

Image Alchemy tm

Version 2.2

Macintosh

Handmade Software, Inc.

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Printed in the United States of America.

First Printing, March 1998.

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Introduction to Image Alchemy 2.2

Image Alchemy?

The name was chosen to honor the memory of mediaeval alchemists who sought to convert lead into gold. True to their spirit, Image Alchemy provides the catalyst for converting images into profit.

Image Alchemy can take small images, scale them up, and output them to wide format printers and plotters. Image Alchemy can take large images and scale them down for presentation on web pages. Image Alchemy provides an easy to learn interface for doing these kinds of jobs with individual files or hundreds, thousands, even millions of files.

Image Alchemy batch processes images. Scripts to perform repetitive graphics processing, manipulation and translation jobs can be easily recorded.

Image Alchemy automatically recognizes 88 different bit-mapped graphics and animation formats including all their color space and compression variations.

Simple chores such as creating the best palette for a series of images, and then mapping all the images to it, can be performed without any need for scripting.

Sophisticated scripts can perform any combination of batch scanning, converting, ICC color matching, dithering, printing and archiving with the click of a mouse.

Please call Customer Support and let us help you get the most out of Image Alchemy. Telephone (510) 252-0101 from 8:30 am to 5:00 pm Pacific Time. Or email support@handmade.com.

Your questions and comments are very important to us and we appreciate hearing from you.

Installing Image Alchemy

Overview	Installation of Image Alchemy is straightforward; it involves running the Image Alchemy Installer on the floppy disk.
Required equipment	At a minimum you must have the following hardware and software to run Image Alchemy.
Computer	Any 68020/68030/68040 or PowerPC based Macintosh with at least 8MB of RAM.
Disk space	Alchemy sometimes uses space on your hard drive while converting images. You should have at least 4 times as much disk space available as the image you are converting. This is calculated in the following way: a 640x480 full color image requires 640x480x3(bytes per pixel), or about 1MB. So to convert that image requires, at the most, about 4MB of disk space.
Operating system	Mac OS version 7 or later. Applescript is necessary to use Image Alchemy's scripting capabilities. ColorSync 2.0 or greater is necessary to use Image Alchemy's ICC color matching capabilities.
Installation instructions	Simply launch the "Image Alchemy Installer" by double clicking on its icon.

Starting Image Alchemy

To start Image Alchemy, double click on the Alchemy icon.

Introduction

The Manual

This manual serves three purposes. The first is to explain to you how to use Image Alchemy to your best advantage. The second is to provide a basic education on the specialized topics pertaining to image transfer. The third is to function as a beginning reference source for these topics.

The manual is divided into seven sections: The Introduction, The File Menu, The Edit Menu, The Image Menu, The Display Menu, The Script Menu, and Appendices.

The Introduction will orient you to Image Alchemy and its manual and includes installation. The Appendices provide detailed ancillary information, and references. The Menus, described below, explain Image Alchemy and provide enough information for you to make reasoned choices when you encounter any options while using Image Alchemy.

Menus



There are five menu headings in Image Alchemy.

The File menu controls converting images (including compression), getting information about an image, and printing.

The Edit menu contains the standard Macintosh functions of Undo, Cut, Copy, Paste, and Clear.

The Image menu allows you to control the color palette, bit depth, and other aspects of transferring images.

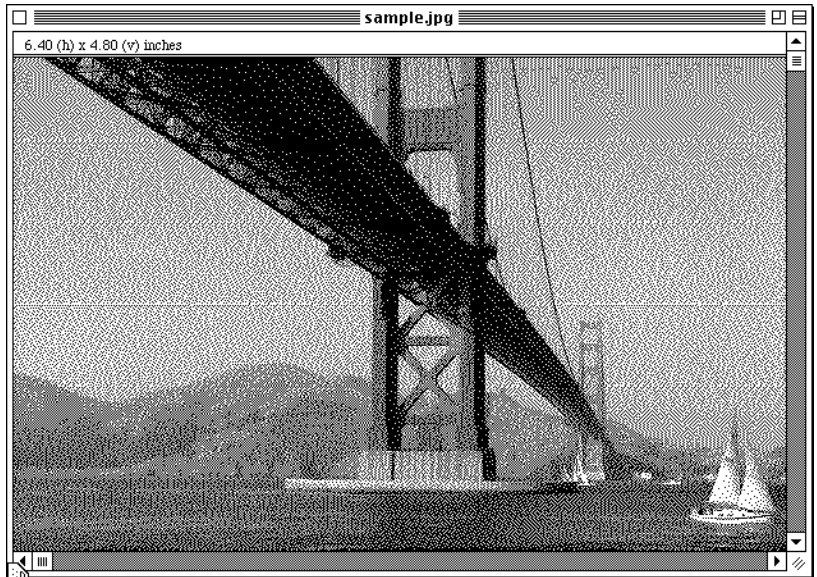
The Display menu controls displaying the image on the screen.

The Script menu controls creating scripts to automate your Alchemy jobs.

Converting or compressing images involves using Open and Save to go from one format to another. Opening and Saving are discussed in Chapter 4.

Changing color spaces involves additional decisions to obtain the best possible output. Color management and other topics related to optimizing output are covered in Chapter 5.

Images



Once you have opened an image it will appear in a window. This window may be moved or resized by using the mouse.

Image Alchemy allows you to have multiple images open at one time. However, when performing various operations, such as scaling, or saving, only the currently selected image is affected. The currently selected image is the one with a striped title bar.

If you wish to select another image that is also open, click the mouse button in the image display area. This also causes the information in any open dialogs, such as the Get Info dialog, to be updated.

Multiple Operations

To preserve the best quality Alchemy performs all operations on the original image.

Example

If you load an image that is 640x480, scale it to 64x48 and then scale it to 320x240, the results would be the same as if you had scaled the image directly from 640x480 to 320x240.

File Format Limitations

Some file formats have limitations. For example, PCL files are always black and white, 1 bit per pixel. If you save a color image as a PCL file Alchemy will automatically perform the operations required.

Details about each file format, including any limitations, are in Chapter 4.

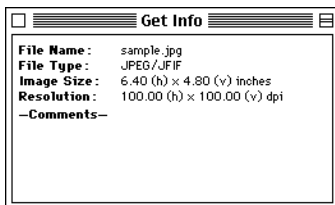
The File Menu

The File Menu: General Options

Introduction

Image Alchemy has several options that control the way it operates and displays information about a file. These options do not affect the conversion of the image. They are “Get File Info”, “Get Info for Current File”, and “Options”.

Get File Info



Choosing Get File Info will allow you to select a file and get information about it without opening it. This information includes the width, height, and resolution.

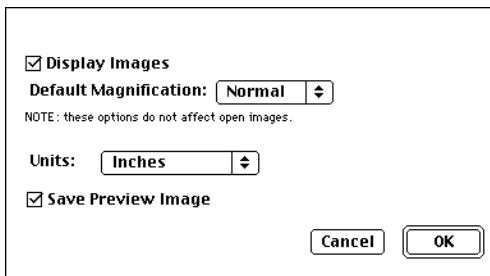
Get Info for Current File

Choosing Get Info for Current File gets information for the currently opened and selected image.

Options

These are settings that control how Image Alchemy operates; they are remembered between sessions. There are four different Options dialogs in Image Alchemy, and five in Image Alchemy PS.

General



Display Images

When this option is checked images will be displayed automatically when they are opened. When it is not checked they will not be automatically displayed. Turning Display Images off will enable faster conversions. This can be overridden for individual images with the Display menu, discussed later.

Unchecking the “Display Image” box is recommended when scripting conversions and when viewing is not required.

Default Magnification

This option allows you to select the initial magnification for viewing images.

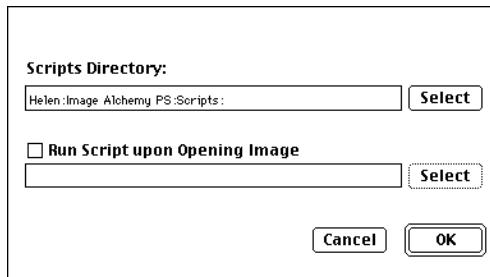
Units

This option allows you to select the units that will be used to display and change image dimensions.

Save Preview Image

This option causes Alchemy to generate a thumbnail for each saved image to use as an icon. If Quicktime is installed, a preview image for those programs that support them is also produced.

Scripts



Scripts Directory:
Helen:Image Alchemy PS:Scripts: Select
 Run Script upon Opening Image
Select
Cancel OK

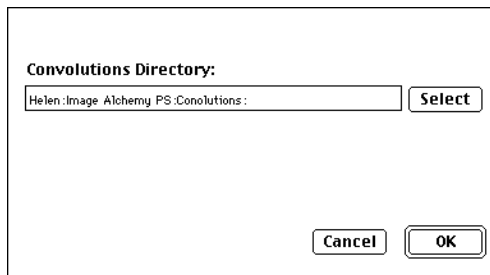
Scripts Directory

This allows you to specify the default location of your scripts. For example, if all your scripts are kept in a folder called Alchemy Scripts, specifying this in Scripts Directory will allow Alchemy to open this folder whenever you select “Execute Script” under the Script menu.

Run Script Upon Opening Image

This option allows you to select a specific script to be run whenever an image is opened.

Convolutions

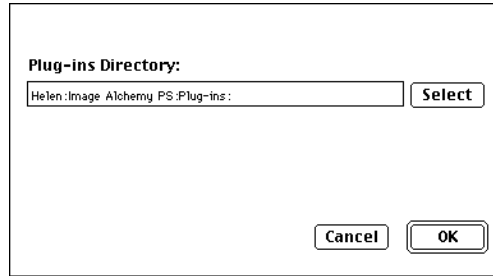


Convolutions Directory:
Helen:Image Alchemy PS:Convolutions: Select
Cancel OK

Convolutions Directory

This allows you to specify the default location of your convolutions. For example, if all your convolutions are kept in a folder called Alchemy Convolutions, specifying this folder will allow Alchemy to open this folder whenever you select “Specify” under the “Convolve...” sub menu in the Image menu.

Plug-ins

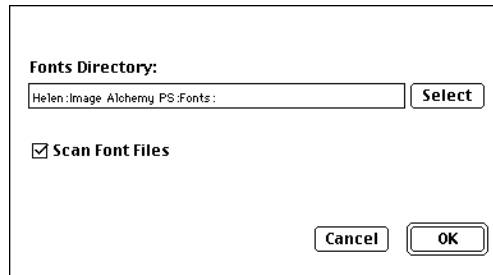


The screenshot shows a dialog box titled "Plug-ins Directory:". It contains a text input field with the path "Helen:Image Alchemy PS:Plug-ins:" and a "Select" button to its right. At the bottom of the dialog, there are "Cancel" and "OK" buttons.

Plug-ins Directory

This allows you to specify the location of your plug-ins. For example, if all your plug-ins are kept in a folder called Alchemy Plug-ins, specifying this folder will cause Image Alchemy to scan that folder for plug-ins to put in the Import and Export menus.

Postscript (Image Alchemy PS Only)



The screenshot shows a dialog box titled "Fonts Directory:". It contains a text input field with the path "Helen:Image Alchemy PS:Fonts:" and a "Select" button to its right. Below the input field, there is a checked checkbox labeled "Scan Font Files". At the bottom of the dialog, there are "Cancel" and "OK" buttons.

Fonts Directory

This allows you to specify an additional location for Image Alchemy PS to search for PostScript type 1 fonts. Normally, Image Alchemy PS will search the Fonts folder located where the Image Alchemy application is, the System fonts folder, and the Fonts folder located where the document being opened is. The folder specified here is also searched.

Scan Font Files

Image Alchemy PS can make use of any PostScript type 1 font. Fonts that are designed for the Macintosh follow a naming convention that allows Image Alchemy PS to find them based entirely on the file names. Fonts for other platforms do not follow those conventions. Image Alchemy PS needs to scan those fonts to be able to use them. Since this takes additional time and is not necessary if you are using only Macintosh fonts, Image Alchemy PS allows you to turn font scans off.

The File Menu: Opening and Saving Images

Introduction

The File menu handles the image file management. The File menu includes the functions Open Several..., Open..., Import, Save, Save As..., Save a Copy..., and Export.

Converting or compressing images involves using one of the Open and any of the Save options to go from one format to another. Opening and Saving are discussed in this chapter.

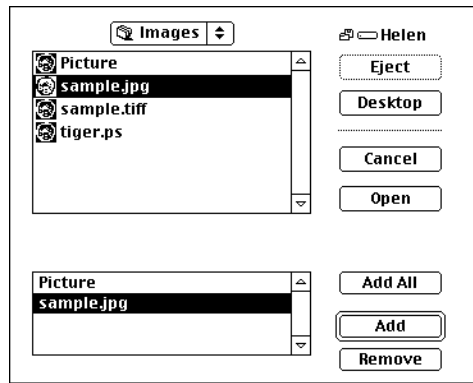
Changing color spaces might involve additional decisions to obtain the best possible output. Color management and other topics related to optimizing output are covered in Chapters 7 and 8.

Opening Images

Opening an image is the first step in converting it to a different format, compressing it, or performing any of the other function which Image Alchemy allows.

Open Several

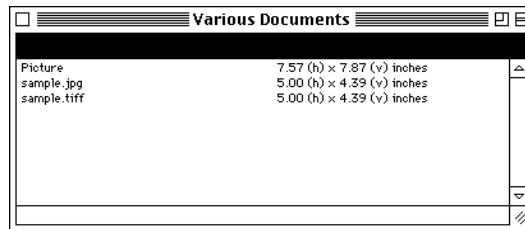
The Open Several command allows the user to select multiple files for batch processing.



An image is selected with a double-click or it can be selected by a single mouse-click, then the “Add” button pressed. The file name then appears in the bottom box.

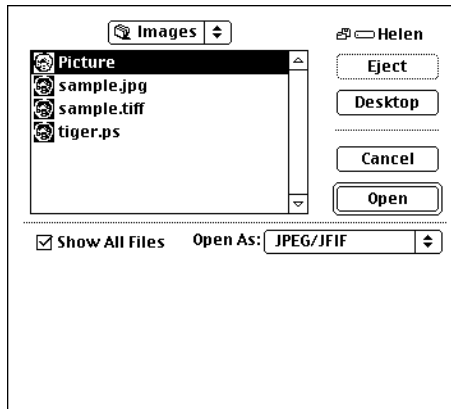
This process is repeated until all images which need to be converted are added.

At this point, “Open” is selected, and the files ready for batch processing will be displayed in a window called Various Documents.



Anything from the Image menu, and all the enabled items in the File and Edit menus can be performed on these files.

Open Dialog Box



An image is selected with a single mouse-click, then the “Open” button pressed, or it can be double-clicked.

Alchemy will automatically determine the format of the file. Unless Alchemy incorrectly identifies a file it is best to leave the format selection alone.

If the image is not displayed when opened, selecting “Show Image” under the Display menu will show the image. If it is not displayed because Image Alchemy is low on memory, selecting a smaller display magnification under the Display menu may help.

NOTE: There is a check box that controls the default for whether or not each image is displayed upon opening. This check box is located in the File Menu, under the “Options” sub menu.

Input Options

If there are options when opening an image, Image Alchemy displays them in the same dialog box. Please consult the individual format types for explanations of the input options.

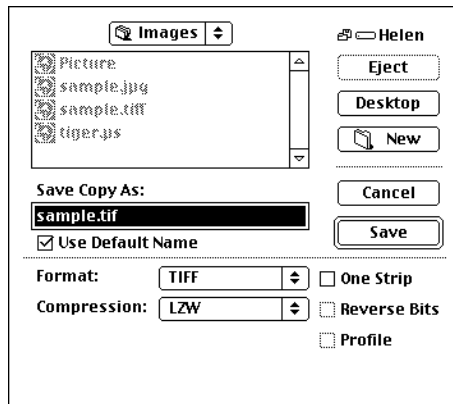
Import

Images may also be imported from Photoshop Import/Acquire plug-ins. Any Import/Acquire plug-ins in the folder specified in the Plug-ins options dialog will be listed under the Import menu.

Saving Images

Images are converted by saving them to the desired format with the desired compression.

Conversion



The Save A Copy... dialog box allows the user the standard Macintosh feature of renaming the file and saving it in an appropriate location.

Save As... is similar to Save a Copy..., but after saving the image, it replaces the current image with the one you just saved. This means Save As... is restricted to formats that Image Alchemy can read and write, not just write, and it is slower than Save a Copy...

Compression

Compressing files is accomplished by selecting the relevant type of compression in the particular image format. Although many formats allow compression types, there are a few which work best most of the time.

We recommend the following choices when compressing different bit-depth images.

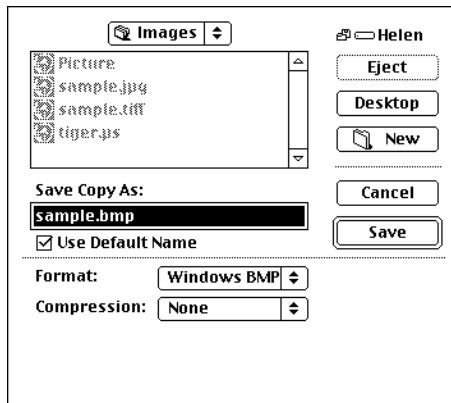
For 24-bit (true color) images, if lossy compression is acceptable, the best choice is JPEG. If compression must be non-lossy, TIFF LZW is probably the best choice.

For 8-bit (paletted and gray scale images) the best choice for non-lossy compression is GIF LZW. If lossy compression is acceptable, then JPEG will compress the image further.

For 1-bit (black and white) either CALS Group 4 or TIFF CCITT Group 4 compression for non-lossy compression.

Output Variations

Compression types are one form of Output Variation. Some of the output formats have several variations; in those cases you can choose among the variations in the save dialog.



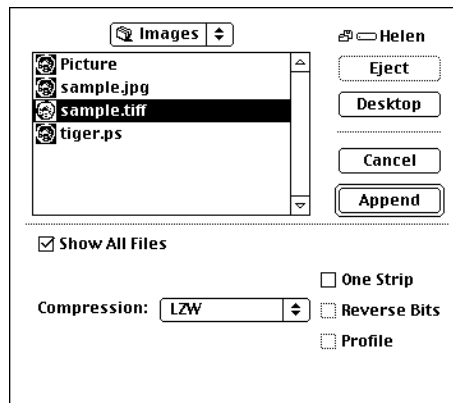
Example There are two types of Bitmap files: uncompressed and Run-Length-Encoded (RLE). To write out an uncompressed Bitmap file select the None option; to write out an RLE Bitmap file select the RLE option.

Further Variations Be aware that other options also affect the type of file that is generated. In particular, the number of colors in the image often affects the type of file that is saved. Alchemy always generates a file using the best match of the output file format and the image.

Example Within the Windows Bitmap file type there are 1 bit, 4 bit, 8 bit, and 24 bit 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. If the output image is true color a 24 bit file is generated.

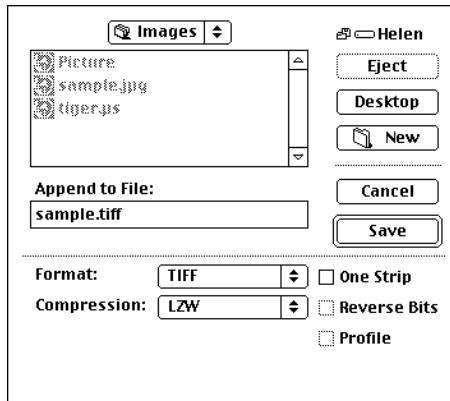
Append Some image formats allow for more than one image per file. Image Alchemy can be used to add images to those files with the Append dialogs.

Append to Existing File



This dialog allows you to select an existing file to append to. It is similar to the Save As... and Save a Copy... dialogs, but does not allow you to specify a new filename, or a format.

Append to New File



This dialog allows you to create a new file to append to. If you are saving a single image, this is equivalent to using Save a Copy... in any of the formats that support multiple images. If you are saving multiple images, opened with Open Several..., this will save all of the images to a single file.

Export Images may also be exported to Photoshop Export plug-ins. Any Export plug-ins in the folder specified in the Plug-ins options dialog will be listed under the Export menu.

Send to Device...

This option can be used to send an image directly to various devices. The image can be sent through a parallel port for NuBus Macs equipped with a Hurdler parallel board, to Axis, JetDirect, Milan, and NetQUE interfaces from any Mac with Open Transport installed. and to any device supported by the Communications Toolbox. Images may be sent to a device in any of the following formats:

- Alps
- Calcomp CCRF
- Encapsulated PostScript
- Epson Stylus
- Fargo Primera
- HP PCL
- HP PhotoSmart
- HP RTL
- Raster Graphics

Choose a device:

Serial

New

Edit

Remove

Save

Cancel

Send

Format: HP RTL On the Fly

Device: DesignJet (3...)

Type: Non-Planar

Compression: PackBits

If the computer is equipped with a Hurdler parallel port, it will show up in the device list automatically. Any other devices must be added before they can be used. You do this with the New button:

Device: Serial Tool

Name: Serial

Type: CTB Connection Tool

Choose Cancel OK

For AppleTalk and Communications Toolbox devices, use the Choose button to select from a list of available devices. For TCP devices (JetDirect, Axis, and Milan in TCP mode), the Device field should be set to the IP address or the full name of the device. For the Axis, this may optionally be followed by a port name separated by a ':'. (typically pr1). Also for the Axis, the port name may optionally be followed by a password, separated by a ':'. For any of the TCP modes, please see the bootp documentation in the Extras folder that came with Image Alchemy for additional information on configuring TCP devices. The Name field is the name that will appear in the Send to Device... dialog.

The Edit button will allow you to edit an existing device, and Remove removes the selected device. Use the Save button after adding, editing, or removing a device to save your changes for next time.

Identifying image files

Alchemy will allow you to attempt to load a file with any extension. In fact, the extension is ignored by Alchemy. Instead, 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 attempts to determine the image type. It is possible for Image Alchemy to incorrectly identify an image; if this happens please contact us.

MacBinary

When reading images Alchemy automatically recognizes and reads MacBinary files (MacBinary files are generated when files are transferred from a Mac to a non-Mac, with MacBinary mode on).

Other information

Alchemy will preserve as much information in each file as is reasonable; 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, and resolution values.

Formats

The individual formats supported by Alchemy are described in alphabetical order on the following pages. The descriptions are given in the template shown on the next page as “Name of format”.

Name of format

The save dialog showing the format selected and available output options.

Input Options

A description of the input options. These include things like which page for file formats that can include multiple images. If a file format does not have any options this section is omitted.

Output Options

A description of the output options. These usually indicate the compression type. If a file format does not have any options this section is omitted.

Extension

The standard extensions for this format. If you have Use Default Name in the save dialog checked, most formats will add one of the extensions listed here to the filename. In general you will not want to alter this extension, since many programs on other computers rely on it when reading images.

Some formats consist of multiple files (for example, Dr. Halo CUT images consist of a palette file and an image data file); in those cases, Alchemy automatically generates the other filenames from the filename given.

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 supported variations.

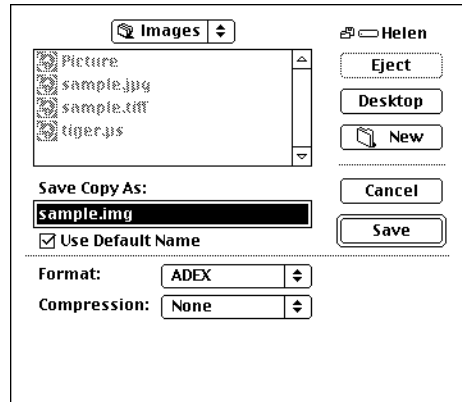
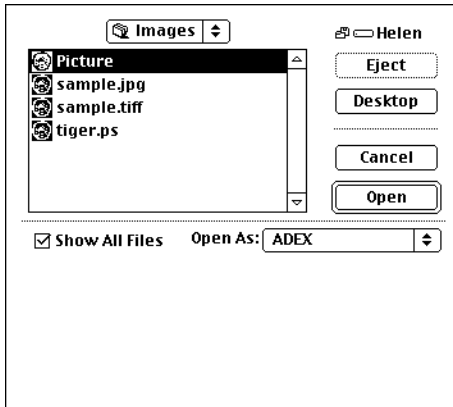
Limitations

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

Comments

Miscellaneous things you should be aware of.

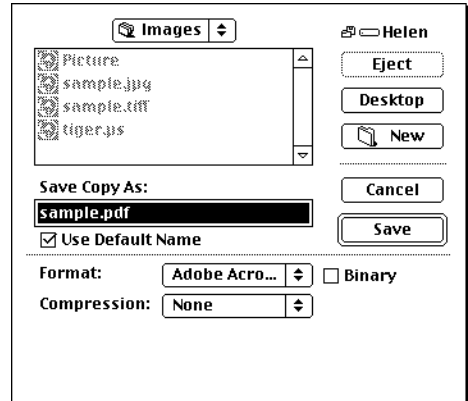
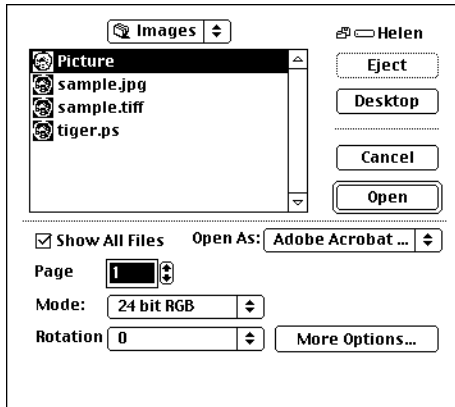
ADEX files are used by the ADEX Corporation ChromaGraph series of graphics cards.



Output options	None Run Length Coded
Extension	.img
Creator	ADEX Corporation
Used by	ADEX ChromaGraph cards
Variations	Alchemy reads and writes 4 bit and 8 bit images.
Comments	Some ADEX files do not contain a palette; in those cases there is usually a second ADEX file which contains the palette to be used. To read those images that do not have palettes, use the false color option on the palette panel to read the palette from a separate file.

Adobe Acrobat PDF

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



Input Options (Image Alchemy PS Only)

Please see the Encapsulated PostScript section for a description of the input options.

Output Options

Compression:
None
Run Length Coded
CCITT Group 3
CCITT Group 4
Binary

Extension

.pdf

Creator

Adobe Systems Incorporated

Used by

Adobe Acrobat

Variations

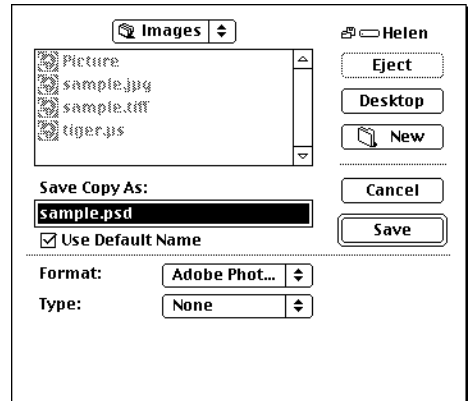
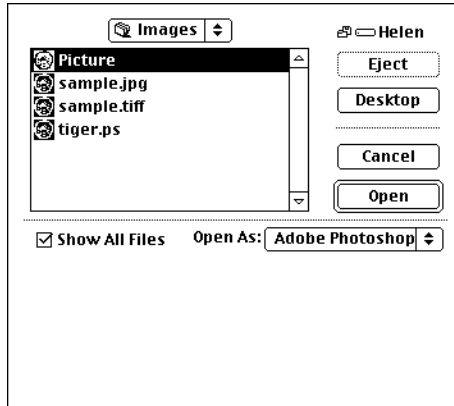
Writes 1 bit black and white, 8 bit gray scale, 8 bit paletted, and 24 bit color images. Group 3 and Group 4 compressed images must be black and white.

Limitations

The standard version of Image Alchemy cannot read PDF files (Image Alchemy PS can).

Adobe Photoshop

Adobe Photoshop files are used by Adobe Photoshop.



Output Options

Compression:

None

Run Length Coded

Extension

.psd

Creator

Adobe Systems Incorporated

Used by

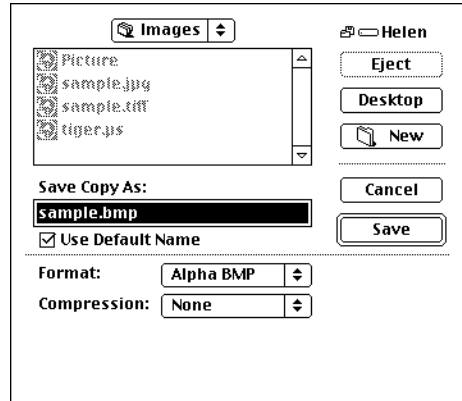
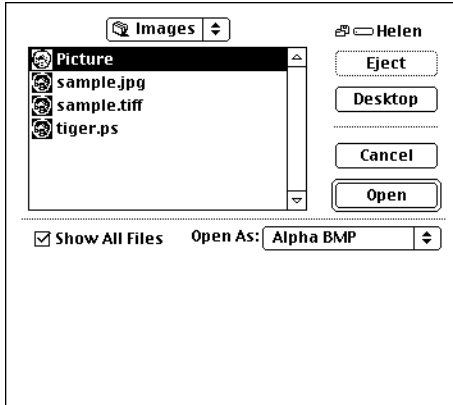
Adobe Photoshop

Variations

Writes 8 bit gray scale, 24 bit RGB, and 32 bit CMYK images.

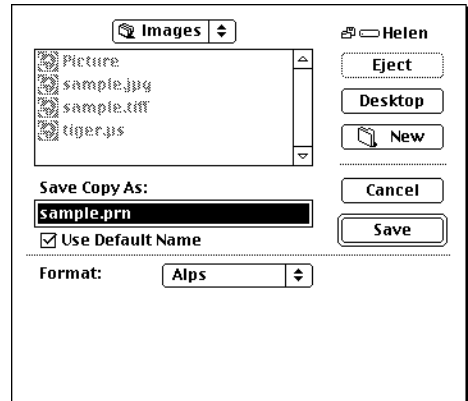
Alpha Microsystems BMP

Alpha Microsystems BMP files are used by Alpha Microsystems.



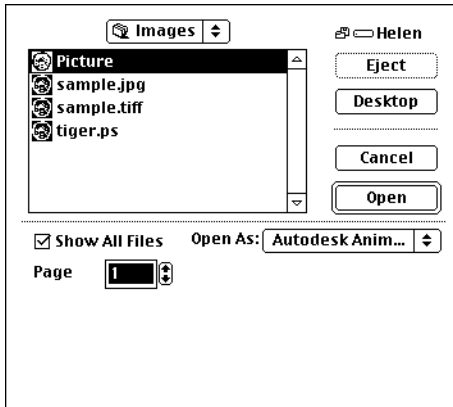
Output Options	None Packed
Extension	.bmp
Creator	Alpha Microsystems
Used by	Alpha Microsystems workstations
Variations	Alchemy reads and writes 1, 4, 8, and 24 bit unpacked and packed (run-length encoded) RGB images.
Limitations	Reading and writing HLS images is not supported.
Comments	When reading an image without a palette Alchemy will generate a gray-scale palette.

Alps



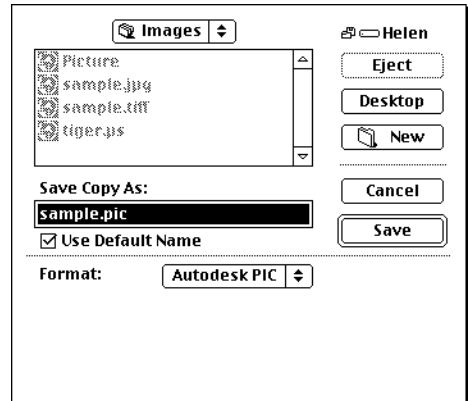
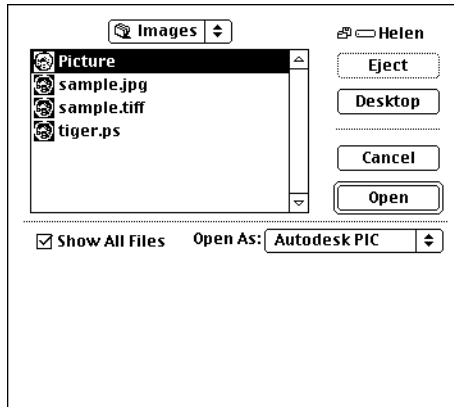
Extensions	.prn
Creator	Alps
Used by	Alps printers
Variations	Writes 1 bit black and white and 4 bit CMYK.
Limitations	Image Alchemy can only write, not read, this format.

Autodesk Animator FLC



Input Options	Page
Extensions	.flc
Creator	Autodesk
Used by	Autodesk Animator
Variations	Reads 8 bit paletted images.
Limitations	Image Alchemy can only read, not write, Autodesk FLC files.
Comments	When reading more than one image from a FLC file, it is most efficient to read them in ascending order.

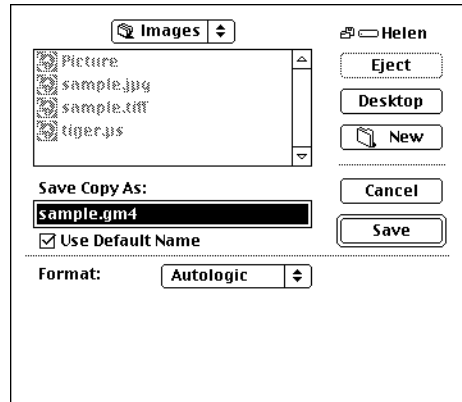
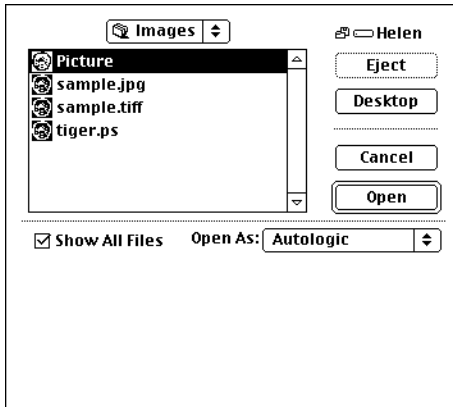
Autodesk PIC



Extensions	.pic
Creator	Autodesk
Used by	Autodesk Animator
Variations	Reads and writes 8 bit paletted.
Comments	This is format is only used by old versions of Autodesk software. Newer versions use Autodesk Animator FLC instead.

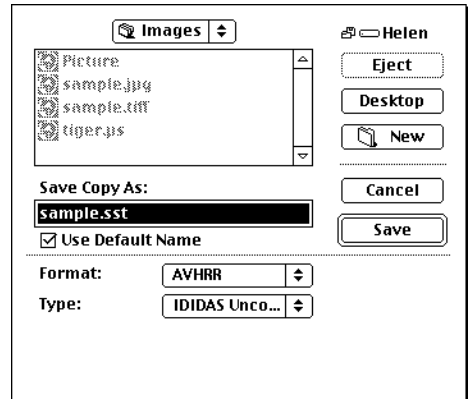
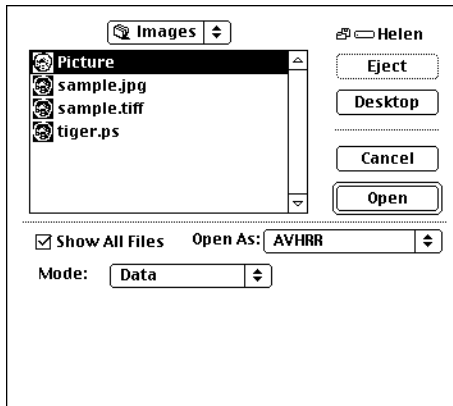
Autologic

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



Extension	.gm
Creator	Autologic, Incorporated
Used by	Autologic typesetting equipment
Variations	Graphics modes 2 (black/white) and 4 (gray-scale) are supported.
Limitations	Only the High Speed Interface inline format is supported. When reading, images must be preceded by a Graphics Parameter Block.

AVHRR files are used for satellite image data.



Output Options	IDIDAS Uncompressed IDIDAS Compressed Type 1
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.

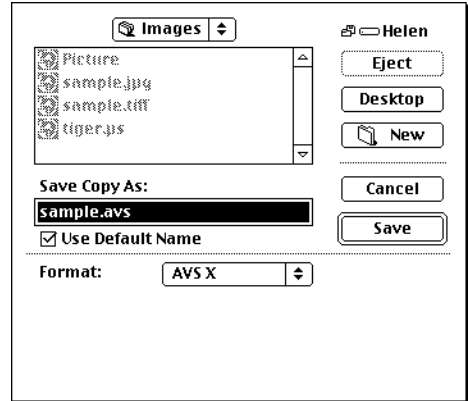
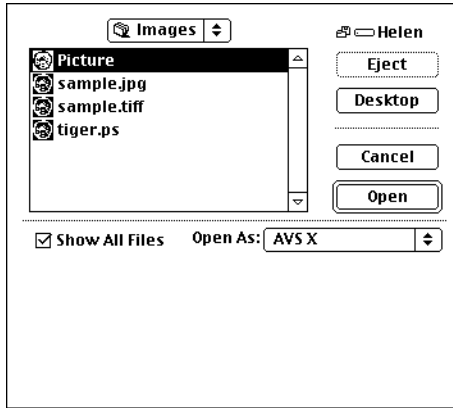
Alchemy discards all but the top 8 bits when reading 11 bit AVHRR files. When writing, the bottom 3 bits are padded with 0.

Any non-graphics information is discarded when reading the 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.

AVS X



Extensions

.avs

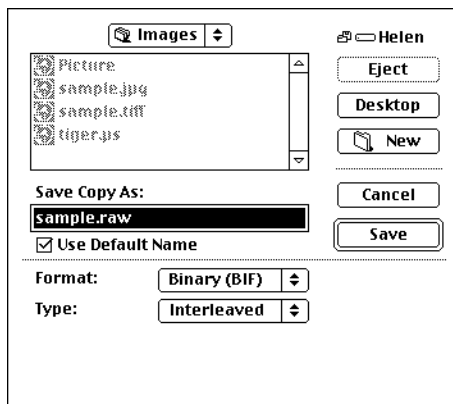
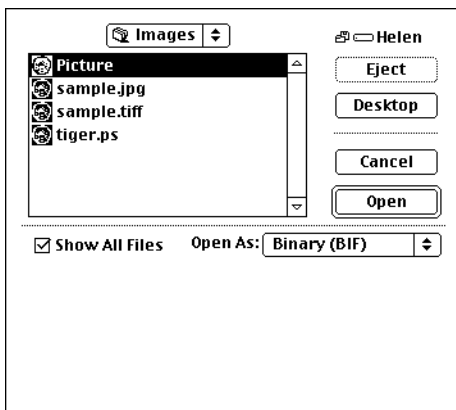
Variations

Reads and writes 24 bit color with an alpha channel.

Binary Information Files (BIF)

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.

BIF files are a method which can be used to allow Alchemy to read these images. BIF files can also be created to allow images to be read by software which expects images to be just pixels. Since required information, such as the height and width of the image, are not present in these files you must supply it.



Output Options

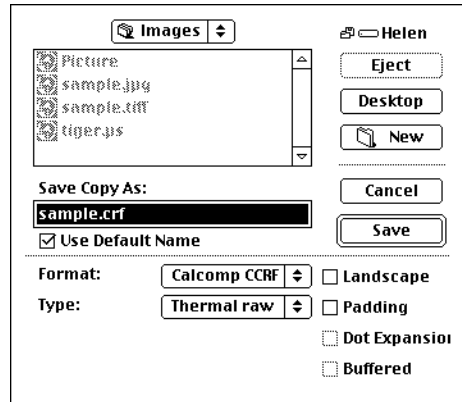
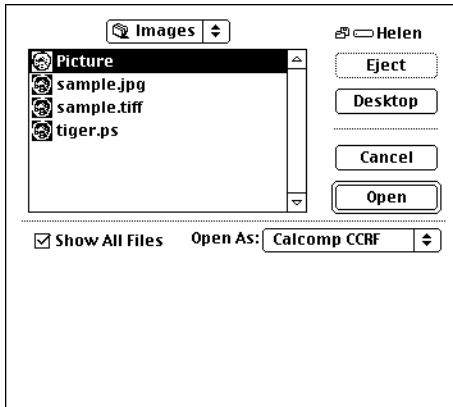
Type:

- Interleaved
- Planar
- ASCII
- Packed
- Group 3
- Group 4
- Group 4 with bits reversed

Extensions	.bif For the ASCII file describing image. .raw For the 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. Group 3, Group 4, and Packed BIF files are always 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 False Color option). Image Alchemy cannot read BIF files created with the ASCII 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.

Calcomp CCRF

Calcomp raster files are used by Calcomp thermal transfer printers, electrostatic plotters, and inkjet plotters.



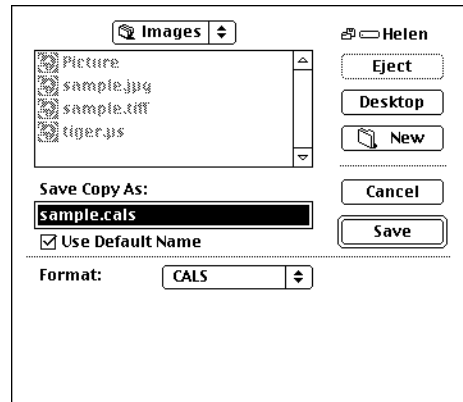
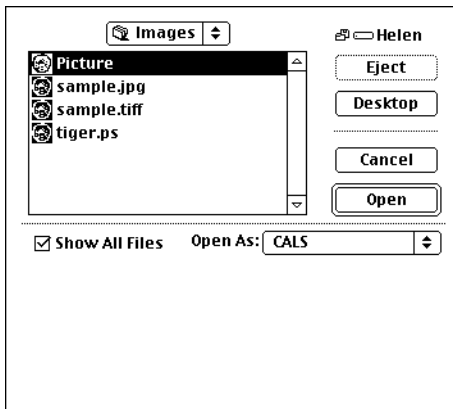
Output Options

Type:

- Thermal Raw
- Thermal (omit white space)
- Thermal (rle)
- Electrostatic 8
- Electrostatic 16
- Electrostatic 32
- Inkjet 8
- Inkjet 16
- Inkjet 32
- Landscape
- Padding
- Dot Expansion
- Buffered

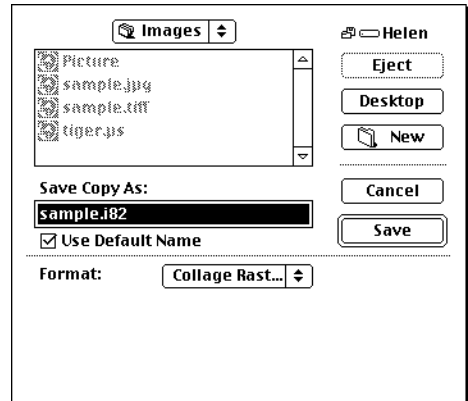
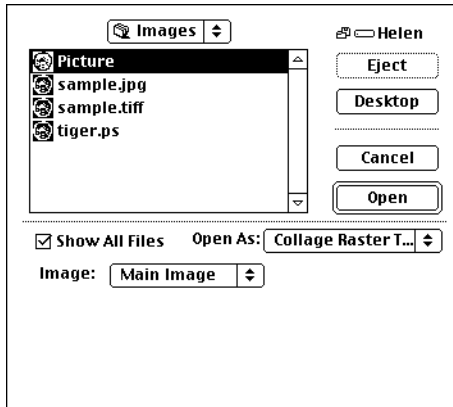
Extension	.crf .ccrf .prn
Creator	Calcomp
Used by	Calcomp thermal printers, electrostatic plotters, and inkjet plotters
Variations	Black and white or 1-bit CMYK. The Landscape and Padding options only apply to thermal transfer printers. Landscape causes the printer to use landscape instead of portrait orientation. Padding may be required by certain older models; we only recommend you try this if you find your printer does not work without it. Dot Expansion and Buffered apply only to Electrostatic and Inkjet devices. Dot Expansion causes the plotter to run at half resolution, printing a 2x2 dot for each dot you send it. Buffered causes it to attempt to buffer the entire image before starting to print.

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.



Extension	.cals
Creator	Defense Logistics Agency (DLA)
Used by	Department of Defense (DoD)
Variations	Alchemy reads and writes 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.

Collage Raster



Input Options

Image:
Main Image
Preview

Extensions

.?

Variations

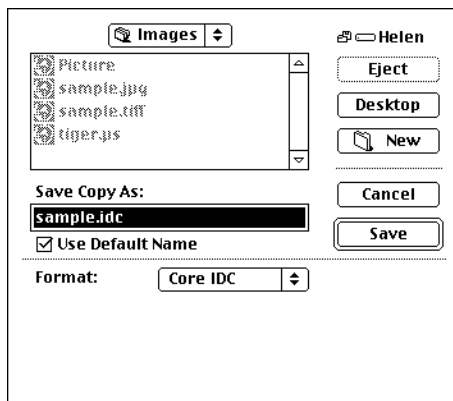
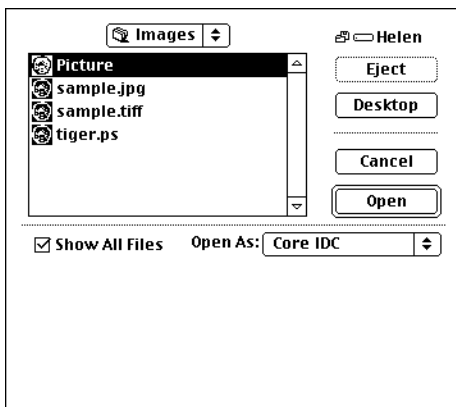
Reads and writes 8 bit grayscale, 24 bit color, and 24 bit color with an alpha channel.

Comments

The filename extension expected by Collage software is dependent on the rest of the filename. Image Alchemy will generate the appropriate extension if "Use Default Name" is on.

Core IDC

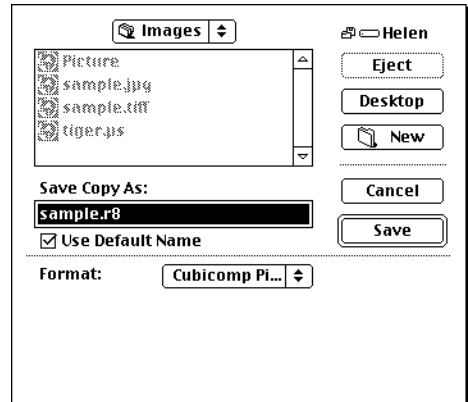
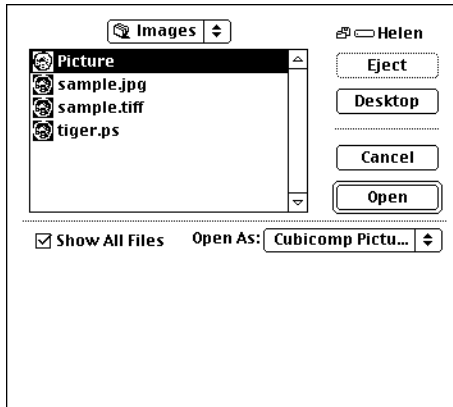
Core IDC files are used by Core Software's GIS software.



Extension	.idc
Creator	Core Software Technology
Used by	Core Software Technology
Variations	Reads and writes 1 and 3 band files. Reads and writes 8 bit files.
Limitations	Only 8 bit images can be read.
Comments	One band files are read in as gray-scale images. Three band files are read in as true color images.

Cubcomp PictureMaker

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



Extensions

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

Creator

Cubcomp Corp.

Used by

Cubcomp PictureMaker

Variations

Alchemy reads and writes 24 bit true color images.

Limitations

The Alpha channel is ignored.

8-bit paletted PictureMaker files are unsupported.

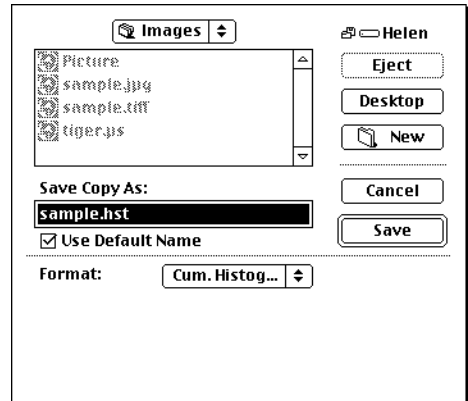
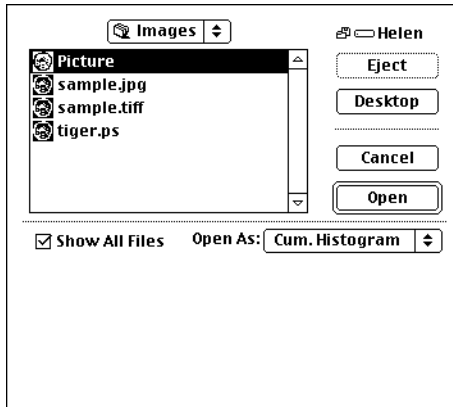
Comments

This format is not the same as IBM Picture Maker (see IBM Picture Maker, below, for information on that format).

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

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

Cum. Histogram



Extensions

.hst

Creator

Handmade Software, Inc.

Used by

Image Alchemy

Variations

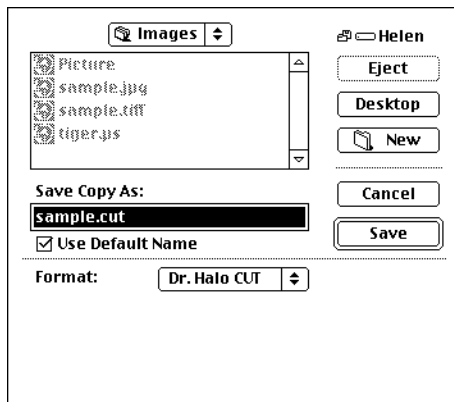
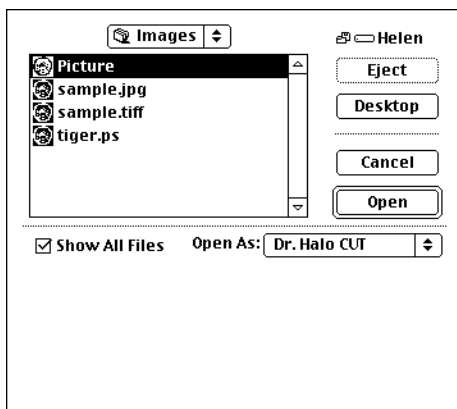
Reads and writes 24 bit color.

Comments

This format can be used to manually create a single palette for multiple images. To do this, append each source image to a Cumulative Histogram file. Then convert the resulting file into a palette, and map the original images to the new palette.

Dr. Halo CUT

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

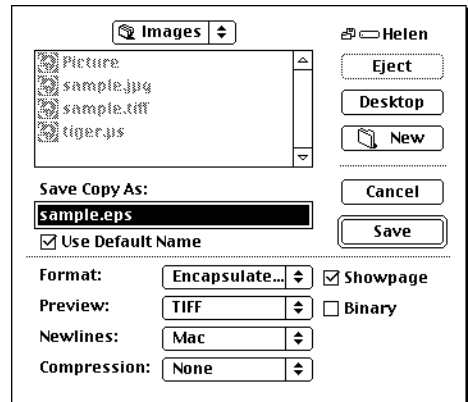
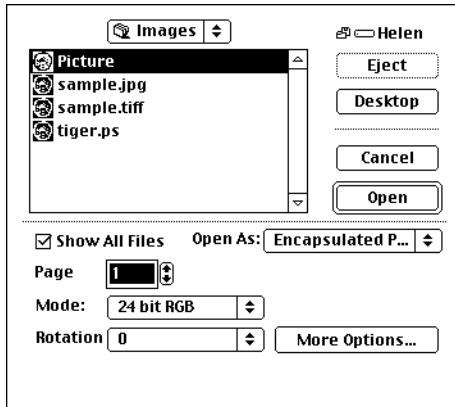


Extension	.pal (palette and header) .cut (pixel data)
Creator	Media Cybernetics
Used by	Dr. HALO III Paint Package HALO Desktop Imager
Variations	8 bits per pixel
Comments	Dr. Halo CUT images are actually two files. You specify the name of the .cut file and Alchemy automatically generates the name of the .pal file.

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

Encapsulated PostScript (EPS)

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.



Input Options (Image Alchemy PS Only)

(See comments below)

Page

Render Mode:

1 bit black and white

8 bit grayscale

24 bit RGB

4 bit CMYK

32 bit CMYK

Rotation:

0

90

180

270

More Options:

Output Size (Width & Height)

Page Size (Width & Height)

Offset (X & Y)

Margins (Left, Right, Top, & Bottom)

Resolution (X & Y)

Preload Fonts

Preserve Aspect Ratio

Clip

Antialias

Output Options

Preview:

None

Device independent Preview

TIFF Preview

NewLines:

Mac

Unix

MSDOS

Showpage

Binary

Extensions

.eps

Creator	Adobe Systems, Inc.
Used by	PostScript printers
Variations	Image Alchemy can write black and white, gray-scale, RGB, CMYK, and indexed images. The Preview option controls whether a preview is included in the file, and if so what type. The Showpage option causes Alchemy to include a showpage command in the file, allowing it to be printed directly. The Newline option controls what style newline is used in the file.
Limitations	The standard version of Image Alchemy cannot read EPS files (Image Alchemy PS can).
Input Comments (Image Alchemy PS Only)	See the section on the Options dialogs for information on font handling. See the Comments field in the Get Info... or Get Info for filename... dialogs for a list of any fonts that were not found.
Page	Page controls which page of the file to render. If you will be reading more than one page from a PostScript file, it is most efficient to read the pages in order.
Render Mode	The mode controls whether the file is to be rendered in black and white, 8 bit grayscale, 24 bit rgb, 4 bit cmyk, or 32 bit cmyk. 24 bit rgb and 32 bit cmyk will fall back to 8 bit grayscale if there is no color in the file. All of the modes will fall back to 1 bit black and white if there is no color or intermediate grays in the file. However the grayscale and color modes require more memory and processing time than black and white, even if they end up falling back to black and white. If the input file contains an Adobe ImageData comment, the initial render mode will be set to match the original image.
Rotation	Rotation can be used to rotate the image to any of four orientations. The image is rotated the specified number of degrees clockwise.

More Options

There are many additional options on the More Options... dialog:

Output Size		Margins	
Width:	<input type="text"/>	Left:	<input type="text" value="0.00"/>
Height:	<input type="text"/>	Right:	<input type="text" value="0.00"/>
(inches)		Top:	<input type="text" value="0.00"/>
		Bottom:	<input type="text" value="0.00"/>
(inches)		(inches)	
Input Size		Resolution	
Width:	<input type="text" value="7.57"/>	X-Offset:	<input type="text" value="0.31"/>
Height:	<input type="text" value="7.87"/>	Y-Offset:	<input type="text" value="-2.37"/>
(inches)		Horizontal:	<input type="text"/>
		Vertical:	<input type="text"/>
(inches)		(dots/inch)	
<input type="checkbox"/> Preload Fonts		<input checked="" type="checkbox"/> Preserve Aspect	
Anti-Alias	<input type="text" value="Off"/>	<input type="checkbox"/> Clip	
		<input type="button" value="Cancel"/> <input type="button" value="OK"/>	

The units used by the numeric fields above are controlled by the Units setting in the Files:Options:General Options... dialog. The size units can be overridden by following the number with a 'p' for pixels, 'i' for inches, 'c' for centimeters, or 'm' for millimeters. The resolution units may be overridden by following the number with a 'i' for dots per inch, 'c' for dots per centimeter, or 'm' for dots per millimeter.

Page Size & Offset

Output Size determines how large the rendered image will be. If it is left empty, it will default to the same as the input size.

Input Size is the page size as far as the PostScript or PDF file is concerned. It defaults to 8.5"x11", but the file can override the default.

The X and Y Offsets shift the page relative to the image to the right and down (for positive numbers). Alchemy will automatically fill in the offsets and input page size when you select a file that contains a bounding box in the header; you may override those values. Note that the input size and offsets are before any rotation (from the rotation option, above) is performed, and the output size is after.

Resolution The Resolution fields control the resolution the file will be rendered at. If the input file includes an Adobe ImageData comment the resolution fields will be filled in to match the original image resolution. If left empty, the resolution will default to 72DPI. It is possible, although very rare, for a PostScript file to override the default resolution. However, it can not override a resolution you explicitly set.

The default resolution of 72DPI is a good choice for rendering images to be used on the screen. If you are going to be sending them to a printer, you will probably want something higher, such as 300DPI.

The specified resolution will be the effective resolution at the output size. If you specify an output width of 2 inches and a resolution of 100dpi, you will end up with a 200 pixel wide image. If you specify an output width in pixels, then the image will be that many pixels across regardless of the resolution.

Margins The margins allow you to specify an area of the page that will not be drawn in, and will not be included in the output image. This can be useful if you are converting images to be sent to a device that has inherent margins; you can set the margins here to be equal to the device's margins so that the PostScript or PDF data will be the intended distance from the paper edge.

Preload Fonts This causes Alchemy to preload all of the fonts mentioned in the Fontmap. Normally Alchemy only loads fonts as needed; loading all of them can take quite a bit of time and memory. This is usually only useful for some very special purpose PostScript files, such as font catalogs.

Preserve Aspect This will cause the image to fit within a box you specified as the output page size, without distorting the image. For example, if the input page size is 8.5"x11", and you specify an output page size of 640x480 pixels with preserve aspect turned on, the resulting image will be 371x480 pixels.

Clip This will cause any white space to be trimmed from the edges of the image. This occurs after any scaling caused by the page size and resolution controls, so you will not necessarily end up with an image that is the same size as you specified in the output size fields.

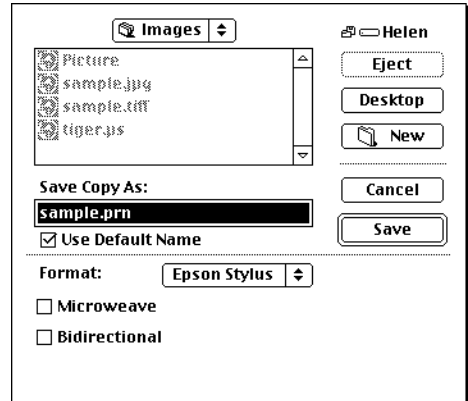
Anti-Alias Anti-Alias causes Alchemy to anti-alias the image. This is particularly useful when producing relatively low resolution output for use on a display; it will prevent the jaggy appearance of low resolution characters and other curves. A setting of medium is usually fine for use at typical display resolutions. Higher settings require more memory and processing time.

Output Comments If the output is gray-scale, it will work with any PostScript device. If it is true color, then the CMYK extensions or a level 2 device is required. For paletted files, a level 2 device is always required.

TIFF previews are more widely supported than device independent. The Showpage option should be harmless for images that will be imported into another application, as they are required to strip it out. However some applications fail to do so, so Alchemy provides the option whether to include it.

Epson Stylus

Epson Stylus files are used by Epson Stylus printers.



Output Options

Microweave
Bidirectional

Extension

.prn

Creator

Epson

Used by

Epson Stylus printers

Variations

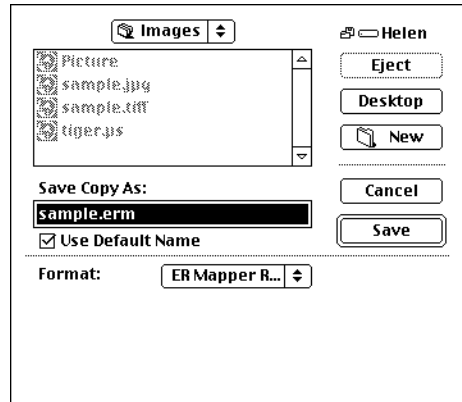
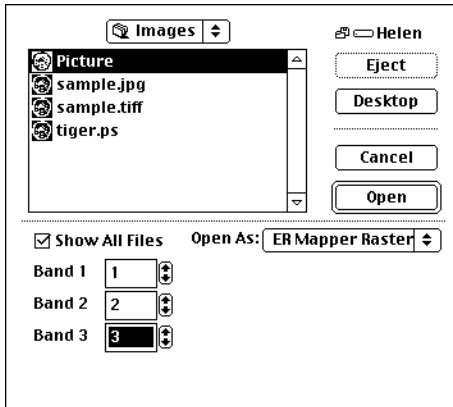
1 bit CMYK

Limitations

Epson Stylus files can only be 720, 360, or 180 DPI. If you specify any other DPI value the output file will automatically switch to one of those.

ER Mapper Raster

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



Extension	.ers	Header data
	.	Pixel data
Creator	Earth Resource Mapping	
Used by	ER Mapper	
Variations	Reads and writes single channel and 3 channel images.	
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-extended file contains the actual image data. You specify the name of the .ers file and Alchemy automatically generates the name of the other file.	

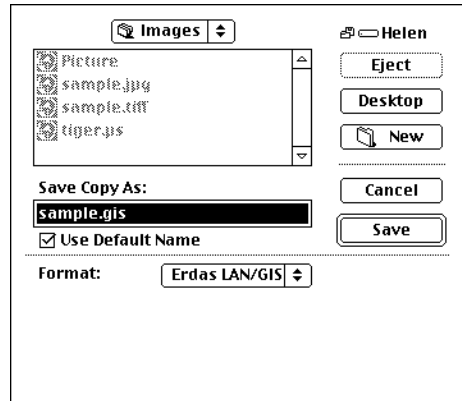
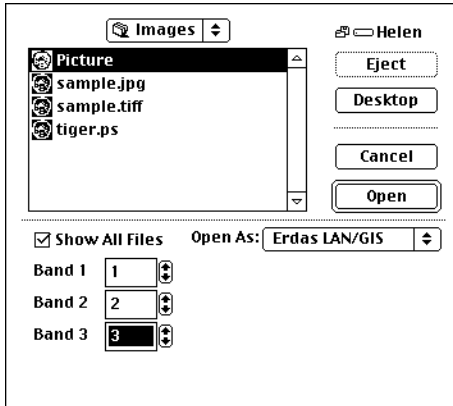
When writing an ER Mapper file Alchemy will overwrite, without warning, existing ER Mapper image data files.

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

Three 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.

Erdas LAN/GIS

Erdas files are used by Erdas image processing software.



Extensions

.lan

Creator

Erdas Inc.

Used by

Erdas remote sensing software

Variations

Alchemy reads and writes 1 and 3 band files.

Alchemy reads 4, 8, and 16 bit files and writes 8 bit 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.

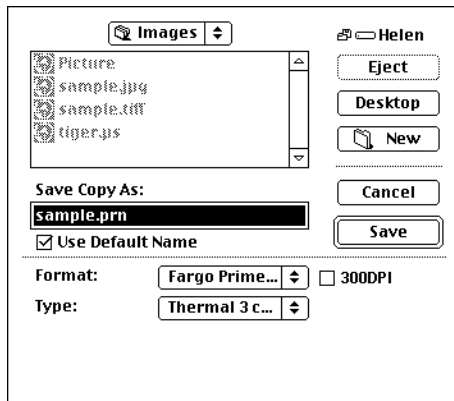
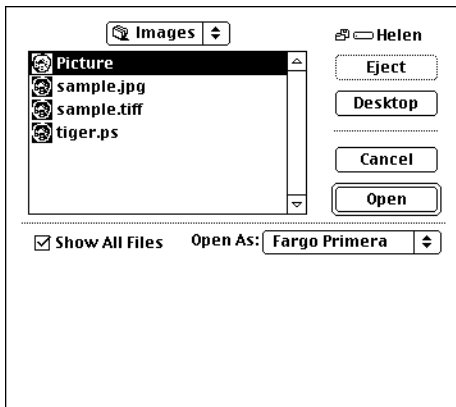
Comments

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

Three 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.

Fargo Primera

Fargo Primera files are used by Fargo Primera printers.



Output Options

Type:
Thermal 3 color
Thermal 4 color
Thermal BW
Dye Sub
Dye Sub BW
300DPI

Extension

.prn

Creator

Fargo

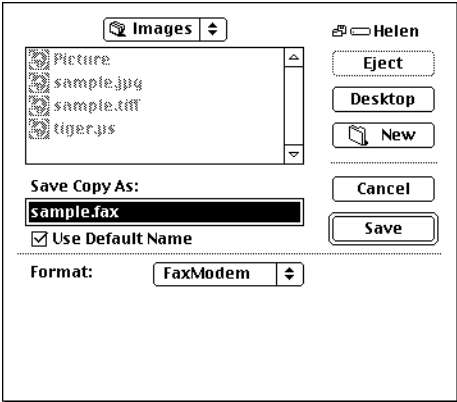
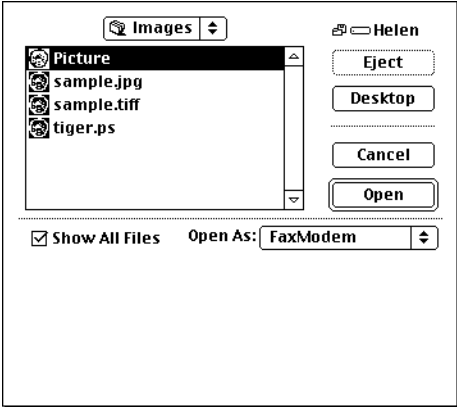
Used by

Fargo Primera printers

Variations

Black and white, 1 bit CMYK.

FaxModem



Extensions

.fax

Creator

Hayes

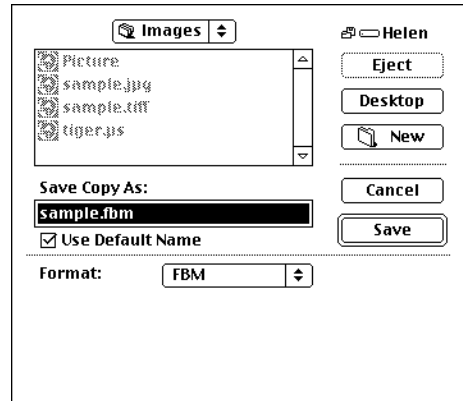
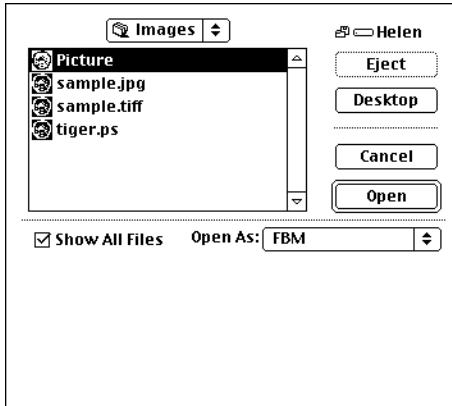
Used by

Hayes JT

Variations

Reads and writes 1 bit black and white.

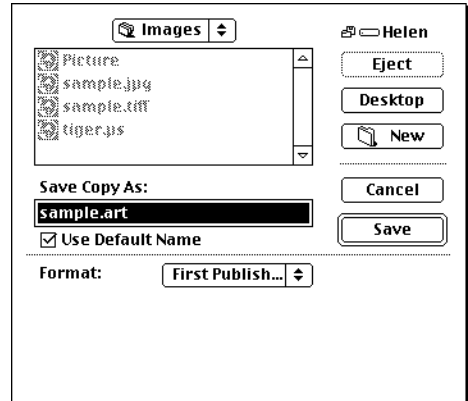
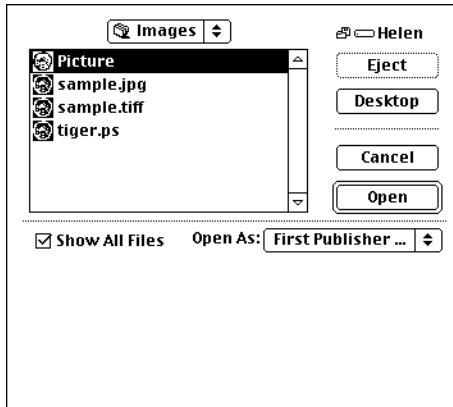
Fuzzy Pixmap Manipulation



Extensions	.fbm
Creator	Michael L. Mauldin
Used by	Fuzzy Pixmap image manipulation package
Variations	Reads and writes 8 bit paletted and 24 bit color.

First Publisher ART

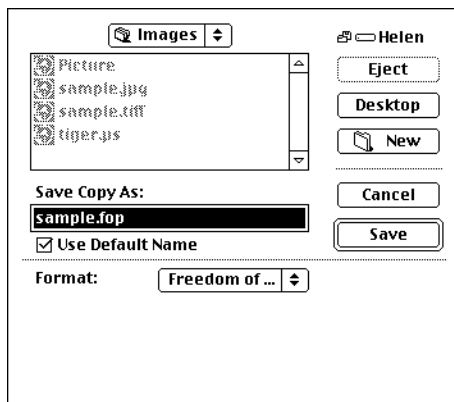
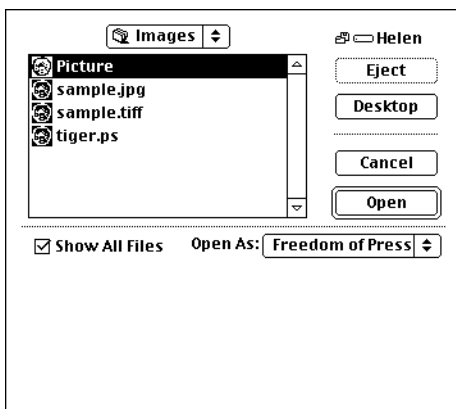
First Publisher ART files are black and white images used as clip art by First Publisher.



Extension	.art
Creator	Software Publishing Corp.
Used by	First Publisher
Variations	Black and white, 1 bit per pixel.

Freedom of Press

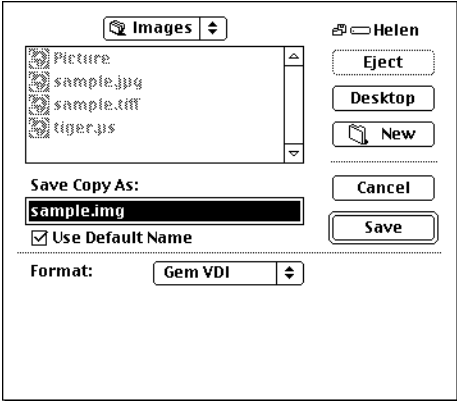
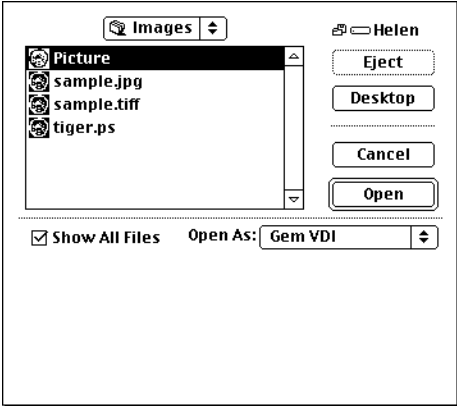
Freedom of Press is a PostScript interpreter from Custom Applications that converts PostScript files to raster files. The Freedom of Press format is one of the file types it can create.



Extension	.fop
Creator	Custom Applications
Limitations	Only 1 bit black and white and 4 bit CMYK are supported.
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 do not specify an extension, Alchemy will use .fop, so you will get two files named filename.fop and info.fop. Alchemy will overwrite info files without warning.

GEM VDI Image File

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



Extension	.img
Creator	Digital Research Inc.
Used by	GEM
Variations	Alchemy reads 1-8 bit grayscale and 3 and 4 bit color files. Alchemy writes 1, 3, and 4 bit grayscale and 3 and 4 bit color files.
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 can in fact handle them.

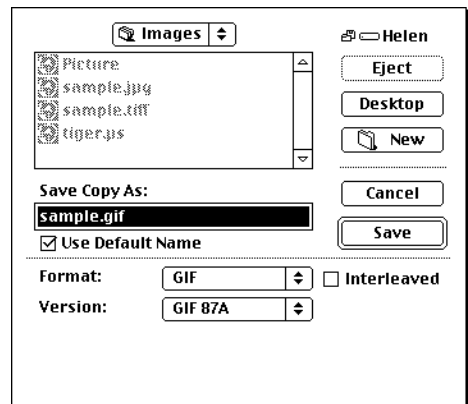
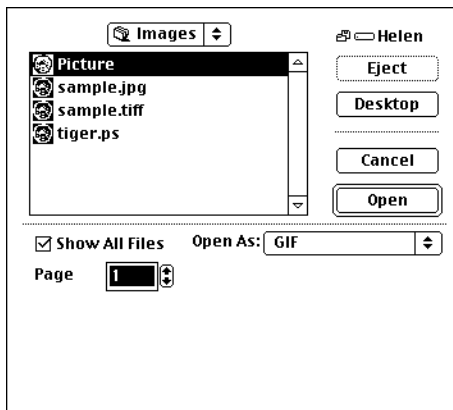
Alchemy defaults to writing out a 1 bit, black and white GEM file. You can explicitly force a 3 plane color file by specifying 8 colors and a 4 plane color file by specifying 16 colors (you may also specify black and white to write a grayscale file instead of a color file).

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.

GIF

GIF files were originally developed by CompuServe as a machine independent image file format. GIF files are clearly the most popular way of storing 8 bit, scanned or digitized images. In addition the compression ratio achieved by GIF files is usually better than any other 8 bit format in common use. GIF89A files were introduced in 1990 as a method for including text and simple animation.



Input Options

Page

Output Options

Version:

GIF87A

GIF89A

Interleave

Extension

.gif

Creator

CompuServe, Incorporated

Used by

CompuServe
Everyone

Variations

Alchemy reads 1 through 8 bit GIF87A and GIF89A interleaved and non-interleaved files.

Alchemy writes 1 through 8 bit GIF87A and GIF89A interleaved and non-interleaved files.

Limitations

When reading GIF89A files any text, overlays, pauses, palette changes, etc. are ignored.

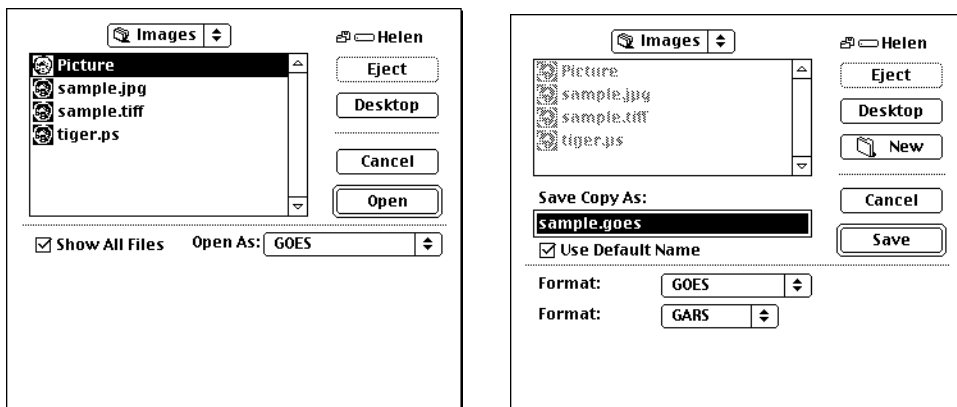
Because GIF files only store the size of the palette to the nearest power of 2 the exact palette size is lost when converting to and from GIF files. For example, if you convert a 240 color Sun Raster file to a GIF file and back to a Sun Raster file the resulting Sun Raster file will have 256 colors.

Comments

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.

GOES

GOES files are used for satellite image data.



Output Options

GARS format
McIDAS format

Extension

.goes

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

Alchemy reads 8, 16, and 32 bits per pixel GOES images.

Alchemy writes 8 bits per pixel images.

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.

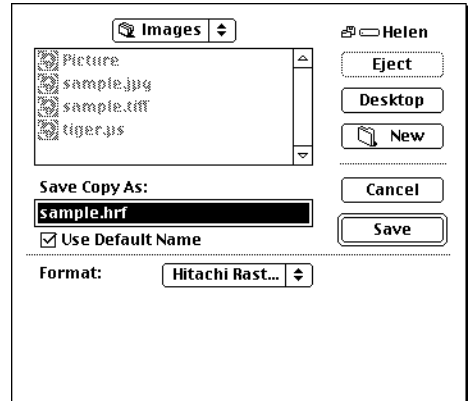
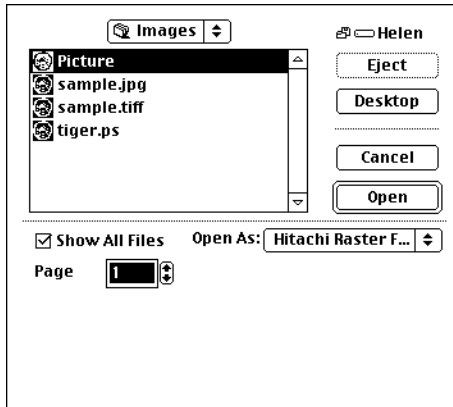
Comments

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.

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.

Hitachi Raster Format (HRF)

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



Input Options

Page

Extension

.hrf

Creator

Hitachi Software Engineering Co., Ltd.

Used by

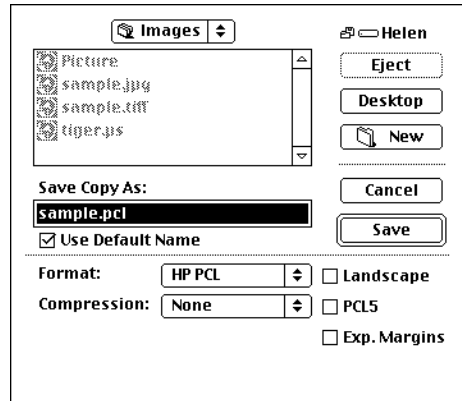
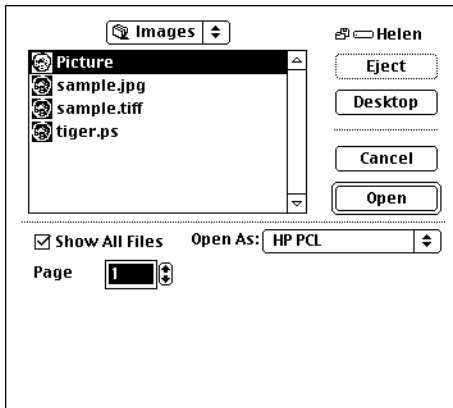
Information and Graphics Systems, Inc. (IGS)

Variations

Black and white, 1 bit per pixel.

HP Printer Command Language (PCL)

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



Input Options

Page

Output Options

Compression:

None
RLE
TIFF
Delta

Landscape
PCL5
Exp Margins

Extension

.pcl

Creator

Hewlett-Packard Company

Used by

HP LaserJet printers
HP compatible laser printers

Variations

PCL files are always 1 bit per pixel, black and white.

Alchemy reads and writes uncompressed, RLE, TIFF, and Delta compressed 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.

The only resolutions allowed in non-PCL5 files are 75 DPI, 100 DPI, 150 DPI, and 300 DPI. PCL5 adds 200 DPI and 600 DPI. The X and Y resolution must be the same. If you specify any other resolution Alchemy automatically alters the resolution to the next higher resolution. If no resolution is specified Alchemy automatically selects a resolution which will allow the entire image to fit on the page.

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.

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 can print Alchemy produced landscape PCL files.

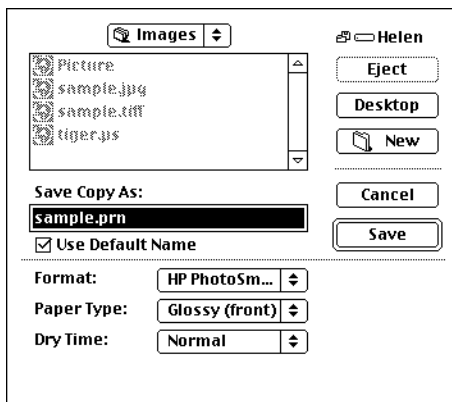
The Exp. Margins option causes the printer to print as close to the edges of the page as possible.

Comments

When converting color or gray-scale images to PCL 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.

HP PhotoSmart

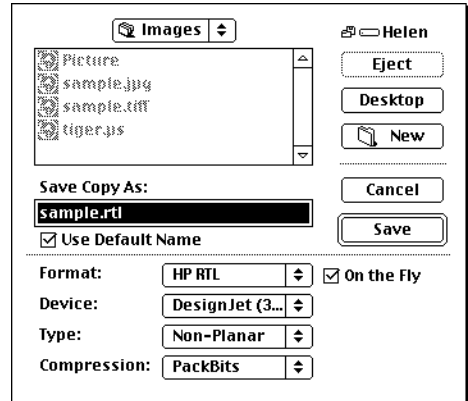
HP PhotoSmart format is used by the HP PhotoSmart printer.



Extensions	.prn
Creator	Hewlett-Packard Company
Used by	HP PhotoSmart printer
Variations	Writes 24 bit color files.
Limitations	Image Alchemy can only write, not read, PhotoSmart files.

HP Raster Transfer Language (RTL)

HP RTL files are used by HP color raster printers and plotters.



Output Options

Devices:

- PaintJet
- HP7600
- DesignJet 3 bit
- DesignJet 4 bit
- DesignJet 24 bit
- DesignJet 24 bit alternate dither
- NovaJet

Types:

- Non-Planar
- Planar

Compression:

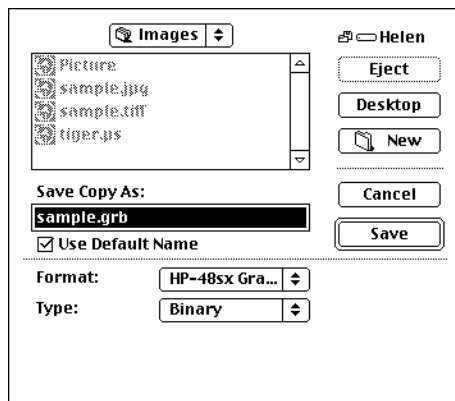
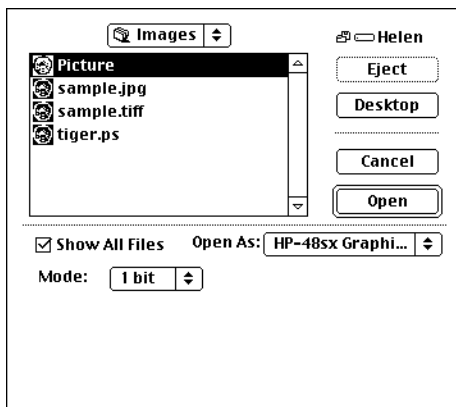
- Uncompressed
- Packbits compressed
- Group III compressed.

On the Fly

Extension	.rtl
Creator	Hewlett-Packard Company
Used by	HP raster plotters and printers including PaintJets, HP 7600 Series plotters, and DesignJets NovaJet Plotters.
Variations	Writes 1 bit black and white, 4 bit CMYK, and 24 bit RGB.
Limitations	Output only.
Comments	<p>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. There is no additional setup required for the PaintJet. 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.</p> <p>On the fly mode can be used by DesignJet users to tell the plotter to start plotting before it has received the entire image. This can be useful if you are plotting very large images and running out of plotter memory.</p> <p>All devices can output uncompressed files. PaintJet 300s, DesignJets, NovaJets, and HP7600s can handle PackBits compression. DesignJets and HP7600s can handle Group III compression.</p> <p>Planar mode only has an effect on HP7600 output. It allows the plotter to start plotting each plane after it is received, rather than having to store the entire image. This can be useful if you are running out of plotter memory.</p>

HP-48sx Graphic Object (GROB)

Graphic Object files are used by HP-48sx calculators.



Input Options

Mode:

1 bit

2 bit

Output Options

Type:

Binary

ASCII

Extension

.grb

.asc

Creator

Hewlett-Packard Company

Used by

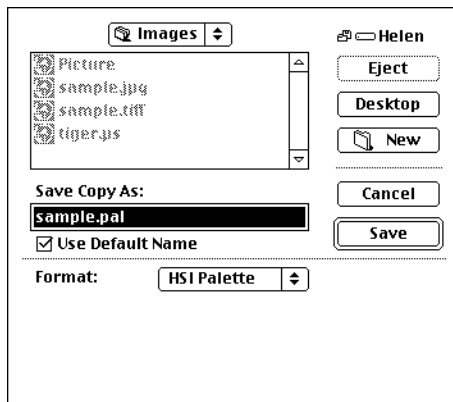
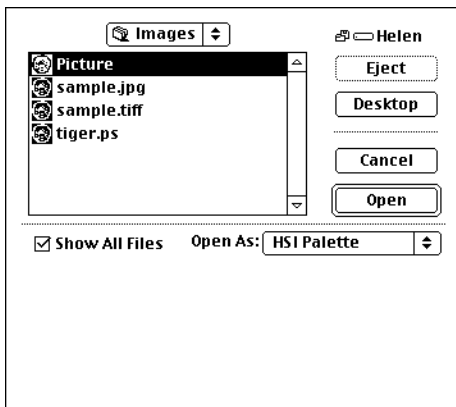
HP-48sx calculators

Variations

Black and white, 1 bit per pixel.

HSI Palette

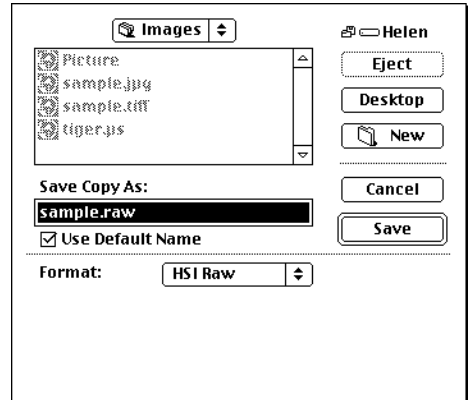
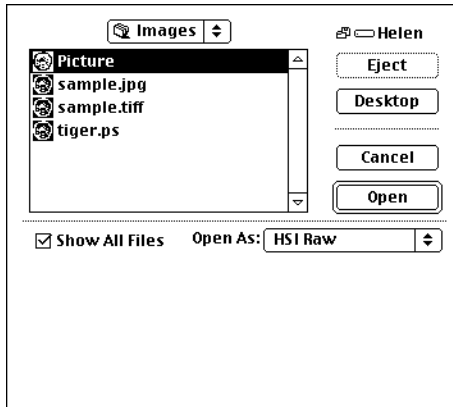
HSI Palette files are palettes which are ASCII files that can be edited with a text editor.



Extension	.pal
Creator	Handmade Software, Inc.
Used by	Image Alchemy
Variations	Palette files are always ASCII files.
Limitations	.PAL files contain only a palette.
Comments	The format of PAL files is described in Appendix H.

HSI Raw

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.

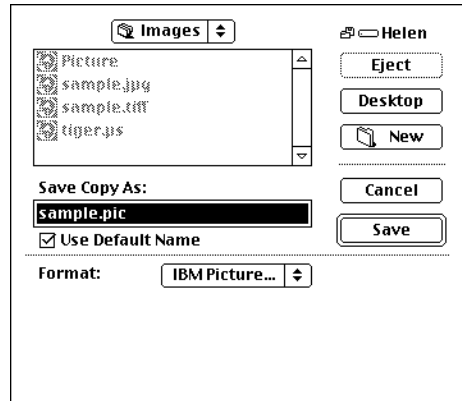
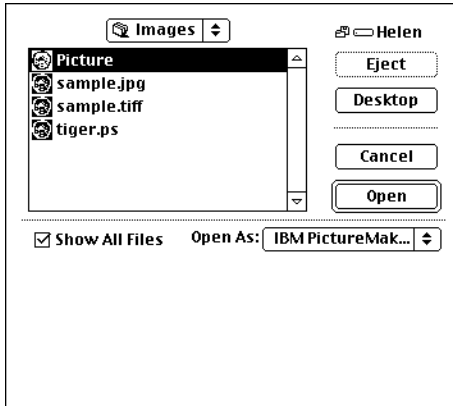


Extension	.raw
Creator	Handmade Software, Inc..
Used by	Image Alchemy
Variations	8 bit paletted and 24 bit true color, uncompressed, not packed.
Comments	This is not the format for importing data which has no header information, see Binary Information Files (BIF) above for information on doing that.

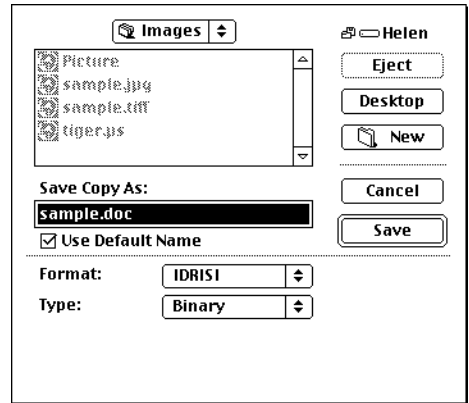
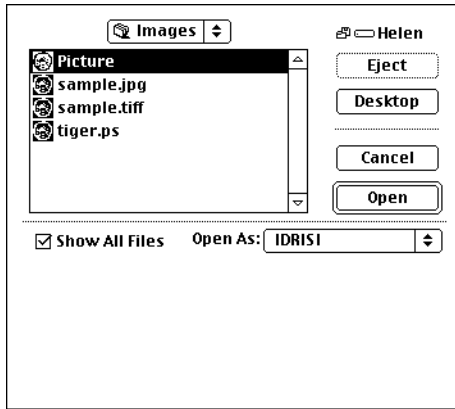
This format is used internally as temporary files by Alchemy when doing certain image conversions; it can also be explicitly read and written. This format is described in Appendix F.

IBM Picture Maker

IBM Picture Maker files are used by IBM presentation software.



Extension	.pic
Creator	IBM
Used by	IBM Storyboard Live!
Variations	Alchemy reads and writes 256 color Picture Maker files.
Limitations	16 color Picture Maker files are not supported. Picture Maker images cannot be larger than 640x480.
Comments	<p>This is not the same format as Cubicomp PictureMaker (see above for information on the Cubicomp PictureMaker format).</p> <p>256 color Picture Maker files may be either 320x200 or 640x480. Image Alchemy will write the smallest variation that the image will fit in, with the image centered; the borders will be filled with color 0.</p>



Output Options

Type:

Binary
Packed Binary
ASCII

Extensions

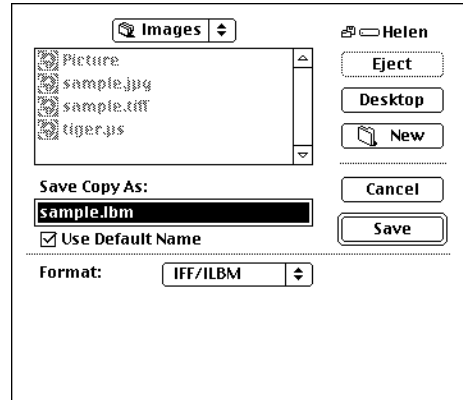
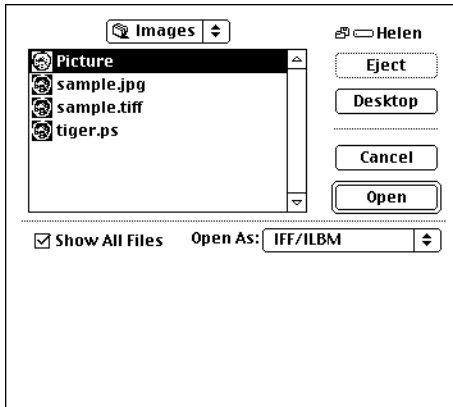
.doc

Variations

Reads and writes 8 bit grayscale.

IFF/ILBM

IFF (Interchange File Format) files are used by Amiga computers for storing a number of types of data, including images, text, and sounds; ILBM (InterLeaved BitMap) is a type of IFF file used to store images.

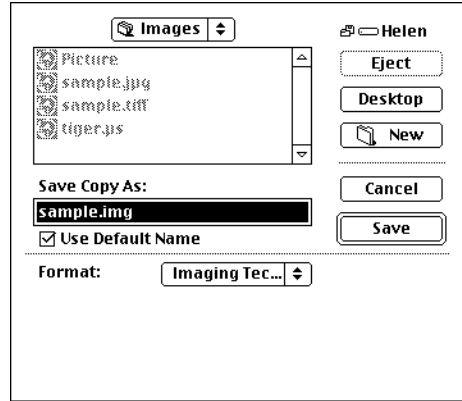
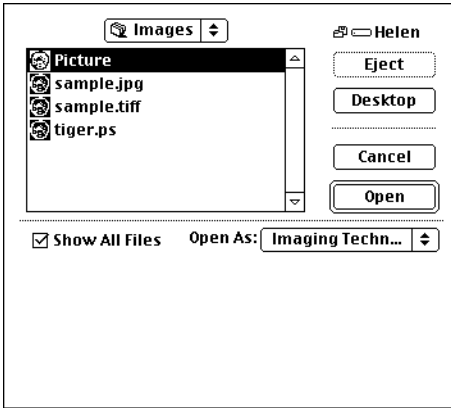


Extensions	.lbm
Creator	Commodore-Amiga Corp..
Used by	Amiga Deluxe Paint
Variations	Alchemy reads 1 through 8 bit, 24 bit, and HAM images Alchemy writes 1 through 8 bit and 24 bit images.
Limitations	Dynamic Hi-Res images are not supported. Does not write images in any of the Amiga specific display modes.

Comments

If you are 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.

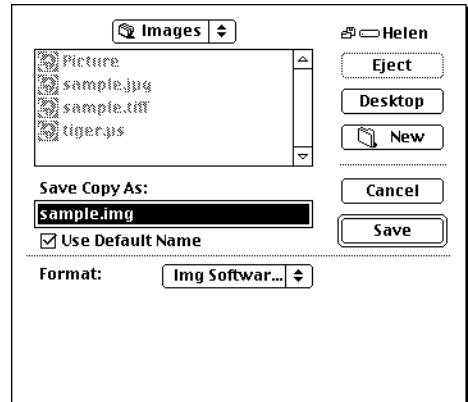
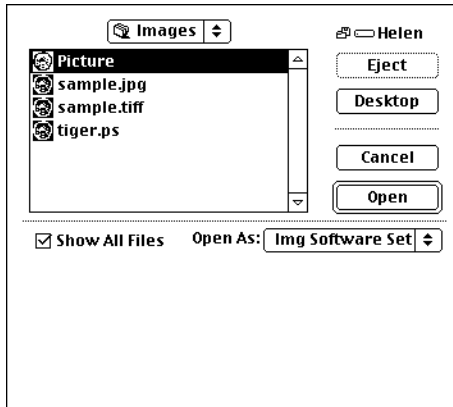
Imaging Technology



Extensions	.img
Creator	Imaging Technology
Used by	Imaging Technology
Variations	Reads and writes 8 bit grayscale.

Img Software Set

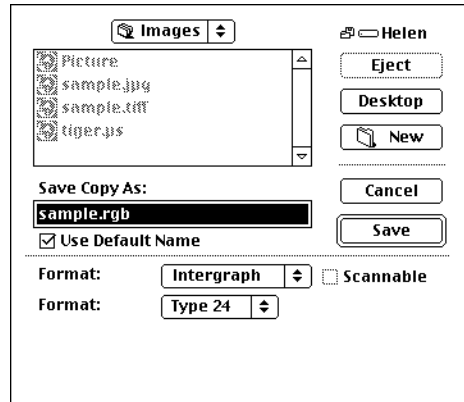
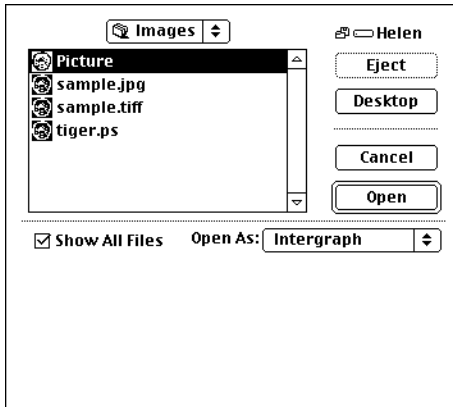
The Img Software Set is a collection of tools for manipulating graphic images freely available for various UNIX workstations.



Extensions	.img .p .a
Creator	Paul Raveling
Used by	Img Software Set
Variations	Reads and writes 8 bit paletted and 24 bit images.
Limitations	Alchemy does not read nor write compressed (.Z) images. Use the UNIX supplied <code>uncompress</code> program to decompress those images before reading with Alchemy.
Comments	The Img Software Set is available via anonymous ftp as <code>expo.lcs.mit.edu:contrib/img_1.3.tar.Z</code> or <code>venera.isi.edu:pub/img_1.3.tar.Z</code> or on floppy disk from us.

Intergraph

The Intergraph file format was developed by Intergraph Corp. and is used by them..



Output Options

Format:

Type 9
Type 24
Type 27

Extensions

.prn

Creator

Intergraph Corp.

Used by

Intergraph Corp.

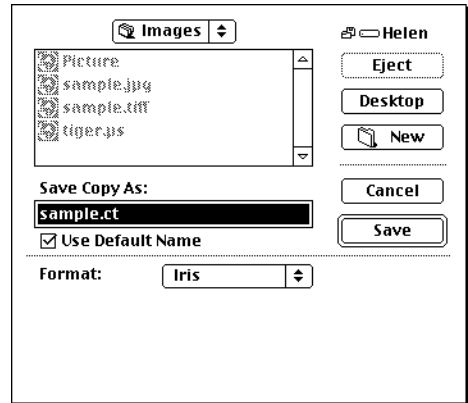
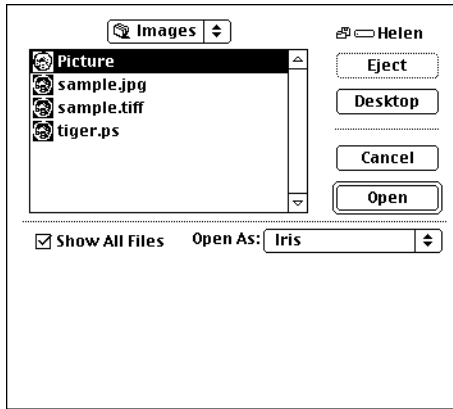
Variations

Reads and writes types 9 and 24 1 bit black and white and type 27 24 bit color images.

Limitations

If you need to read or write other types of Intergraph files please contact us; we are happy to add support for any of the Intergraph formats.

Iris



Extensions

.ct

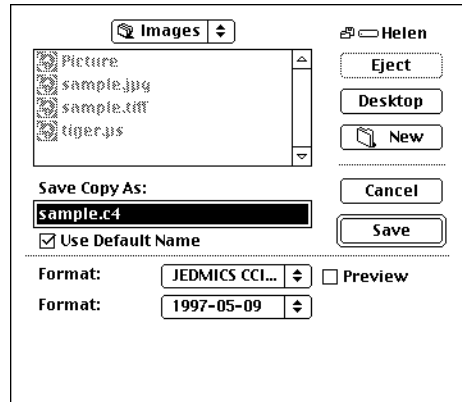
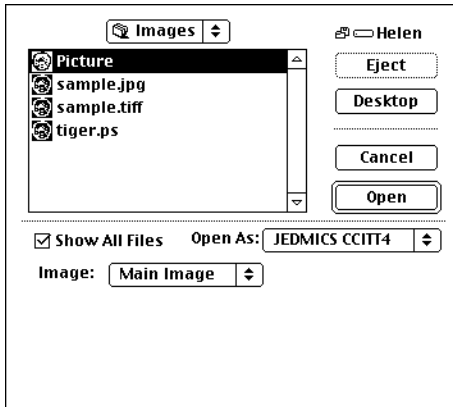
Used by

Iris printers

Variations

Reads and writes 32 bit CMYK.

Joint Engineering Data Management Information and Control System



Input Options

Image:
Main Image
Preview

Output Options

Format:
1991-04-10
1997-05-09
Preview

Extensions

.c4

Creator

US Department of Defense

Used by

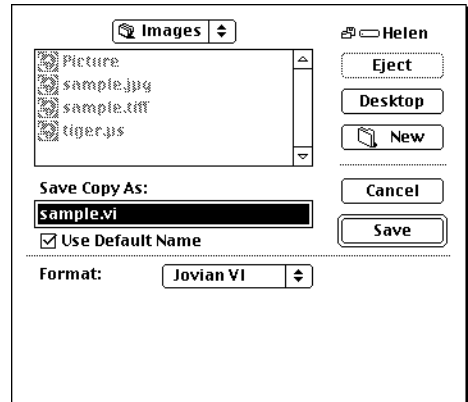
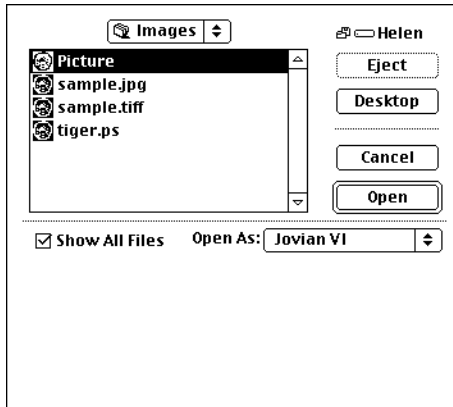
US Department of Defense and contractors

Variations

Reads and writes 1 bit black and white.

Jovian VI

Jovian VI files are created by the Jovian Logic video capture boards.



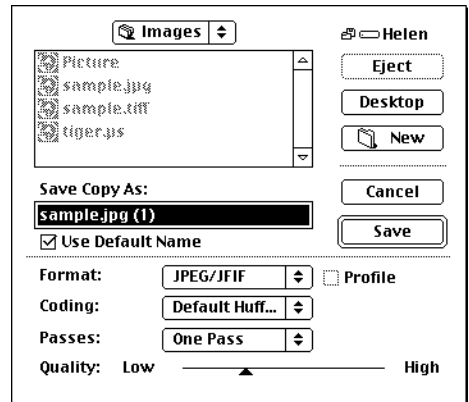
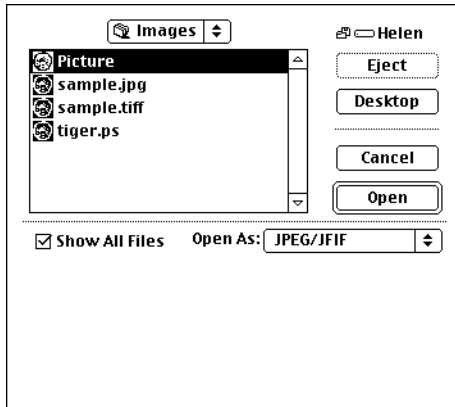
Extension	.vi
Creator	Jovian Logic Corp.
Used by	Jovian Logic
Variations	Alchemy reads 1, 4, 6, and 8 bit gray-scale images, 4 and 8 bit color paletted images, and 16 and 24 bit true color images. Alchemy writes 8 bit gray-scale, 4 and 8 bit color paletted images, and 16 and 24 bit true color images.
Limitations	Alchemy reads files with 6 and 8 bit palettes; Alchemy always writes 6 bit palettes. Gray-scale files are always 8 bit.

Comments

When writing a VI file the palette always starts at 0, but will not necessarily be black (which is the way that Jovian VI files are written).

JPEG/JFIF

JPEG is a lossy compression technique to achieve high compression ratios. See Appendix C, JPEG Compression, for more information.



Output Options

Quality

Coding:

default Huffman coding
optimum Huffman coding

Passes:

1-10

Profile

Extension

.jpg

Creator

Joint Photographic Experts Group (JPEG)

Used by

Everyone

Variations

Gray-scale images are saved as single channel JPEG files; color images are saved as three channel JPEG files.

Alchemy writes baseline JPEG with CCIR-601 YCbCr color space, interleaved components, Huffman coded, and 2h:1v 1h:1v 1h:1v subsampling.

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, Alchemy uses a fixed set of Huffman tables to compress an image. If the optimum Huffman table option is chosen, 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 a little longer to compress (there is no effect on the decompression time).

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.

If Passes is 1, Alchemy will generate a sequential JPEG file; otherwise it will generate a progressive JPEG file.

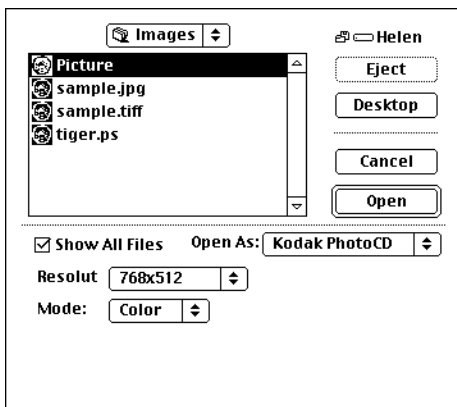
JPEG files are based on the Joint Photographic Experts Group (JPEG) CD 10918-1 standard.

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.

If there is an ICC profile available (see the section on the Profile... dialog), it may be included in the JPEG file by selecting the Profile box. Alchemy will automatically read a profile, if present, from a JPEG file.

Kodak PhotoCD

PhotoCD files are multi-resolution images produced by Kodak.



Input Options

Resolution:

192x128
384x256
768x512
1536x1024
3072x2048

Mode:

Color
Gray

Extensions

.pcd

Creator

Eastman Kodak Company

Used by

Eastman Kodak Company

Variations

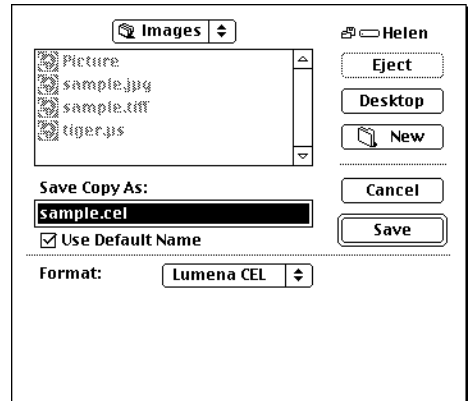
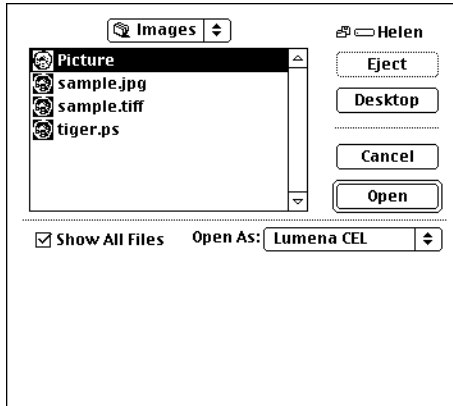
Reads 8 bit grayscale and 24 bit color images, in resolutions up to 3072x2048.

Limitations

Image Alchemy can only read, not write, this format.

Lumena CEL

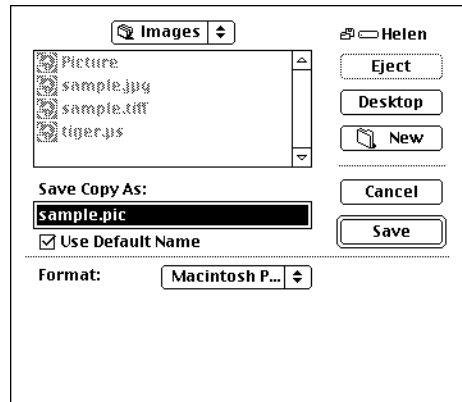
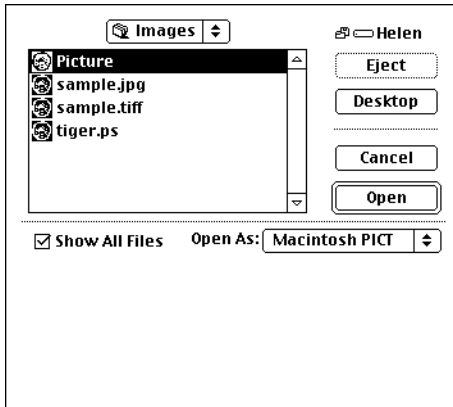
Lumena CEL files are used by Time Arts software.



Extension	.cel
Creator	Time Arts
Used by	Lumena
Variations	Reads and writes 15 and 32 bit images, ignoring the alpha channel when reading 32 bit images and writing an empty channel when writing 32 bit images.

Macintosh PICT/PICT2

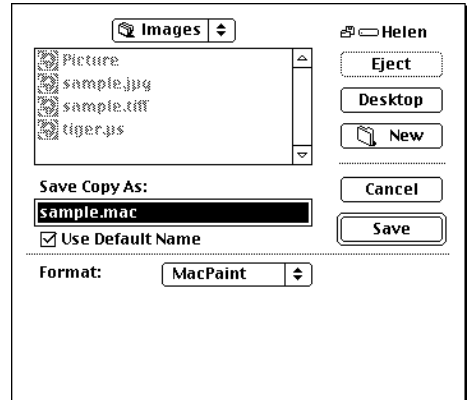
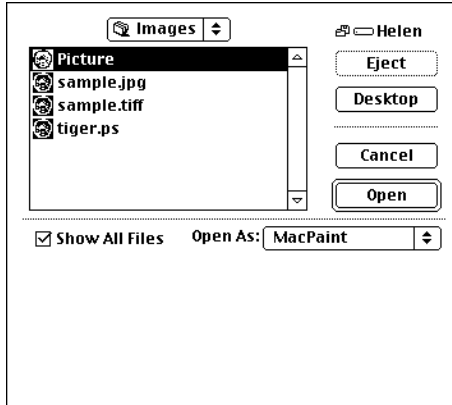
PICT files were created by Apple Computer as a common format for Macintosh applications to use. Virtually every Macintosh application can use PICT files.



Extensions	.pict
Creator	Apple Computer, Inc.
Used by	Macintosh computers
Variations	Alchemy writes 1, 2, 4, 8, and 32 bit PICT2 images.

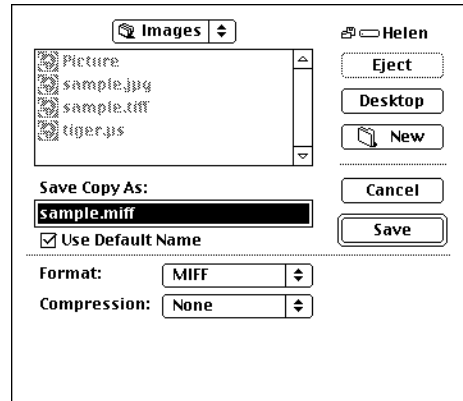
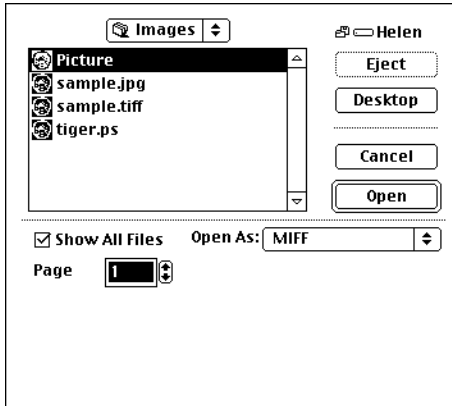
MacPaint

MacPaint files were created by Apple Computer as the format that MacPaint used. MacPaint files have generally been usurped by Macintosh PICT files, but are still supported by some software.



Extensions	.mac
Creator	Apple Computer, Inc.
Used by	MacPaint
Variations	MacPaint images are always 1 bit, black and white, 576x720 pixels.
Limitations	MacPaint images are always 576x720. If you attempt to write an 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.

MIFF.



Input Options

Page

Output Options

Compression:
None
RLE

Extensions

.miff

Creator

John Cristy

Used by

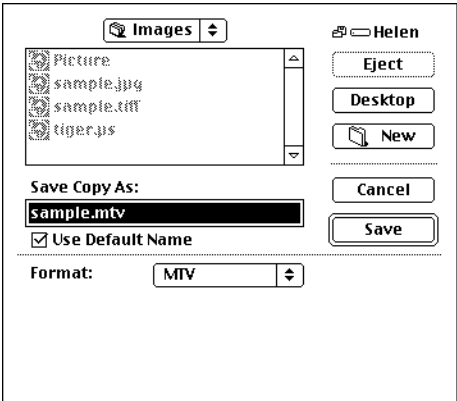
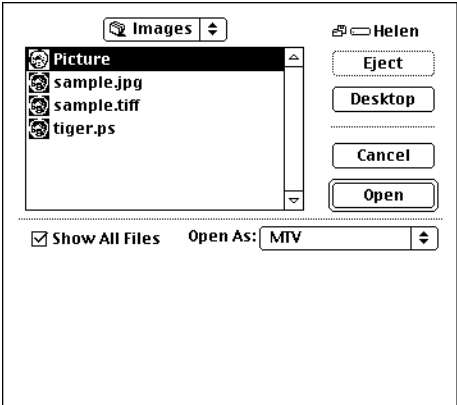
Image Magick

Variations

Reads and writes 8 bit grayscale, 8 bit paletted, 24 bit color, and 24 bit color with an alpha channel.

MTV Ray Tracer

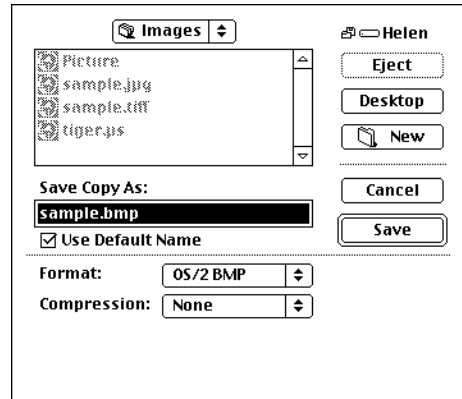
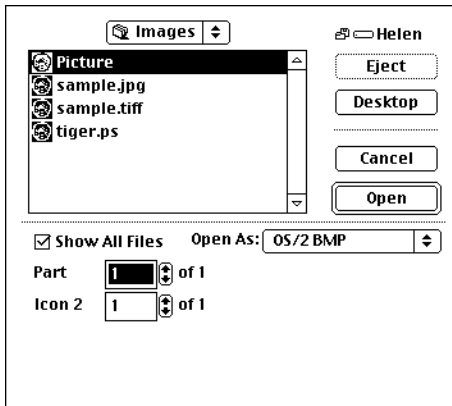
MTV files are used by the MTV RayTracer, a public domain ray tracer for Suns and other workstations.



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 or via floppy disk from us.

OS/2 Bitmap (BMP)

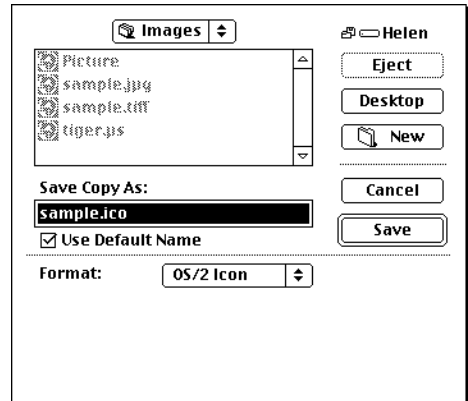
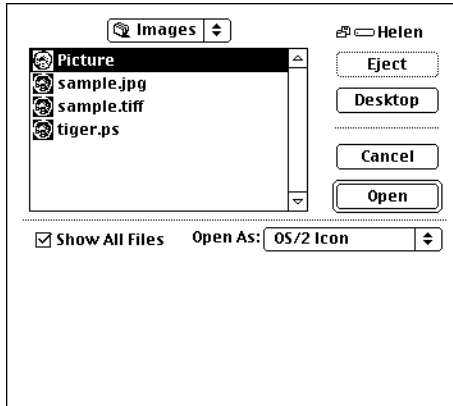
OS/2 BMP files are used by OS/2 2.x and OS/2 Warp.



Output Options	None RLE
Extension	.bmp
Creator	IBM Corp.
Used by	OS/2 2.x OS/2 Warp
Variations	Alchemy reads 1, 4, 8, and 24 bit RGB (raw), RLE4, and RLE8 files. Alchemy writes 1, 4, 8, and 24 bit RGB (raw), RLE4, and RLE8 files.

OS/2 Icon

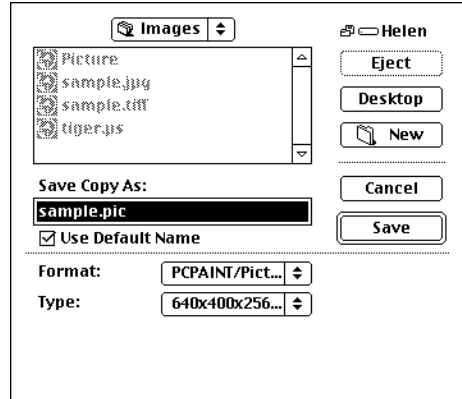
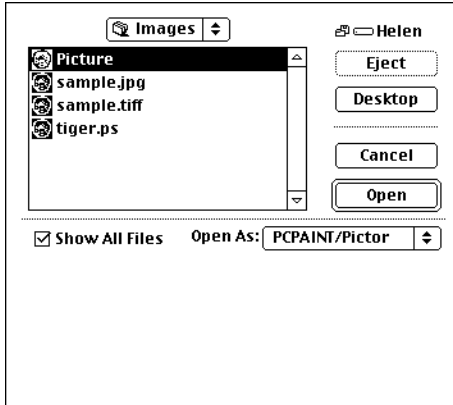
OS/2 Icon files are used by OS/2 2.x and OS/2 Warp.



Extension	.ico
Creator	IBM Corp.
Used by	OS/2 2.x OS/2 Warp
Variations	Alchemy reads and writes 1, 4, 8, and 24 bit RGB files.

PCPAINT/Pictor Page Format

The Pictor format was designed so that an image could be loaded into an IBM graphics adapter very quickly; it does this by almost exactly duplicating the organization of the graphics adapter memory. This makes the format hardware dependent.



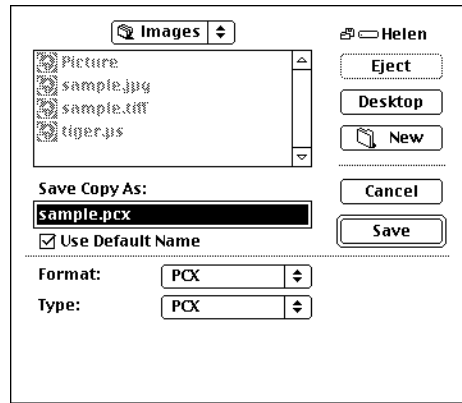
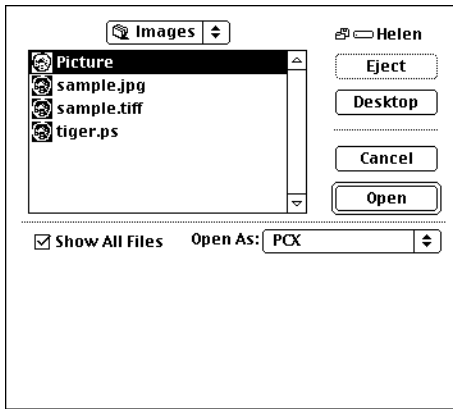
Output Options

640x200x16 EGA
640x350x2 EGA
640x350x4 EGA
640x350x16 EGA
640x350x16 VGA
320x200x16 EGA
320x200x256 VGA/MCGA
640x480x16 VGA
640x480x2 VGA/MCGA
800x600x2 EGA/VGA
800x600x16 EGA/VGA
640x400x256 SVGA

	640x480x256 SVGA 800x600x256 SVGA 1024x768x2 SVGA 1024x768x16 SVGA 360x480x256 VGA 1024x768x256 SVGA
Extension	.pic
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 false color command.

PCX files are used extensively by MS-DOS machines. Originally created by ZSoft for use by their paint packages, PCX files can be read and written by almost all MS-DOS paint software and desktop publishing software.

PCX files suffer from two problems: the compression ratio is poor for 8 and 24 bit images and PCX files are often written out incorrectly; see the Limitations section below for details.

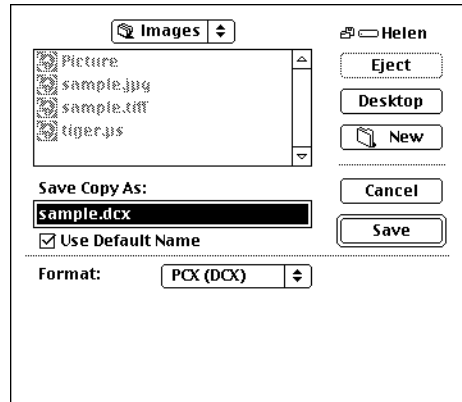
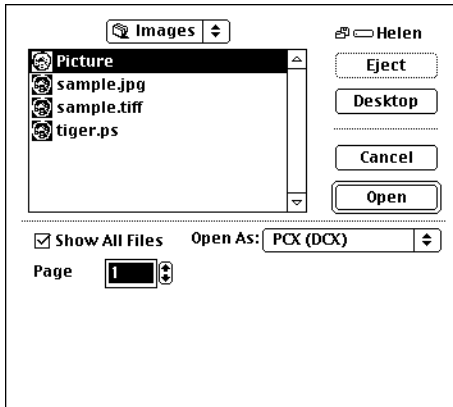


Output Options	Standard PCX PCJ
Extensions	.pcx for PCX files .pcj .p13 for PCJ files
Creator	ZSoft Corporation

Used by	<p>PC Paint Publisher's Paintbrush Most paint and desktop publishing software can read and write PCX files.</p>
Variations	<p>1, 4, 8, and 24 bits per pixel for standard PCX files.</p>
Limitations	<p>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).</p>
Comments	<p>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.</p> <p>ZSoft recently changed some of the information in the header of PCX files so they now include image resolution. Some fax board software makes use of this information when transmitting PCX files as faxes.</p>

PCX (DCX)

DCX is a variation on the PCX file format used by some fax software.



Input Options

Page

Extension

.dcx

Creator

ZSoft Corporation created the original PCX specification on which DCX is based.

Used by

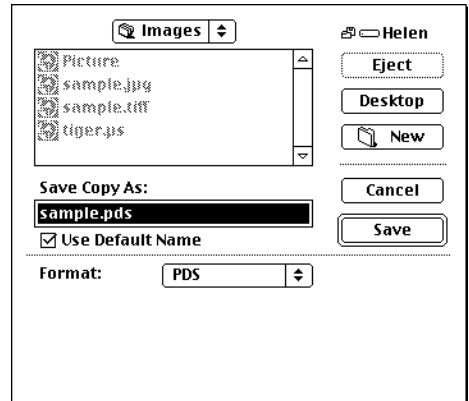
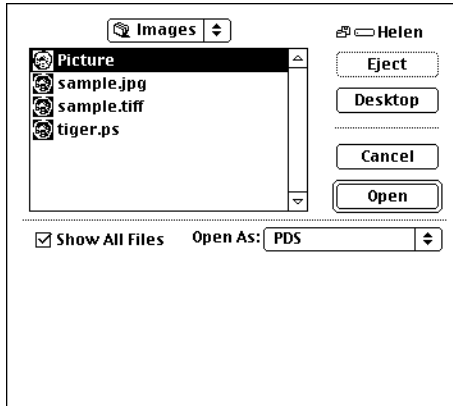
Fax board software

Variations

1 bit per pixel.

PDS

PDS labeled images are used by NASA for planetary images.



Extensions	.ibg .imq
Creator	NASA
Used by	NASA distributes collections of planetary images on CD-ROM in PDS format.
Variations	Alchemy reads 1 and 8 bit uncompressed and 8 bit first difference Huffman compressed files. Alchemy writes 8 bit gray-scale uncompressed PDS files.
Limitations	PDS images must begin with either an "SFDU_LABEL" or a "FILE_TYPE" record for Alchemy to be able to identify it.

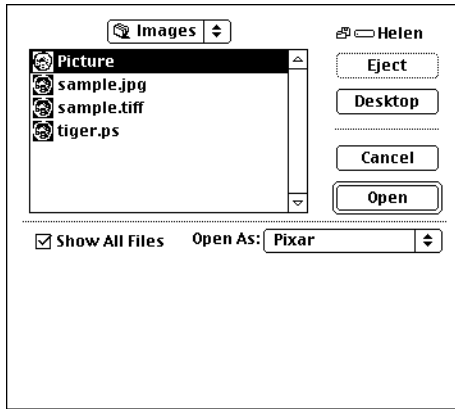
Occasionally a PDS labeled image has a palette. There does not seem to be any standard format for the palette; Image Alchemy handles the palettes we have encountered.

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.

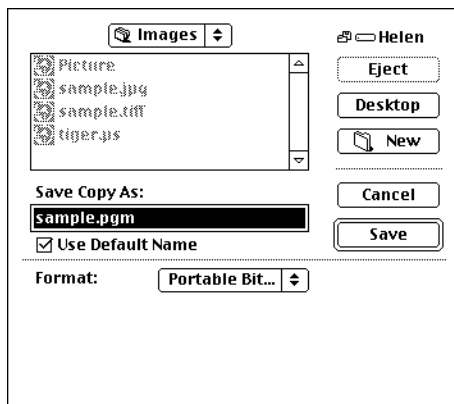
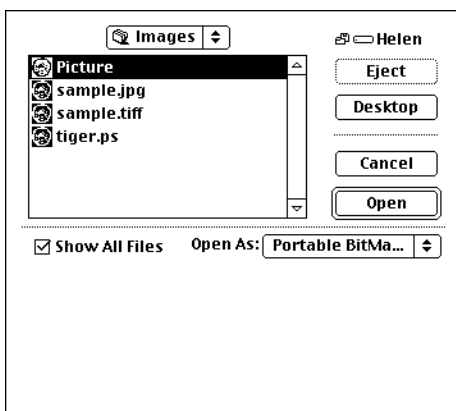
Pixar



Extensions	.pic
Used by	Pixar
Variations	Reads 8 bit grayscale, 24 bit color, and 24 bit color with an alpha channel.
Limitations	Image Alchemy can only read, not write, Pixar images.

Portable BitMap (PBM)

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. The PBM tools are available free of charge from numerous ftp sites (see below for details).



Extensions .pnm Portable aNyMap (Any of those below)
 .pbm Portable BitMap (Black and white)
 .pgm Portable GrayMap (Gray-scale)
 .ppm Portable PixelMap (True color)

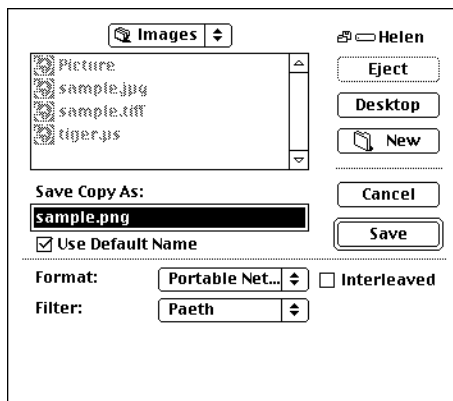
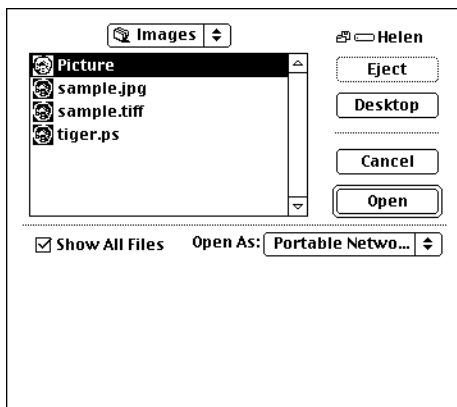
Creator Jef Poskanzer

Used by Portable BitMap Package
 Various workstation graphic programs

Variations	<p>Alchemy reads and writes 1, 8, and 24 bit RAWBITS (binary) images.</p> <p>To write out a PBM file select black and white and two colors To write out a PGM file select black and white and 256 colors. To write out a PPM file select true color (24 bit).</p>
Limitations	<p>When writing a PBM file Alchemy always uses the .pnm extension (the extension should be changed based on the type of file being written).</p>
Comments	<p>The PBM package is a set of image manipulation tools which run on various workstations. The software is available for free via anonymous ftp from expo.lcs.mit.edu as contrib/pbmplus.tar.Z, ftp.ee.lbl.gov as pbmplus.tar.Z, or via floppy disk from us.</p>

Portable Network Graphics (PNG)

PNG files are used by the WWW.



Output Options

Filter:

- None
- Sub-filtering
- Up-filtering
- Averaging
- Paeth filtering
- Adaptive filtering
- Interleaved

Extensions

.png

Creator

The PNG development group

Used by

WWW

Variations

Reads and writes 1 bit black and white, 2, 4, and 8 bit grayscale, 2, 4, and 8 bit paletted, and 24 bit color images, with and without alpha channels, and with and without transparency information.

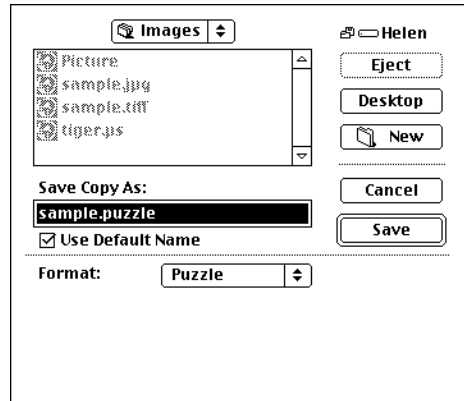
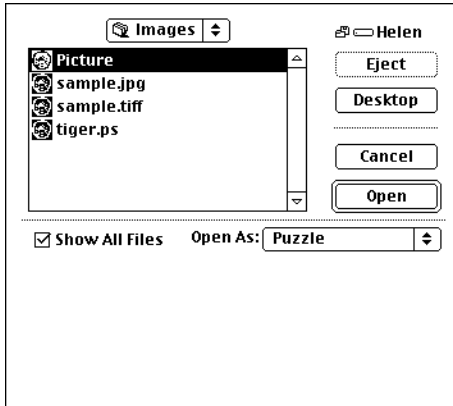
Limitations

Non-image chunks (such as copyright information) are discarded when reading.

Comments

Puzzle

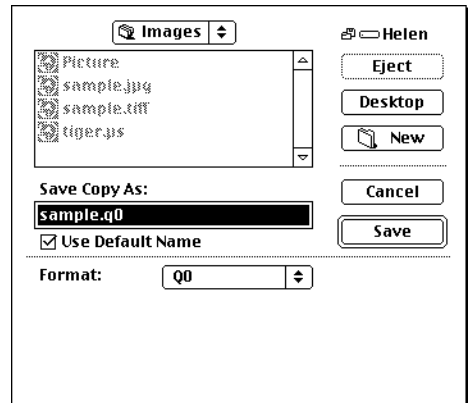
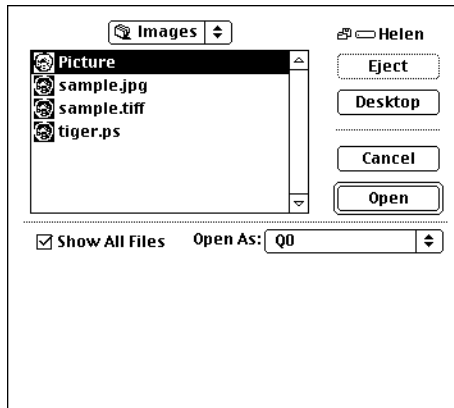
Puzzle files are used by the X supplied Puzzle program.



Extension	.puzzle
Creator	Don Bennett, HP Labs
Used by	puzzle as distributed with the X Windowing System
Variations	Puzzle files are always 8 bits per pixel.

Q0

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.



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

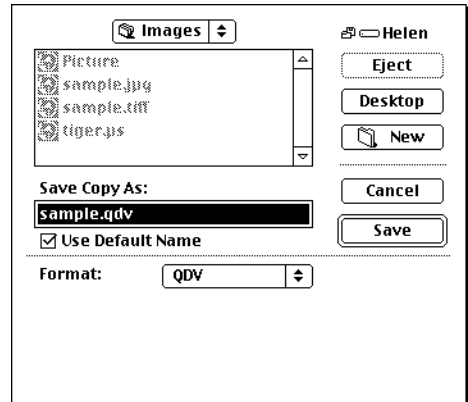
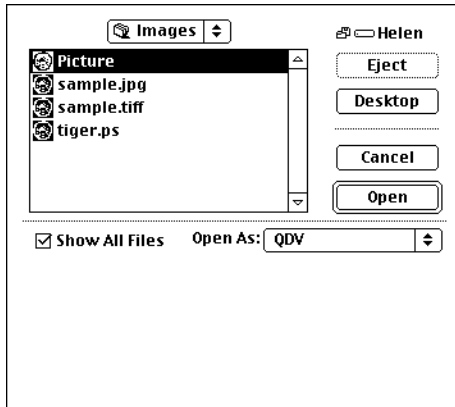
Comments

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 (primarily the height and width of the image). 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.

QDV

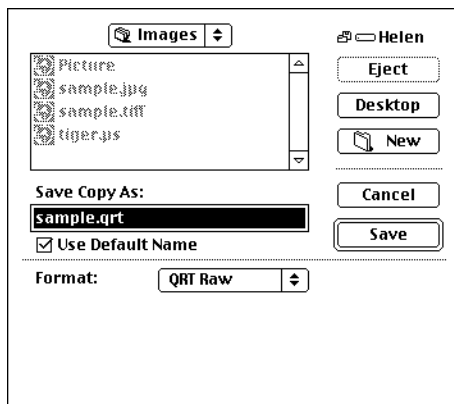
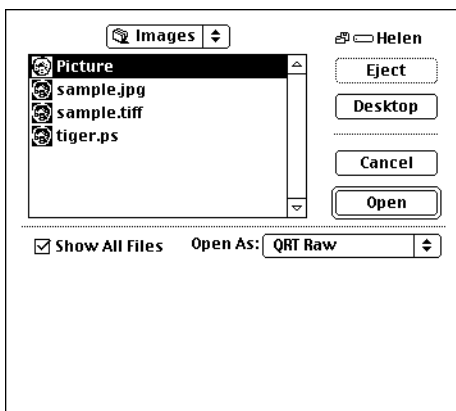
The QDV format is used by Giffer, a Macintosh program which displays and converts image files.



Extension	.qdv
Creator	Steve Blackstock
Used by	Giffer
Variations	QDV files are always 8 bits per pixel.

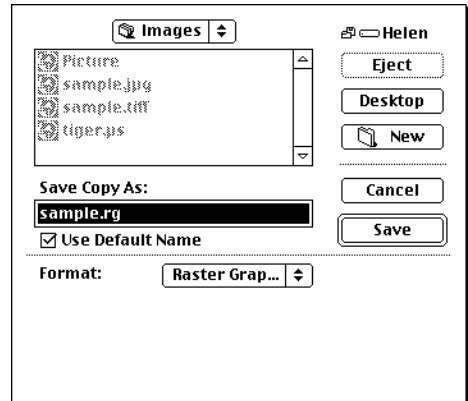
QRT Raw

QRT files are generated by the QRT Ray Tracer, a public domain ray-tracer for Amiga, Macintosh, and IBM PC computers.



Extension	.raw
Creator	Steve Korn
Used by	QRT Ray Tracer
Variations	24 bits per pixel

Raster Graphics



Extensions

.rg

Used by

Raster Graphics plotters

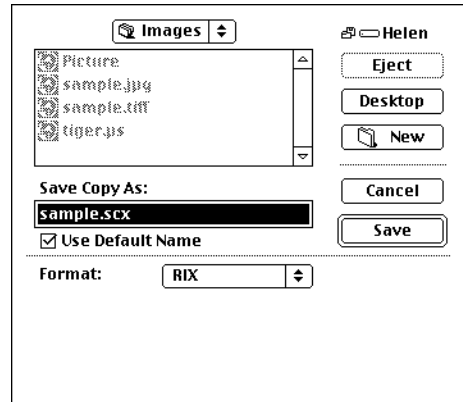
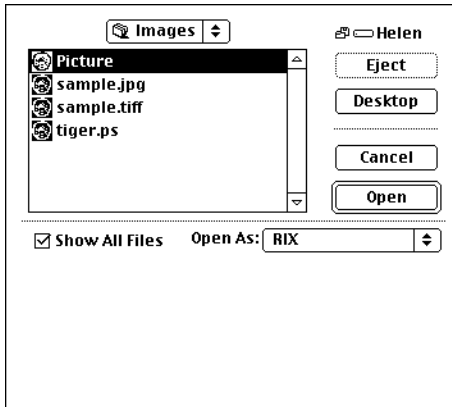
Variations

Writes 1 bit black and white, 4 bit CMYK, 24 bit RGB, and 32 bit CMYK images.

Limitations

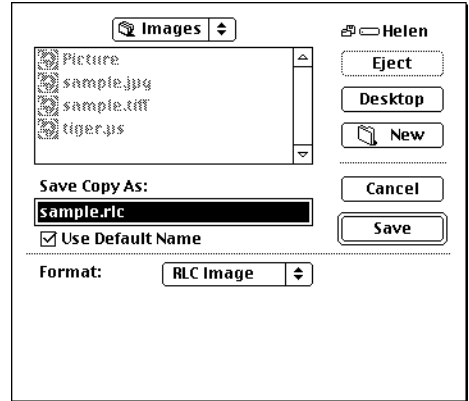
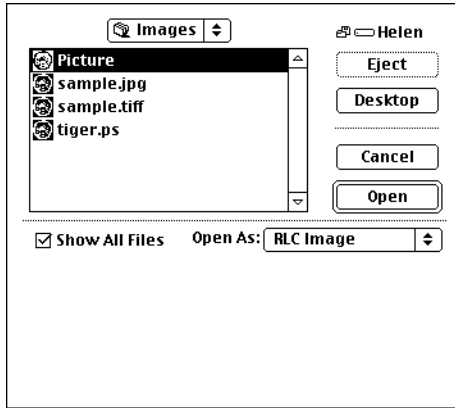
Image Alchemy can only write, not read, Raster Graphics images.

RIX files are color files developed by ColoRIX to use with their paint software.



Extension	.scx
Creator	RIX Softworks, Inc.
Used by	ColoRIX software
Variations	Alchemy reads and writes 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 have not been able to find any; if you have some 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.

RLC Image

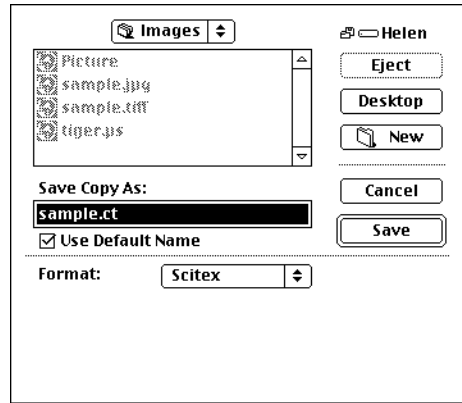
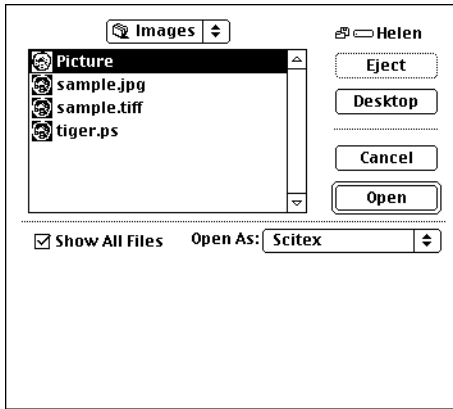


Extensions

.rlc

Variations

Reads and writes 1 bit black and white images.



Extensions

.ct

Used by

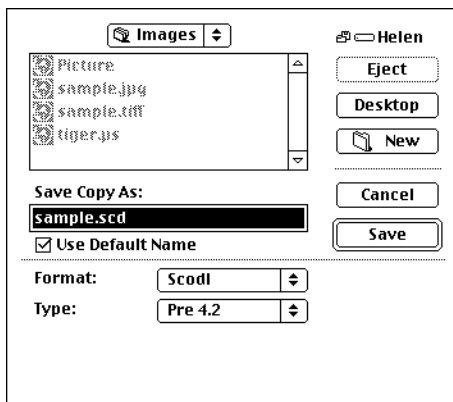
Scitex scanners

Variations

Reads and writes 8 bit grayscale, 24 bit RGB, and 32 bit CMYK.

Scodl

Scodl files are used by Agfa/Matrix slide recorders.



Output Types	Pre 4.2 Post 4.2 (See the Comments section, below)
Extension	.scd
Creator	Agfa Corporation / Matrix Instruments Inc.
Used by	Agfa/Matrix slide recorders
Variations	Alchemy writes 8 and 24 bit run-length coded (RLC) images.
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 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 and pixel averaging when reducing the size of an image.

Note that Alchemy pays attention to the aspect ratio or dots per inch information 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.

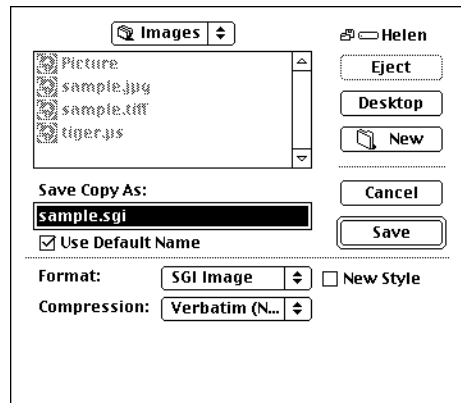
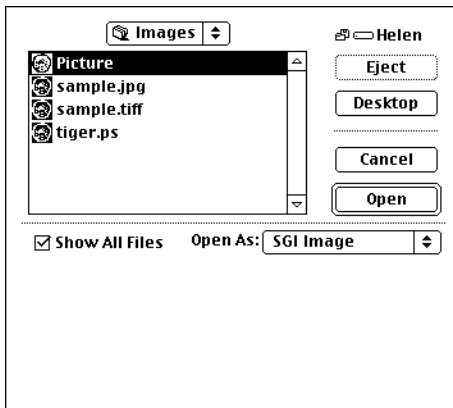
There are some limitations with the MVP software driver supplied by Agfa/Matrix:

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.

Silicon Graphics Image (SGI)

Silicon Graphics Image files are used by Silicon Graphics workstations.



Output Options

Compression:
Verbatim (uncompressed)
RLE compressed
New Style

Extension

.sgi

Creator

Silicon Graphics, Inc.

Used by

Silicon Graphics workstations

Variations

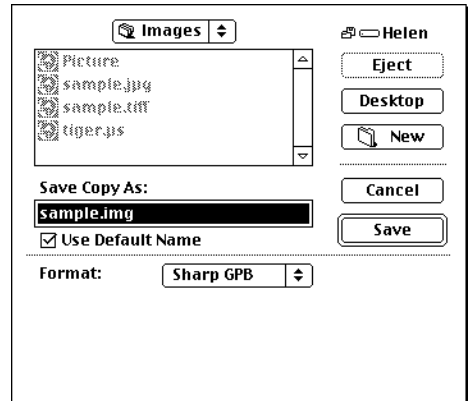
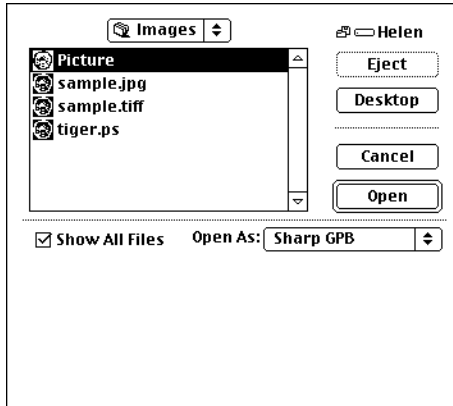
Alchemy reads and writes 1, 8 (gray-scale), and 24 bit verbatim (uncompressed) and RLE files.

Comments

Only gray-scale images may be 8 bit files. Alchemy will automatically switch to 24 bit mode when writing a color image. New Style changes to a slightly different version of the SGI Image specification.

Sharp GPB

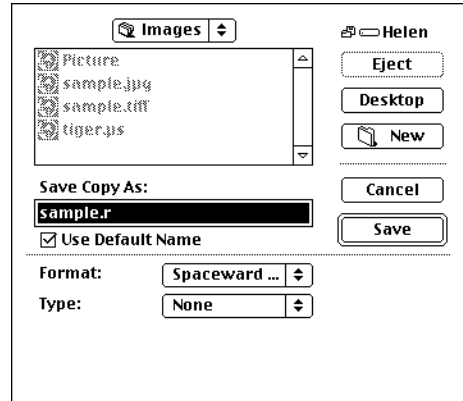
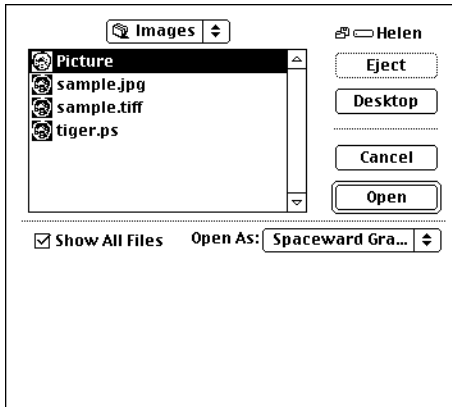
Sharp GPB files were developed by Sharp.



Extensions	.img
Creator	Sharp
Used by	Sharp
Variations	Reads and writes 1 bit black and white, 8 bit grayscale, and 24 bit color images.

Spaceward Graphics

Spaceward Graphics files were developed and are used by Spaceward Graphics.



Output Options

Type:
None
Run length coded

Extensions

.r Red channel image data
.g Green channel image data
.b Blue channel image data

Creator

Spaceward Graphics

Used by

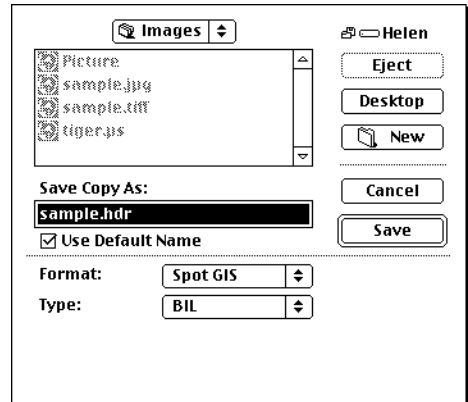
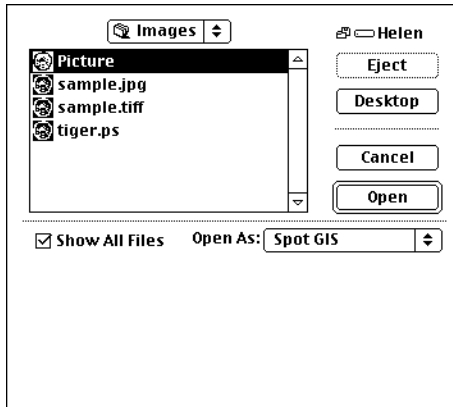
Spaceward Graphics

Variations

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

SPOT Image

SPOT Image GIS data files are high-resolution satellite images produced by SPOT Image Corporation.



Extensions	.hdr (For image header information) .bil (For pixel data) .clr (For palette data [optional])
Creator	SPOT Image Corp.
Used by	SPOT Image Corp.
Variations	8 bits per pixel
Limitations	Only 1 band, GIS images are supported; if you have any other type of SPOT GIS images we would be interested in supporting them; please contact us.

Comments

SPOT Image 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.

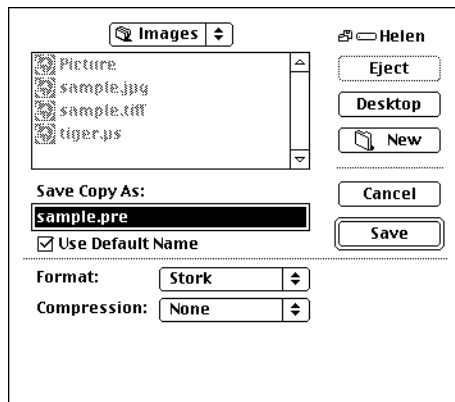
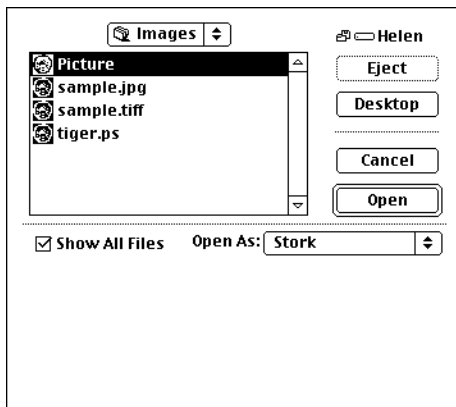
If no palette file (.clr file) exists Alchemy will assume the image is grayscale.

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.

Stork

Stork files are CMYK images used by Stork's color proofing machines.



Output Options

None
Run length coded

Extensions

.idx Index file
.pre Image data
.tab Color lookup table

Creator

Stork Colorproofing B.V.

Used by

Stork Colorproofing machines

Variations

Alchemy reads and writes 32 KCMY, 32 KCMY RLC, 16 CLU, and 16 CLU RLC images (type 100, 101, 300, and 301, respectively).

Limitations

Alchemy can not write paletted files with more than 256 colors.

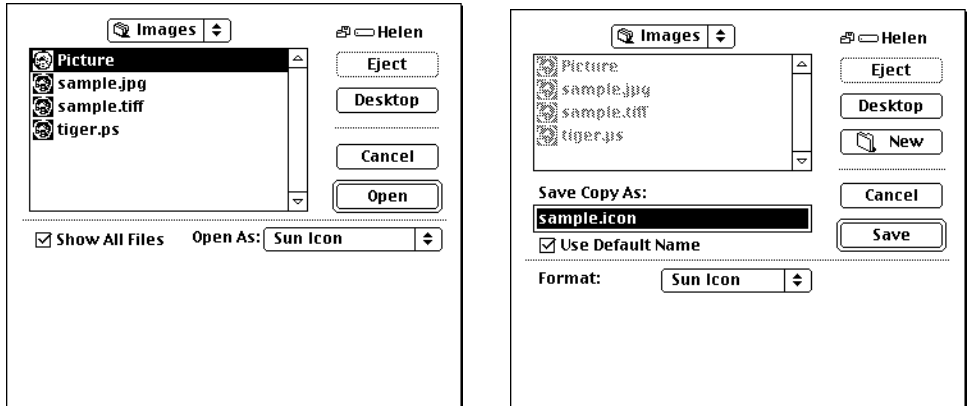
When reading paletted files with more than 256 colors they are treated as true color.

Comments

Stork images are stored in two or three files (depending on whether or not there is 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.

Sun Icon

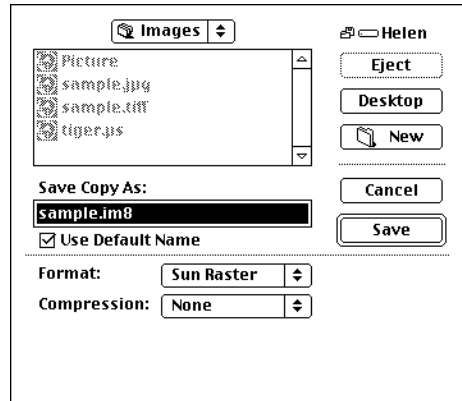
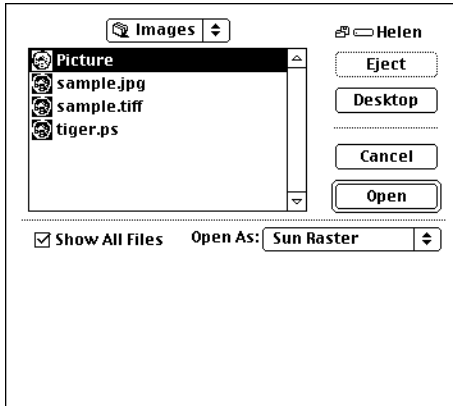
Sun Icon files are used by Sun Microsystems workstations.



Extension	.icon
Creator	Sun Microsystems, Inc.
Used by	Sun workstations
Variations	Sun Icon images are always 1 bit, black and white.
Limitations	Because Sun Icon files are actually C source code there can be many variations of Sun Icon files. Since adding a C preprocessor to Alchemy to handle all the theoretically allowable Sun Icon files is impractical we have instead designed Alchemy to be able to read the Sun Icon files from Sun Microsystems. If you run across any Sun Icon files which Alchemy cannot read please contact us.

Sun Raster

Sun Raster files are used by Sun Microsystems workstations.



Output Options	None Run length compression
Extension	.rast
Creator	Sun Microsystems, Inc.
Used by	Sun workstations
Variations	Reads 1, 8, 24, and 32 bit Standard, BGR, RGB, and Byte Encoded (RLE) files. Writes 1, 8, 24, and 32 bit Standard files, and 1 and 8 bit Byte Encoded (RLE) files.

Limitations

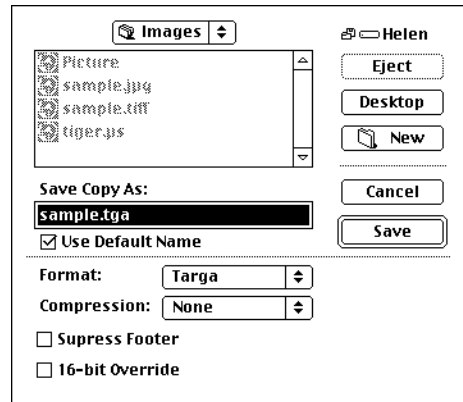
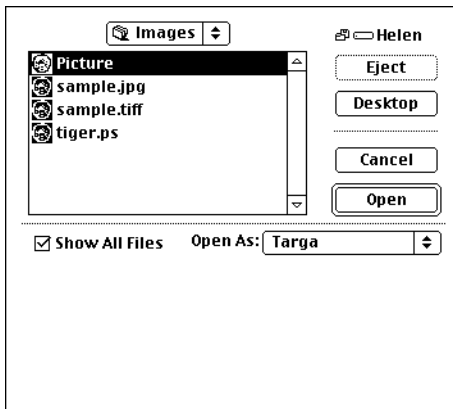
For a short time a version of the PBM toolkit wrote Sun Raster files which had the wrong RGB order. Unfortunately there seem to be many images which were generated with this incorrect RGB order. Please be aware that Alchemy's Sun Raster reading and writing capability has been extensively tested and compared to various other tools; the RGB order we use is correct.

Comments

There is no standard extension for Sun Raster files; the extension that Alchemy uses seem to be the most common.

Targa

Targa files were created to support the line of Targa graphics cards. The Targa format is popular with scanners and high end paint packages.



Output Options

Compression:
Uncompressed
Run Length Coded

Suppress footer

16 bit Override

Extension

.tga

Creator

Truevision, Inc.

Used by

Various scanning and paint software

Variations

Alchemy reads 8, 15, 16, 24, and 32 bit images, ignoring the alpha channel for 32 bit images.

Alchemy writes 8, 15, 16, 24, and 32 bit images, writing an empty alpha channel for 32 bit images.

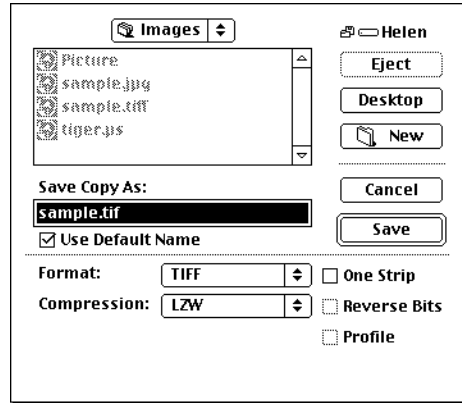
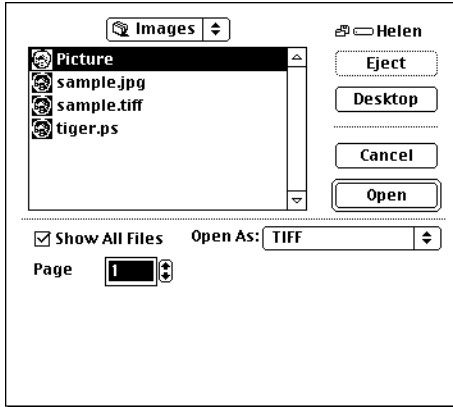
Comments

15 and 16 bit output are actually the same except for one field in the header. The 16 bit override option causes Alchemy to write a 15 bit Targa file, with a 16 bit Targa file header. This is necessary for some software which can only read 16 bit Targa files.

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 you to write Targa images without a footer. The most common variant for other software to be able to read is 24 bit uncompressed.

TIFF (Tagged Interchange File Format)

TIFF is designed to be a universal raster image format; it is very popular with desktop publishing packages.



Input Options

Page

Output Options

Compression:

- None
- LZW
- PackBits
- Group III Fax
- Group IV Fax
- CCITT RLE
- LZW with prediction

One Strip

Reverse Bits

Extension

.tiff

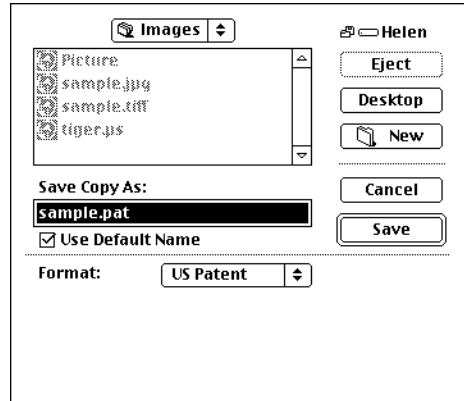
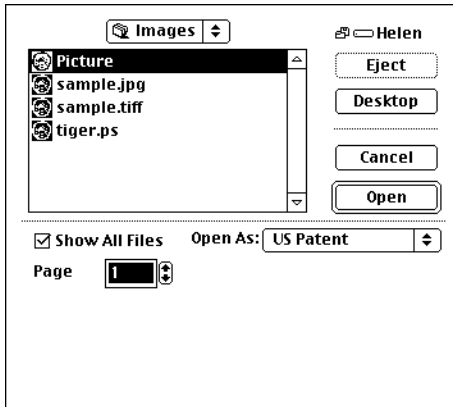
Creator

Aldus Corp.
Microsoft Corp.

Used by	Various desktop publishing and scanning software
Variations	<p>Alchemy reads TIFF class B, G, R, and most class P files.</p> <p>Alchemy reads 1, 4, 8, 12, 24, and 32 bit images (ignoring the alpha channel for 32 bit images).</p> <p>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.</p> <p>Alchemy writes class B, G, P, and R files, depending on the input file and options specified.</p> <p>Alchemy writes 1, 4, 8, and 24 bit images.</p>
Limitations	<p>Class P TIFF files can only be read if they have 1, 4, or 8 bits per pixel.</p> <p>Group III, Group IV, and CCITT RLE compressed images must be black and white.</p>
Comments	<p>If you have trouble reading a fax compressed image with other software, you should try using the One Strip and/or Reverse Bits options.</p> <p>If there is an ICC profile available (see the section on the Profile... dialog), it may be included in the TIFF file by selecting the Profile box. Alchemy will automatically read a profile, if present, from a TIFF file.</p>

US Patent

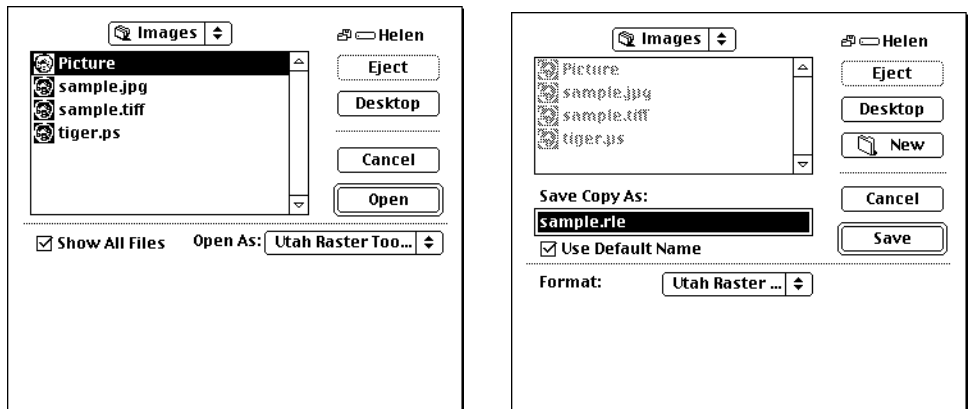
US Patent files are used by the U.S. Patent and Trademark Office (PTO) to store and distribute patent data



Input Options	Page
Extension	.pat
Creator	US Patent and Trademark Office
Used by	US Patent and Trademark Office
Variations	1 bit, black and white, CCITT Group 4 compressed

Utah Raster Toolkit

The Utah Raster Toolkit is a set of public domain utilities for manipulating and converting images for various workstations. The source code is freely available (see below).



Extension	.rle
Creator	The University of Utah The University of Michigan
Used by	Utah RLE toolkit
Variations	Alchemy reads and writes 1 and 3 channel 8 bits per pixel files; the Alpha Channel is ignored during reading.
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 single channel color map, if present, will be used as a 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.

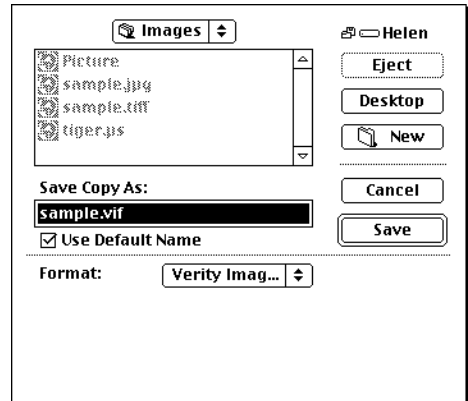
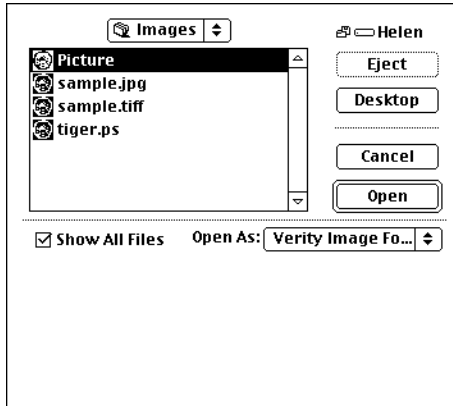
When writing RLE files Alchemy will generate a 1 channel file with a 3 channel color map for paletted images and a 3 channel file with no color map for true color images.

Comments

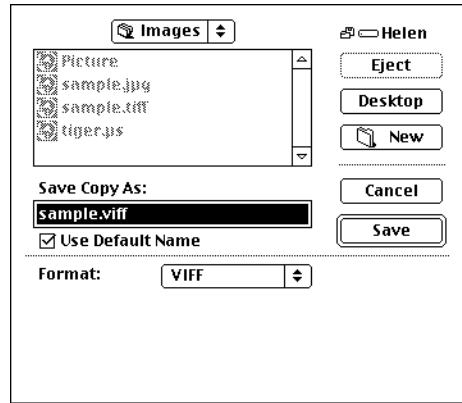
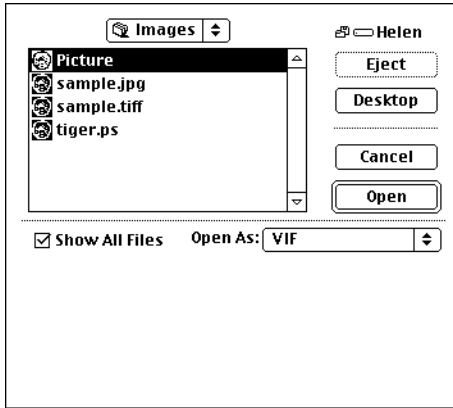
The Utah Raster Toolkit is available free of charge as `pub/urt-3.0.tar.Z` via anonymous ftp from `cs.utah.edu`, `weed eater.math.yale.edu`, or `freebie.engin.umich.edu` or via floppy disk from us.

Verity Image Format (VIF)

VIF is used by the Topic text retrieval software.



Extension	.vif
Creator	Verity Corp.
Used by	Topic
Variations	Alchemy reads and writes 1 bit, black and white, CCITT Group 4 compressed images.



Extensions

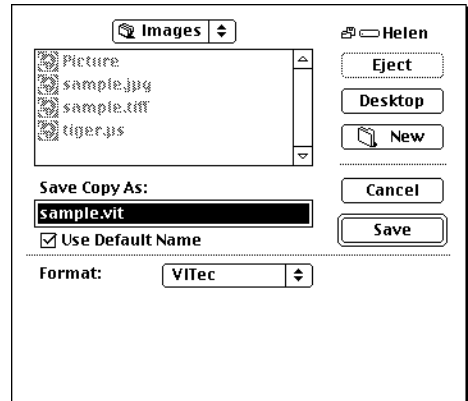
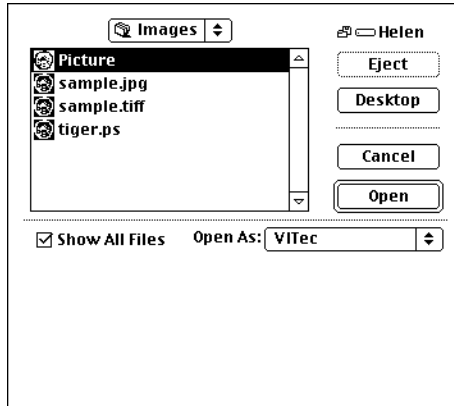
.viff

Variations

Reads and writes 1 bit black and white, 8 bit grayscale, 8 bit paletted, 24 bit color, and 24 bit color with an alpha channel.

VITec

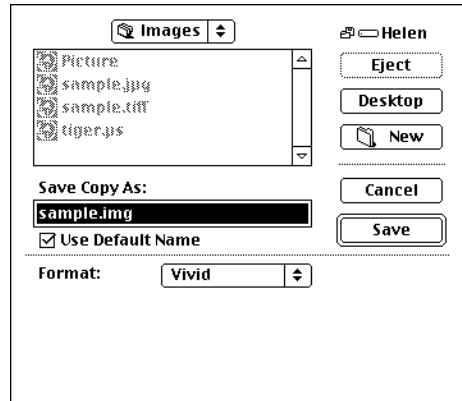
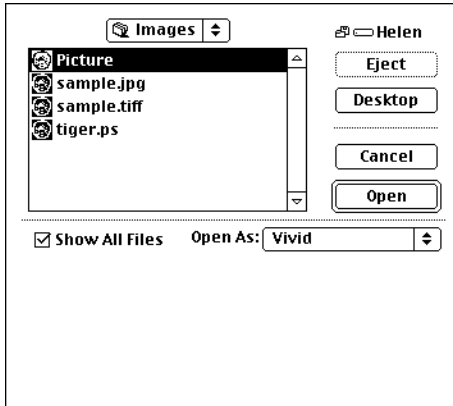
VITec files are used by VITec image processing software.



Extension	.vit
Creator	VITec
Used by	VITec ELT
Variations	Reads 8 bit grayscale and 24 bit color files, untiled and tiled files. Writes 8 bit grayscale and 24 bit color files untiled files.

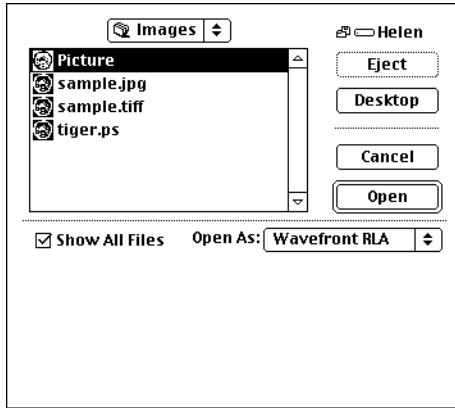
Vivid

Vivid is a shareware ray-tracer for MS-DOS computers.



Extension	.img
Creator	Steven B. Coy
Used by	Vivid Ray Tracer
Variations	Reads and writes 24 bit RLE files.
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

Wavefront RLA



Extensions

.rla

Variations

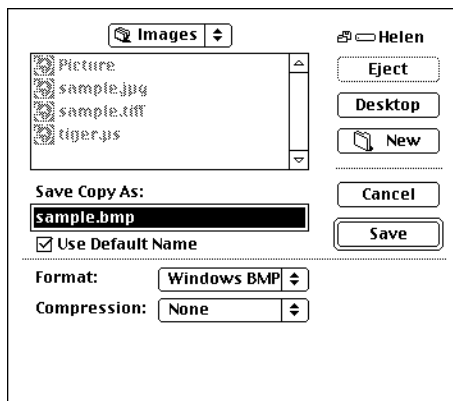
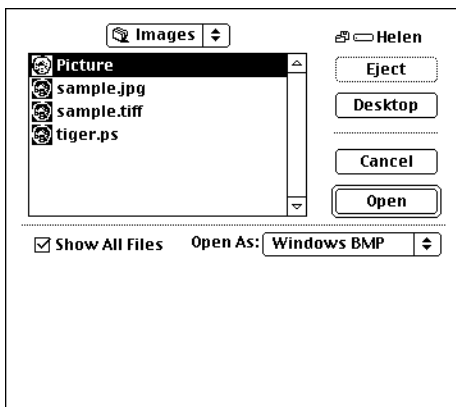
Reads 24 bit color images with an alpha channel.

Limitations

Image Alchemy can only read, not write, this format.

Windows Bitmap (BMP)

Windows BMP files are used by Microsoft Windows.



Output Options	None RLE
Extension	.bmp
Creator	Microsoft Corp.
Used by	Microsoft Windows
Variations	Reads 1, 4, 8, and 24 bit RGB (raw), RLE4, and RLE8 files. Writes 1, 4, 8, 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.

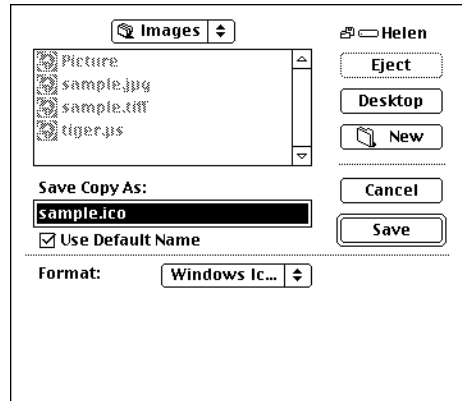
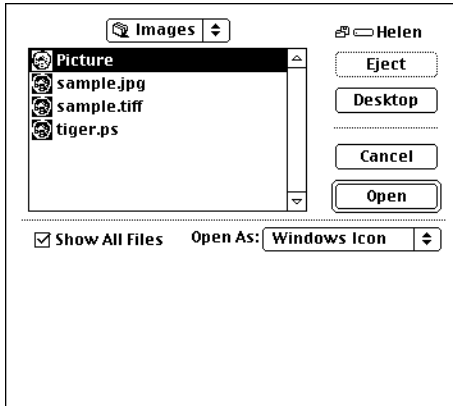
Comments

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.

Windows Icon

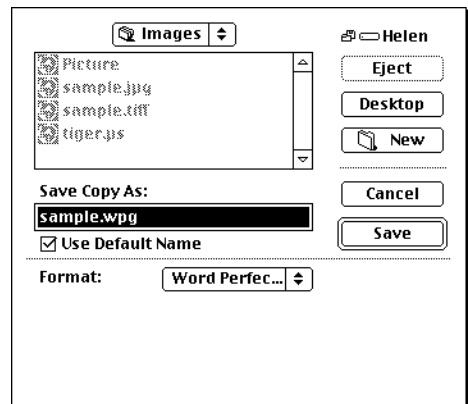
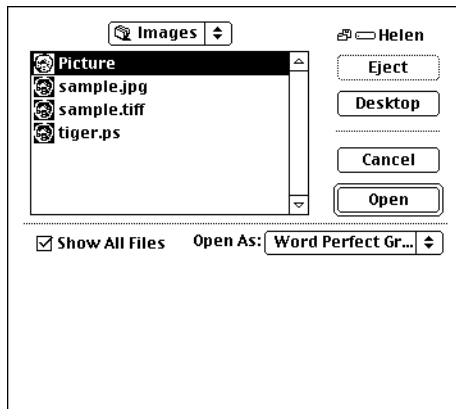
Windows Icon files are used by Microsoft Windows.



Extension	.ico
Creator	Microsoft Corp.
Used by	Microsoft Windows
Variations	Reads and write 1, 4, and 8 bit files.
Limitations	Windows icons always have a width and height of 16, 32, or 64 pixels (32 being the best choice, since Windows displays all icons as 32x32). 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 match to palette option). If you do not have any other icons you can also match to one of the 16 color wallpaper files supplied with Windows.

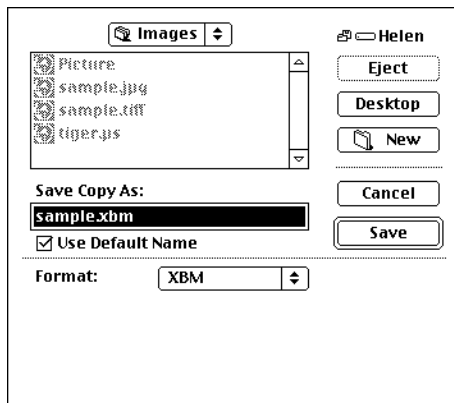
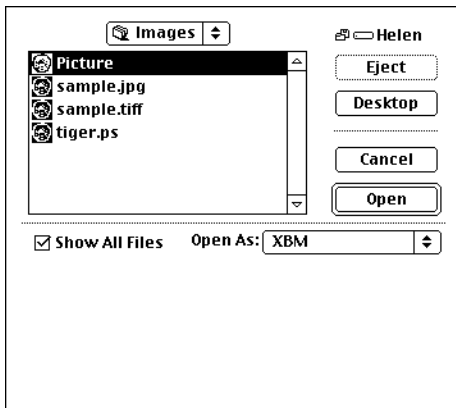
WordPerfect Graphic File

WordPerfect files are images which can be imported into WordPerfect and various other word processors and desktop publishing programs.



Extension	.wpg
Creator	WordPerfect Corp.
Used by	WordPerfect
Variations	1 through 8 bits per pixel are supported.
Comments	In addition to raster images WordPerfect files may contain vectors and text information. Such information is lost when reading WordPerfect files. See Appendix A, Answers to Frequently Asked Questions, for more information.

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.



Extensions	.xbm
Creator	MIT
Used by	The X Windowing system
Variations	1 bit per pixel

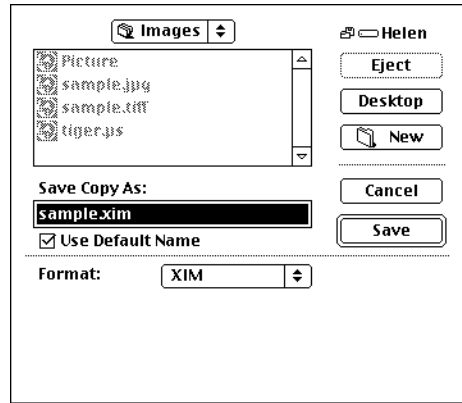
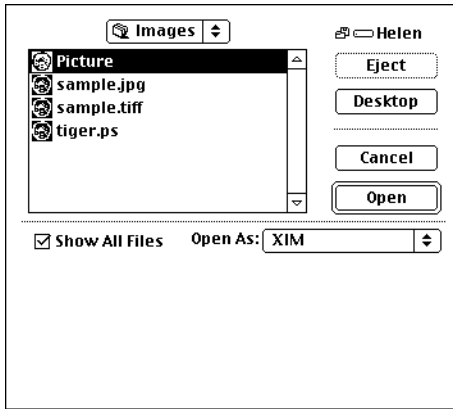
Limitations

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.



Extensions

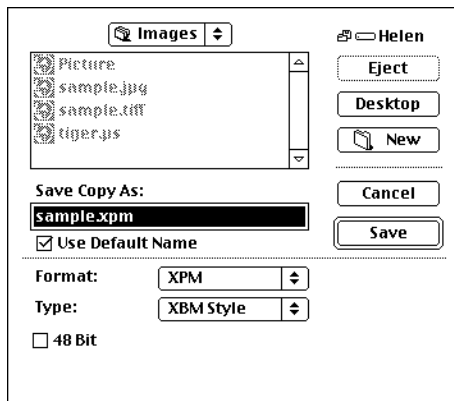
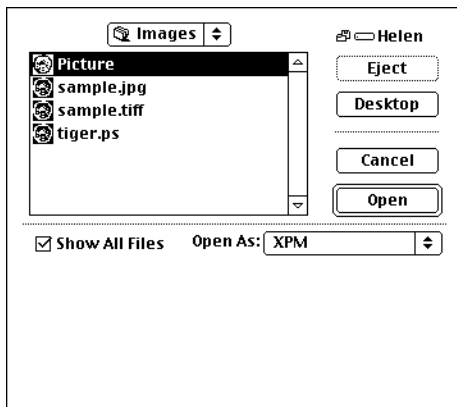
.xim

Variations

Reads and writes 8 bit paletted, 24 bit color, and 24 bit color with an alpha channel.

XPM

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.



Output Variations	Type: XBM Style XPM XPM2 48 Bit
Extensions	.xpm
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 table of these names into values is in a file supplied with the X Windowing system called rgb.txt.

Comments

The different type XPM files can be identified as follows:

Type 0:

```
#define type0_format 1
...
static char *type0_colors[] = {
"a", "#000000",
...
}
```

Type 1:

```
/* XPM */
static char * type1[] = {
"32 20 12 1",
"a c #000000",
...
}
```

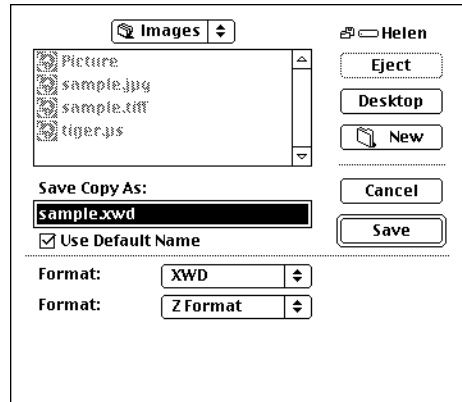
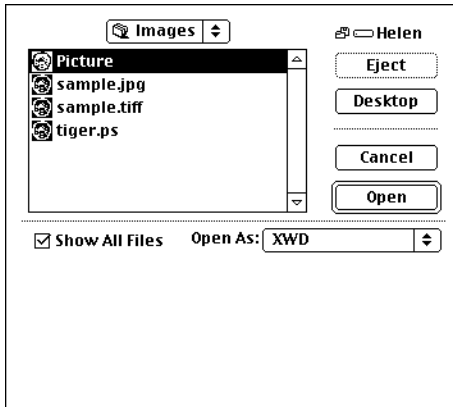
Type 2:

```
! XPM2
32 20 12 1
a c #000000
..
```

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.

XWD is the file format used by xwd, the X Windowing System dumping utility.



Output options	Z format XY format
Extension	.xwd
Creator	MIT
Used by	The X Windowing System
Variations	Alchemy reads 1, 4, 8, and 24 bits per pixel Z format and 1, 4, and 8 bit XY format XWD files. Alchemy writes 1, 8, and 24 bits per pixel Z format and 1 and 8 bit XY format XWD files.

The File Menu: Other Commands

Introduction	The File menu also handles other standard image file management features, such as Close, Revert to Saved, Page Setup, Print, and Quit.
Close	The Close feature closes open windows.
Revert to Saved	The Revert to Saved feature causes all changes made to an image since the last time it was saved to be undone.
Page Setup	<p>Page Setup is the standard window allowing you to change parameters for printing, such as paper selection, layout, reduce/enlarge, and orientation.</p> <p>These functions are not performed by Image Alchemy, but are intrinsic to your system. Depending on your printer driver, you may achieve better results by having Image Alchemy perform the scaling than choosing reduce/enlarge from the Page Setup menu.</p>

Print

Print allows you to access the functions native to your printer when you print your file, such as the number of copies you would like and the paper cassette your printer will use.

These functions are not performed by Image Alchemy, but are intrinsic to your printer.

Quit

Quit causes all Image Alchemy windows to close and Image Alchemy to stop running.

The Edit Menu

The Edit Menu

Introduction	The Editmenu handles standard Mac copy and paste operations.
Undo	The Undocommand undoes the last operation.
Cut	The Cutcommand copies the selected region to the clipboard, and deletes it. This is only functional in text fields.
Copy	The Copycommand copies the selected region to the clipboard. This works in text fields and with selected regions of an image.
Paste	The Pastecommand pastes the contents of the clipboard at the current insertion point. This is only functional in text fields.
Clear	The Clear command deletes the selected region. This is only functional in text fields.

The Image Menu

The Image Menu – Color Management: Adjust Palette, Invert, and Profile

Introduction

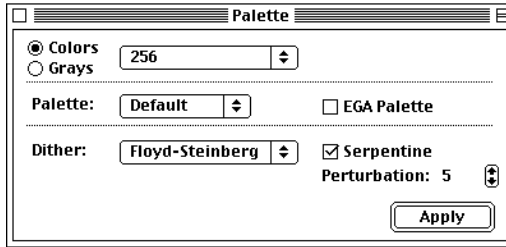
The image menu is used to change those settings which affect the appearance an image. Color controls fall into two broad categories: palette manipulation and profiles.

Generally speaking, palette manipulation features are for multimedia designers and people creating content for the world wide web. They control things like the number of colors in the output image, and the method used to change color spaces. Image enhancement features include convolutions and histogram operations.

Profiles are well suited for achieving accurate color on printers and plotters. Image Alchemy supports profiles for scanners, monitors, printers, and plotters.

Managing color information, palettes, dithering and profiles will be discussed in the following pages.

Colors



The number of colors a converted image will have can be set with the Adjust Palette dialog. The number of colors in the image will be between 2 and 256 for a paletted image and in the thousands for true color images with 15 or 16 bits per pixel, or in the millions for images with 24 or 32 bits per pixel.

To change the number of colors in an image, select the number of colors you would like to have in the image you produce. If you would like to change from a color image to a gray image, select “Color” or “Gray” in the dialog box.

To change a true color image to a 256 color image, set up the dialog box as above by selecting 256.

Color and Dithering

You may also want to choose a dithering type whenever you *decrease* the number of colors for your new image. Please read the section below, “Dithering,” which will explain the tradeoffs of the different types of dithers.

Note that if you *increase* the number of colors in an image beyond what was in the original image, the new image will not actually have more colors. However, the image will be recognized by your application software as having more colors than it originally did (which is useful for compatibility reasons).

2 / 16 /
256/Choose...

Each of these options specifies a certain number of colors to be used in the output file. Note that specifying any of these options will generate a paletted output file, as opposed to a true color file.

16 (4 bit CMYK)	This option will produce a CMYK image with 1 bit per component.
256 (16 bit GA)	This option is similar to 256 colors with Grays selected, but includes an alpha channel.
Thousands (15 bits)	Specifying this option will make the output file a 15-bit image, with 5 bits each for the red, green, and blue fields. This yields a total of 32,768 possible different colors.
Thousands (16 bits)	In this case, the output file will retain 16-bits of color information per pixel (5 bits for red and blue, and 6 bits for green), yielding a total of 65,536 possible different colors.
Millions (24 bits)	This option will yield an output file with 8 bits of information per color, for a total of 24 bits per pixel. With this combination, 16.7 million colors are possible.
Millions (32 bit RGBA)	This option is similar to the 24-bit option; it also has 8 bits of information for the red, green, and blue components. Additionally, though, it has 8 bits of information available for an alpha channel, which is used by some file formats to store auxiliary information such as text, texture characteristics, etc.
Millions (32 bit CMYK)	This option will yield an output file with 8 bits of information per color in CMYK mode for a total of 32 bits per pixel.
Palette	Whenever 256 or fewer colors are selected in the Adjust Palette dialog box, a method of choosing a palette must be specified.
Default	If you start with a color image and reduce the number of colors Alchemy will default to using Heckbert quantization.

Heckbert Use the Heckbert color quantization technique to generate the new palette. This creates a custom palette for the image based on the colors which are used in the image. It produces the best results when converting a true color image to a paletted image or reducing the number of colors in a paletted image.

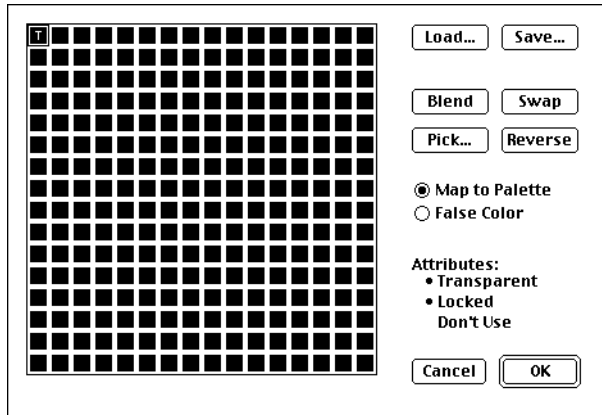
Uniform Instead of using the Heckbert algorithm to generate a custom palette for the image, use a palette with entries which are evenly distributed across the spectrum (of the RGB color cube).

The advantage of using a uniform palette is that it is faster than generating a custom palette. However, this is at the expense of image quality since the palette is not generated based on image content.

The choose... option described above in the section on colors can be used in conjunction with a uniform palette 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). The palette size will not necessarily match the specified size, 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%).

Custom...

This brings up an additional dialog that allows you to: load a palette from a file; edit individual palette entries; or specify entries that Alchemy will not use in the final image.



Single palette entries may be selected by clicking on them, and ranges may be selected by dragging. Load... loads a palette from a file. Save... saves a palette to a file. Blend creates a linear ramp between the end colors in the current selection. Swap swaps the two end colors in the current selection, and Reverse reverses the order of all of the colors in the current selection. Pick... allows you to select a new color for the currently selected entry..

Map to Palette causes Alchemy to map the image to the new palette. False Color cause Alchemy to use the new palette in place of the original, if any.

Transparent marks or unmarks the currently selected entry with a 'T'. At most one entry can be transparent. Transparency is only currently used by GIF and PNG output.

Locked instructs Alchemy to not modify this entry. Palette entries that are not locked may be replaced by colors generated from the original image.

Don't Use instructs Alchemy to not map the image to this entry.

EGA Palette When this option is enabled, Alchemy will optimize the image quality for display on an IBM PC EGA board and monitor. Alchemy does this by reducing the palette resolution to two bits and modifying the manner in which the palette is generated.

Dither Dithering is used to reduce color banding in an image caused by the palette not having a perfect match for every color in the image.

Dither Types Floyd-Steinberg through Sierra Lite are all error-diffusion dithers. Floyd-Steinberg and Sierra Lite are the fastest of the diffusion dithers, and they usually look the best on low resolution devices like computer monitors (CRTs). Stucki, Jarvis, Judice & Ninke, and Stevenson and Arce all tend to cause an image to appear more grainy on monitors; however, they produce better results than Floyd-Steinberg or Sierra Lite on high-resolution, low color output devices such as laser printers and inkjet plotters.

The Halftone option will produce the most accurate grays on a laser printer, but the image will not be as sharp as one produced by the error-diffusion dithers. Bayer is a dispersed dot ordered dither; its only advantage over the error-diffusion algorithms is speed.

The dither option only has an effect if the number of colors is being reduced or the image is being re-mapped to a new palette.

Serpentine Using a serpentine raster can help to reduce visible patterns introduced by dithering. Using a serpentine raster has no effect when Halftone or Bayer dither types are used.

Perturbation 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, with valid values being between 0 and 127. Perturbation has no effect on Halftone or Bayer dither types.

Invert This 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, etc.)

Profile...

The Golden Rule

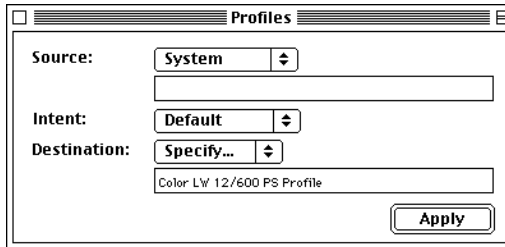
The Golden Rule of Profiling: define the process; profile the process; use the process. If the Golden Rule of Profiling is not followed you can produce worse results than if you had not touched profiles at all.

If the process is scanning a picture and printing it, then you will want to get or make a profile for the scanner and printer, and use them.

Before trying to use the profile feature you should read the material available at <http://colorsync.apple.com>. This is a valuable resource for finding people who will make profiles for you. You will also find a variety of hardware and software for making your own profiles. The site provides accurate and useful information.

Profiles can be generated with third party device profiling systems. Sometimes profiles are provided by hardware manufacturers for their devices. A profile provided with your scanner will most likely be fairly accurate and useful. Profiles provided with color printers can be useful if they are for the exact combination of ink and paper that you are using. Profiles provided with monitors are useless if the monitor is adjusted incorrectly.

Selecting Profiles



Alchemy can use ColorSync to convert colors so that they will be reproduced on profiled devices more accurately. Use the Profiles dialog to choose profiles for the device that created your image and the one that the image will end up on. For example, under source you could specify the profile for your scanner and under destination you could specify the profile for your printer.

The System profile is the one selected in the Apple supplied control panel "ColorSync System Profile". This should be set to match your monitor.

Embedded refers to a profile included in a file. Usually this will appear grayed out. If you open a file that has a profile included in it then embedded will not be grayed out.

In the Destination profile menu, Source instructs Alchemy to use the profile that is specified for the Source image, if any.

Specify... in either profile menu allows you to choose a file containing a profile. When you select one for the Source image, Alchemy will only show you profiles that are appropriate for the colorspace the source image is in. You can override this, so that you may select any profile, by holding down the option key while selecting the Specify... menu item.

Anytime you select a destination profile, the Adjust Palette... dialog will be automatically updated to a colorspace that is appropriate for the profile you selected. You may then go to the Adjust Palette... dialog to override those settings.

Image Enhancement: Convolve, Gamma Correction, Brightness & Contrast, Histogram, and Set Resolution

Introduction

The Convolve, Gamma Correction, Brightness and Contrast, Histogram , and Set Resolution options are used to change to appearance of the image.

Convolve

The convolve option can be used to apply any one of a number of convolutions to an image (such as sharpen or blur).

Convolutions are mathematical transformations which are not necessarily reversible. You can “undo” a convolution, since Image Alchemy will remember what the original image was. However, Blurring a Sharpened image will not give you the original image back.

Image Alchemy includes three filters, and these should be seen on your Convolution sub menu (which is found under your Image Menu). See the Options section to specify the directory in which convolutions are stored.

Understanding Convolutions

The best way to understand what these features do is to use them. You can also create your own convolutions, as described in the Specify... section.

Described below are the convolution filters which have shipped with Image Alchemy.

Sharpen

Sharpen uses a photographic technique called “Unsharp Masking” to make the edges in an image more distinct.

Blur

Blur makes an image less sharp.

Edge Detection

Edge Detection finds and highlights the edges in an image. The parts of the image which are not edges are dark.

Specify... This feature allows you to specify a convolution. The Convolution dialog box allows you to create a series of rows and columns, which is called a matrix.

Convolutions are very complicated, but that should not stop you from playing around!

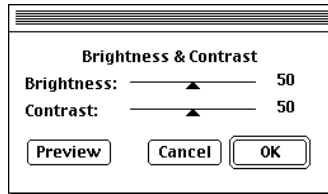
To give you some idea of what is happening: Each pixel on the screen has an "intensity". If you pick 9 pixels arranged like a tic-tac-toe board, then you pick 9 numbers arranged in a different tic-tac-toe board, you can begin to see how convolutions work in this way:

Pick the middle pixel of your tic-tac-toe board. Then see what the middle number is and imagine "multiplying" the intensity of that pixel by that number. Looking to the pixel directly to the left of center, apply the number directly to the left to see how intense that pixel will now be. Do this for all nine pixels and add the results. The final result is the intensity of the pixel in the new image that corresponds to the one under the center of the convolution matrix.

But that is not the end of the story, since now you move the tic-tac-toe board over one pixel and do the same thing again. Repeat for every pixel in the image.

So, convolutions can be very confusing to think about. You might be best advised to simply experiment with different matrices. Remember that the larger the matrix, the longer the calculation time.

Brightness

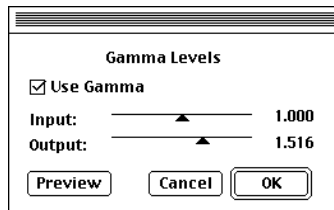


Increases or decreases the brightness of an image by adding a constant to each of the pixels.

Contrast

Increases or decreases the contrast of an image by multiplying each of the pixels by a constant.

Gamma Correction



Input Gamma and Output Gamma

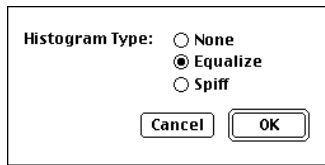
Gamma correction increases or decreases the gamma value of an image. This controls the brightness/contrast of an image in a non-linear fashion. The gamma values range between 0.25 and 4.00. Use "preview" to experiment with input and output gamma.

Use Gamma

Enables gamma changes by taking into account the gamma value stored in the image. The gamma dialog can be used to change the value stored in some file formats without changing the actual image data by leaving Use Gamma off.

Histogram

Histogram enhances an image contrast by stretching the pixel color values to the full 0 to 255 range.



Histogram Types

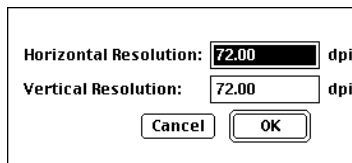
Spiff, ensures that the image has pixels which are distributed over the entire intensity range .

Equalization insures that the distribution of pixels over the output range is linear.

Equalization can produce significantly better results than Spiff for some images. Generally you will want to try both types to see which gives better results.

Set Resolution

Sets the resolution of the image. The default units are controlled by the General Options dialog. You may override the default units by following the number with a 'i' for dots per inch, 'c' for dots per centimeter, or 'm' for dots per millimeter.

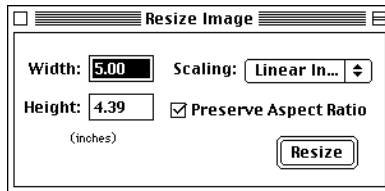


Resize and Crop

Introduction

The Image menu has two submenus, *Resize Image...* and *Crop Image...*, that are used to change the size of an image. *Resize* changes the size of an image by scaling and *Crop* changes the size by removing part of the image (cropping) the image.

Resize



Height and Width

Specify the final image height and width, in pixels, inches, or centimeters. The height and width values can also be changed by changing the size of the window the image is displayed in. To change the size of the window place the mouse cursor on one of the corners of the panel. Then, while pushing down on the mouse button, drag the corner to change the size of the window. You may override the default units by following the numbers with 'i' for inches, 'c' for centimeters, 'm' for millimeters, or 'p' for pixels.

Aspect

When set to *Preserve Aspect Ratio*, the given values will act as a bounding box, reducing one dimension if necessary to preserve the image aspect ratio. In other words, the image will be no larger than the height and width entered.

Scaling

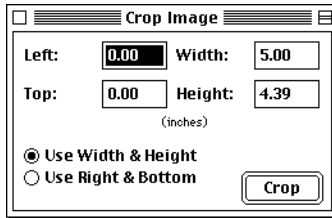
When the size of the image is being changed, Alchemy can use any of four different algorithms to perform the scaling. They are listed in order of quality. Nearest neighbor will produce the fastest transformation, but the resulting image will suffer from aliasing. Alternatively, Lanczos 3 will produce exceptional results, but processing time is longer. Linear Interpolation is the best tradeoff of quality versus time.

All of the scale types other than nearest neighbor give good results 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 Load from File option in the Adjust Palette dialog and specifying the original image as the palette file.

Example

In the above example, the given image will be scaled to a width of 5 inches, height of 4.39 inches, using the Linear Interpolation algorithm.

Crop



You can use the mouse to select the area you want and then press the crop button, or you can enter specific values. The default units are as specified in the General Options dialog. You can override the default units by following the numbers with 'i' for inches, 'c' for centimeters, 'm' for millimeters, or 'p' for pixels.

- Top** This value specifies the number of pixels from the top of the image to begin the cropping procedure. If set to 0, any reduction in the height of the image will be from the bottom.
- Left** This value specifies the number of pixels from the left of the image to begin cropping. If set to 0, any reduction in width of the image will be from the right.
- Bottom** This value specifies the number of pixels from the top of the image to end the cropping procedure.
- Right** This value specifies the number of pixels from the left of the image to end cropping
- Width** The value entered here determines the final width of the image, in pixels. The Left value (described above) determines whether the cropped pixels will be from the left, right, or some combination.
- Height** The value entered here determines the final height of the image, in pixels. The Top value (described above) determines whether the cropped pixels will be from the top, bottom, or some combination.

Using the Mouse

Rather than typing specific values for the final width and height, and having to figure out how many pixels to remove from each side, the mouse can be used to select a portion of the image. Once the image has been loaded and displayed on the screen, the mouse button can be used to visually select a portion of the image to crop; the values in the Crop Window will automatically be updated to reflect the selection made. At this point, simply clicking the Crop button will execute the command.

Example

In the example given above, the resulting image will contain the upper left 5 x 4.39 inches of the original image.

The Display Menu

The Display Menu

Introduction

The Display menu allows the user to control the display of the image on the screen. It does not alter the actual image file, just what you are seeing on your monitor.

Show Image

When Show Image is selected, the image will be displayed. When it is not selected, it will not be displayed. Having the ability to turn the display off is helpful for processing large numbers of images, particularly when using the Script functions, since time spent displaying the image can be avoided. If you cancel a conversion, it will automatically cause the image to not be displayed. You must select Show Image again for the previous image to be reloaded.

Enlarge

Enlarge automatically enlarges the viewed image 200% (twice the size).

Reduce

Reduce automatically reduces the viewed image 50% (half the size).

Set Magnification

Using this option the user can enter the amount of magnification desired: 400% (4X magnification), 200% (2X magnification), Normal (1X magnification), 50% (reduce to half), or 25% (reduce to one-quarter).

Pose

Using Pose allows the image to fill the entire monitor for viewing. To leave Pose, click the mouse anywhere or press any key.

The Scripts Menu



Scripting

Introduction

The Scripting capabilities of Image Alchemy allows the user to automate commonly used conversions.

Record Script

To record, select Record Script under the Scripts menu. The apple icon on the title bar will now flash as a cassette. If the cassette does not flash, check that you have the AppleScript extension installed. From that point, simply select the items you wish to perform and Image Alchemy will record the sequence. It is a good idea to have planned any complex sequence before recording it. When you have completed performing your sequence, select Stop Recording from the Scripts menu. You will then get a dialog box asking you to save the script. Enter the script name, select the appropriate location, and press save.

Execute Script

Selecting Execute Script will bring up a dialog box which allows you to find and select existing scripts.

Answers to Frequently Asked Questions

Question How do I generate a single palette from a collection of images, and map all of those images to the new palette?

Answer This can be done with the Cumulative Histogram format. First, open all of your images using Open Several.... Now, do an Append to New File..., selecting Cum. Histogram as the format. Next, open the resulting histogram file (the image data will not look like anything useful, but it does represent all of the colors used by the original images). Save that file in a paletted format, such as HSI Palette (if you want fewer than 256 colors in the palette, select that first in the Adjust Palette... dialog). Finally, select the window containing your original images and bring up the Adjust Palette... dialog. Select 256 colors, and Custom... in the Palette menu. From the Custom... dialog, push Load ..., and select the palette file you created earlier. Select OK in the Custom... dialog, and Apply... in the Adjust Palette... dialog.

This process can be combined with other palette selection features to do things like generating a custom palette for a collection of images, but with the first and last ten colors fixed. Just use the Adjust Palette:Custom... dialog before converting the cumulative histogram into a palette file to select colors that you do not want changed.

Question Why do I get garbled output when I try to send PCL data to my printer through my Axis print server in AppleTalk mode?

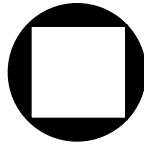
Answer There is one possible complication with AppleTalk output. The protocol is usually used to communicate with PostScript devices, and PostScript has different methods for sending binary data over a network and over a parallel/serial port. Because of this, some print servers perform conversion between the protocols internally; this will prevent the server from working correctly with non-PostScript data. So far we have tested the NetQue pocket print server from Emulex Corporation, and the Axis 540+ from Axis Communications. The NetQue does not currently perform this conversion, so it works as is. The Axis does, but that conversion can be turned off. To do this, follow the directions in the Axis manual (on page 67 for Revision 2.1) - the option you need is 'BINARY: NO'. You do not need to specify a BINARY_TYPE command.

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. You should try writing an uncompressed, 24 bit Targa file.

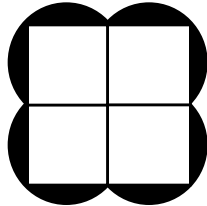
Question I'm using Alchemy to produce an HP RTL file to be printed. The print is much darker than the original image. Why is this?

Answer The solution is to perform gamma correction or see the section about using profiles. 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 $\pi/4$ 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.

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 a Clustered Dot dither (since that dithering type cluster the dots).

Question Why can't my favorite desktop publishing package read the TIFF file I wrote with Image Alchemy?

Answer TIFF (Tagged Interchange File Format) 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 is 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:

B: Black and white/2 color/PackBits compression

G: Black and white/256 color/No compression

P: 256 color/No compression

R: 24 bit color/No compression

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 black and white, gray-scale, and color. In this case it is usually best to use no compression 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.

You may also have 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. Generally, if you are using a 300 DPI Laser Printer you want to make the TIFF file 300DPI x 300DPI.

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 does not 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 is not compatible with JPEG or JFIF.

The other possibility is that the input GIF file did not 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.

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 loaded a HP PCL file but some or all of the information that was in the file is missing. What happened to it?

Answer PCL files can be 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 is not any general way to preserve the rest of the data with Alchemy.

If you are producing the PCL files using Windows 3.1 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 does not 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). 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 shades of gray and saved it as a TIFF file. 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. However the 16 color PCX file you started with probably did not 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. 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

Color and Dithering

Paletted vs. True Color

Color images are normally 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).

The reason for the existence of paletted images is that 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 many 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.

15 bit SVGA boards have 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 normal 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, referred to as a uniform palette. This has the advantage that it is fast and the same palette can be used for any image; the primary disadvantage is that most images do not contain colors from everywhere in the RGB cube, so palette entries are wasted representing colors that are not 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 decision as to where to divide a box is based on the distribution of colors within the box. This algorithm attempts to create boxes which have approximately equal popularity in the image.

Palette entries are then assigned to represent each box. 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 palette'd 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.

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.

Overview

JPEG Compression consists of a series of reasonably complex mathematical operations. These include: 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 is possible to compress the chrominance information more than the luminance before the perceived image quality suffers.

This step is not specified in the JPEG draft (it does not 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 draft 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% better compression (depending on the image and quality setting). 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.

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). If you would like more information on the JFIF standard please contact us.

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 an evaluation 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 Road, Suite 106
Fremont, CA 94538

1 800 252 0101 (Toll-free from within the U.S.)
+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:

email: support@handmadesw.com

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.

Tags

Tag	Description
filename	<p>The name of the file containing the image data.</p> <p>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.</p>
width	The width of the image data, in pixels.
height	The height of the image data, in pixels.
planes	<p>The number of planes of image data:</p> <ol style="list-style-type: none">1: gray-scale2: gray-scale with an alpha channel3: RGB4: RGB with an alpha channel. <p>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 must also specify both the height and width of the image (ordinarily Alchemy can calculate one from the other). See below for an example.</p>
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, rgb, 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 RGBRGRGRGRGRGRGRGB...
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:
group4: use Group IV Fax decompression

Currently the only format tag supported is Group IV Fax compressed data (other standard formats will be added in future versions of Alchemy). See below for an example of reading a Group IV compressed data file using a BIF file.

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 an HSI Palette file and using the false color option while reading the BIF file.

Examples

Using a BIF file

After creating a BIF file with a text editor, open that file as you would any other image file.

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
```

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
```

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 is not 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
```

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
```

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
bitpersample  16
byteorder     intel
```


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 completely uncompressed, unpacked, and unpadded image data files. Therefore they tend to be larger than almost any compressed file format. However, they have the advantage, as far as Alchemy is concerned, that they are very fast 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.

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 version HSI file:

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. Currently only compression mode 0 is supported, but you should check this value when reading a HSI Raw to make sure that we have not added any compression modes.
Reserved	Ten 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
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
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

```
unsigned int getWord(int i, FILE *stream) {
    register unsigned int temp;
    temp=(unsigned int) (getc(stream)<<8);
    if (temp&0x8000)
        temp|=~0xffff;
    return(getc(stream) | temp);
}
```

Writing a two byte
integer

```
int putWord(unsigned int i, FILE *stream) {
    putc(i>>8, stream);
    return(putc(i&0xff, stream));
}
```


PAL Files

Overview

PAL files are text files which contain a palette in an ASCII form. Alchemy can extract palettes from other file formats and write PAL files. Alchemy can also use 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). Those three numbers can be followed by a word instructing Alchemy what to do with that entry. The choices are "dontUse", "use", and "replace". dontUse causes Alchemy to leave that entry alone, and not to map the image to it. "use" is the default; Alchemy will not change the values, and it will map the image to it. "replace" instructs Alchemy to replace the entry with a color generated based on the image data, and then to map the image to it.

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 have 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 at <ftp.sgi.com>.

If you cannot get a copy of libtiff via anonymous ftp 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 GIF and 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

Glossary

- Anonymous FTP** An easy way to transfer files via the Internet. If you do not have Internet access you can not use anonymous FTP; if you do have Internet access you probably already know about it (if you do not, 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 JLN 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 is not 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.

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Colophon

This manual was created using Microsoft Word on a Macintosh..
The body text is set in Times Roman and the chapter and section
headings are set in Gill Sans.

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