



PC TAP

Consumer Report

PC GRAPHICS FILE TRANSFERS

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PC TAP CONSUMER REPORTS

From the Editor's Desk

In this *PC TAP Consumer Report* we are pleased to publish the first installment in the report of our study of graphics file transfers. The article, which begins on Page 2, addresses the transfer of graphic images among a variety of popular PC graphics programs, and into word processors and desktop publishing programs. The discussion is restricted to the MS-DOS environment. In subsequent reports, which won't necessarily appear in the order listed here, we will be addressing these additional aspects of graphics file transfer:

Mac to PC Transfers: This segment will report on standalone packages that transfer images between the MS-DOS and Macintosh environments. We will discuss how successful programs like Pagemaker are at providing a bridge between these two environments, and we'll report on the results of tests of several new products that move CGM or EPS formats between environments.

Mac-to-Mac Transfers: The Mac graphics transfer environment is in a state of ferment. The whole issue will be discussed in this report, along with results from our testing of how different formats transfer among popular Mac packages.

Mainframe to Micro Transfers: The mainframe-to-micro report will discuss the direct transfer of Computer Graphics Metafiles (CGM) and Encapsulated Postscript (EPS) files from programs like TELL-A-GRAF and SAS to a variety of PC and Macintosh packages. We will also report on solutions that use an emulation package to translate images to PC formats like CGM.

In our next issue we will be reporting on our tests of desktop scanners. Scanning hardware and optical character recognition software have come a long way in the last couple of years, and we enjoyed exploring this fascinating bit of desktop technology. We hope you'll like reading our report as much as we did studying and writing about desktop scanning.

David A. Taylor,
PC TAP Coordinator

GRAPHICS FILE TRANSFERS: PC-TO-PC

Introduction

A wide variety of software products are used throughout EPA to produce graphic images for presentations and to display scientific data. Frequently there is a need to move an image from one graphics product to another. This is often necessary when a number of graphics images, each of which was created using a different graphics package, are being incorporated into a single document or presentation.

Generally, both graphics and desktop publishing software packages store images in a proprietary format. Unique file name extensions are used to indicate the format of graphics files (more about this later). Usually, files created in one format can't be read directly by any other product, and until recently MS-DOS graphic images simply could not be transferred from one program to another. Now image files usually can be *exported* in a special transfer format, translated to the native format of the receiving package, and manipulated or displayed in the new environment.

In the pages that follow, we will be exploring the world of graphics file transfer in the MS-DOS environment found in the thousands of IBM PCs and compatibles throughout the agency. The same process between and within other environments will be addressed in subsequent reports. We will be discussing file transfers between particular software products, often in fairly specific terms. But first let's review some of the basics of graphics files.

About Graphics File Transfers

Compounding the fact that graphic image translation is a broad and complex subject area is the fact that it has been in a state of tremendous flux. However, MS-DOS graphics transfer seems to be settling down with the widespread acceptance of three file transfer formats: Computer Graphics Metafiles (CGM), Encapsulated PostScript (EPS), and Tag Image File Format (TIFF). We will be talking more about these, and others, as we progress through the report.

Raster Images and Vector Images

Another piece of the graphics puzzle relates to the concept of the graphics *image*. There are two types: *raster* images, and *vector* images. It is important for the reader to understand the difference between these two image types, because the variations in their composition makes it difficult to transport images between these unique formats. To add to the confusion, a single image file may contain both raster and vector images.

Raster images are referred to as *bit-mapped*--they're made up of a series of dots (bits) that are configured (mapped) in a specific way. One of the distinguishing characteristics of bit-mapped images is that they are affected by the resolution (density of the dots) of the screen on which they're displayed. On a medium-resolution screen (like a PC VGA or Macintosh II monitor), lines have a ragged appearance; something like you would expect them to look when printed on a dot matrix printer.

Vector images are created by a series of commands that contain instructions for producing, or *drawing* the objects (circles, lines, curves) that comprise an image. Thus, vector images (often called object-oriented images) are produced in much the same way as are plotter images. Object-oriented images are less dependent on the screen environment than raster images. If an object-oriented image is moved to an

alternate environment, it is redrawn within the constraints of the alternate configuration. The appearance of these "resolution independent" images is determined by the capabilities of the device on which they are printed. The commands that are stored with the image are referenced, and the image is re-drawn.

MS-DOS Graphics File Formats

As we mentioned earlier, each graphics package has its own conventions for creating and naming files. The file-name extension usually reflects the package in which a graphics image was created. However, regardless of the environment in which a graphics image is created, in order to transfer it to another environment it must be converted to a format that can be read by the receiving software. Three formats are widely used for graphics file transfers, and for the remainder of this report we will be concentrating on them. Here is a brief definition and description of each.

Computer Graphics Metafile (CGM). An ANSI (American National Standards Institute) standard binary data file format for graphics interchange among a variety of graphics software and computer systems. CGM files contain commands or descriptions of graphics images. CGM import and export utilities enable the creation from, or translation to, other graphics image formats from the ANSI standard.

Encapsulated PostScript (EPS). This is an extension of Adobe Systems' page definition language (PDL) PostScript. PostScript is an output format containing commands that are used directly by devices supporting PostScript. EPS files may contain a screen dump, which may vary from one environment to another. For example, Macintosh EPS files enabling image display use the PICT format, while EPS files are displayed on the PC using either TIFF or Windows Metafile format.

TAG Image File Format (TIFF). A bitmapped format enabling high resolution, and requiring large files. The scanning of hardcopy images is a common source of TIFF files. This format is common to both the Macintosh and the IBM PC.

Experience Summaries: CGM, TIFF, and EPS Files

The following paragraphs contain a general overview of our experiences while testing each of the three major file formats used for graphics file transfer.

CGM Files

Generally CGM file transfer is a workable method of moving graphic images from one PC graphics program to another, or from a graphics file to a word processing file or a desktop publishing document. The process, however, is seldom completely effortless; some amount of editing is almost always necessary in the receiving program. Fortunately the images are almost always fully editable, so required changes can be made easily and quickly. Also, it's important to remember that after *images* (as opposed to text) are imported into word processing or desktop publishing files they can no longer be modified; you must return to the program where the image was created to make these adjustments, then transfer in the corrected image to replace the bad one.

CGM translations are particularly useful for moving charts, graphs, and clip art images from one program to another. In the course of this study we moved graphics files into and out of Harvard Graphics, Freelance Plus, Designer, Arts & Letters, and Zenographics. Images from these programs were also imported into Word Perfect, and into the Ventura Publisher and Pagemaker desktop publishing packages. Our test files contained a bar chart (where appropriate), and images composed of ovals, circles, arcs, text, and clip art from each package.

Editing Considerations. Although there is an amazing variability regarding most aspects of graphics file transfer, some generalizations can be made with respect to editability. CGM imports to graphics programs are almost always fully editable. You can "select" any object in the image and change its color, its fill, the line thickness, etc. That object can then be moved, deleted, or duplicated, just as if it had been created in the receiving program. Since in most programs the image will be imported as a single object, sizing and moving of the whole image will be possible in the new environment. The image is then *ungrouped* or *deselected*, after which it becomes a normal part of its new environment. The images discussed in the following paragraphs were fully editable unless otherwise noted. (Imports into word processing programs and desktop publishing programs can't be edited, but they can be resized, moved, and cropped.)

Portability of Fonts. Text in PC graphics files comes from two sources: software fonts and hardware fonts. Software fonts reside in the graphics program, and when CGM files that contain soft-font text are exported, the text is actually represented as polygons. This text can't be edited as text in the receiving program, but it can be sized and moved. Software fonts should be chosen when you want to preserve the type style in the program where the image was created, and you do not anticipate having to change the wording in the receiving program.

Hardware fonts (including downloadable "soft" fonts) result in actual text being exported in the CGM files. This text becomes identical to text created in the receiving program. The words in the text can be edited, and the size and style of the type can be changed. Since hardware fonts map to type styles and sizes in the receiving program, they frequently map incorrectly. When this happens the affected text must be "selected," and an appropriate type face and size must be chosen in the new environment. Often one or two commands are all that's required to make these changes for the entire image.

Curves and Circles. During file transfers, curves and circles in CGM files often seem to seek the lowest common denominator: the polygon or the line. Circles and complex curved objects rarely translate to curved objects and circles in the receiving program. Instead they translate into "polygons" or "lines" that retain enough data points to allow the translated file to look and print as it should. Although these images can't be edited using the sophisticated curve editing tools present in programs like Arts & Letters and Designer, individual objects do size, move, and print quite satisfactorily. The pseudo curves will not print quite as smoothly as real curves, and the differences in the output range from barely noticeable to quite unsatisfactory. In the following discussions of various software products, the circles and ovals became either lines or polygons unless specifically noted otherwise.

Color to Black & White. When color images are being imported to black and white programs like word processors or desktop publishing packages, problems may result from the unpredictable mapping of colors to shades of gray or patterns. When the final image is to be black and white, it's a good idea to change the image to patterns or gray scales before exporting.

PostScript Printer Output. Interestingly, a real quality difference is evident between CGM images printed on HP Laserjet and PostScript printers. The CGM images print beautifully on PCL-type printers like the HP Laserjet, but look kind of "weak" on postscript printers. If you have a PostScript output device, Encapsulated PostScript images should be used instead of CGM whenever possible. The EPS format is much less readily available, however.

Encapsulated PostScript Files

Encapsulated PostScript files are more predictable than CGM files; they tend to look the same in all the programs that import them. As their name implies, they print only on PostScript printers, so they're not very useful unless you are outputting to such a device. PostScript files may or may not display on the screen in your application; even though *Encapsulated* means a screen image is included, the image does not always display.

EPS files are only printer files, so they can't be edited. They are simply "placed" on the page, after which they can be moved and, because they are vector images, accurately sized. Consequently, the EPS format is much less flexible for transferring graphics images between programs. When EPS images are imported into word processing or desktop publishing software, they can't be edited in the new environment.

Tag Image Format Files

Tag Image Format Files are becoming the standard for storing the bitmapped images that result from scanning. A variety of graphics programs also offer an option to export TIFF files. This should be a last choice as an export format, however, because TIFF files are large and they can't be sized and scaled without risking distortion. On the other hand, a TIFF export is predictable, and it will display and print exactly the same in each package.

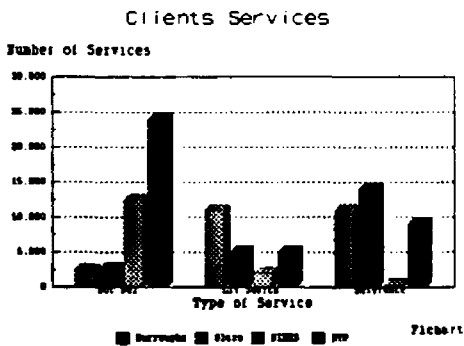
The bitmapped images in TIFF files can be very large. These images can be edited in a paint program, but not in any of the popular PC packages with which we worked. In vector-based graphics programs they can be placed on the page, but no other editing or manipulating can be done. TIFF files have a tendency to turn up displayed 90 degrees from their original orientation; we suspect they will import only in portrait direction. TIFF images display and print consistently from program to program.

Product Reviews

In conducting product reviews, TAP participants evaluated graphics file import and export utilities bundled with leading graphics software. As was mentioned earlier, we focused on the CGM (ANSI standard computer graphics metafile) format. When the CGM format failed, we looked at EPS (Encapsulated PostScript) and TIFF (tag image file format) transfers as alternatives. Sample graphics files, which were built by users of each package, were used to test the ability of product utilities to import from and export to various conversion formats. Images were created using these graphics products:

- Lotus 1-2-3
- Lotus Freelance Plus 3.0
- Software Publishing Harvard Graphics
- Zenographics Mirage
- Micrografix Designer
- Arts & Letters

We created a sample bar chart in each of the packages offering charting (Lotus 1-2-3, Freelance, Harvard). We also prepared a "general image" (the oval image) containing some standard graphic elements--text, circle, ovals, arcs, edges, etc. Finally, we used a piece of "clip art" from each program to test the transferability of complex images. The test images are displayed below and on the following two pages.



Sample Bar Chart



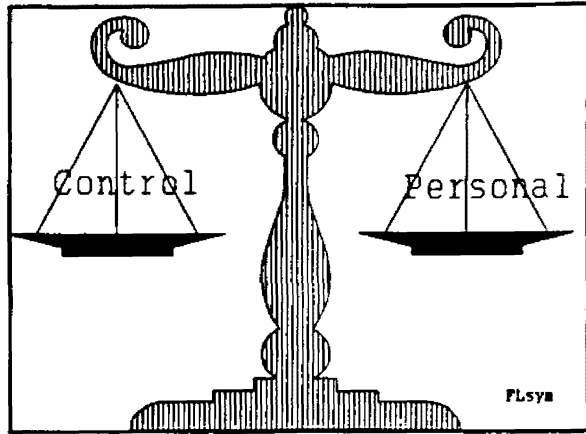
Sample Oval Image

Arts & Letters

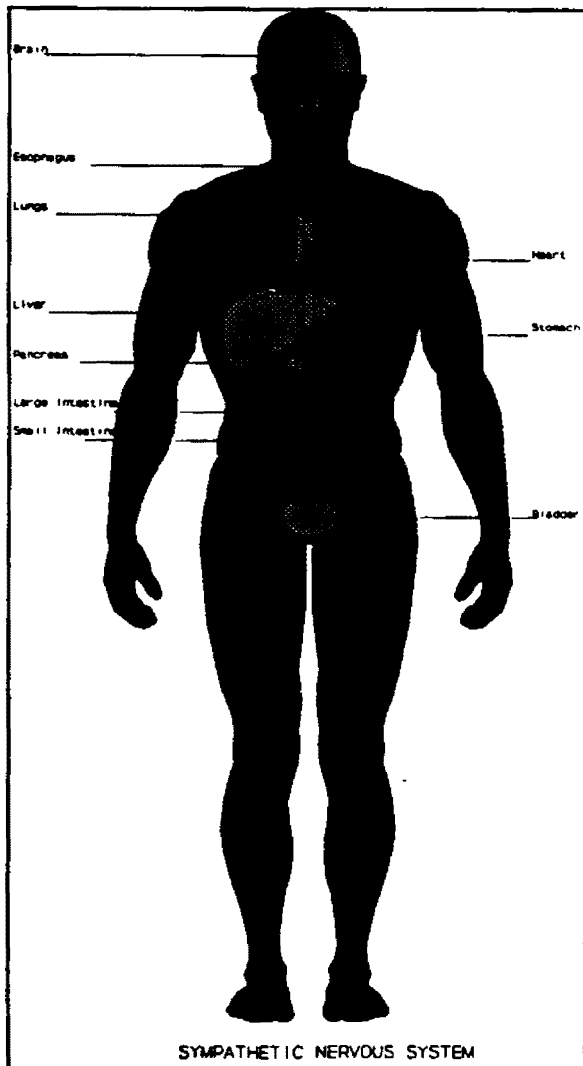


Alclip - Page - 16 million - CGM
New Arts & Letters -

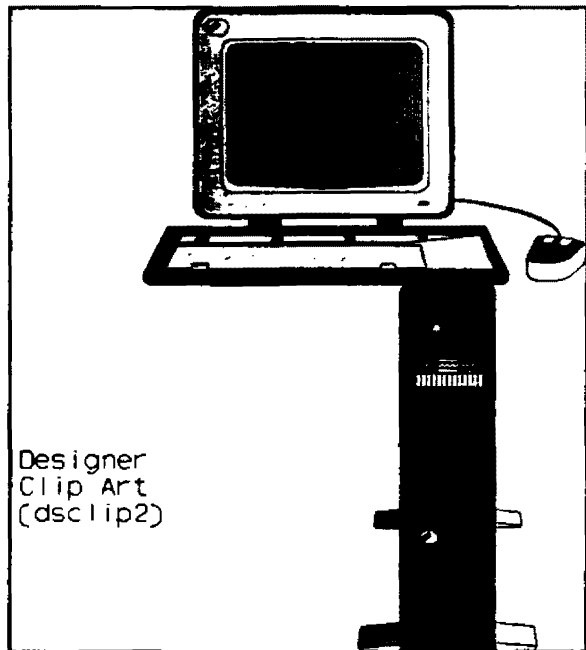
Arts & Letters Clip Art



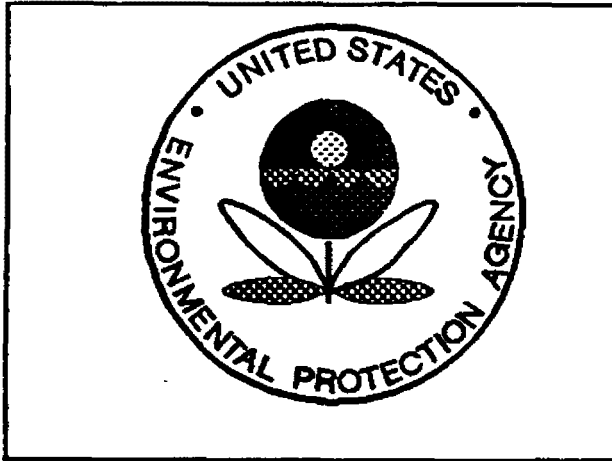
Freelance Clip Art



Designer Anatomy Man



Designer Computer Clip Art



Zeno Full EPA Logo



Zeno Brief EPA Logo

Once the samples had been ported to alternate graphics products, the translated images were evaluated using three basic criteria: faithfulness to original image, ease of modification, and reliability of hardcopy output. We also imported each of the images into WordPerfect, Ventura Publisher, and Pagemaker.

Report Notation

In the discussions of importing and exporting files from each product, we will be referring to a number of file extensions. The file extensions also will be listed across the page at the beginning of each product discussion, along with a notation about which file types the product will import/export. An "I" under an abbreviation indicates that the product will import that file type; an "E" denotes it will export a file in the indicated format. Here are the file types and associated abbreviations:

File Type	Abbreviation
Computer Graphics Metafile	CGM
Encapsulated Postscript	EPS
Hewlett Packard Graphics Language	HPGL
Windows Metafile	WMF
PC Paintbrush Format	PCX
Tag Image Format Files	TIFF
Scanner Files	SCODL
Lotus PIC Files	L.PIC
Lotus 1-2-3 or Symphony Worksheets	WK?
ASCII Files	ASC
Certain Macintosh Graphics Files	PICT

Importing Into Freelance

CGM	EPS	HPGL	WMF	PCX	TIFF	SCODL	L.PIC	WK?	ASC	PICT
I	E	E		E	I	E	I		I	

General Comments. Freelance CGM imports provide very useful access to a number of programs. The imported file generally needs some minor editing, like resizing of the whole image or of the text. This clean-up usually can be accomplished in a minute or two, except for color mapping problems. The color mapping into Freelance is almost never correct. The best color mapping will be achieved if the default

Freelance colors are still in place. Most of the time the colors after import are not the colors you started with. However, color differentiation is maintained; that is, all blue objects will translate to the same wrong color. Using "select like" usually allows quick cleanup. This problem is most severe when bringing an image from a program that supports a wide range of colors to a Freelance file set up for an 8-color output device. The best color imports occur with the color camera files, since they allow the broadest range of color choices (12 different colors at once).

Import Source: Arts & Letters. Images and clip art from Arts & Letters moves very effectively into Freelance using A&L's 16-color CGM export choice. The best procedure is to "select all" and export selected objects, rather than the entire page. Arts & Letters software fonts translate into polygons, of course, so they retain their characteristics. If you want editable text, choose *windows fonts* before exporting. Text is in two layers, an outline layer and a filled polygon. In our oval sample, the ovals and arcs become polygons. When we printed the image the oval looked good, but the arc was weak. The circle edges become separate unfilled lines.

The extensive Arts & Letters clip art libraries exported extremely well to Freelance. While the clip art is totally editable in Freelance, many of the images were created by drawing freehand lines, rather than polygon objects. As a result, it is difficult to select and fill a single object within the drawing. For example, in a drawing of a man with a hat, you could not select the hat and color it red or delete it. The hat was not drawn as a separate object; it is a group of lines that are part of the entire piece of clip art. Nevertheless, the A&L clip art adds tremendous richness to Freelance images. One last note: when objects have an edge, the edge converts to a line that is separate from the rest of the object, and that edge can be edited if you use select inside or touching to get both layers.

Import Source: Micrografix Designer. Designer offers special CGM export for Freelance. The file comes in extremely small and must be enlarged. The translation is reasonably faithful with usual non-circles. We imported a clip art image of the human body with its organs labeled. Although the text required selecting and size editing, this image was very satisfactory. He did have a fuchsia body with blue organs, however, illustrating the random nature of color transition. Designer images definitely can be easily imported into Freelance.

Import Source: Harvard Graphics. The Harvard chart imported particularly well, with text placed and sized correctly. Two of the bars had the same colors. It is possible to avoid this by experimenting with the color slots in the output menu. The oval had more than the usual number of problems. Harvard doesn't really support drawing curves very well; it exports them poorly and the arcs turned into misplaced straight lines. The Harvard symbol exported reasonably well since it was drawn totally with polygons. Harvard offers a CGM export "with or without Harvard fonts" (Harvard fonts are software fonts). The decision should be made as described in the earlier general discussion of CGM exports. One final note: Harvard will export only relatively small CGM files. If your image contains many symbols or much drawing, Harvard will refuse to export it.

Import Source: Zenographics Mirage. Zenographics files export reasonably well into Freelance. In the oval images, the circle edges were created by a separated unfilled circle. These exported as lines and polygons. If you choose the "pre-Swiss" typeface you will map to Freelance fonts; Zeno's software fonts like Swiss will result in polygon text. Zeno images can become too large for import into Freelance, but in general the excellent clip art library can be successfully translated, as can most images drawn with EGO, Zenographics' high end graphics editing program. Colors map very unpredictably. The full-color EPA logo image imports with wild reds and browns, but the object looks good. The arcs of the "leaves" are lines, rather than bows.

Import Source: Lotus PIC. Lotus PIC files import perfectly into Freelance. Colors are correct, and text is appropriately placed and sized. Every element can be edited, and rotated y-axis text is handled properly.

Importing into Harvard Graphics

CGM	EPS	HPGL	WMF	PCX	TIFF	SCODL	L.PIC	WK?	ASC	PICT
IE	E				E	E	I		I	

General Comments. Graphs converted very well, but because of Harvard's relatively primitive drawing capabilities freehand drawings were more of a problem. A number of packages simply lost the oval. The colors did not convert in any predictable fashion; sometimes differentiation was maintained, sometimes all colors converted to a single color. Background colors are not saved with Harvard images, but are determined by the color chosen under setup during that particular Harvard session. This affects imported images as well. Harvard's free-form editing is limited, and the general weakness of "selecting" can make editing tedious since there are no "select likes" to make global changes.

The import procedure, which is external to Harvard, is atrocious. A CONFIG.SYS setup and the use of the DOS SET command are required before importing or exporting CGM files. Files must be converted one at a time into "symbol" files named HG####.SYM, then renamed individually. Furthermore, only ten symbol files may exist at any given time, so if you have more than ten files to convert you must begin renaming and reusing the same ten symbol files before you try to convert the eleventh and subsequent files. There are size limitations on the symbol files too, which will prevent importing some complex clip art into Harvard.

Import Source: Arts & Letters. The Arts & Letters oval image came in pretty well--even the colors were correct. The Arts & Letters clip art PC looked quite good also. The edges were considerably thinner than in the original, and the arcs looked weak.

Import Source: Micrografix Designer. Interestingly, although Designer offers a Harvard CGM export, the Freelance CGM export produced a far superior file. In the Freelance file, the colors were differentiated and all the objects, although visible, were quite crude. The circles, ovals, and arcs were much rougher than in Arts and Letters. No edge coloring was retained. The Harvard CGM import was all black and useless. The Designer computer clip art imported erratically with some parts of the image being almost okay, and other parts--like the mouse--being completely unrecognizable. The anatomy clip art was too large to import, and attempting to do so actually locked up our computer.

Import Source: Freelance. The Freelance chart came in quite faithfully, except that two of the bars were the same color. Correcting this would require tedious editing in Harvard. The oval and one of the arcs disappeared from the oval image. The circles were, however, circles. Our Freelance balance symbol was too large to import completely. If you were desperate for such images, they probably could be imported in pieces.

Import Source: Zenographics Mirage. The oval import was too poor to use. The ovals and circles were extremely rough, and the image either had hidden text and arcs or no text and arcs.

Importing Into Arts & Letters

CGM	EPS	HPGL	WMF	PCX	TIFF	SCODL	L.PIC	WK?	ASC	PICT
IE	E	E		E	IE	E	I		I	

General Comments: Arts & Letters doesn't offer a CGM import option, but Windows Metafile, Lotus PIC, TIFF, and EPS imports are supported. Computer Support Corporation uses Encapsulated PostScript files as the route into Arts & Letters via a batch conversion program that runs at the DOS level or under the Windows Execute and converts the EPS files into fully editable Arts & Letters files. This EPS translator was the best file conversion program of this kind we tested anywhere. Since Encapsulated PostScript files are produced by many Macintosh programs, this conversion utility promises to be a viable option for bringing Mac vector images into the DOS environment. We have successfully used it to import files from Persuasion, Freehand, and other Mac graphics programs. The files imported with circles and curves properly translated to circles and curves; text might or might not translate to text, but it "appeared" exactly as it did in the original file. The resulting file is no different from one created in Arts & Letters from scratch. All curves can be edited with A&L's great curve editing tools. Most imports did have a solid rectangle on top of the image after the "break apart" option was selected. This rectangle could be deleted easily.

CGM files can be imported into Arts & Letters using one of several available circuitous routes. Zenographics metafile will translate a CGM file into a Windows metafile, which subsequently can be read into Arts & Letters. However, Windows metafiles have a file size limitation that causes frequent failures, and they create a "block" import only. As we have pointed out already, metafiles can be sized and moved, but not really edited. On the plus side, it appears that large images that will not copy to the clip board, and which fail in other programs, can be imported into Arts & Letters through the metafile mechanism. Since Designer and Freelance can read CGM files and export EPS files, they too could be used to take a CGM file into Arts & Letters.

Source: Lotus PIC. The Lotus PIC file imported very well while retaining accurate color representation. The text was text, and it was accurately placed and sized. The rotated y-axis text also imported correctly.

Source: Designer Windows Metafile. The Windows metafile import was an exact replica of the original. The anatomy man imported too, although it's surprising that an image of that size made it through the Windows metafile process. There were some problems with the metafile import; the text was difficult to read and, like all metafiles, was uneditable. The edge outline of the man was missing in some places.

Source: Designer Encapsulated PostScript. The translation was perfect, except for text translating to polygons. The import item comes in as a "selected" block that can be sized and moved. If editing is necessary, the "break apart" command will convert the imported image into its component pieces for editing. The image was easy to edit--for example, it was easy to select and change individual organs. The import was in color. The computer clip art looked very good, and each piece could be edited. All the objects in the oval translated to their proper object types in Arts & Letters. A "point" on the oval could be selected, and the curve could be stretched.

Source: Designer TIFF. TIFF files are bitmapped images, rather than vector images, and they redraw quite slowly. When we imported the anatomy man he came in quite accurately, but in black and white. TIFF files should be chosen as a last resort, because they are large, slow to process, and uneditable.

Source: Freelance Encapsulated PostScript. The Freelance images imported beautifully; all three looked perfect. Curves could be edited with curve editing tools; text could be edited with text tools. The import was black and white (reflecting the fact that Freelance does not support any color PostScript printers currently.)

Source: Freelance TIFF. The Freelance TIFF file was accurate, but rotated 90 degrees. Whenever bitmapped images are rotated or resized, you risk distortion.

Source: Harvard Encapsulated PostScript. The imported Harvard chart was rotated 90 degrees, and it was black and white. Considering the poor quality of the "oval" image, the import was excellent. The graph and the clip art imported very well. Curves translated to polygons.

Source: Zenographics Encapsulated PostScript. The Zeno EPS files import fairly well, but they were rotated 90 degrees and were partially off the screen. They can easily be moved onto the screen, rotated, and edited. In the oval image the circles and ellipses are editable curves, but the arcs are polygons. The image looked exactly right. In the black and white version of the EPA logo, the leaves translated as an invisible white that could be selected and recolored.

Importing Into Zenographics

CGM	EPS	HPGL	WMF	PCX	TIFF	SCODL	L.PIC	WK?	ASC	PICT
I	E	E		E	I	E	I		I	

Also imports Autocad DXF and Windows Videoshow

General Comments. Zenographics sells a standalone utility called *Metafile*, which is actually a collection of translation utilities. Metafile imports into Zenographics can be in any of these formats: CGM, HPGL, Autocad, Windows Videoshow, and Windows Metafile. SCODL files, normally destined for a matrix camera, also can be converted to Mirage or CGM files. A Zenographics Mirage user who owns Metafile can import with Mirage, although no access will be available to the Metafile change options. CGM export is available through the output menu.

Metafile has been on the market for several years, and we have used it successfully to convert into Mirage and as a route into CGM format for Videoshow and HPGL files. The recently-released Metafile version 2.0 should be used only with version 5.2 of Mirage. When using earlier versions of Mirage, stick with the older Metafile too. Results are usually unsatisfactory when mixing prior versions of Mirage with Metafile 2.0.

Source: Arts & Letters. The Arts & Letters import looked great, with colors that matched the originals exactly. The circles, ovals, and arcs translated to curved objects that could be edited with A&L's curve editing tools. The text translated to polygons, since Arts & Letters always exports polygons rather than text. The computer clip art was an exact match for the original, except for being slightly smaller. We have made heavy use of Arts & Letters clip art, and the exports generally are fine as long as the polygons are not too large. We tried the SCODL export, but the oval polygon broke apart and the import was not as good as the CGM choice.

Source: Designer. As always with the current version of Designer, the imported images were very tiny. But these imports were *wild*: large diagonals of black and white across the screen. They were completely unusable. SCODL imports generated Metafile error messages.

Designer offers CGM export options to Freelance, Harvard, Pixie, and PageMaker. The Freelance CGMs all errored out in Metafile, while those from Harvard and Pixie were unusable.

Only the Videoshow Import option was viable between Designer and Zenographics. Large polygon problems were common with this import, however. The computer clip art included a filled polygon that should not have been filled, and that obscured all the detail in the image.

Source: Freelance. Freelance imports were excellent. The colors matched the originals exactly (quite an accomplishment, considering Freelance doesn't export colors in CGM files). The only flaw was that the text was about 20 percent too large, but this was easily rectified through editing. The ovals, circles, and arcs were ovals, circles, and arcs. There was a strange problem with "background objects." There was one covering up some of the objects in the middle of each image (the original Freelance images had "white" backgrounds). The objectionable background objects can be deleted easily.

The SCODL imports were inferior to the CGM imports. They all had a light blue background. Text was the right size, but had changed to white, which was invisible after the background was removed. Unlike the CGM import, the ovals, arcs, and circles were all polygons.

Source: Harvard. The Harvard chart imported handsomely and precisely. However, a "background object" usually had to be deleted. The colors imported correctly. If the "Harvard Fonts" option was selected in the import, you have nice looking polygon text that can be sized and moved, but can't be edited as text. In imports without Harvard fonts, the text must be selected and a typeface and size must be chosen. Since cleaning up text is simple with Zenographics' "select all text" feature, you may want to import without Harvard fonts for maximum flexibility.

The oval image, which is actually multiple pie pieces, printed well, and the circles were circles. The Harvard symbol also imported well, although some of the colors were wrong. The SCODL import was a disaster. The oval polygon broke up into a mushroom shape, and the circles became lines. The whole image was quite small.

It should be noted that Harvard CGM export will handle only relatively small files. If your Harvard image contains many symbols or much drawing, Harvard will refuse to export it.

Imports Into Designer

CGM	EPS	HPGL	WMF	PCX	TIFF	SCODL	L.PIC	WK?	ASC	PICT
IE	E	E		E	IE	E	I		I	

Source: Arts & Letters. Images should be exported from Arts & Letters using the "16 million color" option, and imported into Designer with the "Freelance CGM" option. Colors in our oval image were an exact match, although some solids became patterns. Edges were retained, and as usual curved objects translated into polygons that looked very good. Circles translated as circles. Both the computer and the anatomy man clip art images imported very well.

As an alternative to CGM import we tried both Windows Metafile and the clipboard. Neither method would work because of the file size limitations on these file transfer techniques. Even our oval image was too large to import as a Windows Metafile or to place on the clipboard. We also attempted to load the Arts & Letters TIFF file, but received a message that the file could not load completely.

Source: Freelance. All the CGM imports were very good. Although the colors were differentiated, they were wrong because Freelance CGM files don't support colors. The text was text, and the edges were there. The arcs and ovals were polygons or polyines, rather than true Designer curves.

Source: Harvard Graphics. The Harvard CGM chart was rather strange; the text came in rotated 90 degrees. Using Designer's sophisticated selection features, it was possible to select all the text in one command and rotate it. The colors were changed and the Harvard non-oval was strange. The Harvard symbol looked good. Text was text or polygons, depending on whether the export choice specified Harvard fonts. Again, it must be kept in mind that Harvard will export only small CGM files.

Source: Zenographics. Most of the CGM files simply produced no image on the screen. The same file that could be moved satisfactorily into another program would generate the "Importing" message, but when the process was over, no image appeared. This was true for both the Pixie and CGM import choices.

Importing Into WordPerfect

CGM	EPS	HPGL	WMF	PCX	TIFF	SCODL	L.PIC	WK?	ASC	PICT
IE	E	E		E	IE	E	I		I	

General Comments: Whenever possible, images destined to be imported into a word processing program should be prepared in black and white, with use of gray shades or patterns to provide necessary contrast. Use software fonts when they're available, since they provide the most attractive and predictable text appearance.

The graphics format for import into WordPerfect is the WPG (WordPerfect Graphics) file. These are actually CGM files that can be read directly into WordPerfect, so it isn't necessary to run them through GRAPHCV, the WordPerfect graphics conversion program. GRAPHCV, which can be found under the WP50 or WP directory, offers a number of options for *tuning* images. It's important to note, however, that Encapsulated PostScript files created in many other packages must be made compatible with WordPerfect before GRAPHCV will process them. The "raw" EPS file must be edited so the first two lines read like this:

```
First line:  %!PS-Adobe-2.0 EPS
Second line: %% boundingbox:
```

Without these lines, WordPerfect will not process the file. In Harvard Graphics, Designer, and Arts & Letters a substantial amount of "garbage" must be deleted before the "%!PS-Adobe-2.0 EPS" header appears. Freelance does a better job of saving EPS files; only one percent sign must be deleted. Furthermore, an updated Freelance Plus (version 3.01, a free update) saves "clean" EPS files that require no editing.

WordPerfect does a very creditable job of importing a tremendous variety of graphics images. In fact, WordPerfect is actually more successful than Ventura Publisher or Pagemaker at importing many of these images. Although some of the shading looks better when the images are included in Ventura or Pagemaker documents, many images were simply too large for Ventura or Pagemaker to handle (on a 640k machine). WordPerfect imported these CGM files with no image or size problems.

WordPerfect CGM graphics look very good when output to HP Laserjet and compatibles. Although they sometimes look ok when output to PostScript printers, the results are less true to the originals. The CGM files convert to straight black and white images when printed on a PostScript printer; any shades of gray, patterns, or colors all convert either to black or white. As a result, the images generally are not very usable. If your file is to be printed on a PostScript printer, you should export it using the Encapsulated PostScript format, rather than CGM. We also imported some TIFF images, but their quality was inferior to the CGM or EPS images regardless of what printer they were destined for. No file conversion failures were encountered with Zenographics images.

Source: Arts & Letters. The 16-million color CGM export produced the best CGM results on Laserjet printers, and A&L EPS files looked good on PostScript printers. The color CGM oval image really needed to be re-edited into black and white to preserve sufficient contrast. The color EPS translated well without being re-edited. The EPS A&L computer clip art errored out in GRAPHCV.

Source: Designer. The Designer CGM (Freelance choice) clip art came into WP beautifully. The text seemed to export somewhat larger than it should have. The oval CGM image had contrast problems. On the PostScript printer the EPS oval looked very good, but CGM images refused to print and locked up the printer. The other images produced error messages in GRAPHCV.

Source: Freelance. Freelance CGM images (and consequently Graphwriter or Lotus) come into WordPerfect well. The color chart came in very acceptably and with adequate contrast to interpret the chart easily. The clip art image looked good, but color contrast surfaced again on the oval image. Although Freelance EPS files do not show on the preview screen, they do print correctly.

Source: Harvard Graphics. Both the Harvard symbol CGM and the chart CGM imported well into WordPerfect. The oval image showed its pie-piece origin clearly. When the CGM files were printed on the PostScript printer they were unusable since they lost their patterns and gray scales, as usual. The Harvard EPS file exported and printed well, but was rotated 90 degrees.

Source: Zenographics. Zenographics CGM image ported nicely into WordPerfect. Although color translation yielded the usual unpredictable results, Zeno's seven levels of gray or shading patterns allowed creation of strong images for export. As usual, they did not print well on a PostScript printer.

Importing Into Desktop Publishing Software

Two desktop publishing products were used in our tests: Ventura Publisher and Pagemaker. We tested Ventura Publisher Version 2.0 without the Professional Extension. This version will run on a standard 286 machine with 640k of memory. Many of our images would not load completely. They probably would load if we had used a machine with 4 megabytes of memory and Ventura's Professional Extension. We created the same document in PC Pagemaker 3.0 running under Windows 286.

The same CGM, EPS, and TIFF images that were used to test the products discussed earlier were imported into these two programs, and the imported files were printed on the HP Laserjet II, and on either the Apple Laserwriter or QMS PS810 PostScript printer. The PostScript images did not, of course, print on the non-PostScript HP Laserjet.

Importing Into Ventura Publisher

General Comments. We did our testing with a "full up" version of Ventura that includes Professional Extension and extra memory. With standard Ventura a number of the images were too large to load. Generally CGM images looked better when printed on the LaserJet where they tended to have shades of gray, than they did on PostScript printers where patterns of black and white appeared.

Ventura Publisher will import a wide variety of file formats. We tested CGM, EPS and TIFF imports. CGM and EPS formats are preferable, because they are vector-based files that contain commands to draw objects, and they generally are quite reasonable in size and in speed of redrawing. Vector-based graphics also can be resized as much as desired without any image distortion. The disadvantage of TIFF (or PCX or Paint) bitmapped images is that they should be printed at the size in which they were created, or at some multiple of that size. Worrying about resizing these images adds to the complexity of working with Desktop publishing files. TIFF files also load and redraw very slowly. CGM images have the additional advantage

that they always will display on your screen. EPS and TIFF files often don't actually show on the screen in a program like Ventura.

Source: Arts & Letters. Without the Professional Extension, the A&L oval images are too large to load completely. Using Professional Extension the clip art and oval images look very good. Color translates to gray scales on output and looks great. You can use A&L's great clip art library effectively with Ventura using the CGM export choice.

We had problems with both the EPS and TIFF exports. Although we had good success with EPS imports with A&L's earlier version, this time we could not use EPS files. When importing an "EPS with TIFF screen" image, Ventura either locked up or dropped to DOS. For "EPS with Metafile Screen," the import appeared successful, but no image printed or displayed. The TIFF exports simply don't look good, so stick to CGM export.

Source: Designer. Conversion from color to gray scales is quite acceptable. The Pagemaker CGM is a good choice on the Designer export menu. The CGM image of the anatomy man was too large to print completely, even with Professional Extension. The CGM images looked much better printed on the HP LaserJet than they did on either an Apple LaserWriter or the QMS PS810 PostScript printer. The EPS exports were handsome. With Designer, the TIFF versions printed well. Curiously, the export choice "EPS with TIFF Screen" created an image that printed nicely on PostScript printers and on non-PostScript printers.

Source: Freelance. The Freelance chart and the oval image came into Ventura well laid out, and with good contrast. The Freelance CGM symbol was too large to print completely. Again we found that CGM images looked better on the Laserjet printer than on the PostScript printers. The objects' edges were lost, so the image lost its crispness. Freelance's EPS exports looked good, and the symbol images imported completely.

Source: Harvard. The Harvard CGM images looked very good. The colors translated to gray scales and patterns without problems in all cases. The chart looked especially good. The CGM files looked a little better on the LaserJet. The EPS image was rotated 90 degrees; portrait orientation should be chosen.

Note: Harvard CGM export can only export relatively small files. If your Harvard image contains many symbols or much drawing, Harvard will refuse to export it.

Source: Zenographics. Zenographics CGM exports look great in Ventura. The colors translate well to shades of gray. Zeno offers a special Ventura export, but for most files the standard CGM export looks fine. Their new EPS export (no header option) almost works. Just as in Arts & Letters, the EPS file import rotated 90 degrees and with about 25% of the image off the screen.

Importing into Pagemaker

General Comments. Like Ventura, PageMaker supports a variety of graphics formats for import. Like Ventura, the quality of the results varies depending on the source of the file and whether the image is printed on a Laserjet printer or a PostScript printer. Because it runs under Windows, PageMaker suffers from a 64K file-size limit for imported files. Many images simply didn't import completely. In general, Ventura appears to be superior to PageMaker for incorporating graphics from a wide variety of sources. More images printed successfully in Ventura, and they frequently looked better in Ventura.

With respect to printing, Pagemaker simply didn't do a very good job with the HP Laserjet printer. The CGM and TIFF images didn't look nearly as good as they did in other programs. Many of them were incomplete. Pagemaker seems to handle the text in graphic images as text, so frequently it didn't print correctly.

Source: Arts & Letters. The CGM formats worked well, although the text in the oval image was lost due to file import size problems. The EPS computer clip art from A&L looked very good, and it printed well on the Laserwriter. The "EPS with Metafile Screen" looked very nice on the PostScript printer and provided a good screen image. The TIFF images were inferior to CGM or PostScript. The colored background of the TIFF oval translated into a very dark "plaid" fill.

Source: Designer. The Designer CGMs are only "adequate" on both the Laserjet and PostScript printers. The file size limit cripples these imports. The CGM computer has no detail; both the CGM and EPS anatomy man have no organs or labels; the EPS oval doesn't come in at all. With respect to appearance, the oval image is okay; the anatomy man is just a "filled" body. The computer clip art and the Designer TIFF look pretty good.

Source: Freelance Plus. Again, the Laserjet generally didn't provide satisfactory output compared with the PostScript printer. The Freelance CGM files imported into Pagemaker much less satisfactorily than they did into Ventura. The text was not quite the right size, and generally it was "shifted." The contrast among the bars in the chart was not sufficient for the chart to be usable. (Of course, editing the original image using gray scales or patterns would have corrected this.) The text in the oval image was misplaced and became italic. Surprisingly, the Freelance symbol, which proved too large to import into Ventura, imported without difficulty into Pagemaker. The EPS images had good contrast and good text. The Freelance TIFF export was rotated 90 degrees, as always. Contrast on the TIFF chart was much better than in the CGM export, but the patterns were ugly.

Source: Harvard. The Harvard chart and ovals generated error messages indicating that the images were "too complex" and required "too much memory." The Harvard symbol imported alright. The EPS version of the oval image looked fine, but true to form it was rotated 90 degrees.

Source: Zenographics. Zeno's regular CGM images produced very nice looking output on the PostScript printer. The EPS images looked fine except for being misaligned in the box. (This can be fixed within Pagemaker.) The CGM images were seriously distorted when printed on the Laserjet.

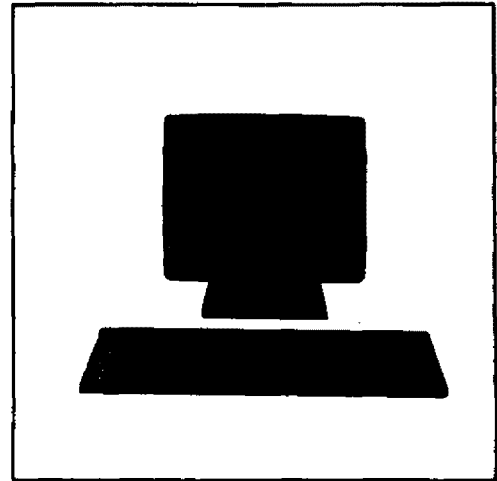
Environmental Variations

We have commented from time to time about variations in output when graphics images are printed on different devices, and from different software products. This was clearly shown in output from WordPerfect, Ventura, and Pagemaker. So you can see for yourself what we're talking about, the same six images were imported into these three products, then they were printed on both a non-PostScript printer and a PostScript printer. The results are reproduced on the next two pages. Note the variations between the two sets of images. For comparisons with the images as they look in their native environments, refer back to pages 6-8.

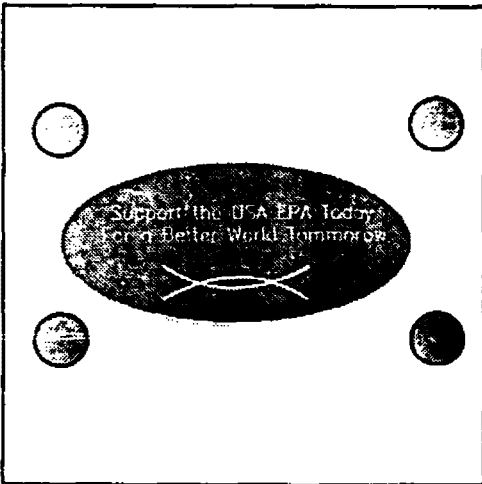
Images Printed on Non-PostScript Laser Printer



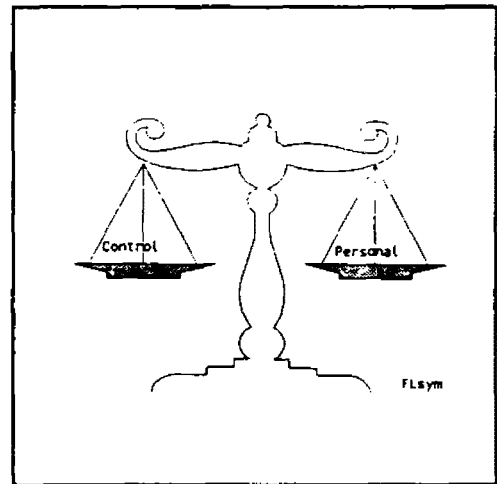
WordPerfect: Zenographics
CGM Image



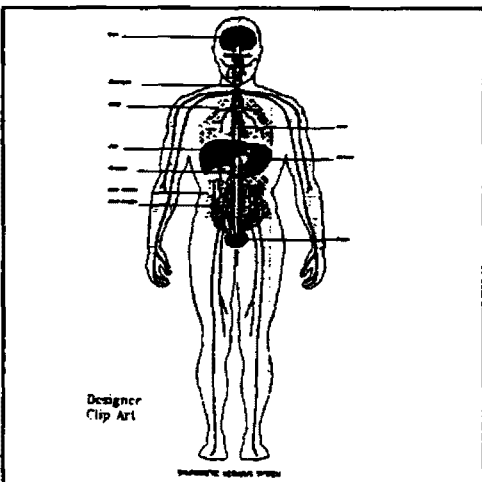
Pagemaker: Arts & Letters
CGM Image



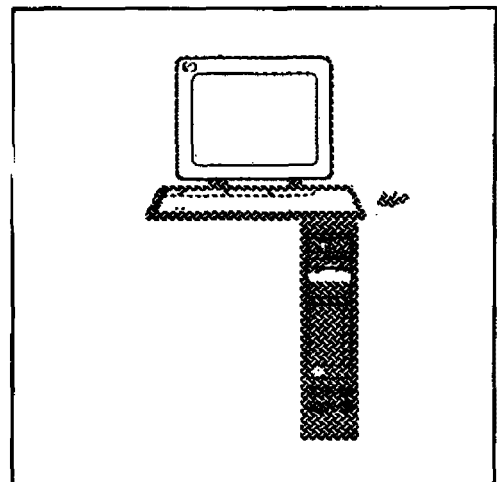
Pagemaker: Designer TIFF Image



Pagemaker: Freelance CGM Image



Ventura: Designer EPS Image

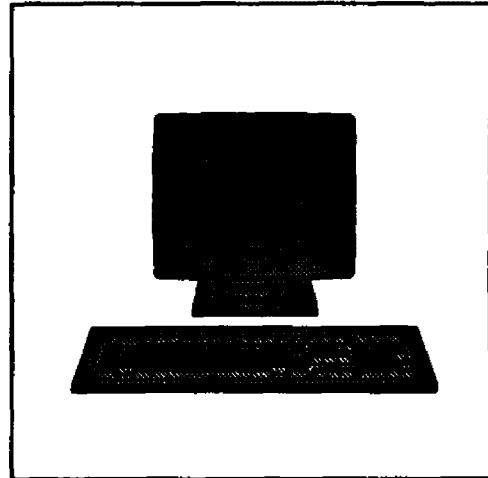


Ventura: Designer CGM Image

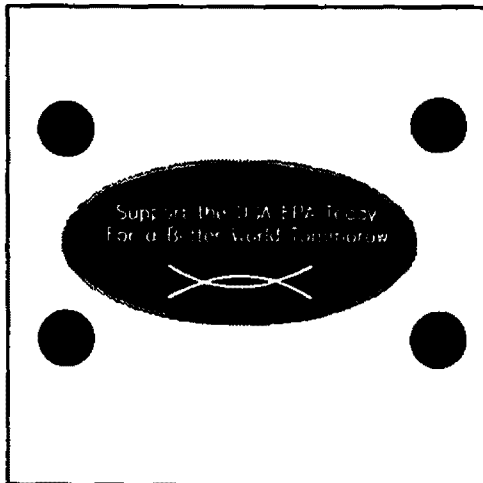
Images Printed on PostScript Printer



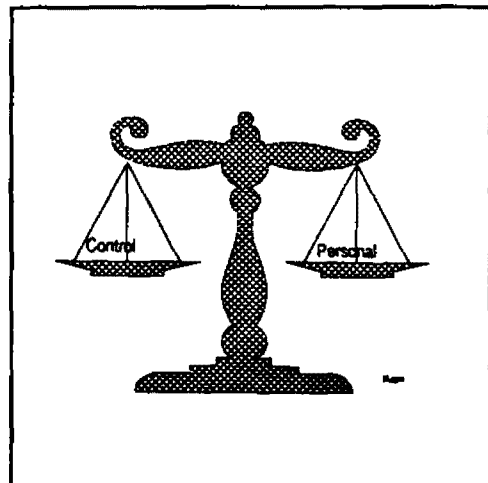
WordPerfect: Zenographics
CGM Image



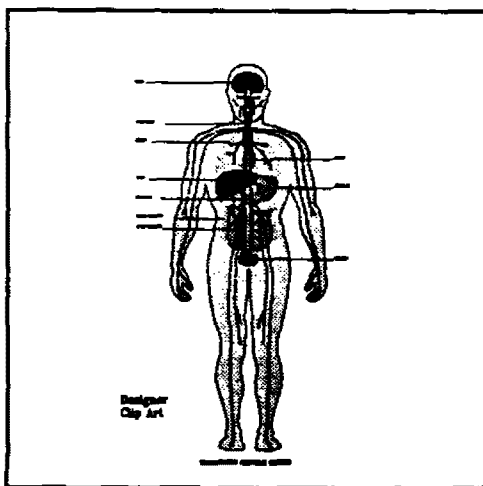
Pagemaker: Arts & Letters
CGM Image



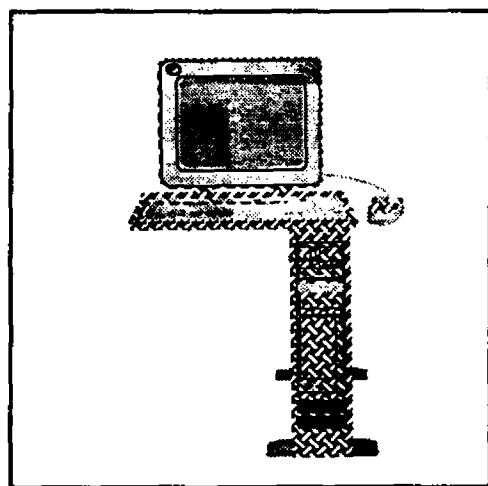
Pagemaker: Designer TIFF Image



Pagemaker: Freelance CGM Image



Ventura: Designer EPS Image



Ventura: Designer CGM Image

Summary

As we have seen, the standard in graphics file transfers is that there really is no standard. Perhaps that is to be expected with the wide variety of products that are available from numerous vendors. Hardware matters too, as is apparent in the difference between certain files printed on PostScript printers versus non-PostScript devices. Most important of all, output quality also varies with different software combinations. This was evident in the discussions of importing and exporting the same file types between different pairs of products. For example, CGM files from Freelance Plus imported quite well into Designer, but attempts to import Zenographics CGM files into Designer were never successful. If you're contemplating the purchase of software and importing/exporting of graphics files is a consideration, the best advice we can offer, is "try it before you buy it."

Looking Ahead

A bright spot in the graphics file exchange picture is the growing use of the Graphic Interchange Format (GIF, pronounced "jiff"). GIF files provide a universal exchange format for high-resolution microcomputer graphic images without regard to hardware compatibility. An added advantage relates to size: GIF stores raster-based images in a compressed format that compresses both the size of the files and the time required to process them. Furthermore, text and images can be scanned and saved in the same file, rather than in different files as is required with other file formats. A software "decoder" (widely available for a number of microcomputers, including PCs and Macs) is required for reading a GIF file. The decoder's job is to format the image for the hardware in use; this is how device independence is achieved. The graphic image conforms to the resolution and color capabilities of the device on which it is being printed or displayed. Proponents of the GIF protocol point out that it's public domain, and they want it to become the industry standard. If they get their way, the Graphic Interchange Format may well be the wave of the future.

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How to Submit Items for Open Forum

In keeping with the PC Technology Assessment Program's objective to have the user community actively involved in TAP projects, users are encouraged to submit items for inclusion in future *PC TAP Consumer Reports*. If you have independently investigated the capabilities of a software product or a hardware component, we would like to hear from you. We'd also like you to share with others your solutions to any problems you may have encountered with a particular application or device, and about tricks, shortcuts, or unique applications you have devised. Although we can't promise to publish every contribution, we will evaluate them all in terms of their potential interest to our readers and their conformance to the spirit and intent of PC TAP.

There are no additional rules for *Open Forum* contributions, but here are some guidelines:

1. Contributions must be typed. Our first preference is that they be submitted on a floppy disk in WordPerfect format. If that isn't possible, the next best method is to EMAIL the text to DAVE.TAYLOR, EPA3099. The least preferable method, but still acceptable, is to mail a typewritten article to TAP at the address on the cover of this publication.
2. The length of your contribution will be determined somewhat by its complexity. However, keep in mind that we're primarily interested in the purpose of your study project and how pleased you were with the results, not in the nitty-gritty details of how you did it. We will publish your name, address, and phone number for those who want more details. Two to three pages is probably a reasonable maximum length. On the other hand, a paragraph containing a nugget that may be useful to others would be equally welcome.
3. All material submitted by users is subject to our editing, and you will not be given an opportunity to review the final manuscript before publication. Sorry, you'll just have to trust us. If we have questions or don't understand any part of your text, we'll contact you for clarification.

We hope you enjoy *PC TAP Consumer Reports*, and we look forward to hearing from individuals who have insights or discoveries to share with others. Thanks for your interest and your participation in the PC Technology Assessment Program.