

### Outline fonts

- Produce the best-looking printed output.
- May be used to generate type on screen with ATM.

### Bitmapped fonts

- Most often used for display of type on screen.
- In a pinch will do for printed output.

There are some very simple questions that anyone who deals with PostScript\*\* fonts should be able to answer:

- What kinds of fonts exist on my computer?
- Where are they located?
- How do they get to the screen and to the printer?

To answer these questions, a discussion of font form and function, font storage and management, and font ID number issues is necessary. This document covers PostScript fonts on the Macintosh\*\* computer.

This is the second document in a two-part series. The first document, PostScript Font Basics (part number 3061), covered the difference between fonts and typeface families, bitmapped and outline fonts, and also described the benefits of ATM (Adobe Type Manager\*\*). Please refer to it for background information on this subject.

### Font form and function

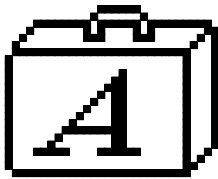


Figure 1 - Macintosh icon for a collection of bitmapped fonts in different point sizes (usually referred to as a screen font suitcase).

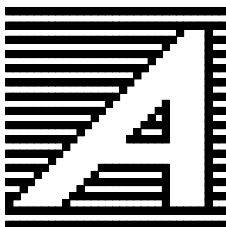


Figure 2 - Macintosh icon for a Linotype Library\* outline font (often referred to as a printer font).

You can describe fonts by the form they take on a computer system: either outline or bitmap. You can also describe them by their function: either to produce type for the screen or to produce type for the printer. It is very important to keep these issues straight when discussing fonts. The reason for this is hidden in the rapid changes of technology.

At one time, the term "screen font" could be used interchangeably with the term "bitmapped font" because all screen fonts were generated using bitmapped (i.e., resolution-dependent) information. Likewise, the term "printer font" was used interchangeably with the term "outline font" (even though this was not, strictly speaking, always true, because bitmapped fonts could, in a pinch, be used for the printer). But that was all before the introduction of ATM. With ATM, PostScript outline font information can now also be used to generate screen fonts. This development has made it so the term "screen font" may refer to either an outline or a bitmapped font.

The critical issue here is how you choose to describe a font. If you only mention its function (screen or printer) you leave an unanswered question as to its form (outline or bitmap). John Warnock, CEO of Adobe Systems Inc., envisions a day when there will be no need for bitmapped fonts. Everything will be able to be done with outline fonts. But since that day hasn't arrived yet, it is best to first mention the form, and then the function when discussing fonts. For example, when a bitmapped font is being used for screen display, it will be described here as a bitmapped screen font. When the function is yet to be determined, the terms "outline font" and "bitmapped font" will be used. This may seem cumbersome, but it will leave no open questions. The only time that the term "fonts" will be used without a modifier is when both bitmapped and outline fonts are implied.

With so-called screen and printer fonts it is easy to know whether you are dealing with bitmaps or outlines. If they are in a suitcase, they are bitmapped. If they have individual icons, they are outlines. (See Figures 1 and 2.)

**Note:** A raster image processor (RIP) takes the information in a page description and turns it into a raster, a series of on and off marks. You could compare this raster to a tile floor made up only of black and white tiles all arranged in perfect rows and

columns. In the end, all PostScript fonts are mapped into this tile floor pattern. The important difference between bitmapped and outline fonts is that outline fonts may be scaled without loss of quality to fit the resolution of the output device. This is why outline fonts are sometimes referred to as scalable fonts. Bitmapped fonts remain the same resolution on any device, and as a result may appear 'jaggy' when resized or output at high resolution.

## RAM, ROM and disk storage

There are three places in a computer system where you may find font information: in RAM, in ROM, or in disk storage.

**RAM (Random Access Memory)** is temporary storage space in a computer, printer, or a RIP. It may be used to store fonts and other data. Any information stored in RAM disappears when the device is turned off. Data stored in RAM may be opened and read as desired. RAM is like a book which you can open to any page and start reading wherever you want.

**ROM (Read-Only Memory)** is permanent memory that is built into a computer or printer. It may also be used to store fonts. Information in ROM will always be there; it doesn't disappear when the device is turned off. Read-only means that the contents of the memory may be read but not changed. So, for example, a set of outline printer fonts may be built into the ROM of a printer or a RIP where they may be easily accessed. However, if the font design were to change, the only way to change the stored outline font in ROM would be to replace the ROM chip.

So-called ROM fonts (also known as built-in or core fonts) have no icons. You can determine which fonts these are by using the Linotype Font Downloader\*. A ROM font is permanently in the memory of a computer or a printer, and remains there no matter what, whereas a font that is downloaded (i.e., sent) to RAM is lost when the printer is turned off. Most PostScript printers (such as the Apple LaserWriter\*\*) have some fonts built into ROM. Times\* and Helvetica\* are two common ROM fonts. These fonts are always resident in the printer when you need them.

**Disk storage** refers to storage space in internal or external hard disks, rewritable optical disks, floppy disks and diskettes. Items may be stored and removed as desired. Data remains even when the device is turned off.

### RAM

- Data lost when turned off
- Read/write

### ROM

- Permanent
- Read only

### Disk storage

- Data maintained when turned off
- Read/write

## Font cache

Another important area of font-related storage is the font cache. (Cache is pronounced 'cash'.) The font cache is an area of the hard disk of a printer or a RIP that is used to save the rasters that the RIP creates for specific fonts at set resolutions. These rasters may have been created from either outline or bitmapped fonts, and describe typefaces of a particular size, weight, and style. If a raster has been generated and is needed later on, the RIP doesn't have to recreate it. Because this information is kept in disk storage, it remains in the RIP even after the RIP has been turned off.

## Operating system

Understanding how fonts are recognized by a computer requires some knowledge of operating systems. At one point in computer history you might have defined an operating system as the software that controls the hardware. Today however, since the operating system may exist as both software and firmware (i.e., as commands in ROM), it is better to say that the operating system provides the interface between the hardware in the computer, and the software application that you are using.

The operating system on a Macintosh is created from the contents of the System folder every time you turn on your computer. A great deal of information is contained in the System folder, including a file called the System file which is the heart of the operating system.

One of the important jobs of the operating system is to provide a list of bitmapped fonts that a software application has access to. This is what you

will see when you pull down the font menu in a software application. (See Figure 3.)

**Printer drivers**

A printer driver is a computer program that acts as the interface between an application and a printer. The LaserWriter driver is a general purpose printer driver that is used for many PostScript printers. It translates documents into PostScript from the Macintosh's internal graphic language (QuickDraw\*\*). It is important because it helps the printer sort out which outline font to choose based on a bitmapped font ID number. (Users of Aldus\*\* products will be familiar with a printer driver called the Aldus driver.)

**Where are fonts stored?**

**Bitmapped fonts** may be stored anywhere on your computer system, however for them to be recognized by the operating system, you must tell the system where the bitmapped font information can be found. There are two ways to do this:

- Bitmapped fonts may be moved into the Macintosh's System file with an application like Font/DA Mover.\*\* Font/DA Mover sees each bitmapped screen font as a particular typeface in a certain size. (See Figure 4.)
- Bitmapped fonts may be made accessible with the utility program Suitcase II\*\* or other installation/access utilities.

Once a particular bitmapped screen font is installed, your application's font size menu will highlight that number with an outline. (See Figure 5 on the next page.)

**Outline fonts** may be found in the following places:

- On your computer on an internal or external hard disk or optical disk.
- In the memory of a file server on a network.
- In the ROM of a printer or RIP.
- In the RAM of a printer or RIP.
- On an external hard disk attached to the printer or RIP.



Figure 3 - Font menu.

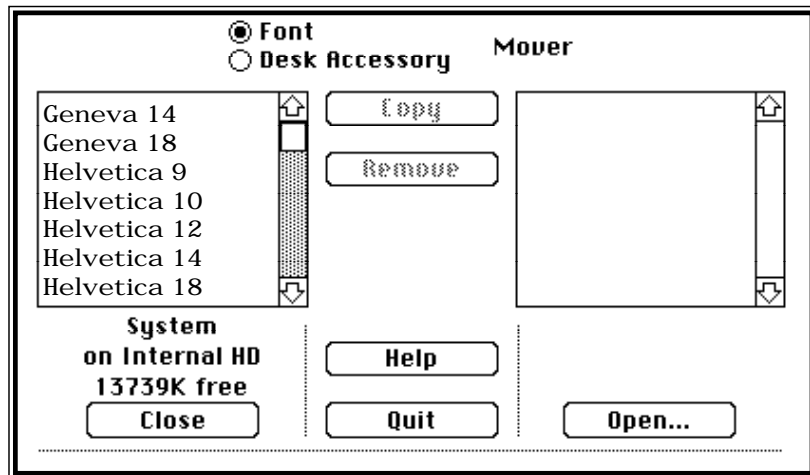


Figure 4 - Menu showing different sizes of bitmapped fonts.

## Downloading outline fonts

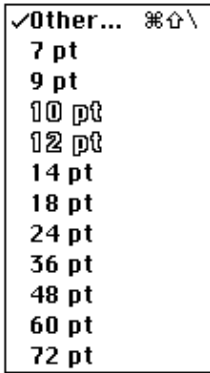


Figure 5 - Font menu showing sizes. Type size highlighted with an outline indicates an available bitmapped font. Other sizes may be selected and will be scaled to that size either from the outline or the bitmapped font. (Note: Outline fonts will be used for screen display only where ATM is installed.)

## Font ID Issues

Downloading is the process of sending an outline font to a location where it may be accessed by the printer. This can be done either automatically or manually.

Page layout or design software programs usually have the ability to do **automatic downloading**. Automatic downloading takes place when you choose Print... from the File menu in a Macintosh application. When the program you are using finds that it does not have an outline font it needs on the printer, it searches the Macintosh System to see if the outline font is there. If it is, the program then downloads the outline font. Also, when an outline font is automatically downloaded, it is deleted from the printer's RAM at the end of the document. For some applications, the deletion occurs at the end of a text block. Having to resend outline font information to the output device each time a document is printed is very time consuming.

Even if your application supports automatic downloading, you can reduce printing time by **manually downloading** outline fonts (with an application like the Linotype Font Downloader). All subsequent documents that use these outline fonts can then be printed without the time it takes to download them. Outline fonts manually downloaded to the printer's RAM remain resident until the printer is turned off or restarted.

Another option, downloading outline fonts to the printer's or RIP's hard disk, can be very beneficial. (Font downloaders give you the choice of downloading either to RAM or to the hard disk.) A hard disk can contain a much greater number of outline fonts than the printer's RAM can hold. After being downloaded to the hard disk, outline fonts can be removed or deleted from your workstation's hard disk to create more free room on the workstation.<sup>1</sup> The outline fonts on the printer's hard disk are available immediately, and remain there until you delete them. As a result, documents print very quickly.

<sup>1</sup>When using ATM, you may wish to leave selected outline fonts on your workstation since ATM uses outline fonts to create the screen display.

**Bitmapped fonts** are recognized by both a name and an ID number. The ID number is necessary because each bitmapped font has multiple sizes. The ID number information for a bitmapped font is contained within the FONt (FONt family Descriptor), a portion of the bitmapped suitcase.

**Outline fonts** are solely defined by name. It is the job of the printer driver to determine which font should be used by matching the bitmapped font number with the appropriate outline font name.

When you create a document, the IDs from the bitmapped screen fonts you used are saved as part of that document. When the document is sent to the printer, the printer driver uses these IDs to find the outline font that it needs.

There have been two font numbering systems during the history of the Macintosh. Apple's original font numbering system (FONT) had one major limitation: far too few available ID numbers. Within a short time, electronic type foundries had created more bitmapped fonts than there were ID numbers available. There was no alternative but to use the same ID number for more than one bitmapped font. When the same font ID number is assigned to two or three bitmapped fonts, it may cause a document to print a different font than the one displayed on-screen.

These unexpected font substitutions forced Apple to create a new font numbering system (called NFNT) which contained many more ID numbers. Apple then called on all electronic type foundries to use the NFNT system and to apply for NFNT numbers so that there would be no more font ID conflicts. NFNT has helped to avoid ID conflicts, but hasn't entirely removed them because not all electronic type foundries have chosen to register their numbers with Apple.

**Concert 2.0**

If you are experiencing font ID problems or other problems related to font management, you should consider the Linotype Concert Series\*. Concert uses the NFNT numbering system and therefore does not have any font ID problems. The recently released Concert 2.0\* also offers a number of utility programs to make working with fonts easier:

- **Linotype Font Downloader** - Installs outline printer fonts on your printer or imaging device twice as quickly as other font downloaders allow, while using less than half the hard disk space. The "Ask Printer" option also saves you time by showing you exactly what outline fonts are resident on the printer. You select only the outline fonts you want to add and download them with a single batch command.
- **Linotype SpeedMenu\*** - Allows you to scroll through the entire list of Concert 2.0 typeface designs in just fractions of a second.
- **Linotype KeyInfo\*** - Automatically generates a printout of character set combinations and keyboard layouts for any typeface installed on your system. (See Figure 6.)

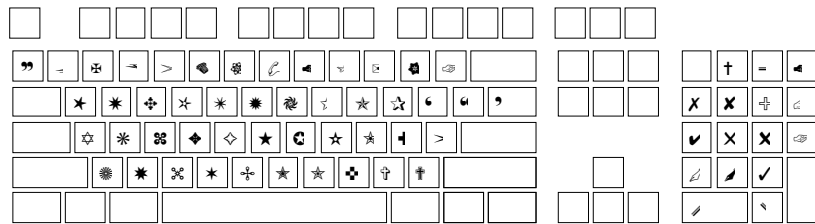


Figure 6 - Keyboard layout using Linotype KeyInfo.

- **Linotype SuitcaseBuilder\*** - Allows you to select individual suitcases and combine them into a single, user-defined suitcase file. You can use batch commands to easily organize fonts in categories such as client, specific job, or alphabetical grouping.
- **Linotype Accordion\*** - Lets you choose between full and collapsed font menus from the same suitcase file. (See Figure 7.)

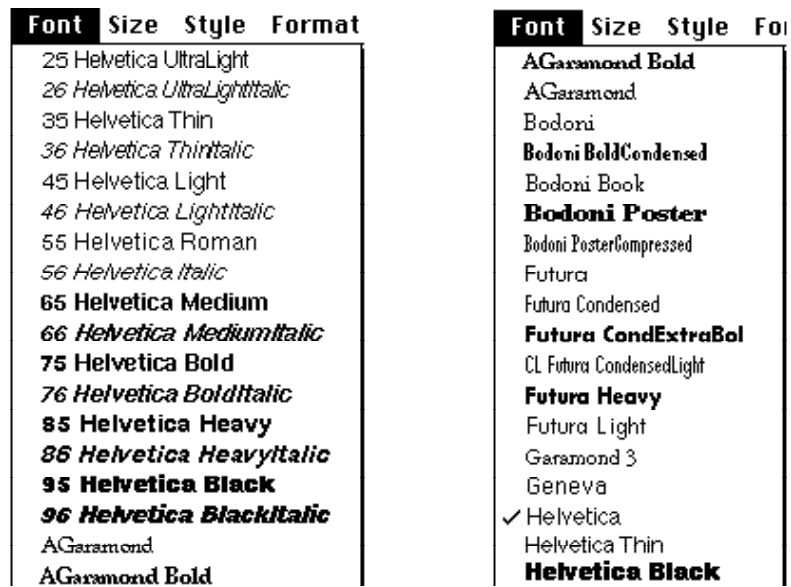


Figure 7 - Regular font menu (left), font menu using Linotype Accordion\* (right).

## Conclusion

To summarize, the operating system of the Macintosh computer puts together a list of bitmapped fonts that are available for screen display. This is the list that you see in your application's font menu when you choose a typeface. Before a job is printed, downloading of outline fonts must be done, either automatically by the application or manually by the user. When the job is printed, the LaserWriter driver identifies the font ID numbers in the job and gives these numbers to the printer which sets out to find the appropriate outline fonts. These outline fonts may reside in a variety of locations on both your Macintosh and printing device. When it finds them it will print the job. If an outline font isn't there, the printer will make a substitution (often Courier) or generate a low-resolution bitmapped version of the missing outline font.

## Further reading

The technical aspect of outline and bitmapped fonts is only a small part of using fonts effectively. Two books by Robin Williams do a nice job of covering the use of the Macintosh, and the use of fonts on a Macintosh. They are: *The Little Mac Book* and *The Mac Is Not A Typewriter*. Both are published by Peachpit Press, 1085 Keith Avenue, Berkeley, CA 94708 (1-800-283-9444).

You will also find the *Concert 2.0 User Guide* to be an extremely useful reference for understanding the use of PostScript fonts.

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## Comments

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