PrivateEye

Image Viewer
by David Thomas, © 1999–2007
version 2.75 (xx Dec 2007)

Welcome

PrivateEye is a freeware image viewer for RISC OS.

It requires RISC OS 3.6 or later and a Boot sequence with the Nested Wimp and a 32-bit Shared C Library.

Features

- Loads and displays bitmap and vector images:
  - Sprites, JPEGs, GIFs and PNGs
  - DrawFiles and ArtWorks
- Bitmap effects system
  - Adjust gamma, brightness and contrast
  - Blur and sharpen
  - Apply Saturation and Histogram effects
- Bitmap rotation with interactive preview
  - Rotation is lossless for JPEGs
- Native JPEG display
  - Inbuilt lossless “cleaning” transparently loads progressive JPEGs
- JFIF, Exif and Adobe metadata display
- Detailed histogram window
- Display images may be saved
  - Convert JPEGs, GIFs and PNGs to Sprite
- Any number of images may be open concurrently
- Customisable key map
- Interactive help (use it!)

Supported Image Formats

PrivateEye may have to convert images so that it can be displayed by RISC OS. The image is converted into the nearest RISC OS native format. In practice this means that GIFs, PNGs and (optionally) JPEGs are converted into Sprite format when they are loaded.

The result of this conversion is referred to as the *display* image. Editing operations such as saving, rotation and the effects system operate only upon the display image.

Sprites

- All varieties of Sprite which can be handled by the OS are loaded and displayed.
- Files containing multiple sprites will only show the first sprite contained in the file.

DrawFiles

- Uses the DrawFile module to display DrawFiles.
- Adds a border of 16 OS units in display.

JPEGs

- Uses the SpriteExtend module, version 0.99 or later, to directly display JPEGs. This allows images larger than available free memory to be displayed as SpriteExtend decompresses and plots on the fly.
- Progressive (multiple scan) JPEGs are supported. PrivateEye has a inbuilt version of *jpegtran* which automatically converts JPEGs to a baseline format that SpriteExtend is happy with.
- May be optionally be converted to Sprite.

ArtWorks

- Uses the ArtWorks rendering modules for display.
- *AWViewer* must have been seen by the Filer for this to work.
  - Note that ArtWorks itself won't do: it must be AWViewer.
  - All RISC OS machines since the Risc PC have been shipped with a copy of AWViewer on the hard disc.

GIF

- Loads and decompresses the GIF into a Sprite.
- Animated GIFs will only show the first frame.

PNG

- Loads and decompresses the PNG into a Sprite.

FFG Converter Formats

- If the file type is not recognised PrivateEye will use the Computer Concepts' FFG protocol to load images it does not natively understand. For this to work you must have *TransFSI*, or similar, installed.

The Viewer Window

The ***viewer window*** is PrivateEye's main interface.

Loading Images

To view an image, drag it from a directory display to the icon bar icon. You can load any number of images, each will be shown in its own viewer window.

To re-use an existing viewer window drag the image into that viewer window.

If the image does not have the correct file type, then PrivateEye will attempt to identify the correct type and set it.

Input Focus

When you click in a viewer window, it gains the input focus. You can then use the keys mentioned below to scroll, scale, etc.

Scrolling Around

If parts of the image are not visible, you can scroll around either by dragging within the window using SELECT—the *grab* tool—or by using the cursor keys.

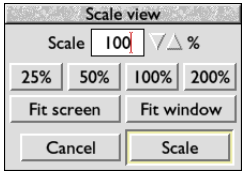
On suitable OS versions, the mouse scroll wheel may also be used to scroll vertically.

You can scroll to a specific point by holding CTRL and clicking with SELECT at the desired position.

Scaling The View

You may need to scale the image to fit the screen, or to view an area in detail. There are a number of controls for this.

The **Scale view** dialogue, available from the viewer menu and also by pressing F11. The default scale of 100% shows the image at a 1:1 pixel ratio.



There are standard preset scales of 25%, 50%, 100% and 200%. **Fit screen** fits the view to the size of the screen. **Fit window** fits the image to the current size of the viewer window. Click **Scale** to make the scale level take effect.

With the **Scale view** dialogue open, you can also use the UP and DOWN keys to change the scale by 5%. This takes immediate effect. Using SHIFT in conjunction doubles the step size to 10%. (PAGE UP and PAGE DOWN perform the same function.)

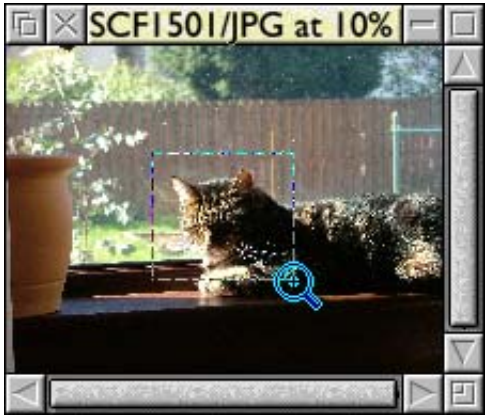
Scaling with the Keyboard

CTRL W and CTRL Q zoom in and zoom out respectively. CTRL T toggles between the previously selected and the current scale level. CTRL D resets the scale to 100%.

Scaling with the Mouse

A SHIFT SELECT click will zoom in around the clicked point. SHIFT ADJUST click does the same but zooms out. If multiple steps are configured then a zoom effect will be used.

Dragging ADJUST in the viewer window drags out a zoom box. The area of the image highlighted will be scaled to fit the window.



Moving Between Files

Pressing SPACE, or alternatively PAGE DOWN, will move the viewer onto the next file in the directory. PAGE UP moves to the previous file.

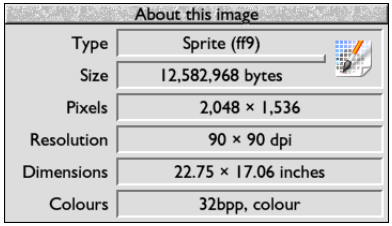
The order of the files in the directory determines the previous / next viewed image.

Image Information

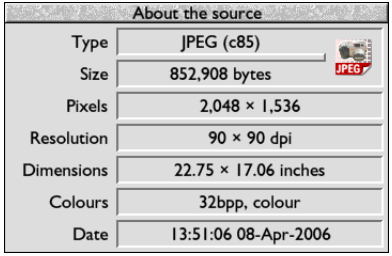
PrivateEye has both display and source images, so there

are *two* information windows.

Image Info shows the information for the display image. It is available with SHIFT F1 and looks like this:



Source Info shows the information for the source image. It is available with CTRL F1 and looks like this:



Note that source info has an extra **Date** field.

The information windows will often display the same information. However, if a change is made (e.g. a rotation) or a change in the image was necessary to load it (e.g. a format conversion) then the information may differ. For example, Sprite files appear to be 4 bytes longer when loaded than when on disc. This is because the in-memory structure of a sprite *is* 4 bytes longer.

Saving

F3 opens the save dialogue. This saves a copy of the display image.

Delete

CTRL K deletes the currently viewed image. It uses a multitasking Filer_Action window to perform the deletion.

New views

Should you need to view an image at two different scales, or view multiple different parts of a single large image, you can create a new view by pressing CTRL N. This opens up a new view of the same image.

Additional views require no significant additional memory.

Embedding

Dragging with SHIFT CTRL SELECT inside the viewer

window allows you to embed the viewer window inside another window.

To un-embed a window perform the same action again but release the drag when over the icon bar.

This uses a feature of the Nested Wimp intended for embedding, for example, Java plugins inside web browser windows.

The Metadata Window

Images may contain embedded information in addition to the image data itself. PrivateEye calls this ***metadata***. The Metadata window lets you see this information.

The Metadata window is only available for JPEG images loaded in their native format. If you want to use this window you may need to disable ***Convert to sprite*** *in the JPEG choices.*

Open the Metadata window by choosing **Metadata** from the viewer window's menu or by pressing SHIFT CTRL F1. One metadata window may be opened for each image.

The menu entry will be greyed out if no metadata is present.

Classes of Metadata

There are three common types of JPEG metadata which PrivateEye understands:

Exif

- The standard for digital camera data.
- Contains information including time, date, camera make, model, resolution, focus and flash.

Adobe

- Output by Adobe applications, primarily Adobe Photoshop.
- Contains information proprietary to Adobe applications such as effect settings.

The Adobe segment also includes ***IPTC-NAA*** data.

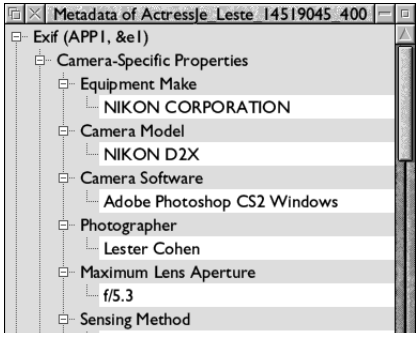
- Contains information about captions, headlines, keywords, photographer, copyright holder, etc.

JFIF Comments

- Provides for multiple blocks of plain, unformatted text data.

Use

The metadata is presented in tree format like this:



Individual branches of the tree can be collapsed and expanded to hide or reveal relevant data.

Click MENU to open up a small menu which lets you collapse or expand all tree branches.

Examples

IPTC-NAA

Images containing this type of metadata may often be found on The Internet Movie Database (www.imdb.com.)

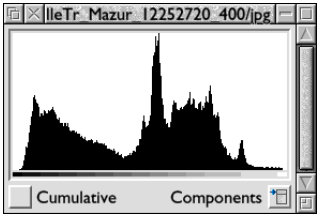
The Histogram Window

The ***Histogram*** window displays a histogram of an image's luma. Luma is the brightness part of an image.

*The histogram window is only available for 8bpp grey and 32bpp colour bitmap formats. If you want to use this window with a JPEG then **Convert to sprite**.*

It can also show the histogram of red, green and blue components.

Open the Histogram window by choosing **Histogram** from the viewer window's menu or by pressing Ctrl I. A histogram window may be opened for each image.

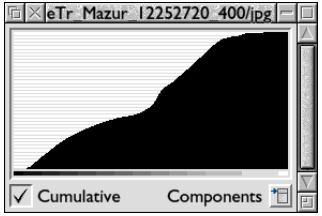


The histogram lets you see which ranges contain the greatest amount of detail. In the above example, the low level at the right hand side of the graph indicates an absence of detail in the bright part of the image.

You can use this information to guide your choices when making adjustments with the Effects window.

Display Options

The **Cumulative** option displays the histogram as an increasing amount from left to right.



The **Components** pop-up opens a menu which lets you choose which colour channel to view: luma, red, green or blue.

Scale Bars

Light grey horizontal bars are drawn across the display for every 3.125% of total pixels shown. (32 intervals.)

Weights

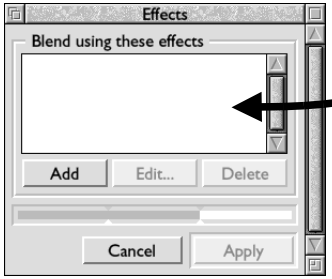
Luma is a weighted sum of gamma corrected components. Luma here is calculated using the Rec. 601 coefficients of Y' = 0.299 R' + 0.587 G' + 0.114 B'.

The Effects Window

The Effects window lets you apply a multitude of effects to bitmap images.

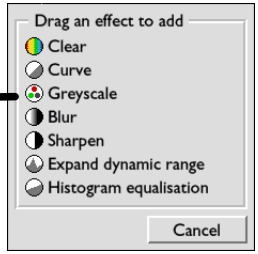
The Effects window is only available for 32bpp colour bitmap formats. If you want to use this window with a JPEG then ***Convert to sprite****.*

Open the Effects window by choosing **Effects...** from the viewer window's menu or by pressing CTRL E. An initially empty effects window will appear:



Adding Effects

Click **Add** to start adding effects. The ***effects palette*** window will pop up:



Drag and drop an effect from the effects palette to the effects window to add it. The viewer window will immediately update with a preview of the effect.

The overall level of the effect is controlled with the slider at the bottom of the window. Dragging the slider around updates the preview.

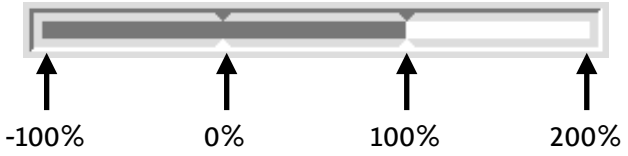
Click **Apply** to make the currently visible effect permanent.

Multiple Effects

You can add multiple effects at once. Multiple effects are applied in top-to-bottom order; they compound. The result is then blended with the original image.

Blending

The level slider controls the blender.



Rather than ranging 0..100%, it ranges -100%..200%. This is because the blender is ***extrapolative***: it can produce results outside the normal range.

Setting the level outside the 0..100% range causes extrapolative results. For example, adding a "clear to black" effect then applying a level of -100% causes the image to be **brightened**.

Editing Effects

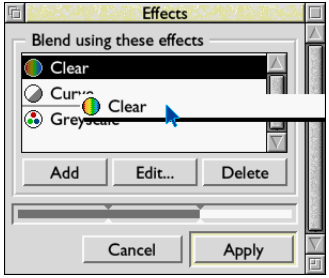
The effects are shown in a scrolling list. Effects can be selected with SELECT and de-selected with ADJUST.

The **Edit...** and **Delete** buttons beneath the list will highlight when the respective actions are available.

To delete the currently selected effect, click **Delete** or press the DELETE key.

Re-ordering Effects

The ordering of effects can be significant: drag and drop effects to re-order them. While you drag the effect a light grey indicator line will show you the position where the effect will be inserted.



Individual Effects

Clear

Simply clears the image to the specified colour.

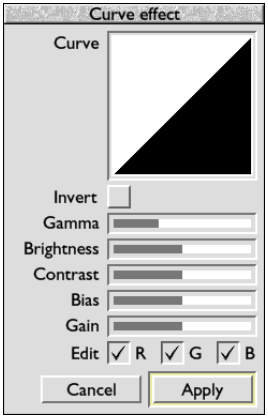
Clicking the **Edit...** button will open up a RISC OS standard ColourPicker dialogue.

This is only really of use by itself, as any further effects added later in the list will be applied to a plain colour.

Curve

The Curve effect offers a combined control for gamma, brightness, contrast, bias, gain and inversion.

By default it shows a linear mapping (no change):



Drag the sliders to adjust the curve.

Each RGB channel may be individually edited by selecting the appropriate option icon.

Greyscale

Discards all chroma information leaving only the luma.

As with the histogram, uses Rec. 601 weightings.

Blur

A mild blur effect using a 3x3 convolution.

Sharpen

A mild sharpen effect, again using a 3x3 convolution.

Expand dynamic range

This looks for unused space in the shadows and highlights of the histogram and stretches the image to fill the available volume.

The RGB channels are stretched by the same amount so this will preserve colours.

Histogram equalisation

Attempts to create an even spread of values across the available colour volume.

Useful for extracting detail from images, but processes RGB separately so can lead to colour distortion.

Examples

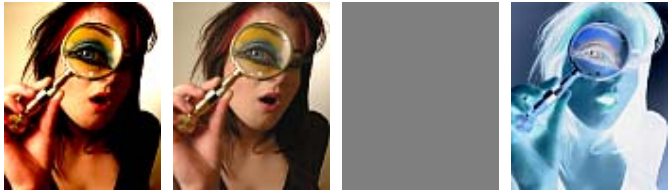
Changing brightness

Add a Clear effect. Set its colour to black. Dragging the slider to the left will increase brightness.

-100% 0% 100% 200%

Changing contrast

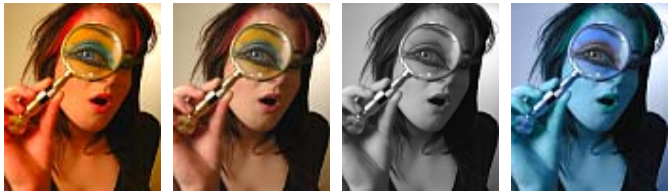
Add a Clear effect. Set its colour to 50% grey. Dragging the slider to the left will increase contrast; to the right will decrease contrast.



-100% 0% 100% 200%

Changing saturation

Add a Greyscale effect. Dragging the slider to the left will increase saturation; to the right will decrease saturation.

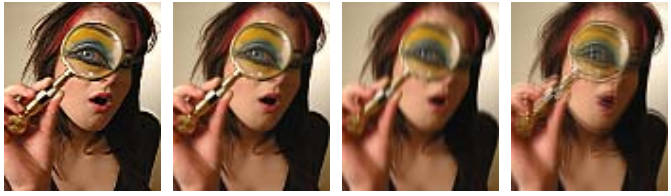


-100% 0% 100% 200%

Sharpening an image

Add a Blur effect (yes, really!) then drag the slider to the left past the left-most 'notch'.

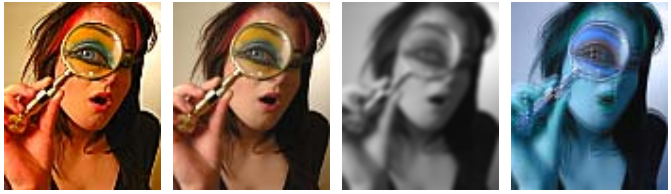
Sharpening this way is sometimes called "Unsharp mask."



-100% 0% 100% 200%

Combined saturation and sharpening

Add a Blur effect then a Greyscale effect. Dragging the slider to the left will simultaneously increase saturation and sharpen; to the right will decrease saturation and blur.



-100% 0% 100% 200%

Memory Use & Speed

The effects system uses two temporary bitmaps of the same size as the original image. Therefore applying effects to large images will claim a lot of memory.

Similarly large images can also take some time to process. The full image is always processed. The update after dragging the effect level slider may not always be instant.

Further Information

The effects window's blending technique is based on "Image Processing By Interpolation and Extrapolation" by Paul Haeberli and Douglas Voorhies.

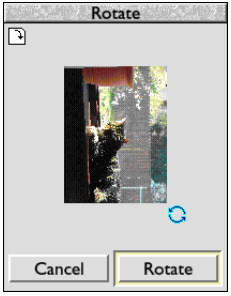
http://www.graficaobscura.com/interp/

The Rotate Window

The ***Rotate*** dialogue can rotate Sprites and JPEGs in multiples of 90 degrees. It can also flip, transpose and transverse.

Rotate and transform functions are only available for Sprites and JPEGs.

Rotation and transformation of JPEGs is lossless. That means it does not perform a full decompress-transform-compress cycle which would result in quality degradation. Instead it uses jpegtran's lossless rotation code.



CTRL O opens the **Rotate** dialogue. The dialogue is straightforward to use. Simply drag the thumbnail image and it will spin around its centre. As you rotate the image it will snap to the nearest 90 degrees. Release when it appears in the desired orientation. Click **Rotate** to effect the rotation.

Dragging with ADJUST behaves similarly, except that it performs an initial horizontal flip.

SELECT and ADJUST allow all possible flips and rotations to be applied.

The icon in the top left hand corner of the window shows which rotation, or transformation, will occur.

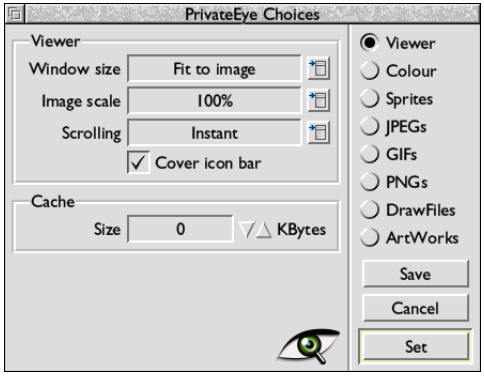
Keys

The equivalent key presses in the viewer window are CTRL L and CTRL R to rotate left and right respectively and CTRL H and CTRL V respectively to perform horizontal and vertical flips.

The Choices Window

The Choices window is available from the icon bar menu. It provides control over a number of different aspects of PrivateEye's behaviour.

Viewer Choices



Window size controls the size of the viewer window. **Fit to image** sizes viewer windows to fit exactly the contained image. **Fit to screen** makes viewer windows *at least* the size of the screen.

Image scale controls the image scale applied when a new image is loaded. The choices are much the same as those available from the **Scale view** dialogue except for **Preserve** which re-uses the previously selected scale, or 100% if a new viewer window is opened.

Scrolling controls how many steps are used when scrolling and zooming. The more steps you configure the smoother the effect will be. However, too many steps can also slow down if the image is complex to redraw.

PrivateEye tries to keep the viewer window in the same position when moving between images. **Cover icon bar** controls whether it will avoid obscuring the icon bar with viewer windows. If not set, viewer windows will be made smaller and positioned to avoid the icon bar.

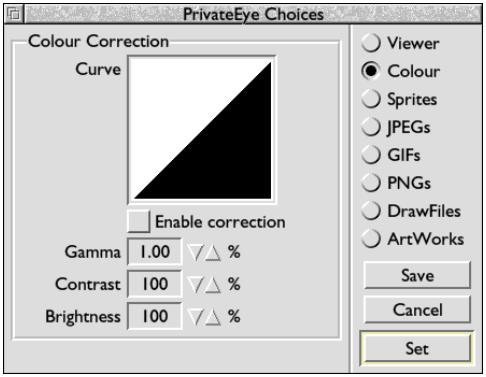
Caching Choices

PrivateEye can set aside memory in which to retain discarded images. When you close an image and the cache is configured, then the image is moved into the cache.

Size controls the size of the cache. The default is zero which disables the cache. Choose a non-zero value to enable the cache.

Use **Empty cache** on the icon bar menu to discard all cached images.

Colour Choices



Colour Correction provides a simple gamma, contrast and brightness control which affects the whole desktop.

Enable correction turns on the automatic setting of these values when PrivateEye is loaded.

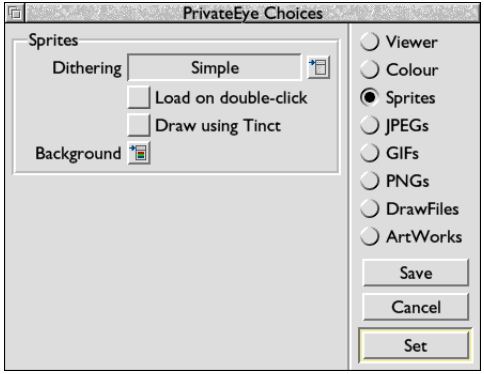
Common File Format Choices

Some common choices exist for every file format. To avoid repetition, they are described here in advance.

Load on double-click controls whether the respective format will be loaded when double-clicked on in a directory display.

Background sets the background colour which is used for masked images and when in “fit to screen” mode.

Sprite Choices

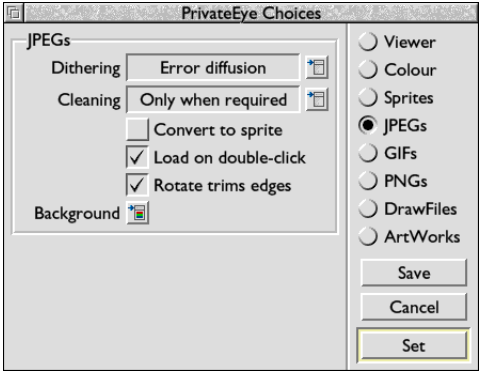


Sprite choices will affect any file format which is converted into Sprite format for display (i.e. GIFs, PNGs, JPEGs).

Dithering can be set to **None** or **Simple**. **Simple** uses a stipple pattern to better approximate unavailable colours.

Draw using Tinct will draw the sprite, where possible, using the Tinct module. Tinct is supplied with Netsurf. Tinct offers higher quality diffusion than the regular OS sprite plotting routines.

JPEG Choices

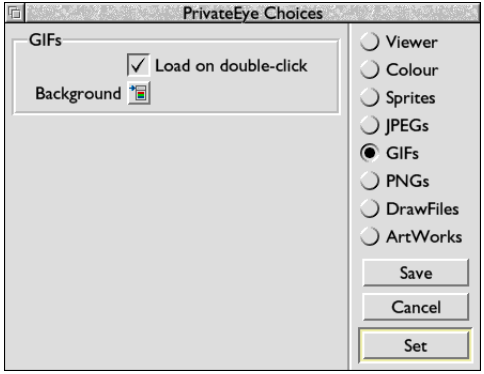


Dithering can be set to **None**, **Simple** and **Error diffusion**.

By default JPEGs are retained in memory in their native format. If this is not desirable, perhaps to speed up redraw or to be able to use the Histogram or Editing windows, then enable **Convert to sprite**. The JPEG will be decompressed to an 8bpp grey or 32bpp colour Sprite.

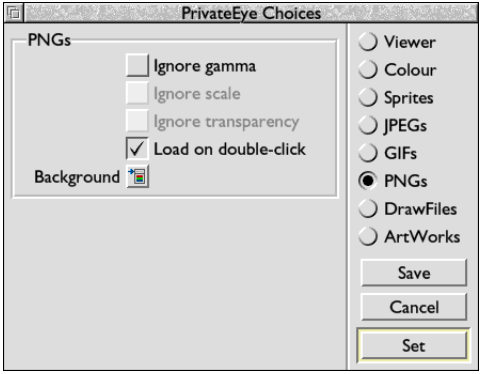
The lossless JPEG rotation code cannot transform boundary blocks. Enabling **Rotate trims edges** will cause those boundary blocks to be discarded in rotation.

GIF Choices



See *Common File Format Choices*.

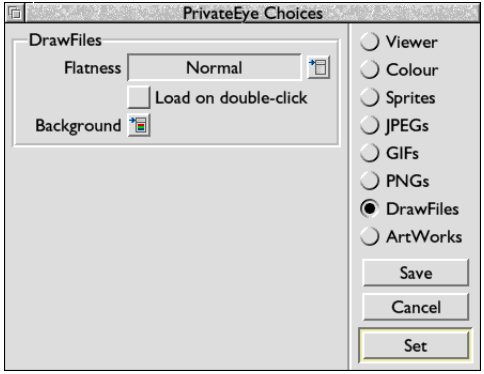
PNG Choices



Ignore gamma makes the PNG loader skip the *gAMA* chunk.

Ignore scale and **Ignore transparency** are disabled in the present version.

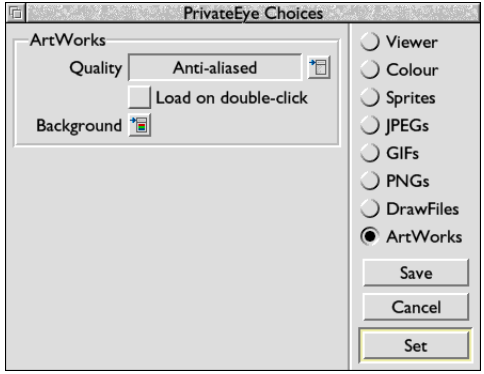
DrawFile Choices



Flatness can be set to **Coarse**, **Normal**, **Best** or **Automatic**. It controls how many lines bezier curves are broken down into for rendering.

The DrawFile module's automatic setting does not always seem to work well. This control is provided to allow the user to force a high-quality render when viewing at high zoom levels.

ArtWorks Choices



Quality controls the famous ArtWorks variable quality setting. It offers **Outline**, **Simple**, **Normal** and **Anti-aliased**.

Control Summary

Mouse Controls

SELECT .....ADJUST
none Gain focus .....Gain focus
SHIFT Zoom in to point.....Zoom out from point
CTRL Scroll to point .....
DRAG Grab .....Zoom to box
SHIFT CTRL Embed viewer window

Keyboard Controls

Viewer windows accept the input focus. These are the keys you can use whilst the window has the focus:

UP.....Scroll up
DOWN.....Scroll down
LEFT.....Scroll left
RIGHT.....Scroll right
CTRL Z.....Scroll somewhere random

CTRL W.....Zoom in
CTRL Q.....Zoom out
CTRL T.....Toggle to previous zoom level
CTRL D.....Zoom to 100%
F11.....Open Scale dialogue

CTRL L.....Rotate left
CTRL R.....Rotate right
CTRL H.....Horizontal flip
CTRL V.....Vertical flip
CTRL O.....Open Rotate dialogue

CTRL C.....Copy to clipboard

CTRL N.....New view

F3.....Open Save dialogue

CTRL S.....Convert to Sprite

CTRL I.....Open Histogram window
CTRL E.....Open Effects window

PAGE DOWN & SPACE
.....Move to next file in directory
PAGE UP.....Move to previous file

CTRL F2 & ESC.....Close viewer window

ESC.....Cancel drag operation

CTRL K.....Kill (delete file)

F1.....Start Interactive Help
SHIFT F1.....Open Image Info window
CTRL F1.....Open Source Info window
SHIFT CTRL F1.....Open Metadata window

Viewer Window Keymap

The key assignments for the viewer window may be customised by altering a Keys file, which is held in PrivateEye's Choices directory:

`Choices:PrivateEye.Keys`

This is held in your !Boot application e.g.
`!Boot.Choices.PrivateEye.Keys`

Entries

Each line of the file is of the form:

`[modifier]keyname:action`

Where `[]` indicates an optional part.

Tokens are case sensitive.

Modifiers

S_ Shift
C_ Ctrl
SC_ Shift Ctrl

Special key names understood

`Escape`, `F1`..`F12`, `Print`, `Backspace`, `Tab`, `Return`, `Space`, `Logo`, `Menu`, `Insert`, `Home`, `Delete`, `Copy`, `PageUp`, `PageDown`, `Up`, `Down`, `Left`, `Right`

Action names understood

`Close`, `ConvToSpr`, `Copy`, `Effects`, `Help`, `Hist`, `HorzFlip`, `Info`, `Kill`, `NewView`, `PanDown`, `PanLeft`, `PanRandom`, `PanRight`, `PanUp`, `Rotate`, `RotateLeft`, `RotateRight`, `Save`, `Scale`, `SourceInfo`, `StepBackwards`, `StepForwards`, `VertFlip`, `ZoomIn`, `ZoomOut`, `ZoomReset`, `ZoomToggle`

Examples

To make TAB step forwards to the next image, add:

`Tab:StepForwards`

To make SHIFT TAB step backwards to the previous image:

`S_Tab:StepBackwards`

History

Version 2.75 (xx Nov 2007)

Metadata

New Metadata window displays the contents of JPEG COM, Exif and Adobe segments in a treeview.

The exiftags library is used to decode the Exif segment.

Metadata is not available if the JPEG is converted to Sprite on loading.

Caching

Memory can now be reserved in which to keep discarded images. This allows quick 'flips' between images when navigating through a directory.

Convert to Sprite

It wasn't very convenient to go to the Choices dialogue, enable an option and re-load a JPEG just to see its histogram or apply an effect, so you can now choose **Convert to Sprite** from the viewer menu, or use Ctrl-S.

Version 2.51 (17 Jul 2007)

Wimp_AutoScroll was being called even on Wimps earlier than 4.00 causing a crash on any OS prior to RISC OS 4.

Fixed some group title icons that would vanish on RISC OS <= 3.7 in the choices pane windows.

Version 2.50 (28 Jun 2007)

Effects

New effects window allows brightness, contrast, gamma, bias, gain, tinting, blurring, sharpening, histogram equalisation, histogram expansion, greyscale and saturation adjustment on 32bpp sprites.

Effects are compounded and applied through an interpolative blending routine which allows effects outside the normal range to be achieved.

Editing awareness

Previous versions didn't know when an image has been edited (the only editing operation available being rotation which was no great loss). It now knows if an image has been edited, and will query attempts to close/quit/replace etc. with a standard DCS/Quit dialogue.

Histogram

Now a separate window no longer attached to the menu structure. One histogram window per image may be open.

Can now choose which component to look at: luma, red, green or blue.

New 'Cumulative' option lets you display the histogram cumulatively.

Light grey gridlines are drawn for every 5%.

Dialogues accept key presses

All dialogues (Save window, Scale window, DCS window, Quit window) now accept key presses. F-keys map onto action buttons.

In windows without writable icons, keys activate the icon with that name (e.g. 'D' presses the '**Discard**' button).

PhotoCheck

This OS patch developed for PhotoFiler has been brought across. This patches the versions of SpriteExtend in RISC OS 3.6, 3.7 and 4.0x to cope with Exif type JPEGs. SpriteExtend rejects these types by default.

Choices are now stored in the "right" place

Choices are no longer stored in `Choices:Sliced` but instead in `Choices:PrivateEye`. Older format Choices files are automatically copied across and upgraded.

User customisable viewer window keymap

Stored in `Choices:PrivateEye.Keys`. This lets you redefine, or add to, the keys that viewer windows use.

ArtWorks

Synchronised the rendering code with a newer version from Tony Houghton's Art2Spr. This fixed a bit of stray 26-bit code which would cause crashes when "Crystal" transparency was used.

Info dialogues

The info dialogues (image info, source info, prog info) are now all derived from a common base class. They all will now shrink or stretch automatically to fit their contents.

Flex

Flex is now used rather than AppEngine for memory management. On RISC OS 5 you can let PrivateEye use the wimp slot by setting `PrivateEye$Flex` to `WimpSlot`. See the `!Run` file for details.

& also...

- ResFind is now used to locate resources.
- Rotate is no longer a sub-menu.
- Unavailable functions activated by keypress now beep rather than causing a crash.

Version 2.00 (22 Dec 2006)

Viewer windows can now gain the input focus. Many key-activated functions have been added.

Viewer windows can fill the whole desktop. The image is shown centred within the viewer.

Rotation. Sprites and JPEGs can now be transformed with any combination of 90 degree rotations and horizontal flips. A new dialogue shows an interactive preview of the rotation.

Progressive JPEGs can now be loaded and displayed. JPEGs are now optionally integrity-checked when loaded. If they fail the check (wrong number of tables, etc.) then they're passed through an internal version of jpegtran. This turns them into baseline JPEGs which SpriteExtend is happy to plot.

Any errors from libjpeg are captured and shown to the user.

Histogram info window added. Shows a luma histogram.

New views. Multiple views on the same image.

Smooth scrolling on cursor keypresses. Smooth scroll-to-click. Smooth scaling. Configurable number of steps.

Stepping through files in the same directory. (SPACE, PAGE UP, PAGE DOWN). This was actually in the previous version, but was hidden behind a weird keypress.

Tinct support. Uses the Sprite dithering setting: 'Simple' is mapped to 'Error diffusion.'

Auto file type. Automatically sets the file type of recognised but un-typed files.

FFG. Added FFG support (can load images using TransTIFF, TransFSI, etc.)

Image info window split into two separate info windows: one for source and one for display. Both now display their values using comma-separated numbers. Physical image size field added.

Mouse wheel support.

Viewer windows will scroll up/down.

Pressing Up/Down in the scale dialogue bumps the scale by +/-5%. Also pressing SHIFT (a.k.a. PAGE UP, PAGE DOWN) can be used to make it go faster (10%).
These values can be configured in the Choices file by setting `scale.step` and `scale.mult`.

"Fit to screen" scale. "Fit to window" scale. Default scale can be configured.

New icon. Including !Sprites11 versions.

Title bars display percentage scale and number of views.

Acknowledgements

ArtWorks support is based on **ArtToSpr** by Tony Houghton.

GIF LZW decoding is based on code by Steven A. Bennett.

PNG support uses **libpng**:

Copyright © 1998-2004 Glenn Randers-Pehrson.
Copyright © 1996-1997 Andreas Dilger.
Copyright © 1995-1996 Guy Eric Schalnat, Group 42, Inc.

...and zlib:

Copyright © 1995-2004 Jean-loup Gailly and Mark Adler.

JPEG support uses **libjpeg**:

This software is based in part on the work of the Independent JPEG Group.

Copyright © 1991-1998, Thomas G. Lane.

Exif decoding uses **exiftags** by Eric M. Johnston.
http://johnst.org/sw/exiftags/

My thanks to all of the above.

Copyright

Contacting the Author

If you have any comments, bug reports or suggestions for future versions then you can contact me at **dave@davespace.co.uk**.

If you have a question, then please check it has not already been answered in this documentation or the interactive help before mailing.

Please remember when reporting bugs to describe **exactly** what you were doing when the bug occurred and the version number.