Image Alchemy

and

Image Alchemy PS

Version 1.11

Handmade Software, Inc.

Notice

Handmade Software, Inc. makes no warranty of any kind either expressed or implied. In particular we make no warranty as to merchantability or fitness for a particular purpose.

In no event shall Handmade Software, Inc. be liable for any errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of the Image Alchemy or Image Alchemy PS product or documentation.

The information in this document is subject to change without notice.

Trademarks

Image Alchemy and Image Alchemy PS are trademarks of Handmade Software, Inc.

All other products or services mentioned in this manual are trademarks, registered trademarks, service marks, or registered service marks of their respective companies or organizations.

Copyright

Printed in the United States of America.

First Printing, April 1998

Image Alchemy was written by:

Marcos H. Woehrmann
Allan N. Hessenflow
David Kettmann
Paul H. Yoshimune

Handmade Software, Inc.
48860 Milmont Drive, Suite 106
Fremont, CA 94538

1 800 252 0101
+1 510 252 0101
+1 510 252 0909 fax

http://www.handmade.com/

Contents

Chapter 5 Conversion Options

Chapter 7 Color and Palette Options

Chapter 8 Scaling and Filtering Options

Chapter 9 Viewing Options (MS-DOS Only)

0

Introduction to Image Alchemy

What is Image Alchemy?

Image Alchemy is a software utility that manipulates computer image files.

Image Alchemy converts between various graphics file formats, including industry standard file formats as well as vendor specific file formats. For example, from GIF to TIFF or from Sun Raster to Scodl. Currently Alchemy supports over 90 different formats, and new formats are always being added.

Image Alchemy can also resize an image, change the number of colors in an image, change an image from color to black and white, and change the color space an image uses.

In addition Image Alchemy PS converts PostScript, EPS, and PDF files to over 90 different raster file formats, such as TIFF and PCX. Alchemy PS also allows you to print PostScript, EPS, and PDF files on non-PostScript printers and plotters, such as HP LaserJet printers, HP DesignJet plotters, and Novajet plotters.

About this manual

This manual is divided into 11 chapters, 11 appendices, a glossary, references, a colophon, and an index.

Chapter 0	Introduction and Conventions
Chapter 1	Installation Instructions
Chapter 2	Introduction to Alchemy
Chapter 3	Reading PostScript Files
Chapter 4	PostScript Fonts
Chapter 5	Conversion Options
Chapter 6	General Options
Chapter 7	Color and Palette Options
Chapter 8	Scaling and Filtering Options
Chapter 9	Viewing Options (MS-DOS only)
Appendix A	Answers to Frequently Asked Questions
Appendix B	Color and Dithering
Appendix C	JPEG Description
Appendix D	Customer Support
Appendix E	Binary Information Files (BIF)
Appendix F	HSI Raw Files
Appendix G	Undercolor Removal Files
Appendix H	PAL Files
Appendix I	Acknowledgments
Appendix J	Other Useful Software
Appendix K	Configuring DOS/4GW (MS-DOS only)
Glossary	
References	
Colophon	
Index	

Document conventions

Type style	Used for
italic	Parameters. You supply values for the items shown in italic. For example, if the description of a command includes *filename*, you would type in the name of the desired file.
[ ]	Brackets. Indicate optional items.
…	Ellipses. Indicates a list of items or items which may be repeated.
`fixedspace`	Examples of Alchemy usage which can be typed in exactly as written. Many of the examples give file names which probably don't exist on your system; substitute different file names as appropriate.

Installing Image Alchemy

Overview

Installation of Image Alchemy is straightforward; it involves copying the Alchemy program and support files off of the supplied floppy disks or tape onto your hard drive or network and setting some environment variables.

The PC versions of Alchemy includes a setup program which copies the files for you.

You need to be familiar with the tar command if doing a UNIX installation. If you are unsure of how to use this command you may wish to read the manuals which came with your computer or ask someone to assist you.

The installation instructions are divided into different sections for Image Alchemy for PC, including MS-DOS, Windows 95, and Windows NT and Image Alchemy for UNIX. Please refer to the section which corresponds to the version of Image Alchemy you have.

Image Alchemy and Image Alchemy PS for PC include an executable named alchlong.exe. Alchlong.exe is a 32 bit Windows 95/NT console application; it is run from the command line. Alchlong.exe has two advantages over alchemy.exe (or alch386.exe): when converting Postscript files it uses up to 2 processors on a multi-processor Windows NT machine and it can process files with long filenames.

PC Installation

Depending on which version of Image Alchemy you purchased there are up to three executable files included: alchemy.exe, alch386.exe, and alchlong.exe.

The alchemy.exe program is the standard version of Image Alchemy, and can be used to process files up to 2550 pixels by 3300 pixels (8.5" x 11" at 300 dpi).

The alch386.exe program is an extended 32-bit version of Image Alchemy which can be used to process files up to 65000 pixels by 65000 pixels. It is also slightly faster than alchemy.exe. The disadvantage that alch386.exe has is that it has a longer startup time, so much so that converting small images takes longer than using alchemy.exe, and it does not support image viewing.

The alchlong.exe program is a Windows 95/Windows NT console application. It is also a 32-bit version of Image Alchemy. In addition to supporting larger files than alchemy.exe, it has the ability to read and write files which have long filenames, which are supported by Windows 95 and Windows NT 4.0.

If you need to use alch386.exe or alchlong.exe simply substitute it for alchemy.exe in the examples shown in the manual.

Required equipment

At a minimum you must have the following hardware and software to run Image Alchemy.

Computer

An MS-DOS computer equipped with an 80386, 80486, Pentium, or other 32-bit Intel processor.

Many of the conversions that Alchemy does are CPU intensive, so a faster computer is definitely an advantage.

Memory

At least 4 megabytes of memory.

Hard drive

A hard drive with as much free space possible.

Converting very high resolution images can require large amounts of disk space (for example, a 8.5" x 11" color PostScript file converted at 300 dpi will require up to 50 megabytes of disk space).

Operating system

Windows 95, Windows NT, or MS-DOS 3.x or greater (because of the additional free memory available, use of MS-DOS 5.0 or higher is recommended).

Note that the setup.exe program used by Image Alchemy is a Windows 32-bit application. If you need to install Image Alchemy on a computer which is running Windows 3.1 or MS-DOS contact us for an alternate set of install disks.

Optional equipment

The following hardware is optional.

Display

A supported SVGA, 8514/A, or XGA board, if you wish to view images.

Supported SVGA boards include those with a VESA driver or with the Paradise, Everex, Trident, Video 7, ATI, Ahead, NCR, or Tseng Labs chipsets.

Supported 8514/A boards include IBM and those with the Western Digital chipset.

Supported XGA boards include those from IBM.

Math co-processor

A math co-processor will increase the speed of converting a PostScript file and raster scaling types c and d.

Packing list

The enclosed diskettes contain the following files:

SETUP.EXE	The Image Alchemy installation program.

ALCHEMY.EXE	The Alchemy software.
ALCH386.EXE	The 32-bit version of Alchemy (only included with Alchemy/386 and Alchemy PS).
ALCHLONG.EXE	The long filename version of Alchemy.
ALCHFONT.EXE	A tool for installing PostScript fonts for use by Alchemy PS (only included with Alchemy PS).
ALCHPS.EXE	The PostScript rendering overlay used by Alchemy (only included with Alchemy PS).
ALCHEMY.PDF	This document in Adobe Acrobat PDF form.
README.TXT	A text document describing any last minute revisions.
\SAMPLES	A directory containing sample data files and images. See the README2.TXT file in this directory for further information.
\PS	A directory containing the fonts supplied with Alchemy PS (only included with Alchemy PS).

Floppy disk installation instructions

1. Insert disk 1 in your disk drive.
2. Open the disk drive icon.
3. Double-click on the setup.exe icon.
4. When prompted, change diskettes and press any key to continue. Repeat this step for each diskette.
5. You have now successfully installed Image Alchemy.
6. The file readme.txt contains information which has changed since the manual was printed. To display this file double-click on it.

CD-ROM installation instructions

1. Insert the CD-ROM in your CD-ROM drive.
2. Open the CD-ROM drive icon.
3. Double-click on the `setup.exe` icon.
4. You have now successfully installed Image Alchemy.
5. The file `readme.txt` contains information which has changed since the manual was printed. To display this file double-click on it.

Environment variables and config.sys

Image Alchemy uses several different environment variables to determine its behavior. These control, among other things, how Image Alchemy uses memory, where PostScript fonts are stored, which display resolutions are available for image viewing, and where temporary files are stored.

config.sys

To insure that Image Alchemy can open the various files it needs while running, you should verify that the `files` value in your `\config.sys` file is set to at least 30 and the `buffers` value is set to at least 20 if you are running MS-DOS or Windows 95. If you are running Windows NT these values do not need to be set.

autoexec.bat

There are several changes you may wish to make to your autoexec.bat file. These consist primarily of set commands, which are used to configure Image Alchemy.

path

You must either add `c:\alchemy` to your path, copy the .exe files to a directory which is already in your path, or be in the `c:\alchemy` directory when executing Alchemy.

PostScript fonts

The fonts that ship with Image Alchemy PS are normally found in the `c:\alchemy\ps` directory, but this can vary depending on where you installed Alchemy.

Alchemy can find the `c:\alchemy\ps` directory if the `c:\alchemy` directory is in your path, if it is the current directory, or if the alchemy.exe program is explicitly executed from the `c:\alchemy` directory. Alternatively, you can set the `alchemyps` environment variable to point to this directory, for example: `set alchemyps=c:\alchemy\ps`.

Virtual memory

Alchemy can require a lot of memory when converting some images.

If you will be converting large images and using alch386.exe you may run out of physical memory, in this case Alchemy will automatically create a virtual memory file on your hard disk. This file will be created in the directory indicated by the `TMP` environment variable (see below for more information). If you are using alchlong.exe to convert large images Windows 95 / Windows NT will manage virtual memory for you.

For more information on virtual memory please refer to Appendix K.

Temporary disk files

Alchemy uses the environment variable `TMP` to determine where to open temporary files. If the `TMP` environment variable is not set these files will be opened in the current directory.

The temporary files that Alchemy PS uses may be very large when rendering high-resolution PostScript images. For example, rendering a 8.5" x 11" PostScript file at 300 dpi in full color may create up to 50 megabytes of temporary files. If Alchemy PS runs out of disk space while writing to a temporary file it will report an error.

An example of setting the TMP variable to the \temp directory on drive e: would be `set TMP=e:\temp`.

Use of extended and expanded memory

If you are using alchemy.exe and there is enough extended or expanded memory available, Alchemy will use it instead of some of the temporary files it would otherwise use during some conversions. To use extended memory you must have an XMS driver installed in the config.sys file (such as HIMEM.SYS, QEMM, or 386MAX). To use expanded memory you must have a LIM 3.2 or LIM 4.0 expanded memory driver installed (such as EMM386, QEMM, or 386MAX).

Alchemy's use of extended/expanded memory can be disabled. To disable the use of extended and expanded memory, set the environment variable `alchemy` to `x` (type `set alchemy=x` at the DOS prompt).

The availability of extended or expanded memory will not allow you to convert larger images, it will just increase the speed of conversions. If you need to convert very large images use alch386.exe, which is the 386 Enhanced version of Image Alchemy.

Checking for 8514/A boards

Alchemy will normally check to determine if there is an 8514/A board installed in the computer when viewing images. However, this can interfere with some network boards, as they use the same I/O addresses that 8514/A boards use. To disable 8514/A checking, set the environment variable `alchemy` to `8` (type `set alchemy=8` at the DOS prompt).

Note that this can be combined with other options; for example, to disable both 8514/A checking and extended/expanded memory usage, use `set alchemy=8x`.

Limiting maximum display resolution

Alchemy will automatically choose the lowest resolution which will fit the entire image when viewing images without specifying a display resolution with a VESA compatible VGA board. However, depending on the monitor and VGA board combination you have, this can be bad since the monitor may not support the particular resolution the SVGA board is trying to switch to. To avoid this problem, the environment variable `alchemy` may be set to indicate the maximum display resolution which Alchemy should use. Set the `alchemy` variable to the highest horizontal resolution which your monitor is capable of. Valid values are 1280, 1024, 800, and 640. For example, type `set alchemy=800` at the DOS prompt if your monitor only supports 640x480 mode and 800x600 mode.

To disable 8514/A checking, disable extended/expanded memory usage, and limit the viewing resolution to 640x480 use `set alchemy=8x640`.

Disabling time estimation information

When performing a long conversion Alchemy will automatically display an estimate of the time needed to complete the operation. To disable the display of this information, set the environment variable `alchemy` to `p` (type `set alchemy=p` at the DOS prompt).

Note that during PostScript conversions a completion time estimate is not displayed. This is because the speed of various PostScript operations varies widely, and any time estimate would be inaccurate.

To disable 8514/A checking, disable extended/expanded memory usage, limit the viewing resolution to 640x480, and disable time estimation use `set alchemy=8x640p`.

UNIX Installation

Required equipment

At a minimum you must have the following hardware to run Image Alchemy.

Disk space

A hard drive with as much free space possible.

Converting very high resolution images can require large amounts of disk space (for example, a 8.5" x 11" color PostScript file converted at 300 dpi will require up to 50 megabytes of disk space).

Packing list

The enclosed diskettes, CD-ROM, or tape is in tar format and contains the following files:

`alchemy`	The Alchemy software.
`alchfont`	A tool for installing PostScript fonts for use by Alchemy PS.
`read.me`	A text document describing any last minute revisions.
`/samples`	A directory containing sample data files and images. See the `read.me2` file in this directory for further information.
`/ps`	A directory containing the fonts supplied with Alchemy PS.

Floppy disk or tape installation instructions

Use `tar` to copy the files from each of the distribution disks or tape to a subdirectory of the current directory called `alchemy`. The examples below assume you are installing Alchemy in `$HOME/alchemy`; if you install Alchemy elsewhere you will have to modify the examples appropriately.

Change to the directory where you wish to install Alchemy. To install into the default `$HOME/alchemy` directory do the following:

```
cd $home
mkdir alchemy
cd alchemy
```

To install the software from diskette insert each diskette, starting at disk 1, and issue the following command for each diskette:

```
tar xvf /dev/fd0
```

For tape installation insert the tape in the appropriate tape drive and replace `/dev/fd0` with the name of the tape device. The name of the tape device varies between different models and configurations of systems; ask your system administrator if you don't know the name of your tape device.

CD-ROM installation instructions

See the installation guide packaged with the CD-ROM for installation instructions appropriate for your platform.

Environment variable usage

Alchemy uses several different environment variables to determine its behavior. Among these are controlling where the PostScript fonts are stored and where to place temporary files.

path

You must either add `$HOME/alchemy` to your path, copy the files `alchemy`, `alchps`, and `alchfont` to a directory which is already in your path, or be in the `$HOME/alchemy` directory when executing Alchemy PS (in which case . must be in your path).

PostScript fonts

The fonts that ship with Image Alchemy PS are normally found in the `$HOME/alchemy/ps` directory, but this may vary depending on where you installed Alchemy PS.

Alchemy PS can find the `$HOME/alchemy/ps` directory if the `alchemy` directory is in your path, if it is the current directory, or if Alchemy PS is explicitly executed from the `alchemy` directory. Alternatively, you can set the `ALCHEMYPS` environment variable to the directory, for example: `setenv ALCHEMYPS=$HOME/alchemy/ps`.

Temporary disk files

Alchemy uses the environment variable `TMPDIR` to determine where to put its temporary files. This is usually set to `/usr/tmp` or `/tmp`, but if you are converting very large or high-resolution images there may not be enough space available in the partition those directories are on (for example, rendering a 8.5" x 11" PostScript file at 300 dpi in full color will create up to 50 megabytes of temporary files).

If there is not enough space in the usual `TMPDIR` directory you will need to set the environment variable `TMPDIR` to a directory on a different partition. For example, to set the temporary file directory to the directory `/home/images` use `setenv TMPDIR /home/images`.

Contact your system administrator if you have problems with Alchemy running out of disk space while converting images.

Disabling time estimation information

When performing a long conversion Alchemy will automatically display an estimate of the time needed to complete the operation. To disable the display of this information, set the environment variable `alchemy` to `p` (type `setenv alchemy=p` at the prompt).

Note that during PostScript conversions a completion time estimate is not displayed. This is because the speed of various PostScript operations varies widely, and any time estimate would be inaccurate.

Differences between UNIX and MS-DOS

The UNIX and MS-DOS versions of Image Alchemy are very similar. However, there are several important differences between the two versions:

Pathnames

Because the MS-DOS and UNIX operating systems use different conventions for path names, users of UNIX will have to substitute forward slashes, "/", for the back slashes, "\", found in the examples in this manual.

Unintentional wildcard expansion

UNIX users should also be aware that the UNIX shell they are using may be performing wildcard expansion on certain characters (generally "*" and "?"). Since these are options which Alchemy uses, they need to be escaped to prevent the wildcard substitution. This is done by using a back slash, "\", before the character (so -? becomes -\?).

Sending output directly to devices

Several of the examples show output being sent directly to a device (for example prn:). UNIX users cannot send output directly to a device using Image Alchemy and should substitute a file name for the output device name.

Viewing images

The UNIX command line version of Image Alchemy does not support image viewing at this time. We have Motif versions of Image Alchemy for various UNIX workstations. Please contact us for information if you are interested in upgrading to one of these versions.

2

Introduction

Introduction

Image Alchemy is a command-line driven program. It is run from a MS-DOS prompt, Windows 95 or Windows NT console prompt, or UNIX terminal window.

Basic instructions

The basic Image Alchemy usage instructions are:

```
alchemy inputFileName [outputFileName]
   [outputExtension] [outputPathName]
   -options …
```

Options

Options are the commands that you give Alchemy so that it knows what you want it to do. So that Alchemy can distinguish between options and file names on the command line, options are preceded by a dash ("-").

The only option that is required is the output file format. Image Alchemy will make reasonable decisions for all of the other options.

Some options take parameters. The parameters may immediately follow the option or be separated by a space. For example, either `-c128` or `-c 128` is acceptable.

The options themselves are documented in Chapters 5 through 9.

Note that options can appear anywhere in the command line and usually they can be in any order (certain options take parameters; in those cases the parameters must follow the option). The case of the options is significant. For example, `-d` and `-D` mean different things.

InputFileName

The inputFileName is the file name of the existing image file that you are converting from and must be specified.

The inputFileName may include an optional drive and/or path.

OutputFileName

The outputFileName is the name of the file you are converting the image to. The outputFileName is optional; if it is not specified Alchemy generates one by substituting an appropriate extension to the input file name.

If you specify an outputFileName and it does not include an extension one will be added.

The outputFileName may include an optional drive and/or path. If you do not supply a path the current directory will be used as the destination directory.

The inputFileName and the outputFileName cannot be the same unless you are writing the output file to a different directory.

OutputExtension

If you specify an output extension it will be used instead of the extension normally used by the output file format. See below for an example.

Specifying an outputExtension is useful when using the wildcard option to convert multiple files; see the wildcard command in chapter 6 for more information.

If you are not using the wildcard option the outputExtension is usually specified on the command line as part of the outputFileName.

Examples

Convert the file test.gif in the directory \images to a TIFF file called temp.tif in the current directory:

```
alchemy \images\test.gif temp.tif -t
```

Do the same thing, calling the new file temp.out:

```
alchemy \images\test.gif temp.out -t
```

Convert all of the GIF files in the directory \images to TIFF files, giving them all the extension .out:

```
alchemy -- \images\*.gif .out -t
```

OutputPathName

The outputPathName is the location where you want to put the output file that Alchemy will create. The outputPathName is optional; if it is not specified Alchemy places the output in the current directory or in the directory specified as part of the outputFileName.

Specifying an outputPathName is useful when using the wildcard option to convert multiple files; see the wildcard command in chapter 6 for more information.

If you are not using the wildcard option the outputPathName is usually specified on the command line as part of the outputFileName.

Examples

Convert the file test.gif in the directory \images to a TIFF file called temp.tif in the current directory:

```
alchemy \images\test.gif temp.tif -t
```

Do the same thing, placing the output in the directory \new:

```
alchemy \images\test.gif \new\temp.tif -t
```

Convert all of the GIF files in the directory \images to TIFF files, placing the TIFF files in the \new directory :

```
alchemy -- \images\*.gif \new -t
```

Limitations on filenames

Since Alchemy lets you optionally enter a space between an option and its parameter it is possible to confuse Alchemy if a filenames starts with a number. In particular, if you use an option which has an optional parameter, you choose not to supply the parameter, and you follow that option immediately with a filename which starts with a number, Alchemy doesn't realize that the filename is not the parameter. While it sounds unlikely that this would ever be a problem it actually happens quite often.

Example

If you wanted to convert the file `12.gif` to a Targa file with the name `output.tga` you would have to be careful of the order in which you specified things.

If you say:

```
alchemy -a 12.gif output.tga
```

Alchemy would misinterpret that as:

```
alchemy -a12 .gif output.tga
```

and would generate an error.

The easiest way around this problem is to always put the filenames first, such as:

```
alchemy 12.gif output.tga -a
```

Using response files

Alchemy can read command line parameters from text files (called response files). Using response files is equivalent to typing the options and/or file names on the command line. Response files are useful when you have commonly used commands or when you have long commands which would be hard to remember or exceed the command line limits of your operating system.

To use a response file you create a text file containing the options and/or file names that you would ordinarily pass to Alchemy on the command line. You create this text file using a text editor. This file can have any name or extension you wish. To specify this file to Alchemy use the `@` operator, followed immediately by the name of the text file.

For example, if you frequently need to scale images to be no larger than 640x480, using 'b' quality scaling, and preserving aspect ratio, you can make a text file which looks like this (called `scale`, for purposes of this example):

```
-Xb640 -Yb480 -+
```

You would then use this text file with Alchemy by passing its name along with any other options (including the output file type option and the file names). For example:

```
alchemy test.gif new.gif -g @scale
```

would convert the GIF file test.gif to a GIF file called new.gif, while performing the desired scaling operation.

It is also possible to place filenames of images to convert and other response files in response files. For example, if you want to convert the files test1.gif, image.tga, scan1.tif, scan2.tif, and scan3.tif to JPEG files you can create a text which looks like this (called `files`):

```
test1.gif
image.tga
scan1.tif
scan2.tif
scan3.tif
```

And then use this command line to convert those files to JPEG files:

```
alchemy -- @files -j
```

Note the use of the `--` option to indicate to Alchemy that more than one filename will be specified.

For MS-DOS users it is also possible to place wildcards in response files. For example, if you want to convert all of the .gif, .tif, and .tga files to JPEG files you can create a text file which looks like this (called `wild`):

```
*.gif
*.tif
*.tga
```

And then use this command line to convert those files to JPEG files:

```
alchemy -- @wild -j
```

UNIX users can accomplish the same task by using `ls` and redirecting output to a file:

```
ls *.gif *.tif *.tga >wild
```

And then use this command line to convert those files to JPEG files (note the use of the `--` option to indicate to Alchemy that you are giving it more than one file to convert):

```
alchemy -- @wild -j
```

If you wanted to scale the images at the same time, using the `scale` text file created earlier, you would add that response file to the command line. For example:

```
alchemy -- @files @scale -j
```

Comments

A line in a response file which begins with a # is treated as a comment and ignored.

Response files may contain commands and filenames on multiple lines and may also contain blank lines.

Using output filename response files

Sometimes you may need to convert a list of filenames but have the output filenames have unrelated names. With Alchemy you can do that in one of two ways. You can give Alchemy a list of output filenames, this list is similar to a response file that contains input filename, except that it contains the output filenames. You can then pass this option to Alchemy with the `-@` operator. For example, you want to convert the following list of files to JPEG files:

```
test1.gif
image.tga
scan1.tif
scan2.tif
scan3.tif
```

You want the output files to have the following names:

```
image1.jpg
image2.jpg
image3.jpg
```

```
image4.jpg
image5.jpg
```

Assuming the first list is called files and the second list is called outnames, the following command can be used:

```
alchemy -- @files -@outnames -j
```

Using paired filename response files

If instead of two lists you have one list containing a pair of filenames the `--@` operator can be used. For example, you want to do the same thing as the previous example, but instead of two lists, the filenames are in one file like this:

```
test1.gif      image1.jpg
image.tga      image2.jpg
scan1.tif      image3.jpg
scan2.tif      image4.jpg
scan3.tif      image5.jpg
```

Assuming the list is called pairs, the following command can be used:

```
alchemy -- --@pairs -j
```

Using sequential filenames

Alchemy can process files that contain a sequence number in various ways. For example, Alchemy can read files with the names image001.gif, image002.gif, image003.gif, … and write files with the names file.001, file.002, file.003, …. For information about this see the Sequential Filenames option in Chapter 6.

Using multiple runs of Alchemy

Sometimes you may know what you want to accomplish but not how to specify the correct combination of options. For example, you may wish to resize a true color Targa file that you have scanned and convert it to a 16 color GIF file. Let's say that the input file name is `file.tga` and you want to generate a file with the name `file.gif`. In this case you could use:

```
alchemy file.tga -Xb640 -Yb480 -c16 -g
```

However, there would be no penalty in quality if you did things in two steps:

```
alchemy file.tga temp.raw -Xb640 -Yb480 -r

alchemy temp.raw file.gif -c16 -g
```

In this case you are telling Alchemy to use a temporary raw file called `temp.raw`. Except for having to delete the file `temp.raw`, this would give you identical results to doing things in one step.

However, the order of steps is important in many cases. For example, reversing the order of the two operations in the previous example:

```
alchemy file.tga temp.raw -c16 -g

alchemy temp.raw file.gif -Xb640 -Yb480 -g
```

would give different results. This is because the scaling operation has to temporarily convert the image to true color, but the GIF file you are generating has to be paletted, so the second operation would re-dither the image, lowering the quality.

Illegal combinations of options

Sometimes you will have to perform operations using multiple steps because there are some combinations of options that Alchemy explicitly does not allow. These combinations of options are not allowed because the results would not be what you expect.

For example, using the spiff option, `-S`, in combination with the false color option, `-F`, would spiff the image first and then false color it, which would give the same results as just using the false color option.

Since this is not the result you would most likely want, Alchemy will generate an error if you specify both of those options at the same time. In this case you could false color the image first, generating a temporary image, and then spiff that image.

3

Reading PostScript, EPS, and PDF Files

If you are using Image Alchemy PS you can read PostScript, EPS, and PDF files. This chapter describes options which effect how these files are read.

Converting PostScript files

Image Alchemy PS automatically identifies PostScript, Encapsulated PostScript, and PDF files and converts them as other formats. However, unlike the other image file formats Alchemy reads, many of the of the characteristics of the input file can be altered depending on what you will be doing with the resulting file.

For example, a PostScript file needs to be interpreted differently if it is going to be displayed on a color CRT versus printed on a 1200 dpi black and white typesetter. Since Alchemy does not know which device will eventually be using the image, various parameters have to be specified at the conversion time.

These parameters include:

- The resolution of the output device (in dots per inch)
- The size of the PostScript image (in inches, cm, or pixels)
- The desired size of the output image (in inches, cm, or pixels)

- Whether the output device is black and white, grayscale, or color
- Which page(s) of the PostScript file to convert
- Whether or not to clip the border of the image
- Whether or not to rotate the image

Alchemy PS makes reasonable assumptions for default values for each of these parameters, so in practice it is usually not necessary to specify all of them.

These parameters are described below.

Identifying PostScript files

Image Alchemy PS can automatically identify most PostScript and Encapsulated PostScript files. However, some non-standard PostScript files may not be recognized by Image Alchemy. If Alchemy fails to identify a PostScript file correctly, the `-=14` option can be used to force Alchemy to recognize the input file as a PostScript file (see the `-=` option, in Chapter 7, for more information).

Disk space requirements

Note that rendering PostScript files may require a lot of disk space or virtual memory. For example, rendering an 8.5" x 11" page at 300 dpi in color generates a temporary file which is up to 25 megabytes in size. In addition, if there isn't enough real RAM available, Alchemy will use up to another 25 megabytes for swap space (for a total of 50 megabytes).

If you tell Alchemy to generate a color file when in fact there is only gray-scale or black and white data in the PostScript file, Alchemy will fall back to gray-scale or black and white and the temporary file size will be smaller, but Alchemy will still need a large amount of real memory or swap space.

Disk space requirements decrease dramatically for 1 bit black and white images; for example the same 8.5" x 11" image at 300 dpi would only require a 1 megabyte temporary file (and 1 megabyte of memory).

Rendering large images

The memory and disk space requirements and processing time can increase dramatically when rendering PostScript images directly for use on large format devices. For example, rendering a full color PostScript image to 34 inches by 44 inches at 300 dpi (the size of a Novajet plotter) requires up to 800 megabytes of disk space.

A way to reduce the memory requirement is to render the image to an intermediate size and then use Alchemy PS's raster scaling operators (`-X` and `-Y`) to increase the image to its final size. This requires much less disk space since the raster scaling is done on the fly.

For example, rendering the same image to 17" x 22" and then raster scaling it to 34" x 44" reduces the disk space requirements to 200 megabytes; and rendering to 8.5" x 11" and then raster scaling to 34" x 44" requires only 50 megabytes.

Performing the image scaling in two steps may reduce the quality of the final image somewhat, but generally the results will be indistinguishable from rendering the PostScript file directly to the final size.

See the examples section below for information about the syntax required for these operations.

Progress information

While interpreting a PostScript file, Alchemy will display progress information. It is normal for the rate at which progress is indicated to vary considerably while interpreting a file. This is because PostScript is a programming language, and interpreting some commands can take far longer than others.

Level 2 Support

Image Alchemy PS can convert all Level 1 and Level 2 PostScript files. If you have a PostScript file that Alchemy does not read correctly please contact us.

Threading

Image Alchemy PS is threaded (except for the version of Image Alchemy PS for MS-DOS). This allows the PostScript data to be RIPed and immediately passed to the rest of Alchemy, as opposed to RIPing the entire image and then converting it. Also if you are using a computer with multiple CPUs Alchemy PS will use two of them during conversion.

Antialias -Za

Specify amount of antialiasing to perform.

Syntax

-Za *mode*

Parameter

mode:

0:No antialias
1:Antialias factor 2.25
2:Antialias factor 4
3:Antialias factor 9
4:Antialias factor 16

The default is No antialias.

Comments

Antialiasing can vastly improve the quality of an image rendered for use on grayscale or color devices by averaging a number of pixels together to convert black and white data (such as fonts) into grayscale data.

Antialiasing will not improve the quality of output black and white devices like laser printers or 4-bit CMYK devices like color raster plotters unless you are performing raster scaling on the image as part of the conversion process.

The antialiasing factor is the number of rendered PostScript pixels that are averaged to produce each output pixel.

Antialiasing causes the memory requirements and processing times to increase (the more so the higher the antialias factor).

Example

Convert the file periodic.eps to a grayscale TIFF file called periodic.tif to be used on a 640x480 display, using antialiasing:

```
alchemy periodic.eps -t -Zo640p 480p -Z+
-Za2
```

Clip -Zc

Specify whether or not to trim any white space around the edges of the image.

Syntax

-Zc *mode*

Parameter

mode:

0:Don't clip
1:Clip

The default is Don't clip.

Comments

This can reduce the size of the output file, although it does not reduce the memory requirements, as Alchemy still has to render a full page before it can determine where the edges are.

This option is most useful when converting EPS clip art or other files for importing into other software. In this case you may also want to use the Use Bounding Box (-Ze) option, see below for more information.

Note that clipping occurs after the image is scaled to the final size; for example, if you specify an output image size of 8.5" x 11", and you specify clipping, the final image will be smaller than 8.5" x 11".

Example

Convert the file person.eps to a black and white TIFF file called person.tif to be used on a 600 dpi laser printer and clip the image to the active image area:

```
alchemy person.eps -t -Zd600 600 -Zc1
```

Color Mode -Zm

Specify whether to render the image in black and white, grayscale, or color.

Syntax

-Zm *mode*

Parameter

mode:

0:Black and White - 1 bit
1:GrayScale - 8 bit
2:RGB Color - 24 bit
3:CMYK Color - 4 bit
4:CMYK Color - 32 bit

The default is Black and White.

Comments

Alchemy defaults to rendering the image in 1 bit black and white.

If you specify grayscale or RGB color, Alchemy will automatically fall back to grayscale or black and white if the image doesn't use any color or grayscale, respectively. However, the memory, disk space requirements, and processing time all increase dramatically when telling Alchemy to render in Mode 1 or Mode 2, so don't specify those modes if it is not necessary.

You may want to specify grayscale output even when converting a PostScript file which will be printed on a black and white device. This way Alchemy can do a better job raster scaling the image and you have control over the dithering type used. If you specify black and white mode the only dither available is the halftone dither.

Using CMYK - 4 bit mode can significantly speed up conversion times, since the amount of data written is less than in the RGB Color or CMYK - 32 bit modes. However the only dither algorithm available with this mode is a digital halftone.

Using CMYK - 32 bit mode can be useful if you have color separations in the PostScript file (for example, CMYK EPS files). The CMYK - 32 bit option will preserve these separations so the color representations will be more accurate and has an advantage over the CMYK - 4 bit mode in allowing any of the dithering types to be used.

Examples

Convert the file poster.ps to a color RTL file for plotting on a NovaJet plotter:

```
alchemy poster.ps -Zm2 --r10
```

Do the same thing, but go directly to 4-bit CMYK:

```
alchemy poster.ps -Zm3 --r10
```

Do the same thing, but generate a 32-bit CMYK file and then convert it to RTL using dither type 3:

```
alchemy poster.ps -Zm4 -d3 --r10
```

Image Offset -Z_

Specify image offset.

Syntax

-Z_ *xOffset*[*xUnits*] *yOffset*[*yUnits*]

Parameter

xOffset:
yOffset:
Distance to offset the image
The default is 0" x 0".

xUnits:
yUnits:
The units the offset parameters are in:
p:pixels
i:inches
c:centimeters
units is optional; the default is inches. The units value must immediately follow the offset parameter.

Comments

Using the "Use Bounding Box" option (-Ze), described below, will often automatically accomplish the same thing as using this option. Many modern PostScript files contain a bounding box which includes the image offset.

This option shifts the image within the page. Positive numbers will shift the page right and down (or the image left and up). This can be useful for PostScript files that have an origin that isn't 0,0.

If a units parameter is used it must immediately follow the offset parameter.

Example

Convert the file contract.eps, which has an origin of 72, 144 (in units of 1/72 inch), to a PCL file at 300 dpi, with the image origin at the lower left corner of the output file:

```
alchemy contract.eps -P -Z_1i -2i
```

Input Page Size -Zi

Specify input image size.

Syntax

-Zi *xSize*[*xUnits*] *ySize*[*yUnits*]

Parameter

xSize:
ySize:
Size of the image
The default is 8.5" x 11".

xUnits:
yUnits:
The units the size parameter is in:
p:pixels
i:inches
c:centimeters
units is optional; the default is inches. The units value must immediately follow the size parameter.

Comments

Using the "Use Bounding Box" option (-Ze), described below, will often automatically accomplish the same thing as using this option. Many modern PostScript files contain a bounding box which includes the input page size.

This option is necessary if the PostScript file being read was not created for a 8.5" x 11" device. Alchemy PS needs this information, along with the output page size and the output dots per inch value, to correctly scale the image to the final size.

If a units parameter is used it must immediately follow the size parameter.

Examples

Convert the file contract.ps, which was originally created to print on legal size paper (8.5" x 14"), to a PCL file at 300 dpi:

```
alchemy contract.ps -P -Zi8.5i 14i
```

Note that the output image will be 8.5" x 14"; if instead you wanted to reduce the image to be no larger than 8.5" x 11" you could add an output page size option (and the preserve aspect ratio option):

```
alchemy contract.ps -P -Zi8.5i 14i -Zo
8.5i 11i -Z+
```

Margins -Zb

Specify that the converted PostScript image should have margins (borders) removed from the edge.

Syntax

-Zb *x1*[*units*] *y1*[*units*] [*x2*[*units*] *y2*[*units*]]

Parameter

x1:
Amount to remove from the left side of the image. The default is 0.

y1:
Amount to remove from the bottom of the image. The default is 0.

x2:
Amount to remove from the right side of the image. The default is the same as the left margin.

y2:
Amount to remove from the top of the image. The default is the same as the bottom margin.

units:
The units the size parameter is in:
p:pixels
i:inches
c:centimeters
units is optional; the default is inches. The units value must immediately follow the size parameter.

Comments

This option is used to trim any margin the PostScript file may have (to conform to non-printable areas on a laser printer, for example).

If a units parameter is used, it must immediately follow the size parameter.

Examples

Convert the file house.ps to an HP-PCL file, remove 1/6" from each of the edges to conform to the non-printable area of HP LaserJet printers.

```
alchemy house.ps -P -Zb 0.166i 0.166i
0.166i 0.166i
```

A simpler way to achieve the same results is to not use the PostScript conversion margin command but instead use the reduce margin command on the HP PCL output:

```
alchemy house.ps -P50
```

Output Page Size -Zo

Specify output image size.

Syntax

-Zo *xSize*[*units*] [*ySize*[*units*]]

Parameter

xSize:
ySize:
Size of the image
The default is the same size as the input size.

units:
The units the size parameter is in:
p:pixels
i:inches
c:centimeters
x:factor
units is optional; the default is inches. The units value must immediately follow the size parameter.

Comments

This option is necessary if you want the PostScript file to be a size other than the size the PostScript image was originally rendered to. Alchemy PS needs this information, along with the input page size and the output dots per inch value, to correctly scale the image to the final size.

If a units parameter is used, it must immediately follow the size parameter.

If you only specify the X-dimension Alchemy PS will automatically generate the Y-dimension to preserve the aspect ratio of the image. This is useful on plotters that take roll paper and therefore have a very long Y-dimension.

Specifying a units value of `x` causes the size parameter to be treated as a scale factor; e.g. `-X 2.5x` scales the image by a factor of 2.5 in the X direction. This is particularly useful when using the Bound Box command and you want to increase or decrease the size of the generated image.

Example

Convert an image which was originally rendered to 8.5" x 11" page to a Targa file which is no larger than 640 pixels x 480 pixels, at the same time preserving the aspect ratio:

```
alchemy image1.ps -a -Zo 640p 480p -Z+
```

Output Page Width -Zx

Specify output image width.

Syntax

-Zx *xSize*[*units*]

Parameter

xSize:

Width of the image

The default is the same width as the input width.

units:

The units the size parameter is in:

p:pixels
i:inches
c:centimeters
x:factor

units is optional; the default is inches. The units value must immediately follow the size parameter.

Comments

This command can be used instead of the -Zo command if you only want to specify the output image width and not the height.

Example

Convert an image which was originally rendered to 8.5" x 11" page to a Targa file which is no larger than 640 pixels wide, at the same time preserving the aspect ratio:

```
alchemy image1.ps -a -Zx 640p -Z+
```

Output Page Height -Zy

Specify output image height.

Syntax

-Zy *xSize*[*units*]

Parameter

ySize:
Height of the image
The default is the same height as the input height.

units:
The units the size parameter is in:
p:pixels
i:inches
c:centimeters
x:factor
units is optional; the default is inches. The units value must immediately follow the size parameter.

Comments

This command can be used instead of the -Zo command if you only want to specify the output image height and not the width.

Example

Convert an image which was originally rendered to 8.5" x 11" page to a Targa file which is no larger than 600 pixel high, at the same time preserving the aspect ratio:

```
alchemy image1.ps -a -Zy 600p -Z+
```

Pages -Zp

Specify which page(s) to render.

Syntax

-Zp

-Zp *page*

-Zp *startPage endPage*

Parameter

page:
Specify page number
The default is page 1.

startPage:
Specify beginning page number.
endPage:
Specify ending page number.

Comments

If the -Zp option is used without a following parameter all pages in the input file(s) will be converted.

If you specify a single parameter after the -Zp option, only that page will be converted.

If you specify two parameters all pages between those two numbers will be converted (inclusive, e.g. -Zp 2 3 will convert pages 2 and 3).

When converting multiple pages, either multiple files will be written (each containing a single page) or a single multi-page file will be written, depending on the use of the ---U option. See the ---U option in Chapter 6 for more information and the examples section below for an example.

Examples

Convert page 2 of the file test.ps to a GIF file called test.gif:

```
alchemy test.ps -g -Zp 2
```

Convert pages 2 through 9 of the file test.ps to multiple GIF files:

```
alchemy test.ps -g -Zp 2 9
```

Convert pages 2 through 9 of the file test.ps to a single multi-page GIF file, called pages.gif:

```
alchemy test.ps -g1 -Zp 2 9 ---U pages.gif
```

Convert all the pages in the file test.ps to a single multi-page GIF file, called pages.gif:

```
alchemy test.ps -g1 -Zp ---U pages.gif
```

Pre-load Fonts -Zf

Specify whether or not to pre-load fonts.

Syntax

-Zf *mode*

Parameter

mode:

0:Don't pre-load fonts
1:Pre-load fonts

The default is Don't pre-load fonts.

Comments

The command causes Alchemy PS to load all of the PostScript fonts installed in the fontmap when it starts up, rather than as needed. This is primarily useful when converting PostScript files that change their behavior depending on the available fonts (a font catalogue program, for example).

Example

Convert the file fontlist.ps to a PCL file, preloading all fonts:

```
alchemy fontlist.ps -P -Zf1
```

Preserve Aspect Ratio -Z+

Preserve aspect ratio when scaling.

Syntax

-Z+ (plus)

Comments

If specified with the -Zo option Alchemy will use the values specified as a bounding box, reducing one dimension if necessary to preserve the image aspect ratio.

Example

Convert the file contract.ps, which was originally created to print on legal size paper (8.5" x 14"), to a PCL file at 300 dpi and fit it to 8.5" x 11":

```
alchemy contract.ps -P -Zi 8.5i 14i
-Zo 8.5i 11i -Z+
```

Rotate Image -Zr

Specify the angle to rotate the image in degrees.

Syntax

-Zr *angle*

Parameter

angle:
Specify rotation angle
The default is 0.

Limitations

Alchemy PS can only rotate images in 90 degree increments.

Comments

The rotation angle is measured the counterclockwise direction (so specifying a 270 degree rotation achieves a 90 degree clockwise rotation).

If a 90 or 270 degree rotation is specified, and the input page size isn't specified, the input size will be changed to 11"x8.5" instead of 8.5"x11".

Example

Convert the landscape file test.ps to a portrait PCL file called test.pcl:

```
alchemy test.ps -P -Zr90
```

Specify Image Resolution -Zd

Purpose

Specify image resolution in dots per inch for the output image.

Syntax

-Zd *dotsPerInchX dotsPerInchY*

Parameters

dotsPerInchX
The horizontal resolution of the image in dots per inch.

dotsPerInchY
The vertical resolution of the image in dots per inch.

Comments

You must specify both dotsPerInchX and dotsPerInchY, even if they are the same.

This command, when reading PostScript files, is identical to the standard Alchemy -D command (see Chapter 9). If both are specified, the -Zd parameters have precedence.

Example

Convert an AutoCad drawing saved as a PostScript file to a PCX file for sending with a fax modem. The resolution of fax machines in fine mode is 200 dpi x 200 dpi:

```
alchemy drawing.ps -p -Zd 200 200
```

Use Bounding Box -Ze

Specify whether or not to use the bounding box from EPS files.

Syntax

-Ze *mode*

Parameter

mode:

0:Don't use bounding box
1:Use bounding box

The default is Don't use bounding box.

Comments

The command causes Alchemy PS to look for a bounding box or a HiRes bounding box in the header of a PostScript or EPS file, and if present use the image offset and input page size data from it.

Using this command is equivalent to manually setting those parameters using the -Z_ and -Zi options. The values from the bounding box will take precedence over any offset or input size specified.

This option is useful for reading EPS files which don't have the origin at 0,0.

The bounding box values are generated by the application writing the EPS file. As such there may be extra white space around the edge of the image, or portions of the image cut off (the bounding box Alchemy PS uses is equivalent to the boundaries that an importing application displays when reading an EPS file which does not have a preview).

Example

Convert the file sah.eps to an RTL file for an HP DesignJet 650C, using the bounding box from the file:

```
alchemy sah.eps --r7 -Ze1
```

Complex Examples

These examples show how to accomplish various common tasks with Alchemy PS.

See Chapters 5 through 8 for more information on the other command line options used in these examples.

Some of these examples use too many options to be used directly with MS-DOS. In these cases you can create a text file which contains the commands and use the `@` response file command with Alchemy PS (see Using Response Files in Chapter 2). Also, depending on your system configuration, you may run out of memory using the standard version of Alchemy PS and may need to substitute `alch386.exe` for `alchemy.exe` in some of the examples.

Printing a PostScript file on an HP LaserJet printer

Send a PostScript file to an HP LaserJet printer; the original image size is 8.5" x 11" and that is the size of paper the image will be printed on (this example is directly usable on IBM PC computers only, UNIX users will have to generate a file and then send that to their laser printer).

```
alchemy drawing.ps prn: -P 0
```

If you have an HP LaserJet 4 and would like to print the file at 600 dpi instead:

```
alchemy drawing.ps prn: -P 100 -Zd 600 600
```

You may also want to specify the Expanded Margin option as part of the PCL output option (-P 50 or -P 150 instead of -P 0 or -P 100 in the above examples); this is especially true if the PostScript file was originally generated to be output on a device which prints all the way to the edge of the paper and the margins built into the LaserJet are causing portions of your image to be clipped.

Preparing an EPS image for inclusion in a word processor

Convert an EPS file to a TIFF file so that it can be imported by a word processor. Keep the image at the original size, using the bounding box information in the EPS file to only convert the relevant portion of the image. This examples assumes the TIFF file will be printed on a 300 dpi laser printer:

```
alchemy logo.eps logo.tif -t1 -Ze 1
```

Do the same thing, this time assuming that the TIFF file will be printed on a 1440 dpi typesetter:

```
alchemy logo.eps logo.tif -t1 -Zd 1440
1440 -Ze 1
```

This time convert the EPS file but don't use the bounding box, instead instruct Alchemy PS to clip to the active image area:

```
alchemy logo.eps logo.tif -t1 -Zd 1440
1440 -Zc 1
```

Preparing a PostScript file for sending via a fax modem

Convert an AutoCad drawing saved as a PostScript file to a PCX file for sending with a fax modem. The resolution of fax machines in fine mode is 200 dpi x 200 dpi:

```
alchemy drawing.ps drawing.pcx -p -Zd 200
200
```

If we were sending in normal mode (200 dpi x 100 dpi) we would use a `-Zd 200 100` instead :

```
alchemy drawing.ps drawing.pcx -p -Zd 200
100
```

Viewing a file on a VGA screen (MS-DOS only)

View a color PostScript file on a SVGA screen. The original image was 8.5 x 11, the final image is being rendered to be screen sized (640 pixels x 480 pixels):

```
alchemy drawing.ps -v -Zm 2 -Zo 640p 480p
-Z+
```

If you have a 24 bit capable SVGA card you can replace the `-v` command with the `--v` command, for better viewing quality:

```
alchemy drawing.ps --v -Zm 2 -Zo 640p 480p
-Z+
```

If you have a higher resolution monitor you could change the viewing command and the PostScript rendering parameters. This example assumes a 1024x768 viewing mode is available:

```
alchemy drawing.ps -v1024 -Zm 2 -Zo 1024p
768p -Z+
```

If you are viewing a PostScript file which contains black and white data (fonts, for example), you can improve the quality of the image by using the antialias option, in this example we use an antialias factor of 4:

```
alchemy drawing.ps -v -Za 2 -Zo 640p 480p
-Z+
```

Plotting a PostScript file on a large format plotter

This example series converts and plots a color PostScript image on an HP DesignJet 2000C plotter.

This example scales the image to the final 34" x 44" size entirely during the PostScript rendering step and therefore may require ridiculous amounts of disk space (up to 900 megabytes).

```
alchemy fish.ps prn: --r 7 -Zm 2 -Zo 34 44
-Z+ -Zd 600 600
```

Render the image at 8.5" x 11" and use raster scaling to scale image to the final size of 34" x 44". This example will require much less disk space than the previous example (50 megabytes). For most images the result will be almost the same as the previous example, although PostScript text will lose a small amount of quality.

```
alchemy fish.ps prn: --r 7 -Zm 2 -Xb34i
-Yb44i -+ -Zd 600 600
```

Render the image at 17" x 22" and use raster scaling to scale the image to the final size of 34" x 44". This will require more disk space than the previous example, but will generate a slightly higher quality plot.

```
alchemy fish.ps prn: --r 7 -Zm 2  -Zo 17i
22i -Z+ -Xb34i -Yb44i -+ -Zd 600 600
```

You may of course also want to combine any of the above examples with a different dithering type (for example `-d22` to use dithering type 22).

```
alchemy fish.ps prn: --r 7 -Zm 2 -Xb34i
-Yb44i -+ -d 22 -Zd 600 600
```

Or use a Alchemy Color Correction file (`-C dj2500a.acc`, to use the ACC file dj2500a.acc).

```
alchemy fish.ps prn: --r 7 -Zm 2 -Xb34i
-Yb44i -+ -C dj2500a.acc -Zd 600 600
```

Preparing a PostScript file for imaging on a Scodl slide recorder

Render the image to be full size on the slide (which is assumed to be 36mm x 24mm). This assumes the Scodl file will be imaged at 2000 by 1366 and that the file was printed in landscape mode (if the file were in portrait mode it wouldn't fill much of the slide). We make the image size reasonably large with the PostScript interpreter, then, after the image is clipped to the active image area, we scale it, using raster scaling, to fill the slide. Note that the preserve aspect ratio option is required for both the PostScript rendering step (the `-Z+` option) and the raster scaling step (the `-+` option):

```
alchemy slide.ps slide.scd --s0 -Zm 2 -Zi
11 8.5 -Zo 2000p 1366p -Z+ -Xb2000 -Yb1366
-+ -Zc 1
```

Do the same thing, but this time also rotating the image 90 degrees:

```
alchemy slide.ps slide.scd --s0 -Zm 2 -Zi
11 8.5 -Zo 2000p 1366p -Z+ -Xb2000 -Yb1366
-+ -Zc 1 -Zr 90
```

Generating PostScript files for use with Image Alchemy PS

Most programs have the ability to generate a PostScript file. Generally you can select a PostScript device as the output device and then generate a disk file. This file can then be interpreted by Alchemy PS. Some programs give you a choice of PostScript printers; usually there is a generic PostScript printer, which should be used. You may also have to specify if you want black and white, grayscale, or color output. Because of the increase in the file size and rendering time you should select the simplest format which meets your requirements; for example, if you will be generating a PostScript file which you will be sending via fax, it is best if you generate a black and white PostScript file.

Generating a PostScript file using Microsoft Windows 95

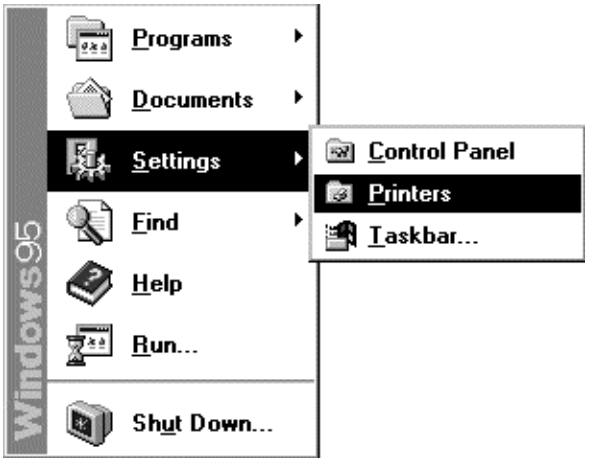
Generating a PostScript file which can be read by Image Alchemy PS when running Microsoft Windows 95 requires setting up a PostScript output device that Windows can print to.

Microsoft Windows 95 includes several different PostScript device drivers, including drivers for the Apple LaserWriter, HP LaserJet PostScript, NEC Colormate PS, etc. However most of these do not include color support, therefore we recommend selecting the QMS ColorScript 100 as the printer driver.

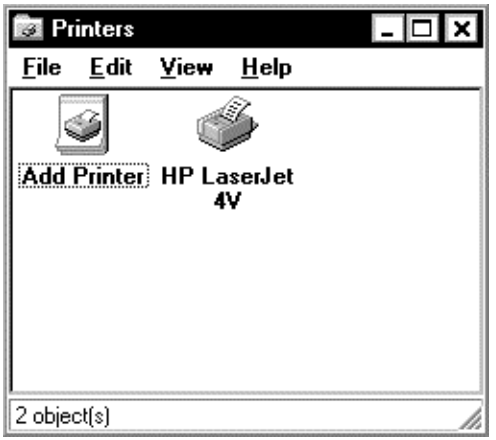
You accomplish this with the following procedure:

Setting up Microsoft Windows 95

Select **Printers** from the **Start** menu under **Settings**:

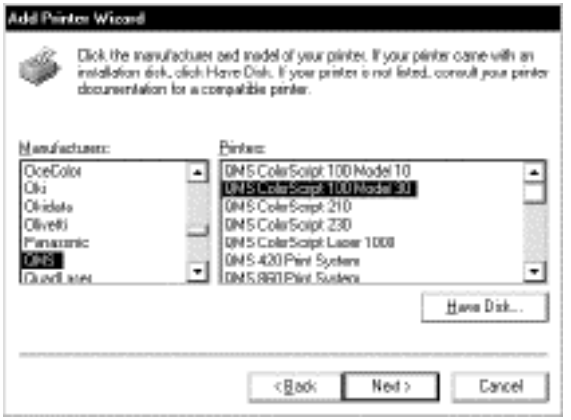


This brings up the Printers window. Double click on the **Add Printer** icon:



This brings up the Add Printer Wizard:

Click **`Next>`** to continue with the procedure.



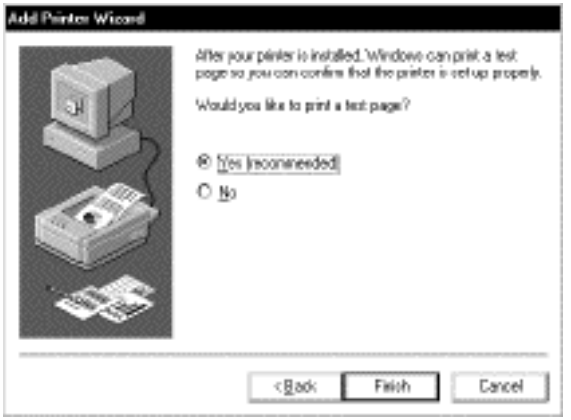
Choose **`QMS`** from the **`Manufacturers:`** window, then select **`QMS ColorScript 100 Model 30`** from the **`Printers:`** list.

Now click on the **Next>** button to bring up the connect dialog box:

Select the **FILE:** item from the **Available Ports:** list. This indicates to Windows 95 that the device doesn't actually exist and that output sent to that driver should be directed to a file. Click on the **Next>** button to accept this choice.

If you want to make this the default printer you can select **Yes** to the "Do you want … to use this printer as the default printer?" question. This isn't recommended, since it will make it more difficult to use your normal printer with Windows. You may want to change the name of the printer (perhaps to "Generate PostScript file") to better reflect what this printer choice is used for.

Click **Next>** to finish the installation procedure:



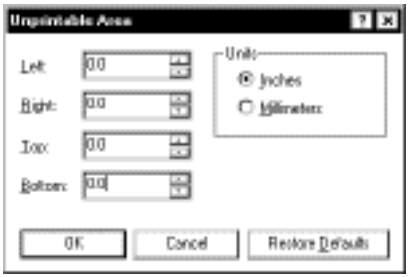
You may be prompted to insert one or more of the Windows 95 distribution diskettes at this point.

The printer is now available for use. However, there are a couple of settings under the Properties sheet that you may want to change. To bring up the Properties sheet select the printer by single clicking on it and choosing Properties from the File menu.

Under the Paper tab you can select whether you want **Portrait** or **Landscape** to be the default choice for printing.

The **Paper Size** selection is best left at 8.5 x 11 in, since that is the default size that Alchemy PS expects for PostScript files. The **Paper Source** selection is not used by Alchemy PS.

Click on the **Unprintable Area…** button to bring up the unprintable area dialog:



These can all be set to zero, since Alchemy PS does not have any unimageable area near the edges. If you will routinely be sending files that you convert with Alchemy PS to a hard copy output device, such as a PCL printer, you can set the margins appropriately for that device. Windows will then warn you if you are printing too close to the edge.

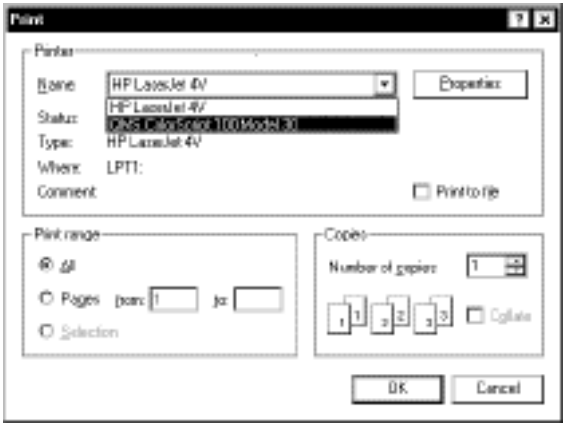
Now click on the various **OK** buttons to close the dialog boxes and accept the choices you have made.

This completes the setup. You are now ready to print a PostScript file.

Printing to a PostScript file

To print to a file select **Print…** from the **File** menu. This will bring up a dialog box similar to the one shown; different programs have different dialogs (this example is from the Paint program, distributed with Windows 95).

Select the printer **QMS ColorScript 100 Model 30** as the printer to print to and click **OK**. If you setup this device as the default printer you can skip this step. You can also change the **Orientation** choice at this point.



Selecting **OK** will bring up the following dialog:

Enter the file name of the PostScript file to be generated. This file will be created and may be converted with Alchemy PS.

Generating a PostScript file from a Macintosh

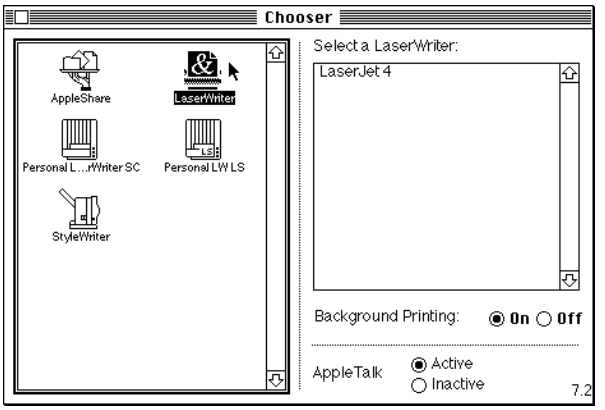
Generating a PostScript file from a Macintosh varies somewhat with the version of the LaserWriter printer driver you have.

There are three LaserWriter drivers available, version 7, early version 8.0, and late version 8.x. LaserWriter 8.x drivers have the advantage that it generates PostScript files that are faster to convert and it allows you to choose which fonts to include in the PostScript document (LaserWriter version 7 always includes all fonts, making the PostScript file larger than necessary).

No matter which LaserWriter version you have, the first step, selecting the LaserWriter from the Chooser menu, is always the same.

Setting up the Macintosh

Bring up the Chooser from the Apple menu:



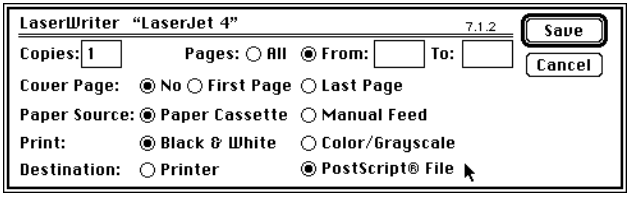
Select the LaserWriter printer icon (which may have a different icon, depending on what version of the Macintosh operating system you are using and which LaserWriter driver you have). If the LaserWriter does not appear as one of the choices you will have to install it off of your system disks. If you have installed the PS Printer driver from Adobe choose that instead of the LaserWriter driver.

Note that you don't actually need to have a LaserWriter, since you will only be using the driver to generate a PostScript file.

If you are changing from a different printer you will be told to choose **"Page Setup"** in all open applications.

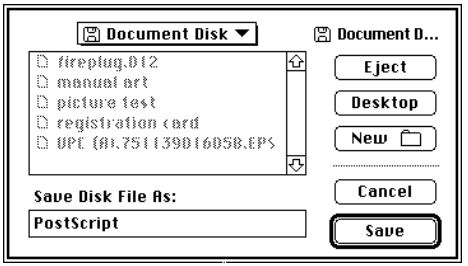
Printing to a PostScript file

To generate a PostScript file with LaserWriter version 7 choose **Print...** from the **File** menu in your application. Then choose **PostScript® File** as the **Destination:** from the print dialog box:



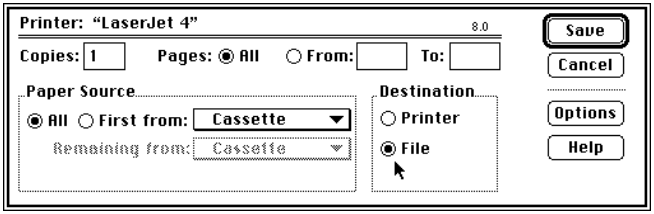
You may also enable **Color/Grayscale** to select printing a color or grayscale file.

After selecting the **Save** button you will be presented with the **Save Disk File** dialog:



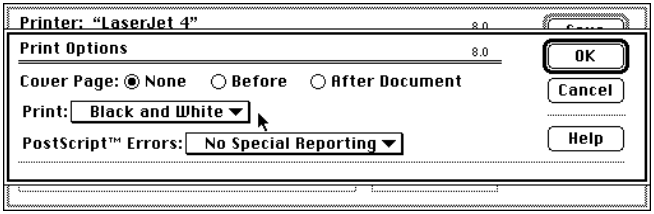
Either accept the default filename of **PostScript**, or enter a new filename, and click the **Save** button. This will generate a PostScript file which Alchemy PS can read.

If you are using the older LaserWriter 8.0 driver things will look slightly different. After choosing **Print...** from the **File** menu in your application the print dialog box looks like this:

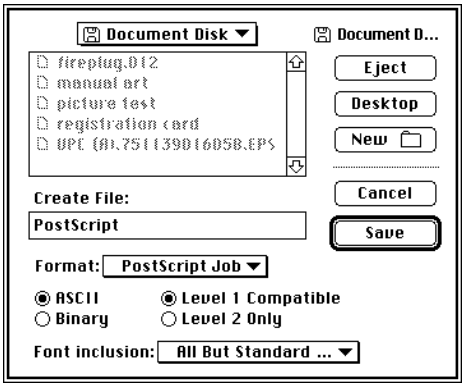


You select **File** from the **Destination** choice.

If you wish to generate a grayscale or color PostScript file that choice is now found in the **Options** dialog box.



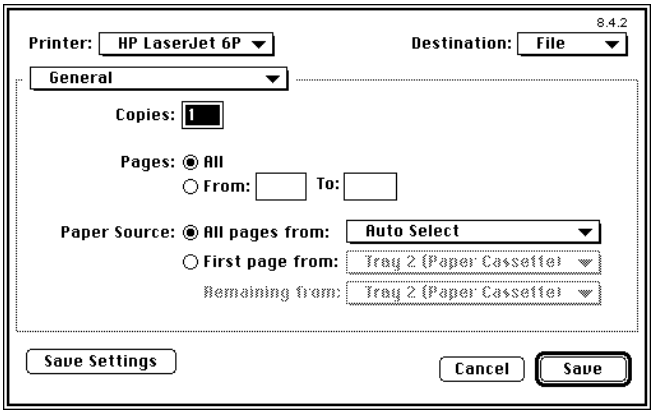
After selecting the **Save** button you will be presented with the **Save Disk File** dialog:



To include the fonts used in the document select **All** under the **Font Inclusion** menu. This will include all of the fonts. To reduce the size of the PostScript file select the **All But Standard 13**, this includes all fonts except for the standard 13 fonts; these fonts are included as part of Alchemy PS. You may also choose **None**, if you have copies of all the fonts used in the document installed for use with Alchemy PS.

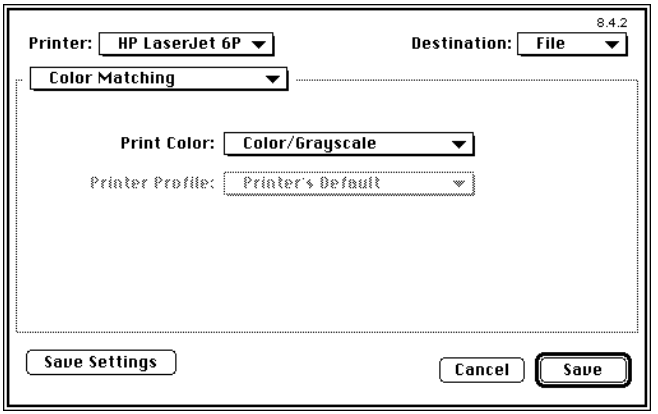
Enter a valid file name to generate and click the **Save** button. This will generate a PostScript file which Alchemy PS can read.

If you are using the newer LaserWriter 8.0 driver things will look slightly different yet again. After choosing **Print...** from the **File** menu in your application the print dialog box looks like this:

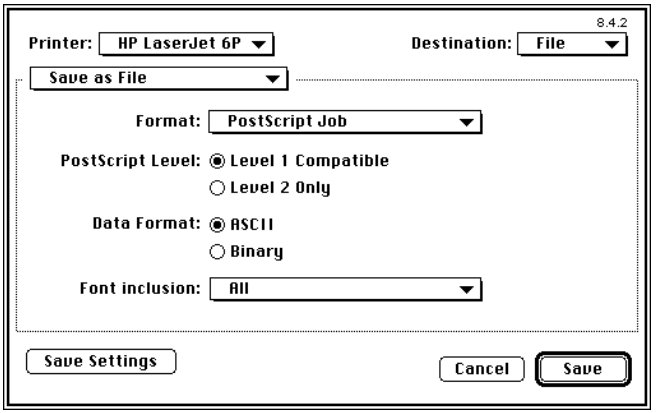


You select **File** from the **Destination** choice.

If you wish to generate a grayscale or color PostScript file that choice is now found in the **Color Matching** dialog box.

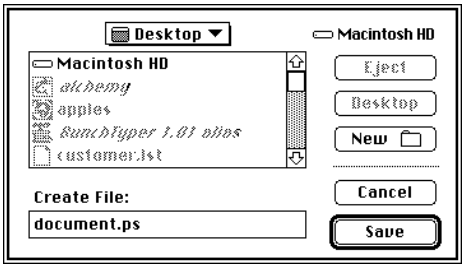


The font Inclusion option is now found in the **Save as File** dialog box.



To include the fonts used in the document select **All** under the **Font Inclusion** menu. This will include all of the fonts. To reduce the size of the PostScript file select the **All But Standard 13**, this includes all fonts except for the standard 13 fonts; these fonts are included as part of Alchemy PS. You may also choose **None**, if you have copies of all the fonts used in the document installed for use with Alchemy PS.

After selecting the **Save** button you will be presented with the **Save Disk File** dialog:



Enter a valid file name to generate and click the **Save** button. This will generate a PostScript file which Alchemy PS can read.

4

PostScript Fonts

alchfont

The program alchfont is used to add PostScript Type 1 fonts to the fontmap used by Image Alchemy PS.

Alchemy PS comes with the standard PostScript fonts, licensed from Soft Horizons, installed and ready to use. These fonts are versions of:, Bookman, Courier, Helvetica, NewCentury Schoolbook, Palatino, Symbol, Times,, Zapf Chancery, and Zapf Dingbats in normal, bold, italic, and bold-italic versions (where applicable).

You can use alchfont to add fonts to those available to Alchemy PS, remove fonts, list the installed fonts, and add font aliases.

The first step in adding new fonts to Alchemy PS is to copy the fonts to either the `\alchemy\ps` directory, the `\psfonts` directory, or the directory pointed to by the `alchemyps` environment variable. Type 1 fonts generally come with several files; the only file which Alchemy needs is the .pfb file (the other files contain various information that programs which generate PostScript files use).

Usage Instructions

Listing installed fonts

```
alchfont -list
```

List fonts in the fontmap

The list of fonts will be quite long; you will probably want to redirect the output to a file for printing or use the more utility to page through the list (`alchfont -list | more`)

Adding fonts

```
alchfont fontfile
```

Add the font found in fontfile to the fontmap, thereby making it available to Alchemy.

For example, `alchfont gn_____.pfb` will add the font GillSans to the fontmap.

Aliasing a font

```
alchfont aliasname:fontname
```

Alias the font fontname with the name aliasname.

Aliasing a font defines an alternate name which may be used to refer to the font. This is useful for some programs like Microsoft Word for DOS which creates PostScript files that refer to all fonts other than the standard 35 fonts as realfontname-F (for these files use realfontname-F:realfontname; for example, for Gill Sans use GillSans-F:GillSans).

In this case, `alchfont GillSans-F:GillSans`, will tell Alchemy PS to use the font GillSans when the font GillSans-F is specified.

This can also be useful when converting a PostScript document which contains fonts you don't have; you can substitute a similar font using an alias (Alchemy ordinarily substitutes Courier for fonts it cannot find).

For example, `alchfont Melior:Times` will cause Alchemy PS to substitute the font Times for the font Melior.

Scanning for fonts

`alchfont -scan`

Scan for fonts in the default directories and add them to the fontmap. The default directories are the `\alchemy\ps` directory, the `\psfonts` directory, and the directories defined by the `alchemyps` environment variable.

Removing fonts

`alchfont -remove fontname`

Remove specified fonts from the fontmap. This does not delete the actual font from the disk.

Specifying an alternate fontmap

`alchfont -fontmap=name`

Use specified fontmap; the default is the file named `fontmap` found in the path specified by the `alchemyps` environment variable (or the file `\alchemy\ps\Fontmap`, if no `alchemyps` environment is set).

Missing fonts

Alchemy PS will substitute Courier for any unknown fonts, as well as fonts that are in the fontmap, but not found on your disk. Alchemy will display warning messages when it does this. If Courier is not present, Alchemy will abort with an error message to that effect.

If Alchemy cannot find fonts which are used in the PostScript file you are converting and you do not want Alchemy to substitute Courier, you can either substitute another font, by creating an alias, or purchase the font and install it using alchfont.

Multiple fontmaps

Image Alchemy will always look for fonts in a file called fontmap when interpreting a PostScript file. If you need several fontmaps, perhaps for different users, you can make font additions and deletions using the `-fontmap` option to specify which fontmap to work on. Then, when you want to use a particular fontmap, copy it to a file called `Fontmap`.

For example, assume you have three different fontmaps, titled allan, marcos, and jill. To add Tekton to the marcos fontmap, you would type:

```
alchfont -fontmap=marcos tekton.pfb
```

Then, to make marcos the fontmap that Alchemy will find, copy marcos to a file called fontmap in the `\alchemy\ps` directory:

```
copy marcos \alchemy\ps\Fontmap
```

It is important to realize that the copy command will overwrite any other file named `Fontmap` in the directory.

5

Conversion Options

Introduction

The one option which is always required when running Image Alchemy is the output image file type. Even if you are just re-sizing an image, or changing the number of colors in an image, Alchemy needs to know what type of image you want to create.

The file types that Image Alchemy supports are listed below. In addition to the syntax required to generate the file, any known restrictions or limitations are listed. If you have trouble reading an image in one of the file formats we claim to support please contact us (see Appendix D, Customer Support).

The output option consists of a single letter, followed by any options needed for the file format you are writing. The output option, like all Alchemy options, is preceded by a dash, "-". The less common output options consist of a letter preceded by two dashes, "--".

Output variations

Some of the output formats have several variations; in those cases you specify which variation you want with an optional letter and/or number after the output option.

Example

The option to generate a Windows Bitmap file is `-w`. There are two types of Bitmap files: uncompressed and Run-Length-Encoded (RLE). To write out an uncompressed Bitmap file use `-w0`; to write out an RLE Bitmap file use `-w1` (the default Bitmap file is uncompressed, so a `-w` without any parameter following it would also generate an uncompressed Bitmap file). Note that Alchemy allows spaces between the option and parameter, so typing `-w 1` would be the same as `-w1`.

Further variations

Be aware that the other options specified on the command line may also affect the type of file that is generated.

Example

Within the Windows Bitmap file type there are 1 bit, 4 bit, 8 bit, and 24 bit files.

Alchemy always generates a file using the best match of the file type and the output image. So, in the case of Windows Bitmap files, if the output image is black and white a 1 bit file is generated. If the output image is paletted with 16 colors or less a 4 bit file is generated. If the output image is paletted with more than 16 colors an 8 bit file is generated. And if the output image is true color a 24 bit file is generated.

You can explicitly force any of these file types by using other Alchemy options. For example, if you wanted a 1 bit Windows Bitmap file you would specify `-c2 -b -w`. To force a 4 bit file use `-c16 -w`. To force an 8 bit file use `-c256 -w`. And to force a true color file use `-24 -w`.

Identifying image files

Image Alchemy identifies the type of file being read by checking various magic numbers and other information that varies from format to format. Unfortunately, some formats do not have a magic number; in those cases Alchemy uses other information to guess as to the image type. It is possible for Image Alchemy to incorrectly identify an image; if this happens you can use the `-=` option to force Alchemy to recognize the file as a particular format (see Chapter 6 for more information on the `-=` option)

Input Options

Some input file formats have optional parameters which affect how the input file is read. These parameters can specify such things as the page to read (for multi-page formats, such as PCL), which bands to read (for multi-band formats, such as Core IDC), or which resolution to read (for multi-resolution formats, such as PhotoCD).

The option used to specify input options is -Z. This is followed by one or more parameters which vary depending on the format being read. The comments section for each format describes any input options which apply to that format.

MacBinary

When reading images, Alchemy automatically recognizes and reads MacBinary II files (MacBinary files are generated when you accidentally leave MacBinary mode on when transferring a file from a Macintosh).

Other information

Alchemy will preserve as much information in each file as practical; this always includes the height and width of the image and the number of colors in the image. Some file types include other data, such as the name of the image, the aspect ratio of the image, the date the image was created, etc. Since most of these items are only supported by a few file formats, Alchemy discards everything but the height, width, number of colors, gamma, aspect ratio, resolution values, and, optionally, alpha channel information.

File Formats

The individual file formats supported by Alchemy are described in alphabetical order on the following pages. The descriptions follow the template given overleaf.

Name of format -option

Overview of file format.

Syntax Description of syntax. Even though it is shown in this section, any parameter following the file format output is optional.

Parameters Brief description of the parameters. Those parameters which require a detailed explanation are further documented under the comments section below.

Extensions The extensions commonly used for this image format. When multiple extensions are listed Alchemy writes files using the first one, but will check for files using all extensions (in the order listed). Some formats use more than one file per image, in that case the extension for each portion of the image is listed. Four letter extensions are skipped on MS-DOS systems.

Creator The company or individual who created this image format. Please contact them for more information on the format.

Used by Programs or types of software that use this image format.

Variations A list of the variations supported by Image Alchemy.

Limitations Any known limitations that Image Alchemy has when reading or writing this image format.

Comments Miscellaneous things of which you should be aware.

Related options Other Alchemy options that affect the reading or writing of this image format. Note that -8, -24 (and, for some formats, -15, -16, and -32), -c, and -b options have an effect for most image formats and are not listed explicitly.

Examples Sample conversions involving this image format.

ADEX --A

ADEX files are used by the ADEX Corporation ChromaGraph series of graphics cards.

Syntax

--A *compressionType*

Parameter

compressionType:
0:None
1:Run Length Coded
The default is None.

Extensions

.img
.rle

Creator

ADEX Corporation

Used by

ADEX ChromaGraph cards.

Variations

4 bit and 8 bit images.

Comments

Some ADEX files don't contain a palette; in those cases there's usually a second ADEX file which contains the palette to be used. To read those images that don't have palettes, use the -F false color option to read the palette from a separate file.

Example

Convert the file test.gif to an uncompressed ADEX file called test.img:

```
alchemy test.gif --A
```

Adobe Acrobat PDF --d

Adobe Acrobat PDF (Portable Document Format) files are used by Adobe Acrobat.

Syntax

--d *compressionType*

Parameter

compressionType:

0:None
1:Run Length
2:LZW
3:CCITT Group 3 fax
4:CCITT Group 4 fax
5:JPEG Low Quality
6:JPEG Medium Quality
7:JPEG High Quality

0:ASCII Encoding
10:Binary Encoding

The default is no compression and ASCII Encoding. Options are combined by adding (see below for an example).

Extension

.pdf

Creator

Adobe Systems Incorporated

Used by

Adobe Acrobat

Variations

1 bit black and white, 8 bit grayscale, 8 bit paletted, and 24 bit color images.

Limitations

CCITT Group 3 fax and Group 4 fax files are always 1 bit, black and white. Selecting either compression type will cause Alchemy to automatically convert the input image to black and white.

Comments

For more information on reading Adobe Acrobat files see Chapter 3.

Alchemy can write multi-page PDF files when used with the ---U option. See below for an example.

Examples

Convert the JPEG file sample.jpg to a Run Length compressed PDF file:

```
alchemy sample.jpg --d 1
```

Convert the JPEG file sample.jpg to a high-quality JPEG compressed PDF file with binary encoding:

```
alchemy sample.jpg --d 17
```

Convert all the pages in the TIFF file, doc.tif, to a multi-page Group 4 compressed PDF file (for more information on the ---U option see Chapter 6):

```
alchemy doc.tif --d 4 -U ---U
```

Adobe Photoshop ---p

Adobe Photoshop files are used by Adobe Photoshop.

Syntax

---p *compressionType*

Parameter

compressionType:
0:None
1:Compressed

0:RGB
400:CMYK
The default is None, RGB.

Extension

.psd

Creator

Adobe Systems Incorporated

Used by

Adobe Photoshop

Variations

Writes 1 bit black and white, 8 bit grayscale, 8 bit paletted, 24 bit color images, and 32 bit CMYK images, with and without alpha channels.

Limitations

Photoshop 3.x files cannot be read, we are planning an update to address this issue, check with us to see if it is available.

Comments

Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

To improve the quality of output may want to use a color correction file when converting to the CMYK variation of this format. See the -C option in Chapter 8 for more information.

Examples

Convert the JPEG file sample.jpg to an uncompressed Photoshop file:

```
alchemy sample.jpg ---p
```

Convert the Targa file alpha.tga to a compressed Photoshop file, with alpha channel:

```
alchemy sample.jpg ---p1 -I
```

Alias Pix --I

Alias is a modeling software package for SGI and Macintosh computers.

Syntax --I (upper case i)

Extension .img
.als

Creator Alias Research, Inc.

Used by Alias
Vivid Ray Tracer

Variations 24 bit RLE files.

Comments This is the same format as used by the Vivid ray tracer (see Vivid, below)

Example Convert the file spheres.qrt to an Alias Pix file:

```
alchemy spheres.qrt --I
```

Alpha Microsystems BMP -M

Alpha Microsystems BMP files are used by Alpha Microsystems.

Syntax

-M *compressionType*

Parameter

compressionType:
0:None
1:Packed
The default is None.

Extension

.bmp

Creator

Alpha Microsystems

Used by

Alpha Microsystems workstations.

Variations

1, 4, 8, and 24 bit unpacked and packed (run-length encoded) RGB images.

Limitations

Reading and writing HLS images is not supported.

Comments

When reading an image without a palette Alchemy will assume the image is gray-scale.

Examples

Convert the GIF file, bigpict.gif, to an uncompressed Alpha Microsystems BMP file:

```
alchemy bigpict.gif -M
```

Do the same thing, but force a 24 bit image, and compress the image:

```
alchemy bigpict.gif -M1 -24
```

ALPS ---a

Alps files are used by Alps Micro Dry printers.

Syntax ---a

Extensions .prn

Creator Alps

Used by Alps printers.

Variations 1 bit black and white and 4 bit CMYK

Limitations Write only.

Comments Alps printers are capable of 300 and 600 dpi in color or black and white mode. Alps printers also support 1200 x 600 dpi for black and white mode.

To position the image on the page use the offset image option ("-_") or the center image option ("--_"), see Chapter 8 for details.

To improve the output quality you may want to use gamma correction or a color correction file when converting to this format. See the -G and -C options in Chapter 8 for more information.

Examples Convert the JPEG file sample.jpg to an Alps file five inches wide at 600 dpi.

```
Alchemy sample.jpg ---a -Xb5i -+ -D600 600
```

Autodesk PIC/CEL ---l

Autodesk PIC/CEL files are files developed by Autodesk.

Syntax ---l (lower case L)

Extensions .pic
.cel

Creator Autodesk

Used by Animator and Animator PRO

Variations 15 bit per pixel RGB and 24 bit per pixel RGB with Alpha channel.

Comments Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Example Convert the file image.tga to an Autodesk PIC file, preserving the Alpha channel information:

```
alchemy input.tga ---l -I
```

Autologic --a

Autologic files are black and white or gray-scale files for use with Autologic typesetting equipment.

Syntax

--a

Extensions

.gm
.gm2
.gm4

Creator

Autologic, Incorporated

Used by

Autologic typesetting equipment.

Variations

Graphics modes 2 (black/white) and 4 (gray-scale).

Limitations

Only the High Speed Interface inline format is supported.

When reading, images must be preceded by a Graphics Parameter Block.

Examples

Convert the file input.tif to a GM4 file called output.gm4:

```
alchemy input.tif output.gm4 --a -b
```

Convert the file input.tif to a GM2 file called output.gm2:

```
alchemy input.tif output.gm2 --a -b -c2
```

AVHRR --R

AVHRR files are used for satellite image data.

Syntax

--R *outputType*

Parameter

outputType
1:IDIDAS Uncompressed
2:IDIDAS Compressed type 1
The default is 1 (IDIDAS Uncompressed).

Extension

.sst

Creators

National Oceanic and Atmospheric Administration (NOAA)
National Environmental Satellite Data Information Service (NESDIS)

Used by

IDIDAS
SSTMAP
IMGMAP

Variations

Reads 8 and 11 bits per pixel IDIDAS AVHRR files.

Writes 11 bits per pixel IDIDAS AVHRR files.

Limitations

Level 1B AVHRR files will be supported at a later date; please contact us for more information.

Alchemy discards all but the top 8 bits when reading 11 bit AVHRR files. When writing, the bottom 3 bits are set to 0.

Any graphics information is discarded when reading the file.

Since AVHRR images are always grayscale, Alchemy assumes the use of the -b and -8 options when writing an AVHRR file.

Comments

AVHRR images contain a lot of information which is not part of the image data. This information includes the time and date the image was captured, the satellite which captured the image, the type of instrumentation used, etc. When reading AVHRR images this information is discarded; when writing AVHRR images 0 is written for all values for which data is unavailable.

Example

Convert the GOES file, florida.goe, to an uncompressed IDIDAS AVHRR file:

```
alchemy florida.goe --R1
```

AVS X ---A

AVS X files are image files used by AVS (Application Visual System)

Syntax ---A

Extensions .x

Creator Advanced Visual Systems Inc.

Used by AVS Software systems

Variations 24 bit true color with alpha channels

Comments Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Example Convert the file picture.im32 to an AVS file, preserving the alpha channel:

```
alchemy picture.im32 ---A -I
```

Binary Information Files (BIF) -B

There are quite a few programs which produce image files which contain just pixel data. These image files do not have a header and hence do not include enough information to allow Alchemy to read them. Using a BIF file Alchemy can read these images. However, since required information, such as the height and width of the image, is not present in these files, it must be supplied by the user.

BIF files can also be created by Image Alchemy for software which expects images to be just pixels.

See Appendix E, "Binary Information Files", for more information.

Syntax

-B *outputType*

Parameter

outputType:
0:Standard
1:3 Files
2:ASCII
3:Group III
4:Group IV
5:Packed, 1 bit per pixel, black and white
The default is Standard. See the comments section below for more information on the output types.

Extensions

.bif For ASCII file describing image.
.raw For actual image data.

Creator

Handmade Software, Inc.

Used by

Image Alchemy
Various image processing software

Variations

24 bit true color, 8 bit gray-scale, and 1 bit black and white.

Limitations

Paletted files cannot be read in (a work around is to generate a .PAL file and then false color the gray-scale image using the -F option).

Comments

BIF files are used to read and write files which consist entirely of image data. You have to generate a text file which describes the format of the data you are trying to read in. This file is called a BIF file. The format of BIF files is documented in Appendix E, Binary Information Files. You then instruct Alchemy to read the image data by giving it the name of the .BIF file.

Alchemy can generate a variety of different types of BIF data:

The standard BIF file consists of either gray-scale or byte interleaved RGB data in binary form. Each pixel is stored as one or three bytes and there is no padding at the end of lines or at the end of the image. This is the most common output type.

The three file BIF data has the red, green, and blue data stored in separate files. The red data will be stored in a file with a .r extension, the green data has the extension .g, and the blue data has the extension .b.

The ASCII BIF file is identical to the standard BIF file except that the data is stored as ASCII instead of binary. Each line of data in the original image is stored as one line of data in the BIF file, with a new-line character at the end of the line. There are commas separating each of the pixel values. This type of BIF file cannot be read by Image Alchemy.

The Group III BIF files that Alchemy outputs are CCITT Fax Group III compressed. They have the least-significant bit first, end-of-line markers before the first line, and after every line except the last, and are not byte aligned. This is the native order for a fax machine. This format can be useful if you are generating data to be sent via a fax modem.

The Group IV BIF files that Alchemy writes are CCITT Fax Group IV compressed; they have the least significant bit first.

Packed BIF files are required to be black and white. Packed files are identical to standard BIF files except that 8 pixels are packed together into one byte and the data is padded to a multiple of 8 pixels per line.

Examples

Convert the file data to a GIF file:

```
alchemy data.bif -g
```

Convert the image helen.pcx to a Binary file (this will create two files: helen.raw and helen.bif):

```
alchemy helen.pcx -B
```

Calcomp CCRF --l

Calcomp raster files are used by Calcomp thermal transfer printers and electrostatic and ink jet plotters.

Syntax

--l *type* (lower case l)

Parameter

type:
Thermal Transfer Printer:
0:Uncompressed
1:White Space Suppression
2:Run Length Compression
Electrostatic plotter (CCRF):
6:8 bit bytes, 8 bit compression units
7:8 bit bytes, 16 bit compression units
8:8 bit bytes, 32 bit compression units
Ink jet Plotter (Interleaved CCRF):
46:8 bit bytes, 8 bit compression units
47:8 bit bytes, 16 bit compression units
48:8 bit bytes, 32 bit compression units
49:8 bit bytes, Zip compression
The default is Thermal transfer, uncompressed.

Extensions

.crf
.ccrf
.prn

Creator

Calcomp

Used by

Calcomp thermal transfer printers and electrostatic and ink jet plotters, including the CrystalJet.

Variations

Black and white or 4-bit CMYK.

Comments

If there is only black and white data in the image, a 1 bit file will be generated.

To position the image on the page use the offset image option ("-_") or the center image option ("--_"), see Chapter 8 for details.

To improve the output quality you may want to use gamma correction or a color correction file when converting to this format. See the -G and -C options in Chapter 8 for more information.

Example

Convert the Targa file image1.tga to a CCRF file using 16 bit compression units:

```
alchemy page1.tif --l7
```

CALS --c

Computer-aided Acquisition and Logistics Support (CALS) files are black and white images used by the US Government as part of their transition to electronic media.

Syntax --c

Extension .cal

Creator Defense Logistics Agency (DLA)

Used by Department of Defense (DoD)

Variations Type 1 (Group 4 raster) CALS images.

Limitations Document labels, such as document ID and figure ID, are ignored.

Comments

CALS images are Fax Group IV compressed and are therefore a good way of storing black and white line drawings and scans.

Example Convert the TIFF file page1.tif to a CALS file:

```
alchemy page1.tif --c
```

Core IDC --B

Core IDC files are used by Core Software's GIS software.

Syntax --B

Extension .idc

Creator Core Software Technology

Used by Core Software Technology

Variations 1 and 3 band, 8 bit files.

Limitations Only 8 bit images can be read.

Alchemy cannot read 2 channel or 4 or more channel images without using the -Z option (see the comments section below for more information).

Comments 1 band files are read in as gray-scale images.

3 band files are read in as true color images. The default color mapping between RGB and bands 1, 2, and 3 is Red=Band 1, Green=Band 2, and Blue=Band 3, this can be changed by using the -Z option. See the example section below for details.

Using the -Z option it is possible to select a single channel or 3 channels when reading a multi-channel Core IDC image. To use the -Z option follow it with a single number to indicate which channel is to be read as a gray-scale image or three numbers to indicate which channels are to be read as a 24 bit color image. See the example section below for details.

Examples Convert the Core IDC file atlanta.idc to a Sun raster file:

```
alchemy atlanta.idc -s
```

Convert the file satellite.image to a Core IDC file.

```
alchemy satellite.image satellite.idc --B
```

The Core IDC file newyork.idc contains 9 bands, the next examples show various ways to read selected bands out of the image.

Convert the first band in the image to a grayscale Sun Raster file.

```
alchemy newyork.idc -Z 1 -s
```

Convert the sixth band in the image to a grayscale Sun Raster file.

```
alchemy newyork.idc -Z 6 -s
```

Convert the image to a 24 bit, color Sun Raster file, using band 2 as the red channel, band 7 as the green channel, and band 4 as the blue channel.

```
alchemy newyork.idc -Z 2 7 4 -s
```

Cubicomp PictureMaker --P

Cubicomp PictureMaker files are used in broadcast-quality three dimensional modeling and animation.

Syntax

--P *type*

Parameter

type:
0:Allow any size image
1:Adjust image size to 512 x 488
The default is 0.

Extension

.r8	Red channel image data
.g8	Green channel image data
.b8	Blue channel image data
.a8	Alpha channel image data [optional]

Creator

Cubicomp Corp.

Used by

Cubicomp PictureMaker

Variations

24 bit RGB images with an optional alpha channel.

Limitations

8-bit paletted PictureMaker files are unsupported.

Comments

This format is not the same as IBM Picture Maker.

The option for adjusting the image size to 512 x 488 is useful because Cubicomp PictureMaker does not work with images which are not of this exact size. If either the X or Y dimension is larger than 512 or 488, respectively, that dimension will be truncated. If either dimension is smaller than 512 or 488, the image will be padded on the right-hand side or bottom, as necessary, with black.

PictureMaker images have either three or four separate files per image: a red file, a green file, a blue file, and an optional alpha channel file. When reading or writing a PictureMaker file specify the name of the .r8 file, Alchemy automatically generates the name of the .g8, .b8, and .a8 files

When writing a PictureMaker file Alchemy will overwrite, without warning, existing .g8, .b8, and .a8 files.

To preserve the alpha channel information when converting to or from Cubicomp PictureMaker files use the -I option.

Example

Convert the 24-bit JPEG image stones.jpg to PictureMaker files:

```
alchemy stones.jpg --P
```

Dr. Halo CUT --C

Dr. Halo CUT files are used by various MS-DOS based paint programs.

Syntax

--C

Extension

.pal	Palette and header data
.cut	Pixel data

Creator

Media Cybernetics

Used by

Dr. HALO III Paint Package
HALO Desktop Imager

Variations

8 bits per pixel

Comments

Dr. Halo CUT images are actually two files. You specify the name of the .cut file and Alchemy automatically generates the name of the .pal file.

When writing a Dr. Halo CUT file Alchemy will overwrite, without warning, existing .pal files.

Examples

Convert the image test.pcx to a Dr. Halo CUT file:

```
alchemy test.pcx --C
```

Encapsulated PostScript (EPS) -e

EPS files are a subset of PostScript; they may be included by other PostScript files without requiring that the importing software be able to interpret the file.

Syntax

-e *type*

Parameter

type:

0:No preview
1:Device independent preview
2:TIFF preview

0:UNIX newlines
10:Mac newlines
20:MS-DOS newlines

0:Showpage
100:No showpage

0:RGB
400:CMYK

0:Uncompressed
1000:LZW
2000:CCITT Group 4 fax
3000:JPEG Low Quality
4000:JPEG Medium Quality
5000:JPEG High Quality

0:ASCII
10000:Binary

Options are combined by adding. The default is an uncompressed EPS file with a TIFF preview, UNIX newlines, and showpage (output type 2).

Extensions

.epsi
.eps
.epi

Creator

Adobe Systems, Inc.

Used by

PostScript printers

Variations

Black and White, Gray-scale, RGB, and CMYK.

Comments

For information about reading EPS files see Chapter 3.

If the output is black and white or gray-scale and is not compressed, it will work with any PostScript device. If it's color, then the CMYK extensions or a level 2 device is required.

If you are writing an EPS file which you intend to send directly to a PostScript output device, such as a printer, you will want to write a file with no preview and include the showpage command.

EPS files are normally written using the UNIX newline convention. To write an EPS file with Macintosh newlines, add 10 to the preview type. To write an EPS file with MS-DOS newlines, add 20 to the preview type. See below for an example.

To omit the showpage command from the end of the EPS file add 100 to the preview type. Some software which imports EPS files does not correctly handle EPS files which contain the showpage command.

To improve the quality of output may want to use a color correction file when converting to the CMYK variation of this format. See the -C option in Chapter 8 for more information.

Examples

Convert the file input.gif to an uncompressed color EPS file called input.eps with no preview:

```
alchemy input.gif -e 0 -24
```

Do the same thing, but write out MS-DOS newlines:

```
alchemy input.gif -e 20 -24
```

Do the same thing, but use LZW compression:

```
alchemy input.gif -e 1020 -24
```

Convert the file input.gif to a gray-scale EPS file called gray.eps, with a device independent preview:

```
alchemy input.gif gray.eps -e 1 -b
```

Convert the file test.gif to a black and white EPS file called test.eps, with no preview and MS-DOS newlines:

```
alchemy test.gif -e 20 -b -c2
```

Epson Stylus --K

Epson Stylus files are used by Epson Stylus printers.

Syntax

--K *outputType*

Parameter

outputType:

0:Stylus Color
1:Stylus Color II and IIs
2:Stylus Color 400
3:Stylus Color 600
4:Stylus Color 800
5:Stylus Color 1520
6:Stylus Color 3000

0:Microweave
10:Disable Microweave

0:Uni-directional
20:Bidirectional

The default is Stylus Color 800, Microweave, Uni-directional (outputType 4). Options are combined by adding.

Extensions

.prn

Creator

Epson

Used by

Epson Stylus printers

Variations

4 bit CMYK.

Limitations

Epson Stylus files can only be 1420x720, 720x720, 360x360, or 180x180 dpi (depending on printer model selected). If you specify any other dpi value the output file will automatically switch to one of those.

Comments

Only Epson Color Stylus 600, 800, 1520, and 3000 support 1440x720 dpi mode. If you specify it for the other models Alchemy will use 720x720 dpi mode instead.

To improve the output quality you may want to use gamma correction or a color correction file when converting to this format. See the -G and -C options in Chapter 8 for more information.

Examples

Convert the file page1.tif to a 360 dpi Epson Stylus Color 800 file, scaled to 5 inches wide:

```
alchemy page1.tif --K -D 360 360 -Xb5i -+
```

Do the same thing, but use a gamma correction value of 2.0:

```
alchemy page1.tif --K -D 360 360 -Xb5i -+
-Gi1.0 -Go2.0
```

Do the same thing, but use a dpi value of 1440x720:

```
alchemy page1.tif --K -D 1440 720 -Xb5i -+
-Gi1.0 -Go2.0
```

ER Mapper Raster --m

ER Mapper files are used by ER Mapper satellite image analysis software.

Syntax

--m

Extensions

.ers	Header data
.	Pixel data

Creator

Earth Resource Mapping

Used by

ER Mapper

Variations

1 channel and 3 channel images.

Limitations

Alchemy cannot read 2 channel or 4 or more channel images without using the -Z option (see the comments section below for more information).

Comments

ER Mapper files are actually two files, one with the extension .ers and the other without any extension. The .ers file contains header information and the non-extensioned file contains the actual image data. You specify the name of the .ers file and Alchemy automatically generates the name of the other file.

When writing an ER Mapper file Alchemy will overwrite, without warning, existing ER Mapper image data files.

Using the -Z option it is possible to select a single channel or 3 channels when reading a multi-channel ER Mapper image. To use the -Z option follow it with a single number to indicate which channel is to be read as a gray-scale image or three numbers to indicate which channels are to be read as a 24 bit color image. See the example section below for details.

Examples

Convert the Sun Raster file earth.ras to an ER Mapper file:

```
alchemy earth.ras --m
```

The ER Mapper file Landsat_TM_year_1991.ers contains 7 bands; the next examples show various ways to read selected bands out of the image.

Convert the first band in the image to a grayscale Sun Raster file.

```
alchemy Landsat_TM_year_1991.ers -Z 1 -s
```

Convert the fifth band in the image to a grayscale Sun Raster file.

```
alchemy Landsat_TM_year_1991.ers -Z 5 -s
```

Convert the image to a 24 bit, color Sun Raster file, using band 2 as the red channel, band 7 as the green channel, and band 3 as the blue channel.

```
alchemy Landsat_TM_year_1991.ers -Z 2 7 3
-s
```

Erdas LAN/GIS/IMG --e

Erdas files are used by Erdas image processing software.

Syntax

--e

Extensions

.lan
.gis.img

Creator

Erdas Inc.

Used by

Erdas remote sensing software.

Variations

1 and 3 band files.

Reads 4, 8, and 16 bit files LAN, GIS, and IMG. Writes 8 bit LAN and GIS files.

Limitations

When writing Erdas files Alchemy does not change the extension depending on the number of bands in the image; according to the specification gray-scale files should have the extension .gis and true color files should have the extension .lan. Alchemy always uses .lan.

Alchemy cannot read 2 channel or 4 or more channel images without using the -Z option (see the comments section below for more information).

Because of a shortage of test files this feature has not been extensively tested; if you have Erdas IMG files which Image Alchemy cannot correctly read please contact us.

We will be adding Erdas IMG output, if you are interested in this capability please contact us.

Comments

1 band files are read in as gray-scale images.

3 band files are read in as true color images. The default color mapping between RGB and bands 1, 2, and 3 is Red=Band 1, Green=Band 2, and Blue=Band 3; this can be changed by using the -Z option. See the example section below for details.

Using the -Z option it is possible to select a single channel or 3 channels when reading a multi-channel Erdas image. To use the -Z option follow it with a single number to indicate which channel is to be read as a gray-scale image or three numbers to indicate which channels are to be read as a 24 bit color image. See the example section below for details.

Examples

Convert the GIS file texas.gis to a Sun raster file:

```
alchemy texas.gis -s
```

Convert the file satellite.image to a GIS file.

```
alchemy satellite.image satellite.gis -b
--e
```

The Erdas file miami.gis contains 4 bands; the next examples show various ways to read selected bands out of the image.

Convert the first band in the image to a grayscale Sun Raster file.

```
alchemy miami.gis -Z 1 -s
```

Convert the fourth band in the image to a grayscale Sun Raster file.

```
alchemy miami.gis -Z 4 -s
```

Convert the image to a 24 bit, color Sun Raster file, using band 2 as the red channel, band 1 as the green channel, and band 4 as the blue channel.

```
alchemy miami.gis -Z 2 1 4 -s
```

Explore TDI (read only)

TDI is used by the Alias/Wavefront Explore system

Extensions .tdi

Creator Nothing Real

Used by Explore
Shake

Variations 24 bit true-color with alpha channels, read only

Limitations The TDI file format specification is not published, Alchemy's support for the format is based on examining customer supplied files. There are variations of the TDI format, including grayscale and files without alpha channels, which we do not support because we have not had such files to examine.

Because of the lack of a published specification Alchemy cannot write TDI files.

Comments If you have TDI files which Alchemy cannot read please contact us. Similarly if you are interested in having Alchemy write TDI files please contact us.

Alpha channel data can be read by using the -I option, see Chapter 6 for more information.,

Examples Convert the sequence of TDI files frame.000 through frame.499 to TIFF files, with the names 0.tif through 499.tif:

```
alchemy frame.### #.tif -t0 --- 0 499
```

Fargo Primera --k

Fargo Primera files are used by Fargo Primera color printers.

Syntax

--k *type*

Parameter

type:
0:Thermal 3 Pass Color (CMY)
1:Thermal 4 Pass Color (CMYK)
2:Thermal Black and White (K)
10:Dye Sub 3 Pass Color
11:Dye Sub Black and White
The default is 0.

Extensions

.prn

Creator

Fargo Electronics, Inc.

Used by

Fargo Primera printers

Variations

1, 3, and 4 channel Thermal files.

1 and 3 channel Dye Sub (photo-realistic) files., write only.

Limitations

Reading Dye Sub (photo-realistic) files is not currently supported.

When writing a dye sub (photo-realistic) file the Fargo supplied file primera.fzp must be located in the directory the source file is in. The Primera printer needs the information to print dye sub images.

Comments

There seems to be little difference in the quality of Thermal 3 Pass files versus Thermal 4 Pass files.

When printing onto the T-Shirt transfer material you will probably want to use the mirror image option (--^, see Chapter 8) so that the image will appear correct after it is transferred.

The Primera printer tends to print the left edge of the page off of the paper. You will probably want to specify a small image offset to prevent this (see the -_ option, Image Offset, in Chapter 8).

To improve the output quality you may want to use gamma correction or a color correction file when converting to this format. See the -G and -C options in Chapter 8 for more information.

Examples

Convert the sample JPEG file, sample.jpg, to a Thermal 3 Pass file:

```
alchemy sample.jpg --k
```

Convert the sample JPEG file, sample.jpg, to a Dye Sub 3 Pass file, scaling the image to be 6 inches wide (and a proportionate height), offsetting the image 1 inch from the left edge and 3 inches from the top of the page:

```
alchemy sample.jpg --k10 -Xb6i -+
-D200 200 -_ 1i 3i
```

FBM ---F

FBM is the native file format of the Fuzzy pixmap manipulation package.

Syntax ---F

Extensions .fbm

Creator Michael L. Mauldin

Used by Fuzzy pixmap manipulation package

Variations 8 bit paletted and grayscale and 24 bit true color

Comments The Fuzzy pixmap manipulation package is freely available from ftp://nl.cs.cmu.edu/usr/mlm/ftp/fbm.tar.Z.

Example Convert the file children.rast to a FBM file:

```
alchemy children.rast ---F
```

First Publisher ART --F

First Publisher ART files are black and white images used as clip art by First Publisher.

Syntax --F

Extension .art

Creator Software Publishing Corp.

Used by First Publisher

Variations Black and white, 1 bit per pixel.

Examples Convert the image scan.pcx to a First Publisher ART file:

```
alchemy scan.pcx --F
```

FLC (read only)

FLC files are a simple animated file format.

Extensions

.flc
.fli

Creator

Autodesk

Used by

Various shareware readers

Variations

8 bit, paletted.

Limitations

Read only.

Comments

FLC files are multi-page files, to read all of the pages in a FLC file use the -U option (see Chapter 6).

Examples

Convert the FLC file, movie.flc, to a multi-page GIF file.

```
alchemy movie.flc -g1 -U ---U movie.gif
```

Freedom of Press --f

Freedom of Press is a PostScript interpreter from Custom Applications that converts PostScript files to raster files. The Freedom of Press format is one of the file types it can create.

Syntax --f

Extension .fop

Creator Custom Applications

Variations 1 bit black and white and 4 bit CMYK.

Comments Freedom of Press images are actually two files, a data file and an info file. You specify the name of the data file and Alchemy automatically generates the name of the info file. The output file is normally output.001, output.002, etc. Alchemy will strip the first part of the name and replace it with 'info', so if you specified an output filename of output.005 there will be another file created called info.005. If you don't specify an extension, Alchemy will use .fop, so you'll get two files, named filename.fop and info.fop. Alchemy will overwrite info files without warning.

To improve the output quality you may want to use gamma correction or a color correction file when converting to this format. See the -G and -C options in Chapter 8.

Example Convert the file image.tga to a Freedom of Press image called output.003 and info.003, controlling the undercolor removal process using sample.ucr, scaling the image to 2500 pixels across (and scaling proportionately vertically) using nearest neighbor scaling, and conserving memory:

```
alchemy --f -Csample.ucr -X2500 -+ -$
image.tga output.003
```

GEM VDI Image File --g

VDI files are files that were developed by Digital Research for use with GEM.

Syntax --g

Extension .img

Creator Digital Research Inc.

Used by GEM

Variations 1-8 bit grayscale and 3 and 4 bit color files, reading.

1, 3, and 4 bit grayscale and 3 and 4 bit color files, writing.

Limitations The support for color and multiple bit grayscale GEM files is not very universal. Therefore make sure the application you are using to read the GEM files supports them.

Alchemy defaults to writing out a 1 bit, black and white GEM file. You can explicitly force a 3 plane color file by use of the -c8 option and a 4 plane color file by use of the -c16 option (you may add a -b to write a grayscale file instead of a color file).

Comments Because color GEM files have only 3 or 4 bits of information and no palette support the quality is generally not very good for scanned images. The GEM format seems to have been designed for line drawings.

Examples Convert the image scan.pcx to a black and white GEM file:

```
alchemy scan.pcx --g
```

Convert the image bigscan.tga to a 640x480, 8 color GEM file, using nearest neighbor scaling and type 2 dithering:

```
alchemy bigscan.tga -c 8 --g -X640
  -Y480 -d2
```

Do the same thing but write an 8 shade grayscale file with no dithering:

```
alchemy bigscan.tga -c 8 --g -X640
  -Y480 -d -b
```

GIF -g

GIF files were developed by CompuServe as a machine-independent image file format. GIF files are the most popular way of storing 8 bit, scanned or digitized images. GIF files are frequently used for storing images on the WWW.

Syntax

-g *type* [*delay* [*repeatCount*]]

Parameter

type:

0:GIF87A
1:GIF89A

0:non-interleaved
10:interleaved

0:disposal method 0
100:disposal method 1
200:disposal method 2
300:disposal method 3

The default is GIF87A,non-interleaved, and disposal method 0. Options are combined by adding (see below for examples). See the comment section below for an explanation of the different disposal methods).

delay:

Specifies the delay between multiple pages in GIF files, in hundredths of seconds (a delay of 250 is 2.5 seconds). The default is 0 (display images with no delay between pages).

repeatCount:

Specifies the number of times the images are to be repeated. Indicating a repeat count of 0 causes the images to repeat continuously. The default is 0. This is a Netscape specific tag.

Extension

.gif

Creator

CompuServe, Incorporated

Used by

CompuServe
WWW
Everyone

Variations

Reads 1 through 8 bit GIF87A and GIF89A interleaved and non-interleaved files, single and multi-page.

Writes 1 through 8 bit GIF87A and GIF89A interleaved and non-interleaved files. Also writes images with transparency information and multi-page GIF images.

Limitations

Any text, overlays, pauses, palette changes, etc. are ignored when reading GIF images.

When writing a multi-page GIF file or one with transparency information, the GIF89A type must be used. Alchemy will automatically change to writing a GIF89A file in these cases.

Because GIF files only store the size of the palette to the nearest power of 2, the exact palette size is lost when converting to and from GIF files. For example, if you convert a 240 color Sun Raster file to a GIF file and back to a Sun Raster file, the resulting Sun Raster file will have 256 colors.

Comments

GIF89A files are a newer variation of GIF files that were introduced in 1990. They allow the inclusion of transparency information, text, simple animation, and multiple pages in GIF files.

When writing a simple GIF file you will want to use the GIF87A variation, since the GIF89A extensions aren't necessary to store single images and some software still can't read GIF89A images. The advantages of GIF89A are: aspect ratio information is preserved, transparency information is stored, and multiple pages are allowed.

The GIF format includes a field for storing the color to be used for the background when viewing files. Alchemy does not make use of this value. Alchemy sets the background color to the darkest color in the palette when viewing files and organizes the palette such that the first color is the darkest color when writing GIF files, if the palette is created by Alchemy (you can override this by using the -z option).

To write a GIF file with transparency information use the ---t option (see below). When writing a GIF file with transparency information Alchemy defaults to making the lightest color the transparency color; you can override this by using the ---t option (see below for an example).

Multi-page GIF files are used by certain Web browsers (most notably Netscape Navigator 2.x). See the ---U command below for more information on writing multi-page files.

When writing a multi-page GIF file you may specify the delay, in hundredths of seconds, between images. If you do not specify a delay it defaults to 0 (which will display the images as quickly as possible). You may also specify a repeat count. This field is a Netscape specific tag that indicates how many times to display the sequence. The default is 0, indicating that the sequence is to repeat indefinitely

Alchemy will write a multi-page GIF file with a global palette if you use either the match to palette (-f) or false color (-F) option, otherwise Alchemy will write local palettes. If you have a series of images which contain identical palettes you can force Alchemy to write a global palette by using the -F option and give the name of the first file (see below for an example). If you have a series of images which do not contain identical palettes but you still want to write a global palette you can use Alchemy to generate a multi-image palette file and then match each of the images to that palette using the -f option (see below for an example).

The different disposal methods cause software which is displaying a multi-page GIF to perform different operations between images. There are 4 different disposal methods supported by the GIF specification and using Alchemy it is possible to write any one of them.

Disposal method 0: Restore to background color
Disposal method 1: Do not dispose, leave image in place
Disposal method 2: Restore area to previous
Disposal method 3: No disposal required

It's difficult to convey what this actually means when an image is displayed. The easiest thing to do is to write out a multi-page GIF using each of the disposal methods and use the software which you will use to display the image to view the results . If each of the images in the multi-page GIF is the same the disposal method has little effect, the most obvious differences are noted when an image is smaller than the previous image.

The LZW compression used in GIF files is patented by Unisys Corporation and used under license. If you write software to read or write GIF files you need to contact Unisys to arrange a license. See Appendix I in the Image Alchemy manual for contact information.

Examples

Convert the image test.pcx to a GIF87A image:

```
alchemy test.pcx -g
```

Convert the file input.tga to a 16 color GIF89A file:

```
alchemy input.tga -c16 -g1
```

Convert the image logo.pcx to a GIF89A image, using white as the transparent color (white is the default transparent color, so we do not need to specify 255 255 255 after the ---t):

```
alchemy logo.pcx -g1 ---t
```

Do the same thing, with red as the transparent color:

```
alchemy logo.pcx -g1 ---t 255 0 0
```

Write out a multi-image GIF file called output.gif, using the files image00.gif through image99.gif (this example will write out a local palette for each image):

```
alchemy image??.gif -g1 ---U output.gif
```

Do the same thing, but force Alchemy to write out a global palette (this assumes that all of the input gif images contain an identical palette):

```
alchemy image??.gif -g1 ---U output.gif -F
image00.gif
```

If the images contained different palettes, but you still wanted a single, global palette, you could use two runs of Image Alchemy to do this. First you would use the Multi-Image Palette output option to generate a .pal file and then run Alchemy again, matching each of the images to that palette:

```
alchemy image??.gif -L temp.pal -c256
alchemy image??.gif -g1 ---U output.gif -f
temp.pal
```

Write out a multi-image GIF file called output.gif, using the files image00.gif through image99.gif (this example will write out a local palette for each image), specifying a delay of 1 second between images, the loop will repeat indefinitely:

```
alchemy image??.gif -g1 100 ---U
output.gif
```

Do the same thing, but specify that the loop is to be displayed exactly twice:

```
alchemy image??.gif -g1 100 2 ---U
output.gif
```

Do the same thing, but use disposal method 2:

```
alchemy image??.gif -g201 100 2 ---U
output.gif
```

GOES --G

GOES files are used for satellite image data.

Syntax

--G *type*

Parameter

type:
0:GARS format
1:McIDAS format
The default is 0 (GARS format).

Extension

.goe

Creators

The University of Wisconsin
National Oceanic and Atmospheric Administration (NOAA)
National Environmental Satellite Data Information Service (NESDIS)

Used by

Various satellite image processing software, including the McIDAS system.

Variations

8 bits per pixel.

16, and 32 bits per pixel, read only.

Limitations

When reading 16 and 32 bit images Alchemy discards all but the top 8 bits of data.

Alchemy discards any calibration data and level maps when reading images.

Because of difficulty in getting a sufficient number of test images in the GOES format (especially the PUT format) reading GOES images has not been thoroughly tested. If you have any GOES images which Alchemy does not read correctly please contact us.

Comments

The GARS format is a 7680 bytes per block, Motorola byte-order, EBCDIC format; the McIDAS format is a continuous data, Intel byte-order, ASCII format.

Since GOES images are always grayscale, Alchemy assumes the use of the -b and -8 options when writing a GOES file.

GOES images contain a lot of information which is not part of the image data. This information includes the time and date the image was captured, the satellite which captured the image, the type of instrumentation used, etc. When reading a GOES image this information is discarded; when writing a GOES image 0 is written for all values for which data is unavailable.

Examples

Convert the Erdas file, florida.gis, into a GOES GARS image:

```
alchemy florida.gis --G0
```

Do the same thing, but write out a GOES McIDAS image:

```
alchemy florida.gis --G1
```

Histogram -H

Histogram files are HSI Raw files which contain a histogram.

Syntax

-H *options*

Parameter

options:

0: Do not ignore any pixels
1: Ignore white
2: Ignore black
3: Ignore sharp peaks

0: Do not generate a cumulative histogram
10: Generate a cumulative histogram

0: Use a black background for the histogram
100: Use a white background for the histogram

See the comments section below for more information. Options can be combined by adding (see below for an example). The default is 0.

Extension

.hst

Creator

Handmade Software, Inc.

Used by

Image Alchemy

Variations

Output only (can be read as a raw file).

Histogram files are always paletted with 8 colors.

Comments

Histogram files are HSI Raw files which contain the frequency of occurrence of pixel values. The horizontal axis indicates the intensity (from 0 at the left to 255 at the right). The vertical axis shows the frequency (the axis is automatically scaled so that 100% corresponds to the most frequently occurring value).

Ignore white and black automatically removes the white and black values from the histogram. This is useful if the background color is white or black, which would make the interesting portion of the histogram too small.

Peak ignore does the same thing, except it automatically decides what are the most used intensities and ignores them.

The cumulative option generates a cumulative histogram instead of a discrete histogram.

The white background option makes the background white (which is nice if you are going to be printing the histogram).

Examples

Generate a histogram for the image sample.jpg:

```
alchemy sample.jpg -H
```

Generate a histogram for the image tiger.ras, ignoring the white background:

```
alchemy tiger.ras -H 1
```

Do the same thing, but make it a cumulative histogram:

```
alchemy tiger.ras -H 11
```

Hitachi Raster Format --h

Hitachi Raster Format (HRF) files are black and white images used by CADCore.

Syntax --h

Extension .hrf

Creator Hitachi Software Engineering Co., Ltd.

Used by Information and Graphics Systems, Inc. (IGS)

Variations Black and white, 1 bit per pixel.

Comments Alchemy can read and write multi-page HRF files, use the -U option to read pages other than page 1 and option ---U to write a multi-page HRF file (see Chapter 6 for more information).

Examples Convert the TIFF file page1.tif to a HRF file:

```
alchemy page1.tif --h
```

Convert the TIFF files page1.tif through page9.tif to a multi-page HRF file:

```
alchemy page?.tif ----h ---U output.hrf
```

HP Printer Command Language (PCL) -P

HP PCL files are used by HP LaserJets and compatible printers.

Syntax

-P *type*[*paperSize* [*inputTray*]]

Parameter

type:

0:Uncompressed
1:RLE compressed
2:TIFF compressed
3:Delta Row compressed

0:Portrait
10:Landscape

0:Standard Margins
50:Expanded Margins

0:PCL3
100:PCL5
200:PCL XL
300:Lexmark PCL

0:Reset printer at start of data
1000:Do not reset printer at start of data

0:Include position information
4000:Do not include position information

See the comments section below for more information. Options are combined by adding (see below for an example). The default is 0 (Uncompressed, Portrait, Standard Margins, PCL3, Reset printer, and include position information).

paperSize:
0:Printer default setting
1:US Letter
2:US Legal
3:US Ledger
11:A4
13:A3
The default is 0.

inputTray:
0:Printer default tray
1 through 99:Tray varies with printer model
The default is 0

Extension

.pcl

Creator

Hewlett-Packard Company

Used by

HP LaserJet printers
HP compatible laser printers

Variations

1 bit per pixel, black and white, for PCL3, PCL5, and Lexmark PCL.

Writes 1 bit, 4 bit, and 8 bit grayscale and RGB paletted, for PCL XL

Reads and writes uncompressed, RLE compressed, TIFF compressed, and Delta Row Compressed PCL3 and PCL5 files.

Reads and writes portrait and landscape files.

Limitations

In addition to raster images, PCL files can include text and vector graphics information. When reading Alchemy only pays attention to raster images in the file and attempts to skip everything else. See Appendix A, Answers to Frequently Asked Questions, for a further discussion of this.

The only resolutions allowed in PCL files are 75 dpi, 100 dpi, 150 dpi, and 300 dpi (and, in the case of PCL5 type files, 200 dpi and 600 dpi, and, in the case of Lexmark PCL files 1200 dpi) and the X and Y resolution must be the same.

If you specify a non-allowable resolution Alchemy automatically uses the next higher resolution. For example, if you specify 250 dpi Alchemy will write a 300 dpi PCL file.

If no resolution is specified either on the command line or in the input file Alchemy automatically chooses the smallest resolution which will allow the entire image to fit on an 8.5" x 11" page (or whatever page size is selected).

PCL XL files are always written as uncompressed, so specifying -P200 and -P201 will result in the same file being written.

PCL XL files cannot be read.

Comments

To write a color file for the HP Color LaserJet use the HP RTL output option, --r 9, see below.

PCL3 files are supported by LaserJet 3 and earlier printers, PCL5 is supported by LaserJet 4 and newer printers. PCL XL is supported by LaserJet 6 and newer printers. Lexmark PCL is supported by Lexmark printers which are 1200 dpi capable.

The paperSize option will cause the LaserJet to automatically switch to whatever tray contains the correct size paper. If the paperSize selected is not available the printer's control panel will display a message.

The paperTray option varies with different model LaserJets and with what options are installed. The only way to determine what your printer

The Reset printer/Do not reset printer option is useful if you are generating PCL files which will be sent to the printer by another application. If you select the Do not reset printer option the resulting PCL file can be sent as part of a larger PCL stream

The Do not include position information is similarly useful, if you choose that option the application that sends the generated PCL data can send a PCL position command before the PCL data.

When converting color or gray-scale images to PCL3 or PCL5 you will probably want to scale the output so the image will be larger than the input image. This will allow the dithering to preserve more detail in the image. This is not necessary with PCL XL, the printer will do the appropriate conversion, preserving detail.

PCL XL has advantages of other PCL types in that the printer will automatically scale the image, perform color/grayscale density correction, and dither the image. If you use the --X and --Y options with Alchemy you can set the DPI values such that the printer will print the image at your desired size, see the Examples section below for an example.

The best quality dither for PCL output is generally type 3 (Jarvis, Judice, & Ninke), with a serpentine raster, and some dithering noise (use `-ds3 10`, for example).

Not all PCL compatible printers can print all types of compressed PCL file. Specifically, LaserJet II, IID, and earlier printers can print only uncompressed PCL files. LaserJet IIp printers can print only uncompressed and RLE compressed files. LaserJet III, IIID, IIIp, IIIsi, and 4 printers can print all types of compressed PCL files.

In general, the higher the compression type, the better the compression ratio.

The Landscape option can be used to write a landscape PCL file. Because of changes in the PCL format, only LaserJet III and newer printers will correctly print Alchemy produced landscape PCL files.

PCL files can be used to generate output which can be printed on HP LaserJet and compatible printers. The easiest method is to simply generate a .PCL file and then copy it to the printer by using the copy command (when using the copy command from MS-DOS you will have to use a /B to make sure the entire file is copied to the printer; see the example below for more information).

For MS-DOS users it is possible to write a PCL file directly to a HP LaserJet or compatible printer. If you use the name of the device as the output file name Alchemy will redirect output to that device (for example, use `prn:` as the output file name if your LaserJet is attached to the `prn:` port) .

You may want to adjust the output gamma to compensate for dot gain when generating a PCL file to print on a laser printer. Typically specifying an input gamma of 1.0 and an output gamma of 2.0 produces good results (`-Gi 1.0 -Go 2.0`). See Appendix A, Answers to Frequently Asked Questions, for more information on dot gain.

When converting a PCL file which contains multiple pages you can specify which page to convert by using the -U option followed by the page number, see Chapter 6 for more information.

The expanded margin option adds PCL commands to the output file to reduce the margin when the page is printed. The upper left corner of the image will then correspond to the upper left corner of the paper (note that HP laser printers cannot print all the way to the edge of the paper, so some information will be lost).

To position the image on the page use the offset image option ("-_") or the center image option ("--_"), see Chapter 8 for details.

Examples

Convert the image image.gif to an HP PCL file, using no compression:

```
alchemy image.gif -P
```

Convert the image small.gif to a HP PCL file called out.pcl with dimensions of 2000 by 2000 at 300 dpi, performing gamma correction to compensate for dot gain, and using dithering type 3, with a serpentine raster, and adding dithering noise :

```
alchemy small.gif out -P -X2000 -Y2000
-D 300 300 -Gi 1.0 -Go 2.0 -ds3 10
```

Convert the image small.gif to a HP PCL file called out2.pcl with dimensions of 2000 by 2000 at 300 dpi, using TIFF compression:

```
alchemy small.gif -P2 -X2000 -Y2000
-D 300 300 out2
```

Print the image madonna.gif directly to your LaserJet 4 at the largest resolution, using Delta Row compression with dithering type 22 (printing directly to the printer works only in the MS-DOS version of Alchemy):

```
alchemy madonna.gif prn: -P104 -D600 600
-Xb4800 -YB6600 -+ -d22
```

Print all the TIFF files in the current directory directly to a HP LaserJet, while scaling them to fill the page and performing gamma correction to compensate for dot gain:

```
alchemy *.tif prn: -P -D 300 300 -Xb2400
-Yb3000 -+ -Gi1.0 -Go2.0
```

Convert the page 3 of the HP PCL file, contract.pcl, to a TIFF file:

```
alchemy contract.pcl -U 3 -t
```

Convert all of the pages in the file to TIFF files (the output files will be called contract.001, contract.002, …):

```
alchemy contract.pcl -U -t
```

Convert the file sample.jpg to an HP PCL XL file, setting the DPI such that the file will print out at 8 inches by 6 inches:

```
alchemy sample.jpg --X8i --Y6i -P200
```

HP PhotoSmart ---S

HP PhotoSmart files are used by PhotoSmart printers.

Syntax

---S *paperType*[*dryTime*]]

Parameter

paperType:
0:Glossy
1:Glossy Reverse Side
2:Matte
3:Deluxe
4:InkJet
5:Plain
6:Project
7:Project Reverse Side
8:Transparency
The default is 0.

dryTime:
0:Short
1:Normal
2:Long
The default is 1.

Extension

.prn

Creator

Hewlett-Packard Company

Used by

HP PhotoSmart printers

Variations

24 bits per pixel, RGB.

Comments

This is a really great printer, buy one and a copy of Image Alchemy PS to use with it.

The printer is always at 300 dpi, if you want the output to be at the expected size specify -D300 300 as one of the options.

The Reserve Side paper types are used if you are printing on the reverse side of the paper.

Example

Convert the image sample.jpg to a HP PhotoSmart file, 5 inches wide:

```
alchemy sample.jpg -D300 300 ---S -Xb5i -+
```

HP Raster Transfer Language (RTL) --r

RTL files are used by HP color raster printers and plotters.

Syntax

--r *outputType*

Parameter

outputType:

0:PaintJet, DeskJet, and Color LaserJet uncompressed
1:DesignJet and HP7600 uncompressed
2:DesignJet and HP7600 TIFF compressed
3:HP7600 planar, uncompressed
4:HP7600 planar, TIFF compressed
5:HP7600 planar, Group III compressed
6:DesignJet on-the-fly, uncompressed
7:DesignJet on-the-fly, TIFF compressed
9:PaintJet, DeskJet, and Color LaserJet TIFF compressed
10:Encad NovaJet TIFF compressed
11:DesignJet compressed, 4 channel
12:DesignJet on-the-fly, compressed, 4 channel
13:DesignJet compressed, 24 bit
14:DesignJet on-the-fly, compressed, 24 bit
15:DesignJet compressed, 24 bit, old dithering
16:DesignJet on-the-fly, compressed, 24 bit, old dithering

The default is Type 2. See the comments section below for information on output types 11 through 16.

Extension

.rtl

Creator

Hewlett-Packard Company

Used by

HP raster plotters and printers including PaintJet, DeskJet, DesignJet, and HP 7600 Series printers and plotters.

NovaJet Plotters.

Variations

4 bit CMYK

Black and white,

24 bit RGB

Limitations

Output only.

Comments

HP RTL files can be used to produce output which can be printed on HP color printers and raster plotters. The file can be printed by sending the file to the plotter.

To improve the quality of output may want to use a color correction file when converting to the CMYK variation of this format. See the -C option in Chapter 8 for more information.

Compression type 7 is the best to use on DesignJets. The files are generally smaller than type 6 files and the on-the-fly mode allows the plotter to start plotting before the entire file is received, decreasing the total plot time.

Compression types 6 and 7 are equivalent to types 1 and 2 except they tell the plotter it may plot the data as received instead of waiting for the entire image. This is useful on the DesignJet plotters which have small buffers compared to the imageable area.

The NovaJet option causes Alchemy to create RTL files which are compatible with NovaJet plotters.

Type 7 RTL files are compatible with various Mutoh plotters. These include Falcon CAD (RJ-800), Falcon Graphics (RJ-4000), HJ-800, RJ-1300, and RJ-1800. These plotters operate at either 180, 300, 360, or 720 dpi. Specify the appropriate dpi value using the -D command.

Output types 11 through 16 are only available on Revision B HP 650C and newer DesignJets. Types 11 and 12 are the same as types 2 and 7 respectively, with the difference that types 11 and 12 allow for independent control over the black channel (types 2 and 7 always perform 100% black removal). Types 13 through 16 send 24 bit data to the plotter, allowing it to perform the RGB to CMYK conversion; types 13 and 14 use a stochastic dither pattern, types 15 and 16 use a digital halftone dither. Types 13 through 16 can also be used to scale the image, by specifying a different dpi value than the dpi value the plotter natively uses, see the examples section below for an example.

Specifying on-the-fly mode instructs the plotter to start plotting as soon as it receives data (as opposed to buffering the data until the end of the image). Using on-the-fly mode is a good idea when plotting large images on the 650c and newer plotters, otherwise the plotter will buffer the data until it fills its memory, then it will plot that information, and then revert to on-the-fly mode. The two different plotting methods produce a slightly different banding effect, which can be noticeable in the output image.

Alchemy will generate a color RTL file unless the input file is black and white or grayscale or the -b option is specified as part of the conversion.

There is no additional setup required for the PaintJet or DesignJet plotters. HP7600 series plotters should be in HP-GL/2 mode; best results will generally be achieved with compensation off. To get color plots from the HP7600 series the plotter must be in 4 or 5 pass mode.

If the input is black and white, you can do the conversion without an undercolor removal file and with dithering off. This will result in a faster conversion.

If the input is gray-scale, you probably do want to use an undercolor removal file to perform density correction, but with 100% black removal (the black removal tables should contain 0 through 255, increasing by one each line) so that the output won't contain cyan, magenta, or yellow. The samples directory on the distribution diskette has a UCR file called gray.ucr which has 100% black removal.

MS-DOS users can send the RTL file directly to the plotter when generating an RTL file of type 0, 1, 2, 6, 7, and 9 through 16. To send the file directly give the name of the output device as the output file (for example, if your plotter is connected to your computer via lpt1: specifying `lpt1:` as the output file will send output directly to that device).

You may want to use gamma correction or a color correction file when converting to this format. See the -G and -C options in Chapter 8 for more information.

The best quality dither for HP RTL output is generally type 3 (Jarvis, Judice, & Ninke), with a serpentine raster, and some dithering noise (use `-ds3 10`, for example).

You may want to adjust the output gamma to compensate for dot gain when generating a HP RTL file. Typically, specifying an input gamma of 1.0 and an output gamma of 1.8 produces good results (`-Gi 1.0 -Go 1.8`). See Appendix A, Answers to Frequently Asked Questions, for more information on dot gain.

Examples

Convert the black and white image test.wpg to an HP RTL file for a PaintJet called test.rtl, not using a UCR file and with dithering off:

```
alchemy test.wpg --r0 -d0
```

Convert the file image.tga to an RTL file for a PaintJet called image.rtl, using the undercolor removal file sample.ucr:

```
alchemy image.tga --r0 -Csample.ucr
```

Do the same thing, but use gamma correction instead of the undercolor removal file:

```
alchemy image.tga --r0 -Gi1.0 -Go1.8
```

Convert the file image.tga to a planar RTL file called image.rtl using TIFF compression, controlling the undercolor removal process using sample.ucr, scaling the image to 3000 pixels across using good quality scaling, preserving the aspect ratio (by proportionately scaling the image vertically), and conserving memory:

```
alchemy image.tga --r4 -Csample.ucr
-Xb3000 -+ -$
```

Convert the file sample.jpg to an RTL file for a DesignJet 2000C, sending the image directly to the plotter, with gamma correction, dithering type 3 (with a serpentine raster), and scaling the image to be 17 inches wide at 600 dpi while preserving the aspect ratio (the plotter is attached to the lpt1: port of an IBM PC):

```
alchemy sample.jpg lpt1: --r7 -Gi 1.0
-Go 1.8 -ds3 -Xb17i -+ -D600 600
```

Convert the file tiger.ps to a 34" x 44" 600 dpi RTL file, performing the scaling entirely during the PostScript rendering step a:

```
alchemy tiger.ps --r 7 -Zm 2 -Zo 34 44 -Z+
-Ze 1 -Zd 600 600 -Gi 1.0 -Go 1.8
```

Do the same thing, but render the PostScript file at 8.5" x 11" and use raster scaling for the final conversion to 34" x 44". This uses much less disk space and memory than the previous example, and most images the result will be almost the same, although PostScript text will lose a small amount of quality.

```
alchemy tiger.ps --r 7 -Zm 2 -Zo 8.5 11
-Z+ -Ze 1 -Zd 600 600 -Gi 1.0 -Go 1.8
-Xb34i -Yb44i -+
```

Convert the 640 x 480 image sample.jpg to a 24 bit RTL image. Specify the dpi value such that the image will be plotted at 24 inches x 18 inches. The -D 27 27 value is calculated by dividing the size of the image (in dots) by the desired output size (in inches), to derive the required dots per inch value (640/24=26.6667). Note that because the dots per inch value is required to be an integer this will not produce a plot that is exactly 24 inches x 18 inches, but instead will be 23.7 inches x 17.78 inches. Also note that the DesignJet 650C uses pixel replication scaling to increase the size of the images (this is equivalent to Image Alchemy type 'a' scaling).

```
alchemy sample.jpg --r14 -D 27 27
```

The above example has been made simpler by newer Alchemy commands that perform the calculation for you: --X and --Y

```
alchemy sample.jpg --r14 --X 24 --Y 18 -+
```

HP-48sx Graphic Object (GROB) --H

Graphic Object files are used by HP-48sx calculators.

Syntax

--H *type*

Parameter

type:
0:Binary
1:ASCII
The default is Binary.

Extension

.grb
.asc

Creator

Hewlett-Packard Company

Used by

HP-48sx calculators.

Variations

Black and white, 1 bit per pixel.

Comments

Since GROB files are always black and white, Alchemy assumes the use of the -b, -8, and -c2 options when writing GROB files.

Example

Convert the image madonna.gif to a ASCII HP-48sx GROB file

```
alchemy madonna.gif --H 1
```

HSI JPEG --j

The HSI JPEG format is a variation of the JPEG format that was designed by Handmade Software to better compress paletted images.

Syntax --j

Extension .jpg

Creator Handmade Software, Inc.

Used by Image Alchemy
GIF2JPG (another Handmade Software product)

Variations 8 bit paletted

Comments Paletted images often have large areas where the image consists of 1 or 2 colors; JPEG compression does a poor job on these sections when compared to LZW compression. HSI JPEG files are a combination of JPEG and LZW compression.

HSI JPEG files are not compatible with JPEG or JFIF files. If you intend to transfer files to other systems do not use this format, use the standard JPEG format instead (using the -j option).

If you are interested in adding support for HSI JPEG files to your software please contact us for information on the format.

Example Convert the file madonna.gif to an HSI JPEG file:

```
alchemy madonna.gif --j
```

HSI Palette -l

HSI PAL files are palettes which are ASCII files that can be edited with a text editor.

Syntax -l (lower case L)

Extension .pal

Creator Handmade Software, Inc.

Used by Image Alchemy

Variations HSI PAL files are always ASCII files.

Limitations .PAL files contain only a palette.

Comments The format of PAL files is described in Appendix H.

Related options

-f Match image to specified palette
-F False color with specified palette
-L Output Multi-Image Palette

Examples Extract the palette from the GIF file madonna.gif:

```
alchemy madonna.gif -l
```

Convert the file image.tga to a GIF file, matching the palette found in standard.pal:

```
alchemy image.tga -g -f standard.pal
```

HSI Raw -r

HSI Raw files are used internally by Image Alchemy when converting between certain combinations of image formats. If you are interested in converting custom format images to be used with Image Alchemy we suggest using HSI Raw Files.

Syntax

-r *compressionType*

Parameter

compressionType:
0:None
1:Packbits

0:RGB
200:4 bit CMYK
400:32 bit CMYK
The default is 0, None, RGB. Options are combined by adding (see below for an example).

Extension

.raw

Creator

Handmade Software, Inc.

Used by

Image Alchemy

Variations

8 bit paletted, 24 bit true color, 4 bit CMYK, and 32 bit CMYK.

Comments

This format is used internally as temporary files by Alchemy when doing certain image conversions; it can also be explicitly read and written. This format is described in Appendix F.

Examples

Convert the file test.lbm to a raw file:

```
alchemy test.lbm -r
```

IBM Picture Maker --i

IBM Picture Maker files are used by IBM presentation software.

Syntax --i

Extension .pic

Creator IBM Corp.

Used by IBM Storyboard Live!

Variations 256 color, paletted.

Limitations 16 color Picture Maker files are not supported.

Picture Maker images cannot be larger than 640x480.

Comments This is not the same format as Cubicomp PictureMaker.

Picture Maker files may be either 320x200 or 640x480. Image Alchemy will write the smallest variation that will fit the image, with the image centered and the borders filled with color 0. If you attempt to write a Picture Maker file which is larger than 640x480 an error is generated.

Example Convert the PCX file, giraffe.pcx, into an IBM Picture Maker file:

```
alchemy giraffe.pcx --i
```

IDRISI ---I

The IDRISI project is a not-for-profit project from the Graduate School of Geography at Clark University. The IDRISI file format is used by their Windows software.

Syntax

---I *type* (capital i)

Parameter

type:
0:Binary
1:Packed Binary
2:ASCII
The default is Binary.

Extension

.img For pixel data
.doc For image header information

Creator

Clark University

Used by

IDRISI for Windows

Variations

8 bit grayscale, 16 bit grayscale, 32 bit floating point

Limitations

Alchemy always converts 16 bit and 32 bit images to 8 bit when reading; you can control whether to use the min. and max. values that are stored as part of the data by using the -Z option, see below for more information

Comments

IDRISI images require two files, one with the extension .img and the other with the extension .doc. The .img file contains the actual image data and the .doc file contains the header information. You specify the name of the .doc file and Alchemy automatically generates the name of the .img file.

When writing an IDRISI file Alchemy will overwrite, without warning, existing .img files.

Using the -Z option it is possible to choose whether or not to use the min. and max. values that are stored as part of the header information when reading a 16-bit IDRISI file. The default is to not use the values, instead the 16 bit date is scaled to 8 bit by discarding the lower 8 bits. Using a -Z1 option will cause the 16 bit data to be scaled to 8 bits using the min. and max. values. See below for an example.

Examples

Convert the PCX file, earth.pcx, into an IDRISI file:

```
alchemy earth.pcx ---I
```

Convert the 16 bit IDRISI file earth.doc to a GIF file, using the min. and max. values to scale the 16 bit data to 8 bit data:

```
alchemy earth.doc -Z1 -g
```

IFF/ILBM -i

IFF (Interchange File Format) files are used by Amiga computers for storing a number of types of data, including images, text, and music; ILBM (InterLeaved BitMap) is a type of IFF file used to store images.

Syntax

-i

Extensions

.lbm
.iff
.ilbm

Creator

Commodore-Amiga Corp.

Used by

Amiga
Deluxe Paint

Variations

1 through 8 bit, 24 bit, HAM, and PBM images, input.

1 through 8 bit and 24 bit images, output.

Limitations

Dynamic Hi-Res images are not supported.

Does not write images in any of the Amiga-specific display modes.

Comments

If you're writing an ILBM file for use on an Amiga, you probably want to write either a paletted file with 32 colors or a 24 bit file. 24 bit ILBM files can then be converted to one of the Amiga-specific display modes with various third-party utilities.

Example

Convert the file input.pcx to an IFF/ILBM file called output.lbm with 32 colors:

```
alchemy input.pcx output.lbm -i -c32
```

Imaging Technology ---M

Little is known about this format, it was added at the request of a customer. If you have any information please contact us.

Syntax ---M

Extensions .img

Creator Imaging Technology

Used by Imaging Technology software.

Variations 8 bits per pixel, grayscale.

Examples Convert the file sample.jpg to a Imaging Technology file.

```
alchemy sample.jpg ---M
```

Img Software Set --Q

The Img Software Set is a collection of tools for manipulating graphic images freely available for various UNIX workstations.

Syntax

--Q

Extensions

.img
.p
.a

Creator

Paul Raveling

Used by

Img Software Set

Variations

8 bit paletted and 24 bit images.

Limitations

Alchemy does not read nor write compressed (.Z) images. Use the UNIX supplied `uncompress` program to decompress those images before reading with Alchemy.

Comments

The Img Software Set is available via anonymous ftp from ftp://expo.lcs.mit.edu/contrib/img_1.3.tar.Z or ftp://venera.isi.edu/pub/img_1.3.tar.Z.

Example

Convert the Sun Raster file test.ras to an Img Software Set file:

```
alchemy test.ras --Q
```

Intergraph ---r

The Intergraph file format was developed by Intergraph Corp. and is used by them.

Syntax

---r *compressionType*

Parameter

compressionType:
9:Run Length Compressed, black and white
24:Group 4 compressed, black and white
27:Run Length Compressed, RGB
The default is 24.

Extensions

.rgb

Creator

Intergraph Corp.

Used by

Intergraph Corp.

Variations

1 bit black and white and 24 bit RGB images, input and output.

8 bit grayscale, tiled and untiled, input only.

Limitations

If you need to read or write other type Intergraph files please contact us; we are happy to add support for any of the Intergraph formats for which documentation is available.

Comments

You can write a scannable type 9 Intergraph file by specifying 109 as the compression type (---r109). Scannable files are Intergraph files which contain additional information, their usage is deprecated by the Intergraph documentation, but some software requires scannable files.

Example

Convert page.tif to an Intergraph file

```
alchemy page.tif ---r
```

Iris CT ---Q

Iris CT is used by Iris printers.

Syntax ---Q

Extensions .ct

Creator Iris

Used by Iris printers.

Variations 32 bit CMYK

Examples Convert the file sample.jpg to Iris CT format.

```
alchemy sample.jpg ---Q
```

JEDMICS CCITT4 ---E

Syntax ---E *type*

Parameter *type*:
0:new format (1997-05-09 draft)
1:old format (1991-04-10 spec.)

0:no preview image
10:preview image
The default type is 0.

Extensions .c4

Creator JEDMICS

Used by JEDMICS

Variations 1 bit per pixel black and white.

Comments JEDMICS files contain two images, a normal image and a reduced size preview image. Alchemy treats the normal image as page 1 and the preview image as page 2 for reading purposes (therefore you can use -U 2 to read the preview image).

Examples Convert the file sample.jpg into JEDMICS CCITT4 format.

```
alchemy sample.jpg ---E
```

Jovian VI --J

Jovian VI files are created by the Jovian Logic video capture boards.

Syntax --J

Extensions .vi

Creator Jovian Logic Corp.

Used by Jovian Logic

Variations 8 bit gray-scale images, 4 and 8 bit paletted images, and 16 and 24 bit true color images, input and output.

1, 4, 6, bit gray-scale, input only.

Limitations Reads files with 6 and 8 bit palettes, always writes 6 bit palettes.

Gray-scale files are always written 8 bit.

Comments When writing a VI file the palette always starts at 0, but color 0 will not necessarily be black (this is the way that Jovian VI files are written by Jovian software).

Example Convert the GIF file, test.gif, to a 16 color VI file:

```
alchemy test.gif --J -c16
```

JPEG/JFIF -j

JPEG is an image file format that uses a lossy compression technique to achieve high compression ratios. See Appendix C, JPEG Compression, for more information on the JPEG file format.

Syntax

-j[*coding*] *quality* [*passes*]

Parameters

coding:
none:default Huffman coding
h:optimum Huffman coding
The default is default Huffman coding.

quality:
1 through 100 (larger is higher quality)
The default quality is 32.

passes:
1:write one pass JPEG files
2 through 10:write n pass JPEG files
The default number of passes is 1.

Extension

.jpg

Creator

Joint Photographic Experts Group (JPEG)

Used by

WWW
Everyone else storing photographic images.

Variations

Baseline JPEG with CCIR-601 YCbCr color space, interleaved components, Huffman coded.

Gray-scale images are saved as single channel JPEG files; color images are saved as three channel JPEG files. CMYK JPEG files can be read.

Alchemy can read files with any component sub-sampling up to 4x4; it always writes 2h:1v 1h:1v 1h:1v.

Alchemy JPEG files comply with the industry standard 'JFIF' interchange format.

Limitations

JPEG files are always lossy, which means that the compressed image is not identical to the original image. At high quality factors (32 and above) this loss is generally so slight as to be barely noticeable. There is no quality factor which is guaranteed to be lossless.

Comments

By default, Image Alchemy uses a fixed set of Huffman tables to compress an image. If the -j is immediately followed by an 'h', Alchemy will generate a set of custom tables optimized for the image and quality factor. This usually produces 5-20% better compression (depending on the image content and quality factor) but requires an additional pass over the image data, so it takes longer to compress (there's no effect on the time it takes to decompress the image).

Quality may vary between 1 and 100; the default is 32. The higher the number the higher the quality of the image and the lower the compression ratio. Quality factors below 10 will produce images with significant loss of quality.

JPEG files are based on the Joint Photographic Experts Group (JPEG) CD 10918-1 draft standard.

Since JPEG compression was designed for use with continuous tone images (such as those produced by a scanner or digitizer), poor results can be expected when compressing line drawings.

Multi-pass files are useful when generating JPEG files which are going to be displayed on the WWW. A multi-pass file allows a rough preview of the image to be displayed quickly when using a browser which supports multi-pass JPEG files.

Related options

`-q` Apply Smoothing when decompressing a JPEG image. Because JPEG compression works on 8x8 pixel blocks there may be discontinuities at the edges of these blocks producing block artifacts. Smoothing attempts to reduce these artifacts. Smoothing is really only necessary at very low quality settings (less than 10); even then the effects of smoothing are not particularly significant.

Examples

Convert the file, photo.tga, to a JPEG file called photo.jpg, using a high quality setting:

```
alchemy photo.tga -j70
```

Convert the file, photo.tga, to a JPEG file called photo.jpg, using a low quality setting and generating optimum Huffman tables:

```
alchemy photo.tga -jh10
```

Convert the file, photo.tga, to a JPEG file called photo.jpg, using four pass mode and a low quality setting:

```
alchemy photo.tga -j10 4
```

Convert the JPEG file, lores.jpg, to a PCX file using smoothing:

```
alchemy lores.jpg -p -q
```

Lumena CEL --L

Lumena CEL files are used by Time Arts software.

Syntax --L

Extension .cel

Creator Time Arts

Used by Lumena

Variations 15 and 32 bit RGB images, including alpha channels (for 32 bit files).

Comments Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Example Convert the file test.tga to a Lumena CEL file:

```
alchemy test.tga --L
```

Macintosh PICT/PICT2 -m

PICT files were created by Apple Computer as a common format for Macintosh applications to use. Virtually every Macintosh application can use PICT files.

Syntax

-m *macBinary*

Parameters

macBinary:
0:Do not write a MacBinary file
1:Write a MacBinary file
The default is to not write a MacBinary file.

Extensions

.pict
.pic

Creator

Apple Computer, Inc.

Used by

Macintosh computers

Variations

1, 2, 4, 8, and 32 bit PICT and PICT2 images.

16 bit PICT2 images, input only.

Limitations

Alchemy only pays attention to pixMaps in the image; attempts to skip everything else.

Comments

Due to the enormous number of options allowed in PICT files, reading PICTs may not always work. See Appendix A, Answers to Frequently Asked Questions, for more information.

Adding a MacBinary header to a PICT file is useful if transferring the file to a Macintosh computer by modem. The MacBinary header will allow the Macintosh to automatically recognize the file as a PICT file.

Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Example

Convert the file input1.gif to a Mac PICT file called input1.pic:

```
alchemy input1.gif -m
```

MacPaint --t

MacPaint files are black and white images used by Macintosh computers.

Syntax

--t *macBinary*

Parameter

macBinary:
0:Do not write a MacBinary file
1:Write a MacBinary file
The default is to not write a MacBinary file.

Extensions

.mac

Creator

Apple Computer, Inc.

Used by

Macintosh computers

Variations

1 bit per pixel, black and white.

Limitations

MacPaint images are always 576x720 pixels. If you attempt to write a MacPaint image which is larger, Alchemy will report this as an error. If you write an image which is smaller Alchemy will pad the image with white space along the right-hand side and bottom.

Comments

Adding a MacBinary header to a MacPaint file is useful if transferring the file to a Macintosh computer by modem. The MacBinary header will allow the Macintosh to automatically recognize the file as a MacPaint file.

Example

Convert the file input1.gif to a MacPaint file called input1.mac:

```
alchemy input1.gif --t
```

MIFF ---i

MIFF files are used by ImageMagick, a freely available UNIX image utility.

Syntax

---i *compressionType*

Parameter

compressionType:
0:Uncompressed
1:RunlengthCoded
2:Zip
The default is Uncompressed.

Extensions

.miff
.mif

Creator

John Cristy

Used by

ImageMagick

Variations

8 and 24 bit, with optional alpha channel.

Limitations

JPEG compressed files cannot be read nor written.

Comments

ImageMagick is available on the Internet. See http://www.wizards.dupont.com/cristy/ImageMagick.html for more information.

Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Example

Convert the file picture.gif to an uncompressed MIFF file:

```
alchemy picture.gif ---i
```

Mimaki MRL-1 ---m

Mimaki MRL-1 files are used by Mimaki plotters.

Syntax ---m

Extensions .mrl

Creator Mimaki

Used by Mimaki plotters

Variations 4 bit CMYK

Comments Mimaki plotters are only capable of printing at a few resolutions (which resolutions vary between model). Be sure to specify a valid resolution using the -D option (see Chapter 8 for more information).

To improve the output quality you may want to use gamma correction or a color correction file when converting to this format. See the -G and -C options in Chapter 8 for more information.

Example Convert the file flower.tif to a Mimaki MRL-1 file, using gamma correction of 1.8:

```
alchemy flower.tif ---m -Gi1.0 -Go1.8
```

MTV Ray Tracer --M

MTV files are used by the MTV RayTracer, a public domain ray tracer for Suns and other workstations.

Syntax --M

Extension .mtv

Creator Mark T. VandeWettering

Used by MTV Raytracer

Variations 24 bit true color.

Comments MTV is a public domain ray-tracer available free of charge via anonymous ftp from drizzle.cs.uoregon.edu.

Example Convert the file spheres.img to a MTV file:

```
alchemy spheres.img --M
```

Multi-Image Palette -L

This option will generate an optimum palette for a number of images. This is useful for finding a common palette where multiple images are used (animations, for instance).

Syntax

-L *filename*

Parameters

filename:
name of the output file to contain the optimized palette

Extension

.pal

Creator

Handmade Software, Inc.

Used by

Image Alchemy

Variations

HSI PAL files are always ASCII files.

Limitations

.PAL files contain only a palette.

Comments

The format of PAL files is described in Appendix H.

This output option is unique in that it will cause Alchemy to generate only one output file, independent of how many input files are specified (the other output options generate one output file per input file). Also the file name of the output file must be specified immediately after the -L option (ordinarily the output file name can appear anywhere on the command line).

Related options

-f Match image to specified palette
-F False color with specified palette
-l Generate a palette file for a single image

Examples

Generate an optimum palette called final.pal for all GIF files in the current directory:

```
alchemy -- *.gif -L final.pal
```

Now map all the GIF files to that palette, putting the results in a sub-directory call new (the files cannot be placed in the current directory because the file names would conflict with the original image file names):

```
alchemy -- *.gif -f final.pal new\
```

OS/2 Bitmap (BMP) -O

OS/2 BMP files are used by IBM OS/2 2.0.

Syntax

-O *compressionType* (Uppercase letter o)

Parameter

compressionType:
0:None
1:RLE
2:OS/2 1.1 format
The default is none.

Extension

.bmp

Creator

IBM Corp.

Used by

OS/2 2.0

Variations

1, 4, 8, and 24 bit RGB (raw), RLE4, and RLE8 files.

Comments

OS/2 1.1 files are older version files which are supported because some OS/2 software cannot read current OS/2 bitmaps. OS/2 1.1 files seem to be identical to Windows 2.0 bitmap files, and Alchemy identifies them as such when reading them.

Examples

Convert the image test.jpg to a OS/2 BMP file:

```
alchemy test.jpg -O
```

OS/2 Icon --O

OS/2 Icon files are used by IBM OS/2.

Syntax

--O *outputType* (Uppercase letter o)

Parameter

outputType :
0:OS/2 2.0 and Warp
1:OS/2 1.2
The default is OS/2 2.0 and Warp.

Extension

.ico

Creator

IBM Corp.

Used by

OS/2

Variations

1, 4, 8, and 24 bit RGB files.

Comments

OS/2 1.2 Icon files are older version files which are supported because some OS/2 software cannot read current OS/2 Icons.

OS/2 Icons can contain multiple parts and multiple resolutions. The default for Image Alchemy is to read the first part of the first resolution. You can specify which portion and which resolution to read by use of the -Z option, see below for an example.

One of the parts of an OS/2 icon is often the mask, used by OS/2 to change the appearance of the icon when it is selected. The mask is often a black rectangle, so if the image resulting from an OS/2 Icon conversion is a black rectangle you are probably reading the mask portion.

Examples

Convert the image icon.bmp to an OS/2 Icon file called program.ico:

```
alchemy icon.bmp program.ico --O
```

Convert the OS/2 Icon program.ico to a Windows BMP file, reading part 1 of the first icon:

```
alchemy program.ico -w
```

Do the same thing, but read part 2 of the first icon:

```
alchemy program.ico -w -Z 2
```

Do the same thing, but read part 1 of the second icon:

```
alchemy program.ico -w -Z 1 2
```

Do the same thing, but read part 2 of the second icon:

```
alchemy program.ico -w -Z 2 2
```

PCPAINT/Pictor Page Format -A

The Pictor format was designed by John Bridges. It is optimized so that an image can be loaded into various IBM PC graphics adapters very quickly; it does this by almost exactly duplicating the organization of the graphics adapter memory. This makes the format hardware dependent.

Syntax

-A *type*

Parameter

type:

0:320x200x4 CGA*
1:320x200x16 PCjr/Tandy*
2:640x200x2 CGA*
3:640x200x16 EGA
4:640x350x2 EGA
5:640x350x4 EGA
6:640x350x16 EGA
7:720x348x2 Hercules
8:640x350x16 VGA
9:320x200x16 EGA
10:640x400x2 AT&T/Toshiba*
11:320x200x256 VGA/MCGA
12:640x480x16 VGA
13:720x348x16 Hercules InColor*
14:640x480x2 VGA/MCGA
15:800x600x2 EGA/VGA
16:800x600x16 EGA/VGA
17:640x400x256 SVGA
18:640x480x256 SVGA
19:800x600x256 SVGA
20:1024x768x2 SVGA
21:1024x768x16 SVGA

22:360x480x256 VGA
23:1024x768x256 SVGA
*These modes are not yet supported (if you are interested in support for any of these modes please contact us).

0:packed
100:not-packed

0:new style palette
200:old style palette

The default is 640x480x256 SVGA, packed, new style palette. Options are combined by adding, see the Example section below for an example.

Extension

.pic
.clp

Creator

John Bridges

Used by

PCPAINT
GRASP

Variations

There are variations for most IBM and third party graphics adapter display modes.

Limitations

Only the EGA and VGA modes are supported at this time.

Text modes are not supported.

Comments

Some Pictor files do not contain palettes. For those files Alchemy will default to using a standard palette appropriate to the display mode the file was saved in. However, the image may not use the default palette; in that case you can read the palette from another file with the -F false color option.

Examples

Convert the file image.pcx to a Pictor file called image.pic, for 800x600x256 SVGA mode:

```
alchemy image.pcx -A19
```

Do the same thing, but write out an old style palette:

```
alchemy image.pcx -A219
```

PCX -p

PCX files are used extensively by IBM PC computers. Originally created by ZSoft for use by their paint software, PCX files can be read and written by almost all MS-DOS paint software and desktop publishing software.

A variation of PCX file, DCX, is used by many MS-DOS fax boards.

Syntax

-p *type*

Parameter

type:

0:Standard PCX
1:DCX
2:PCJ

The default is standard PCX.

Extension

.pcx.dcx

Creator

ZSoft Corporation

Used by

PC Paint
Publisher's Paintbrush
Most paint and desktop publishing software can read and write PCX files.
Fax board software uses the DCX variation of PCX.

Variations

1, 4, 8, and 24 bits per pixel for standard PCX files.
1 bit per pixel for DCX files.
8 bits per pixel for PCJ files.

Limitations

PCX format files are often written out incorrectly; Alchemy attempts to figure out what is wrong and make intelligent decisions (things Alchemy can deal with include PCX files without palettes, files missing the last line of image data, and files with illegal (and incorrect) combinations of bits per pixel and planes).

The 24 bit PCX file variation is new and many programs which support PCX do not support the 24 bit variation. Therefore, unless you are sure that the software you are using can read a 24 bit PCX file, you probably want to use the -8 option to force Alchemy to write a paletted file when generating a PCX file.

DCX files are multiple page PCX images which are used by various manufacturers of fax boards and fax software. Alchemy always writes single page DCX files.

Comments

Because so many software packages can read and write PCX files we are especially interested in supporting as many variations as possible. If you have any PCX files which Alchemy does not read correctly please contact us.

Since DCX files are always 1 bit, black and white images, Alchemy assumes the use of -b -c2 -8 when writing the DCX variation of PCX.

Recently some of the header information in PCX files has been changed to include image resolution information. Some fax board software makes use of this information when transmitting PCX or DCX files as faxes. See the example section below for an example of how to specify image resolution when writing a PCX file.

PCJ files are a variation of 256 color PCX files which have the palette in a separate file. The palette file has the extension .p13. Alchemy will automatically look for the palette file in the same directory as the PCJ file when reading.

When converting a DCX file which contains multiple pages you can specify which page to convert by using the -Z option followed by the page number. You can also convert all of the pages in the file by using the Multi-Page option (-U), see the examples section below.

Examples

Convert the GIF file, lush.gif, to a PCX file:

```
alchemy lush.gif -p
```

Convert the scanned image, page1.tif, to a DCX file:

```
alchemy page1.tif -p1
```

Convert the scanned image, page2.tif, to a DCX file, specifying an image resolution of 200x100 (a common resolution for fax images):

```
alchemy page2.tif -p1 -D 200 100
```

Convert the image, flower.tif, to a PCJ file:

```
alchemy flower.tif -p2
```

Convert page 3 of the DCX file, fax.dcx, to a TIFF file:

```
alchemy fax.dcx -Z 3 -t
```

Convert all of the pages in the file to TIFF files (the output files will be called fax.001, fax.002, …):

```
alchemy fax.dcx -U -t
```

PDS --p

PDS labeled images are used by NASA for planetary images.

Syntax

--p

Extensions

.ibg
.imq

Creator

NASA

Used by

NASA distributes collections of planetary images on CD-ROM in PDS format.

Variations

8 bit gray-scale uncompressed PDS files.

1, 4, and 8 bit uncompressed and 8 bit first difference Huffman compressed files, input only.

Limitations

PDS images must begin with either an "SFDU_LABEL" or a "FILE_TYPE" record for Alchemy to be able to identify it.

Occasionally a PDS labeled image has a palette. There doesn't seem to be any standard format for the palette; Image Alchemy handles the palettes we've encountered.

Any portions of the PDS labels not required to extract the image, such as longitude and latitude, are ignored.

Comments

Some PDS images actually consist of two files, a label file and a data file. To read that type image you should use the name of the label file and Alchemy will find the data file.

Examples

Convert the GOES file, phoenix.goe, into a PDS labeled image:

```
alchemy phoenix.goe --p
```

Do the same thing, but name use an .imq extension for the output filename:

```
alchemy phoenix.goe .imq --p
```

PhotoCD (read only)

PhotoCD files are multi-resolution images produced by Kodak

Extensions .pcd

Creator Eastman Kodak Company

Used by Eastman Kodak Company

Variations Reads single channel and three channel images.

Limitations Read only.

Comments PhotoCD files contain multi-resolution image data. You may specify which resolution image you want Alchemy to read by using the -Z option, followed by the resolution value. Available resolutions are:

2: 192 x 128
3: 384 x 256
4: 768 x 512
5: 1536 x 1024
6: 3072 x 2084

The default is 3 (384x256).

If you specify a -b as part of the command line Alchemy will read a grayscale version of the image.

Examples Convert the first PhotoCD image to a TIFF file, using the default resolution of 384x256:

```
alchemy L:\photo_cd\images\img0001.pcd -t
```

Do the same thing, this time read the 768x512 copy of the image:

```
alchemy L:\photo_cd\images\img0001.pcd -t
-Z 4
```

Pixar PIC ---j

Pixar PIC files are used by Pixar software.

Syntax ---j

Extensions .pic

Creator Pixar

Used by Pixar

Variations 8 bit grayscale and 24 bit RGB, uncompressed with optional alpha channel.

8 bit grayscale and 24 bit RGB, compressed, with optional alpha channel, input only.

Limitations Compressed files cannot be written.

Tiled files cannot be read nor written (if you have any tiled files please contact us, we'd like to add support for tiled files but haven't been able to find any for testing).

Comments Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Example Convert the file traced.qdv to an Pixar file:

```
alchemy picture.gif ---j
```

Pixel Power Collage ---c

Collage files are used by Pixel Power's Collage system.

Syntax ---c

Extensions Varies with filename

Creator Pixel Power

Used by Collage

Variations 8 bit grayscale and 24 bit RGB images with and without alpha channels.

Comments Collage files contain a smaller preview image, to read this image specify that you want to read page to (use option "-U 2"). When writing files Alchemy always writes a preview image which is one quarter the height and width of the original image.

Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Example Convert the file sample.jpg to Pixel Power Collage format

```
alchemy sample.jpg ---c
```

PNG (Portable Network Graphics) ---n

PNG files are used by the WWW.

Syntax

---n *outputType*

Parameter

outputType:

0:None
1:Sub-filtering
2:Up-filtering
3:Averaging
4:Paeth filtering
9:Adaptive filtering

0:Standard
10:Interlaced

The default is Paeth filtering, non-interlaced. Options are combined by adding.

Extension

.png

Creator

The PNG development group

Used by

WWW

Variations

1 bit black and white, 2, 4, and 8 bit grayscale, 2, 4, and 8 bit paletted, 16 bit, and 24 bit, and 48 bit color images.

With and without alpha channels.

Transparency information, output only.

Limitations

Non-image chunks (such as copyright information) are discarded when reading.

Comments

When writing a PNG file with transparency there are several different modes that are used depending on whether the file is paletted, grayscale, or true color. In the case of true-color images specifying the transparent color using the ---t option (see below) causes that value to be treated as transparent. When writing a paletted or grayscale file the nearest match to the color specified is made transparent.

Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Examples

Convert the JPEG file sample.jpg to a PNG file:

```
alchemy sample.jpg ---n
```

Convert the JPEG file sample.jpg to a PNG file, using red as the transparent color:

```
alchemy sample.jpg ---n ---t 255 0 0
```

Portable BitMap (PBM) -k

The Portable BitMap format was developed by Jef Poskanzer to allow the transferring of black and white image files between different workstations. The PBM format has grown to include black and white, gray-scale, and true color images, a large set of programs to convert various other image formats to and from PBM, and a set of image manipulation tools.

Syntax

-k

Extensions

.pnm
.pbm
.pgm
.ppm

Creator

Jef Poskanzer

Used by

Portable BitMap Package
Various workstation graphic programs

Variations

1, 8, and 24 bit RAWBITS (binary) images.

1, 8, and 24 bit ASCII images, input only.

Limitations

When writing a PBM file Alchemy always uses the .pnm extension (the extension should be changed based on the type of file being written).

Comments

To write a PBM file use -b -c2.
To write a PGM file use -b -c256.
To write a PPM file use -24.

By convention the extension of a PBM file changes depending on the type of image data which it is storing, based on the following table:

.pnm	Portable aNyMap (Any of those below)
.pbm	Portable BitMap (Black and white)
.pgm	Portable GrayMap (Gray-scale)
.ppm	Portable PixelMap (True color)

Alchemy does not make use of this convention when writing images, always writing files with the extension .pnm.

The PBM package is a set of image manipulation tools which run on various workstations. The software is available free of charge via anonymous ftp: ftp://expo.lcs.mit.edu/contrib/pbmplus.tar.Z or ftp://ftp.ee.lbl.gov/pbmplus.tar.Z.

Examples

Convert the file sun.im32 to a PBM file:

```
alchemy sun.im32 -k -b -c2
```

Convert the file sun.im32 to a PGM file, overwriting any existing sun.pnm file:

```
alchemy sun.im32 -k -b -c256 -o
```

Convert the file sun.im32 to a PPM file called image77:

```
alchemy sun.im32 image77 -k -24 -.
```

Puzzle --U

The Puzzle format is used by the UNIX supplied Puzzle program

Syntax --U

Extensions .pzl
.puzzle
.cm

Creator Unknown

Used by The puzzle program.

Variations 8 bits per pixel

Comments Since puzzle files are always paletted, Alchemy assumes the use of the -8 option when writing a puzzle file.

Example Convert the file einstein.im8 to a Puzzle file:

```
alchemy einstein.im8 --U
```

Q0 --q

The Q0 format is apparently commonly used by various Japanese scanning, painting, and viewing software to store 24 bit images. Handmade Software has no information other than a basic description of the format and some sample images; if you have further information on the Q0 format please contact us.

Syntax

`--q`

Extensions

.q0	For pixel data
.rgb	For pixel data
.fal	For image header information

Creator

Unknown

Used by

Various Japanese image processing software.

Variations

24 bits per pixel

Comments

Q0 files are actually two files, one with the extension .rgb or .q0 and the other with the extension .fal. The .rgb or .q0 file contains the actual image data and the .fal file contains the header information. You specify the name of the .rgb or .q0 file and Alchemy automatically generates the name of the .fal file.

When writing a Q0 file Alchemy will overwrite, without warning, existing .fal files.

Since Q0 files are always true color, Alchemy assumes the use of the -24 option when writing a Q0 file.

Example

Convert the file dogcow.gif to a Q0 file:

```
alchemy dogcow.gif --q
```

QDV --D

The QDV format is used by Giffer, a Macintosh program which displays and converts image files.

Syntax --D

Extension .qdv

Creator Steve Blackstock

Used by Giffer

Variations 8 bits per pixel.

Comments Giffer is a great shareware (Beerware™, actually) program for the Macintosh that converts between various image file formats and allows viewing of graphics files.

Example Convert the file input.tga to a qdv file:

```
alchemy input.tga --D
```

QRT Raw --T

QRT files are generated by the QRT Ray Tracer, a public domain ray-tracer for Amiga, Macintosh, and IBM PC computers.

Syntax --T

Extension .raw

Creator Steve Korn

Used by QRT Ray Tracer

Variations 24 bits per pixel

Example Convert the file spheres.gif to a QRT file called spheres.raw:

```
alchemy spheres.gif --T
```

Raster Graphics ---g

The Raster Graphics format was created by Raster Graphics and is used by Raster Graphics printers.

Syntax ---g

Extensions .rg

Creator Raster Graphics

Used by Raster Graphics printers.

Variations 1 bit black and white and 4 bit CMYK.

Comments The result will be either 1 bit black and white if the source image is grayscale or -b is specified; otherwise it will be 4 bit CMYK.

Examples Convert the file sample.jpg to Raster Graphics format.

```
alchemy sample.jpg ---g
```

RIX -R

RIX files were developed by ColoRIX to use with their paint software.

Syntax -R

Extension .scx
.rix

Creator RIX Softworks, Inc.

Used by ColoRIX software

Variations Type 0 (8 bits per pixel) and Type 4 (4 bits per pixel) images.

Limitations We would like to add support for Type 1 and Type 2 images but we haven't been able to find any documentation on this variation. If you have information please contact us.

Comments A type 0 file will be written if there are more than 16 colors in the image; otherwise a type 4 file will be written.

Example Convert the file test.gif to a RIX file:

```
alchemy test.gif -R
```

RLC ---R

Little is known about this format, it was added at the request of a customer. If you have any information please contact us.

Syntax ---R

Extensions .rlc

Creator Unknown

Used by Unknown

Variations 1 bit black and white.

Comments There is some confusion about the orientation of RLC files. If the RLC files you are reading are backwards use the --^ to mirror them.

Because of a shortage of test files this feature has not been extensively tested; if you have RLC files which Image Alchemy cannot correctly read please contact us.

Examples Convert the file sample.jpg into RLC format

```
alchemy sample.jpg ---R
```

Scitex CT ---X

Iris CT is used by Scitex scanners.

Syntax ---X

Extensions .ct

Creator Scitex

Used by Scitex scanners

Variations 32 bit CMYK

Examples Convert the file sample.jpg to Scitex CT format.

```
alchemy sample.jpg ---X
```

Scodl --s

Scodl files are used by Agfa/Matrix slide recorders.

Syntax

--s *type*

Parameter

type:
0:Non-scalable image (MVP version pre-4.2)
1:Scalable image (MVP version 4.2 or later)
The default is 0 (Non-scalable).

Extension

.scd

Creator

Agfa Corporation / Matrix Instruments Inc.

Used by

Agfa/Matrix slide recorders

Variations

8 and 24 bit run-length coded (RLC) images, output only.

Limitations

Output only.

Comments

Agfa/Matrix made significant changes to the Scodl file format when they introduced version 4.2 of the MVP and Conductor software in 1992. Old version Scodl files could not be scaled by the MVP software; new version Scodl files can be scaled but only work with the newer version of the MVP and Conductor software.

Scalable Scodl images have the advantages that they do not have to be scaled to a specific output resolution and are therefore generally smaller than pre-scaled Scodl images. They can also be imaged on a film recorder with any output resolution or previewed on a monitor.

The disadvantage of scalable Scodl images is that you must be using at least Scodl MVP version 4.2 and the Scodl MVP software does not perform very high-quality scaling. In particular, the MVP software only does pixel replication scaling when increasing the size of an image (this corresponds to type 'a' scaling in Alchemy) and pixel averaging when reducing the size of an image (corresponding to Alchemy 'b' scaling).

Note that Alchemy pays attention to the aspect ratio or dots per inch information specified as part of the command line or present in the original image when converting to a Scodl scalable image. Therefore you should ensure that this information is correct when writing a Scodl scalable image.

When writing Non-scalable Scodl files the image should be scaled up to either 2000x1366 or 4000x2732 to fill the slide.

There are some limitations with the MVP software driver supplied by Agfa/Matrix:

> 24 bit Scodl files are not correctly interpreted by the MVP driver version 4.1 and earlier. 8 bit images are correctly interpreted.
>
> When sending very large images to the background MVP driver you must be using version 4.0 or later and have lots of EMS memory (4 megabytes is recommended). When using the foreground MVP program turning on disk caching is necessary.

Examples

Convert the file pict.im32 to a Scodl file using high quality scaling and preserving the aspect ratio:

```
alchemy pict.im32 --s -Xc2000 -Yc1366 -+
```

Do the same thing, but generate a scalable Scodl file:

```
alchemy pict.im32 --s1
```

SGI Image -n

SGI Image files are used by Silicon Graphics workstations.

Syntax

-n *compressionType*

Parameter

compressionType:
0:Verbatim (uncompressed)
1:RLE compressed
The default is 0 (Verbatim).

Extension

.sgi

Creator

Silicon Graphics, Inc.

Used by

Silicon Graphics workstations.

Variations

8 bit (gray-scale) and 24 bit RGB verbatim (uncompressed) and RLE files, with and without alpha channels.

Comments

Only gray-scale images may be 8 bit files. Alchemy will automatically switch to 24 bit mode when writing a color image.

Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Examples

Convert the Sun raster file sun.im8 to a SGI file called sgiout:

```
alchemy sun.im8 sgiout -n -.
```

Do the same thing, but write out a RLE compressed SGI file:

```
alchemy sun.im8 sgiout -n1 -.
```

Sharp GPB ---G

Sharp GPB files were developed by Sharp.

Syntax ---G

Extensions .img

Creator Sharp

Used by Sharp

Variations 1 bit black and white, 8 bit grayscale, and 24 bit color images.

Example Convert the JPEG file image.jpg to a Sharp GPB file:

```
alchemy image.jpg ---G
```

Spaceward Graphics ---s

Spaceward Graphic files were developed and are used by Spaceward Graphics.

Syntax

---s [*compressionType*]

Parameter

compressionType:
0:None
1:Compressed
The default is None.

Extensions

.r	Red channel image data
.g	Green channel image data
.b	Blue channel image data
.a	Alpha channel image data [optional]

Creator

Spaceward Graphics

Used by

Spaceward Graphics

Variations

1 bit black and white, 8 bit grayscale, 8 bit paletted, and 24 bit color images, with and without alpha channels.

Comments

Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Example

Convert the Targa file apple.tga to a Spaceward file, include the alpha channel information:

```
alchemy apple.tga -I ---s
```

SPOT Image --S

SPOT Image files are high-resolution satellite images produced by SPOT Image Corporation.

Syntax

--S

Extensions

For GIS (tape) format:

.hdr Header information
.bil Pixel data
.clr Palette data [optional]

For CCT (CD-ROM) format:

.dat

Creator

SPOT Image Corp.

Used by

SPOT Image Corp.

Variations

8 bits per pixel GIS (tape) format files.

8 and 24 bits per pixel CCT (CD-ROM) format files, input only.

Limitations

Only GIS (tape) format images are currently written; contact us if you are interested in writing CCT SPOT Image files.

Comments

SPOT Image GIS (tape) images are actually three files. You specify the name of the .hdr file and Alchemy automatically generates the name of the .bil and .clr files.

If no palette file (.clr file) exists Alchemy will assume the image is grayscale.

There may also be a statistics file with a .stx extension, but Alchemy ignores this file.

When writing a SPOT file Alchemy will overwrite, without warning, existing .bil and .clr files.

When reading a CCT (CD-ROM) format image specify the complete path and name of the image file. For example, on an MS-DOS system: `alchemy l:\scene04\imag_04.dat -g` will convert the scene 4 image to a GIF file.

Example

Convert the Erdas file, phoenix.lan, to a SPOT Image file:

```
alchemy phoenix.lan --S
```

Stork -K

Stork files are CMYK images used by Stork's color proofing machines.

Syntax

-K *compressionType*

Parameter

compressionType:
0:None
1:Run length coded
The default is none.

Extensions

.idx Header information
.pre Image data
.tab Color lookup table

Creator

Stork Colorproofing B.V.

Used by

Stork Colorproofing machines

Variations

32 KCMY, 32 KCMY RLC, 16 CLU, and 16 CLU RLC images (type 100, 101, 300, and 301, respectively).

Limitations

Alchemy can't write paletted files with more than 256 colors.

When reading paletted files with more than 256 colors they are treated as true color.

Comments

Stork images are stored in two or three files (depending on whether or not there's a color lookup table associated with the image). The filename given to Alchemy should be the name of the data file (normally with a suffix of .pre); Alchemy will generate the names of the other files by stripping the extension and appending .idx for the index file and .tab for the color lookup table (if any).

Alchemy will overwrite existing .idx and .tab files without warning when creating Stork files.

To improve the quality of output may want to use a color correction file when converting to the CMYK variation of this format. See the -C option in Chapter 8 for more information.

Example

Convert the file image.tga to an uncompressed Stork image called image.pre and image.idx, using the undercolor removal file sample.ucr:

```
alchemy image.tga -K -Csample.ucr
```

Sun Icon --N

Sun Icon files are used by Sun Microsystems workstations to contain icon information.

Syntax --N

Extensions .icon
.ico

Creator Sun Microsystems, Inc.

Used by Sun workstations

Variations 1 bit black and white.

Comments This is not the same format as Sun Raster (see below).

Example Convert the sun raster file icon.im1 to a sun icon file called program.ico:

```
alchemy icon.im1 program.ico --N
```

Sun Raster -s

Sun Raster files are used by Sun Microsystems workstations.

Syntax

-s *compressionType*

Parameter

compressionType:
0:None
1:Run length compression
The default is None.

Extensions

.rast
.ras
.im
.im1
.im8
.im24
.im32

Creator

Sun Microsystems, Inc.

Used by

Sun workstations

Variations

1, 8, 24, and 32 bit Standard, BGR, RGB, and Byte Encoded (RLE) files, input.

1, 8, 24, and 32 bit Standard files and 1 and 8 bit Byte Encoded (RLE) files, output.

Comments

There is no standard extension for Sun Raster files; the extensions that Alchemy uses are the most common.

Some versions of the PBM toolkit read and write Sun Raster files which have the wrong RGB order (causing the red and blue channels to be swapped). You can correct for this problem by using the swap RGB option (see Chapter 7, for more information).

Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Examples

Convert the SGI file sgiout to a sun raster file called sun.im8:

```
alchemy sgiout sun.im8 -s
```

Do the same thing, writing out a compressed sun raster file:

```
alchemy sgiout sun.im8 -s1
```

Do the same thing, preserving the alpha channel information:

```
alchemy sgiout sun.im8 -s1 -I
```

Convert the Sun Raster file lena.im24 to an uncompressed TIFF file, correcting for a wrong RGB order in the Sun Raster:

```
alchemy lena.im24 --n -t0
```

Targa -a

Targa files were created to support the line of Targa graphics cards. The Targa format is popular with scanners and high end paint packages.

Syntax

-a *outputType*

Parameter

outputType:
0:Uncompressed
1:Run Length Coded

0:Include footer
10:No footer
The default is 0 (Uncompressed, include footer). Options are combined by adding (see below for an example)

Extension

.tga

Creator

Truevision, Inc.

Used by

Various scanning and paint software.

Variations

8, 15, 16, 24, and 32 bit images (32 bit images include an alpha channel).

Comments

15 and 16 bit output are actually the same except for one field in the header.

Targa files allow a footer containing additional information such as aspect ratio. However some software is unable to read Targa files which have a footer, so Alchemy allows all valid combinations to be written. The most common variant for software to be able to read is 24 bit uncompressed (specify `-a0` and `-24`).

Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Examples

Convert the file input.tif to an uncompressed 24 bit Targa file:

```
alchemy input.tif -a -24
```

Convert the file input.tif to an uncompressed 15 bit Targa file called output.tga with no footer:

```
alchemy input.tif output.tga -a10 -15
```

TIFF (Tagged Interchange File Format) -t

TIFF is designed to be a universal raster image format. It's very popular with desktop publishing packages.

Syntax

-t *compressionType*

Parameter

compressionType:

0:None
1:LZW
2:PackBits
3:Group III Fax
4:Group IV Fax
5:CCITT RLE
7:LZW with Prediction

0:Multi-strip
100:One strip

0:Not bit reversed (applies to fax compressed)
200:Bit reversed (applies to fax compressed)

0:RGB
400:CMYK

The default is LZW Compression, multi-strip, not bit reversed, and RGB. See the comments section below for more information. Options are combined by adding (see below for an example).

Extensions

.tiff
.tif

Creator

Aldus Corp.
Microsoft Corp.

Used by

Various desktop publishing and scanning software.

Variations

Reads TIFF class B, G, R, and most class P files.

Reads 1 through 8, 12, 24, and 32 bit images.

Input compression types supported are raw, LZW, PackBits, Group III fax, Group IV fax, CCITT RLE (byte and word aligned), NeXT, Thunderscan, PICIO, and SGI RLE.

Writes class B, G, P, and R files, depending on the input file and options specified.

Writes 1, 4, 8, 24, and 32 bit images.

Output compression types supported are raw, LZW, PackBits, Group III fax, Group IV fax, and CCITT RLE.

CMYK images are always 8 bits per component.

Limitations

Class P TIFF files can only be read if they have 1, 4, or 8 bits per pixel.

Comments

TIFF files are often written out incorrectly; Alchemy attempts to figure out what is wrong and make intelligent decisions. If you have TIFF files which Alchemy cannot read please contact us.

1,4, and 8 bit output files are paletted unless the palette is all gray, in which case the output is a gray-scale file.

When writing TIFF files using any of the fax compression types (Group III, Group IV and CCITT RLE), Alchemy uses a photometric interpretation of minIsWhite.

See Appendix A, Answers to Frequently Asked Questions, for more information on writing TIFF files which conform to the various TIFF classes.

LZW compression is patented by Unisys Corporation and used under license (for more information see Appendix I, Acknowledgments).

Specifying a one strip TIFF output option causes Alchemy to generate a TIFF file which contains the image data in one long strip (ordinarily you do not want the entire image data be in one strip, since this increases the memory requirements of software reading the image; if you do not specify one strip TIFF output Alchemy will generate a TIFF file which has 8k strips). This option is useful because some software (primarily fax software) cannot handle multi-strip TIFF files.

Some Fax decoding software requires the bit order to be backwards when reading a Fax compressed TIFF file. You can write such a file by adding 200 to the appropriate output type when writing a TIFF file.

When converting a TIFF file which contains multiple pages you can specify which page to convert by using the -Z option followed by the page number. You can also convert all of the pages in the file by using the Multi-Page option (-U); see the examples section below.

Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

To improve the output quality you may want to use gamma correction or a color correction file when converting to this format. See the -G and -C options in Chapter 8 for more information.

Examples

Convert the file input.gif to an uncompressed gray-scale TIFF file called output.tif:

```
alchemy input.gif output.tif -t 0 -b
```

Convert the file cover.bmp to a Group III Fax compressed TIFF file, with the bit order reversed

```
alchemy cover.bmp -t 203
```

Convert page 3 of the TIFF file, contract.tif, to a PCX file:

```
alchemy contract.tif -Z 3 -p
```

Convert all of the pages in the file to PCX files (the output files will be called contract.001, contract.002, …):

```
alchemy contract.tif -U -p
```

US Patent Image ---P

Used by the US Patent and Trademark Office to store and distribute patent data.

Syntax

---P *compressionType*

Parameter

compressionType:
0:Group 3 compressed
1:Group 4 compressed
The default is Group 4 compressed.

Extensions

.pat

Creator

US Patent and Trademark Office

Used by

US Patent and Trademark Office

Variations

1 bit black and white images.

Comments

Alchemy can write multi-page US Patent files when used with the ---U option; see below for an example

Examples

Convert the TIFF file page1.tif to a US Patent file:

```
alchemy page1.tif ---P
```

Convert all the pages in the TIFF file pages.tif to a multi-page US Patent file:

```
alchemy pages.tif ---P -U ---U
```

Utah Raster Toolkit (RLE) --u

The Utah Raster Toolkit is a set of public domain utilities for manipulating and converting images for various workstations.

Syntax --u

Extension .rle

Creator The University of Utah
The University of Michigan

Used by Utah RLE toolkit

Variations 1 and 3 channel 8 bits per pixel files, with an optional alpha channel.

Limitations While reading, files which are 1 channel and have either no color map or a single channel color map are assumed to be gray-scale images. The color map, if present, will be used as a gamma correction table.

Files which are 1 channel and have a 3 channel color map are assumed to be paletted color files.

Files which are 3 channel are assumed to be true color.

When writing RLE files Alchemy will generate a 1 channel file with a 3 channel color map for paletted images and a 3 channel file with no color map for true color images.

Comments The Utah Raster Toolkit is available free of charge via anonymous ftp: ftp://cs.utah.edu/pub/urt_3.0.tar.Z.

Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Example Convert the PBM file, image.ppm, to a Utah RLE file:

```
alchemy image.ppm --u
```

Verity Image Format (VIF) --E

VIF is used by the Topic text retrieval software.

Syntax --E

Extension .vif

Creator Verity Corp.

Used by Topic

Variations 1 bit black and white.

Example Convert the file fax.tif to a VIF file:

```
alchemy fax.tif --E
```

VIFF ---v

VIFF files are used by Khoros, a visual programming environment for the X Windowing System.

Syntax ---v

Extensions .xv

Creator Khoral Research

Used by Khoros

Variations 1 bit black and white, 8 bit grayscale, 8 bit paletted, and 24 bit RGB (with an optional alpha channel) uncompressed.

1 bit black and white, 8 bit grayscale, 8 bit paletted, and 24 bit RGB (with an optional alpha channel) compressed, read only.

Limitations Writing compressed files is not yet supported.

Comments There doesn't seem to be any method for storing an 8 bit grayscale or paletted image with an alpha channel, when writing such an image Alchemy will automatically convert the image to 24 bit RGB.

VIFF files may be in either byte order (low byte first or high byte first). Alchemy will read either byte order and always write VIFF files with high byte first byte order.

Alpha channel data can be read and written by using the -I option, see Chapter 6 for more information.,

Example Convert the file image.rgb to a VIFF file:

```
alchemy image.rgb ---v
```

VITec -T

VITec files are used by VITec image processing software.

Syntax -T

Extension .vit

Creator VITec

Used by VITec ELT

Variations 8 bit grayscale and 24 bit color files untiled.

8 bit grayscale and 24 bit color files tiled, input only.

Example Convert the file map.erm to a VITec file:

```
alchemy map.erm -T
```

Vivid --I

Vivid is a shareware ray-tracer for MS-DOS computers.

Syntax --I (upper case i)

Extension .img.als

Creator Stephen B. Coy

Used by Vivid Ray Tracer
Alias

Variations 24 bit RGB.

Comments The Vivid Ray Tracer is a shareware program for PCs and is available from:

Stephen Coy
15205 NE 13th Pl., #2904
Bellevue, WA 98007

or from us.

This is the same format as used by Alias (see Alias, above).

Example Convert the file spheres.qrt to a Vivid file:

```
alchemy spheres.qrt --I
```

Wavefront RLA/RLB (read only)

RLA and RLB files were developed by Wavefront.

Extensions

.rla
.rlb

Creator

Wavefront

Used by

Wavefront Advanced Visualizer

Variations

24 bit true-color with alpha channels, read only

Limitations

There seem to be many variations of RLA/RLB files. We have documentation for 3 different variations and the sample files we have seem to be different from any of those; if we cannot read the RLA/RLB files that you have please contact us, we'd like to add support for as many variations as possible.

Comments

If you have Wavefront files which Alchemy cannot read please contact us. Similarly if you are interested in having Alchemy write Wavefront files please contact us.

Alpha channel data can be read by using the -I option, see Chapter 6 for more information.,

Examples

Convert the sequence of Wavefront RLA files frame.000 through frame.499 to TIFF files, with the names 0.tif through 499.tif, including the Alpha channel data:

```
alchemy frame.### #.tif -t0 -I --- 0 499
```

Windows BitMap (BMP) -w

Windows BMP files are used by Microsoft Windows.

Syntax

-w *compressionType*

Parameter

compressionType:
0:None
1:RLE
10:Write an ICOn file
The default is none.

Extension

.bmp

Creator

Microsoft Corp.

Used by

Microsoft Windows

Variations

1, 4, 8, 15, 16, and 24 bit RGB (raw), RLE4, and RLE8 files.

Limitations

Several of the programs which claim to read and write RLE files do not do so correctly; we do not recommend writing RLE files unless you have verified that they work with your intended application.

Comments

Microsoft supplied Windows utilities cannot read nor write RLE4 or RLE8 files.

If you are converting an image to use as wallpaper on a 16 color display you will want to match the palette of the output image to one of the existing 16 color BMP images supplied with Windows (chess.bmp, for example). If you do not do this the wallpaper will not be loaded correctly. See the example section below.

If you are converting an image to use as wallpaper on a 256 color Windows 3.1 display you will want to reserve the first 8 colors. Use the `-c 256 8` option to do this (see below for an example). This will force the first 8 colors of the palette to be the standard Windows colors.

If you are writing a Windows icon (.ico) file you must scale the image to a width and a height of 16, 32, or 64 pixels (32 being the best choice, since Windows displays all icons as 32x32). Also, Windows seems to remap all icons to the standard 16 colors, so the best results can be obtained if you match the palette of your icons to an existing icon (see the -f option). If you don't have any other icons you can also match to one of the 16 color wallpaper files supplied with Windows.

Alchemy can write a BMP file which contains an identity palette as specified in the Microsoft Multimedia Development Kit. These images provide for quicker bitmap loading when used with the Multimedia Extensions. A palette identity file has the first and last 10 palette entries reserved for 20 system defined colors. Alchemy will write such an image if you specify `-c 246 10` as part of the command line. Note that ordinarily this would produce a file which has 246 palette entries, but in this special case the file will have 256 palette entries (20 fixed by the Windows specifications and 236 chosen by Alchemy). Note that you can also specify a number smaller than 246, but the palette will always have 256 colors (since the last 10 have to occupy positions 246 through 255).

Examples

Convert the image test.gif to a Windows BMP file:

```
alchemy test.gif -w
```

Do the same thing, but force the output file to be a 15 bit BMP file:

```
alchemy test.gif -w -15
```

Convert the image test.gif to a 16 color Windows BMP file to be used as wallpaper (the file chess.bmp is supplied with Windows 3.0 (substitute leaves.bmp when using Windows 3.1); this example assumes that it is in the current directory):

```
alchemy test.gif -f chess.bmp -w
```

Convert the image test.gif to a 256 color Windows BMP file to be used as wallpaper with Windows 3.1:

```
alchemy test.gif -c256 8 -w
```

Convert the image test.gif to an icon file for use with Windows 3.1:

```
alchemy test.gif -Xb32 -Yb32 -w 10
   -f leaves.bmp
```

Convert the image test.gif to an identity palette BMP file:

```
alchemy test.gif -w -c 246 10
```

WordPerfect Graphic File -W

WordPerfect files are images which can be imported into WordPerfect and various other word processors and desktop publishing programs.

Syntax -W

Extension .wpg

Creator WordPerfect Corp.

Used by WordPerfect

Variations 1 through 8 bits per pixel.

Comments In addition to raster images WordPerfect files may contain vectors and text information. Such information is lost when reading WordPerfect files.

Example Convert the image, newpict.pcx, to a black and white WPG file:

```
alchemy newpict.pcx -b -c2 -W
```

XBM --b

XBM files are used by the X Windowing System. XBM files are C source code files which can be read and written by various X utilities and are designed to be included in C source code for use as icons and other bit-mapped graphic images.

Syntax

--b

Extensions

.xbm
.bm

Creator

MIT

Used by

The X Windowing system

Variations

1 bit per pixel, black and white.

Limitations

Because .xbm files are actually C source code files there can be many variations of .xbm files. Since adding a C preprocessor to Alchemy to handle all the theoretically allowable .xbm files is impractical we have instead designed Alchemy to interchange .xbm files with the PBM utilities and the X supplied utilities, and to read the sample .xbm files from Sun Microsystems. If you run across any .xbm files which Alchemy cannot read please contact us.

The hotspot field is ignored when reading .xbm files.

Comments

Most of the X supplied utilities (bitmap, for example) are designed to edit small .xbm images.

Example

Convert the file picture.im32 to an XBM file using high quality scaling and preserving the aspect ratio:

```
alchemy picture.im32 --b -Xb64 -+
```

XIM ---x

XIM is yet another file format used by the X Windowing System.

Syntax ---x

Extensions .xim

Creator MIT

Used by The X Windowing System

Variations 8 bit paletted, 8 bit grayscale, and 24 bit RGB images.

Example Convert the file screen.xwd to an XIM file:

```
alchemy screen.xwd ---x
```

XPM --x

XPM files are used by the X Windowing System. XPM files are C source code files which can be read and written by various X utilities and are designed to be included in C source code for use as icons and other bit-mapped graphic images.

Syntax

--x *type*

Parameter

type:

0:XBM similar style
1:XPM3 style
2:XPM2 style

0:24 bit colors
10:48 bit colors

The default is XBM similar style, 24 bit colors (see the Comments section below for a discussion of the different XPM file types). Options are combined by adding (see below for an example).

Extensions

.xpm
.pm

Creator

MIT

Used by

The X Windowing system

Variations

8 bits per pixel

Limitations

Because .xpm files are actually C source code files there can be many variations of .xpm files. Since adding a C preprocessor to Alchemy to handle all the theoretically allowable .xpm files is impractical we have instead designed Alchemy to interchange .xpm files with the PBM utilities and the X supplied utilities, and to read the sample .xpm files from IBM. If you run across any .xpm files which Alchemy cannot read please contact us.

Some XPM files contain color names instead of color values for some of the colors. The conversion information to convert these names into values is in a file supplied with the X Windowing system called `rgb.txt`. When needed, Alchemy will look for this table in the following directories: the current directory, `/usr/lib/X11`, `$OPENWINHOME`, and `/usr/openwin/lib`. If your system has the `rgb.txt` file in a different location you may have to copy it to the current directory (its location is system dependent; ask you system administrator if you need help finding it).

Comments

The different type XPM files can be identified as follows:

Type 0 (XBM similar style):

```
#define type0_format 1
…
static char *type0_colors[] = {
"a", "#000000",
"b", "#ff0000",
…
```

Type 1 (XPM3 style):

```
/* XPM */
static char * type1[] = {
"32 20 12 1",
"a c #000000",
"b c #ff0000",
…
```

Type 2 (XPM2 style):

```
! XPM2
32 20 12 1
a c #000000
b c #ff0000
…
```

The 48 bit color XPM files are identical except that the color values are written as a 48 bit number (instead of a 24 bit number). Some software expects XPM files that have 48 bit numbers (Alchemy automatically reads either). For example:

Type 10 (XBM similar style with 48 bit colors):

```
#define type0_format 1
…
static char *type0_colors[] = {
"a", "#000000000000",
"b", "#ffff00000000",
…
```

The other formats (11 and 12) are analogous.

When writing an XPM file with less than 27 colors Alchemy writes 1 character XPM files, otherwise Alchemy writes 2 character XPM files.

XPM files are usually quite small, therefore many utilities (the PBM toolkit for example) may have trouble reading large XPM files.

Examples

Convert the file picture.im32 to an XPM file using high quality scaling and preserving the aspect ratio:

```
alchemy picture.im32 --x -Xb64 -+
```

Do the same thing, but write an XPM3 style file with 48 bit colors:

```
alchemy picture.im32 --x11 -Xb64 -+
```

XWD --w

XWD is the file format used by xwd, the X window dumping utility.

Syntax

--w *type*

Parameter

type:
0:Z type
1:XY type
The default is Z type.

Extension

.xwd

Creator

MIT

Used by

The X Windowing System

Variations

1, 4, 8, and 24 bits per pixel Z format and 1, 4, and 8 bit XY format, input.

1, 8, and 24 bits per pixel Z format and 1 and 8 bit XY format, output.

Example

Convert the XBM file, icon.xbm, to an XWD file:

```
alchemy icon.xbm --w
```

6

General Options

Introduction

General options are options which do not affect the conversion of the image. They control such things as the overwriting of existing files and the way that memory is used.

Control Memory Usage -$

Purpose

Control the amount of memory uses for temporary storage of image data.

Syntax

-$

-$ *memory*

Parameter

memory:
The amount of memory in kilobytes.
Default is 0 (use as much memory as needed).

Comments

Using the -$ without a following parameter causes Alchemy to use as little memory as possible, both for temporary image storage and for other internal buffers. On MS-DOS based systems using the standard version of Alchemy this will usually allow conversion of larger images than would otherwise be possible.

Using the -$ option with a parameter causes Alchemy to use no more than that much memory for temporary image storage, but use as much memory as necessary for other internal buffers. Note that a value of 0 following the -$ causes Alchemy to use as much memory as needed, this is different than -$ without a parameter. Using this option will limit the amount of virtual memory that Alchemy will use.

Examples

Convert the image giant.tga to a TIFF file using as little memory as possible:

```
alchemy giant.tga -$ -t
```

Convert the image giant.tga to a TIFF file using no more than 5 megabytes of memory for temporary image storage:

```
alchemy giant.tga -$ 5000 -t
```

Display Image Stats -x

Purpose

Display image statistics.

Syntax

-x [*option*]

Parameter

option:

0:Traditional image statistics
1:Verbose image statistics, English Units
2:Verbose image statistics, Metric Units
3:Terse image information
4:Alchemy program information

Default is 0.

Comments

Displays image type, size, number of colors, aspect ratio, resolution, and compression ratio.

Option 1 and 2 image stats contains more information than Option 0 and the information is presented in a manner to allow it to be more easily parsed by other software.

Option 3 image stats produces output in the same format as options 1 and 2, however only the filename and file type is returned. The advantage of this option is that PostScript, EPS, and PDF files are not scanned, so there is no delay in returning the file type information. This is useful if you are calling Alchemy from other software; your software might need to know what file format an image is before calling Alchemy to convert the image.

Option 4 returns Alchemy's version number and the type of Alchemy (i.e. PS or non-PS).

Example

Find out about the image called image.tga:

```
alchemy -x image.tga
```

Do Not Alter Output Filename -.

Purpose

Disable automatic appending of the output image type to the output file name.

Syntax

-. (period)

Comments

By default, if there's no '.' in the output filename, Alchemy will add an extension indicating the type of file. If the -. option is specified no extension will be added.

This is most useful on non-MS-DOS systems where '.' is not a special character in filenames.

Examples

Convert the file called infile.gif to a PCX file called outfile (if you did not use the -. option Alchemy would automatically change the output file name to outfile.pcx):

```
alchemy infile.gif outfile -p -.
```

Do Not Remove Old Extension ---.

Purpose

Allows appending a new extension instead of removing the existing extension.

Syntax

---.

Comments

Generates filenames such as test.tif.gif

Limitations

Only works on operating systems that support long filenames.

Examples

Convert all the files in the series filename.001, filename.002 into TIFF format while adding a tiff extension in order to create filenames such as filename.001.tif, filename.002.tif:

```
alchemy filename.* ---. -t
```

Do the same thing on Windows 95 or Windows NT

```
alchlong filename.* ---. -t
```

Help -h

Purpose

Give you information on how to use Image Alchemy.

Syntax

-h *option*

Parameter

option:

0:General help
1:General options
2:Output formats A through L
3:Output formats M through Z
4:Color options
5:Scaling and Filtering Options
6:Display options (MS-DOS Only)
7:PostScript input options

Default is 0, general help

Limitations

The help option cannot be combined with any other options.

Comments

The help information given by this command is only a summary.

The numbers in braces after the command name refer to the page numbers in this manual.

Example

Get help on the color options:

```
alchemy -h4
```

Multi-Page Input -U

Purpose

Allow the conversion of multiple pages with a single execution of Alchemy.

Syntax

-U

-U *page*

-U *firstPage lastPage* [*stepPage*]

Parameter

page:
Specify page number
The default is page 1.

startPage:
Specify beginning page number.
endPage:
Specify ending page number.
stepPage:
Specify step between pages.

Comments

The multi-page option allows you to process multiple pages of an image when reading an image file which contains multiple pages.

Each page of the image can be written to a separate file or to a single multiple-page output file (if writing to a format which supports multiple pages and using the ---U option). If writing separate files the output file names will be as specified, with the extension replaced with .001 for first page, .002 for the second, and so on.

If the -U option is used without a following parameter all pages in the input file(s) will be converted.

If you specify a single parameter after the -U option, only that page will be converted. If you specify two parameters all pages between those two numbers will be converted (inclusive, e.g. -U 2 3 will convert pages 2 and 3). If you specify three parameters the third will be used to indicate the step between pages (i.e. -U 2 8 2 will convert pages 2, 4, 6, and 8).

Limitations

Image Alchemy reads multi-page: TIFF, DCX (PCX), PCL, US Patent, FLC, HRF, JEDMICS, Collage, MIFF, and GIF. Image Alchemy PS has multi-page reading support for these file formats plus PostScript and PDF.

Examples

Convert all the pages in the PCL file doc.pcl to TIFF files:

```
alchemy doc.pcl -U -t
```

Convert all the pages of all the TIFF files to PCX files, placing the output files into the directory \images\output:

```
alchemy *.tif -U -p \images\output
```

Do the same thing, but write a single multi-page DCX variant PCX file, called doc.pcx:

```
alchemy *.tif -U -p1 ---U doc.pcx
```

Do the same thing, but only convert the even pages, starting at page 4 (9999 is used as the ending page count since we don't know how many pages the TIFF files contain):

```
alchemy *.tif -U 4 9999 2 -p1 ---U doc.pcx
```

Multi-Page Output ---U

Purpose

Allow the output of image files which contain multiple pages.

Syntax

---U [*filename*]

Parameter

filename:
Specifies the output filename when writing a single multi-page file.

Comments

The multi-page output option allows you to write multiple images or pages to a single image file.

Because it is possible to write a single multi-page file based on multiple single page files, a single multi-page file, or multiple multi-page files and it is also possible to write multiple multi-page files based on multiple multi-page input files there are four permutations to consider.

When writing a single multi-page output file and reading multiple files, the output filename must appear immediately after the ---U option.

Limitations

Only certain image file formats allow multiple images in a single file: Adobe PDF, PCX (the DCX variant), GIF, TIFF, MIFF, US Patent, and PCL.

Examples

Convert all the pages in the TIFF file doc.tif to a multi-page PDF file (note that in this case the -U option is needed to cause Alchemy to read all the pages in the doc.tif file, without it only the first page would be read):

```
alchemy doc.tif -U ---U --d
```

Convert the TIFF files page1.tif, page2.tif, and page3.tif to a multi-page PDF file called output.pdf (the -- option is required to tell Alchemy that there are multiple files being read and the filename after the ---U option is required to specify the output file name):

```
alchemy -- page1.tif page2.tif page3.tif
---U output.pdf --d
```

Convert the multi-page TIFF files doc1.tif, doc2.tif, and doc3.tif each to their own multi-page PDF files (this assumes that each TIFF file is a multi-page file). The -U option is required to tell Alchemy to treat the input files as multi-page documents. In this case there is no filename specified after the ---U, because a single multi-page output file is not being written:

```
alchemy -- doc1.tif doc2.tif doc3.tif -U
---U --d
```

Convert the multi-page TIFF files doc1.tif, doc2.tif, and doc3.tif into a single multi-page PDF file (this assumes that each TIFF file is a multi-page file). In this case there is a filename specified after the ---U, because a single multi-page output file is being written:

```
alchemy -- doc1.tif doc2.tif doc3.tif -U
---U docs.pdf --d
```

Override Input Type -=

Purpose

Force Alchemy to treat the input file as the specified file type.

Syntax

-= *inputType*

Parameter

inputTypes:

Comments

Rarely will Alchemy misidentify a file; the file is usually damaged in some way when this happens. If the file is damaged, or if you specify an input type that does not correspond to the actual type of the image, the results will be unpredictable. If you have a file which Alchemy misidentifies but is otherwise undamaged please contact us.

Example

Convert the file unknown.xxx to an OS/2 Bitmap file called output.bmp, forcing unknown.xxx to be treated as a Sun Raster image:

```
alchemy unknown.xxx output.bmp -O -=8
```

Overwrite -o

Purpose

Allow Alchemy to overwrite existing files.

Syntax

-o

Comments

Image Alchemy will not overwrite an existing file unless the -o option is specified.

Limitations

The input file name and the output file name cannot be the same, see the --o option to replace the input file with the output file.

Example

Convert the file input.tga to a GIF file called output.gif, overwriting the existing file called output.gif:

```
alchemy input.tga output.gif -g -o
```

Program Information -?

Purpose Give you information on how to get support for Image Alchemy or inquire about update information.

Syntax -?

Comments UNIX users have to escape the question mark with a back-slash (instead of -? use -\?). This is because the UNIX shell will attempt to perform wildcard expansion on the question mark.

Limitations The information option cannot be combined with any other options.

Example Get support information:

```
alchemy -?
```

Quiet -Q

Purpose

Suppress all status messages (but not error messages).

Syntax

-Q

Comments

This is useful when running Alchemy in the background on UNIX systems or in batch files on MS-DOS systems (and you don't want the output of Alchemy scrolling important messages off of the screen).

Limitations

There is no way to suppress error messages.

Example

Convert the file dummy.gif to a PCX file but don't report any status messages:

```
alchemy dummy.gif -Q -p
```

Response Files @

Purpose

Response files allow you to place commonly used commands or lists of input filenames into a text file; the commands or input filenames in this file will be processed by Alchemy in the same way as if you had put the parameters on the command line

Syntax

@filename

Parameters

filename:
An ASCII file containing a list of Alchemy options and/or a list of input filenames.

Comments

Lines beginning with # are treated as comments and ignored.

You must use the -- (Wildcard) option if the response file contains multiple filenames.

Response files may contain response file commands.

Limitations

Wildcards (* and ?) in response files do not work under UNIX.

Examples

If you have a response file, called resize which contains the following:

```
-Xb640 -Yb480
-+
```

The following command will use this response file to scale a set of JPEG files to GIF files:

```
alchemy -- *.jpg -g @resize
```

If you have a list of files that you want to convert (called files):

```
test1.jpg
image.tga
```

```
scan1.tif
scan2.tif
scan3.tif
```

This command will convert them to GIF files:

```
alchemy -- @files -g
```

You can use multiple response files, in this case one contains the list of input filenames and the other the scaling commands:

```
alchemy -- @files @resize -g
```

Response Output Filenames -@

Purpose

Allows you to specify an arbitrary list of filenames that the output files are to be called.

Syntax

-@filename

Parameters

filename:
An ASCII file containing a list of output filenames.

Comments

Lines beginning with # are treated as comments and ignored.

You must use the -- (Wildcard) option if the response file contains multiple filenames.

This command is usually used along with a response file containing a list of input names.

Limitations

Wildcards (* and ?) are not allowed in a response output file.

Example

You want to convert the following list of files to JPEG files:

```
test1.gif
image.tga
scan1.tif
scan2.tif
scan3.tif
```

You want the output files to have the following names:

```
image1.jpg
image2.jpg
image3.jpg
image4.jpg
image5.jpg
```

Assuming the first list is called files and the second list is called outnames, the following command can be used:

```
alchemy -- @files -@outnames -j
```

Response Paired Filenames --@

Purpose

Allows you to specify an arbitrary list of input filename and output filename pairs..

Syntax

--@filename

Parameters

filename:
An ASCII file containing a list of input and output filename pairs.

Comments

Lines beginning with # are treated as comments and ignored.

You must use the -- (Wildcard) option if the response file contains multiple filenames.

Limitations

Wildcards (* and ?) are not allowed in a response paired file.

Example

You have a list of paired filenames, containing one input filename and one output filename per line, like this:

```
test1.gif      image1.jpg
image.tga      image2.jpg
scan1.tif      image3.jpg
scan2.tif      image4.jpg
scan3.tif      image5.jpg
```

Assuming the list is called pairs, the following command can be used:

```
alchemy ----@pairs -j
```

Sequential Filenames ---

Purpose

Allow the conversion of a sequentially numbered series of files (i.e. image000.tif, image001.tif, image002.tif, …)

Syntax

--- [*startInput*[-*endInput*[x*incrementInput*]]
[*startOutput*[-*endOutput*[x*incrementOutput*]]]

Parameters

startInput:
The number of the first input image, defaults to 0.

endInput:
The number of the last input image, defaults to 9999.

incrementInput:
The increment between input values, defaults to 1.

startOutput:
The number of the first output image, defaults to the startInput value.

endOutput:
The number of the last output image, defaults to the endInput value.

incrementOutput:
The increment between output values, defaults to the incrementInput value.

Comments

Insert # characters (pound signs) in the input and output filenames where the sequence numbers belong, using multiple # to indicate leading zeros. For example # would be replaced by 1, 2, 3, … 999 and #### would be replaced by 0001, 0002, 0003, … 0999, assuming the specified range was 1 to 999.

Alchemy will automatically skip missing files, so if you specify image.### as the input filename but only image.005 and image.006 exist only those files will be converted.

If the starting value is greater than the ending value the value will be decremented (i.e. 50-1 will be treated as 50, 49, 48, …, 1). Specifying a negative decrement is not necessary (nor possible).

When reading a multi-page document you can use sequential filename mode to specify the name of the output files. In this case the startInput, endInput, and incrementInput values are not specified. See below of an example.

Limitations

You must specify both an input filename and an outputfilename when using this option.

This option cannot be combined with multiple input filenames (i.e. alchemy test?.### ----- is not allowed).

Examples

Convert the files image001.gif, image002.gif, image003.gif … to TIFF files with the names file.001, file.002, file.003, …:

```
alchemy image###.gif file.### ----t
```

Do the same thing, but use the filenames image1.gif, image2.gif., image3.gif:, through image100.gif as the input files:

```
alchemy image#.gif file.### --- 1-100 -t
```

Do the same thing, but skip the even numbered files (image1.gif, image3.gif, image5.gif, …):

```
alchemy image#.gif file.### --- 1-100x2 -t
```

Do the same thing, but name the output files file.300, file.297, file.294, …:

```
alchemy image#.gif file.### --- 1-100x2
300-1x3 -t
```

Convert all the pages in addendum.pdf to TIFF files, name the output files addendum.01.tif, addendum.02.tif, addendum.03.tif, …:

```
alchemy addendum.tif addendum.##.tiff -t
-U ---
```

Do the same thing, but starting number the pages at 10 (so page 1 will be page 10, etc.):

```
alchemy addendum.tif addendum.##.tiff -t
-U --- 10
```

Do the same thing, but starting number the pages at 100 and count down:

```
alchemy addendum.tif addendum.##.tiff -t
-U --- 100-1
```

Use Input Directories for Output --.

Purpose Place the output files into the same directory as the input files.

Syntax --. (period)

Comments By default Alchemy places output files into either the current directory or a directory specified on the command line. If the --. option is used the output files will be written to the same directory as the input files.

Example Convert all the PCX files in the directories imgs\ and photos\ to JPEG files, placing the output files in the same directories the input files were read from:

```
alchemy -- imgs\*.pcx photos\*.pcx -j --.
```

Use Input File Format for Output -- =

Purpose

Causes Alchemy to write out a file in the same format as the file being read.

Syntax

-- = [*compressionOption*]

Parameter

compressionOption:

Sets the output compression or output type based on the format being written.

Comments

If the output file already has the extension that Alchemy uses for the file being read and the output file is not being written to a different directory this command will fail unless the --o command is used.

Limitations

Only one parameter can be specified (i.e. if writing a multi-page GIF file the delay between images and the repeat count cannot be specified when using this option).

Examples

Convert all the files called image.* to files with the same format, flipping the files and placing the output in a directory called \flipped:

```
alchemy image.* --= --^ \flipped
```

Do the same thing, but replace the existing files with the new files instead:

```
alchemy image.* --= --^ --o
```

Do the same thing, using type 1 compression (what that actually means depends on the file format being written):

```
alchemy image.* --= 1 --^ --o
```

Use Input Filename for Output --o

Purpose

Causes Alchemy to write out a file with the same name as the file being read, replacing the input file.

Syntax

--o (lowercase letter O)

Comments

If the input file is read only this command will fail.

Example

Convert the GIF file, test.gif, to a GIF file, scaling it to 640x480 and keeping the same name:

```
alchemy test.gif -g -Xb640 -Yb480 --o
```

Use 3 Letter Extensions --3

Purpose

Causes Alchemy to use 3 letter extensions (this is the default under MS-DOS).

Syntax

--3

Comments

Ordinarily Alchemy will use the extension specified by the image file format (.GIF, for example), however some file formats, such as TIFF, specify that on systems which allow it the extension should be more than 3 letters (.TIFF, in the case of TIFF). This can be a problem if you are interchanging files with an MS-DOS system. This option causes Alchemy to always use no more than 3 letter extensions.

Example

Convert the file large.gif to a TIFF file with a 3 letter extension:

```
alchemy large.gif -t --3
```

Warnings --W

Purpose

Treat missing input files, unidentifiable input files, and non-overwriteable output files as a non-fatal errors.

Syntax

--W

Comments

When used in conjunction with the Wildcard option (see below) the Warnings option allows Alchemy to proceed even when certain error conditions occur. Specifically, any input files which are missing or can't be identified as valid image files and any output files which already exist but are not to be overwritten are skipped and processing continues with the next file.

At the end of processing Alchemy displays lists of the files which were not found, which could not be identified, and which already existed but could not be overwritten.

This option was added at the request of our customers who routinely convert large numbers of files and don't want Alchemy to stop if it finds a file missing or finds that an output file already exists.

Limitations

Any errors which occur during the processing of an image file are always fatal.

This option can only be used with the Wildcard option.

Example

Convert all the GIF files in the current directory to JPEG files, skipping any files which can't be identified or already have existing JPEG files:

```
alchemy -- *.gif -j --W
```

Wildcard --

Purpose

Allow the conversion of multiple files with a single execution of Alchemy.

Syntax

-- (dash dash)

Comments

The wildcard option allows you to specify multiple file names and file names which include wild card characters. Alchemy will perform the same conversion for each input file name that it finds.

On MS-DOS systems the use of the wildcard option (--) is not required if the first file name specified includes a wildcard character (* or ?); however to reduce confusion it is still recommended.

Limitations

If you are using the wildcard option you may not specify an output file name; the file names are automatically generated by substituting an appropriate extension to the input file names. If you do specify an output file name it will be misinterpreted as another input file. An output path name may specified and all output files will be stored there (see the Examples section below for an example of this).

Any error will terminate the execution of Alchemy; any images which appear in the filename list after the one causing the error will not be processed. This includes attempting to overwrite an already existing file without specifying the -o option. If you use the --W option in conjunction with wildcards certain errors will be treated as warnings and not cause Alchemy to terminate. These errors are: missing input files, input files which could not be identified, and output files which already existed but could not be overwritten (because the -o option was not specified).

Alchemy does not intelligently retain information between files. For example, if you are matching a group of files to an existing palette, the inverse palette generation step only needs to be performed once, but it is in fact done for each file. This only affects the speed of conversions, not the quality.

Examples

Convert all the GIF files in the current directory to JPEG files:

```
alchemy -- *.gif -j
```

Convert all the TIFF files in the directory \tiff to PCX files in the directory \images\output:

```
alchemy -- \tiff\*.tif -p \images\output
```

Convert all the GIF files in the current directory, in the directory \images, and in the directory \more to GIF files, scaling them to be no larger than 640x480 and write them to the directory \small:

```
alchemy -- *.gif \images\*.gif \more\*.gif
   -g -Xb640 -Yb480 -+ \small
```

Convert the files madonna.gif, bay4.gif, everest.tga, and basil.tif to JPEG files, overwriting any existing files:

```
alchemy -- madonna.gif bay4.gif
   everest.tga basil.tif -o -j
```

Convert the files test1.tif, test2.tif, and new*.gif to ILBM files, matching them to the palette from the file output.pal:

```
alchemy -- test1.tif test2.tif new*.gif -f
   output.pal -i
```

7

Color and Palette Options

Introduction

Color and Palette options are options which affect the appearance of the output image. They control such things as the number of colors in the output image and the dithering techniques used.

Alpha Channel -I

Purpose

Control the Alpha Channel when converting a file.

Syntax

-I *alphaOption* (capital i)

Parameter

alphaOption:

1:preserve the alpha channel
2:always write an alpha channel
3:do not write an alpha channel

The default is 1, to preserve the alpha channel.

Comments

Some file formats include alpha channel information. The alpha channel is often used to store information such as transparency. By default Image Alchemy writes out an alpha channel if the input image includes one and the output file format supports alpha channels.

If you are reading a file which does not have an alpha channel using the -I 2 option will create an empty alpha channel in the output file.

If you are writing a file format which does not support alpha channel data the -I option will be ignored.

Examples

Convert the image giant.tga to a TIFF file, preserving the alpha channel information:

```
alchemy giant.tga -t
```

Do the same thing, removing the alpha channel:

```
alchemy giant.tga -t -I 3
```

Do the same thing, but force an alpha channel to be written:

```
alchemy giant.tga -t -I 2
```

Black and White -b

Purpose

Convert the image to black and white or gray-scale.

Syntax

-b

Comments

The -b option causes an image to be converted to either black and white or gray-scale. If the -c2 option is specified the output image will be black and white. Any other number of colors specified with -c will cause Alchemy to generate a file with that many shades of gray uniformly distributed from 0 to 255.

If the -c option is not used the default is to write a file with 256 shades of gray when converting from a true color image. When converting from a paletted image the number of shades of gray defaults to the number of colors in the original image.

When converting from true color the image will be changed to a paletted image unless the -24 option is used.

You can use the -b option combined with -c 256 and a scaling option to perform scale to gray. Scale to gray converts a black and white image, at high resolution to a grayscale image at lower resolution, while preserving readability. It is often used when converting fax received data to a format for displaying on a monitor. See below for an example.

Related options

-8 Paletted output
-24 True color output
-c Specify number of colors

Examples

Convert the file sample.jpg into a 256 shades of gray raw file:

```
alchemy sample.jpg -b -r
```

Convert the file madonna.jpg into a 4 shades of gray gif file called gray.gif:

```
alchemy madonna.gif gray.gif -b -c4 -g
```

Perform scale to gray scaling on the file fax.tif, converting the file to a grayscale GIF file which is no larger than 800 x 600:

```
alchemy fax.tif -g -c256 -b -Xb800
-Yb600 -+
```

Brightness ---y

Purpose

Adjust the brightness of an image.

Syntax

---y *brightnessValue*

Parameter

brightnessValue:
-1.0 to 1.0, default is 0.

Comments

Changes the brightness of an image by adding or subtracting a constant value from each pixel. A brightness value of 1.0 will add 100% to each pixel, making the entire image white. A brightness value of -1.0 will subtract 100% from each pixel, making the entire image black.

Related options

---Y Contrast Adjustment
-G Gamma Correction

Example

To convert the Mac PICT file test.pic to a PCX file, while slightly increasing the brightness of the image:

```
alchemy test.pic -p ---y 0.10
```

CMYK ---K

Purpose Convert the image to CMYK.

Syntax ---K

Comments The ---K option causes an image to be converted to CMYK data. This option can only be used by those file formats which support CMYK data.

Example Convert the file sample.jpg in to an uncompressed CMYK TIFF file:

```
alchemy sample.jpg ---K -t0
```

Color Correction -C

Purpose

Apply an Alchemy Color Correction (ACC) file while performing a conversion. This helps maintain image quality when converting from RGB to CMYK or CMYK to RGB (for example from JPEG to RTL or from CMYK EPS to GIF).

Syntax

-C *filename*

Parameter

filename:
The name of the color correction file.

Comments

More information and various ACC files can be found on our web site in the acc directory: http://www.handmade.com/acc.

Alchemy continues to support UnderColor Removal (UCR) files. The undercolor removal portion of UCR files is compatible with the format used by Stork Colorproofing B.V. The format of this file is described in Appendix G, Undercolor Removal Files.

Examples

Convert the file image.tga to an HP RTL file called image.rtl using the ACC file dj2500a.acc:

```
alchemy image.tga --r7 -Cdj2500a.acc
```

Convert the file image.tga to an HP RTL file called image.rtl using the undercolor removal file sample.ucr:

```
alchemy image.tga --r7 -Csample.ucr
```

Colors -c

Purpose

Specify the number of colors for the output file.

Syntax

-c *colors* [*reserveColors*]

Parameters

colors:

Specifies the number of colors in the output image. May be between 2 and 256.

reserveColors:

Specifies the number of colors to reserve in the output image. May be between 0 and 255.

Comments

If the input file has a larger number of colors than specified for the output file, the image will be quantized using Heckbert's median cut algorithm and dithered. For further information on Heckbert's median cut algorithm see Appendix B, Color and Dithering.

The number of colors to reserve is an optional parameter. If it is present it causes the specified number of colors to be reserved from the beginning of the palette. The output image will not contain any of those color indices. This can be useful if you have menus or other information you wish to display at the same time as the images and they use colors at the beginning of the palette. The menu colors will then not interfere with the image. The first indices are set to black unless 16 is specified, in which case they are set to the standard VGA color palette.

Limitations

Specifying the number of colors only has an effect if you are writing a paletted file (using the -8 option) or if the output file type is always paletted.

Converting an image with a large number of colors to a small number of colors (less than 8) will usually give poor results.

The reserved colors will be set to black unless 16 colors are reserved. In that case they will be set to the standard VGA colors.

Related options

-8 Convert to paletted image
-d Specify dither type
-u Use uniform palette

Examples

Convert the image colors.gif into a 16 color PCX file called color16.pcx

```
alchemy colors.gif color16.pcx -p -c16
```

Convert the image colors.tga into a 256 color GIF file called output.gif, reserving the first 16 colors.

```
alchemy colors.tga output.gif -g -c256 16
```

Contrast ---Y

Purpose

Adjust the contrast of an image.

Syntax

---Y *contrastValue*

Parameter

contrastValue:
0.1 to 10.0, default is 1.0.

Comments

Changes the contrast of an image by multiplying each pixel by a constant. A contrast value of 2.0 will double the value of each pixel, making the image quite a bit more contrasty.

It is actually possible to specify a negative contrast value, this has the effect of negating the image while applying the contrast adjustment (a contrast value of -1.0 has the same effect as using the -N option).

Related options

---y Brightness Adjustment
-G Gamma Correction

Example

To convert the Mac PICT file test.pic to a PCX file, while slightly decreasing the contrast of the image:

```
alchemy test.pic -p ---Y 0.90
```

Dither -d

Purpose

Specifies the type of dithering to apply to the image.

Syntax

-d[*s*] *ditherType* [*perturbation*]

Parameters

If the -d is immediately followed by an 's', then a serpentine raster is used.

ditherType:

0:None
1:Floyd-Steinberg
2:Stucki
3:Jarvis, Judice, & Ninke
4:Stevenson and Arce
5:Sierra Lite
20:Halftone (clustered dot)
21:Bayer (dispersed dot)
22:Halftone 2 (clustered dot)

The default is Floyd-Steinberg.

perturbation:

0 through 127

The default is 0.

Comments

Dithering reduces the color banding in an image caused by the palette not having a perfect match for every color in the image.

Types 1 through 5 are all error-diffusion dithers. Types 1 and 5 are the fastest of the diffusion dithers, and they usually look the best on low resolution devices like CRTs. Types 2, 3, and 4 all tend to cause an image to appear more grainy on low resolution output devices (such as CRTs). However, they produce better results than types 1 or 5 on high-resolution, low color output devices such as laser printers or 1 bit CMYK plotters.

Type 22 is a digital halftone; this will produce the most accurate grays on a laser printer, but the image won't be as sharp as one produced by the error-diffusion dithers. Type 21 is a dispersed dot ordered dither; it's only advantage over the error-diffusion algorithms is speed. Type 20 is an additional halftone pattern. It's similar to type 22, but with a coarser screen.

The -d option only has an effect if the number of colors is being reduced or the image is being re-mapped to a new palette.

Specifying a perturbation adds noise to the image, which can help break up visible patterns introduced by dithering. The parameter specifies the magnitude of the noise. Perturbation has no effect on dither types 20, 21, and 22.

Using a serpentine raster can also help to reduce visible patterns introduced by dithering. Using a serpentine raster has no effect on dither types 20, 21, and 22.

In general we use `-d1` when converting 24 bit images to 8 bit paletted, and `-ds3` when converting color images to black and white and 1 bit CMYK (for sending to a laser printer or plotter).

Examples

Convert the 256 color file image.gif to a 16 color PCX file using a uniform palette and no dithering:

```
alchemy image.gif -p -c16 -d0 -u
```

Convert the true color image sample.jpg into a 256 color GIF file called sample.gif, using Stucki dithering:

```
alchemy sample.jpg -g -d2
```

Convert the 256 color image sample.gif into a one bit black and white PCL file called sample.pcl, using Jarvis, Judice, and Ninke dithering, a serpentine raster, and a little noise:

```
alchemy sample.gif -P -b -c2 -ds3 20
```

EGA Palette -E

Purpose

Optimize the image quality for display on an EGA board and monitor.

Syntax

-E

Comments

If you are converting images to display on an EGA board and monitor this option will optimize the image quality.

This option reduces the palette resolution to two bits and automatically specifies the following: `-8 -c16 -z0 2 0`.

Limitations

The number of colors in an EGA palette must be less than or equal to 16; the number of colors defaults to 16 but can be reduced by using the -c option.

Related options

-c specify number of colors

Example

Convert the image dave1.tga into dave1.pcx, a PCX file with a palette optimized for EGA use:

```
alchemy dave1.tga -E -p
```

False Color -F

Purpose

False color an image using the palette from a file. The input image will be changed to use the palette found in the specified filename but no attempt at picking the best match will be done.

Syntax

-F *filename*

Parameter

filename:
Any valid image file which contains a palette.

Comments

This feature can be used to add false color to monochrome images.

The output file is not dithered.

False color may only be used with paletted input files.

Limitations

Cannot be combined with the spiff (-S) or match palette (-f) options.

Related options

-f match palette

Example

False color the file scan.gif using the palette from the file colorful.pcx, creating the GIF file new.gif:

```
alchemy scan.gif new -F colorful.pcx -g
```

Gamma Correction -G

Purpose

Specify the gamma of an input, output, or palette file and/or perform gamma correction.

Syntax

-G *gammaType gammaValue*

Parameters

gammaType:

i:Specify input gamma
o:Specify output gamma
p:Specify gamma of palette

gammaValue:

0.1 to 10.0

Comments

Gamma correction can be used to compensate for dot gain when generating a file that will be printed on an inket or laser printer. Dot gain occurs because each dot that is placed on the paper is actually round, and in order to completely fill in a square grid with round pixels the round pixels have to be larger than the square. This allows black areas to appear as solid black; however it also causes gray areas to appear darker than they should. See Appendix A for a more complete discussion of dot gain.

A good starting place when using Gamma Correction to correct for dot gain is to specify an input gamma of 1.0 and an output gamma of 2.0. If the image appears to light on the page decrease the output gamma, if it is too dark increase the output gamma.

To perform gamma correction, Alchemy needs to know both the input and output gamma. For some file formats the gamma is known; if you're reading a file with known gamma, such as JPEG, PICT, PCPAINT, or a Targa file with a gamma field, you don't need to specify the input gamma. Likewise, if you're writing a file which has a fixed gamma you don't need to specify an output gamma. Even if reading or writing a file format which has a known gamma you may override it by using the -Gi or -Go option.

Even if both input and output gamma are known based on the input file and the output format, you must still enable gamma correction for any correction to take place; you can do this with just '-G' (if you had specified input, output, or palette gamma, this would be implied). This is because there are quite a few images around that have specified or implied gammas that are wrong, which would cause Alchemy to make matters worse instead of better if gamma correction was always enabled.

Typical gamma values are 1.0 for images from Macintoshes and 2.2 for images from PCs.

Related options

---y Brightness Adjustment
---Y Contrast Adjustment

Examples

To convert the Mac PICT file test.pic, which has a gamma of 1.0, to a PCX file for use on a PC (which should have a gamma of 2.2), use:

```
alchemy test.pic -p -Gi1.0 -Go2.2
```

To convert the file image.tga, which has a gamma of 2.2, to a GIF file for use on a Mac, matching the palette test.pal which was created with a gamma of 1.5:

```
alchemy image.tga -g -Gi2.2 -Go1.0 -Gp1.5
   -ftest.pal
```

Match Palette -f

Purpose

Match the output to a palette read from a file. The input image will be re-mapped to use the palette found in the specified file.

Syntax

-f *filename*

Parameter

filename:
Any valid image file which contains a palette

Comments

Using the -f option will cause the output image to be dithered (unless you specify no dithering by using the -d0 option).

The -f option can be useful if you are combining several images into a collage or want to match an image to a pre-existing palette. You can also create a custom palette from scratch by using a text editor and creating a .PAL file.

Limitations

Cannot be combined with the spiff option (-S) or the false color option (-F).

The number of colors in the final image will be equal to the number of colors in the palette being read in.

The specified file must contain a palette (i.e. cannot be true color).

Related options

-l Generate palette file
-F False color
-d Dither

Examples

Convert the image bigimage.tif to a pcx file using the palette from the file standard.pal:

```
alchemy bigimage.tif -p -f standard.pal
```

Convert the image color.gif to a gif file called color2.gif using the palette from the file newpal.gif:

```
alchemy color.gif color2 -fnewpal.gif -g
```

Negate -N

Purpose

Changes the image to a negative.

Syntax

-N

Comments

This option is equivalent to a photographic negative. When used on black and white images black is changed to white and white is changed to black. On color images each of the Red, Green, and Blue channels are inverted separately (so that bright blue will become bright yellow).

Example

Negate the file sample.gif, generating a GIF file called negative.gif:

```
alchemy sample.gif negative -N -g
```

Palette -8

Purpose

Force the output image to be paletted.

Syntax

-8

Comments

This option is -8 because paletted images are typically 8 bits per pixel.

Alchemy defaults to the -8 option if the input file is paletted or gray-scale.

Some file formats require files to be paletted; for those formats the -8 option is assumed. Some file formats do not have a paletted variation; in those cases the -8 option will be ignored if specified. Some file formats only allow gray-scale files to be 8 bit; in those cases Alchemy will ignore the -8 option if the image being written is not gray-scale.

The actual number of bits per pixel is determined by the -c option (below).

If the input file is true color the output file will be quantized and dithered (see the -c and -d options below).

Related options

-15 True color output
-16 True color output
-24 True color output
-32 True color output
-c specify number of colors in image
-d dither

Examples

Convert the JPEG file bigimage.jpg into a paletted TIFF file with 256 colors:

```
alchemy bigimage.jpg -8 -t
```

Convert the Targa file madonna.tga to a 16 color PCX file (note that the -8 option is implied by the use of the -c16 option):

```
alchemy madonna.tga -c16 -p
```

Palette Selection: Heckbert Tuning -zh

Purpose

Select the specific Heckbert quantization method to use.

Syntax

-zh *heckbertType*

Parameters

heckbertType:
0:Method 0
1:Method 1
2:Method 2
3:Method 3
The default is Method 0.

Comments

The default Heckbert quantization method produces good results for most images; however, you may find the results are better for your images using one of the other methods. This may be especially true when reducing images to a small number of colors (in this case method 1 will probably produce better results).

Image Alchemy v1.7.7 and earlier used Heckbert quantization method 2. To produce images identical to those versions use -zh2 on the command line.

Example

Convert the file input.tga to a gif filed called output.gif with 16 colors, using Heckbert Method 1 for the color reduction.

```
alchemy input.tga output.gif -g -zh 1 -c16
```

Palette Selection: Palette Selection -zp

Purpose

Alter the method which Heckbert quantization uses to select colors.

Syntax

-zp *selectionType*

Parameters

selectionType:
0:Mean
1:Median
2:Corner
The default is Mean.

See Appendix B, Color and Dithering, for an explanation of these choices.

Comments

See Appendix B.

Example

Convert the file sample.jpg to a GIF file, using the corners of the Heckbert boxes to select the palette entries:

```
alchemy sample.jpg -zp 2
```

Palette Selection: Palette Sorting -zo

Purpose

Sort the colors in the palette produced by Alchemy

Syntax

-zo *sortType*

Parameters

sortType:

0:None
1:Popularity
2:Luminance (lightest to darkest)
3:RGB
4:Luminance (darkest to lightest)

The default is None.

Comments

This option only affects palettes that are generated by Image Alchemy. To sort an existing palette you can save the image as a true color file (such as HSI Raw), by using the -24 -r options, and then convert that back to a paletted file, specifying the desired sort type. In most cases this will not change the image (other than the palette order); however if the palette had entries representing colors that are nearly identical then the image may be slightly modified. See the Example section below for an example.

Examples

Convert the image sample.jpg to a GIF file, sorting the palette by Luminance (lightest colors first):

```
alchemy sample.jpg -g -Zo 2
```

Sort the colors by Luminance (darkest colors first) in the paletted image test1.gif:

```
alchemy test1.gif -r -24
alchemy test1.raw test1.gif -g -zo 4 -o
```

Palette Selection: Palette Swapping -zs

Purpose

Force certain colors to be in certain places when generating a palette.

Syntax

-zs *swapType*

Parameters

swapType:

0:None
1:IBM (color 0 is black, 7 is white)
2:Macintosh (color 0 is white, 255 is black)
3:Sun (color 0 is white, 1 is black)

The default is based on the file type being written out (Macintosh for Mac PICT, Sun for Sun Raster, and None for all others).

Comments

This option forces black and white to be located in certain places in the palette. This is primarily useful when displaying images on certain hardware which uses black and white to display menus and other information.

Example

Generate a GIF file which has black at color 1 and white at color 0:

```
alchemy sample.jpg -g -zs 3
```

Palette Selection: Palette Weighting -zw

Purpose

To select between different types of palette weighting.

Syntax

-zw[*weightingType*]

Parameter

weightingType:
0:NTSC
1:Equal
The default is NTSC weighting.

Comments

NTSC palette weighting places the highest importance on green and the lowest importance on blue when mapping images to a palette. Equal palette weighting places equal importance on red, green and blue when mapping images to a palette.

Examples

Convert sample.jpg into GIF format using equal palette weighting.

```
alchemy sample.jpg -zw1
```

Preserve Palette While Scaling ---f

Purpose

Keep the original palette when scaling paletted images.

Syntax

---f

Comments

When using type 'b' or better scaling on paletted images Alchemy has to convert the image to true color as part of the scaling process and then convert the image back to paletted before saving. Ordinarily the best results are obtained if Alchemy is allowed to choose the final palette based on the scaled image content. However there may be times when you wish to preserve the original palette instead of generating a new one. This option does that.

Examples

Scale the gif file flowers.gif to 320 x 200, preserving the original palette and aspect ratio:

```
alchemy flowers.gif new.gif -g ---f -Xb320
-Yb200 -+
```

Scale all the files ending in .gif to 320 x 200, preserving the original palette and aspect ratio, placing the new files in the directory new:

```
alchemy *.gif new -g ---f -Xb320 -Yb200 -+
```

Spiff -S

Purpose

Enhance the image contrast by stretching the pixel color values to the full 0 to 255 range.

Syntax

-S *spiffType*

Parameter

spiffType:

a:Histogram stretching
b:Histogram linearization
c:Histogram stretching with black and white ignored

The default is Histogram stretching.

Comments

This command can be used if the image you are converting is shifted in brightness or squished in contrast. This can happen if you scan or digitize a very dark or very bright image.

The default type, histogram stretching, simply insures that the image has pixels which are distributed over the entire output range (0 to 255).

Histogram linearization insures that the distribution of pixels over the output range is linear.

Type c spiffing is identical to type a spiffing except that the colors absolute black and absolute white are ignored in the image. This is useful when you have images which have black borders or white captions, since type a spiffing would treat these as part of the image data and not perform any spiffing.

Histogram linearization can produce significantly better results than histogram stretching for some images. Generally you will want to try both types to see which gives better results.

Limitations

The -S option cannot be used at the same time as the -b option when converting from a true color image. A work around is to do the operation in two steps, converting it to black and white first and then spiffing the resulting image.

Using the spiff option at the same time as the match palette, -f, or false color, -F, options is not allowed. This is because the spiff option would be performed before the palette is changed, which would nullify the effects. A work around is to do the matching or false coloring first, and then spiff the resultant image.

Related options

-b Black and White
-f Match palette
-F False color image
-H Histogram output option

Examples

Convert the file gloomy.pcx into a PCX file called better.pcx:

```
alchemy gloomy.pcx better.pcx -S -p
```

Do the same thing using histogram linearization instead of histogram stretching:

```
alchemy gloomy.pcx better.pcx -Sb -p
```

Swap RGB --n

Purpose Swap the red channel with the blue channel.

Syntax --n

Comments This option is usually only needed if you have an incorrectly written file or are writing a file which will be read by a broken file reader.

Example Convert the Targa file wrong.tga to another Targa file called right.tga, swapping the red and blue channels:

```
alchemy wrong.tga right.tga -a --n
```

Transparency ---t

Purpose

Specify which color in the output image is considered to be transparent. Note that transparency is only supported by certain file formats.

Syntax

---t [*red green blue*]

Parameters

red green blue:

Specifies the color to use for the transparent color (0 0 0 is black, 255 255 255 is white). The default is 255 255 255 (white).

Comments

Only supported by GIF89A and PNG. See those file formats for more information. If the source file has a transparent color it is now preserved during conversion unless a new transparent value is defined.

Examples

Convert the image logo.tif to a GIF file, specifying white as the transparent color:

```
alchemy logo.tif -g1 ---t
```

Convert the image logo.tif to a GIF file, specifying black as the transparent color:

```
alchemy logo.tif -g1 ---t 0 0 0
```

Do the same thing, this time using red as the transparent color:

```
alchemy logo.tif -g1 ---t 255 0 0
```

Check to see if logo.gif has a transparent color.

```
alchemy logo.gif -x1
```

True Color (15 bits) -15

Purpose

Force the output image to be true color, 15 bits (5 bits per component).

Syntax

-15

Comments

See the True Color (24 bits) section, below.

Related options

-8 Paletted output
-16 True color output (16 bits)
-24 True color output (24 bits)
-32 True color output (32 bits)

Example

Convert the GIF file test.gif into an uncompressed, true color 15 bit Targa file called test.tga:

```
alchemy test.gif -a0 -15
```

True Color (16 bits) -16

Purpose

Force the output image to be true color, 16 bits (5 bits each for red and blue, 6 for green).

Syntax

-16

Comments

See the True Color (24 bits) section, below.

Related options

-8 Paletted output
-15 True color output (15 bits)
-24 True color output (24 bits)
-32 True color output (32 bits)

Example

Convert the GIF file test.gif into an uncompressed, true color 16 bit Targa file called test.tga:

```
alchemy test.gif -a0 -16
```

True Color (24 bits) -24

Purpose

Force the output image to be true color, 24 bits (8 bits per component).

Syntax

-24

Comments

This option is -24 because true color images are typically 24 bits per pixel.

Some file formats require files to be true color; for those formats the -24 option is assumed. Some file formats only have a paletted variation; in those cases the -24 option will be ignored if specified.

The file formats which may be either true color or paletted default to true color if the input file is true color.

Certain file formats may only be paletted if the images are gray-scale, in those cases Alchemy will automatically switch to true color if the output image is color.

Converting a paletted image to true color will not improve its quality or change its appearance. The primary use of this option is to force an image to be true color when converting to a format which allows either paletted or true color, but where the paletted variation is not well supported (like the Targa image format).

If the file format you are converting to does not have a 24 bit mode the closest true color mode available will be chosen, in the following order: 32 bit, 16 bit, 15 bit.

Related options

-8 Paletted output
-15 True color output (15 bits)
-16 True color output (16 bits)
-32 True color output (32 bits)

Example

Convert the GIF file test.gif into an uncompressed, true color Targa file called test.tga:

```
alchemy test.gif -a0 -24
```

True Color (32 bits) -32

Purpose

Force the output image to be true color, 32 bits (8 bits per component, 8 bits for the alpha channel).

Syntax

-32

Comments

See the True Color (24 bits) section, above.

Related options

-8 Paletted output
-15 True color output (15 bits)
-16 True color output (16 bits)
-24 True color output (24 bits)

Example

Convert the GIF file test.gif into an uncompressed, true color 32 bit Targa file called test.tga (the alpha channel will be empty):

```
alchemy test.gif -a0 -32
```

Uniform Palette -u

Purpose

Use a Uniform Palette.

Syntax

-u [*paletteType*]

Parameter

paletteType:
1:Unevenly weight palette
2:Netscape 216 color (6:6:6) palette
The default is 1.

Comments

Instead of using the Heckbert median cut algorithm to generate a custom palette for the image, use a palette with entries which are evenly distributed in the RGB color cube.

The advantage of using a uniform palette is that it's faster than generating a custom palette. However, this is at the expense of image quality since the palette isn't generated based on image content.

Using the Netscape palette will optimize the display of images on the WWW, both for quality and speed.

When just viewing a true color image on a paletted display a uniform palette is used.

The -c option can be used in conjunction with -u to specify the size of the uniform palette; in that case Alchemy will generate a palette with not more than the specified number of colors (but not less than 8).

Limitations

The palette size will not necessarily match the specified size for type 0 uniform palettes, as the actual size must be the product of three integers. Alchemy picks integers that roughly correspond to the sensitivity of the human eye to red, green, and blue (30%, 59%, and 11%).

Related options

-c Specify number of colors
-d Dither type

Examples

Convert the file many.tga to a gif file using a 256 color uniform palette:

```
alchemy many.tga -g -u
```

Convert the file many.tga to a gif file with up to 128 colors in a uniform palette:

```
alchemy many.tga -g -u -c128
```

Convert the file many.tga to a gif file using the Netscape palette:

```
alchemy many.tga -g -u 2
```

8

Scaling and Filtering Options

Introduction

These options are all related to image scaling and filtering.

Center Image --_

Purpose

The center image option changes the position of the image on the page. It only affects printer and plotter formats.

Syntax

--_ *xSize*[*units*] *ySize*[*units*] (underscore)

Parameter

xSize:
The width of the page.

ySize:
The height of the page.

units:
The units each size parameter is in:
p:pixels
i:inches
c:centimeters
units is optional; the default is pixels. The units value must immediately follow the appropriate size parameter.

Comments

To only center the image in one dimension use 0 for the dimension that you do not want centered (this is useful when you have roll paper loaded into your ink jet plotter).

Limitations

Only works for those output options that support centering. These are Fargo, Epson, Spaceward, Sharp GPB, Imaging Technology, Pixel Power Collage, Mimaki, Raster Graphics, Alps, Calcomp, EPS, Fargo, HP PCL, and HP RTL.

If you specify the page size in inches or centimeters you must also specify a dots per inch value.

Can be used in conjunction with offset image to offset the image from the center of the page.

Related options

-_ Offset image

Example

Convert the image temp.gif to an HP PCL file at 300 dpi, centering it on the page:

```
alchemy temp.gif -P50 --_ 8.5i 11i -D300
300
```

Change Image Resolution --y

Purpose

Change the image resolution (see the comments section below for a more detailed explanation).

Syntax

--y[*scaleType*] *dotsPerInchX dotsPerInchY*

Parameters

scaleType:

The type of scaling to use:

a:Nearest Neighbor
b:Averaging/Linear Interpolation
c:Lanczos2
d:Lanczos3

scaleType is optional; the default is Nearest Neighbor. The higher the scale type the higher the quality (and the longer the processing time).

dotsPerInchX:

The resolution of the image in the X direction, in dots per inch.

dotsPerInchY:

The resolution of the image in the Y direction, in dots per inch.

Comments

Changing the resolution of an image is a combination of changing the image dpi and the image size (in pixels). For example, if you print an image which was scanned at 600 dpi on a 300 dpi laser printer the printed image would ordinarily be twice the size of the original image. You could use Alchemy to scale the image a proportional amount (using, in this case, `-X 0.5x -Y 0.5x -D300 300`), but this method requires you to calculate the scale factor (0.5, in this case). Changing the image resolution does this for you.

Nearest neighbor type scaling is faster than the other types but introduces aliasing (which reduces image quality). The highest quality scaling supported is lanczos3, but it takes much longer than averaging/linear interpolation and usually doesn't produce significantly better results.

If the dpi information in the input file is missing or incorrect you can supply a dpi value using the -D option.

Related options

-X Scale in horizontal dimension
-Y Scale in vertical dimension
-D Specify image resolution

Examples

Convert a TIFF file that was scanned at 400 dpi to a 300 dpi PCL file, preserving the size of the image:

```
alchemy image.tif -P --y 300 300
```

Convert a GIF file, which was designed to be viewed on a 72 dpi monitor to a GIF file which will look the same size on a 100 dpi monitor, using medium quality scaling (we use the -D 72 72 option because the original GIF file does not contain that information):

```
alchemy orig.gif new.gif -g -D 72 72
   --yb 100 100
```

Convolve Image -yf

Purpose

Applies any one of a number of convolutions to an image (such as sharpen or blur).

Syntax

-yf *filename*

Parameter

filename:
The name of the file which contains the convolution information

Comments

The various convolutions that ship with Image Alchemy are found in the samples\ directory. Additional convolutions are available from our server at http://www.handmade.com/conv.

Examples

Convert the TIFF file image.tif to a TIFF file called new.tif, sharpening it in the process:

```
alchemy image.tif new.tif -t -yf
samples\sharpen
```

Convert the TIFF file image.tif to an HP RTL file for the NovaJet, scaling it to 2500x2550 and blurring it:

```
alchemy image.tif --r10 -yf samples\blur
-X2500 -Y2550
```

Flip Image -^

Purpose

Flip image vertically (turn image upside-down).

Syntax

-^ (caret)

Comments

Causes the image to be turned upside-down.

May be combined with the mirror image option (see below) to cause the image to be rotated 180 degrees.

Related options

--^ Mirror image

Example

Convert the Targa file head.tga to another Targa file called tail.tga:

```
alchemy head.tga tail.tga -a -^
```

Mirror Image --^

Purpose Flip image horizontally (mirror image).

Syntax --^ (caret)

Comments Causes the image to be mirrored.

May be combined with the flip image option (see above) to cause the image to be rotated 180 degrees.

Related options -^ Flip image

Example Convert the Targa file left.tga to another Targa file called right.tga:

```
alchemy left.tga right.tga -a --^
```

Offset Image -_

Purpose

The offset image option changes the position of the image on the page. It only effects printer and plotter formats.

Syntax

-_ *xOffset*[*units*] *yOffset*[*units*] (underscore)

Parameter

xOffset:
The amount to shift the image horizontally.

yOffset:
The amount to shift the image vertically.

units:
The units each size parameter is in:
p:pixels
i:inches
c:centimeters
units is optional; the default is pixels. The units value must immediately follow the appropriate offset parameter.

Comments

The offset is measured from the upper left corner for Calcomp, HP PCL, and HP RTL files and from the lower left corner for EPS files.

Can be used in conjunction with center image to offset the image from the center of the page.

Limitations

Only works for those output options that support an offset. These are Fargo, Epson, Spaceward, Sharp GPB, Imaging Technology, Pixel Power Collage, Mimaki, Raster Graphics, Alps, Calcomp, EPS, Fargo, HP PCL, and HP RTL.

If you specify the offset in inches or centimeters you must also specify a dots per inch value.

Related options

--_ Center image

Example

Convert the image temp.gif to an HP PCL file at 300 dpi, positioning it on the page 1 inch from the top and 200 pixels from the left:

```
alchemy temp.gif -P -_ 200 1i -D300 300
```

Only Scale If Too Large --+

Purpose

Causes Alchemy to only scale images down.

Syntax

-- +

Comments

This command can be useful if you have a variety of images and want to scale them all to be no larger than a certain size. If this command is not used all of the images that are smaller will be scaled up.

Example

Scale all the GIF files in the current directory to be no larger than 640 x 480, preserving aspect ratio and placing the output files in the directory called new:

```
alchemy -- *.gif new -Xb640 -Yb480 -+ --+
-g
```

Only Scale If Too Small ---+

Purpose

Causes Alchemy to only scale images up.

Syntax

---+

Comments

This command can be useful if you have a variety of images and want to scale them all to be no smaller than a certain size. If this command is not used all of the images that are large will be scaled up.

Example

Scale all the GIF files in the current directory to be no smaller than 640 x 480, preserving aspect ratio and placing the output files in the directory called new:

```
alchemy -- *.gif new -Xb640 -Yb480 -+ ---+
-g
```

Preserve Aspect Ratio -+

Purpose

Preserve aspect ratio when scaling.

Syntax

-+

Comments

If specified with either the -X or -Y option Alchemy will choose the other dimension to preserve the aspect ratio of the image.

If specified in conjunction with both -X and -Y Alchemy will use the values specified as a bounding box, reducing one dimension if necessary to preserve the image aspect ratio.

Limitations

Does not pay attention to the pixel aspect ratio values in the input image.

Related options

-X Scale image in horizontal dimension
-Y Scale image in vertical dimension

Examples

Change the size of the image toobig.gif so that the width is 640 and the height is the correct number to preserve the aspect ratio of the image (the new image will be called new.gif):

```
alchemy toobig.gif new -X640 -+ -g
```

Do the same thing but guarantee that the image will not be larger than 640 by 480:

```
alchemy toobig.gif new -X640 -Y480 -+ -g
```

Do the same thing but use better quality scaling:

```
alchemy toobig.gif new -Xb640 -Yb480 -+ -g
```

Preserve Palette While Scaling ---f

Purpose

Keep the original palette when scaling paletted images.

Syntax

---f

Comments

When using type 'b' or better scaling on paletted images Alchemy has to convert the image to true color as part of the scaling process and then convert the image back to paletted before saving. Ordinarily the best results are obtained if Alchemy is allowed to choose the final palette based on the scaled image content. However there may be times when you wish to preserve the original palette instead of generating a new one. This option does that.

Examples

Scale the gif file flowers.gif to 320 x 200, preserving the original palette and aspect ratio:

```
alchemy flowers.gif new.gif -g ---f -Xb320
-Yb200 -+
```

Scale all the files ending in .gif to 320 x 200, preserving the original palette and aspect ratio, placing the new files in the directory new:

```
alchemy *.gif new -g ---f -Xb320 -Yb200 -+
```

Scale Image in Horizontal Direction -X

Purpose

Scale the horizontal dimension of the image to the specified size.

Syntax

-X[*scaleType*] *size*[*units*]

Parameters

scaleType:

The type of scaling to use:

a:Nearest Neighbor
b:Averaging/Linear Interpolation
c:Lanczos2
d:Lanczos3

scaleType is optional; the default is Nearest Neighbor. The higher the scale type the higher the quality (and the longer the processing time).

size:

The size of the output image in the horizontal dimension.

units:

The units the size parameter is in:

p:pixels
i:inches
c:centimeters
x:factor

units is optional; the default is pixels. The units value must immediately follow the size parameter.

Comments

Nearest neighbor type scaling is faster than the other types but introduces aliasing (which reduces image quality). The highest quality scaling supported is lanczos3, but it takes much longer than averaging/linear interpolation and usually doesn't produce significantly better results.

Specifying a units value of `x` causes the size parameter to be treated as a scale factor; e.g. `-X 2.5x` scales the image by a factor of 2.5 in the X direction.

If you specify a units for the image size in inches or centimeters you must specify a dots per inch value for the output image.

Limitations

All of the scale types other than nearest neighbor give much better results than nearest neighbor scaling, but they are slower and require a new palette to be generated for paletted output files (you can force Alchemy to use the original palette by using the -f option and specifying the original image as the palette file or using the ---f option).

Related options

-Y Scale in vertical dimension
-+ Preserve aspect ratio
-D Specify image resolution

Examples

Scale the input image, test.gif, to 640 by 480 using good quality scaling, calling the output file test2.gif:

```
alchemy test.gif test2.gif -Xb640 -Yb480
   -g
```

Scale the input image, big.tga, using fast scaling to an image which is 320 pixels across and the same aspect ratio as the input image, calling the output file out.tga:

```
alchemy big.tga out -X320 -+ -a
```

Scale the input image, oddsize.gif, using the highest quality scaling, to an image which is no larger than 640x480, but has the same aspect ratio as the original image, calling the output image new.gif:

```
alchemy oddsize.gif new.gif -Yd480 -Xd640
   -+ -g
```

Do the same thing as the previous example, but retain the same palette:

```
alchemy oddsize.gif new.gif -Yd480 -Xd640
   -+ -g -f oddsize.gif
```

Scale the input image, test.gif, to 2.5 times its original size in both dimensions using good quality scaling, calling the output file test2.gif:

```
alchemy test.gif test2 -Xb2.5x -Yb2.5x -g
```

Scale the input image, silly.tga, to 1/3 its original size in the X dimension and 1/4 the original size in the Y dimension, using low quality scaling in the X dimension and very high quality scaling in the Y dimension, calling the output file test.tga:

```
alchemy silly.tga test -a -Xa.33x -Yd0.25x
```

Scale, using type b scaling, the input image, test.jpg, to 3" x 4.5" inches writing a 300 dpi HP PCL file:

```
alchemy test.jpg -P -Xb3i -Yb4.5i
   -D300 300
```

Print all JPEG images in the current directory to an HP LaserJet at 300 dpi, using dither type 22, scaling the images to fill the page and preserving aspect ratio (we use 8.16" x 10.66" inches as the printable area since the printer has a 1/6" border on all four edges):

```
alchemy -- *.jpg -P -Xb8.16i -Yb10.66i -+
   -D300 300 -d22
```

Scale Image in Vertical Direction -Y

Purpose

Scale the vertical dimension of the image to the specified size.

Syntax

-Y[*scaleType*] *size*[*units*]

Parameters

scaleType:

The type of scaling to use:

a:Nearest Neighbor
b:Averaging/Linear Interpolation
c:Lanczos2
d:Lanczos3

scaleType is optional; the default is Nearest Neighbor. The higher the scale type the higher the quality (and the longer the processing time).

size:

The size of the output image in the vertical dimension.

units:

The units the size parameter is in:

p:pixels
i:inches
c:centimeters
x:factor

units is optional; the default is pixels. The units value must immediately follow the size parameter.

Comments

Nearest neighbor type scaling is faster than the other types but introduces aliasing (which reduces image quality). The highest quality scaling supported is lanczos3, but it takes much longer than averaging/linear interpolation and usually doesn't produce significantly better results.

Specifying a units value of `x` causes the size parameter to be treated as a scale factor; e.g. `-Y 2.5x` scales the image by a factor of 2.5 in the Y direction.

If you specify a units for the image size in inches or centimeters you must specify a dots per Inch value for the output image.

Limitations

All of the scale types other than nearest neighbor give much better results than nearest neighbor scaling, but they are slower and require a new palette to be generated for paletted output files (you can force Alchemy to use the original palette by using the -f option and specifying the original file name or using the ---f option).

Related options

-X Scale in horizontal dimension
-+ Preserve aspect ratio
-D Specify image resolution

Examples

See the -X option, Scale Image in Horizontal Direction, above, for examples.

Set Horizontal DPI --X

Purpose

Change the horizontal dpi of an image to a value based on the specified final image size (e.g. if you have an image which is 100 pixels across and you specify 5 inches this command sets the horizontal dpi to 20).

Syntax

--X *size*[*units*]

Parameters

size:

The size of the output image in the horizontal dimension.

units:

The units the size parameter is in:

i:inches

c:centimeters

units is optional; the default is inches. The units value must immediately follow the size parameter.

Comments

This command is similar to the -D command, except that the dpi value is set based on the size specified and the number of pixels in the image.

To set the vertical dpi use the --Y command (described below).

If you want to preserve the aspect ratio in the image use the -+ command. Using both the --Y and -+ commands will cause the dimensions given to be treated as a bounding box.

Related options

`--Y` Set Vertical DPI

`-+` Preserve aspect ratio

Examples

Set the horizontal dpi value so that the image test.tif is converted to an EPS file that will be 5 inches across when printed:

```
alchemy test.tif -e --X 5i
```

Do the same thing, but preserve the aspect ratio (so the vertical dpi will be set to the same value as the horizontal dpi):

```
alchemy test.tif -e --X 5i -+
```

Do the same thing, but set the vertical size to 6 inches, this will cause the 5 in x 6 in dimension to be treated as a bounding box:

```
alchemy test.tif -e --X 5i --Y 6i -+
```

Set Vertical DPI --Y

Purpose

Change the vertical dpi of an image to a value based on the specified final image size (e.g. if you have an image which is 125 pixels down and you specify 5 inches this command sets the vertical dpi to 25).

Syntax

--Y *size*[*units*]

Parameters

size:

The size of the output image in the vertical dimension.

units:

The units the size parameter is in:

i:inches

c:centimeters

units is optional; the default is inches. The units value must immediately follow the size parameter.

Comments

This command is similar to the -D command, except that the dpi value is set based on the size specified and the number of pixels in the image.

To set the horizontal dpi use the --X command (described above).

If you want to preserve the aspect ratio in the image use the -+ command. Using both the --Y and -+ commands will cause the dimensions given to be treated as a bounding box.

Related options

`--X` Set Horizontal DPI
`-+` Preserve aspect ratio

Examples

Set the vertical dpi value so that the image test.tif is converted to an EPS file that will be 5 inches high when printed:

```
alchemy test.tif -e --Y 5i
```

Do the same thing, but preserve the aspect ratio (so the horizontal dpi will be set to the same value as the vertical dpi):

```
alchemy test.tif -e --Y 5i -+
```

Do the same thing, but set the horizontal size to 6 inches, this will cause the 6 in x 5 in dimension to be treated as a bounding box:

```
alchemy test.tif -e --X 6i --Y 5i -+
```

Specify Image Aspect Ratio -D

Purpose

Specify aspect ratio for the output image.

Syntax

-D *aspectRatio*

Parameter

aspectRatio:
The percentage of the width of a pixel to its height.

Comments

This option does not actually change the aspect ratio of the image, it just adds the aspect ratio value to the output file. This is important when trying to export the image to software which expects this information.

The aspect ratio of an image is the ratio of the width of a single pixel to the height of a single pixel. (So to specify an aspect ratio of 5:6 use -D 83, since (5/6)*100 is 83).

Alchemy attempts to preserve the aspect ratio value when converting images whenever one is found in the input image, but since so few file formats have aspect ratio information this hardly ever happens.

To write an output image without aspect ratio information specify an aspect ratio of 0 (zero).

This option also has an effect when using the MS-DOS version of Image Alchemy and displaying images.

Limitations

It is not possible to specify both an aspect ratio and a dots per inch value for an image. This is because specifying a dots per inch value implies an aspect ratio.

Many file types do not have an aspect ratio value; specifying one when writing such a file type will have no effect.

Related options

-D Specify resolution

Examples

You are converting a 640x350 IBM EGA PCX image called ega.pcx (which has an aspect ratio of 35:48) to a TIFF image and you want the TIFF image to have the correct aspect ratio value (so that an intelligent TIFF reader will correctly interpret the image). Note that the value of 73 is (35/48)*100:

```
alchemy ega.pcx -D 73 -t
```

The resulting image will still be 640x350, but the TIFF file now contains the information that the pixels are not square (and in fact are 35:48).

If you had instead wanted to convert the image to a 640 by 480 image (with square pixels) you could have used:

```
alchemy ega.pcx -Y480 -D100 -t
```

The -D option isn't really needed here, since any software reading the TIFF file will assume that if there is no aspect ratio specified the pixels are square.

Specify Image Resolution -D

Purpose

Specify image resolution in dots per inch for the output image.

Syntax

-D *dotsPerInchX dotsPerInchY*

Parameters

dotsPerInchX:
The resolution of the image in the X direction in dots per inch.

dotsPerInchY:
The resolution of the image in the Y direction in dots per inch.

Comments

You must specify both dotsPerInchX and dotsPerInchY, even if they are the same.

When converting from a raster file this command does not actually change the resolution of the image, it just adds the resolution fields to the output image. This is important when trying to import the image into software which expects this information. For example, Microsoft Word is much more likely to give the expected results when importing a TIFF image for printing on a laser printer if the image has a resolution of 300 dpi.

Reasonable values to use for dotsPerInch include 72 (the resolution of a 13 inch monitor displaying 640x480) and 300 (the resolution of many laser and inkjet printers).

To write an image without resolution information specify a resolution of 0 0 (zero zero).

Alchemy will preserve this information when converting files whenever possible.

Many file types do not have a resolution value, specifying one when writing such a file will only effect raster scaling functions when using the inches or centimeter output option.

This option also effects the MS-DOS version of Alchemy when displaying images.

Limitations

It is not possible to specify both an aspect ratio and a dots per inch value for an image. This is because specifying a dots per inch value automatically implies an aspect ratio.

This option is ignored when writing a file format which does not have image resolution.

Many file formats that are associated with output devices, such as HP PCL or ALPS, only support certain resolutions (for example an HP PCL file cannot have a resolution of 500 DPI). In these cases writing a file with an unsupported resolution will give unpredictable results.

Related options

-D Specify aspect ratio

Examples

Convert the Targa file input.tga to a TIFF file called output.tif, specifying that the resolution of the image in the TIFF file is 300 dpi:

```
alchemy input.tga output -t -D 300 300
```

Convert the file scan.tif to a DCX variation of a PCX file, scaling the output image to 1500 by 750 (preserving the image's aspect ratio) and setting the resolution to 200 dpi by 100 dpi (this is useful if you will be faxing the image using a fax card):

```
alchemy scan.tif -p1 -X1500 -Y750 -+
-D 200 100
```

9

Viewing Options

MS-DOS Only

Introduction

Image Alchemy is primarily designed as an image file conversion utility but it can also display images on properly equipped MS-DOS based computers.

Using wildcards or multiple file names allows you to display a series of images. After each image is displayed, pressing the space bar will skip to the next image. After the last image is displayed pressing the space bar will return to DOS. Pressing the space bar while an image is being displayed will stop the display of the image (see the Actions during viewing section below for other things you can do while displaying images).

Display hardware

Depending on the hardware you have installed, Alchemy supports the following display resolutions: 640x480, 800x600, 1024x768, and 1280x1024.

Also depending on the hardware, Alchemy supports the following display depths: 8 bit, 15 bit, 16 bit, and 24 bit (for 256, 32768, 65536, and 16,777,216 colors, respectively).

In addition, Alchemy supports the standard VGA mode of 320x200x256, the quasi-standard VGA mode of 360x480x256, and the common SVGA mode of 640x400x256.

When instructed to display an image, Alchemy automatically detects which type of display board you have installed. If there are multiple display boards installed in your computer then Alchemy will display images on the first board it finds, searching in the following order:

Western Digital based 8514/A board
AI compatible 8514/A board
XGA board
VESA compatible SVGA board
Other SVGA board

Western Digital 8514/A

8514/A boards which are equipped with the Western Digital chipset are automatically recognized by Alchemy. Depending on the model board and the amount of memory installed, 640x480x256, 1024x768x256, and 1280x1024x256 modes are available.

AI 8514/A

Alchemy requires AI to be installed to use 8514/A displays which aren't based on the Western Digital chipset. In addition to 8514/A boards Alchemy should also be able to display on other AI compatible boards, such as 340x0 based boards; however this has not been tested. For AI based boards the only resolution available is 1024x768x256.

XGA

Alchemy automatically detects the presence of an XGA or XGA2 board and will use it when displaying images. The display modes available for XGA boards are 640x480x256, 1024x768x256, and 640x480x65536 (the actual modes available vary with the model XGA board installed and the amount of memory available).

VESA

The best support for SVGA boards is available for VESA compatible SVGA boards. VESA is an SVGA standard which allows application software, such as Image Alchemy, to interrogate the SVGA board to determine which display modes are available.

Some SVGA boards have VESA support built directly into the BIOS found on the board; in this case Alchemy will automatically detect the VESA driver and use it. Other SVGA boards require a software driver to be installed; these drivers are usually found on the floppy disks which came with your SVGA board (typically the driver is called VESA.EXE).

If you can't find a driver on the diskettes and the documentation does not explicitly mention that VESA support is built into the BIOS you might call the manufacturer to see if a VESA driver is available.

VESA drivers are currently available for SVGA boards using chipsets from Cirrus Logic, ATI Technologies, Chips and Technologies, Everex Systems, Genoa Systems, Paradise Logic, Sigma Designs, STB Systems, Tecmar, Headland Technology (Video 7), Orchid Technology, Appian Technology, Trident Microsystems, and Oak Technology.

Other SVGA

If Alchemy cannot find a VESA SVGA board it attempts to determine what kind of SVGA board is present. If Alchemy can identify the type of SVGA board installed, either a 640x400x256 or 640x480x256 mode will be available.

SVGA boards which are known to work with Alchemy include Paradise, Tseng Labs 3000 & 4000, Video 7, Trident, and Everex chipset based SVGA Boards.

VGA

The 320x200x256 mode is a standard IBM VGA mode and will work on all VGA boards. The 360x480x256 is a non-standard VGA mode which should also work on all VGA boards.

Display Resolution

Unless you explicitly specify a resolution after the view command, Alchemy automatically uses the lowest resolution mode which will display the entire picture.

Alchemy can be told to not use above a particular resolution by setting the environment variable `alchemy` to the largest horizontal resolution to be used.

For example, if your monitor can only display up to 800x600 pixels, but your VESA compatible VGA board can display up to 1024x768 pixels. You would `set alchemy=800`, to insure that Alchemy won't try to use the 1024x768 mode. You may want to add this command to your `autoexec.bat` file, so that it is automatically set when your computer is turned on.

When an image is displayed that is smaller than the screen resolution the image will be centered in the display and the area around the image will be set to the darkest color in the image (which is usually black).

Wrong RGB order

There seem to be a number of SVGA boards that have the incorrect RGB order information in their VESA driver. You can correct for this problem while viewing by the using the swap RGB option (--n), see chapter 8 for more information.

Actions during viewing

While images are being viewed there are several actions that you can perform. These include: skipping to the next image (if you are using wildcards to view multiple images), marking the current image, and deleting the current image file. These actions can be useful if you are viewing a large number of images (such as you might have downloaded from a bulletin board).

These keys may be pressed either while the image is being displayed, or afterward, while Alchemy is waiting for a keystroke to go on to the next image (pressing any other key at that point will skip to the next image):

Key	Action
`q`	Quit viewing
`s`	Skip to next image
`m`	Mark the image
`alt-d`	Delete the image

A list of images that were marked is displayed after Alchemy finishes. If you redirect the output from Alchemy to a file, the file will contain a list of the images that were marked. This file can then be used with Alchemy as a response file.

For example, to view all of the GIF files in the current directory, redirecting the resulting list of any files that are marked to a file called list:

```
alchemy *.gif -v >list
```

If you then what to convert all of the marked files to TIFF files:

```
alchemy -- @list -t
```

See Chapter 2 for more information on response files.

Disabling actions

You can disable these keystrokes by setting the Alchemy environment variable to k (e.g. `set alchemy=k` at the DOS prompt).

Offset View -_

Purpose

The offset view option changes the position of the image on the screen during viewing.

Syntax

-_ *xOffset yOffset* (underscore)

Parameter

xOffset:
Number of pixels to shift the image horizontally.

yOffset:
Number of pixels to shift the image vertically.

Examples

View moving the image up 100 pixels:

```
alchemy madonna.gif -v -_ 0 -100
```

View moving the image to the right 200 pixels and down 50 pixels:

```
alchemy madonna.gif -v -_ 200 50
```

Slide Show -~

Purpose

Automatically change from one image to the next when displaying images.

Syntax

-~ [*delay*]

Parameters

delay:

Delay between images in seconds (for example, 0.5 is 1/2 second). Negative numbers indicate that the slideshow repeats. The default is 0, no delay between images.

Comments

The slide show mode command does not reset the SVGA card between images, this has been found to work on most SVGA cards. Use -- ~ to force a reset between images (robust slide show mode). Robust slide show mode causes some monitors to have to resync between images.

Examples

Display the images flower.gif, puppy.gif, and kitten.gif in a slideshow, repeating the loop and pausing 5 seconds between images:

```
alchemy -- flower.gif puppy.gif kitten.gif
-v -~ -5.0
```

Do the same thing, but use robust slide show mode:

```
alchemy -- flower.gif puppy.gif kitten.gif
-v --~ -5.0
```

Do the same thing, but with no screen clear:

```
alchemy -- flower.gif puppy.gif kitten.gif
-v ---~ -5.0
```

View Image -v

Purpose

View file.

Syntax

-v *horizontalResolution*

Parameter

horizontalResolution:

320:Use 320x200 mode
360:Use 360x480 mode
640:Use 640x480 mode
800:Use 800x600 mode
1024:Use 1024x768 mode
1280:Use 1280x1024 mode

Comments

If displaying on a Western Digital chipset 8514/A or VESA compatible VGA board, an optional parameter may follow the -v command. This parameter specifies horizontal resolution and may be 320, 360, 640, 800, 1024, or 1280. The default is to use the lowest resolution which can fit the entire image. You may set the environment variable `alchemy` to indicate the highest horizontal resolution you want Alchemy to use when displaying images (for example, `set alchemy=800` to will cause Alchemy to use only 640x480 and 800x600 resolutions when displaying images).

If the image is true color, a uniform palette will be used and the image will be dithered (dithering may be disabled by use of the -d option, see above). See Appendix B, Color and Dithering, for more information.

Related options

-V Reduce image to fit display

Example

View the image madonna.gif:

```
alchemy madonna.gif -v
```

View Image in True Color Mode --v

Purpose

View file using 15, 16, or 24 bits/pixel mode. This allows true color images to be viewed without dithering to a uniform palette.

Syntax

--v *horizontalResolution*

Parameter

horizontalResolution:

640:Use 640x480 mode
800:Use 800x600 mode
1024:Use 1024x768 mode
1280:Use 1280x1024 mode

Comments

Requires a VESA compatible SVGA board or a Tseng 4000, S3, ATI, Genoa, Speedstar24, or a Speedstar24X with an appropriate DAC and at least 1 megabyte of memory on the SVGA board.

Resolutions above 640x480 are only supported by SVGA boards with a VESA driver. 640x480 mode is supported for various SVGA boards with sufficient memory and the correct DAC.

Alchemy automatically picks the highest color resolution which will fit the image you are trying to view. For example, if your SVGA board supports 800x600x15 bit and 640x480x24 bit, Alchemy will use the 640x480x24 bit mode when viewing images which are 640x480 and smaller and the 800x600 mode when viewing larger images. You can of course override this by giving Alchemy a resolution parameter after the view command (for example, `--v 640`, to view in 640x480x24 bit mode). You may also set the environment variable `alchemy` to indicate the highest horizontal resolution you want Alchemy to use when displaying images (for example, `set alchemy=800` to will cause Alchemy to use only 640x480 and 800x600 resolutions when displaying images).

If the image being displayed is a 24 bits per pixel true color image, and the display mode is 15 or 16 bits per pixel, the image will be dithered (dithering may be disabled by use of the -d option, see above).

Example

View madonna.tga:

```
alchemy madonna.tga --v
```

View Scaled Image -V

Purpose

View image while scaling image to fit on monitor and correcting aspect ratio.

Syntax

-V *horizontalResolution*

Parameter

horizontalResolution:

320:Use 320x200 mode
360:Use 360x480 mode
640:Use 640x480 mode
800:Use 800x600 mode
1024:Use 1024x768 mode
1280:Use 1280x1024 mode

Comments

If displaying on a Western Digital chipset 8514/A or VESA compatible VGA board, an optional parameter may follow the -v command. This parameter specifies horizontal resolution and may be 320, 360, 640, 800, 1024, or 1280. The default is to use the lowest resolution which can fit the entire image. You may set the environment variable `alchemy` to indicate the highest horizontal resolution you want Alchemy to use when displaying images (for example, `set alchemy=800` to will cause Alchemy to use only 640x480 and 800x600 resolutions when displaying images).

This command will scale the image and correct the aspect ratio of the image by removing rows and/or columns from the image.

Note that this option can also be useful for displaying images which are not larger than the screen but which have an aspect ratio different than the display.

Limitations

Alchemy assumes that the aspect ratio of a display pixel is 1:1 when in 640x480, 800x600, 1024x768, and 1280x1024 modes, 5:6 when in 640x400 mode and 320x200 modes, and 16:9 in 360x480 mode.

If not otherwise specified by using the -D option or in the file, Alchemy assumes that the aspect ratio of pixels in 640x400 images and 320x200 images is 5:6 and the aspect ratio of pixels in 640x350 images is 35:48. You can override any of these assumptions with the -D option.

Don't worry if this is confusing; in practice Alchemy deals with everything automatically if you use the -V option. However, there is a problem with displaying 320x400 IFF files; see Appendix A, Answers to Frequently Asked Questions, for more information.

Related options

-D Specify image resolution
-v View image

Example

View madonna.gif:

```
alchemy madonna.gif -V
```

View Scaled Image in True Color Mode --V

Purpose

View image in 15 bit mode while scaling image to fit on monitor and correcting aspect ratio.

Syntax

--V *horizontalResolution*

Parameter

horizontalResolution:

640:Use 640x480 mode
800:Use 800x600 mode
1024:Use 1024x768 mode
1280:Use 1280x1024 mode

Comments

Requires a Tseng 4000, S3, ATI, Genoa, or Speedstar24 or an appropriate VESA compatible SVGA board with an appropriate DAC and 1 megabyte of memory on the SVGA board.

Resolutions above 640x480 are only supported by SVGA boards with a VESA driver. 640x480 mode is supported for various SVGA boards with sufficient memory and the correct DAC.

Alchemy automatically picks the highest color resolution which will fit the image you are trying to view. For example, if your SVGA board supports 800x600x15 bit and 640x480x24 bit, Alchemy will use the 640x480x24 bit mode when viewing images which are 640x480 and smaller and the 800x600 mode when viewing larger images. You can of course override this by giving Alchemy a resolution parameter after the view command (for example, `--v 640`, to view in 640x480x24 bit mode). You may also set the environment variable `alchemy` to indicate the highest horizontal resolution you want Alchemy to use when displaying images (for example, `set alchemy=800` will cause Alchemy to use only 640x480 and 800x600 resolutions when displaying images).

If the image being displayed is a 24 bits per pixel true color image, and the display mode is 15 or 16 bits per pixel, the image will be dithered (dithering may be disabled by use of the -d option, see above).

This command will scale the image and correct the aspect ratio of the image by removing rows and/or columns from the image.

Note that this option can also be useful for displaying images which are not larger than the screen but which have an aspect ratio different than the display.

Limitations

The same limitations as for scaled 8 bit viewing apply (see above).

Related options

-D Specify image resolution
--v View image in True color mode

Example

View big.jpg in true color 640x480 mode, reducing the image to fit on the screen:

```
alchemy big.jpg --V 640
```

A

Answers to Frequently Asked Questions

Question **How do I perform Scale to Gray?**

Answer Scale to Gray is used when the incoming image is black and white and it is being scaled to a lower resolution. By converting the black and white data to grayscale while scaling the resulting image will maintain readability. For example, if you are displaying a received fax document full size on a monitor. To perform scale to gray use the following options: `-b -c256` in addition to the scaling options, which must use type b or better scaling. For example: `alchemy fax.tif -b -c256 -Xb800 -Yb600 -+ -g` will convert the fax.tif file into a grayscale GIF file. You might also want to use: `alchemy *.tif -b -c256 --yb 72 72 -g`, this will convert the .tif files in the current directory to grayscale GIF files at 72 dpi.

Question **Why can't my paint package read the Targa file I wrote with Image Alchemy?**

Answer Some software which reads Targa files cannot handle compressed files. In addition, some software can read true color Targa files, but cannot read paletted or gray-scale files. Image Alchemy can be forced to write out a true color file by using the -24 option.

Question

I keep getting "Out of Memory trying to …" messages. Help!

Answer

Image Alchemy is running out of memory. If you are running on an IBM PC you can use `alch386` or `alchlong` instead of `alchemy` to do the conversion (if you were running alch386 or `alchlong` when you received this error please contact us).

If you are running one of the UNIX versions of Alchemy this message indicates that you are running out of swap space. Contact your system administrator to find out how you can increase the size of your swap space.

Question

How do I capture screens when running Microsoft Windows (or MacOS)?

Answer

To capture the current screen when running Microsoft Windows press PRINT SCREEN. This copies a bitmap of the entire screen onto the clipboard. Then open the Paintbrush program which comes with Windows and select Paste to copy the image from the clipboard. The image may now be saved as a BMP file which Alchemy can convert.

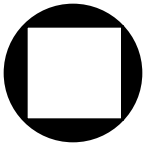
Under MacOS press Command-Shift-3. This will create a file on your hard disk called `Picture n`, where n is a number which starts at 1 and increases by 1 every time you capture another screen. This file can be converted by Alchemy.

Question **When I view a JPEG compressed image on my VGA board it looks much worse than when I first convert it to a GIF file and then view it. Why is this?**

Answer To save time Alchemy automatically uses a uniform palette when you are just viewing a true color image. When converting to a different file format Alchemy uses Heckbert quantization to generate a palette. The difference in image quality is the difference between using a uniform palette and an optimum palette. See Appendix B, Color and Dithering, for more information on palette generation.

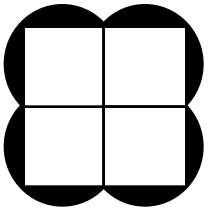
Question **I'm using Alchemy to print an image. The print out is much darker than the original image. Why is this?**

Answer Many hard copy output devices, including laser printers, ink jet printers, and ink jet plotters, have a property known as dot gain. Dot gain causes more toner or ink to be placed on the paper than is expected. This is caused by the fact that the individual pixels being output are round, and in order to completely fill in a square grid with round pixels the round pixels have to be larger than the square (in fact the circle has $\pi/2$ times as much area as the square). In this example of a single pixel the black area represents the "extra" toner or ink that is being printed:



You can compensate for dot gain by adjusting the gamma of the image during the conversion process. The exact gamma value will depend on the output device, but in general, specifying an output gamma of 2.0 produces good results (`-Gi 1.0 -Go 2.0` on the command line will accomplish this). (If you are using a UCR file you can also compensate for dot gain by using a UCR file with a gamma of 2.0.)

It is not as necessary to compensate for dot gain when printing at a resolution less than the printer's maximum resolution. This is because the output device automatically groups individual pixels together to make the output pixel, which reduces the amount of extra toner or ink being deposited on the page, as in this example of printing a 150 dpi pixel on a 300 dpi device:



The same is true if you are using dithering types 20 and 22 (since those dithering types cluster the dots).

Question

Why can't my favorite desktop publishing package read the TIFF file I wrote with Image Alchemy?

Answer

TIFF is an extremely versatile standard; it can handle anything from 1 bit images to full color images with an alpha channel. Also, TIFF allows many different types of compression. Unfortunately this versatility means that it's difficult for a single piece of software to be able to read in every valid TIFF file.

If the software specifies the classes of TIFF it can read, you can force Alchemy to write out a specific TIFF class by using the following options:

```
class B:-8 -b -c2 -t2
class G:-8 -b -t1
class P:-8 -t1
class R:-24 -t1
```

Class B is black and white, Class G is gray-scale, Class P is paletted, and Class R is true color.

If the supported classes are not specified, experiment with various combinations of -24, -8, -b, and -c. In this case it is usually best to use no compression (-t0) while experimenting with the other options, as many TIFF readers have difficulty with compressed files. When you find a set of options that work, then you can try various compression modes to save space. Be aware that using the -b option will force the output file to be gray-scale and you will lose the color information in the file (most desktop publishing programs only have support for gray-scale TIFF files).

You may also have to use the -Dn n option to specify the resolution of the image (this is especially true when converting from a file format which does not have a value for image resolution). You can generally tell if this is necessary because the program you are using to read in the TIFF file will claim that the file is unreasonably large or small. Usually, if you are using a 300 dpi Laser Printer you want to make the TIFF file 300 dpi x 300 dpi (-D 300 300).

If you would like further information specific to using Image Alchemy with your word processor or desktop publishing program please contact us; we will be maintaining a list of how to make Alchemy work with other software packages. Similarly if you figure out how to import files into a specific package let us know and we will add your tips to our documentation.

Question

When I convert a GIF file to a JPEG file and then back to a GIF file the final GIF file is twice the size of the original. Why is this?

Answer

There are two things which might cause this to happen:

JPEG compression doesn't really work well for images which have large areas which are all the same color. The reason for this is that JPEG is a lossy compression technique. Therefore you are not going to get back exactly the same values for each pixel in an area that was one solid color before being JPEG compressed. But GIF compression works much better on areas which are one solid color, so, when you GIF compress these areas, they are quite a bit larger than they were before. The solution to this problem is to use HSI JPEG compression, which automatically detects large areas of solid colors and does not JPEG compress them. The problem with HSI JPEG compression is that it isn't compatible with JPEG or JFIF.

The other possibility is that the input GIF file didn't have very many different colors. When you converted it to a JPEG file the number of colors in the file was lost (JPEG gray-scale files always use 256 shades, and JPEG color files are always true color). When the JPEG file was converted back to a GIF file Alchemy assumed you wanted 256 colors in the file, and a 256 color GIF file is bigger than a 16 color GIF file. To prevent this you can use a -c32 (or however many colors the original had) option in the command line; this forces Image Alchemy to use that many colors for the output file.

Question

I am using Alchemy to display a 320x400 IFF image created by an Amiga. When I use just the -v option the image comes out tall and skinny. When I use the -V option, which is supposed to correct the aspect ratio, things get worse instead of better (the image is even skinnier). What's going on?

Answer

As near as we can tell, some Amiga software has a different idea of what aspect ratio is than the rest of the world.

For displays, aspect ratio is defined as the ratio of the width of a single pixel to the height of a single pixel. So if you have square pixels (which you do on a standard monitor in 640x480 mode) the aspect ratio is 1 to 1 (commonly written as 1:1). When you change display modes the height and width of the total display area does not change; what is changing is the width and height of each pixel, which means that the aspect ratio changes. For example, a 640x400 display has an aspect ratio of 1:1.2 (that means each pixel is 1.2 times as tall as it is wide (which makes sense since 480/400 equals 1.2)). A 640x200 display has an aspect ratio of 1:2.4.

Now this is where it gets interesting in terms of IFF files. The aspect ratio number stored in Amiga IFF files for 320x400 images is 1:1.1, meaning pixels are 1.1 times as tall as they are wide, so therefore the actual image should be the equivalent size of a 320x440 image with square pixels. And this is what Alchemy will attempt to display when you use the -V option (Alchemy never makes any dimension larger, so the actual image Alchemy displays is 291x400, which is the same ratio as 320x440). However this is obviously wrong, as you can tell when you examine an image. As near as we can tell the correct aspect ratio of these images is 5:3 (the math we used to come up with this number is 640/320:480/400). And if you tell Alchemy to override the aspect ratio by using a -D 167 option (167 because 5/3*100 is 166.6666) the image displays correctly. Why Amigas create images which claim they are 1:1.1 remains a mystery.

Question

I told Alchemy to convert a PCX file to an 8 bit GIF file (using the -8 option). Yet when I get statistics on the file (using -x) Alchemy reports the file only has 16 colors.

Answer

Alchemy will always store the file using the smallest bits-per-pixel allowable for the given image (this results in the smallest possible file). In this case the input file only had 16 colors in it.

Things get more unpredictable with formats such as Sun Raster (which requires 1 bit files to be black and white) and SGI (which requires 8 bit files to be gray-scale). In these cases Alchemy will always do the best it can (giving you a warning message if it does something which may surprise you later).

Question

I've converted a Mac PICT file to a GIF file, but the GIF file is missing some or all of the information that was in the PICT file. What happened to it?

Answer

PICT files are a combination of drawing commands (such as lines, rectangles, and circles) and raster areas (called pixMaps). Alchemy can only read the raster portions of the files. Programs such as MacDraw and MacDraft write out files with drawing commands, programs such as MacPaint write out files which are entirely raster areas (pixMaps), and some programs, such as SuperPaint can write out files which are either, or a combination of both. If you are using such a program check the documentation on how to write out files in "paint" mode.

Question **Why can't Image Alchemy read in JPEG files produced by Kodak's ColorSqueeze (or Sun's VFCtool)?**

Answer Some software packages support an obsolete version of JPEG. Image Alchemy supports the JFIF format and should work with any other JPEG software which also claims JFIF compatibility. If other software you are using claims to support the JFIF format and you are having trouble, please contact us. If the other software does not support JFIF, contact the manufacturer and tell them they should send you an update which does (you can tell them to contact us if they need a copy of the JFIF standard).

Question **I've converted an HP PCL file to a GIF file, but the GIF file is missing some or all of the information that was in the PCL file. What happened to it?**

Answer PCL files have the same problem as PICT files (see above); they are a combination of text, fonts, drawing commands (such as lines and rectangles), and graphics (also called rasters). Alchemy can only convert the raster areas in PCL files. Unfortunately there isn't any general way to preserve the rest of the data with Alchemy.

If you are using Windows and printing using TrueType fonts you can select the Print TrueType As Graphics check box in the printer setup dialog box under the Options choice. This will cause Windows to print all information as graphics which Alchemy can then successfully convert.

Question

When I convert a 32 bit Targa file to a GIF file and then to a JPEG file it doesn't look nearly as good as if I convert the Targa File directly to the JPEG file. What can I do to maintain high quality in JPEG compressed files?

Answer

When the Targa file was converted to the GIF file Image Alchemy had to reduce the number of colors in the file (the original Targa File had up to 16 million colors, GIF files are limited to 256 colors). This step is known as color quantization (Image Alchemy uses the Heckbert Median Cut method for quantization; see Appendix B, Color and Dithering, for more information). The difficulty with color quantization is that it leaves artifacts known as color banding. To reduce this phenomenon Image Alchemy dithers the image (you can see the effect of color banding by turning off dithering by using the -d0 option). Unfortunately a dithered image does not JPEG compress very well (dithering adds a lot of high-frequency information to an image; JPEG compression attempts to remove much of that information). In addition JPEG images are always continuous color images, so when the JPEG file is decompressed it has to be color quantized and dithered again. Dithering a previously dithered image reduces the quality even more. The solution is to use the best starting quality you can for JPEG compression, ideally a continuous tone image. The compressed image size will be smaller than if you had started with a paletted image and the quality will be better.

Question

I converted a PCX file with 16 colors to a 16 shades of gray TIFF file using the -b and -t options. The 16 color PCX file had some shades of gray in it which were changed in the TIFF file. How can I prevent this?

Answer

The problem is that gray-scale TIFF files have a uniformly spaced gray palette. If you create a TIFF file with 16 shades of gray it will have the following shades in it: 0, 17, 34, 51, 68, 85, 102, 119, 136, 153, 170, 187, 204, 221, 238, and 255. However the 16 color PCX file you started with probably didn't have those exact colors in it (for example, PCX files written out by Windows 3.0 Paint have shades of gray which correspond to 0, 128, 192, and 255). So Alchemy did the best it could and matched the input colors to the output colors (and depending on the other options that you specified may also have dithered the image).

The solution is to tell Alchemy to write out a 256 color gray-scale TIFF file (which you do by adding a -c256 to the -b and -t options). This file still has a uniform gray palette; but that palette now contains every color: 0, 1, 2, 3, …, 255. Therefore Alchemy can map, for example, the colors 128 and 192 to their exact match. This does have the disadvantage of making the resulting 256 color TIFF file twice as large as the 16 color TIFF file, but this is the only way to guarantee that Alchemy can find an exact match for all the shades of gray in the input file.

Question **How do I get a copy of the JPEG standard?**

Answer The JPEG standard is an ISO/IEC standard and you should contact your local ISO/IEC office to get a copy. The document number is ISO IS 10918-1.

In the United States you can contact ANSI at:

ANSI
11 West 42nd St.
New York, NY 10036
(212) 642-4900

Question **Do you give multiple copy discounts? Do you have site licenses? Are you interested in licensing the source code?**

Answer Yes. Yes. Yes. Contact us for more information.

B

Color and Dithering

Paletted vs. true color

Color images are usually stored in one of two ways: as an array of direct color values (usually red, green, and blue) (referred to as a true color file in this document) or as an array of indices into a color-map which contains red, green, and blue color values (referred to as a paletted file in this document).

Paletted images exist because they take less memory, so the hardware to display them is less expensive. The dominance of paletted hardware is changing as the price of memory and the processing power it takes to update large amounts of memory at a reasonable speed drops.

Until true color graphics devices become the norm, there is a need to convert images from true color to paletted. This conversion is done in two steps: the first is to generate a palette for use by the image; the second is to map the image to the new palette.

Color cube

The color model generally used by computers is a cube with red, green, and blue as the axes (this is known as a color cube or RGB cube). Each point inside the cube is a different color, depending on the amount of red, green, and blue used. In nature each of the three axes is nearly continuous, therefore there are a nearly infinite number of colors available. Computer hardware and software represent colors in a discrete fashion.

For true color displays or file formats the number of discrete positions along each axis of the color cube gives the color resolution of the output device. For example, a Targa 24 board for an IBM PC has 8 bits per red, green, and blue channel for a total of 24 bits (or 256 discrete shades of each color, for a total of 16 million colors (256x256x256)). This is also the color resolution of most true color file formats.

A 15 bit SVGA boards has 5 bits per channel, for a total of 32x32x32 different colors (32,768). This is the same color resolution as a Targa 15 file.

A paletted display or image file has the same color resolution limit as a true color display or image file, but in addition there is a limit on how many points inside the cube can be used at the same time. An 8 bit file format, such as GIF, allows 256 different colors out of 16 million. A non-true-color SVGA board also only allows 256 different colors at one time.

So, converting a true color file to a paletted file involves reducing the number of occupied points in the color cube. There are several ways this can be done.

Generating a palette

Image Alchemy supports two methods of generating a palette:

Uniform palettes

The simplest and fastest method is to use a palette containing colors which are uniformly distributed in the RGB cube, this is referred to as a uniform palette. This has the advantage that it's fast and the same palette can be used for any image; the primary disadvantage is that most images don't contain colors from everywhere in the RGB cube, so palette entries are wasted representing colors that aren't needed for the particular image being converted.

Optimal palettes

To generate a palette which is better for representing a particular image, Image Alchemy supports Heckbert's median cut algorithm. This algorithm first builds a three dimensional table (a histogram cube) indicating how popular any given color in the RGB cube is in the image being converted. It then proceeds to subdivide this histogram cube (by dividing boxes in half) until it has created as many boxes as there are palette entries. The default Heckbert method bases this decision as to where to divide a box is based on the distribution of colors within the box. This will create boxes which have approximately equal popularity in the image. Using the -zh 1 option changes the algorithm to instead divide the boxes in half, creating boxes which are therefore equal in size.

Assigning colors

Palette entries are then assigned to represent each box using one of several different methods. You can change the method used to select a color to represent each box by using the -zs option (see chapter 6, for more information).

The default method is to use the mean of all the colors in the box. However for some images slightly better results can be obtained by using the center of the box (without regard to where the pixels are in the box).

For images being reduced to a very small number of colors (less than 16) better results can be obtained by using a corner of the box (the boxes tend to be large when reducing an image to a small number of colors; therefore picking colors near the centers of the boxes will give you muddy colors, while using corners of the boxes will give you saturated colors). And having saturated colors allows the dithering algorithms to generate better looking images.

There are other methods of generating a palette from an image, but Heckbert's algorithm is generally regarded as the best tradeoff between speed and quality.

Mapping the image to the palette

The next step is to map the image to the new palette; this is where dithering becomes important.

No dithering

The simplest approach is to map every color in the original image to the palette entry which is closest to it (this is what Image Alchemy does if you specify no dithering).

However, since the palette entries generally represent several different colors in the original image, this results in color banding where areas of smooth color changes in the original become areas of one solid color in the paletted version.

Advantages of dithering

This can be alleviated by dithering the image data such that any given pixel might not be mapped to its closest palette entry, but the average over some area of the image will be closer to the correct color than it would otherwise be. Image Alchemy uses a class of algorithms called "error-diffusion" to do dithering.

Error diffusion dithering

These algorithms work by using the closest palette entry to a color and then distributing the error (the difference between the desired color and the chosen palette entry) to the nearby pixels. This process is repeated for every pixel in the image, using the color values which have been modified due to the error from previous pixels. The different dithering algorithms spread the error over a different area or use a different weighting within the same area.

Serpentine raster

Error diffusion can be done as a normal raster (left to right, top to bottom) or as a serpentine raster (alternating left to right and right to left, top to bottom). A serpentine raster tends to break up visible patterns introduced by dithering.

Noise

Random noise can also be added to help break up visible patterns in the resulting image.

Further information

For more information on Heckbert's median cut and dithering see the appropriate reference listed in the References section below.

C

What is JPEG Compression?

Who are those JPEG guys?

JPEG stands for the "Joint Photographic Experts Group". This is a group of experts who defined a standard compression scheme for still images, commonly called JPEG Compression. The JPEG compression standard is an ISO standard.

Overview

JPEG Compression consists of a series of complex mathematical operations; including: color space conversion, discrete cosine transforms, quantization, and entropy coding. After these steps you end up with an image which takes fewer bits to store than you started out with.

However, when you decompress a JPEG compressed image you end up with an image that is not quite the same as the original (which is why JPEG Compression is referred to as "lossy").

Is lossy compression bad?

You might well ask why anyone would want to compress an image using a lossy technique. Compression ratios for lossy compression are much better than for lossless compression and the loss is generally very small. And, in fact, every operation of converting an image is lossy (the original photographic or electronic process which captured the image was lossy, scanning or digitizing the image was lossy, displaying the image on a monitor is lossy, and printing the image is lossy).

Details

JPEG compression involves the following steps:

Step 1

The image is converted to a color space with separate luminance and chrominance channels. This is done because the human eye is far more sensitive to the luminance information (Y) than it is to the chrominance information (Cb and Cr); by separating them, it's possible to compress the chrominance information more than the luminance before the perceived image quality suffers.

This step isn't specified in the JPEG standard (it doesn't discuss color space at all), but is standard practice. Image Alchemy uses CCIR-601 YCbCr, which is the color space specified by the JFIF standard.

Step 2

The luminance and chrominance information are separately transformed to the frequency domain using a discrete cosine transform acting on 8x8 pixel blocks.

To reduce the amount of data which needs to be compressed the chrominance information may be sub-sampled first. Alchemy uses 2h:1v:1h:1v:1h:1v sub-sampling when writing JPEG files, which means that the first component (luminance) has twice as many samples horizontally as the other two components (chrominance), and the same number of samples vertically. Alchemy can read JPEG files with any sub-sampling allowed by the standard.

Step 3

The transformed data is quantized (so some information is thrown away). The samples representing higher frequencies are generally quantized using larger steps than those representing low frequencies.

The quality level you specify is used to scale a set of quantization values which have been found to cause the quantized data to all have approximately equal importance visually. A lower quality number will cause larger quantization steps to be used, and hence increase the compression ratio and decrease the image quality.

Step 4

The quantized data is compressed using an entropy coder. Huffman and Arithmetic coding are allowed by the JPEG standard; only Huffman coding is allowed by the JFIF standard. Huffman coding can either be done with a set of fixed tables or custom tables can be generated for an image. Alchemy, by default, uses a fixed set of tables, but can also generate custom tables which usually produce 5-20% (depending on the image and quality setting) better compression. However, producing custom tables requires an additional pass over the image data and therefore takes a little longer.

JPEG Interchange Format

This data corresponds to the JPEG Interchange Format and is ready to be stored in a file. Unfortunately the JPEG Interchange Format does not include enough information to actually be able to convert the file back to an image. Specifically the color space used and the aspect ratio or resolution of the image are not included. Until recently there was no standard way of putting this information in a JPEG file.

JFIF

On March 1, 1991 representatives of several JPEG hardware and software developers (including C-Cube, Radius, NeXT, Storm Tech., the PD JPEG group, Sun, and Handmade Software) met at C-Cube and established the JPEG File Interchange Format (JFIF). JFIF allows for the standardization of those pieces of information missing from the JPEG Interchange Format and therefore allows various software packages, by different vendors, to produce compatible JPEG files. If you would like more information on the JFIF standard please contact us.

D

Customer Support

Why might Alchemy mess up?

We have made every effort to insure that Image Alchemy can read all files in its supported formats. However, because of poorly written standards and non-adherence to standards there are undoubtedly certain files that Image Alchemy does not read correctly.

What we need to help you

If you come across any files which Image Alchemy has trouble with, please contact us with as much of the following information as you have: version of Image Alchemy you are using, type of file, type of computer which generated it, name and version of software which wrote the file, size of image, and the number of colors in image. We may ask you to send us the file so that we can figure out what went wrong. If you send us a file we will attempt to modify Image Alchemy so that it can read the file. Once Alchemy is modified, we will send you an updated copy of it.

Similarly, if any files that Image Alchemy writes cannot be read by other software please contact us. We may ask you to send us a copy of a file that can be read by that software package for comparison.

Please contact us even if you are just using a demo copy of Alchemy. In addition to helping fix a bug, we feel the best way to get you to purchase a copy of Alchemy is to demonstrate how committed we are to customer support.

How to contact us

Our address and phone numbers are:

Handmade Software, Inc.
48860 Milmont Drive, Suite 106
Fremont, CA 94538

+1 510 252 0101 (Voice)
+1 510 252 0909 (Fax)

The most efficient way to contact us is by e-mail; this is especially true if you can send us a sample file which demonstrates the problem you are having. Please enclose a short note with your name and phone number so that we may call you if we need further information. Our e-mail address is:

Internet: support@handmade.com

E

Binary Information Files (BIF)

Overview

Binary files are files which are just image data. In other words, they do not contain any information other than the actual pixels in the image file. In order to read these files you must create a file using a text editor which describes to Alchemy the format of the file you are trying to read. This is called a BIF file (and typically has the extension .bif).

Required information

At the minimum a BIF file needs to contain the name of the image data file and either the height or the width of the image. Alchemy will make assumptions about the other characteristics of the image based on the information that it is given and the total length of the image file.

BIF file format

The first line contains the letters BIF, which identifies the file as a BIF file.

Each of the rest of the lines in the BIF file consist of an information tag followed by the information. The spelling of the tags must be exact or Alchemy will report an unknown tag error. The usage of many of the tags may not be entirely clear from the description, please see the examples section if the usage of a tag needs more explanation.

Data following each tag can be in decimal or hex (0x before the number indicates hex). See below for a example of using hex data in BIF file.

Tags

Tag	Description
filename	The name of the file containing the image data. To read images that consist of separate files for the red, green, and blue data, repeat the filename tag three times. The first filename tag specifies the red data file, the second blue, and the third green. You must also specify both the height and width and the number of planes in the image (which must be three) when using three filename tags (ordinarily Alchemy can calculate one tag from the others). See below for an example.
width	The width of the image data, in pixels.
height	The height of the image data, in pixels.
planes	The number of planes of image data: 1: gray-scale 2: gray-scale with an alpha channel 3: RGB 4: RGB with an alpha channel. You can read a black and white image which consists of packed data (i.e. 8 pixels per byte) by specifying 1 bitspersample (see below for more information on the bitspersample). In this case you should not use a planes tag but you must specify both the height and width of the image (ordinarily Alchemy can calculate one from the other). See below for an example.
header	The size of the header, in bytes. This many bytes are skipped when reading the file.

leftpadding The number of bytes to remove from the beginning of each scan line.

rightpadding The number of bytes to remove from the end of each scan line.

order The order of the pixels:
For 1 channel g (g=gray).
For 2 channel images either ga or ag (a=alpha).
For 3 channel images, any sequence of r, g, and b: rgb, rbg, grb, gbr, brg, or bgr (r=red, g=green, b=blue).
For 4 channel images, any sequence of a, r, g, and b (a=alpha).

The defaults are g, ga, rgb, and rgba, depending on the number of planes.

interleave The type of interleaving of the pixel data:

0: Byte interleave	RGBRGBRGBRGBRGBRGB...
1: Line interleave	RRR...GGG...BBB...RRR...GGG...BBB...
2: Plane interleave	RRRRRR...GGGGGG...BBBBBB...

The default is 0, Byte interleave.

upsidedown The presence of this tag indicates that the data in the file is recorded from the bottom of the screen up to the top of the screen.

format The format of the data:

ascii:	read ASCII data
group3:	use Group III Fax decompression
group4:	use Group IV Fax decompression

ASCII data files can be decimal or hex (0x before each value is used for hex). See below for an example of reading ASCII data and an example of reading a Group IV compressed data .

faxoptions

Options which affect decompressing fax compressed data:
bitreversal: most significant bit first

This tag allows you to specify various fax options when reading Group IV Fax compressed data. Currently the only faxoptions tag supported is bitreversal (other options will be added in future versions of Alchemy).

bitspersample

The size of the data, in bits per sample:
1: 1 bit per sample (8 pixels per byte)
8: 8 bits (one byte) per sample
16: 16 bits (two bytes) per sample

The default is 8 bits per sample.

In the case of 1 bit per sample, it indicates that data is packed, 8 pixels being stored per byte (in which case the bitorder tag determines whether the data is MSB to LSB or LSB to MSB (see bitorder, below)).

8 bits per sample is the standard way of storing data, with one byte storing one pixel.

16 bits per sample is used when reading data which is stored as two bytes per pixel. In this case Alchemy automatically scans the data to determine the minimum and maximum values. Then, when the image is being read, the data is scaled to 8 bits. The 16 bits per sample value can be used for 2-bit to 16-bit data, as long as the data is padded to 2 bytes. By default, 16-bit data is presumed to be unsigned and Motorola byte ordered (see signed and byteorder, respectively, below).

bitorder

The bit ordering in a 1 bit per sample (packed) image:
msblsb: Most significant byte first
lsbmsb: Least significant bit first

The default is msblsb (most significant byte first).

This option lets you specify the bit ordering when reading 1 bit per sample data.

byteorder

The byte ordering in a 16 bits per sample image:
motorola:Motorola byte ordered (most significant byte first)
intel:Intel byte ordered (least significant byte first)

The default is Motorola byte ordered.

This option lets you specify the byte ordering when working with 16 bit per sample data.

signed

The presence of this tag indicates that the data is signed. By default, it is assumed that 16 bit per sample data is unsigned.

Comments

Lines beginning with a # are treated as comments. Comments and blank lines are ignored when processing the BIF file.

Palette files

If the binary file has a palette available, you can use that palette by writing your own software to convert it to a .PAL file and using the -F option while reading the BIF file.

Examples

Using a BIF file

Assuming the BIF file is called sample.bif, the following Alchemy command can be used to convert the image to a GIF file:

```
alchemy sample.bif -g
```

A BIF file is treated as an ordinary file, so all the standard Alchemy commands may be used with it.

Standard BIF files

This is an example BIF file which can be used to read a 640 pixel wide, true color HSI Raw file. Note that HSI raw files have a 32 byte header which is being skipped. Also note that the height tag is not needed. Alchemy will automatically calculate the height based on the length of the file and the other tags.

Of course you could read the Raw file directly using Alchemy, but this is after all an example of a BIF file.

```
BIF
width    640
#skip past header
header    32

filename  sample.raw
planes     3

#the tags below aren't actually needed,
#since rgb and non-interleave are
#the default, but they are included
#here to give an example of what those
#tags look like

order       rgb

interleave    0
```

Hex Data

If you have certain values in hex you can put them in a BIF file directly by preceding them with a 0x:

```
BIF
filename  sample.raw
width      640
height     480
header     0x020
```

Plane Interleaved

This example shows how to read an image which is plane interleaved (i.e. all of the blue pixels are first, followed by the green, and finally the red).

```
BIF
filename  planar.img
width     1024
height    1024
channels     3
interleave   2
order      bgr
```

Separate RGB files

This is an example BIF file which would be used to read a 512x512 RGB file which has each of the different color pixels in a separate file. Note that the width, height, and planes tags must all be present to read a file of this type:

```
BIF
filename  image.red
filename  image.grn
filename  image.blu

width    512
height   512
planes     3
```

Group IV Fax compressed

This BIF file can be used to read a page of Group IV compressed patent data as distributed by the United States Patent and Trademark Office:

```
BIF
filename  4456956.001
width     2320
height    3408
channels     1
format       group4
faxoptions   bitreversal
```

Packed black and white data

This is an example BIF file which would be used to read a black and white image which is packed at 8 pixels per byte. Note that the width, height, and bitspersample tags must all be present to read a file of this type (the bitorder tag isn't necessary in this case, since msb-lsb is the default order, but it is included because we figured you were curious what that tagged looked like):

```
BIF
filename  scan.img

width         2700
height        3300
bitspersample    1
bitorder    msblsb
```

16 Bit Data

You can use BIF files to read 16 bit data; only 8 bits of data will actually be read, but Alchemy will automatically scale the data to preserve the most information possible. This BIF file can be used to read a 1024 x 1024 image which is 16 bit, Intel byte ordered:

```
BIF
filename      lunar.dat
width         1024
height        1024
channels         1
bitspersample   16
byteorder    intel
```

ASCII Data

BIF files can read data in hex or decimal ASCII, for example, if you had a file that looked like this (a small black and white checkerboard, which changes from hex to decimal halfway through, for no obvious reason):

```
0x00 0xff 0x00 0xff
0xff 0x00 0xff 0x00
   0  255    0  255
 255    0  255    0
```

This BIF file could be used to read this data (note that we have to supply width, height, and channels, Alchemy can't calculate one from the other in this case):

```
BIF
filename         checker.txt
width            4
height           4
channels         1
format       ascii
```

The data file can be much less well organized, Alchemy just looks for sequences of number separated by whitespace (spaces, tabs, commas, carriage returns, etc). For example this file is equivalent:

```
0x00,0xff,0x00
0xff
0xff
0x00
0xff 0x00 0 255 0 255
 255           0  255


0
```

F

HSI Raw Files

History

The HSI Raw format was originally an internal format to Image Alchemy. Because of user demand the format has been documented to allow others to read and write HSI Raw files.

Overview

HSI Raw files are very simple image data files, they have the advantage that they are very easy to read and write and the location of any pixel in the image may be found by simple calculations.

If you need to convert custom files to a format that Alchemy can read we recommend using a Raw file; it is the simplest format to write and the fastest for Alchemy to read.

This document only describes uncompressed, RGB HSI Raw files without Alpha channels, if you need to read or write compressed and/or CMYK files or files which include an Alpha channel please contact us for a more complete description of the HSI Raw file format.

Variations

There are two types of HSI Raw Files: paletted and true color. Paletted images are stored one byte per pixel with a palette at the beginning of the file. True color files are stored three bytes per pixel.

Gray-scale

Gray scale files are stored as paletted files with a palette that contains all gray values. Alchemy automatically recognizes such files during reading and will treat them appropriately.

Black and white

Black and White files are stored as paletted files with a palette that contains two values, black and white. Alchemy automatically recognizes such files during reading and will treat them appropriately.

Warning

Note that Handmade Software, Inc. reserves the right to make changes to this format at any time and without notice. And while it is unlikely, it is possible that future versions of Image Alchemy will not support this format.

Old version files

This appendix describes version 4 Raw files. This is the version that Image Alchemy has written since March 1991. Before this Alchemy wrote version 2 and 3 raw files (version 2 were 8 bit files, version 3 were 24 bit files). Those raw files can be read by current versions of Image Alchemy but are not otherwise supported. If you run across any of these raw files the easiest thing to do is to use a current copy of Alchemy to convert them to a version 4 raw file.

Details

Word size

All values which are not otherwise identified are two byte integers (16 bits). This is the native integer size of most IBM PC C-compilers but not Macintosh and UNIX C-compilers.

Byte order

All integers are stored high byte first (big-endian order). This is the native mode for Macintosh's and Sun's but not the native mode for IBM PC's.

See below for a CPU independent method to read and write 2-byte integers.

Pixel format

Paletted files are stored one byte per pixel.

True color files are stored as three bytes per pixel in red, green, blue order.

Padding

Neither the palette information nor the pixel data is padded to anything other than a byte boundary. This means that if you store a file which is 13 by 11 pixels it will occupy 429 bytes if stored as a true color file (not including the header), or 143 bytes if stored as a paletted file (not including the header and palette data).

Hex

Numbers including a `0x` prefix are hex; all other numbers are decimal.

File format

The header for a paletted file is 32 bytes plus the size of the palette. The header for a true color file is exactly 32 bytes (a true color file contains no palette).

Magic number

Six bytes used to identify the file as an HSI Raw file:

```
0x6d 0x68 0x77 0x61 0x6e 0x68
```

Version

An integer used to identify the HSI Raw file version, if you are reading a file and the version is later than this you won't be able to read the file because we've made changes to the header information, in this case contact us for a detailed description of the HSI Raw file format:

```
0x0004
```

Width

An integer indicating the width of the image (in pixels).

Height

An integer indicating the height of the image (in pixels).

Palette size	An integer indicating the number of entries in the palette. Range is 2 to 256. A 0 or -24 indicates a true color image (which has no palette data).
Horizontal DPI	An integer indicating the horizontal resolution of the image, in dots per inch. A zero indicates that the resolution is unknown. A negative number is used if only the aspect ratio is known.
Vertical DPI	An integer indicating the vertical resolution of the image, in dots per inch. A zero indicates that the resolution is unknown. A negative number is used if only the aspect ratio is known.
Gamma	An integer indicating the gamma of the image, scaled by 100 (a gamma of 2.2 is stored as 220). A zero indicates that the gamma is not known.
Compression	An integer indicating the compression mode used to write the file. This appendix only describes compression mode 0, so you should check this value when reading a HSI Raw to make sure it isn't compressed. If you need to be able to read or write compressed HSI Raw files please contact us.
Alpha Channel	An integer indicating whether or not the file contains an alpha channel. This appendix only describes files without an alpha channel, if you need to be able to read or write HSI Raw files with alpha channels please contact us.
Reserved	Eight bytes reserved for future use. Should be set to zero when writing.
Palette	The palette data is stored as 3 bytes per palette entry. The bytes are in red, green, blue order; 0 is black, 0xff is full intensity. True color raw files have no palette.
Image data	The image data.

Example files

8 bit paletted, 320 x 200:

```
6D 68 77 61 6E 68 00 04  01 40 00 C8 01 00 00 00
00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
49 24 24 24 00 00 00 00  00 DB 6D 6D FF 92 92 FF
B6 B6 92 49 49 FF DB DB  FF B6 92 FF FF DB FF DB
B6 FF FF FF B6 6D 6D 6D  24 24 DB 92 6D 6D 49 49
…
```

24 bit true color, 320 x 200:

```
6D 68 77 61 6E 68 00 04  01 40 00 C8 00 00 00 00
00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
49 24 24 49 24 24 49 24  24 49 24 24 49 24 24 49
24 24 49 24 24 49 24 24  49 24 24 49 24 24 49 24
24 49 24 24 49 24 24 49  24 24 49 24 24 49 24 24
…
```

Reading a two byte integer

```
int getWord(int i, FILE *stream) {
   register int temp;
   temp=getc(stream)<<8;
   return(getc(stream) | temp);
}
```

Writing a two byte integer

```
int putWord(int i, FILE *stream) {
   putc(i>>8, stream);
   return(putc(i&0xff, stream));
}
```

G

Undercolor Removal Files

Summary

Undercolor removal files are text files which control the conversion from RGB to CMYK color space.

This conversion consists of four steps.

The first is to convert an RGB value to an ideal CMY value; this simply involves negating the RGB values.

The next step is to determine how much black is in that color; this is done by finding the minimum of the CMY values and using that as an index into the black removal portion of the Undercolor Removal tables documented below. These tables have independent values for how much black to use for that pixel and how much black to subtract from the CMY values.

Next, a linear transform is optionally applied to the CMY portion of the CMYK pixel.

Finally the CMYK values are optionally translated, independently, through the CMYK density correction tables (this last step is only used if the image is going to be dithered output on a 1 bit per pixel per component device).

File format

Black removal tables

The first 256 non-comment lines contain undercolor removal values corresponding to computed black values of 0 (white) to 255 (black).

Each of these lines has two numbers; the first indicates how much black to use in place of the computed black value corresponding to the line, and the second indicates how much black to subtract from the cyan, magenta, and yellow components (this value must not be greater than the corresponding computed black value).

After the black removal block the remaining blocks may appear in any order.

CMY linear transform

If there is a line which says only "HSI CMY matrix" then the next 3 non-comment lines contain a matrix representing a linear transform which is applied to the cyan, magenta, and yellow components after black removal and before applying the density map. The entries are normalized around 256. The first row and column represent cyan, the second magenta, and the third yellow. The rows are multiplied by the input cyan, magenta, and yellow values to create the corrected values. A matrix of

```
256   0   0
  0 256   0
  0   0 256
```

is equivalent to omitting the matrix and causes no correction to take place. In this case it would be preferable to omit the matrix as the conversion will run slightly faster without it.

CMYK density correction tables

If there is a line which says only "HSI CMYK density map" then the next 256 non-comment lines contain density correction tables, corresponding to cyan, magenta, yellow, and black values of 0 (white) to 255. Each of these lines has four numbers representing, in order, the amount of cyan, magenta, yellow, and black to use in place of the corresponding computed values. These tables are only applied during dithering; they will not be used for those CMYK output formats which are continuous tone, as devices which take continuous tone input data should be doing their own correction.

Comments

Any line beginning with ';' is a comment and is ignored.

Example

The following undercolor removal file has undercolor removal tables, CMYK density correction tables, and a CMY color correction matrix.

```
; Undercolor removal file
;
  0   0
  1   1
  1   1
  2   2
  3   3
… (256 entries total)
169 169
169 169
170 170
;
```

```
HSI CMY matrix
;the following matrix leaves the
; Cyan and Yellow planes alone, and
; subtracts a bit from the Magenta
; plane when there's Cyan present.
;
256   0   0
-32 256   0
  0   0 256
;
HSI CMYK density map
;
  0   0   0   0
  0   0   0   0
  0   0   0   0
… (256 entries total)
248 248 248 248
251 251 251 251
253 253 253 253
255 255 255 255
```

H

HSI PAL Files

Overview

HSI PAL files are text files which contain a palette in an ASCII form. Alchemy can extract palettes from other file formats and write HSI PAL files. Alchemy can also use HSI PAL files when converting images.

File format

The first line contains the letters "PAL"; this identifies the file as a palette file.

The next line contains an integer indicating the number of palette entries. Valid values are 2 through 256.

The rest of the file consists of lines of 3 numbers, representing the red, green, and blue values for each of the colors. These have a range of 0 (black) to 255 (full intensity). Any information after the 3 numbers is treated as a comment and ignored.

Example

```
PAL
8                ;# colors
  0   0   0      ;black
255   0   0      ;bright red
  0 128   0      ;dark green
255 255   0      ;yellow
  0   0 255      ;blue
255   0 255      ;magenta
 63  63  63      ;gray
255 255 255      ;white
```

Acknowledgments

Summary

Almost all the software which comprises Image Alchemy was written in house. However some of the modules are modifications of software originally written by other people or software that we've licensed.

TIFF

Image Alchemy's TIFF I/O is based on libtiff which is copyright by Sam Leffler and is used with his permission. If you are interested in reading or writing TIFF files we strongly suggest that you start with libtiff.

Libtiff is available by anonymous ftp as ftp://ucbvax.berkeley.edu/pub/tiff/*.tar.Z or ftp://uunet.uu.net/graphics/tiff.tar.Z.

If you cannot get a copy of libtiff via anonymous ftp please contact us for a free copy.

VGA display

The MS-DOS version of Image Alchemy's 640x400 SVGA display routines are based on VGAKIT, written by John Bridges.

VGAKIT is available free of charge from a variety of bulletin boards

If you cannot find VGAKIT locally please contact us for a free copy.

LZW Compression

The LZW compression method is the subject of United States patent number 4,558,302 and corresponding foreign patents owned by Unisys Corporation and the use of it for TIFF LZW compression is licensed from them.

Further information on licensing this patent can be obtained from:

Unisys Corporation
Welch Licensing Department
Office of the General Counsel
M/S C1SW19
Blue Bell, PA 19424

J

Other Useful Software

Summary

There are several image processing packages available for free or as shareware.

Please be aware that we mention these software packages only as a service to Image Alchemy users. We are not endorsing or recommending any particular package. Some of the packages are no longer supported by their authors.

If you have trouble finding any of the listed software please send us a blank tape or diskette and we will send you a copy free of charge (please be aware that the software may be quite large; contact us first if you have any questions).

If you know of any other software which would be appropriate to add to this list please let us know. If you are the author of any of these packages and you would rather not be on this list please let us know that also.

IBM PC

These programs are only available as executable code and can only be run under MS-DOS.

PicLab

A public-domain image file conversion and printing tool. Written by Lee Crocker and the Stone Soup Group. Available via CompuServe.

Cshow

A shareware image viewing program.
Written by Bob Berry.
Available from:

Canyon State Systems and Software
PO Box 86
Sedona, AZ 86336

Vivid

A shareware ray-tracing program.
Written by Stephen B. Coy
Available from:

Stephen Coy
15205 NE 13th Pl., #2904
Bellevue, WA 98007

Workstations

These programs are only available as source code and generally require a workstation running UNIX or one of its variants.

Utah Raster Toolkit (URT)

Written by Spencer W. Thomas, Rod G. Bogart, and James Painter.
Available from ftp://cs.utah.edu/pub/urt-3.0.tar.Z, ftp://weedeater.math.yale.edu/pub/urt-3.0.tar.Z, or ftp://freebie.engin.umich.edu/pub/urt-3.0.tar.Z.

Fuzzy Bitmap Manipulation (FBM)

Written by Michael Mauldin
Available from ftp://nl.cs.cmu.edu/usr/mlm/ftp/fbm.tar.Z, ftp://uunet.uu.net/pub/fbm.tar.Z, or ftp://ucsd.edu/graphics/fbm.tar.Z.

Portable BitMap (PBMPLUS)

Written by Jef Poskanzer
Available from ftp://expo.lcs.mit.edu/contrib/pbmplus.tar.Z or ftp://ftp.ee.lbl.gov/pbmplus.tar.Z.

ImageMagick	Written by John Cristy See http://www.wizards.dupont.com/cristy/ImageMagick.html for more information.
Img Software Set	Written by Paul Raveling Available from ftp://expo.lcs.mit.edu/contrib/img_1.3.tar.Z or ftp://venera.isi.edu/pub/img_1.3.tar.Z.
XLI	Written by Graeme Gill (XLI is based on xloadimage, written by Jim Frost) XLI and XloadImage are available by anonymous ftp from a variety of ftp sites.

K

Configuring DOS/4GW Pro

MS-DOS Only

DOS/4GW Pro is the DOS Extender used by Image Alchemy/386 and Image Alchemy PS. The DOS Extender is the software that allows protected mode software to run under MS-DOS. Only alch386.exe use the DOS Extender. This chapter explains how to control various operations of the DOS Extender to optimize use of your computer.

Updating from previous versions

If you have been using earlier versions of Image Alchemy and have made use of the DOS4GVM environment variable you will have to make changes to that variable. In particularly the old style DOS4GVM=1 setting is no longer supported (it isn't needed, since that is now the default operation) and all '#' symbols must be changed to ':'.

Virtual Memory

The Virtual Memory Manager (VMM) uses a swap file on disk to augment RAM. With VMM you can use more memory than your machine actually has. When RAM is not sufficient, a portion of memory is swapped out to disk until it is needed again. The combination of the swap file and available RAM is called *virtual memory*.

Image Alchemy automatically uses virtual memory if you do not have enough physical memory available. However, there may be cases where you wish to change the behavior of virtual memory. This is done through the DOS4GVM environment variable.

To set the DOS4GVM environment variable, use:

```
set DOS4GVM=[option [:value]] …
```

(A ":" is used with options that take values instead of "=" since the DOS command shell does not allow "=" to appear in environment variables.)

DOS4GVM Options

DeleteSwapFile:[On:Off] Default: On
By default the swap file is deleted when Alchemy exits. Program startup is quicker if the file is not deleted.

PhysMin:n [K|M] bytes Default: 1024K
The minimum amount of RAM managed by VMM.

PhysMax:n [K|M] bytes Default: 65M
The maximum amount of RAM managed by VMM.

SwapFileName:[path][filename]
The default name is "DOS4GVM.SWP". The default path is the executable directory.

SwapInc:n [K|M] bytes Default: 4096K
The size by which the swap file grows.

SwapMin:n [K|M] bytes Default: 0
The minimum or initial size of the swap file.

VirtualSize:n [K|M] bytes Default: 16M
The size of the virtual memory space.

Changing the Defaults

To change the default values set the DOS4GVM environment variable. For example:

```
set DOS4GVM=VirtualSize:64M PhysMax:16M
```

Sets up a swap file up to 64 megabytes in size after using up to 16 megabytes of RAM.

Glossary

Anonymous FTP An easy way to transfer files via the Internet. If you don't have Internet access you can't use anonymous FTP; if you do have Internet access you probably already know about it (if you don't, ask your system administrator or local network guru).

Black and white An image which contains just two colors, black and white. Many file formats, such as TIFF and Sun Raster, have special variations for black and white images. You can force Alchemy to write a black and white image by specifying -b -c2 as options.

Dithering A technique for reducing the amount of color banding in an image when converting from a large number of different colors to a small number of different colors. Different dithering techniques are usually named after the person or persons who first invented them. Alchemy supports Floyd-Steinberg, Stucki, and JJN dithering; these are further described in "Digital Halftoning", by Robert Ulichney, MIT Press.

Gray-scale An image which contains just shades of gray. Many file formats, such as TIFF and Silicon Graphics, have special variations for gray-scale images. You can force Alchemy to write a gray-scale image by specifying -b -8 as options.

Header The portion of an image file that is not the actual image data. The data in a header generally includes the image size (in pixels), the image depth (in number of bits per pixel or number of colors), and the palette (if the image has a palette). Some file formats include quite a bit of additional data in the header, such as: the name of the image or the date and time the image was created. Some file formats store information which is usually found in the header in a separate file.

Heckbert color quantization A technique for reducing the number of colors needed by an image, typically used to convert a true color image to a paletted image. Named after Paul Heckbert who originally described the technique in "Color Image Quantization for Frame Buffer Display", SIGGRAPH '82 Proceedings, p. 297.

Magic Number A number or sequence of numbers that is found at or near the start of an image file so that software may determine what type of format the file is. Most formats have a well defined magic number; some formats do not, in which case Alchemy examines various parameters in the header of the file and guesses what format the image is.

Paletted An image which isn't true color. Each pixel in the image is an index into a table of values (typically red, green, and blue) which describe the color of that pixel. Most paletted images are limited to 8 bits of information, which allows 256 unique colors. Most display adapters only allow the display of paletted images (Alchemy can display true color images on those display adapters by using a uniform palette).

True color An image which does not contain a palette. Each pixel in the image is represented by at least three values, typically red, green, and blue. True color images are generally produced by scanners and digitizers and are better quality and much larger than paletted images. Most display systems cannot display true color images.

References

General Computer Graphics

Computer Graphics - Principles and Practice, Second Edition
(Commonly referred to as Foley and van Dam)
J.D. Foley, A. van Dam, S.K. Feiner, and J.F. Hughes
Addison-Wesley
ISBN 0-201-12110-7

Principles of Interactive Computer Graphics
(Commonly referred to as Newman and Sproull)
W.M. Newman and R.F. Sproull
McGraw-Hill
ISBN 0-07-046338-7

Algorithms for Graphics and Image Processing
Theo Pavlidis
Computer Science Press
ISBN 0-914894-65-X

Graphics Gems I through ?
various
Academic Press
various

Image Lab
Tim Wegner
Waite Group Press
ISBN 1-878739-11-5

Specific Topics

Color

Digital Color Management
Edward J. Giorgianni and Thomas E. Madden
Addison-Wesley
ISBN 0-201-63426-0

The Reproduction of Color in Photography, Printing & Television
R.W.G. Hunt
Fountain Press
ISBN 0-85242-356-X

Dithering

Digital Halftoning
Robert Ulichney
MIT Press.
ISBN 0-262-21009-6

File Formats

The File Formats Handbook
Günter Born
International Thomson Computer Press
ISBN 1-85032-117-5

Graphics File Formats - Reference and Guide
C. Wayne Brown and Barry J. Shephard
Manning Publications Company
ISBN 1-884777-00-7

Graphics File Formats
David C. Kay and John R. Levine
Windcrest/McGraw-Hill
ISBN 0-8306-3060-0

Programming for Graphics Files in C and C++
John Levine
John Wiley & Sons
ISBN 0-471-59854-2

Bitmapped Graphics Programming in C++
Marv Luse
Addison-Wesley
ISBN 0-201-63209-8

Graphics File Formats
James D. Murry and William vanRyper
O'Reilly & Associates
ISBN 1-56592-161-5

Bit-Mapped Graphics
Steve Rimmer
Windcrest
ISBN 0-8306-3558-0

The Graphic File Toolkit
Steve Rimmer
Addison-Wesley
ISBN 0-201-60846-4

Supercharged Bit-Mapped Graphics
Steve Rimmer
Windcrest/McGraw-Hill
ISBN 0-8306-3788-5

Heckbert Color Quantization

"Color Image Quantization for Frame Buffer Display"
Paul S. Heckbert
SIGGRAPH '82 Proceedings

"Median-Cut Color Quantization"
Anton Kruger
Dr. Dobb's Journal, September 1994

Image Scaling

Digital Image Warping
George Wolberg
IEEE Computer Society Press Monograph
ISBN 0-8186-8944-7

JPEG

JPEG Still Image Compression Standard
William B. Pennebaker and Joan L. Mitchell
Van Nostrand Reinhold
ISBN 0-442-01272-1

PDF (Portable Document Format)

Portable Document Format Reference Manual
Adobe Systems Incorporated
Addison-Wesley
ISBN 0-201-62628-4

PostScript

PostScript Language Reference Manual, Second Edition
Adobe Systems Incorporated
Addison-Wesley
ISBN 0-201-18127-4

Adobe Type 1 Font Format, Version 1.1
Adobe Systems Incorporated
Addison-Wesley
ISBN 0-201-57044-0

VGA Programming

Michael Abrash's Graphics Programming Black Book
Michael Abrash
Coriolis Group Books
ISBN 1-57610-174-6

Programmer's Guide to the EGA and VGA Cards, Second Edition
Richard F. Ferraro
Addison-Wesley
ISBN 0-201-57025-4

Colophon

This manual was created using Microsoft Word 5.1a on a bizarre collection of computers consisting of a Macintosh Quadra 840AV, Power Macintosh 7100/66, and a PowerBook 5300cs. The body text is set in Times Roman and the chapter and section headings are set in Gill Sans. The examples and such are set in Courier, the Windows references are set in Monaco, and the Macintosh references are set in Chicago (what else).

The Microsoft Windows screen shots were captured by using PrintScreen to copy the screen to the clipboard and then converted to TIFF using Image Alchemy. The Macintosh screen shots were captured as PICT files, moved to the IBM PC, and then also converted to TIFF by Image Alchemy.

Camera-ready copy was produced by an HP LaserJet 4MV printer onto Hammermill Laser Plus® paper. The manual was then printed using standard offset printing techniques.

Index

Extensons

Numbers

A

B

C

D

E

F

G

H

I

J

K

P

Q

R

S

T

U

V

W

X

Y

Z