a painting operation is managed with the lower color well. You need to establish a working link between this color well and the color picker to work with this color well. A double click on the color well is the easiest way to do this. When selected and linked a darkened border is shown around the color well. The color provided by the painting color well is used for actions with the painting tools, even if the painting color well is not selected, highlighted and linked to the color picker.

Click on a tool to select it for an action. After the action is complete the tool selection will return to the default arrow tool. Double click to *stick* the tool selection, then the tool will remain in effect after initial use. You then must overtly click the arrow tool to return to the default arrow tool action.

Arrow Tool: The arrow tool can be used to select focus pixel. Click on a pixel rectangle on the close-up view and that pixel is selected and focused for inspection. If the control key is held down while a pixel is clicked the *eyedropper* action is applied, and the color of the target pixel is loaded to the painting color well.

Hand Tool: The hand tool is used to move the pixels on the image field. The movement is loss-less, no pixels are erased by moving. Pixel colors are moved in a rotating fashion, off one side of the image field and onto the opposite side.

Pencil Tool: The pencil tool is used to color individual pixels. Each pixel touched with the tool is painted the color from the painting color well. You may just click pixels or click and drag to color several pixels with a single motion. If the command key is held down, the painting will have a "pour" effect; all adjacent pixels of the same color are changed to the new color. This has the affect of filling closed regions with the new color.

Fill Tool: The rectangular fill tool (lower right tool) is used to paint approximate rectangular regions on the bit map. The painting is done with a click and drag motion. The initial clicked pixel becomes the anchor or pivot for filling a rectangular region of pixels. Drag the mouse to encompass the pixels desired for coloring.

If the command key is held down, all pixels of the same color anywhere on the image are changed to the new color. To remove a portion of the bit-map, first move the region of pixels to be retained to the top left corner of the image, with the hand tool. Then decrease the size of the bit map with the size controls located just below the close-up view.

You may drag and drop a color, from any color well or color swatch, directly to a pixel. This action can take place independent of the color present in the painting color well. The drop action also changes the focus pixel.

Close-up Pattern View

The close-up view is used to examine individual pixels of the master image of the pattern. Its size is changed by resizing the full palette.

There is no imposed limit to the size of an image that can be inspected with this view. Optimizations are applied for very large images, but as always when working with large bit maps performance will be effected if the image is large enough. The

pattern view displays each individual pixel precisely as it is colored. The view is resized for optimum viewing by resizing the full palette.

You may drag an individual color to any pixel on the view. You may also drag a pattern color to the view, then all the pixels of the new pattern color are grabbed and displayed by the view.

The full pattern color may be dragged from the pattern view. Click anywhere on the pattern view, begin a drag operation, after dragging a small distance the pattern color is "loaded" to the dragging clipboard and shown with your cursor. This image may be dragged to an EazyDraw graphic (on any open drawing) or to any other object (any application) that will accept a color list specified color. A plus sign appears with your cursor when the pattern is dragged over an object that will accept the color.

A standard resize control (lower right corner) is provided for the patterns palette. Use this to adjust the size of the close-up view to match the extent of the inspecting image. If the image has a lot of pixels (20 or more) you'll need to make the palette larger to view individual pixels.

Using Patterns

Patterns are defined by individual pixels. This leads to different effects when used with modern vector drawing. First a bit of history - patterns were originally applied as colors when computers only had 2 or 8 colors available. Patterns were used as a "work around" for this limitation. For example, on a black and white monitor a gray color is possible using a pattern of alternating black and white pixels. Below we will discuss some of the quirks of Patterns carried over from this original use.

Vector graphics are specified internally in precise ideal fractional coordinates. Points, which are defined as 72 per inch, are the units used by macOS graphics technology. With EazyDraw it is possible to position a graphic to an absolute fraction of a point (100.0123 points over and 71.367 points down, for example). In contrast Patterns are specified in units of Pixels. It is common to use points and pixels interchangeably, but they are inherently quite different. Pixels are individual display elements of a display device. Historically, they are about the same size as a point (not really in this day and age), but this is not a defined relationship. And pixels are integral elements; one cannot draw a half of a pixel. In fact the "old gray trick" described above is how antialiasing draws a nice even gray edge to a black line at a fraction of pixel on your screen because at the lowest level each pixel is still one color.

Patterns are applied in a *wall paper* manner to the printed paper or display window background. This means they will move relative to an individual graphic as the graphic is moved or the window is resized. Think of the pattern as anchored to the window or preprinted on the paper. It is actually anchored to the pixels discussed above.

If you need an individual image that is fixed relative to a graphic then the specific image should be imported to the drawing and the desired graphic used as a cropping path or frame to the image. You can also apply the pattern to a graphic then convert the graphic to an image, the conversion will freeze the pattern content and should look the same.

Next, please understand that the pattern will have all the quality issues associated with bitmap images. An exported drawing containing a pattern will become *jaggy* if expanded. Exported and printed patterns may not be as crisp as your vector line art.

If you change the on screen zoom of the drawing a small amount, the pattern's pixels can't follow the change and will remain unaffected by the zoom. So the graphic will change size but the pattern will not. If you zoom a factor of 2, or 4 EazyDraw will double or quadruple the image's pixel area (using 4 or 16 actual pixels for represented pixel). Larger zooms are ignored with the pattern remaining unchanged with the zoom. These appearance fudges are only applied to screen drawing and are not applied to printing actions wether they be to a bitmap export, pdf, or printer. The zoom fudge is only applied on screen. So you need to view graphics with patterns at zoom 100 in order to get a feel for the appearance, even this may not give a proper look. Test prints or exports are advised to be certain of the final appearance.

Final note, the Pattern technology is an older technology and probably a dying technology. While macOS still supports the core technology, the support is best viewed as a legacy activity. When you encounter the quirks described above keep in mind they are not something that will be *fixed next rev*.

Outline Mode

In some cases it is desirable to turn off all graphic fill (solid color, gradient, ...). This can make it easier to see and edit shapes, or for large complex drawings it can improve the program's response time significantly. This is managed with the Outline submenu found or Format main menu, near the bottom. You can manage this mode for the entire drawing or individual layers. You can also set thicker or thinner line width - just for the outline mode.

Abstract (Bucket) Fill

This menu command will create a new "concrete" graph[ic]
interior area defined only conceptually by other paths
and shapes. A solid Fill color is applied to the new
graphic. This fill can easily be changed to a pattern or
gradient. The function of this command is to
automatically generate the well defined graphic
shape from the abstract shape informally defined by
several shapes, paths, or curves

Abstract Fill	
Union	
Difference	
Intersection	
Extend	>
Trim	>
Fillet...	
Chamfer...	
Recent	>
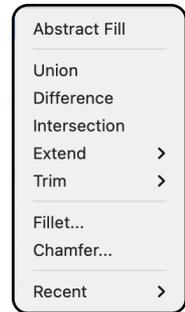
The "Paint Bucket" tool is a common tool found in pixel painting applications. It is
used to flood an area defined by a solid pixel border with color. The tool is needed
to facilitate coloring areas of a pixel-painted drawing. Vector drawing has this
filling capability precisely defined for each vector shape, solid color, patterns or
gradients are used to fill the interior defined by a graphic.

An example of a "conceptually" defined shape is a triangle created from 3
intersecting lines. In terms of the vector graphics computer drawing medium,
these are not a triangle - they are 3 un-related lines. For vector drawing the
triangle (or a similar) tool is used to draw a single shape with three sides that form
the triangle. These vector drawing concepts are not here "changed" - the Abstract
Fill command will simply attempt to assemble and draw the triangle from the
conceptual arrangement of the three lines.

The Abstract Fill menu command is found on the Combine Submenu - on the Tools
main menu, about 2/3rds of the way down. There is a Toolbar tool for the this
command, the icon is the "Paint Bucket" icon shown to the left. To add this tool to
the drawing window toolbar use the Customize command found on the View main
menu.

Execute the Abstract Fill menu command (or click the toolbar button) to enter the
Abstract Fill mode. Move the cursor over the drawing and note the "paint bucket"
cursor indicating that the next mouse click will define the internal conceptual area
to be filled. Click the mouse and the new shape is created.

The new shape will have "no-outline" and a solid fill color. The Color is the current
default color as defined and shown on the Color and Style palette. After the shape
is created the color can be changed using the Color and Style palette or a Toolbar
Fill color button.

The full area to fill needs to be visible on the screen. Adjust the viewing area and zoom to present the desired area on screen. The new fill area will not "spread" or flood off the viewing area of the screen.

There, naturally, can not be "hole" or leak in the defined area. If the flooding of the color from the click point can reach the edge of the viewing area (not the edge of the drawing) without crossing a path, then the algorithm fails and no graphic is created.

This tool may be used with multi-layer drawings. The new graphic element is added to the current active layer. All selectable graphics are considered for possible defining border paths - note this is not all visible graphics. There may be boundaries clearly visible but if these are not selectable they will not be used for the definition of the new fill shape. Study Enabled Actions to learn more about the distinction between visible and selectable graphic elements.

The new filled shape is inserted behind all other graphics. This is the appropriate logic as the finite line widths of the defining border will normally show above the fill area, obscuring one half of the associated line-width's dimension. This means that if one clicks on an area that already has solid fill - nothing will be seen on the drawing as the new shape will be obscured by the exiting fill. Caution should be used to avoid introduction of spurious hidden graphic elements.

The generation of the new filled shape is based on heuristic algorithms; the solution is derived by trial and error and rules that are loosely defined. These algorithms will work best when the area of interest is expanded to reasonably fill the viewing area of the screen. The user is expected to cooperate in the success of the algorithms.

Flood Fill algorithms are trivial when dealing with defined pixels. The solutions are much more complex if a precise vector shape is the goal. EazyDraw does not use a pixel-hybrid implementation. The actual Bezier paths are analyzed, meeting end points and intersections are defined mathematically, then by recursion a continuous exact Bezier path is stitched together to form a closed outline of the new shape.

If the algorithm fails (nothing happens), adjust the zoom and or position of the target conceptual shape on the drawing view (the computer screen). The algorithms are designed to fail quickly and gracefully rather hang the system. The analysis of the scene is performed on a separate thread (utilizing other available CPUs) while the user is choosing the click point.

Vector Hatch

The Hatch panel is used to fill graphics with a repeating sequence of straight lines that may be dashed. This form of graphic fill is called a Vector Hatch. The repeating lines are sequenced with an over/down offset.

Hatches are drawn with straight line paths, curved paths are not supported.

Bitmap vs Vector: Hatches are one of the two techniques for filling a graphic with a repeating (or tiled) pattern. Hatches are rendered as vectors. The technique discussed in the previous section, Pattern and Texture Fill (EazyDraw's terminology) are drawn as bitmaps. The quality and appearance of a Hatch will be more consistent with respect to size, scaling, and export format, but bitmap patterns may be more intricate.
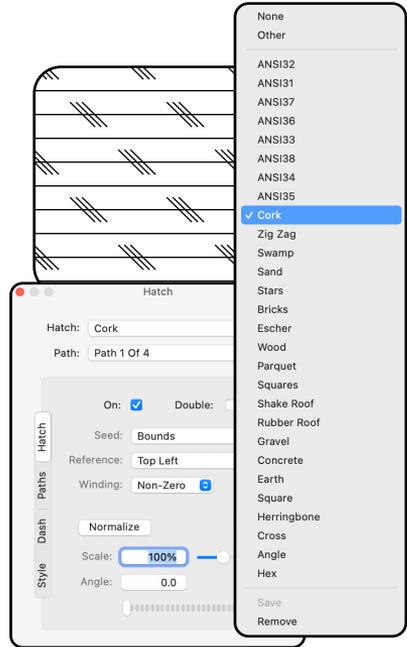
Standard Hatches: The technology implemented here follows the CAD industry standards for specification of vector Hatches. Those familiar with other CAD applications will see the same terms behavior on this parameter palette.

These parameters will correspond to the DXF file format specification for a vector Hatch. The experienced user will be able to correlate these settings and values with those recorded in DXF text file.

Standards institutes have specifications for vector Hatch usage. (examples: Earth, Swamp, Sand, Cork, ...). These are defined with length offsets and angles. These specifications will mesh well with parameters found on this palette.

Degenerate Cases: There are degenerate Hatch specifications. If the across and down sequence for a path falls on (or close to) the path, then an infinite (or very large) number of paths are needed to fill the graphic. This situation is signified with a red warning message. In this situation use the X and Y Shift, or the Angle settings on the Path tab to rectify.
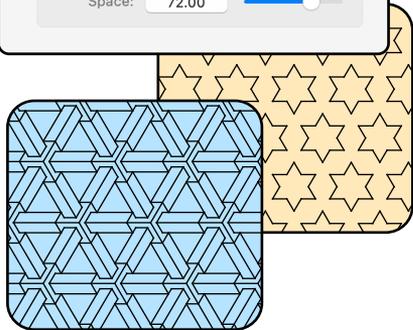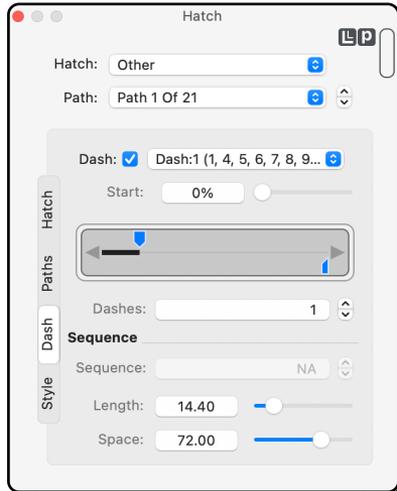
Hatch Parameters

The popup menu at the top of the palette (Hatch popup) provides access to named vector Hatches. EazyDraw ships with several standard hatch designs, select from this list to use a hatch from this list. The menu has "save" and "remove" items (found at the bottom), use these to save new or modified hatch designs for future use. If the drawing is saved, closed and re-opened with the Hatch turned off, the hatch design is lost.

The Path popup menu indicates how many individual paths (lines, possibly dashed) are used to construct the Hatch. This menu does not have relevance for this (the Hatch) tab, it is used when working with individual paths on the Paths, Dash, or Style tab.

The On check box is the master control that triggers use of the Hatch with a graphic. When checked the hatch fill is drawn for the target graphic(s). When unchecked, no hatch is drawn; in this state the non-visible Hatch is still stored with the graphic and available for usage as designed.

The Double checkbox, when checked, will cause the Hatch to be drawn a second time at 90 degree orientation relative to the specified hatch.

Seed: This specifies the reference location for the repeating sequence of lines. The choice "Bounds" will tie the hatch to the graphic, as the graphic is moved the Hatch will remain stationary relative to the graphic. The choices "Drawing" and "Page" ties the repeating sequence to a stationary point, in this case when the graphic is moved the hatch will appear to slide under the graphic. The latter two settings are useful when several graphics employ the same hatch and a continuous (across the drawing or page) Hatch appearance is needed.

Reference: This setting works with the Seed setting to define the actual "zero" reference position of the Hatch. The best way to understand this setting is to experiment with different settings while resizing a rectangle. solid Fill color is applied to the new graphic. This fill can easily be changed to a pattern or gradient. The function of this command is to automatically generate the well defined graphic shape from the abstract shape informally defined by several shapes, paths, or curves

Hatch Path

The parameters provided on this tab manage the repetition geometry for an individual path.

The top popup menu, "Dash" should be used generally as an inspector. The Dash tab is the primary interface for the dash pattern of a Hatch. This popup menu sorts through all dashes set for the target Hatch and indicates which paths share a dash sequence.

The Plus, Minus, and Duplicate buttons are used to add or remove a path from the hatch.
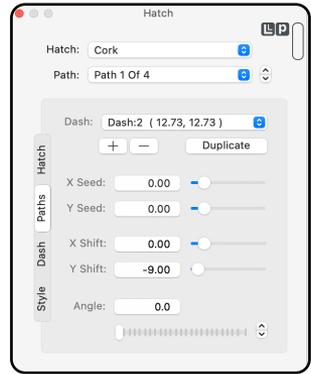
The X (over) and Y (down) seed parameters establish the reference path. All other paths sequence in steps, in both directions if necessary, starting with the seed point. The seed point is referenced from the reference and seed settings on the main Hatch tab of this palette. For example the reference point might be the lower right corner of the host graphic's bounding box, or perhaps the center of the drawing.

X and Y shift define the repeating interval for the selected path. This allows repeating intervals to be fully independent for each path. The repeated intervals for paths of a hatch do not interact.

The Angle defines the direction of the line for the selected path. The reference, orientation, for the angle follow the settings for the drawing, found on the Graphic Details drawer.

There are degenerate Hatch specifications. If the X and Y shift generates a point that falls on (or close to) the path, then an infinite (or very large) number of paths are needed to fill the graphic. This situation is signified with a red warning message. In this situation use the X and Y Shift, or the Angle settings on the Path tab to rectify

Hatch Dashes

The parameters provided on this tab manage the dashed line sequence for an individual path.

The parameters on this tab apply to an individual Path of the Hatch. The target path is shown or selected with the Path popup menu near the top of the palette.

If the target path is to have a dash sequence, the Dash check box is checked. A path does not need to have dashes, it may be a solid line in this case the Dash check box is not checked and then the parameters on this tab are not in use.

The popup menu next to the Dash check box will display the possible name of a named hatch. Dash sequences may be saved and named for reuse, saving and selecting is provided with this menu. Dash sequences in the target Hatch are shown near the top of the menu, see example below on right. Dash sequences for the Hatch that do not match a named dash sequence are named named generically with numbers. Following the name, in parenthesis, is a list of the numbered paths currently using each uniqued dash sequence.

Hatch Style

Individual paths of the Hatch may have different colors, line widths and end cap geometry. These individual color and line style parameters are managed on this tab of the Hatch palette.

Line: The parameters on this tab apply to an individual Path (when Apply is set to "Line") of the Hatch. The target path is shown or selected with the Path popup menu near the top of the palette.

Hatch: If the Apply selection is set to Hatch, a color and style change is applied to all paths of the Hatch. The color and other parameters shown always apply to the selected Path. The Apply setting is only used when changes are made. If Apply is set to "Line" then changes only apply to the selected path.

Normally the Cap setting is applied to the end of a line. It is also always applied to each end of a dash sequence. For Hatches the ends of each path line are clipped exactly at the edge of the host graphic, therefore the Cap setting has no impact on the actual line ends. Cap style, in many cases, will have a significant impact on a dash pattern. The Square setting adds one half of a line width's length to each dash line segment.

Chapter
16

Graphic Augmentations

Dashes

The Dashes Palette provides parameters for dashed lines and borders or outlines for graphics. The Palette is shown to the right. Detailed documentation of each parameter is available in this section.

Inspection View

The top area of the Dash Palette provides selection of a dash pattern from a named list and inspects the dash pattern with an interactive close-up view.

Sequence

The lower portion of the palette allows detailed numeric inspection and specification for the sequence of dash and space lengths. You may use standard dash sequences accessed from the Dash name popup menu at the top of the dash panel. Any custom dash sequence can be created with the interactive controls found on the Dash Inspector view or by using the numeric Dash Sequence parameters. A custom dash pattern may be saved and given a name by using the Save selection on the Dash Name popup menu.

Named Dash Patterns: These are saved in the Applications Support folder assigned by the operating system. There is an EazyDraw folder in the Applications folder and it contains a "plist"; file called Dashes. This file may be accessed with any text editor or the macOS Property List Editor application. To re-generate a new "Factory" list of dashes, remove this file then quit and re-start EazyDraw.Lines, curves, and outlines (borders) may be drawn as dashed lines. The parameters that control the size of the dashes and spaces between the dashes are found on the Dashes Panel. To show this panel select "Dashes" from the Tools Menu which is on the Main Menu.

Another method for accessing desired patterns is to save commonly used patterns in a drawing. Then a pattern can be copied using the Copy Special and Paste Special menu commands to transfer the dash pattern to new graphics.

A third method for conveniently using specially designed dash patterns is to add them to a user library. The "LL" button at the top of the Dash palette is used to drag a dash pattern to a user library. From the library the special dash pattern is available as a single click tool or a drag and drop attribute.

A graphic doesn't always have an outline component. If no outline is drawn the graphic will consist only of its Fill with no border, or specific outline. In this case the dash parameters do not apply.

You may independently change the length of the dash line and the length of the space between dashes. These lengths are measured in Fine Scale Units (inches, mm, or points) as shown by the Units Button found at the upper right hand corner of the palette.

The Dash checkbox, top left, determines if a dash pattern is drawn for a graphic. If the checkbox is checked a dash pattern is used, if not the line is drawn solid with no dashes.

The Start value controls the beginning phase of the dash pattern as applied to the graphic's Bezier path. It is defined as a percentage of the total length of the dash pattern. This parameter will *slide* the dash pattern along the running length of the Bezier path. The results of changes to this parameter are viewed on the target graphic on the drawing page. Changes here are not reflected in the Dash inspecting view at the top of the palette.

The view pane provides an interactive close-up view of the active dash pattern. It is blank unless the selected graphic has an active dash pattern. When a dash pattern is active, adjusting handles are shown associated with a close-up proportionate view of the dash pattern. The adjusters are used to change dash or space length by clicking and sliding a particular handle. The actual extent (length) of the pattern is shown at the lower right of the view, in the current palette units. The integer value and stepper control below the close-up view is used to inspect and set the total number of "dash-space" sequences of the dash pattern. Enter a value or use the stepper to set the total number of distinct dash and space sequences.

A double click on one of the adjusting handles will insert another dash-space sequence. The new sequence may then be adjusted as needed. A double click while holding down the Shift key will remove a dash-space sequence.

A dash-space may be removed from the pattern by sliding one of the adjusting handles fully left or right and bringing the adjacent element of the sequence to zero length. The actions that remove dash-space sequences only apply if there is more than one dash-space sequence.

A new dash-space is added by sliding the end adjuster handle (the one with a smaller width) to the left. Normally adjustments hold the overall length of the pattern constant, but this method extends the total pattern length to incorporate the new sequence. This fact may be noted by observing the changes to the total pattern length as reported at the lower left of the close-up view.

The arrow controls at the ends of the close up dash pattern (dark gray in color) are used to adjust the overall length of the dash pattern. The one on the right increases the total length and the one on the left decrease all sequences and correspondingly the total pattern length. Click and hold, on the arrow to change the pattern length.

The close-up view will accept a drag-and-drop of a Bezier that has an active dash pattern. This process will set the current dash pattern that is applied to newly created graphics. Since the *dropped* dash pattern must be selected, this action is equivalent to clicking the Current button at the bottom of the palette.

Select a sequence index, then you may independently change the length of the dash line and the length of the space. These lengths are measured in Fine Scale Units (inches, mm, or points) as shown by the Units Button found at the upper right hand corner of the palette. You may change either value by typing in a new number or adjusting the associated slider control. As you change values you will see the dash pattern change on the drawing.

Cap style, as discussed in the previous chapter, controls the appearance of the ends of each dash of a dashed line. This parameter is found on the Color and Style palette.

Space Color: A dashed appearance is normally drawn with breaks in the line (or curve). This is the case if the Space Color checkbox is not checked, then "nothing" is drawn in the dash breaks of the sequence. If the Space Color checkbox is checked the line or curve will be solid and the dash appearance created by altering two colors. One color is derived from that specified on the Color and Style palette, the other from the Color Well adjacent to the Space Color checkbox. Of course one or both of the colors may still utilize opacity.

Arrows

The Arrows palette provides parameters for arrows for the ends of lines and curves. The panel is shown to the right. There are three groups of parameters. Detailed documentation of each group is available in the sections found below.

Form: These parameters control where arrows are drawn, which end(s) and how far from the end. The shape of the arrow is selected using parameters on this tab.

Style: These parameters control the color and drawing style of the arrows. Arrows may be drawn with the same Style as the host path, or these variables may be defined independently with this tab panel.

Custom: This tab provides methods for implementing and adjusting user defined arrow shapes.
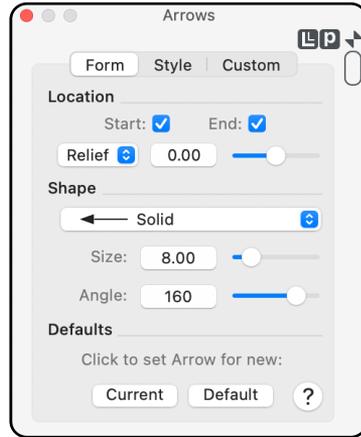
Form

Location: The Start and End checkboxes, determine the end(s) that will have an arrow for a graphic. If a path has multiple vertices and Multiple for each segment is checked, then these checkboxes determine which end(s) of each segment have an arrow.

Relief / Offset: Specify the exact postion of the Arrow relative to the line (or curve) end point. Specify Relief to place the tip of the arrow exactly at the end point, the Relief value moves the drawn line end point "back" from the defined end point. Specify Offset to place the tip of the line exactly at the defined end point, the Offset value moves the arrow tip "back" from the line end. The Help page on this topic covers this setting in greater detail.

Shape: There are several named arrow shapes to choose from. The popup menu show what is available; a submenu provides access to custom arrow shapes that are created and installed using the features on the Custom tab. Several pre-built custom shapes are provided with the EazyDraw installation.

Size: You may specify a size parameter for the arrow. The value is a length or diameter of the arrow feature. This length is measured in Fine Scale Units (inches, mm, or points) as shown by the Units Button found at the upper right hand corner of the palette.

Angle: An angle may be specified for several of the standard arrow shapes, angles are not used with custom shapes. The angle is entered in degrees or radians as defined by the Fine Scale setting. A selected arrow is updated and redrawn as changes are made so that the affect of the change may be visualized in real time.

Walls and Ribbons: A few of the standard arrow shapes are allowed for Wall graphics (see chapter 10, Walls section). The arrow shape actually becomes part of the end of the Wall or Ribbon graphic. There are only three of the Arrow Shapes that logically apply in these cases, Open, Swept and Open Dot. The other selections for arrow shape are disabled when a Wall or Ribbon graphic is selected.

Style

The Style tab of the Arrows palette provides an interface for control of an independent color and style for the Arrow. By independent we mean different from that of the host line or graphic.

The colors for arrows may be those of the line, path or curve to which the arrow is attached. Or the colors may be defined independently using the parameters provided. The "From Curve" check-box determines which method is used.
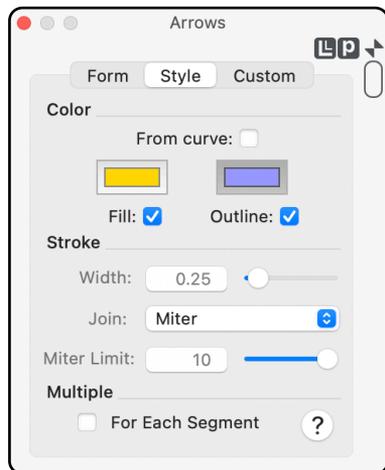
If the From Curve checkbox is not checked, the two color wells and checkboxes for Fill and Outline are enabled and are used to specify the arrow's Style. The Fill color well and checkbox apply to the interior of the arrow. The Outline color well and checkbox apply to the outline or border of the arrow.

The drawing style parameters follow the model of the Fill and Outline parameters that control the appearance of all graphics in EazyDraw. This was covered in the previous chapter, Color and Style section. Refer to the previous chapter for details concerning stroke Width, Join style and Miter Limit.

Multiple: The "Multiple-For Each Segment" checkbox adds arrows to each vertex along a multiple segment path, curve, or outline (e.g. the box of a rectangle). This parameter works with the Start or End arrow Location parameters to determine which side of a vertex (or end of a segment) gets an arrow.

Custom Shape

Arrows are actually quite simple to use, you can see this from the previous brief description. In most cases the parameters on the Form tab are all that are needed to add expressive arrow shapes to a drawing. The full capability provided by the elements on the Custom tab is quite powerful and correspondingly more complex. A study of the rest of this section is certainly not needed simply to add an arrow to a line.

Using custom arrow shapes is a more advanced task. If you are new to EazyDraw or just need to apply arrows to the ends of lines or paths, focus on using EazyDraw's built-in standard arrows. Unless a specialized shape is needed, one should be able stick with the "Form" main tab of the Arrow palette.

Conversely, if you intend to design and use custom arrow shapes, the following information will be quite helpful. The capability here is probably not advised for trial and error learning.

The Custom tab of the Arrow panel provides an interface for the application of any Bezier path as a user defined arrow shape. A small drawing area is provided for managing these custom shapes and performing simple editing tasks. This drawing area will accept drag and drop of any EazyDraw Bezier path from a normal EazyDraw drawing window. This allows more complex editing and shape creation to be done with the full drawing capability of EazyDraw.

The drawing view itself has 4 tabs to access four "scratch" drawing areas to define arrow shapes. An EazyDraw graphic dropped on the custom shape drawing area is placed first in this Temp(orary) position. From there the shape may be applied to another EazyDraw graphic. The Temp scratch area maintains a history of recently used shapes to further assist in the management of these custom arrow shapes.

The custom shape editing area has a very useful contextual menu. Control or left click the mouse anywhere on the bordered arrow shape drawing area to access this menu. The contextual menu is used to place or retrieve custom shapes to or from the system pasteboard.

Temp: This is the "scratch pad" tab view for intermediate storage and in-place editing of arrow shapes.

Start and End: These tabs are used to view and edit custom arrow shapes placed at the ends of a graphic.

Along: This tab manages an arrow shape that is repeated and possibly sequenced along the path of a graphic.

Named Custom Shapes: User created shapes may be saved to a permanent disk file. These shapes are then accessed and managed with the popup menu.

Transform: Custom arrow shapes may be positioned, oriented, scaled and sheared, with respect to the tangent of the host graphic's path. Use the Transform and Sequence buttons to access to this capability.

The in-place editing capability on this palette is rather limited. When this becomes a problem, click and drag the custom shape to the main drawing window. Continue editing there then drag the shape back to the Arrow palette. Remember that if the editing needed is a "stretch" or "flip" - use the Transform capability.

The named custom shapes are saved in a disk file in the Applications Support folder of your home Library folder. So the path is "Tilde"->Library->Application Support->EazyDraw->Arrows.plist . The file is a human readable text file. It may be edited with any text editor or the Apple supplied pList editor. The history shapes managed by the Temp view are also found in this folder, their file name is ArrowsHistory.plist.

It is interesting and helpful to note the reasoning behind the use of a separate "Temp" arrow shape. The most common method to create a new arrow shape is to draw one on an EazyDraw drawing. Then the task is to apply this custom shape to another EazyDraw graphic. If one is to drag and drop the arrow shape graphic on the arrow palette, this must be the focused graphic (the arrow palette is ready to apply an arrow to the arrow shape). When the new arrow shape is dropped on the arrow palette, the normal intention is not to apply "the arrow to itself" but to another graphic. So an intermediate place holder is needed, this is the Temp tab view. After placing the custom shape on the Temp view, the graphic that needs the arrow is selected and becomes the focus of actions on the Arrow palette.

Scratch Pad

When a Bezier path, from an EazyDraw (or other drawing application) drawing, is dropped on the Arrow palette's custom shape view, it is automatically placed in the Temp position, and is not immediately applied as an arrow to a target graphic. From this position the shape is applied to a target graphic or saved as a named arrow for future use.

This Temp tab view is accessed from the Arrow Palette by clicking the Custom tab (at the top of the palette) and clicking the Temp tab of the Custom shape editing view. This tab is automatically selected when a graphic is dropped on the custom shape view.

The 3 small blue buttons - "S," "A," and "E" - are used to apply the current displayed Temp custom shape to the Start, Along, or End position of a target graphic. Select the target graphic on the main EazyDraw drawing, then click one of these buttons to apply the shape to the desired position on the target graphic.

Use the stepper button (top right of the custom editing area) to step through a history of the recent custom shapes that have occupied the Temp editing view. This is a circular stepper that will sequence through all the remembered shapes.

Use the contextual menu, control - click on the custom shape editing area, to copy or paste shapes to or from an EazyDraw drawing. Or drag-and-drop Bezier path graphics between the in-place editing view and a main drawing. Notice that the normal Copy and Paste actions, on the main EazyDraw Edit menu, cannot work directly with this floating palette view as they focus on the host graphic on main drawing.

A new shape may be selected for editing by making a choice from the Named shape popup menu. The contextual menu provides access to the standard EazyDraw arrow shapes, so they may be used as a starting shape for customization.

Note that the Transform buttons are not enabled for a Temp arrow shape. Also there are no reference markers as you have for the defined custom arrow positions. These attributes (a transform and reference point) only apply relative to a host Bezier path and hence have no meaning for the Temp shape view.

Start & End Custom View

Any Bezier path may be used as a "Arrow" applied to the start or end of a Bezier graphic. The Start or End tab of the custom shape view is used to manage user defined, or custom, arrow shapes.

For clarity, we will refer only to the Start position for the rest of this section. Understand that operations are identical for the End tab, except for the location on the target graphic.

The "On" and "Custom" buttons determine if the start of the selected graphic will have an arrow (ON), and if it will be a standard arrow or a Custom arrow. If Custom is not checked, the arrow's shape is defined by the Arrow Shape on the main Form tab. Check both boxes to apply a custom arrow shape. If no other shape is specified or shown, the current Temp shape is applied.

You may perform minor editing the custom shape, in-place, by click and drag of a vertex or control point handle. These are the small light brown or blue rectangles overlaid on the shape. Editing is similar to the editing procedure on a normal EazyDraw drawing. If more editing capability is required (such as adding or removing a vertex) drag the shape to an EazyDraw drawing window and continue editing with the full EazyDraw capability. Then drag and drop the shape back on this view.

Every arrow shape has a defined reference point. This reference is used to define a unique mating position of the arrow shape and the target Bezier path, the point where the arrow is "attached." The default reference position of a custom shape is the first point of the Bezier path. You may shift this reference by using the two blue tab handles found in the right and bottom margins of the editing view. The reference position may be shifted, but is constrained to remain inside the bounding rectangle of the custom shape. Larger shifts are done with the full Transform. Move the reference with the click and drag of one of the tab-handles. The position is shown with the light blue crossing lines.

A new shape is selected for editing by making a choice from the Named shape popup menu. The contextual menu provides access to the standard EazyDraw arrow shapes, so they may be used as a starting shape for customization.

Color and style selections such as fill color, stroke width, line color are not reflected on the in-place editing view. These are managed by parameters on the Style main tab view. These are applied to the shape as attached to a target graphic and shown on the main drawing. Shapes shown on this view do not reflect choices for these attributes.

The Transform button is used to apply a full morphing transform to the arrow shape. Use this to position, orient, scale, or shear the arrow shape. Note, the transformed shape is not reflected in this editing view, this view always shows the original starting shape. The transformed shape is viewed interactively on the main EazyDraw drawing, relative to the target graphic.

A starting shape is moved to the Temp position with Paste selections found on the contextual menu for this tab view. Control click to access.

Along Arrow

Any Bezier path may be applied in a sequence along the path or curve of a Bezier graphic. A common term for these shapes are "Brushes," but we will just call them arrows, as they are an extension of the general "Arrow" on a line concept. The Along tab of the custom shape view is used to manage this drawing technique.

Editing and positioning for an Along arrow is the same as discussed above for Start and End arrows. An Along arrow has additional capability with respect to morphing

transforms, and positioning.
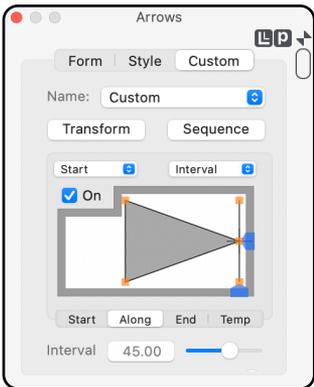
An "Along" sequence has an additional reference point, one that defines the beginning of the sequence of shapes. The popup menu just above the On button is used to define this master reference point. Three choices: Start, Center, and End are available. This reference is the stationary point, along the target path, from which the sequence of shapes emanates.

Two methods are provided for determining the spacing of the sequence of arrow shapes, Interval or Count. The method is selected using the popup menu, top-right corner of this tab view. The Count method will place, at even intervals from the master reference point, count number of shapes along the full length of the target graphic. The Interval method will space the shapes at a specified interval, thus providing more arrow shapes for longer path lengths.

The text field and slider at the bottom of the palette control the Interval or Count of the arrow sequence along the target path. The value controlled depends on the popup menu selection, as described in the previous paragraph.

You may apply an arrow at each vertex of a curve. This is a simpler "along" technique. It applies only for the standard arrow forms. The user interface for this approach is found at the bottom of the Style tab.

The contextual menu provides access to the standard EazyDraw arrow forms, so they may be used as a starting shape for customization. The standard EazyDraw arrow forms do not respond to this "Along" technique, you must first assign the standard shape as the Along custom shape, using the contextual menu.

Two separate transforms are available for the Along technique, the first is the normal transform to morph and position the custom shape as desired, this works just as described for the start and end arrow positions. The second is called the Sequence transform. Think of the second transform as a "delta" transform applied sequentially to each arrow shape along the host path. An example of the sequence technique would be to make the series of shapes smaller and smaller as if disappearing in the distance. See the examples at the beginning of this section.

Sequential Transform

The Transform Button is found top center of custom shape editing area. Separate transforms are applied to the Start, End, or Along custom shapes -- each are controlled separately. The current editing Transform is reflected by the tab selection, visible just below this transform panel.

Offset: Offset is a value that will shift the arrow shape along the host path. If the path is a straight line, it just follows the line. If the host path is a curve, Offset follows a line tangent to the curve at the attach position.

Away: Away is a value that will shift the arrow shape away from the host path, perpendicular to the direction of the Offset shift.

Rotate: Rotate is a value that will spin the arrow shape around the final position point. The point of rotation is the shape's reference point which is shown by the blue margin tabs on the in-place editing view.

Scale: Scale is a uniform sizing parameter that will adjust the overall size of the arrow shape. Positioning and rotation are done first, then the shape is scaled according to this fractional value.

Distort: The four Distortion parameters, Across, Pitch, Tilt, and Down are the core morphing transform factors. In mathematical terms they are the Affine transform matrix. You don't need a math degree to use them, experimentation is the best method. In general, but not precisely, their control aspects are as follows: Across controls width scaling which is the "along" axis but after rotation. Down controls height scaling which is the "away" direction but after rotation. Pitch and Tilt used together provide rotation, if they are equal in magnitude this will be a simple rotation. Shear is accomplished with Pitch and Tilt - when they have non-matching values. Pitch and Tilt are specified as angles, Across and Down are specified in scaling percentages.

Cancel: The Cancel button will close the Transform panel, clear the current transform configuration and restore the transform configuration that was present when the panel was called.

Done: The Done button will close the Transform panel, and permanently apply to the target graphic's arrows the transform in its current configuration.

Flip: The Flip button will rotate the target arrow shape, 180 degrees. This will flip the pointed direction of the arrow to the opposite direction along the target graphic path. It is the same as adding 180 degrees to the current rotation.
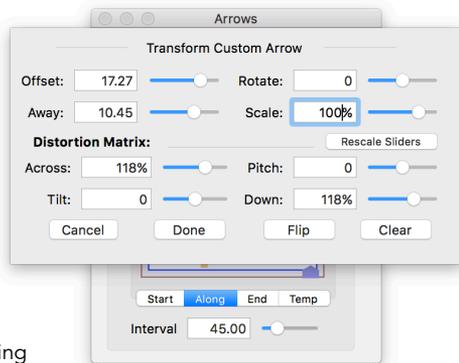
Clear: The Clear button will return the current transform to the "no-action" state, or unity transform. This has no offset, translation, rotation or shear. The arrow shape is drawn directly as defined by the master shape and the over-all arrow Size parameter found on the main Form tab of the Arrow palette.

Changes to Rotation and Scale values will cause changes to the the Affine matrix parameters. The scaling or rotation is actually accomplished by EazyDraw computing and setting the correct matrix values. Conversely, if changes are made directly to the matrix values, you may see a change in the defined scale or rotation values. However, changes to the matrix do not result in changes to the translation parameters, "Along" and "Away."

Scaling and rotation have well defined meanings when there is no shear to the transform. In the case of shear, the actual rotation and scale have more general and approximate meanings.

The Along, Offset, and Rotate values are measured in Fine Scale Units (inches, mm, or points) as shown by the Units Button found at the upper right hand corner of the palette. All other values are unit-less fractions - percentages defined by the Fine Scale selection for presenting percentages.

Named Arrows

You may save a user designed custom arrow shape as a simple "named" arrow. This allows custom shapes to be easily reused.

Named custom shapes are accessed from the popup menu found near the top of the Custom tab on the Arrows palette. All named arrows are saved in one disk file in the EazyDraw's applications support folder (see chapter 02).

Choose a named arrow shape using a popup menu. The menu shows the name of the arrow and a small automatically generated icon hint of the shape. Select a shape and it is applied to the position (Start, Along, End, or Temp) as defined by the current in-place editing tab selection.

If a shape is edited and does not match an existing named shape, the Save menu selection is enabled. Select this item and a pull down panel will allow entry of a name for the shape. It is best to use a unique name for the shape, but not required.

If a custom named shape is not edited, or simply matches an existing named custom arrow shape, the "Remove" menu selection is enabled. Selecting the

Remove item will clear the shape from disk file. This action does NOT have Undo support and no warning check is provided, so use wisely.

The named custom shapes are saved in a disk file in the Applications Support folder of your home Library folder. So the path is "Tilde_for Home"->Library->Application Support->EazyDraw->Arrows.plist . The file is a human readable text file. It may be edited with any text editor or the Apple supplied pList editor. The history shapes managed by the Temp view are also found in this folder, their file name is ArrowsHistory.plist.

If a significant amount of time is spent designing custom arrows, the current set of named custom shapes should be backed up. It is wise to make copies right before and after a designing session.

Note for the advanced user: The default set of custom arrows is derived from an EazyDraw drawing that is included as a resource file in the EazyDraw application Bundle. As a reference for expert users or language translation engineers: the file is ArrowShapes.ezdrw.gz; the format is a simple set of group graphics that contain a Bezier path and Text Area graphic with the associated shape name. This avenue provides another way to custom design a set of arrows.
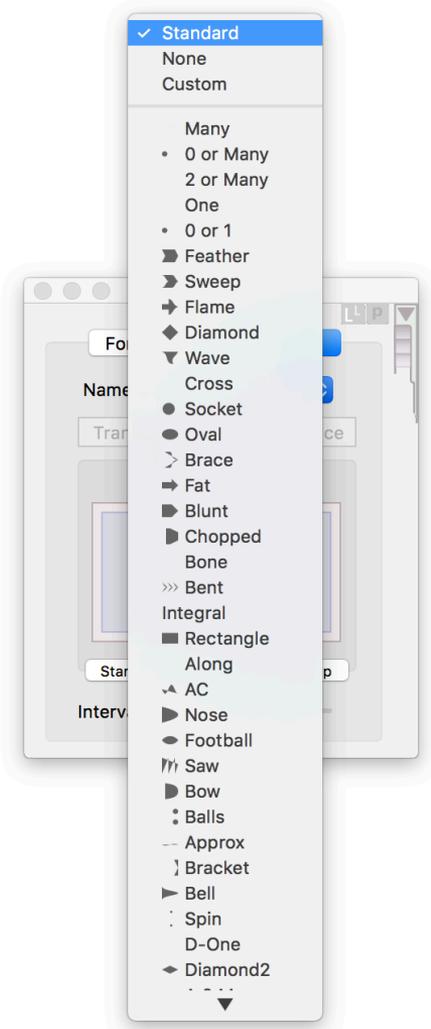
Brushes

The Brushes panel is used to design and apply custom Bezier paths along the outline (or stroke) of a master graphic's path. The common usage term for this techniques is a "brush."

This topic is a bit recursive, a Brush involves applying a Bezier path to a master Bezier path. The concept may appear confusing until you have made an initial study of the topic. If you have had training towards artistic vector drawing, then you will find this topic familiar.

If your usage of vector drawing is more towards technical, scientific, or general usage there are several interesting techniques available via brushes. Think of a brush as a repeating arrow or marker that is applied along master path.

EazyDraw extends the concept of brushes when using repeating cyclic waveforms as the brush path. This provides effects that may be interesting to both the artist and the general purpose or scientific user. For example, a brush can be used to apply a sine wave along a curving path.

Palette Summary

We divide the workflow for brushes into 3 processes. A brush path is first created and stored in the Brush scratch pad store. Next the brush path is applied to a graphic, or the master path.

Scratch Pad: A brush path is first created and stored in the Brush scratch pad store. The scratch pad is the lower section of the Inspect tab on the Brush palette. The actual brush path is designed on a standard EazyDraw drawing canvas. This provides the full capability of EazyDraw for the brush path design activity.

Apply and Inspect: Next the brush path is married to the master path. This activity is managed in the top area of the Inspect tab on the brushes palette. This similar to other graphic augmentations (such as dashes or arrows). The target graphic is selected, a brush path from the scratch pad is applied and associated parameters are set.

Use: The final aspect of the work flow is the actual usage of a brush. It is important that this activity be as efficient as possible. Brushes are often needed for artistic drawing. The creative process must be fluid and unbroken by tedious menus and extra key clicks.

After a complete brush (brush path, method, and associated parameters) is designed it is sent to the Use table. The Use tab of the brush palette presents this "use" table. A full set brushes is available for single click selection.

The Use table is similar to a User library but the focus is on usage not archival. This table will be more dynamic a brushes library, it will often change with each project.

Concepts

The illustration below will help establish the concept of a Brush and clarify the nomenclature. At the top there are two normal EazyDraw graphics, a nearly circular oval and a line. These two elements will interact as we define and use a brush. Two methods are shown, Artistic and Interval. These will demonstrate the two major brush concepts provided with EazyDraw.

The illustration next shows two possible results. The extended oval is an Artistic brush, the Artistic Brush method is used. In this case the vertical shape of the oval is held constant and the horizontal dimension of the oval is extended along the length of the line.

Just below the extended oval brush stroke is the same Master Path (the line) and the same Brush Path (the nearly circular oval) but the brush method is Interval. With this method the Brush Path is repeated along the Master Path.

The concept of brushes then extends to a path that is not a line, but is curved. For the Interval brush the Brush Paths are simply placed along the curved path. But for the Artistic brush the Brush Path is distorted, the vertical shape of the path applies perpendicular to the path, the horizontal component is extrapolated or stretched along (parallel to) the master path.

Brush Path
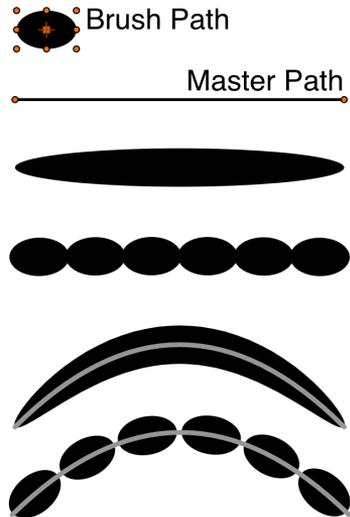
Master Path

The simple examples do not exhibit the trait of direction. But attribute of direction is firmly carried with the Brush path. The brush direction component is horizontal from left to right. As the line or curved master path is rotated the "start" and "end" determine the applied direction which corresponds with the "left" to "right" direction of the original drawn path.

Brush Design Work Flow: As you study this brush design and usage process it will be helpful to organize your thoughts along a work flow path. The illustration on the page to the right provides an generic overview of the workflow usedThe process begins with a brush design, on a drawing window. Next the process flows to the bottom area of the Inspect tab (on the Brushes palette), this is the scratch pad. The flow then moves upward to the design area at the top of the Brushes palette. Finally a complete brush moves conceptually to the right to the Use table. Conceptual summary: over-up-over, as simple as that.

Scratch Pad

The lower section on the Brush palette's Inspect tab is a scratch pad for managing Brush Paths. A brush path is designed and drawing on a normal EazyDraw drawing, using all of EazyDraw's drawing tools and capability.

The completed Brush Path is conceptually moved to the scratch pad where it is held until used in a Brush.

Reason for a scratch pad: Since a Brush Path Bezier is drawn and designed on an EazyDraw drawing. And a Brush is applied to a Bezier Path The inspector of a Brush will need to distinguish the target Master Path from the Brush Path that is a component of a Brush. Just as this paragraph is recursive and difficult to follow, actual concept is recursive and potentially confusing.

In fact if you work frequently with brushes you will inevitably apply a Brush Path to itself, which usually results in strange nearly comical effects.

The Scratch pad breaks the loop of requisition. First drawing, design and editing of the Brush Path is completed. The resulting graphic or Bezier path is selected on the drawing, then added to the scratch pad. Secondly: the master path is drawn, edited and designed on a (may be the same) drawing. Then the Master path is selected and the Brush Path residing on the scratch pad is available (think second selection) to use as a brush for the selected master path.

Brush Design Work Flow
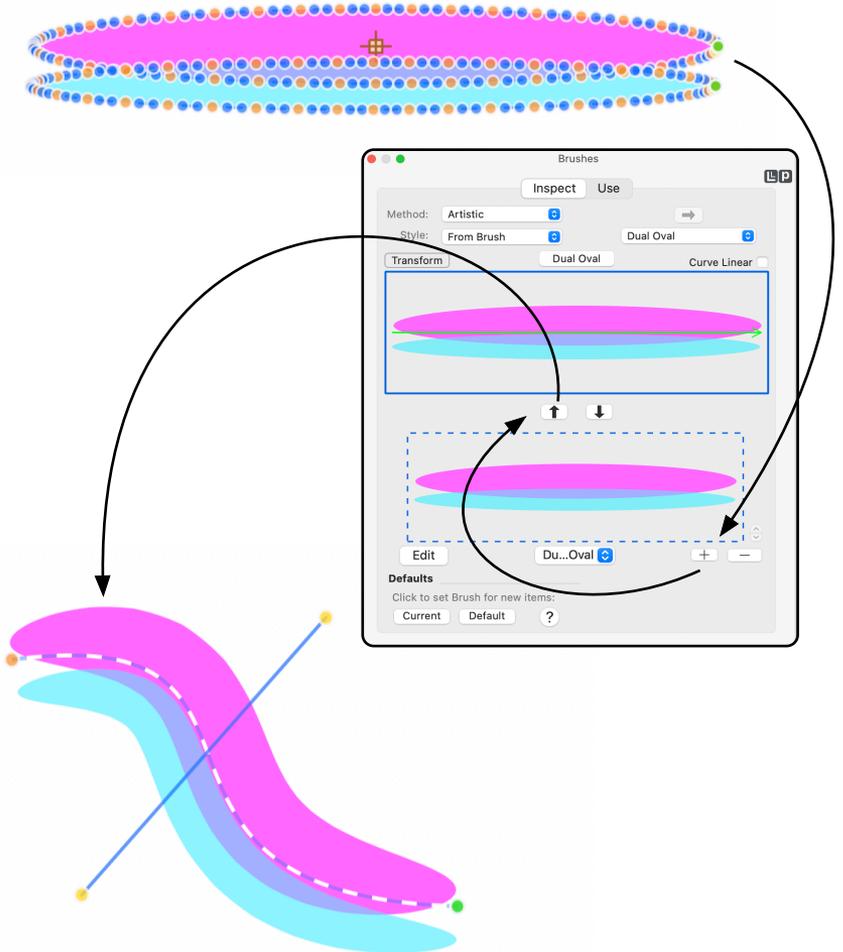
Adding a Bezier to the Scratch Pad: There are the expected normal methods for adding a Brush Path to the Scratch Pad. Drag and Drop from a drawing to the scratch pad inspection area. Drag and Drop may originate from a drawing or from a User Library. The "plus" button at the bottom right corner will add selected Bezier paths (from the main drawing window) to the scratch pad.

A Brush Path may be comprised of multiple individual Bezier paths. If more than one Bezier is selected on the drawing, all are added to the scratch pad, as one Brush Path. It is common that a Brush Path is built from several individual Bezier paths, think of the a brush that will have a fuzzy or "hair" like appearance.

The source on the drawing does not need to be a "raw" Bezier path. Any graphic that has a Bezier path may define a component of the Brush Path. The Bezier Path is extracted and added to the Scratch Pad as a Bezier path. This means that if a Brush Path is returned from the Scratch Pad to a drawing for editing, the higher level information (that the path was a Rectangle, or Up Arrow) is lost, only the Bezier path is introduced to the Scratch Pad table.

If a source Bezier graphic has an active Brush, the Master Bezier path is installed in the Scratch Pad table, not the Brush Path. To send the Brush Path to the Scratch Pad: select the Bezier Graphic, the Brush path is presented in the Inspection View (top area of the Brushes palette), then click the "downward" arrow button found a the center of the Brushes palette. This "sends" the Brush Path from the inspector (that of the selected Bezier graphic) to the Scratch pad.

Naming Brush Path: The Scratch Pad may contain several Brush Paths. Only one is selected and visible in the Scratch pad display. The popup menu lower center shows a name for each Brush path. The popup menu has a selection to change the name for the selected Brush Path.

A new Brush Path is given a name when added to the Scratch Pad. This is the name associated with the graphic, as inspected on the Easy Look panel (near top of Format main menu). If the graphic does not have a name, EazyDraw creates one derived from the graphic shape.

If a Brush path is edited (moved back to the drawing) then added back to the Scratch Pad, the originating Brush Path name is conserved. When the path is sent back to the drawing, the name is carried along with the shape information.

Editing Brush Path: If changes are needed for a Scratch Pad path, the path is sent back to an EazyDraw drawing. The Edit button will place a copy of the Scratch Pad's selected Brush needed the current main drawing window. Drag and Drop, from the Scratch Pad to the drawing is another method. Drag and Drop will also work from the Scratch Pad to a User Library.

Brush Path Table: The Scratch Pad has storage for multiple Brush Paths. Use the popup menu (the "Naming" popup) to select a specific Brush Path by name.

The Stepper control, found to the right of the Brush Path view, is used to step though each Brush Path.

Archival Note: The Scratch Pad is not intended for use as a primary permanent archive of Brush Paths. The implementation here is for temporary use. The Brush Paths are stored (at the time of this writing) in your system Library folder in the Applications Support folder assigned to EazyDraw. This means the paths will not necessarily automatically move to a new system or across a major upgrade.

Archive Brush Paths in an EazyDraw drawing or User Library. These will be public visible files on your system with normal backup support by Time Machine or other persistent archive activities.

Brush Path Color and Style

Brush designs will use various color and style (or fill and outline) configurations. For example a brush that emulates a paint brush stroke will have a filled-no outline configuration with a solid color and perhaps transparency. But a brush that is an artistic border, perhaps a scroll appearance, will have outline - no fill configuration.

The second implication for Color and Style relates to which component, the Brush Path or the Master Path, defines the Color and Style configuration for the final Brush graphic. Conceptually either component may be the defining component. EazyDraw supports both approaches.

The Color and Style settings for the Brush Path are set on the originating EazyDraw drawing, before introduction to the Scratch Pad. The Brush Path information, held in the Scratch Pad table, carries the originating Color and Style settings.

For this discussion Color and Style is a precise concept, It is all of the parameters found on the Color and Style palette. Including the use of Fill and Outline, Bezier end and join settings, color, color space, and opacity.

Multiple Brush Paths: Many brush forms will require several individual Brush Paths. All required Brush Paths are added to the Scratch Pad as a bundle or multiple Bezier Graphics. Each individual brush path component may carry a unique set of Color and Style parameters. They are recored and assigned to the individual paths at the point of introduction to the Scratch Pad.

This means that a complex Brush Path comprised of multiple individual Bezier graphics may have multiple fill colors and appearance settings.

Opacity: Individual assignment of Color and Style settings implies that individual Bezier paths of a complex Brush Path may have different settings for Opacity (Opacity is defined with the Color, on the system Color Picker). This allows interesting transparency effects especially if there is overlap of multiple individual Bezier paths. This should be conceptually clear now for the case where Color and Style is defined with the Brush Path, rather than the Master Path.

Opacity has different treatment than other Color and Style parameters when Color and Style is defined by the Master Path. Opacity of individual Bezier paths carries though and is applied to the color setting defined by the Master Path. This seems a complex definition logic, but in actual use it is natural and much the expected behavior.

The Opacity treatment means that transparencies may be applied at the Brush Path design stage. These then are used and applied to a color defined at the later usage stage. This allows color change and set when the brush is used, yet it is applied with transparency built into the the Brush Path design.

This capability is applicable when a complex, multi-Bezier path Brush Stroke has varying opacities for individual Bezier path components.

Brush Inspector

The top section of the Brush palette is where the primary brush design and inspection takes place. Here you may initiate a Brush by assigning a Brush Path from the Scratch Pad. Or you may inspect a Brush that is associated with one or more graphics on a drawing.

The Brush inspector offeres varying parameters according to the assigned Brush Method. The different methods have differing specification requirements. For example the Sequence method has a defined interval, but interval is not a parameter for the Stretch Between. As you study the next few sections keep in mind that the specific parameters visible in this area of the Brushes palette will vary.

The inspection activity for the Brush palette is the same as found on other palettes such as Arrows, Color and Style or Dashes. The inspector shows the state a graphic selected on the drawing. Changes apply to the target graphic. If no graphic is selected then changes apply to the temporary default Brush (the one that applies when creating a new graphic). If multiple graphics are selected, changes apply to the Brush attribute of all selected graphics.

If you are new to EazyDraw or computer drawing and the previous paragraph was not "clear" then it might be better to "cut your teeth" on Dashes or Arrows, these are simpler and it will be easier to get a feel for the concepts of defaults and inspection. It can be frustrating if you play around here a bit and then find that everything you draw has elaborate brush effects.

Note on Use Table: The Use Table is a convenience extension of the general concept of defaults for EazyDraw parameter palettes. It is nearly as efficient to use temporary default, Current Button, Default Button, and Copy -> Paste Special Brushes as it is to employ the Use table. There is also the named brush popup menu (near the top, on the right of the Brushes palette). Each user and project will likely lead to a different combination of these approches for a fluid creative work flow.

How to turn Off a Brush: This is often a specifically needed bit of information: To remove a brush from a graphic, select the graphic(s) on the drawing then use the Method popup menu (found top left) - select None for the method. This will return the graphic to a normal non-brush-stroke state.

If everything you draw has an unintended and undesired Brush: deselect all graphics, use the Method popup menu to choose None for Brush. The key here is that no graphics are selected on the drawing.

Brush Design

The two arrow buttons, seen in the middle of the palette, are used to transfer the Brush Stroke Path between the active Brush and the scratch pad. The design of a brush begins by bringing (the upward arrow button) a Brush Stroke Path "up" to become the active Brush. An initial guess for the brush method is applied based on recent activity and the shape and configuration of the Brush Stroke Path - this is only an initial convenience guess and will likely need manual selection using the Brush Method popup menu.

The key parameter for Brush design is the Brush Method. This is selected with the top popup menu. The presented parameters and appearance of the Brush Inspector View changes significantly after the Method is selected. Changes, such as Method, are applied directly to selected graphics on the EazyDraw drawing. Only a portion of your design inspection will focus on this palette and the Brush Design View. The final appearance of the brush design is seen on the EazyDraw drawing and target graphic.

The central brush viewing area is called the Brush Design View. This will display the specific Brush Stroke Path and associated design parameters specific to the selected Brush Method. This display may or may not actually represent the appearance of the brush in use, a typical target graphic on an EazyDraw drawing should be used for the actual design appearance of the brush.

The arrow button near the top right is used to send a completed brush design to the brush Use table. Click the button to place the full brush design (Brush Stroke Path, Brush Method, all associated parameters) to holding slot in the brush Use container. The brush, identified by the assigned name, is then available for quick convenient use from the Use table. A detailed discussion of the Use table follows.

The Style popup menu manges the origin of Color and Style information for the brush. Two choices, From Brush and From Path. From Brush: in this case Color and Style settings for the Brush were defined at the time of the original design of the Brush Path, before introduction to the Scratch Pad. From Path: in this case Color and Style are "dynamic" they may be set and inspected with the Color and Style palette, the values are those associated with the graphic (the master path) and not the settings assigned to the actual brush.

The Color and Style settings used in the inspection view reflect the Style popup selection

Brush Naming: It is a good idea to assign a name to a brush, this will generally prove useful while drawing. The Brush name is found just above the brush viewing area, at the center of the palette. The name of the brush may be different than the name of the Brush Path, often one Brush Path may be used for several Brushes.

The name entered and inspected in the text box carries with the brush if it is placed in the Use table. The name may or may not be seen on the popup menu of brushes in the Use table. This is the popup menu just above and to the right of the brush name text box. This popup menu has names of brushes present in the Use table. If the inspecting brush does not match a brush in the use table, dashes are displayed as the popup selection

If the inspecting brush matches a brush in the Use table, the name of the matching brush is shown in the popup menu. This simply indicates a match of all settings for the brush (except perhaps the name). The assigned name for the actual brush under inspection may be different. This assigned name is associated with the target Brush in use on the Drawing, hence it is logically unique from a name assigned to a brush in the Use table.

If a graphic with a brush is duplicated, copied or interchanged with a User Library, the assigned name is carried with all other relevant Brush parameters.

To further clarify, the name of a Graphic, that uses a Brush, will be unique from the Brush name. The name of the Graphic is seen on the EazyLook table or perhaps as a User Library assigned name.

Brushes and Brush Paths are assigned automatic initial names. The assignment is based on the best information available, if none is present the name of the originating Brush Path shape is used with a sequential numbering suffix.

A drawing may naturally have several graphics with the same Brush name, but the Scratch pad table and User table both require unique names.

Factory Brushes: EazyDraw ships with a small set of stock Factory brushes. These are intended to show the use of various parameters for the different brush methods. This set will initially populate the Use table and associated popup menu.

If these are removed or partially deleted the factory set is regenerated with the selection found a the bottom of the popup menu. The "Factory" selection will not show if all Factory brushes are present in the Use table.
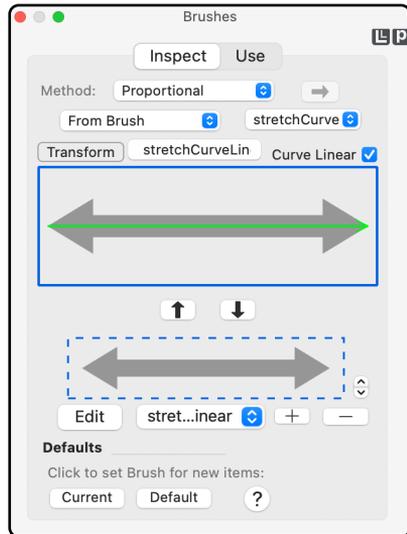
The Factory Brushes are intended primarily as a teaching aid, not as a design library. Check the Additions Pack or other resources libraries of pre-designed brushes to use for sketching or illustrations.

Brush Transform & Sequence Transform

Brush Stroke Paths may be morphed with two independent transforms, a primary transform and the sequence transform. The primary transform applies directly the Brush Stroke Path, changing the size, shape, and orientation before the path is applied to the master path. The sequence transform applies to some repeating brush methods, in these cases the modifications (generally a smaller change) are applied successively to each of the repeating paths.

The transformed shape is not reflected in an inspection view, the preview on the panel shows the original starting shape. The transformed shape is viewed interactively on the main EazyDraw drawing. Generally the target master path with the applied brush is used to view and design the proper settings for the transform parameters.

The generic transform panel is accessed from the Transform or Sequence buttons on the Brush design tab of the Brush palette. This panel is used for Arrows and other morphing actions in EazyDraw, parameters are generally similar. The Transform and Sequence buttons are shown when a Brush Method that uses the transform is selected.

Offset: Offset is a value that will shift the Brush Stroke path along the master path.

Away: Away is a value that will shift Brush Stroke Path away from the master path, perpendicular to the direction of the "Offset" shift.

Rotate: Rotate is a value that will spin the Brush Stroke path around the geometric center of the Brush Stroke Path.

Scale: Scale is a uniform sizing parameter that will adjust the overall size of the Brush Stroke Path.

Distort: The four Distortion parameters, Across, Pitch, Tilt, and Down are the "raw" Affine transform matrix. You don't need a math degree to use them, experimentation is the best method. In general, but not precisely, their control aspects are as follows: Across controls width scaling which is the "along" the master path but after rotation. Down controls height scaling which is the "away" direction but after rotation. Pitch and Tilt used together provide rotation, if they are equal in magnitude this will be a simple rotation. Shear is accomplished with Pitch and Tilt - when they have non-matching values. Pitch and Tilt are specified as angles, Across and Down are specified in scaling percentages.

Cancel: The Cancel button will close the Transform panel, clear the current transform configuration and restore the transform configuration that was present when the panel was called. The panel does not support Undo, use Cancel to exit without changes.

Done: Click Done to close the Transform panel, and permanently apply the transform in the current configuration.

Flip: The Flip button will "flip" the brush shape along the direction of the master path.

Clear: Clear returns the current transform to the "no-action" state, or unity transform. This has no offset, translation, rotation or shear.

Sequence - Transform

There is a Sequence Brush, and Sequence Transform. A Sequence Brush employs a Sequence Transform, and the Sequence Transform may be used by other Brush Methods. The discussion here relates to the Sequence Transform.

The Sequence Transform uses the generic transform panel as described in the previous section. The unique aspect is that the Sequence Transform applies as a compositing delta transform along a progression of Brush Strokes. Normally the Sequence Transform will apply small incremental changes that build (add) with each use of a Brush Stroke along a Master path.

The classic example of a Sequence transform might be a graphic sequence that diminishes in size fading to a point. Another is a "rolling" effect, that causes a shape with a direction (think "arrow") to spin or roll orthogonal to the direction of a master path. See the illustration below for an example and corresponding (typical) Sequence transform values.

Brush Use Table

The Use table provides a preview container for a set of previously designed Brushes. This table is designed for convenient, quick, simple, single click, selection of Brushes while drawing. Similar to a tool palette, one click on the Use button and the desired brush is set for use on the next drawing action.

The focus here is not editing or designing brushes. Brushes should be designed, debugged and tweaked using the Inspect tab before loading in this table.

The quickest way to edit a brush in this table is to Apply it to a graphic on a drawing then switch to the Inspect tab, leaving the graphic selected.

Description: The table provides a preview display of each Brush. The user assigned name for the Brush is shown top left of the preview display. The Brush Method is shown top right of the display. These will be important because the preview of a Brush may not always provide a definitive look that will represent the Brush appearance when applied to a graphic on a drawing.

The Use and Apply buttons are the focal point of the Use table. If you click the Use button, that assigns the associated Brush as current default.

There may be only one Brush active as *the* Use Brush at a given time. Any new graphic is drawn with *the* Use Brush. Click the Use button again to remove the Brush as default and return to normal non-brush graphic creation. When a Use Brush is active, the rest of the table is shown faded to gray, and the Use button is highlighted.
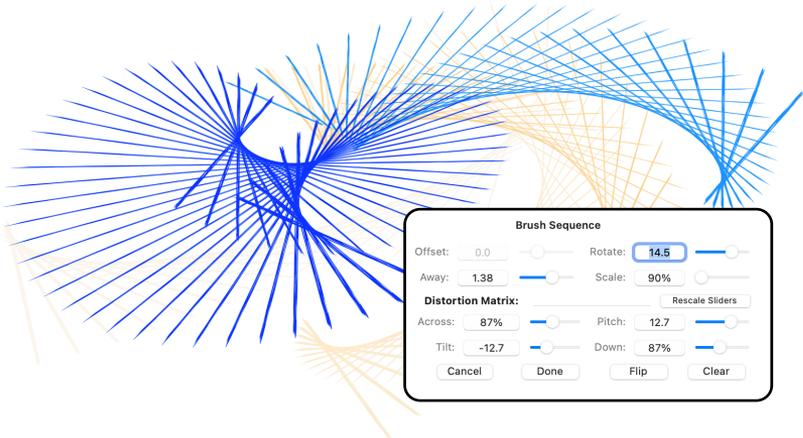
If a graphic(s) is already drawn and it is desired to add or change the associated Brush, this is done with the Apply button. A single click and the brush is assigned to the target graphics.

The Brushes palette is fully resizable. Don't forget that you may adjust the size as needed. Arrange the palette and your desk top for fluid efficient access to the Brushes that are in use. And remember that the table supports drag and drop re-arrangement.

Add Brush: As described above, Brushes are added to this table with the "right arrow" button found top right on the Brushes Inspect tab, of the Brushes palette.
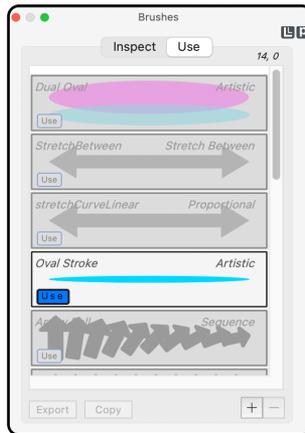
The Use table fully supports drag and drop, this is another way to add a brush to the table. A graphic with a Brush may be dragged from a drawing to the Use Table, the actual Brush will "drop" onto the table, not the full graphic.

Dragging from the Use table sends the simple Brush Path, not the full brush. This relates to dragging from the Use table to a User Library or a Drawing. If the full Brush is needed (not just the Brush Path Bezier) use the Lʟ button for the Brush palette.

As with other EazyDraw parameter palettes, the Lʟ button (top right corner of the palette) represents the attribute of the palette, in this case the Brush. Dragging from the Lʟ button to a User Library adds the attribute, current Brush (the complete Brush not just the Brush Path), to the User Library. The resulting Library Element is then a representation of the attribute set (in this case the Brush). Application of the resulting Library Element from the User Library to a target graphic on a drawing applies the corresponding attribute.

Selecting Use Table Brush(es): The Use table follows macOS conventions for a table list of elements. Click on Brush to select the Brush. If there is a Brush selected, shift click on another to select the additional Brush and all Brushes between. Cmd-Shift-click to add (or remove) a single selection.

Some users don't always recall the techniques for multiple selection and deselection of a table. In this table a selected brush has a small "x" at the lower right (of the Brush display). Click this "x" to deselect an individual Brush.

Selected Brushes in the table have a bold red border. Notice that a "selected" Brush does not have any relationship to a brush that is in use. Selected brushes only relate to management of the table or list of Use Brushes. For example, to delete several from the table with a single click, or to re-arrange their position.

The number of Brushes in the table and the number of selected Brushes is shown at the top right of the panel as a pair of comma separated integers. This can be an important visual clue if the table has numerous entries and some selections are out of view.

The Minus button at the lower right of the panel is used to remove the set of selected Brushes. Keep an eye on the top right of the palette, the second number of the pair shown there will indicate how many Brushes are selected for delete.

Color and Style: If the Brush Style setting (for the Color and Style parameters) is From Brush, then the Use table will show the brush's color. If the Brush Style setting is From Path, then a dark gray color is used on the Use table.

The choice for Fill or Outline only for the display on the Use table is derived from the Color and Style parameters (regardless of the Brush Style setting) applied to the Brush Path at the first design step. This arrangement allows user control for the appearance on the Use table, but the settings need to be considered at that first design step.

For example a Sine wave brush would start out as Outline only (no Fill), but the solid curvy arrow would be set to have Fill before sending the path to the Brush Scratch Pad. This seems complicated, but natural usage and drawing techniques should lead to the proper results with little thought.

Archival: This table is intended to be dynamic and configured for specific drawing projects. It is not intended as a permanent persistent archive for valuable brush designs. Use a User Library or Export your brushes to a persistent file on the hard drive so that backup regimens and Time Machine will have backup copies in case they are needed.

Paths in the Use list are saved when EazyDraw quits and restarts. The paths are saved in a property list text file in the Application Support folder assigned to

EazyDraw by macOS. This information will not normally move from system to system or to future installations of EazyDraw. Use Export capability found at the bottom of the Use Tab table to generate a persistent archive for important tables of brushes

Export Import: The Export button presents a standard Save panel, select a location on your system or iCloud. Selected Brushes are written to a text file formatted as an XML Property List.

The Plus button (lower right) is used to load or import Brushes that were saved with the Export button.

The Export and Plus actions are the appropriate method for exchanging Brushes with other users or distribution.

Brush Methods

Several Brush Methods are provided. The Brush Method is selected with the popup menu found top left of the Inspect tab on the Brushes palette. Each method will have a unique set of associated parameters. These are presented around and "on" the brush inspection view, the top portion of the Brush palette.

This manual will provide a brief description of each Brush Method. The Help pages will provide full detailed information for each method. The Help page for the method will be more complete. The descriptions here will attempt to be brief and non-repetitive. If a parameter is used by several methods, it will only be explained once with the first method encountered.

Artistic Brush: The Artistic Brush stretches and conforms the Brush Stroke Path to the master Bezier path. An Artistic brush stretches the Brush Bezier path the full length of the master path. This is a simple linear stretch with no thinning or thickening of the brush path.

The Curve Linear checkbox is found just above the top right corner of the brush inspection view. Curve Linear applies when the Brush path has straight (linear. non-curved) components and the master path is curved. Selecting Curve Linear will bend and curve the linear portions of the Brush Path. Notice the difference between the two double headed arrow's below. They both use the same Brush Path, the smoother of the two has Curve Linear applied.

EazyDraw brushes support multiple semi-independent Brush Paths. This is

especially useful with the Artistic brush method. The individual Brush Paths may have different opacity values assigned to their respective colors, and individual paths may have different colors. If the Brush Style is set to be derived from the Master path, the color specified for the Master path is applied to all the independent Brush Stroke paths, but each Brush Path uses the specific value for opacity.

Stretch Brush: The Stretch Brush method stretches and conforms the Brush Stroke Path to each segment of a Bezier Path. This is a linear stretch along the Master Path with no thinning or thickening of the Brush Path.

Curve Linear applies, see description above in the Artistic Brush section. Behavior is the same.

This brush method provides repetition of the Brush Path. The repeating elements need not have the same length. The length of each repeat is determined by placement of Bezier vertices as the master path is drawn or according to a graphic's geometry. For example, a rectangle will have 4 repeats of the Brush Path.

Stretch Between Brush: The Stretch Between Brush stretches and conforms the Brush Stroke Path to each segment of a Bezier Path, both ends of the Brush Stroke path are applied at drawn size. A central portion of the path stretches with the length of the master path. The central portion stretch connects the two fixed size ends. The Stretch Between brush is selected with the Method popup menu found at the top of the palette.

A Stretch Between brush employs a 3 part stretch of the Brush Path. A user defined middle portion providing the length adjustment to match the drawn length of the Master Path.
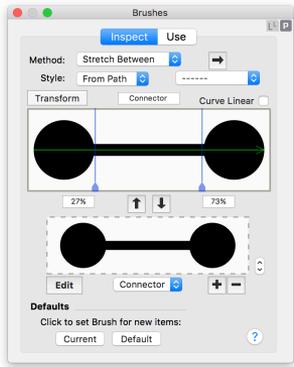
The design view of the brush has two blue indicators. These indicators are interactively adjustable. Click and drag handles at the bottom of the view to adjust their position. These indicators delineate the three portions of the Brush Path.

The stretch portion is inspected numerically with the values seen just below the design view of the brush. Numeric entry is supported. The values are defined as a percentage of the Brush Path's length.

This method is normally used with the Path, Bezier, or Continuous Bezier tools. These Bezier paths have user defined vertices. This is not appropriate for the Pencil or Brush tools because which automatically add vertices needed.
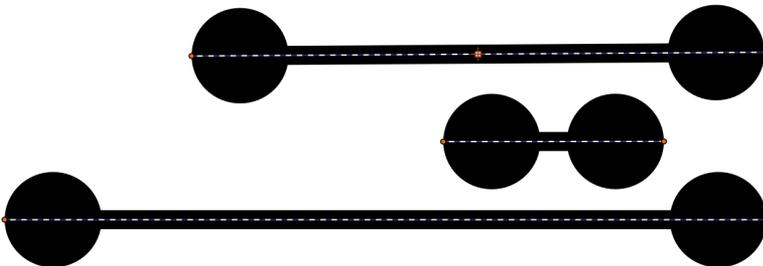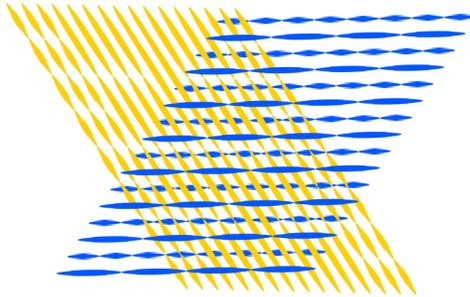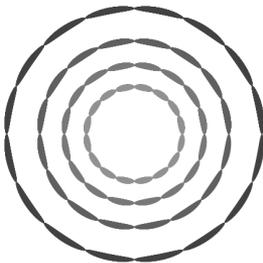
Stretch Proportional Brush: This method is the same as Stretch Between except the Brush Path does not repeat for each Bezier segment. The Brush Path applied for the full length of the Master Path, without regard to Bezier vertices.

Parameters are the same, see the immediately previous description.

Interval Brush: The Interval Brush Method repeats the Brush Path at a user defined interval along the Master Path.

The Interval Brush Method repeats the Brush Stroke Path at a user defined interval. The value for the user defined interval is found just below on the left of the brush design inspection view. The value is physical length, the units are the Fine Scale Units for the palette.

There is control for the starting phase, or initial portion of an the interval. This has both numeric and interactive input. the brownish control handle near the left edge of the design view provides interactive control for the phase. The phase is available numerically for inspection and input just to the right of the interval numeric value. The phase value is defined as a percentage of the full interval.

Both Transform and Sequence Transform apply for this brush method. This was explained above, refer to that information.

Sequence and repeat brushes are not stretched, their size is the size "as drawn." The drawn size relates to the originating size when the Brush Stroke Path was designed and first drawn on an EazyDraw drawing, before introduction to the Brush Scratch pad. A brush may be resized rather quickly: select the brush, click the "down" arrow to send the Brush Stroke Path to the scratch area, click the "Edit" button and the brush path will appear on the drawing. Perform the size or other editing changes and repeat. It seems a large "logical" step to edit a brush stroke, but it really is only two mouse clicks to edit and two more to send it back as a brush.

Sequence Brush: The Sequence Brush Method repeats the Brush Stroke Path a defined number of times along the full length of the master path. The Sequence Brush Method repeats the Brush Stroke Path a defined number of evenly spaced times along the master path.

The count of repeats is found just below and on the right of the brush design inspection view. The value is an integer, fractions are truncated to the floor integer value.

As explained above: The term sequence on the Sequence Transform button (above the inspection view on the right) has a slightly different meaning than the sequence term for the name of the brush method. A sequence transform applies to other repeating brush methods, not just to this particular Sequence Method.

Sequence and repeat brushes are not stretched, their size is the size "as drawn." The drawn size relates to the originating size when the Brush Stroke Path was designed and first drawn on an EazyDraw drawing, before introduction to the Brush Scratch pad.

A brush may be resized rather quickly: select the brush, click the "down" arrow to send the Brush Stroke Path to the scratch area, click the "Edit" button and the brush path will appear on the drawing. Perform the size or other editing changes and repeat. It seems a large "logical" step to edit a brush stroke, but it really is only two mouse clicks to edit and two more to send it back as a brush.

Repeat Sequence Brush: This Brush Method repeats the Brush Path a defined number of times at a specified interval along the master path. When the defined number of repetitious are complete, if there is length remaining on the master path, the sequence begins again. The repetitions continue along the full length of the master path.

The Repeat Sequence Brush Method has a specified interval and a specified count. The interval is just below the inspection view, on the left. The count is just below the inspection view, on the right. Since both an interval and a count are specified the sequence has a defined length (interval times the count). This length may be different than the length of the master path. If the master path is shorter, the first portion of the sequence appears on the master path. If the master path is longer than the sequence's defined length the sequence completes then begins again.
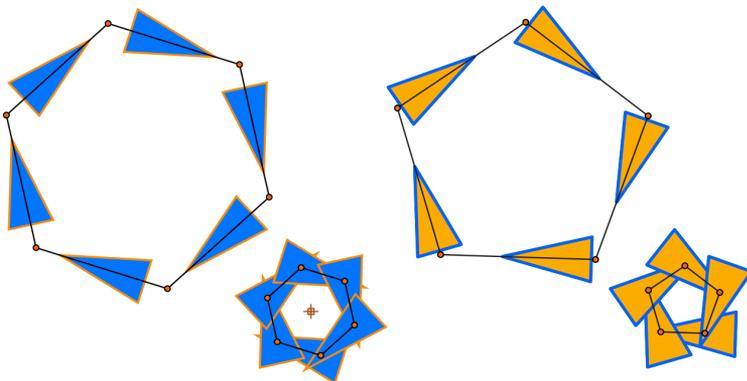
There is control for the starting phase, or initial portion of an the interval. This has both numeric and interactive input. the brownish control handle near the left edge of the design view provides interactive control for the phase. The phase is available numerically for inspection and input just to the right of the interval numeric value. The phase value is defined as a percentage of the basic interval (not the full length of the sequence).

Remember that the Brush Palette is resizable. If necessary increase the width of the panel to provide room for all of the interactive and numerical inspectors that relate to this method.

As you may see with the examples on the next page, this method works with a Sequence transform. A Sequence transform will step the size and / or orient or "roll" of the repeating brush along the master path. The Sequence transform (not to be confused with a Sequence Method) was described in detail a few pages back.

Reflect Sequence Brush: This Brush Method is the same as the Repeat Sequence method just described, except that the repeating sequence is applied in reverse. For example, if the Sequence Transform diminished the size of each repetition of the Brush Path, then the "next" sequence will begin that the finishing small size and increase in size with each repetition.

The parameters are the same as described above, refer to that description for documentation of this method.

Cycle Brush: The Cycle Brush Method repeats the Brush Path along the full length of the master path. Controls are provided to seamlessly match the end of the Brush Stroke Path with the start of the next in the sequence.

The Cycle Brush Method repeats a defined portion of the Brush Stroke Path along the full length of the master path. The sub-portion of the Brush Stroke Path is defined to
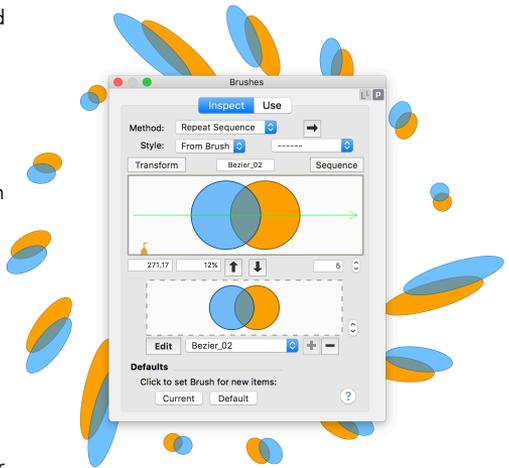
have matching end (start and finish) orthogonal (or "y") values. This matching property ensures continuity (no breaks) as the repetitions are drawn along the master path. In some cases the originating Brush Stroke Path will be designed to also have matching slope at the start and finish; support is provided for this second constraint.

There are two key controls for a Cycle Brush, they are the indicators along the bottom of the design preview area. They have a vertical line that extends up to the Brush Stroke Path. They control (and indicate) the limits (start and finish) for the Cycle brush (the sub-portion of the defining Brush Stroke Path). The left one is always the light blue, the right one is either blue or red. The left one is positioned independently, simply slide it along to the desired starting point for the repeating cycle. The right one traverses up to the y-value of the left indicator, then it extends to the left back to a

matching y-value on the Brush Stroke path, this becomes the end of the cycle as used in the brush.
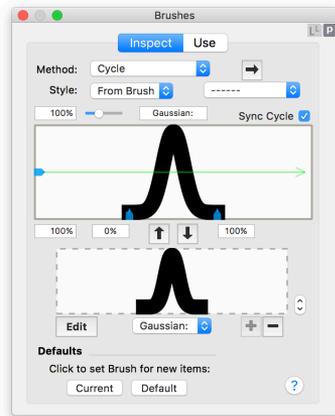
If the right indicator is blue that means the finishing in the same direction as the start, so the brush path on the master path will be smooth and continuous. If the indicator shows in red that means the finishing direction is not the same as the start, in this case the drawn path will be continuous but there will be a peak or break in slope between cycles.

The blue indicator on the left edge of the inspection preview adjusts the brush's amplitude. There is no support for a master transform for the Cycle Brush Method, but this adjuster provides a small range of amplitude adjustment for the brush. The numerical value for the amplitude factor is shown just above the preview, on the left.

Sync Cycle (checkbox above the preview, on the right) will adjust the scaling along the master path to cause an exact even integral number of cycles to exactly fit along the length of the master path. This is useful in many cases, especially if the master path closes on itself. For example a "flower-petal-circle" design needs the full cycles at the start and finish to match exactly for proper appearance.

The start and finish indicators have numerical inspection and input. The values are shown just below the design preview area, start on the left and finish on the right. The values are defined as percentage of the straight line length of the Brush Stroke Path.

A Cycle brush will likely use a Brush Path that is itself a cyclical function. EazyDraw's Math tools palette has provides several well defined cyclical functions. These functions support multiple cycles, but in their natural form the cyclical curve is traced along a straight "x" axis. A Cycle brush with a cyclical Brush Stroke Path allows the curve to trace along a curved or otherwise more complex master path.

Shadows

The Shadows Palette provides parameters for controlling the application of shadows to graphics and Text.

Drop: These are the basic shadow parameters; they provide full control for simple soft bitmap shadows. The vector and vector image shadow methods use these parameters and others on the other two tab views.

Effect: This tab provides parameters for controlling the design of vector and image shadows.

Distort: A morphing transform may be applied to vector shadows to add a perspective effect to the shadow.

Use the checkbox at the top to apply a shadow to a graphic or text. The popup menu to the right applies if a graphic has associated text - annotation or inserted text. In this case the popup is used to specify which shadow is the target of your parameter changes. Individual shadows may be applied to either the graphic and/ or its associated text.

Vector or Bitmap

There are 2 ways to construct the drop shadow: Vector or Bitmap. The desired construct is selected with the Method popup menu.
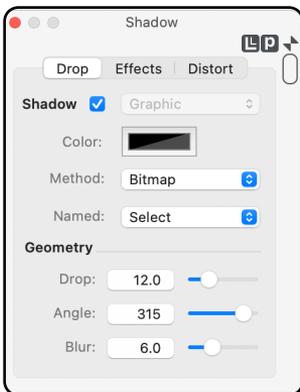
Bitmap: The simplest method is a Bitmap shadow. It is best for soft or fuzzy shadows. This method uses the macOS shadow technology. It is the same core coding that draws the soft shadows around windows and other objects in the Finder. Bitmap shadows cannot be distorted.

Vector: Vector shadows are constructed as a series of vector paths that follow the outline of the hosting graphic. An interior is filled and then a sequence of outline paths are drawn successively fainter (more transparency)

each growing slightly larger. This process is highly optimized to minimize performance issues. This technique is best when a crisp shadow edge is needed. Vector shadows may be distorted and scaled.

Drop

These parameters control the primary color and appearance of shadows. Shadow may be applied to graphics, text, contoured text and graphics with associated text.

The top checkbox will turn a shadow on or off. The shadow needs to be "On" to enable most parameters on this palette. You can also turn on a shadow by selecting a named shadow from the Name popup menu.

Method: The Method popup menu determines which technique is used to construct the shadow: Bitmap or Vector. Bitmap is the simplest technique. A bitmap shadow is controlled fully with the few parameters on the main "Drop" tab view of this palette. The color of the shadow is controlled by the top Color Well . If imaging is not being used, transparency may still be achieved by applying an Opacity to the color using the normal Color Picker controls. The Drop and Angle parameters control the position of the shadow relative to the primary graphic. The location, or drop, of the shadow is specified in polar coordinates by the Drop value (length) and Angle (direction).

Bitmap shadows look best on screen and work well for web sites. Vector shadows will print more predictably but are a bit harder to use for a soft blur look.

One possible draw back of Bitmap shadows (or conversely an advantage for the Vector shadow methods) is their use at different scales. The Bitmap shadow is actually only well defined for a zoom factor of 100%. When a document is zoomed, EazyDraw makes a rough adjustment to the Blur Radius to provide the proper approximate appearance of the shadow. However the exact shadow is only shown on screen at 100% zoom and when printing or exporting. If a drawing is designed for a broad range of uses such as posters and web

graphics, then one of the Vector techniques should be used. But when designing for one output medium, Bitmap shadows are easier and look better if a soft effect is desired. It is strongly advised to do a test print or export early in a design project to make sure the shadow settings are providing the desired appearance.

Shadows can be expensive with respect to CPU time. EazyDraw uses advanced caching and anticipatory algorithms to minimize CPU load. Normally you will not notice performance degradation. But if shadows are combined with other CPU intensive effects such as contoured text (i.e. a advanced shadow applied to contoured text)) you may notice increased redraw times. The Outline setting found on the Format main menu is used to globally turn off advanced effects such as Shadows. This mode speeds up the display and clarifies the display for more convenient design response.

The Blur parameter controls the "softness" of a bitmap shadow. This value is entered in Fine Scale units. A larger value will yield a softer or more blurred shadow. Blur only applies to the Bitmap shadow method.

Effects

This tab view provides parameters used with the Vector and Image shadow methods. None of these parameters apply to the simple Bitmap shadow method

For compositing effects such as highlighting the Image option is required, note the check box lower right. Without imaging the shadow will be a crisp copy of the parent graphic, it can still be shaped, distorted and softened.

Edge: The Edge parameter is used to soften, or blur a Vector shadow. A 100% setting will generate a crisp edge to the shadow. Lesser settings will generate a fade region on the outer edge of the shadow. The shadow color will fade to transparent across the fade-edge parameter dimension.

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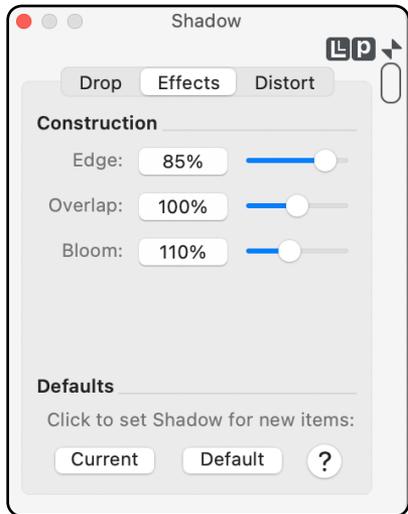
Overlap: Overlap controls the density of the shadow. In some cases applying a shadow to curved regions with sharp curvature gaps may appear in the generated shadow. Increasing the overlap can help reduce this affect. Light overlaps can be used to generate interesting lined effects.

Bloom: Bloom is used to enlarge (or shrink) the shadow. For example, a Bloom greater than 100% would be used, with a zero drop, to generate a glowing effect around a graphic.

Anti-Aliasing: The Anti-Aliasing check box can be used to turn off Anti-Aliasing when drawing the shadow. Anti-Aliasing is normally used by the macOS advanced Quartz rendering technology. It is key to the display of crisp high quality graphics. In some cases when drawing the closely nested family of curves required to generate the shadow effects it may be desirable to turn off Anti-Aliasing.

It requires more work to use the Vector compared to a simple bitmap shadow. However a Vector shadow will hold its appearance better over a wide range of scalings. In both cases it is wise to do a test print or Export and verify the appearance of the shadow as displayed or printed on the final output medium for your drawing. This should be done early in a design project to verify that all steps of the producing work flow faithfully reproduce the techniques used.
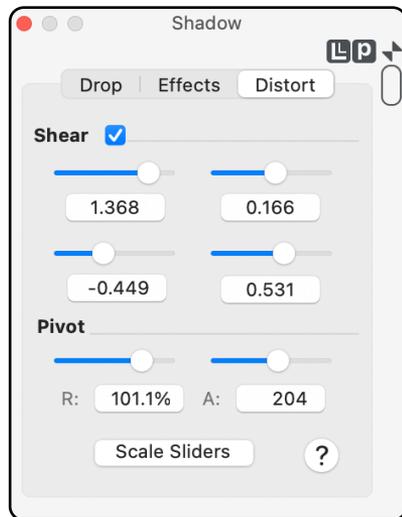
Distort

In addition to a simple drop, you may shear or distort the shadow with a full morph transform. The morphing transform is defined mathematically as an Affine transform. The checkbox at the top is used to enable the transform. The distortion transform only applies to the two Vector shadow methods: Vector and Image. Bitmap shadows may not be distorted.

The best way to learn the effects of the matrix is to apply a simple shadow to a rectangle. The unity matrix (or do-nothing) values are 1.0's on the diagonal and 0.0's on the cross diagonal. Experiment by varying each element in turn, with the others at their do-nothing settings.

The details of the transform are discussed above in the section on custom arrows. Review these writings for details concerning the use of the transform.

The Pivot values define a focal point for the transform in polar coordinates. These combine with the Drop location to define the actual pivot point for the resulting shadow.

The sliders are set to provide a reasonable range of adjustment. The Scale Sliders button recomputes the center points and ranges of the sliders, sort of a reset action when limits are met.

Cross Over

The Cross-Over Palette provides a method to indicate the state of two crossing lines or paths. The indicators are used to show schematically whether or not the crossing paths are physically connected.

Cross-Overs may be positioned manually, at a particular across (X) or down (Y) position or automatically at points where paths cross.

Automatically placed Cross-Over indication depends on the relative painting order of the path with the Cross-Over and the path
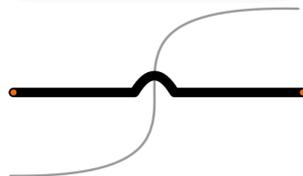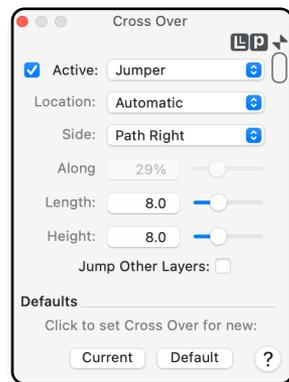
that is being crossed over. Before using the Automatic Cross-Over location option one should have a clear understanding of Painting Order discussed in chapter 06.

The Cross Over palette is accessed from the Tools main menu. A graphic is selected to set or inspect the Cross-Over attributes. Text and images are not capable of indicating Cross-Over State. Cross-Overs may be applied to curved or straight paths.

Placement

Choice: The top popup menu provides a choices for the indicator graphic used to mark a Cross Over. There are several choices, see the examples below and the names assigned. Notice that a Cross Over can also be used to indicate a connection in the sense of a schematic drawing.

Location: The Location popup menu is used to set the position of the Cross-Over. There are 3 manual methods and one automatic choice for this parameter. Percent: specifies the location as a percentage along the path. Across: places the location at a specific across or "X" on the drawing, in the units of the drawing. Down: places the location at a specific down or "Y" on the drawing, in the units of the drawing. Automatic: places a Cross-Over at each point where the path crosses over (above or to-the-front) another path. Multiple Cross-Overs are supported for each selection except Percent.

Side

Some Cross-Over shapes, such as Jumper or Bridge, involve specifying a direction. The Side popup menu is used to control this direction. There are 3 possibilities for the parameter.

Path Right: draws to the right hand side of the path as one travels from the start to the end of the path.

Path Left: draws to the left-hand side.

Alternate: applies to multiple cross over situations, successive Cross-Overs are drawn to opposite sides of the path, starting at Path-Right.

Method

Along: The Along parameter varies with choice of Location. For Percent the value is the percentage along the path for the placement of the single Cross-Over. For Across or Down, the value is absolute position on the drawing, this value is then specified in drawing units - not palette units as specified by the palette Fine Scale. For the Automatic Location setting, this parameter does not apply and is disabled.

Length: The Length parameter specifies the drawn size of the Cross-Over shape. The value applies to the length along the hosting line or path. The units are those of the palette (not the drawing) as specified by the palette Fine Scale.

Height: The Height parameter specifies the drawn size of the Cross-Over shape. The value applies to the dimension perpendicular the hosting line or path. The parameter does not apply to all Cross-Over shapes, for example the Dash shape would have no height. The units are those of the palette (not the drawing) as specified by the palette Fine Scale.
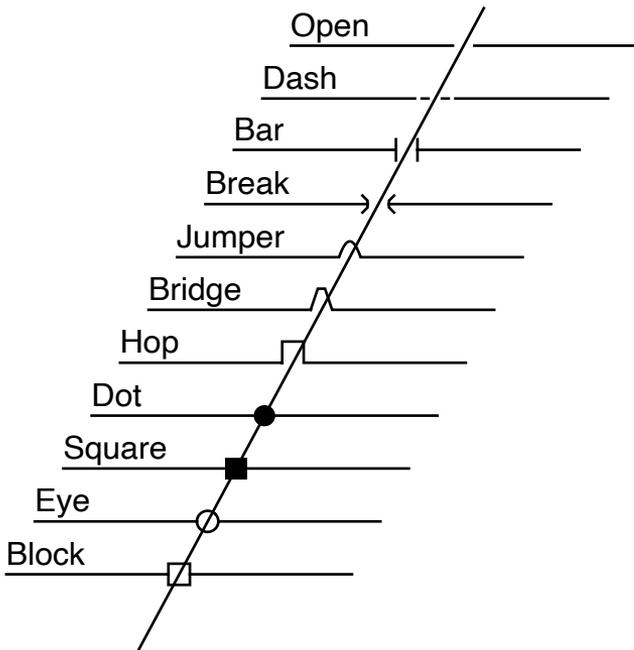
Jump

Jump Other Layers: The Jump Other Layers checkbox applies in the Automatic Location situation. If checked, paths on Layers below the host graphic's layer are included for placement of Cross-Over indicators. If not checked, only graphics on the same layer as the Cross-Over graphic are indicated.

This parameter only applies if the drawing has multiple layers and for Automatic placement of Cross-Over indicators. The Dot and Square Cross-Over shapes are usually used to schematically indicate a connection. This in contrast to the normal use for this property which is to indicate that crossing paths do NOT connect. These two do not have an "opening" property so Length does not apply, only height.

Automatic: All Cross Over selections, manual and automatic placement, may be applied to curves as well as straight paths. In these cases it is possible to have several Cross Overs for a single graphic. A curve crossing itself will not show a Cross Over indicator.

Automatic Cross Over placement will nearly always provide an indicator where needed and visually logical for the schematic situation. A cut of a path with multiple Cross Overs may change the computation logic and provide a means to attain the look needed.

Chapter

17

User Libraries

User Libraries

Libraries are disk files that contain graphics elements, property containers, or drawing tool references for use as specialized drawing tools.

Graphics: Graphics, sometimes called symbols, created with EazyDraw that will be reused many times are placed in a library for convenient access.

Property Containers: Property containers are parameter sets such as a specific gradient fill, dash pattern or arrow head shape; these may be added to a library.

Drawing Tool Reference: A drawing tool reference provides a mechanism to include a standard drawing tool in a library thereby allowing users to design custom tool palettes.

Creating: A library is created by executing the New Library command which is found at the top of the Libraries main menu.

Adding To: Graphics are added to a library with a simple drag and drop from an EazyDraw drawing. Property Containers are added by dragging the "Ll" icon from a parameter palette to a library. Or use the "+" button on the Library palette.

Replacing: Replace a library element by holding down the shift key while clicking the "+" button on the Library palette. The target library element should be selected on the Library palette; the new element selected on the Drawing. Warning: there is no Undo for this action.

Saving: Libraries are saved with the the normal save command found on the File main menu. All macOS options (Save, Save As, Duplicate, Rename, Move To) will work with user Libraries.

Library Window

A library palette has 3 forms of display presentation, Name, Element, and Button. These different manners of viewing a library are provided to assist in the management and use of the library elements. The libraries popup menu, found at the bottom of the library palette, is used to change the presentation form for the library palette.

Since Libraries are displayed as floating palettes, some of the commonly used menu commands such as Save, Save As, Copy, Paste, and Paste Special must be accessed specifically from the library palette's own popup menu. When these commands are executed from the main menu their actions are directed at the current drawing window. To direct one of these actions to a library palette the private menu for the palette is required.

Element Mode

In the Element mode a library's contents are shown as thumbnail images on the array of squares found on the top portion of the palette. The name of the selected library element is shown in the text box near the bottom of the palette. Scrollers are provided if necessary to view the complete contents in the screen area provided.

These images are used to select a library element, click on an element to select. Selected elements have a red frame in their element square. Multiple selections are possible, use the Shift key to extend a range of selections. The Apple-Command key is used to make multiple, non-contiguous, selections, hold down the CMD key to add another element to the selection. In the case of multiple selections, only the last (most recent) selection is shown in the name text box at the bottom of the palette. Multiple selections are useful when arranging or moving graphic elements between different libraries.

The name of a library element is changed by first selecting the element's image, then editing the text in the lower text box. Names of elements in a library must be unique. If a duplicate name is entered, EazyDraw will automatically make it unique by adding a counting number at the end of the name.

Use drag and drop to move elements to different locations in the library. First select an element square (or squares), then click and drag it to a new location to re-arrange the location of elements in the library.

Click - drag - drop may be used from element squares portion of the palette to an EazyDraw drawing. This action will add the library element(s) to the drawing. Drag and drop between libraries is also supported, this will add a copy of library

element to the destination library, the originating graphic always remains in the source library.

Drag and Drop works in both directions. A graphic from an EazyDraw drawing may be added to a library by dragging the graphic to the element squares area at the top of this palette. The specific drop position is honored and the new library element is inserted into the corresponding position in the library. The other way to add a graphic to a library is to use the "plus" button found near the bottom of this palette.

Selected Elements are removed from a library with the "minus" button found at the bottom of the palette. This action cannot be undone.

Image Quality: The display of library elements on this palette may be high resolution vector quality, or more likely a lower resolution bitmap rendition. This choice is made automatically by EazyDraw. The choice of library display method does not represent the format or inherent quality of the library element. A vector graphic library element is stored in the native vector format and added to a drawing as a full quality original vector graphic.

The use of a bitmap display for this palette is often required to properly convey the appearance of the original graphic. A large complex group graphic may not be recognizable as a size reduced line-art vector, but the original appearance is maintained when shown as an down-sampled and antialias bit map representation. This is true for large size line art group graphics and for any text.

Name Mode

In the Name Mode the library's complete contents are shown by name on the list found on the lower portion of the palette. A small thumbnail display of a single selected library element is shown in the graphic area found at the top of the palette. These two display areas may be adjusted by clicking and dragging the split bar found between the two. Use this split view adjuster to resize.

The name list is used to select a library element, click on a name to select an element. The selected element is displayed in the graphic area at the top of the palette. Multiple selections are possible, use the Shift key to extend a range of selections. The Apple-Command key is used to make multiple, non-contiguous, selections, hold down the CMD key to add another element to the selection. In the case of multiple selections, only the last (most recent) selection is shown in the graphic view. Multiple selections are useful when arranging or moving graphic elements between different libraries. CMD-click a selected element to remove it

from the selection list.Use drag and drop to move elements to different locations in the name list. First select a name, then click and drag it to a new location to re-arrange.

Click - drag - and drop may be used from this palette to an EazyDraw drawing. This action will add the library element(s) to the drawing. Both the lower name list and upper graphic display may be used to originate a drag and drop to an EazyDraw drawing. Drag and drop between libraries is also supported, this will add a copy of library element to the destination library, the originating graphic always remains in the source library.

Add Custom Icon: The small button seen in the lower right of the graphic display area is used to provide a specific icon graphic for the library element in the Button presentation mode. The icon may be completely different than the actual graphic element. You provide a different icon graphic by first drawing the icon using EazyDraw, then drag and drop the icon graphic on this button. If there is no independent icon for a library element, the button on this view remains blank. This component of a library element is only used in the Button (or tool palette) presentation mode of the Library. If there is no independent icon for a library element, EazyDraw automatically creates an icon for use in the Button presentation mode. The automatic icon is derived directly from the graphic, resized and adjusted to display pleasantly as a small bitmap icon.

A graphic from the web, a photo, or another graphic application may be used as a custom button icon. It is not possible to drag and drop the graphic directly on this library palette, as it is a floating palette and will disappear when another application is selected. To use an external graphic element, first drag it to an EazyDraw drawing window, then click on the EazyDraw drawing window to activate the floating palette, then drag the graphic from the Eazydraw drawing to the library palette user icon button.
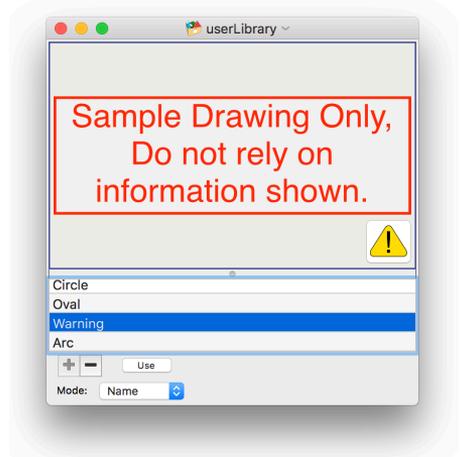
Button Mode

In the Button Mode the library window turns into a standard EazyDraw tool palette. The symbols that you designed and installed in the library are available to use in the normal click and drag out the size method, just like the Bounding Rectangle Graphics described in chapter 08.

Exiting Button Mode: This mode is entered using the Mode popup button found a the bottom of the library window. This mode is exited in a unique way, since a tool panel would have no place for the more flexible popup menu.

The lower right button of the palette is "return to library mode" button, depicted as the letter L for library with a return icon. Click this button to return to either the Name or Element presentation mode for design, configuration and management of the library's content.
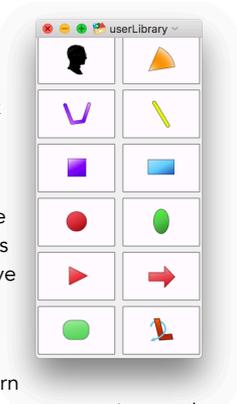
Using Library Buttons (Graphics): The buttons provided behave in a manner similar to the normal EazyDraw tool palettes. Click a button to make that graphic the current creation graphic for the current front EazyDraw drawing window. Then use the mouse to move the cursor over the drawing window, the cursor changes to the rectangular creation cursor. Then click and drag on the drawing window at the desired target location for the new graphic. The library graphic element associated with the tool button is created on the target drawing. It is drawn enclosed by the rectangle specified by the drag motion. You may move in any direction, the rectangle's content will flip or mirror to follow your motion. The process is completed when the mouse button is released.

The buttons are by default one-shot in nature. After one graphic is created the selected button is cleared and the main arrow tool cursor is re-activated. A double click of a button will override this behavior. After a double click the target button remains active, in this way you may create several copies of the same library element. This "sticky" mode must be overtly cleared by clicking another EazyDraw tool, typically by clicking the default Arrow tool.

Using Library Buttons (Properties): Some library elements may not represent actual graphics, they may be containers of parameter settings. In this case the button icon is shown with a light yellow backdrop and bluish dashed inner border. These buttons have a different behavior. First at least one graphic on the

EazyDraw drawing window needs to be selected. When a graphic is selected, the library element's represented parameter settings are applied to the target graphic by a single click of the button.

Customize Tool Palette

Use drag and drop to move elements to different locations in the library. Simply click and drag a button to the desired location.

This tool palette is resizable; use the small lined triangle area, bottom right of the palette, to click and drag to adjust the size of the palette. After a resize, a stepper control is shown on the top left of the palette. This stepper is used to change the number of columns, when in the vertical mode, or number of rows in the horizontal mode. The horizontal or vertical mode determines the size of the palette and whether it is wider than it is tall. When you are happy with the number of columns (or rows) use the OK button to dismiss the button. The size of each tool button is adjusted to fill the area of the palette. In all cases all elements of the library are displayed in this mode, if necessary buttons will draw smaller and more columns or rows will be added to place buttons for all elements.

Drag and Drop can be used to rearrange the order of the buttons on your palette. Drag and drop can be used to copy a button over to another user library palette. Drag and Drop is not be used to drag the associated graphic element to an EazyDraw drawing. If you desire to place library elements on drawings via drag and drop, use the Element presentation for the library palette.

You may design your own icons for the standard EazyDraw tools. This is done easily by adding a built-in tool to a library. Then use the Name presentation mode to drop an icon of your own design on the icon button. Then your icon will represent the tool's button when the library is in the tool button presentation mode.

The size of the library palette in the button mode is independent of the size of the palette when switched to the Name or Element presentation mode. This size is persistent; it is remembered when the library is closed and re-opened. The position of the palette on the desktop is the same for all 3 presentation modes; this is also remembered with a palette layout save and when you quit and restart EazyDraw.

The order of buttons corresponds to the order of elements in the library. Note that if you were to re-order a library with an alphabetical sort while in the Name presentation mode, the order of the tools in the Button presentation mode will change too.

Add EazyDraw Tools: Built-in EazyDraw tools may be added to a library tool palette. If a user library window is open, drag and drop from a standard EazyDraw tool palette is enabled. Simply drag a tool to the library palette, it is then installed and available for normal use from both its original palette and the library tool palette.

Saving In Button Mode: To overtly save a library palette configuration you need to return to one of the other modes for your library. This means that if you resize in the tool button mode, or if you want to lock in the tool button mode for a library, you will need to make your changes then click the close button on this palette. Before closing the window EazyDraw will ask if you want to save the Library, select Save and the button form and layout will become the default mode for the library.

Library Window Menu

The library window has a popup menu at the bottom. This is used to manage the library and the contents of the library.

Copy and Paste

The Copy and Paste items are used to overtly copy to the library or paste from the library. Note that the Copy and Paste items on the main Edit menu associate their action to the frontmost EazyDraw drawing window. Since libraries are represented in the user interface as floating palettes and not main windows, these specific menu commands are used in association with the user library file.

Paste Special is a submenu that behaves in a manner similar to the main menu's Paste Special commands. In this case the source attributes are those on the system pasteboard that have resulted from a Copy or Copy Special from an EazyDraw graphic on a normal drawing window. The Paste Special command will create a new container library element that represents just the specified attribute, for example, a Fill Color only. The Transfer mechanism is used to create one of these container elements. Use the Transfer Palette to inspect the Library elements created with these Paste Special menu commands.

Sort

Sort will sort all elements of the library alphabetically according to names of the library elements. Sorting will re-position elements in the library. The new positions will re-order elements on both the button presentation mode and the other presentation modes. Do not use this function if a particular order has been established for the buttons in the tool mode of the library.

Make Default will set the current size, position, and library presentation mode the setup used for new libraries.

Two native file formats are provided when saving libraries to a disk file. One is a XML like format called a Property List described as Text format, the other is a more compact and quicker to load and save binary format. All formats are lossless, all drawing information is faithfully recorded. The save panel has a popup menu near the bottom, use this to make your selection. These formats are analogous to the corresponding main EazyDraw file formats discussed in Chapter 3.

Transfer Panel

The transfer palette is accessed from the Format main menu. The transfer palette is used to manage the way a graphic is passed from a drawing or user library to another EazyDraw drawing. These settings are used to control the position and size of the graphic when placed in a new drawing. With the parameters on this panel it is possible to convert a graphic to
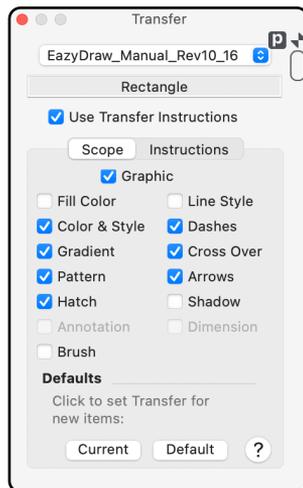
be just a carrier of parameter sets or properties, in this case the graphic itself is not copied to the new drawing.

The Instructions Tab applies when the graphic is actually being sent to the destination drawing. The Scope Tab provides control over the aspects of the graphic that are transferred to the destination drawing.

This palette is used primarily in conjunction with user libraries but it applies equally to any graphic on any drawing or user library. When used to transfer graphics from one drawing to another these settings apply for both Copy and Paste as well as drag-and-drop. In the case of drag-and-drop the position settings are not used but all other aspects of the parameters on this palette do apply.

Note that it is not at all necessary to deal with these parameters for simple copy and paste of graphics between drawings. Nor are these absolutely needed for a simple library graphic, especially when not drawing to scale. EazyDraw automatically makes these decisions if the transfer mechanism is not engaged.
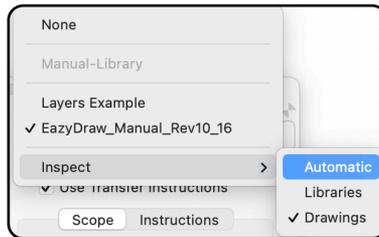
Scope

The top popup menu and text box immediately below show the current target of the Transfer Palette settings and actions. These indicators become important when one or more library palettes are open. Since library palettes may be the focus of this palette, and the libraries palettes themselves are floating palettes, the hard and fast rule of applying palette actions to the front drawing window does not suffice. EazyDraw attempts to direct the focus to the correct target graphic (drawing window or library palette) but care must be taken to verify that the desired target graphic is appropriate.

The top popup menu and text box immediately below show the current target of the Transfer Palette settings and actions. These indicators become important when one or more library palettes are open. The popup menu may be used to redirect the focus of this palette's actions. The popup menu displays all open libraries and drawing windows, choose one of these to specifically select a working target.

The top popup menu has a submenu that is used to limit the possible selections for the Transfer palette's actions. The submenu is titled Inspect, select Libraries to limit actions to library palettes. Select Drawings to limit actions of this palette to EazyDraw drawing windows. The Automatic setting will focus Transfer parameter actions to the current Key window. The Key window is the one drawing window or parameter palette with a selected title bar. A drawing or parameter palette is made the key window by clicking on the title bar of the associated desktop window. The Key window's title bar has a darker shade of gray than all other windows on the desktop.

The Use Transfer Instructions checkbox enables a graphic to actually use the Transfer mechanism. Normally a graphic is copied and pasted to another drawing automatically in an expected manner. It is not necessary to actively manage these Transfer settings for most normal drawing activities. If the Transfer mechanism is desired, this checkbox is selected to engage the parameters on this Palette.

The simple primary use of this Transfer concept applies to User Library graphics. In particular to the "Use" function on a library palette, or the application of a library graphic by menu selection via the Libraries main menu. In these cases when a library graphic is dropped into a destination drawing one needs to think about where the graphic should be placed, what size should it be, should it be drawn with current settings (arrows, dashes, color, gradient, etc) or should the graphic's own settings be used. If one thinks of this situation then the function of the Transfer parameters will become clear.

An advanced use of Transfer concept is to create specific user tools that apply a property or parameter set. If the transfer mechanism is engaged, and the actual graphic is not transferred, then the graphic becomes an abstract carrier of properties such as color, gradient fill, or dashed line pattern. Install one of these transfer-carrier graphics in a user library and it becomes a properties only tool that you may access from the user library. If the user library is installed on the Libraries menu, a complex set of carried parameters may be applied with a simple menu action.

Transfer Instructions

Two things on the Transfer palette need to be checked in order for these Instructions parameter to apply and be enabled. First, "Use Transfer Instructions" needs to be checked. Second, "Graphic" on the Scope tab needs to be checked. In other words, you need to be using transfer instructions and applying them to a graphic in order for these parameters and this tab to enable. If these conditions are not met the Instructions tab is disabled and has a reddish overlay.

The Reference parameter has 3 possibilities; Screen, Page, and Drawing. This setting determines a reference area that is used by the other positioning parameters. Screen is dynamic and will respect the current zoom state for the drawing. Page applies if the drawing has multiple pages as set on the Page Layout panel. It is also dynamic and reflects the page occupying the majority of the current display screen. The "Drawing" selection means the positioning is done relative to the entire drawing, independent of the current display region.

The "Position" parameter determines the actual location for the transferring graphic when added to the drawing. The values are self-explanatory (top left, top center, ...) and specify the logical location for the placement of the graphic. The placement is performed relative to the Reference rectangle described in the previous paragraph.
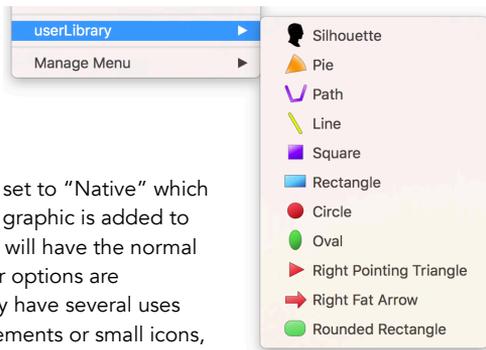
Graphic Format will normally be set to "Native" which means that a simple copy of the graphic is added to the drawing. The added graphic will have the normal editing characteristics. Two other options are possible, PDF or TIFF. These may have several uses for very large complex library elements or small icons, or perhaps forms. If one of the latter are selected the original graphic is converted to an image graphic of the specified format and added to the drawing.

The Interaction level correspond to the values as defined for the Interaction submenu on the Format main menu. This parameter defines initial interaction level, for example "uniform scale," assigned to the transferring graphic when added to the target drawing.

Manage Library Menu

A user library may be used to define a graphic tool menu with menu entries for each element in the library. This process is somewhat recursive and can get confusing. But it is much easier to execute than to explain or study so do not get discouraged. You do not need to be a power user to take advantage of this capability.

The Manage Library Menu has a submenu. This submenu is used to install or remove the menu representations of a user library. The submenus discussed here are added to the Libraries main menu.

Both tool palettes and libraries may be added to the user configurable library menu. This provides a means to provide menu command access to normal EazyDraw drawing tools. This in turn provides a means to apply a keyboard shortcut to a drawing tool. The Menu Keys preferences panel is used to assign key combinations to user menus. First the tool palette needs to be added to this menu, then the desired keys assigned using the Menu Keys panel.

This submenu is accessed from the Libraries main menu, it is near the bottom.

Tools

Add Tools: The Add Tools submenu is used to add a standard EazyDraw tool palette to Libraries menu. This is a fixed menu and shows the available and supported EazyDraw tool palettes. Tools menus are added to the top user defined portion of the Libraries main menu.

Remove Tools: The Remove Tools submenu is used to remove a standard EazyDraw tool submenu. Only tool menus that are installed are enabled on this menu.

Libraries

Add Library: The Add Library menu command is used to install an existing EazyDraw library as a Libraries menu item. This is a standard Open panel that will allow you to navigate your system and select an EazyDraw library file. Library menus are added to the middle user defined portion of the Libraries main menu.

Remove Library: The Remove Library submenu is used to remove a EazyDraw Library tool submenu. Only library menus that are installed are shown on this menu.

Notice that installing a library on this menu is completely different from opening a library palette. A library palette does not need to be open in order for it to be used on the menu. Conversely, an open library will not have an active library menu. The library must be overtly added to the menu in order for its elements to be available as menu commands.

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