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Gambling Games
See
Card Games

Game Editors
See
Crystal Crazy

Games
See
Entertainment; Simulation Games; Roll Playing Games; Adventure Games; Strategy Games

Gaming
See
Entertainment

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Gaming Services on the Internet

See
Online Live Games

Gamma Curve

See
Image Scanning

Gamma Values in Scanners

Most scanning software supports the concept of gamma correction: rather than adjusting the brightness of a scan by changing all the light and dark pixels in the same way; light and dark pixels are adjusted differently to improve the balance and contrast of the image. It's almost always better to adjust tonal values with gamma controls rather than simple brightness/contrast controls.

Software controls for setting gamma value controls vary widely, but many packages allow you to enter gamma values directly. lowering a scan's gamma value from the default value of 1.0 darkens the scan; increasing the gamma value lightens the scan.

See Also

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Scanners

Gantt Charts
See
Plan & Track

Garfield Virus
See
MDEF Virus

Gassée, Jean Louis

Jean-Louis Gassée took over as general manager of Apple France in 1981 after working for Hewlett Packard and Data General. Gassée was extremely successful there; Apple computers even outsold IBMs in France.

Gassée was brought in on the Macintosh project when **Steve Jobs** and **John Sculley** were in the midst of their falling out. He was ostensibly the Macintosh marketing director, but Sculley wanted him running the entire Mac division instead of Jobs. Gassée was extremely reluctant to get involved in the mess the Mac division had become, but was finally convinced to take the job.

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When Jobs began plotting to oust Sculley, it was Jean-Louis Gassée who warned Sculley. When Jobs left Apple, Gassée became the head of product development at Apple. Though not an engineer, Gassée is a brilliant marketer and a visionary. He left Apple in 1990 and now heads Be, Inc., in San Jose, California.

Be is a new computer company that manufactures a unique multiprocessor computer targeted at technology enthusiasts. The computer, known as the BeBox, uses two (or more) PowerPC microprocessors and a new operating system (BeOS) that takes full advantage of the power of multiprocessing.

See Also
Jobs, Steve; Sculley, John

Gatekeeper

Gatekeeper is a free System **extension** /INIT developed by Chris Johnson designed to protect your system against the **WDEF** virus that infects the invisible **desktop file** on disks of all types. Gatekeeper was originally introduced back in 1990 when the WDEF virus was spreading rapidly—it would infect a hard disk and then transfer the virus to any inserted disks. Gatekeeper was designed to keep the desktop file from being altered by the WDEF virus.

Gatekeeper also stops unknown suspicious activity in the hopes of preventing virus attacks. Many genuine applications perform activities that

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resemble virus attacks. Gatekeeper can learn which routines should be allowed and which should be prevented. Codes can be entered into Gatekeeper to allow it to detect (but not remove) new viruses.

The proliferation of commercial virus detection software has made an appearance of the WDEF virus very rare.

See Also
Anti-Virus; Extension; Desktop File; Virus; WDEF

Gateway
See
Internet Services

GCR (Gray Component Replacement)

GCR, or gray component replacement, is a technique used in **process color printing** to reduce the amount of ink needed to cover an area in the printed image. A variation of **UCR** (undercolor removal), GCR helps control ink trapping and reduces ink cost.

When three process colors (cyan, magenta, and yellow) mix and two predominate to create the hue, the third color determines the grayness of the mixture. In GCR, this gray component is replaced with black in varying

percentages so that there are never more than two primary colors plus black. This is also called *achromatic reproduction*, and it affects all the colors in an image.

See Also
Color Printing; UCR (Undercolor Removal); Ink Trapping; Process Color

General Controls Control Panel

This control panel enables you to personal preferences for your system including: The rate at which the **cursor** blinks while waiting at an insertion point; how many times a **menu item** blinks when selected; whether or not you want to see items on your **desktop** when it's in the background (such as your **hard drive**, disks, the **trash can**, and so on); whether you want to lock your **System Folder** or Applications folder to keep other users from accidentally removing items; whether you want the Mac to display a warning dialog box if the Mac was **shut down** improperly; and the default location you want when you save a file.

All of these preferences are available to make working on your system more convenient. To select any of these options, click the check box or **radio button** beside your selection.

To set your preferences in the General Controls Control Panel, follow these steps:

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1. Open the General Controls Control Panel from the Control Panels submenu on the Apple menu (or System Folder).

2. Set your preferences by selecting the options you want.

3. Close the General Controls Panel.

See Also
Cursor; Desktop; Hard Drive; Menu Item; Radio Button; Shut Down; System Folder; Trash Can

General Magic

General Magic was founded by three former Apple employees in 1990 to develop software for personal digital assistants (PDAs). Apple, Sony, and Motorola are all major investors in General Magic.

General Magic might have been just another Silicon Valley startup if not for its major investors and the names of the three founders: **Bill Atkinson**, creator of HyperCard, MacPaint, and the Mac's graphics engine, QuickDraw; Andy Hertzfeld, who wrote much of the original Macintosh **Toolbox**; and Marc Porat, former manager of business development for Apple's Advanced Technology Group.

There are two significant software developments created by General Magic. The first is the MagicCap operating system. This OS is used in PDAs from Sony and Motorola. The second is a technology called TeleScript, a language for

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creating intelligent software agents that can complete tasks without user intervention.

See Also
Atkinson, Bill; Toolbox

General MIDI

The original **MIDI** specification failed to map specific patches (sounds) to MIDI ID numbers. Different manufacturers used different numbers to identify similar sounds, resulting in unusual results when playing a MIDI file on a different keyboard to the one it was created for. General MIDI fixed that problem by assigned specific types of sounds to specific ID numbers. For example, an electric guitar is always #28, and an acoustic grand piano is #1. Drums are always on channel 10, with specific notes representing different drum parts; a kick drum is note 36 of patch 10.

See Also
MIDI

Generic Icons

The invisible **desktop file** on your Macintosh keeps track of all the file **icons** on your **hard drive** . Over time, this file becomes larger and larger as it keeps track of every icon added and deleted to your hard drive, and

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occasionally it needs to be rebuilt to operate properly. If you have not **rebuilt the desktop** on your recently, the custom icons that normally appear on your files may start to revert to black and white generic icons. The generic icon for an application is a white diamond with a hand holding a pen. The generic icon for a document is a blank white page.

This either means that the icons have lost their bundle bits, and rebuilding your desktop may remedy the situation, or that the application that created the document is not on your hard disk, so your system treats it as a generic document and gives it a generic icon. The bundle bits are small bits of code in the file used to link a document's icon to the application that created it. When you create a document in Microsoft Word, for example, the icon looks very similar to Word's own icon. And if you double-click this icon, you system knows it's a Word document and launches Word for you. However, if the icon lost its bundle bits, or they somehow got corrupted, it would still be a Word document, but it would not know it was a Word document, and this link back to the application (and matching icon) would be temporarily lost. So when the Mac doesn't recognize this document as a Word document, it gives it a generic icon.

So if you have the application that created the document, the document may have a bundle bit problem. You can use a repair utility program to fix this situation. Both Norton Utilities and MacTools can repair most common bundle bit problems, and you can also try Apple's free repair utility Disk First Aid, which is on the DiskTools disk of system install disks that you got when you first purchased your Mac. (Note: If you have a CD-ROM install disc, there is a

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Disk Tools folder on the CD-ROM, and Disk First Aid is in that folder.)

See Also
Desktop File; Hard Drive; Icons; Rebuilding the Desktop

GeoPort

Beginning with the AV Macs (the Quadra and Centris 660AV/840AV) Apple replaced the standard modem **Serial port** with a new connector called the GeoPort. The presence of a GeoPort type serial port can be noted by the looking for an additional ninth pin in the serial connector. The ninth pin carries power from the Mac to a device called a GeoPort Telecom Adapter or Phone Pod. This is a little box that, combined with the internal hardware in these Macs, can replace a modem.

The GeoPort technology takes advantage of the Digital Signal Processing chips in the AV Macs to let the computer itself take on many of the functions previously performed by the modem. With old style modem technology, the computer would send a modem a digital signal, which the modem converted to an analog signal and sent out to the telephone lines. (See **Modems** for additional details).

All Power Macs have GeoPort-enabled printer and modem ports, as do the older Centris 660AV, Quadra 660AV, and Quadra 840AV. GeoPort-enabled serial ports have the ability to transmit data at 115,000Bps, faster than ordinary Mac serial ports, which have a limit of 56,000Bps. This is faster than ordinary

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modem traffic, but is useful when modems use compression and when you are connecting to **ISDN** lines. GeoPort connectors look the same as the traditional round Mac serial ports, but have 9 pins, one more than the traditional Mac serial ports.

To connect to an **analog telephone line** or a digital **ISDN line**, GeoPort requires the use of a telecommunications adapter. The most common is the Apple GeoPort Telecom Adapter (see the following figure), which connects to standard telephone lines. Like a modem, the Adapter has two connectors, one for a telephone line and one for a telephone.

The first ISDN adapter for GeoPort is the Sat-Sagem SPIGA, which has two ISDN B channels at 64Kbps each, which can be combined.

There are several advantages to using a GeoPort adapter and a software modem instead of ordinary modem, and a few disadvantages. One advantage is that there is some really innovative telephony software available that is easy to set up, use, and manage. For instance, MegaPhone from Cypress research turns your Mac into a full-duplex speaker phone, which means that you and the party at the other end of the line can speak at the same time.

Another advantage is that you can use the same line for both fax and voice without having to turn anything on or off. The Express Modem software can recognize what type of call is received and use the appropriate software, fax or voice, to either answer the call or let you answer it.

Another bonus is that upgrades can be inexpensive software-only additions.

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At press time, Apple was expected to offer a 28.8Kbps software upgrade for the Apple GeoPort Telecom Adapter sometime during the summer of 1996. Previous to this upgrade, the top speed of the Express Modem and the Apple GeoPort Telecom Adapter was only 14.4Kbps, which is one of the disadvantages to using GeoPort technology.

There is also an annoying incompatibility with the Power Macintosh 7200 series, the 7500/100, the 8500/120, and the 9500 series. With these machines, you must disable LocalTalk in order to use a GeoPort Telecom Adapter by disconnecting any devices attached to the printer port. (Serial printers, which are not LocalTalk devices, can remain attached).

The GeoPort lets the Macintosh perform this translation from digital to analog and back again without the need for a modem. To use the GeoPort, you simply connect a GeoPort Telecom Adapter to your telephone line and into the GeoPort on your Mac. The Adapter is about the same size as a mouse and has, in addition to the GeoPort cable and connector, a pair of phone jacks (incoming and outgoing).

The GeoPort provides for backward compatibility with existing serial products, in addition to its new features set. You can plug an ordinary modem or fax/modem into the GeoPort or use any other device that attaches through a conventional serial port. The extra pin socket won't interfere.

The GeoPort technology makes the Mac uniquely suited to answer and process incoming telephone calls. It's bundled with ApplePhone software, which lets your AV Mac turn itself into a phone-answering machine and speakerphone.

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By giving computer the power to interface directly the Mac can act as a complete voice mail system, in addition to processing standard data and fax telephone calls. ApplePhone has a screen display that mimics a real phone and answering machine, right down to the blinking lights.

See Also
Express Modem; ISDN; Modems

GeoPort Adapter

See
Ports, Types of

GeoPort Telecom Extension

This extension is used when utilizing Apple's GeoPort features that enable you to connect a phone line, through a special GeoPort adapter, directly to an AV or Power Macintosh model for use in telecommunications.

See Also
Modems; Extensions

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Gershwin

See
System 9

Get Info Command

The Get Info command shows you information on the item you request by pressing ⌘-I. To get information on an item, click the item and select Get Info from the **File menu**. The Get Info box is available for any item that has an icon: files, folders, documents, graphics, applications, and so on. If you Get Info on an **alias** of a file, its Get Info box tells you where the original is and there's a "Find Original" button to help you locate that original.

Get Info works only when you're in the **Finder**. When you select Get Info, a window is displayed with the item's information, including: the kind of document (a Microsoft Word document, a PageMaker document, and so on), the size of the document, where it is located, when it was created, a version number (if applicable), and so on.

Below this information area is a **Comments box** where you can enter any comments you might have about this particular document. These comments do not appear in your document; they appear only in this box. The nice thing is that comments you put in the Comments box are searchable using the **Find File** command.

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Just below the Comments box is the Locked checkbox. If you click the Locked checkbox, it locks that item so that it can't be altered or accidentally thrown away. If the file is already locked (an "X" appears in the checkbox), clicking the locked checkbox unlocks the file.

This is especially helpful if you have children using your Mac; you can lock any files you fear may be accidentally thrown away, such as applications or important system files.

To the right of the Locked box is the **Stationery Pad** checkbox, which enables you to turn this item into a template. If, for example, you design an elaborate form layout and think you'd want to use this form again, rather than redrawing the form from scratch each time you need a form, you can save that document as a template (stationary pad) by clicking the Stationary Pad checkbox. Any document that has been converted to a stationary pad gets a slightly different icon resembling a note pad with dog-eared corners to let you know it's a template.

The Get Info box is also where the item's **icon** is stored and where you can customize an icon. The file's current icon appears in the Get Info window to the left of the name of the file. To copy this file's icon, click the icon in the Get Info window. A square border appears around the icon to let you know it has been selected. Go to the **Edit menu** and select **Copy** (⌘-C) to make a copy of the icon. That icon is now in the **Clipboard** where you can transfer that icon to the file of your choice. To place that icon on another file, find the file that you want to have the new icon, click it, and select Get Info from the File

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menu. Click that file's icon in the Get Info window. Again, a box appears around the icon letting you know it's selected. Then choose **Paste** (⌘-V). This pastes the icon in the Clipboard onto the existing icon. Close the Get Info window to see the results, as shown in the figure.

If you Get Info on a program, rather than a document, the program's **memory requirements** appear in the lower-right corner. This is important information for a number of reasons. The first number is the minimum amount of memory the manufacturer has recommended for this program to operate properly.

The second number appears in a box where you can input your own minimum memory requirements, making it higher or lower than the manufacturer's recommendations. Assume, for example, that 158K is the minimum requirement, and you decide to set it at 100K. When you try to close the Get Info window, you get a dialog box alerting you, "You have set the minimum size below 158K and this may cause the program to crash. Are you sure you want to continue?" (Having virtual memory turned on, by the way, will significantly lower the memory requirements for PowerPC-native programs.)

The last box enables you to input how much memory you'd prefer this program to use. If you have a program, for example, that is memory intensive, such as Adobe Photoshop, and you have 48MB of RAM on your computer, you may want to Get Info and assign more memory than the suggested minimum. You may want to assign 24MB just for Photoshop so that

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it uses the fastest memory possible: **RAM.** To do so, type the number **24,000** in that field and close the Get Info window. The next time you launch Adobe Photoshop, you have 24MB of your 48MB total set aside just for Photoshop.

To Get Info on a file, document, folder or application, follow these steps:

1. Click the item you want to Get Info on.

2. Select Get Info (⌘-I) from the File menu.

3. The Get Info window displays the item's information.

4. To lock the item to keep it from being deleted or altered, click the Locked checkbox.

5. To turn the document into a stationary pad, to use as a template, click the Stationary Pad checkbox.

6. If the item is an application, you may adjust the memory allocation for that application by entering new figures in the appropriate boxes.

7. If you want to leave a comment about this particular file, you may do so in the Comments box.

8. If the file is an Alias, the Get Info gives the location of the original file, and it has a locate original button to find the original file which the alias was created from.

See Also

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Alias; Application Memory; Clipboard; Comments Box; Copy; Edit Menu; File Menu; Find File; Icon; Locked; MB; Memory Requirement; Paste; RAM; Stationery Pad

Get Info (Keyboard Shortcut)

After selecting a file, you can bring up the **Get Info** keyboard shortcut by pressing ⌘-I. You can also get info on a disk, a drive, and even the trash can use the same keyboard shortcut.

See Also
Get Info Command; Keyboard Shortcuts; Trash

Ghosting of Disk

See
Eject Disk Command

GIF

Originally developed by the online service **CompuServe**, the Graphics Interchange Format (GIF) for **bitmapped graphics** is commonly used for graphics displayed on the World Wide Web and exchanged on the Internet. It incorporates a **compression** technique that reduces the file size with no

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degradation in quality.

Often pronounced "jif" (like the peanut butter), GIF is one of only three graphic file formats officially supported by HTML for inline graphics on Web pages. The other two formats are Unix-only, so GIF is the lingua franca for online and Internet graphics use.

Not only is it a bitmapped graphic, it's an Indexed Color bitmapped graphic, which means it uses a color table limited to a maximum of 256 colors. The idea behind indexed color is to a have a reduced color palette that can be recreated by the standard 256-color monitor. Indexed color graphics look OK on screen but tend to print out poorly.

Photoshop has a new plug-in that allows images to be exported as GIF89a files, the newer GIF format that supports transparency (certain colors being transparent) and interlacing (the "venetian blind" effect that makes an image fill in strips on screen.

See Also
Bitmapped Graphics; CompuServe; Image Compression

GIFConverter

Shareware ($30-$45) program by Kevin A. Mitchell that converts edits graphics files in a wide variety of formats. Especially useful in preparing or converting files for presentation on the **World Wide Web,** the graphical

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part of the **Internet** .

Installation is simple: download GIFConverter from the Internet, and double-click the program to launch it.

To convert a file, simply choose "Open" from the "File" and navigate to the document. Choose "Save as" from the "File" menu. Choose a new graphics format from the pull-down menu in the window that opens on screen.

Like other graphics conversion programs such as GraphicConverter, GIFConverter also lets an author manipulate images and select color palettes and resolution.

See Also
GIF; GraphicConverter; Internet; Multipart GIF Images; Transparent Images; World Wide Web

Global Village OneWorld Combo
See
Modems

Glow
Glow defines the luminance of a **3D** object. A luminous object appears bright, as if glowing from within. A glow parameter or a glow map creates surfaces

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of objects, such as neon tubes. Depending on the **rendering** software, an object that glows may or may not cast light on another object.

A *glow map* is an image file that adjusts the appearance of the glow emitted by the object. Not all software supports this feature.

See Also
Rendering; Shaders; Texture Mapping

God Games
See
Strategy Games, Afterlife

Golf Games
See
Links Pro CD for Macintosh, PGA Tour Golf III, Sports Games

Go-Moku
See
Classic Collection

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Gopher

Gopher, one of the most extensive **Internet   services** , is distinctive for its ease of use and flexibility. Gopher originated with the Golden Gophers of the University of Minnesota. More than 1,500 sites on the Internet run the host Gopher software, which makes information available online so users can "go-fer" it.

Gopher can be likened to **File Transfer Protocol (FTP)** as a standard for information retrieval on the Internet, with one major difference: Gopher works only for retrieving rather than sending data.

Gopher can boast several major advantages over FTP, but has obvious disadvantages over graphical browsers, as shown in the following table.

Gopher: Pros and Cons

Advantages	*Disadvantages*
Provides a much friendler interface than the standard command-line FTP client.	Uses character-based rather than graphical environment.
Provides access to more types of information resources than FTP[em]online phone books, online library catalogs, WAIS databases, email directories, Usenet news, and Archie.	Users navigate in a hierarchical, linear fashion; through levels of folders, in order to find information.
Pulls its various information sources together under a single interface and	

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makes that information available from a basic menu system. Gopher lacks the Web's novelty, excitement, and use of multimedia.

Uses less net bandwidth than FTP.

Gopher sites are interconnected; users can move from one to another seamlessly.

TurboGopher , the most popular Gopher client for the Macintosh, was also created at the University of Minnesota. It has the fastest perceived speed of any Gopher client, and supports the Gopher+ extensions that add new features, such as letting the server tell you the size of a file. Gopher + items can be displayed in alternate views, and may have fill-out forms associated with them.

To get connected to Gopher, download TurboGopher as follows:

1. Using **Fetch** , **Anarchie** , or another **FTP** client, download TurboGopher from ftp://ftp.tidbits.com/pub/tidbits/tisk/tcp/ or ftp://boombox.micro.umn.edu/pub/gopher/Macintosh-TurboGopher/or from the *Internet Starter Kit* disk.

2. Double-click the TurboGopher icon to launch the program, which is configured to connect to the home Gopher server at the University of Minnesota. You will see the main menu, which appears as a line of folders (see the figure that follows). Double-click one folder to open it and begin navigating. A good place to start is "Information About Gopher."

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Gopher, Searching, and Finding Information   Gopherspace, the popular term for the network of Gopher servers, is huge. Navigating Gopherspace becomes possible with **Veronica** , which allows searches of either only Gopher directories or of all items in Gopherspace. **Jughead** , another search engine, allows you to conduct more focused searches. Once you find a file you want, TurboGopher can download several files at once and can obtain files while you continue to browse other Gopher sites. Helper applications work with TurboGopher to process data such as **GIF images** .

See Also
Anarchie, Archie, Fetch, File Transfer Protocol, Internet Services, Jughead, GIF Images, TurboGopher, Veronica

Gopher Searching
See
Gopher, Jughead, Veronica

Gopher Software
See
TurboGopher

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Go To Command

This command, which appears in many applications, enables you to jump from the current page to any numbered page within the document. Go To appears on the **Edit menu,** and when chosen, it displays a **dialog box** asking you to insert the number of the page you want to go to.

To go directly to a particular page using the Go To command, follow these steps:

1. Choose Go To (usually ⌘-G) from the Edit menu of your application.

2. Enter the page number you want to go to.

3. Click the OK button to go to that page.

See Also
Dialog Box; Edit Menu

Gouraud Shading

See
Rendering

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Government Simulation Games
See
Sim Games

Grammar Checker
Like the spelling checker, a grammar checker is built into most word processors. It works much like the spelling checker, comparing text against a set of rules. Unlike the spelling checker, however, the grammar programs often make mistakes, flagging a perfectly good sentence as incorrect and occasionally skipping mistakes that an elementary school student would catch. You can customize the grammar checker to ignore some rules and to use either the formal or casual rule set. Doing so helps avoid some of the "false" errors. Most grammar checkers also rate your writing according to a readability index, determining how many years of school you'd have to have in order to understand the material. These indices are based on the ratio of long words to short words in a sentence, and really shouldn't be taken too seriously. The readability index for this paragraph is 10.44.

Graphics Compressor
This QuickTime compressor only works with 8-bit graphics. If you attempt to compress a 16-bit graphic, it is converted to 8-bit during the compression

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routine. While this compressor can be used to compress sequences, it is not recommended. Use the **Animation Compressor** instead.

See Also
Animation Compressor; Asymmetrical Compressors; Compressor; Drop Frames; Spatial compression; Symmetrical Compressors; Temporal Compression

Graphics Coprocessors

See
Coprocessors, Types of

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Graphic design is the process of applying aesthetic principles in the creation and arrangement of type, pictorial elements, and other graphic images in printed matter or in electronic displays. A graphic is usually defined as any element printed on a two-dimensional surface; however, computer-based technologies have expanded that meaning to include elements intended only for display on a computer monitor, television, or other electronic display device.

For example, multimedia displays that include both two-dimensional and three-dimensional graphics should generally follow the basic principles of graphic design. A home page on the World Wide Web or the display graphics of an online service or of a software application are certainly subject to graphic design precepts.

Although graphic design is thought of as an art form and follows many of the same principles as fine art, it differs to the extent that it is more commercially oriented. Communication is the basic goal of all art, but graphic design exists almost solely for that purpose. In the past, graphic designers have been called commercial artists—a category which also

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includes illustrators. Many graphic designers have an artistic temperament and may have been trained in the fine arts (painting, drawing, sculpture, and so on), or they may have participated in commercial art or advertising degree programs at a college or university.

Desktop publishing technology has attracted many more people to the field of graphic design, and many lack any background at all in fine art or commercial art.

Communication is such an important goal in graphic design, that creativity and self-expression can be much more restricted than in fine arts. A conservative designer follows the principle of "form follows function" and does not allow artistic expression to obscure the message. For example, using a decorative typeface that is beautiful in form but difficult to read as body copy would be considered inappropriate. This type of graphic design is necessary for most published material, and few milieus exist for designers who wish to experiment and break the rules.

The rules of graphic design involve fundamentals that govern the placement of elements on a page. Rules have also evolved for the selection and formatting of type. In fact, type may be thought of as the primary element of graphic design. The proper use of type often distinguishes an experienced professional from a novice. In fact, finesse and attention to detail are often distinguishing characteristics in a well-designed publication. For more information about the basic principles of design and typography, read *The Non-Designer's Design Book* by Robin Williams (Peachpit Press).

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Graphics File Formats

Mac graphics files come in two basic flavors—**vector** and **bitmapped**—but there are a lot of variations on those two themes. Different types of graphics and different uses demand different file formats.

Some formats are readable only by the program that creates them—for example, **Freehand's** native format; others can be read and written by a variety of applications, as Freehand can write **EPS** files that can be opened and imported by other programs.

The original Mac format for graphics was MacPaint, the native format used by a paint program of the same name that was bundled with the first Macs in 1985. It was—and still is—the most basic bitmap file format, only capable of saving black-and-white files. Then, eventually, came TIFF, a much more advanced bitmapped format that supports 24-bit color in RGB and CMYK modes. It's a very stable, cross-platform format that's the standard for scans and other photo-based art that must eventually be printed out on a high-resolution printer or imagesetter.

The vector graphics file formats developed slightly later, as there wasn't even a program that could manipulate EPS (Encapsulated Post Script) files until 1988, when Adobe's Illustrator 88 came along. But the EPS format is exceptional in that it unlocks the power of PostScript printers and imagesetters, allowing complex graphics made of basic points and lines to be scaled, skewed, rotated, shaded, and more. EPS files are typically a fraction of

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the size of their TIFF cousins, they're cross-platform compatible, and they're very stable…"

PICT is a simple screen display format that's part of the Mac's basic architecture, but it's not meant for printing. It's fine for multimedia work or slide and on-screen presentations.

These days, **TIFF**, EPS, **GIF**, and **JPEG** are much more common names in the world of graphics formats. TIFF and GIF are used for bitmapped graphics, such as scans, while EPS is the most common format for vector graphics on the Mac. JPEG is a compression standard for color bitmapped images that can drastically reduce file size with little loss of image quality.

Macs can also read formats commonly used on other platforms, such as the BMP, CGM, and PCX formats used by PCs.

See Also
Bitmapped Graphics; EPS; Freehand; GIF; JPEG; MacPaint; PICT; TIFF; Vector Graphics

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Graphics Interchange File
See
GIF

Graphics Tablets

If you do serious graphics work or enjoy drawing with a pen-based object rather than a **mouse** or **trackball** , you might need a graphics tablet. True, enough, you can draw and paint with a mouse, but not with the degree of control that a pen and tablet provide. For those who have highly developed skills with pen and ink or brushes and paint, a pressure-sensitive pen and tablet provide the familiar feedback of working with these real-world tools.

Tablets can be used in almost any application. For example, editing a spreadsheet or a database is easier if you can tap directly on the cell or field you want to change and not have to slide the cursor all over the screen. Complex applications, from desktop publishing to computer-aided design (CAD), often have special palettes and function keys; tapping on them saves time. Tablets can also be helpful for people entering music into a notation application via its note palette.

Graphics tablets (shown in the illustration) are radio-frequency based devices. When you draw with the stylus, it exchanges tiny radio signals with the tablet through a grid of wires that crisscross the drawing area. The tablet

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determines the location of the stylus and transmits the location to the Mac. Most graphics tablets are pressure-sensitive: the harder you press the palette with the stylus, the darker or wider the pen line.

Most graphics tablets (also called digitizing tablets) are covered with a clear plastic sheet (an overlay). You can slip artwork you wish to trace under the sheet, or draw with ink-filled cartridges inserted into the stylus on tracing paper to see what you are drawing on the screen.

The biggest differences of graphics tablets from mice or trackballs are the following:

- Working area. This factor refers to the actual size of the tablet's pressure-sensitive input area. Bigger tablets are more expensive; smaller tablets can be more comfortable if you like to hold them in your lap as you would a sketch pad.

- Resolution. The resolution of a tablet is measured in the number of divisions per square inch. If you create finely detailed illustrations or complex CAD documents, you need more expensive models that support higher resolutions. The down side of high resolution tablets is that the amount of data throughput increases and processor performance slows down due to the large amounts of data that must be processed with each stylus movement.

Pressure-sensitive pens emulate real-world tools and, with compatible software, enable you to work on screen just as you would on canvas. Press

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down on a brush, and the stroke widens. Pressing lightly on a watercolor brush creates a tiny drop of color. Nearly all major graphics applications, such as Fractal's Painter and Adobe Photoshop, support pressure-sensitive pens. Many pens do not require batteries, which usually means that all the position and pressure sensing takes place on the tablet. Most pens used with graphics tablets are cordless. Such cordless pens can be filled with ink for an intuitive, natural feeling. You can also use such a pen to actually produce an electronic signature.

Graphics tablets and styluses are absolute-motion pointing devices. The stylus has the ability to tell the Mac its physical location on the tablet, and that location is mapped to an exact location on the screen. When you move the stylus on the palette, the cursor on the screen moves to the same location on the screen. Graphics tablets are able to operate in relative-motion (like **mice** and **trackballs**), but their ultimate benefit is their ability to trace exact positions. The graphics tablet and stylus also provide better pixel precision than mice or trackballs. Mice and trackballs can discern approximately 200 to 300 units of movement per inch. Graphics tablets detect 1,000 units or more per inch (known as *resolution* and measured in lines per inch (LPI). The higher the pointing device's resolution, the better it will be for use in precise drawing.

Tablets have historically been **serial devices** because the **Apple Desktop Bus port** is not fast enough to handle the amounts of data they generate. Some manufacturers, however, have introduced products that work with the ADB port. Tablets also tend to draw more power than most ADB devices can

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	CAD applications at Lockheed, which markets them through CalComp. 6 by 9 iches, 12 by 12 inches, 12 by 18 inches tablets. 2,540 lpi with accuracy of ±0.01 inches. $395 to $595
Summagraphics	Microgrid Ultra ADB Backlit models, ADB port compatible. 17 by 24 inches to 44 by 60 inches. $3,299 to $8,699
Hitachi Digital Graphics	StudioPadSmall tablet $199.99

See Also
Absolute Versus Relative Motion; Apple Desktop Bus; Keyboards; Mice; Pen/Handwriting Devices; Serial Ports; Trackballs; Touchpads; Touch Screens

Graphics Terms

Active Display Area —That part of an image visible on the display screen.

ADC (Analog to Digital Converter)— A device that changes analog real —world information into digital information that the computer can store and manipulate.

Algorithm —A formula that is used to initiate an operation.

Animation —Frames of a sequence that the eye defines as moving.

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Aspect Ratio —Width to height ratio. Common ratios for computer videographics and multimedia are 3:2 and 4:3, though desktop publishing pages can be produced at any needed ratio.

Backup —a saved file that duplicates another file.

Batch Processing —An operation that targets more than one file at a time.

Bit Map —A graphic whose content is determined by its collection of picture elements or pixels.

Blue Screen —A blue background that is seen by the system as transparent so that another scene or graphic can be placed behind the foreground image.

Brightness —Luma or luminescence.

Buffer —A area of temporary memory in the computer used to store data.

Byte —A unit that represents a sequence of eight bits for computation and storage.

CAD (Computer Aided Design)— using a computer to originate and /or modify a design.

CAM (Computer Aided manufacturing)— Computerized process for manufacturing products direct from on —screen data.

Color Key —A special effect used to composite still or moving images in film and video. Sometimes called blue screen.

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Color Picker —A Mac palette screen [Control panel device] used to select colors.

Compression —A process that squeezes data into a smaller space, for example, the JPEG file format.

Contrast —The difference between the darks and lights in an image.

Cross Platform —referring to a file that can be accessed on more than one computer type or platform.

Data/Resource Forks —Disk files with the proper data needed to reconstruct a saved file.

Decompression —A reverse procedure used to read compressed files and reconstruct them back to their original state.

Digital —A medium that has only a binary or on/off signal.

Digitize —To grab data from the real world and translate it into digital form so that the computer can display it.

Dithering —Creating intermediate colors between any two choices by a system of dots.

Dots per Inch (DPI)— the number of discreet dots an output device can print per inch (horizontal x vertical).

Frame Grabber —A video digitizer with onboard storage capacity built in.

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Grayscale —usually refers to a spectrum of 256 gray levels.

Hard Copy —Printed or film computer output.

Histogram —A graphing of the brightness values in every pixel in a raster image.

Image Processing —Changing the elements in an image through an effect or specific algorithm.

Macintize —To place White as the first color and black as the last color in the image's palette.

Multimedia —The combining of more than one media in a presentation, as for example, sight and sound.

Palette —the range of hues in a defined spectrum.

Palette Number Index —Considering that the first color (White in a MAC palette) is number zero, the palette number of any color may be calculated by finding its numeric position.

Palette Switching —More than one palette in use in a sequence of images. This may lead to slower animation playback and can cause discomforting flickering.

Pixel (Picture Element)— The smallest element that a raster image contains whose actual size and shape is determined by the resolution of the image on screen and the extent to which the display device can accommodate

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that size.

Pixel Depth —The number of bits needed to store a pixel, stated in increments that double with each succeeding level. A one bit pixel can store two colors, 2 bits four colors, 3 bits eight colors, 4 bits sixteen colors, 5 bits 32 colors, 6 bits 64 colors, 7 bits 128 colors, and 8 bits 256 colors (or shades of gray). Common pixel depth for color work is 24 bits or sixteen million plus colors, while 32 bit pixel depth includes 24 bits of color and an 8 bit "alpha channel" of grays.

Plotter —An output device that uses moving pens to create a graphic in response to computer signals.

Preferences —Settings that determine how software is configured.

RGB (Red, Green, Blue)— the three primary colors of the electron guns in a video compatible system.

Remap —To change the colors in a palette to match another palette.

Scaling —Changing the size of an image.

Scan —To place an image in a flatbed digitizer for translating image data to digital format.

Script —A series of encoded instructions that initiate an action.

Translate —Converting one format to another.

Threshold —Setting a level at which an operation will take place.

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Vector Graphics —Image elements defined by their directional heading and length.

Video Digitizer —A device that captures an image from a video source, whether a camera, VCR, or video still camera. A professional video digitizer can capture a single frame of video from a moving sequence in real time.

GraphicConverter

Shareware ($35) program by Thorsten Lemke that converts edits graphics files in a wide variety of formats. Especially useful in preparing or converting files for presentation on the **World Wide Web,** the graphical part of the **Internet**.

Installation is simple: downloading GraphicConverter from the Internet creates a preferences file in your System Folder. Double-click the program to launch it.

To convert a file, simply choose "Open" from the "File" and navigate to the document. Choose "Save as" from the "File" menu. Choose a new graphics format from the "Format" pull-down menu in the right half of the "Save as" window that opens on-screen.

After converting a file you can check a box in the "Save as" window to automatically compress that file with the shareware application StuffIt, if you already have StuffIt installed on your Mac.

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GraphicConverter saves **GIF** files as GIF89 format, which allows **transparent** images and **Multipart GIF** animation. It also has a "Slide Show" feature, which plays all the image files in a designated folder, one after another.

Recent versions of GraphicConverter are accelerated for the PowerMac. The program requires a Mac with color QuickDraw, System 7 and at least 2MB of memory.

See Also
GIF; GIFConverter; Internet; Multipart GIF Images; Transparent Images; World Wide Web

Graphics Programs for Children
See
KidPix Studio

Gravure
See
Printing Methods, Traditional

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Gray Disk Icon

If you use the **Eject Disk** command on the **Special menu** to eject a **disk** from the disk drive, the disk ejects, but a gray "ghosted" disk icon is left on the **desktop**, as shown in the figure. To remove this gray disk icon, **drag** the icon into the **Trash,** and it disappears. If you drag the disk icon to the Trash or use the **Put Away** command on the **File menu** to eject a disk, the gray disk icon does not appear.

If you drag the ghost disk icon into the Trash and it doesn't go away, resources of that disk are still in use. In **System 7** and higher, you are be met with a dialog box that states, "The disk (the disk's name appears here) cannot be put away because it contains items that are in use." You have to click OK to continue. If this should happen, re-open the disk and make certain all the documents on the disk have been properly closed.

This ghosting of the disk can create additional problems. If you **double-click** the ghosted disk, the Mac brings up a dialog box asking you to reinsert the original disk. You can make this dialog box go away by hitting ⌘-. (period) on your keyboard or by inserting the original disk.

You can run into more problems if you happen to eject a disk using the Eject Disk command and that disk had an open window when you ejected it. If you try to close that window, perhaps to reduce clutter on your desktop, you are met with a dialog box insisting that you reinsert your disk. It asks for the disk because a change to the disk has been made (a window was closed) and the

information needs to be updated on the original disk. Having your system demand disks that have already been ejected can be a frustrating experience.

Because of the problems that ghosting disks cause, many people prefer to use the **Put Away** command (⌘-Y) rather than using Eject Disk. The Put Away command dismounts and ejects the disk, but does not leave the ghosted version of the disk on the desktop.

See Also
Click and Drag; Disk; Desktop; Eject Disk; File Menu; Ghost Disk; Put Away; Special Menu; Trash

Gray Component Replacement
See
GCR

Gray Levels
There is a direct relationship between gray or color levels and output resolution in digital halftone production. The dots in **digital halftones** are composed of a matrix of smaller dots made by a laser imaging device. These are sometimes called laser spots or machine spots. The grouping of these smaller dots, or spots, is called a digital **halftone** cell. The number of these smaller dots within the digital halftone cell determines the potential gray or

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color levels of the cell. If, for example, a cell contains only four of the smaller dots, it has the potential to represent five gray levels: no dots (white), one dot, two dots, three dots, and four dots (black). In other words, a halftone image made up of these cells would be severely posterized because the cells do not contain enough laser spots to create the illusion of continuous tone. The image would have only three grays in addition to black and white.

At lower output resolutions (300 to 1200 dpi), it is difficult to achieve good halftones because there is a trade-off between the halftone screen frequency (lpi) and the device output resolution (dpi). This is because a lower screen frequency provides more gray levels at a given output resolution. The following formula can be used to determine gray levels: $(dpi/lpi)^2 + 1$ = gray levels. A 100 lpi halftone, for example, printed on a 600 dpi laser printer has some posterization because it has only 37 gray levels. (600 divided by 100 equals 6. 6 squared equals 36. 36 plus 1 equals 37.) Decreasing the lpi requirement to 65, however, yields an image with 82 gray levels—still not a great halftone but better than 37 levels. The object is to obtain as many gray levels as possible at a given screen frequency; therefore, it becomes obvious that higher output resolutions are key.

Another factor must be considered when working with gray levels. **PostScript** Level 1 devices are limited to 256 gray levels. Level 2 PostScript supports more, but most experts agree that there is no point in striving for more than 256 levels. There is no harm in having more gray levels than are necessary, but one should avoid having too few. To determine the optimum

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output resolution required for a given screen frequency, a formula using the square root of 256 has been devised: lpi x 16 = dpi. Therefore, a 133 lpi halftone requires an output device with a dpi rating of at least 2128 (133 lpi[ts]16 = 2128 dpi). Naturally, this is rounded off to 2400 dpi, a common resolution for **imagesetters.** This example provides 325 gray levels—more than are needed but better than not enough!

See Also
Digital Halftones; Halftones; Resolution Measurement

Grayed Commands

If you go to a menu and the name of a command is grayed, that command is not available. A grayed-out command is also referred to as *dimmed*. Commands that are available for use appear in black type.

See Also
Command; Font; Menu

Grayscale

See
Image Scanning

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GrayShare

See
Printers, Inkjet

Grow Box

See
Size Box

Guides

In many graphics and page layout applications, users can click on the **ruler** at the edge of a document window and drag to pull a positioning guide onto the page. Often, users can specify that objects moved near the guide should "snap" to the guide, facilitating alignment, and some programs also allow users to specify exactly how close an object must be to the guide to be affected by it.

See Also
Drawing Applications; Guides; Page Layout Applications; Rulers

Gutter

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Gutter Margins

Gwydion Project

GX Fonts

Rather than the 256 characters that the Mac's system would previously allow in any font, GX fonts can contain—get ready for this—256^2, or 65,536, characters. That leaves a lot of room for things like expert and swash characters, ornaments, ligatures, and fractions. And non-Roman alphabets, such as in Asian languages, can be entirely contained in one font. GX fonts also have room for information about how an application should use a font—features like automatic ligature substitution, optical alignment (often lines that *are* centered don't *look* centered), true drawn small caps, hanging

punctuation, and font-level kerning and tracking.

Adobe's Garamond Plus combines the Regular, Expert Set, Titling, and Alternate sets of Garamond. It includes accented characters, small caps, ligatures, superior and inferior numbers (drawn for that purpose, not just reduced), fractions, swashes, and ornaments. GX-aware applications allow users to enable and disable automatic use of any of these options through menu choices.

Another Adobe face, Caflisch Script, is a connecting script that uses the extra character slots for variations on each character that are chosen automatically based on which letters precede and follow it. It can also choose variations randomly, to give a more hand-drawn feel to the type.

GX could also mean an end to the screen font/printer font dichotomy of PostScript fonts, because GX PostScript fonts are one-piece, like TrueType fonts, and live in suitcases. For now, though, few page layout and graphics applications support GX.

See Also
Bitmapped Fonts; Fonts; Outline Fonts; PostScript; TrueType; Typesetting Terms