

WarpTIFF

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Chapter 1

WarpTIFF

1.1 WarpTIFF.datatype 44.4

WarpTIFF.datatype 44.4 - the fastest TIFF picture datatype!
(for 68k, PPC/WarpOS and PPC/MorphOS)

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Description	what is this datatype for?
Features	list of features
System requirements	what you need to use this software
Installation	installing this software
Preferences	descriptions of configurable settings
Speed	information regarding speed issues
Distribution	distribution conditions
Disclaimer	important notices
Acknowledgements	thankyous and credits
Support & the Future	support + improvements I intend to make
About the author	how to contact the author
History	program history

1.2 Description

WarpTIFF.datatype is a powerful, fast datatype capable of reading images using the TIFF image format that adhere to the 5.0 or 6.0 TIFF spec. In terms of encoding support, it offers the widest selection of any TIFF datatype on the Amiga. However, support for files using LZW compression is not available due to legal restrictions concerning the LZW patent owned by Unisys.

As users of other datatypes in my WarpDT series will be familiar with, WarpTIFF comes optimized in a variety of cpu flavours, with PPC versions (native WarpOS and native MorphOS) and separate versions for 68020, 030, 040 and 060. Even better, it is fast, compact, clean, well behaved and fast - a true plug'n'play PPC datatype. One of the key features of my

WarpDT engine is its superior speed, and WarpTIFF inherits that just like the other datatypes in the series.

1.3 Features

- Supports 5.0 and 6.0 TIFF spec, including Packbits, Thunderscan, CCITT (fax), Pixar, LogLuv (CIE and SGILog) and Deflate (zip) encodings, and uncompressed files. LZW and JPEG encodings are currently unsupported
- Image types supported include RGB (24-bit and 48-bit), palette based greyscale (1-bit, 2-bit, 4-bit, 8-bit and 16-bit) and CMYK (32-bit and 64-bit)
- Supports image data organized as strips, tiles or separate components
- For multi-image files, applications may choose which picture to decode
- Scaling options for high resolution fax images
- Highly optimized datatype dispatch engine, and fast TIFF decoder, resulting in a very efficient, compact and quick TIFF datatype
- Asynchronous file i/o and double buffering techniques (WarpOS only), which speeds up image decoding
- Optimized versions for 68020, 030, 040 and 060
- PowerPC support with native WarpOS and native MorphOS versions
- Alter the pen allocation precision when images are remapped to an 8-bit display
- Specific support for the OS 3.5/3.9 picture.datatype, when available
- The dithering feature of the OS 3.5/3.9 picture.datatype can be configured to your liking (e.g. disabled for 15/16-bit displays)
- Based on libtiff 3.5.6-beta and zlib 1.1.3

1.4 System Requirements

This datatype needs the following in order to work:

- Kickstart 3.0 or higher
 - picture.datatype v43 or higher
(i.e. either of the ones supplied with AmigaOS 3.5/3.9, P96 or CGraphX)
- 68k version
- 68020 processor or higher (optimized versions included)
-

WarpOS version

- PPC accelerator card + 68040/060
- WarpUp Release 4 (powerpc.library V15) or higher

MorphOS version

- PPC accelerator card
- MorphOS beta release 1 or higher

Note that a graphics card is not necessary.

1.5 Installation

To install WarpTIFF.datatype, simply run the provided installer script by double-clicking the icon. This will create a CPU specific version of the library for you, and install it to SYS:Classes/Datatypes and also installs the TIFF descriptor file to DEVS:Datatypes. It does nothing else, so you needn't worry about it messing about with your system :)

1.6 Preferences Options

WarpTIFF can be configured using the "Datatypes/WarpTIFF.prefs" environment variable. The preferred way of altering the settings is via the WarpDTPrefs graphical user interface (requires OS3.5 or higher), available from <http://www.nanunanu.org/~oliver/warpdtprefs.html> or Aminet (util/dtype/WarpDTPrefs.lha).

However, it is also possible to alter the settings manually by changing the environment variable with setenv, according to the following template:

```
DITHER_OVERRIDE/K,DITHER_QUALITY/K,DITHER_DEPTH/K/N,PENS_OVERRIDE/K,  
PENS_QUALITY/K,FAX_SCALING/K,FAX_EXPAND/K/T
```

OS3.5 DITHER CONTROL OPTIONS

The three dither options all interact with each other and apply only when at least picture.datatype V44 (OS3.5/3.9) is in use.

By default picture.datatype V44+ dithers images for all target displays less than 24-bit. It is debatable whether it's worth using dithering on 15/16-bit displays - for photographic images, the difference is usually not noticable, but for computer generated images containing smooth colour gradients dithering produces a noticably better output image.

DITHER_OVERRIDE

Selects what our dither quality setting should override:

- NOTHING - do not change the dither quality in any circumstances
- DEFAULTS - only override picture.datatype's default dither quality,

which is used when the application does not specify it's own dither quality value

- APPS - override the dither quality that an application may set
- EVERYTHING - always use your custom dithering settings

DITHER_QUALITY

Select the dither quality to use when this datatype decides that changes to the dither quality are required, according to your dither override and depth settings:

- POOR - simple colour remapping and no dithering (fastest)
- GOOD - slower, higher quality dithered output (default)
- BEST - similar to GOOD, with maybe slightly higher quality output

DITHER_DEPTH (Screen Bit Depth Filter)

Use this option to select which display depths should use the above quality setting. When the target display is deeper than the given depth value, the above dither quality will be applied to that image. For example setting this to 8 will cause the dithering settings to be used for 15/16-bit target displays, but left untouched when the target display is \leq 8-bit.

PEN SELECTION OPTIONS

The pen selection options are only relevant to 8-bit displays, and adjust the precision to which pens/colours are allocated, which affects the image quality and number of pens that will get used.

PENS_OVERRIDE

Selects what our pen/colour quality setting should override:

- NOTHING - do not change the pen precision under any circumstances
- DEFAULTS - only override picture.datatype's default pen precision quality, which is used when the application does not specify it's own pen precision value
- APPS - only override the pen precision that an application has set
- EVERYTHING - always use your pen precision settings

PENS_QUALITY

Changes the pen precision quality to use when remapping an image to an 8-bit display, in situations according to your pens override setting:

- POOR - use only a small amount of unique colours, at the expense of image quality
- GOOD - allocate enough pens to ensure a reasonable output image quality, whilst not hogging all pens for a single image (default)
- BEST - allocate as many pens as possible/necessary, resulting in the best image quality, but when displaying multiple images on the same screen, the quality of every image might not be so good

FAX OPTIONS

Fax images are usually very large, so the following scaling options are provided to fit the output image to your display and memory requirements:

FAX_SCALING

Choose whether the image should be made smaller:

FULL - full size image - no scaling (default)
 HALF - scale image down by 50%
 QUARTER - scale image down by 25%

FAX_EXPAND

This option applies to low resolution (204x98 dpi) fax images only, and allows these images to be stretched vertically (effectively doubled) so that the aspect ratio looks closer to the original document. This feature interacts with your FAX_SCALING setting.

ON - vertically expand low resolution fax images, preserving aspect
 OFF - output low resolution fax images as is, which means the image may look a bit "squished" vertically (default)

1.7 Speed

The fastest TIFF datatype?

The table below shows the time (in seconds) it took to decode 12 different images on my A1200 603e/240MHz 060/50MHz, with BVision and CGX picture.datatype, with other tested datatypes configured as close as possible to WarpTIFF's internal settings. However, I should emphasize that the figures below are for comparison purposes only - the actual values are likely to be slightly different (faster or slower) on your system, but I'm confident that WarpTIFF is noticeably faster than other TIFF datatypes, whilst supporting more encoding types.

The figures speak for themselves... WarpTIFF for WarpOS is clearly much faster than other PPC datatypes where most image types are concerned, with WarpTIFF generally around 2-4 times faster depending on image type. For cpu-intensive codings the WarpOS version is about twice as fast as WarpTIFF 68k on a 060 (the speed difference will be even greater on 040 systems with a fast PPC). Maybe you don't believe these claims - my answer to that is simple... Try WarpTIFF for yourself and you will see the difference! :)

PowerPC/68K (dual-cpu)				
		WarpOS	PowerUp	
		akTIFF	44.112	
		WarpTIFF		
		44.4	PPCLibEmu	PowerUp
			native	
584x768x24	RGB uncompressed, 1.28Mb	0.57	1.81	1.84
584x768x24	RGB packbits, 1.29Mb	0.85	1.07	0.90

584x768x24	RGB deflated, 910K	0.88	*	*	
800x607x8	Grey packbits, 190K	0.22	*	*	
800x607x8	Grey tiled, 768K	0.38	*	*	
333x225x8	Grey CIE LogL, 71K	0.48	*	*	
333x225x24	RGB CIE LogLuv, 220K	1.25	*	*	
487x414x8	Colour uncompressed, 205K	0.14	0.47	0.38	
256x192x8	Colour packbits, 46K	0.07	0.28	0.19	
1728x1028x1	B&W Fax, 32K	0.40	0.90	0.75	
664x813x1	B&W uncompressed, 66K	0.17	0.47	0.37	
1512x359x4	Grey thunderscan, 151K	0.22	*	*	
+-----+					

(* = not supported, causes crash or corrupt output image)

The results for the MorphOS version are even more impressive, outperforming the WarpOS version, and outperforming akTIFF to a far greater extent with WarpTIFF being 3-7 times faster depending on image type.

+-----+					
PowerPC only (no 68K)					
+-----+					
MorphOS					
+-----+					
WarpTIFF akTIFF 44.112					
44.4 PowerUp					
emulation					
+-----+					
584x768x24	RGB uncompressed, 1.28Mb	0.52	1.61		
584x768x24	RGB packbits, 1.29Mb	0.61	0.68		
584x768x24	RGB deflated, 910K	0.78	*		
800x607x8	Grey packbits, 190K	0.18	*		
800x607x8	Grey tiled, 768K	0.35	*		
333x225x8	Grey CIE LogL, 71K	0.22	*		
333x225x24	RGB CIE LogLuv, 220K	0.49	*		
487x414x8	Colour uncompressed, 205K	0.14	0.73		
256x192x8	Colour packbits, 46K	0.08	0.43		
1728x1028x1	B&W Fax, 32K	0.26	1.57		
664x813x1	B&W uncompressed, 66K	0.13	0.74		
1512x359x4	Grey thunderscan, 151K	0.19	*		
+-----+					

(* = not supported, causes crash or corrupt output image)

The results for the 68k version are much the same, relatively speaking. WarpTIFF is by far the fastest, able to decode most types of images 3-4 times faster than akTIFF.

+-----+					
M68K					
+-----+					
WarpTIFF akTIFF TIFFDT					
44.4 44.112 43.2					
+-----+					
584x768x24	RGB uncompressed, 1.28Mb	0.55	1.53	14.94	
584x768x24	RGB packbits, 1.29Mb	0.86	1.07	15.35	
584x768x24	RGB deflated, 910K	1.75	*	*	
800x607x8	Grey packbits, 190K	0.23	*	2.68	
800x607x8	Grey tiled, 768K	0.35	*	*	
333x225x8	Grey CIE LogL, 71K	1.43	*	*	

333x225x24	RGB CIE LogLuv, 210K	2.59	*	*	
487x414x8	Colour uncompressed, 205K	0.13	0.44	2.33	
256x192x8	Colour packbits, 46K	0.07	0.29	0.59	
1728x1028x1	B&W Fax, 32K	0.55	2.09	*	
664x813x1	B&W uncompressed, 66K	0.17	0.82	0.82	
1512x359x4	Grey thunderscan, 151K	0.32	*	*	
+-----+-----+-----+-----+-----+					

(* = not supported or corrupt output image)

Note: all tests were performed, multiple times, using Visage, with the following command line: "visage test.tif time test". Most of the test images were taken from ftp://ftp.onshore.com/pub/libtiff/v3.4pics.tar.Z

WarpOS version still too slow!

Despite these facts, I'm still disappointed with the relatively slow performance advantage offered by my 603e over my 060. The main problem is that PPC datatypes still have to use the 68k for reading the data from disk and for creating / writing to the bitmap structures that the datatypes system requires. As far as the former goes, time lost for file i/o is negligible as WarpTIFF uses double buffered asynchronous i/o (supports DMA controllers).

The largest bottleneck is that the DTM_WRITEPIXELARRAY method of the picture.datatype has to be used to write the image data from WarpTIFF into the image bitmap. As this process is done via picture.datatype, it can only currently be performed by the 68k. To give you some idea of how much of a problem this is for WarpTIFF, typically, half of the overall decode time is used by the PPC to decode the whole image, and the other half is used by DTM_WRITEPIXELARRAY on the 68k. And that's on a graphics card - the time used by DTM_WRITEPIXELARRAY will probably be even greater on systems using native Amiga graphics. It doesn't take a genius to see that this is slowing the datatype down, and is the main reason why WarpTIFF will still be faster on a 060 than a 040.

How to make the datatype faster

Is there anything that can be done about this? Well, yes, there are a few patches that you can install which should make things faster:

- NewWPA8 (util/boot/NewWPA8.lha on Aminet) should provide a notable speed increase on native Amiga graphics - probably won't make any difference if you use a graphics card.
- If you use a graphics card and CyberGraphX, you may want to make sure you are using the supplied v43 picture.datatype, as this will be faster than the P96 and OS3.5/3.9 picture.datatype on your system.

Of course, any other general speed-up patches should help too.

1.8 Distribution Conditions

WarpTIFF.datatype is public domain with the copyright remaining with the author and may be freely distributed legally providing:

- (1) None of the distributed files are changed in any way
- (2) It is not sold for profit and it is not included on any disks that are sold solely for profit (includes magazine coverdisks)
- (3) The distribution contents remain complete (see list below)

If this software is to be sold for profit, permission must be obtained from me, the author.

Aminet and Amigactive have been granted permission to distribute WarpTIFF.datatype on their CDs.

The following files must be present in their original and unchanged form in any copies of this software:

```
Classes/Datatypes/WarpTIFF.datatype.020
Classes/Datatypes/WarpTIFF.datatype.030.pch
Classes/Datatypes/WarpTIFF.datatype.040.pch
Classes/Datatypes/WarpTIFF.datatype.060.pch
Classes/Datatypes/WarpTIFF.datatype.wos
Classes/Datatypes/WarpTIFF.datatype.elf
Devs/Datatypes/TIFF
Devs/Datatypes/TIFF.info
WarpTIFF.guide
WarpTIFF.guide.info
Install_WarpTIFF
Install_WarpTIFF.info
spatch
```

1.9 Disclaimer

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libtiff

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1.10 Acknowledgements

TIFF support based on the libtiff link library...

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Deflate decompression support provided by the zlib link library by Jean-loup Gailly and Mark Adler.

The WarpOS version was made possible by VBCC, which was used to build and compile the datatype. Thanks to Volker Barthelmann and Frank Wille, for their support and help.

The Spanish installer translation is by Dámaso D. Estévez.

The French installer translation is by Philippe Bovier.

Thanks also to Sam Jordan for WarpOS and helping me out with various queries regarding it.

Finally, thanks to the OS 3.5 development team - now everyone has access to a 24-bit picture.datatype, I don't need to bother messing about adding dithering routines :)

1.11 Support & the Future

Some things that may appear in the future:

- I am undecided whether to include JPEG encoding support, since I have no idea how widely used it is. So, do let me know if you need it and I'll consider adding JPEG encoding support to WarpTIFF.
- If I can squeeze any more speed out of the datatype, in general, I'll do so :)

If you have any other suggestions, please let me know.

Future releases of WarpTIFF.datatype will be available from either Aminet (util/dtype/WarpTIFFdt.lha) or its webpage:

<http://www.nanunanu.org/~oliver/warptiff.html>

If you would you like to know when WarpTIFF is next updated, then you may want to subscribe to my announcement list to receive an e-mail informing you of the changes as soon as a new versions of any of my products are released. To subscribe, send a blank e-mail to

futuraura-announce-subscribe@yahoogroups.com

or go to

<http://groups.yahoo.com/subscribe/futuraura-announce>

1.12 About the author

If you have any problems with this software, or if you have any suggestions/queries, please contact me and I will do my best to sort any bugs out as soon as possible:

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1.13 LZW Decompression

TIFF files allow image data to be stored in compressed form using a number of different algorithms - one of which is LZW. LZW is patented by Unisys in many countries, including Canada, France, Germany, Italy, Japan, the United Kingdom and the United States. In countries where the patent applies, a license is required to use TIFF-LZW decompression. This is why LZW support is not present in WarpTIFF, and if you attempt to load a LZW compressed TIFF, it'll return an error (unknown compression).

Visit the WarpTIFF homepage for more information.

1.14 Program History

44.4 (24.9.2001)

- WarpOS version reworked, now working in a fundamentally different way, to completely banish any possibility of cache conflicts - it also brings a speed increase for compressed images of around 2%.
- Fixed a bug which could cause a system deadlock if the dither control or pen precision options were enabled when using picture.datatype V44 or higher.
- Optimizations made to the dispatch engine.

44.3 (20.8.2001)

- Added fax scaling and low->high resolution fax expansion options.
- Fixed bug in 1, 2 & 4-bit pixel expansion code, which could have caused

- the first few columns of an image to be shown incorrectly.
- Discovered a bug in the CyberGraphX picture.datatype, concerning error numbers which would have resulted in an unknown error being reported by application software if bitmap allocation failed - added workaround.
 - Modified internal structure of the WarpOS version, to totally safeguard against cache conflicts (may have been causing rare random crashes)

44.2 (12.8.2001)

- Now fully supports multi-image TIFF files, allowing applications to choose which image to decode, by using the PDTA_GetNumPictures and PDTA_WhichPicture tags.
- Added support for CMYK based images.
- PixarLog decompression support was broken - fixed.
- Files with a missing StripByteCounts tag no longer cause crashes.
- Files that don't declare the number of samples per pixel now load ok.
- Fixed handling of images with separated colour components.
- Reworked/improved error handling and error return codes.
- Removed some redundant code.

44.1 (31.7.2001)

- Initial release.
-