WILD VISION

Hawk V9 MkII
User Guide

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Note: the details in this user guide refer to the Hawk V9 MkII single-width card with hardware dither facility. A separate guide is supplied for the standard Hawk V9 single-width digitiser.

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Roger Wilson, Acorn Computers.
Robert Hamilton, Mercenary Software.
Gordon Taylor:

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N.B. This issue of the documentation is liable to change. It is essential that customers return the registration card supplied with this product if they wish to be kept informed of changes:

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Introduction

The Hawk V9 MkII is a Real Time Colour Video Digitiser for use with Acorn Archimedes Computers: It has been designed with the specific aim of capturing high quality colour sprites for use in RISC OS applications. The product has been optimised to give the best possible operation under the multi-tasking desktop environment: It gives facilities to produce both live colour displays on the desktop and high quality sprites which can be dragged into other applications:

The product consists of a single-width expansion card (podule), which contains all the digitiser hardware, together with a RISC OS application, !FastGrab (on disc), which provides software for the capture and processing of images.

The digitiser accepts any composite PAL video input signal via a BNC connector on the back panel. Suitable signals can be found from almost any video camera or recorder. The signal is converted to RGB and digitised in real time as three five bit per pixel data streams. These can then be stored in the digitiser's onboard memory at a resolution of 512 X 256 pixels. The Brightness, Contrast and Saturation of the digitised image can be adjusted via software to get the best control over the image.

The digitiser is set up to produce images with square pixels - something which is most important if subsequent processing is not to distort the image. However, hardware facilities do allow the pixel aspect ratio to be changed if required.

Data can be read from the digitiser in one of four formats:

8 bit per pixel hardware dithered format. In this mode, an error diffusion technique is used within the hardware to dither the image data, giving a high quality 8 bit dithered live display and the ability to grab a high quality sprite without the need for further processing.

16 bit per pixel format - This can then be processed to provide high quality images for display by the Archimedes, or saved for later processing within !Fastgrab.

8 bit per pixel raw format, compatible with the desktop palette. In this mode hardware processing is used to provide data which can be written directly to screen in 256 colour modes to give reasonable picture quality: The use of hardware processing means that an acceptable quality,"live" colour display can be produced on screen without dithering.

6 bit monochrome format. In this format, images are stored as 64 grey-level sprites. While Fastgrab itself is unable to display more than 16 grey levels, data stored in this format can be used to great effect with scanner software, which recognises 256 levels, or DTP programs such as Impression II. This option is the ideal way to optimise output of monochrome images for desktop publishing or other applications where high quality grey-level sprites are required and a suitable printer is available.

The desktop application !FastGrab allows several functions to be performed:
>   the display of a live image on screen in a window at different sizes;
>   the capture of an image and display in a window - 8 bit per pixel;
>   the processing of 16 bit image data to give high quality 8 bit sprites using a dithering technique:

!FastGrab provides two main windows, one for the display of a live colour image, the other for the display of grabbed or processed sprites.

The image manipulation options offered by !Fastgrab exist within the incorporated version of Change FSI, a program developed by Roger Wilson at Acorn Computers. This provides several features:
>   the ability to produce a high quality 8 bit sprite in any mode;
>   image scaling and flipping;
>   image processing such as Contrast Enhancement, Histogram Equalisation, Sharpening and Edge Detection;
>   conversion to monochrome images for low colour (e.g. sixteen colour) modes.

!FastGrab also allows the processed images to be displayed in windows, saved to disc, or dragged into other applications. 16 bit image data files which have been saved out of !Fastgrab may be reloaded and will then be manipulated according to the current settings of ChangeFSI to give an 8 bit RISC OS sprite:

Control of the PAL decoder hardware from the desktop is also provided by !FastGrab. Simply dragging slider bars with the mouse gives precise control of brightness, contrast and saturation of the digitised image.

Work with images makes intensive use of both memory and processor power and !FastGrab is no exception. For best results a machine with at least 2 Megabytes of memory and a hard disc is recommended: However, the software has been specially designed so that it will run in less memory by saving temporary files to disc: In practice this means that !FastGrab will run on any Archimedes with 1 Mb of memory, although it may perform more slowly. The software automatically senses the amount of memory available and uses disc cacheing if required. The changeover is transparent to the user.

Whilst the product has been designed primarily for easy desktop operation some users may wish to use it in their own applications. To facilitate this a module containing SWI calls to grab images is provided: These calls are documented in Appendix D:

About this manual

Before proceeding to use this product it is necessary for the Hawk V9 to be fitted into an Archimedes: Instructions on how to do this are provided in Appendix B. The fitting of the card is a simple operation. However, it is recomended that the instructions be read fully before proceeding. If you are in any doubt about your ability to fit the card it is suggested you consult

your local Acorn dealer who should be able to assist you:

Appendix B also gives some details of suitable video equipment for use with the V9:
The remainder of this manual covers the Installation and use of the !FastGrab Software and the function of the ChangeFSI Image Processing Software:

Whilst every effort has been made to explain fully the operation of the software a basic knowledge of the RISC OS desktop is assumed: If the user is unfamiliar with this it is recommended they first study the user guide supplied with the Archimedes.

Using the Hawk V9

A full RISC OS application, '!FastGrab', is supplied on disc with the Hawk V9: !FastGrab runs as a task on the RISC OS desktop, and it allows pictures to be grabbed, processed and saved to disc or into other desktop applications:

Installing the !FastGrab software

First you should make a backup copy of the !FastGrab disc. if you are working from the desktop you can use the backup option on the floppy disc icon menu. Put the original ! FastGrab disc in a safe place - you can use your backup to work with from now on:

Alternatively you may wish to perform a backup from the command line. To do this, insert the ! FastGrab disc into drive 0 and after accessing the command line (F12), type

```
*BACKUP 0 0 Q
```

Now press RETURN and press Y to confirm your actions. Pressing the space bar will start the backup process: After a short while, the computer will ask you to insert a destination disc. Replace the !FastGrab disc with a blank, formatted disc and then press the space bar. If your machine is short on memory, you may have to repeat the disc swapping process: When the normal prompt returns, the backup is finished. We advise you to name your backup disc using the "name disc" option on the floppy icon menu, for easy reference.

Installing on a hard disc

To install !FastGrab on a hard disc use the desktop. Place the floppy in your disc drive and click on the floppy drive icon to display the catalogue. Now display the hard disc directory where you want to install !FastGrab. Press and hold down the left hand mouse button while pointing to the !FastGrab icon (dragging), then drag the box across to the hard disc directory. RISC OS will then copy all of the necessary software onto your hard disc. Keep the original ! FastGrab disc in a safe place, as you will need it should you have any problems with your hard disc.

Using !FastGrab

If you are familiar with using the RISC OS desktop, then you should find !FastGrab easy to operate. If you have little or no RISC OS experience, then you may find it helpful to read some of the applications chapters from the RISC OS user guide, as this manual assumes some familiarity with the standard terminology:

!FastGrab supports the RISC OS interactive help system, and you may find it useful to take advantage of this while you get to know !FastGrab.

As is usual with RISC OS applications, you should double-click on the !FastGrab icon to run it from disc. The software will then load, and install itself on the icon bar: After clicking on this

icon you should see the picture from your video source appear in a small window at the centre of the screen.

The icon itself is useful in letting you know what the status of your video signal is. A flat red line underneath the icon indicates that no video input signal has been detected by the Hawk V9. Your live display is probably black. In this case you should check whether your connections are secure, and indeed whether your video source has been activated.

Controlling the live display

The small window is the live display, and it is updated all the time, to show you what signal the V9 is receiving. It gives a preview of the picture, and the colours used may not be exactly the same as the final output from the V9. Down the left hand side of the window there is a small, thin window with icons in it. This is the live toolbox. It provides quick access to the most frequently used functions, and it is attached to the live display.
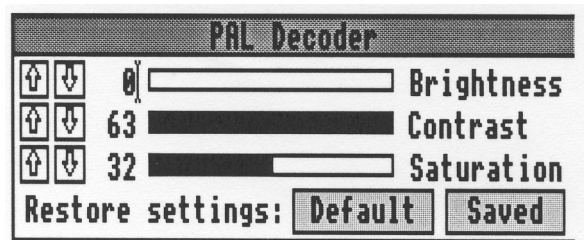

The PAL Decoder
To try the toolbox, click on the icon that looks like this:

When you do this, a dialogue box will pop up.

This is the PAL Decoder and with it you can control aspects of the video source. To adjust the contrast of the image, press and hold down the left button while pointing at the black slider bar beside the word 'Contrast': By moving the mouse from side to side you can now alter the contrast of the image. You can also vary the settings by typing values into the writable icons, or by clicking on the arrow buttons to increase or decrease a particular value: You can also change the brightness and saturation of an image using this dialogue box: Note that if you are using a monochrome video source, the saturation control will not make much difference, as it controls the amount of colour in the picture. If you press a mouse button outside the PAL decoder dialogue box, it will disappear.

You should experiment to get the optimum results using your video source and the picture conditions. Clicking on the 'Default' icon restores the default settings for when the digitiser is set up at the factory, and clicking on the 'Saved' icon restores the values that you last saved to disc. When you first use !FastGrab, these will be set to alternative default values, but you may wish to store a new set of standard values according to your own preference, and this is done using the *Save choices* option in the main Fastgrab menu. For instance, you may be grabbing pictures from a long video tape over several different sessions and need to reload !Fastgrab each time. Clicking on 'Saved' will return you to your previously chosen settings:

The main menu

For more control over the live display, click menu (middle button) over the window: The main V9 menu will appear: You will probably notice that the PAL decoder option is duplicated. In fact, all the functions provided by the toolbox are on the menu too.

Grab frame
This duplicates the camera icon in the top compartment of the toolbox, as shown above. More details on grabbing frames will be given later.

Frame size
This option leads to a sub-menu (slide pointer over arrows), giving the four alternative display sizes for the grabbed image. This affects the frame that is displayed immediately after grabbing a picture: The actual data from the V9 is always read at full resolution, and scaling pictures to other sizes is covered in the section on **ChangeFSI.**

Live size
The 3rd choice on the main menu is 'Live size'. If you move over the sub-menu pointer for this, you can choose the size of the live display from the following list:

> 512 x 256 pixels
> 256 x 128 pixels
> 128 x 64 pixels
> 64 x 32 pixels

You will find that the display is faster for smaller sizes: This is because a smaller picture can be displayed much more quickly. The largest live size is useful for focusing video cameras, or for fine tuning of the PAL decoder to give the best possible results. Changing the size of the live display does not affect the size of the image that you grab from the video source:

16 bit and 8 bit data

The V9 board is designed to grab 16 bits of data for each pixel. However, under current versions of RISC OS, only eight bits per pixel can be displayed on the screen. !FastGrab incorporates ChangeFSI, a program which can convert 16 bit images to high quality eight bit pictures: To use ChangeFSI you need to grab sixteen bit data from the V9: If the icon at the bottom of the live toolbox shows *16 bit* as on the toolbox diagram above, then the full sixteen bits of data will be captured: If the icon is as below, then !FastGrab will only read the eight bit data, and you will be unable to further process the image from within Fastgrab.

8 bit

This saves memory and reduces the amount of disc slaving, but the resulting images will be of poorer quality.

To change between 16 and 8 bit modes, click on the icon itself. It works as a toggle, so clicking on it switches between the two types of data. You can also change over via the main menu: The '16 bit data' line will be ticked if 16 bit data is to be grabbed.

Dithering

This mimics the dithering icon which is the bottom icon of the toolbox. Again, the icon acts as a toggle, switching between the dithered and undithered versions of the live display: On the menu, the line will be ticked if hardware dithering is activated. This option gives greater clarity to the live display, as an error diffusion technique, similar to that used by ChangeFSI, is implemented to give the video image a realistic appearance. In addition, selecting dithered display means that a very good standard of sprite appears immediately upon grabbing. This has obvious benefits to those users requiring speedy acquisition of good images without the need for further processing. However, it is still possible to use the ChangeFSI menu on images grabbed with the *dithered* option selected. Any processing routines will be carried out on the 16 bit data still held in the Hawk V9's memory, not on the 8 bit dithered information:

Monochrome

Select this menu option to switch the live display and subsequent grabbed images to 6 bit monochrome: While the Archimedes is unable to display more than 16 levels of grey, there are some applications that will be able to interpret the images grabbed in this function so that they actually use 64 grey levels: In Impression II, for example, you will be able to print out monochrome images of far greater quality than has previously been achieved with other digitisers. Images saved in this format may be used with grey-level processing software, such as Scan-Light Plus:

Note that when *monochrome* is selected on the menu, the saturation level within the PAL decoder is automatically set to zero. This should be maintained while the digitiser is operating in this function. It should also be noted that ChangeFSI cannot be used with images grabbed with *monochrome* selected:

Single Field

Each video frame from your external source consists of two fields, which form alternate lines of the picture. When a live image is being displayed by Fastgrab, this may result in a slight up and down movement of the picture as the fields change. This is never very noticeable, and there are probably few applications when the effect would be of extreme importance. However, to avoid this occurring, it is possible within the !Fastgrab menu to select either the 'even' or 'odd' field for display.

Force cacheing

As the sixteen bit images are very large, a 1 megabyte computer may not always have enough spare memory to accomodate them. In such situations !FastGrab automatically switches to disc slaving, i.e. it stores the information on disc instead. This means that as far as you are concerned, using the program is exactly the same, only a little slower. Sometimes, even on a computer with larger RAM, you may want to keep some of the memory free: for example you may want to scale grabbed images up to a larger size and even though there is space for a sixteen bit picture, you would rather keep it free for storing the large sprite. To do this, choose the *'Force cacheing'* option on the main menu. When this option is ticked, all sixteen bit data will be kept on disc, regardless of the memory available.

Grab mode

If you want to grab sprites in a particular screen mode, you can enter this mode in the 'Grab mode' submenu. To do this, display the submenu and type in the number of the mode that you wish to use. Note that the mode must have at least 256 colours, or !FastGrab will report an error. If you want to produce images with fewer colours, then you can use ChangeFSI to produce a sprite in a suitable mode. For most purposes, the best mode to use is mode 15.

V9 Speed

Video work is very processor-intensive, as large amounts of data need to be dealt with very quickly. This means that a substantial proportion of your computer's power may be taken up by !FastGrab. Normally this will not be a problem, but you may wish to run another intensive task at the same time, so the speed of !FastGrab can be adjusted to allow this. The 'V9 Speed' option on the main menu has a sub-menu in the form of a slider bar.
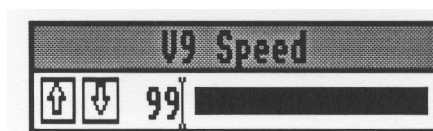
The speed range is from 0 to 99, with 0 being the slowest and 99 the fastest. As you lower the value, the live display will slow down, leaving your computer more and more time to carry out other tasks. Experiment to find a combination of live size and speed which gives you the right ratio of speed to processor activity (the RISC OS !Usage utility can help here). The speed for grabbing a particular image is not affected by this control.

Save choices

Click on this option to save your chosen settings on the PAL decoder and other menu selections:

Toolbox

To toggle the presence of the toolbox beside the live window on and off, click on this item. For most V9 work you will want to have the toolbox displayed, simply for speed, although some people prefer to stick to menu options only.

Grabbing an image

To grab an image, wait until the picture you want appears in the live display, then click on the camera icon. A copy of the picture will appear in a window, at the size specified by the 'Frame size' menu. This window also has a toolbox, the 'grab toolbox'.
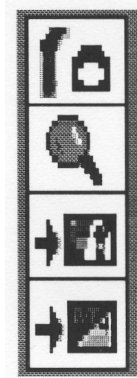
If you want to save the image as it is, click on the 'Save sprite' icon in the toolbox (3rd icon). This pops up the standard RISC OS save box, and you should type in a filename and drag the file icon to a directory for storage. This option is also available via the Sprite Menu, which you can access by clicking menu over the grabbed image.
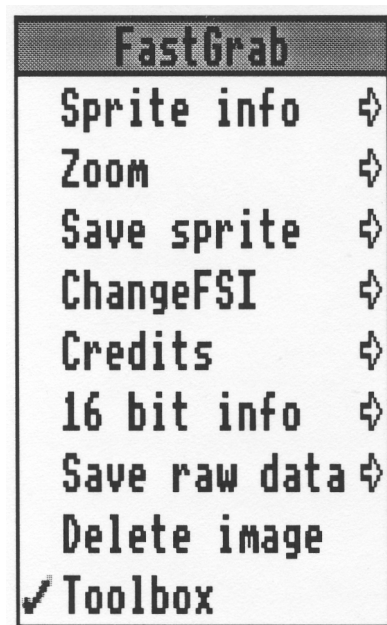
When you are happy with the image you have grabbed, you can save it as a RISC OS sprite or perform a processing, scaling or mode changing operation using 'ChangeFSI'. Note this option refers to the 16 bit image data, not the 8 bit grabbed image. ChangeFSI obeys the PAL decoder settings which you may have chosen for the live image.

You can also save the 16 bit raw data from the V9 itself - click on the 'Save raw data' icon for this operation (bottom icon in toolbox) and type in a filename as before. This option can be used at any time, as long as you have grabbed a picture: The file will be stored as Data (filetype &FFD), and it has a special header which means that !FastGrab and certain other applications can recognise it as 16 bit information from the Hawk V9:

Normally though, you will want to process the data to produce an eight bit sprite for use in other applications. To do this, choose dithered output or use the ChangeFSI routine, as described below.
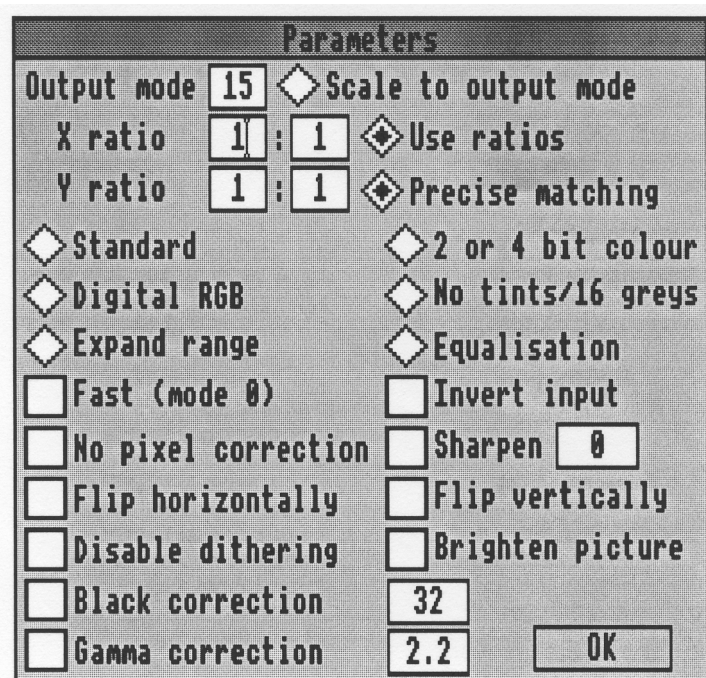
To delete an image (and reclaim the memory or disc space it was taking up), choose the ' Delete image' option from the Sprite Menu.

You may at any time show the last grabbed image in the digitiser's memory by choosing the blue "eye-con", the second icon down in the live image toolbox, which is also in the live image menu as *Show Image.*

ChangeFSI

To display the ChangeFSI window, click on the paint brush and pot icon at the top of the grab toolbox.

The window which appears looks like this:

```
                    Parameters
Output mode [15] ◇Scale to output mode
   X ratio  [1]:[1] ◈Use ratios
   Y ratio  [1]:[1] ◈Precise matching
◇Standard          ◇2 or 4 bit colour
◇Digital RGB       ◇No tints/16 greys
◇Expand range      ◇Equalisation
☐Fast (mode 0)     ☐Invert input
☐No pixel correction ☐Sharpen [0]
☐Flip horizontally  ☐Flip vertically
☐Disable dithering  ☐Brighten picture
☐Black correction   [32]
☐Gamma correction   [2.2]  [OK]
```

The nature of ChangeFSI means that using it can be complicated, but the front-end which ! FastGrab uses removes a lot of the donkey work, and you can easily experiment to achieve the best results for a given picture.

Modes and Scaling

Output mode
Enter the mode for sprite output here. The sprite produced by ChangeFSI will be in the given mode. The best results come from using 256 colour modes, but you can use most modes, even a two colour mode will work! However, you must choose a graphics mode, and modes 2,4,5 and 8 are not supported. If you try to use an invalid mode number, mode 15 will be used instead.

Scale to output mode
If you select this radio-button, then ChangeFSI will automatically stretch or compress the image to fill the screen in the output mode.

X and Y ratios
These settings control the size of the output sprite. If you want a half size image, then you

should enter the values like this:

2	:	1
2	:	1

You can scale up or down, and to strange sizes, and ChangeFSI will usually produce a very good image: When scaling *down,* it uses dithering techniques to maintain detail.

To apply a scale factor, you must select the 'Use ratios' radio button. Note that you cannot select both 'Scale to output mode' and 'Use ratios'.

Palette control

Precise matching
The Precise matching button turns on a colour matching algorithm which uses lookup tables to maximise output quality. This option produces the best colour output in most cases.

Standard
This will produce sprites which use the standard desktop palette. You should normally use this option, as it will make sure that all true RISC OS software can display your sprites properly: If your chosen output mode has sixteen colours or less, ChangeFSI will provide a monochrome image using as many shades of grey as are possible in that mode.

2 or 4 bit colour
If you are converting to a mode with less than 256 colours, then you can still get colour images from ChangeFSI. The '2 or 4 bit' colour option does this, and although the pictures are not such good quality, they can be displayed properly in a wider range of modes.

Digital RGB
The option above has a major drawback - there is no magenta, cyan or full intensity blue in the standard desktop palette. Using the 'Digital RGB' setting gets around this, but you must use the 'RGBPal' palette file supplied on the !FastGrab disc to display the pictures: This option is best used only for your own non-desktop programs which run in sixteen colour modes.

No tints/16 greys
The effect of this setting depends on the output mode you use. If it has 256 colours, then the sprite will not use tints, ie it will only consist of the sixty-four base colours in the palette: If it has sixteen colours, then the output sprite will have its own palette, consisting of a linear grey scale: These pictures can be viewed at the best in 256 colour modes, or in 16 colour modes, using the 'MonoPal' palette supplied on the !FastGrab disc.
Note : This form of output is not possible for modes with less than sixteen colours.

Image enhancement

Expand range

Selecting this radio button expands the dynamic range of the source image. It is similar to performing a contrast stretch. Although it doesn't always improve the image, it often provides benefits. This option maintains colours correctly.

Equalisation

This option applies a function known as 'Histogram equalisation' to the image before converting it: This makes the histogram of level versus the number of points at that level as flat as possible using the range of colours available: It often produces inferior images, especially from colour sources, but it can sometimes help to bring detail out of pictures:

Note that you can only select either Expand range or Equalisation at any one time: To use neither process, click on the one which is selected with ADJUST (the right hand mouse button):

Fast (mode 0)

You will probably know that your RISC OS computer runs more slowly in high resolution screen modes, because it has to spend more time keeping the screen updated: Mode 0 takes less time and memory than other modes, so this option allows you to switch into it for image processing: Once ChangeFSI has finished, the previous screen mode will be restored:

Invert input

This allows you to invert the colours in the picture before processing it. If you have a black and white video source, (or you have grabbed a picture with the saturation set to zero) inverting the image will produce a black and white negative, while a colour source will produce a colour negative image.

No pixel correction

The 'No pixel correction' option allows you to ignore the fact that pixels are different sizes in different modes. For instance, multisync modes' vertical pixels are half the size of those in standard modes: This option needs to be used with care, as it will result in stretched or compressed images if the scaling ratios are not set up correctly: It is really best to let ChangeFSI work out what's best for a given mode instead this option allows the adventurous to get some different effects.

Sharpening

Sharpening is digital enhancement of the image prior to processing. It is used in conjunction with a sharpening value, between 8 and 31. Eight represent very harsh enhancement (it is in fact edge detection), and thirty-one the softest option. You should enter the value for sharpening into the writeable icon to the right of the Sharpen option button.

Flip horizontally

Should your video source be laterally inverted, you can fix this by selecting this option.

Flip vertically

This setting will flip invert the image vertically, so that the top becomes the bottom and vice versa.

Disable dithering

The disable dithering option may be used to turn off the error diffusion algorithm which ChangeFSI uses.

Brighten Picture

The brighten picture option can be used to brighten the whole image. It should be used with care, as in some circumstances it can lead to white patches on the output.

Black Correction

This option allows you to improve the quality of sprites for printing on 'write black' output devices using dispersed dot dither (not clustered dot dither). The parameter which should accompany this option defines how much larger than the ideal square pixel the printer's dots are: The default value is 32, which is defined as a dot covering 50% more area than the square which represents a pixel. Black correction will not significantly improve pictures which are output on printers which use randomly sized dots - clustered dithering will produce better effects with such devices. Some pictures processed with this option look very pale on screen, because here a black pixel is smaller than the ideal pixel square:

The amount of black correction to be applied can be controlled by entering a value between 0 and 128: Using 0 results in no black correction at all, and 128 corresponds to a dot which covers four times the area of the ideal square pixel.

Gamma Correction

This option should be used to produce images which are only to be used for screen output. It allows you to correct for the fact that Cathode Ray Tube displays do not have a linear relationship between the brightness of a spot and the input voltage. Rather than the response being

$$brightness = constant * voltage,$$

it is

$$brightness = constant * voltage \, ^{(1/gamma)}$$

The accepted standard value for gamma is 2.2, but the value which gives best results on your system depends on the type of monitor and how it is set up: Using a low value, ie between 0 and 1, will darken colours, values above 1 make colours lighter.

Running ChangeFSI

Once you have decided which options to use (the defaults are suitable in most cases), click on the 'OK' icon: The ChangeFSI routine requires over 100 processor instructions per pixel of data, so it can take a few seconds to complete, even on speedy Acorn RISC processor! When it has finished, the result will be displayed in the sprite window: You can now save this sprite, using the same procedure as before.

Quitting the V9

Clicking on the close icon of the live display window will cause the live display to shut down. However, the task will remain active and the display can be resumed by clicking on the ! FastGrab Icon on the Icon Bar.

To quit completely press the menu button whilst over the !FastGrab Icon. Selecting the quit option on the menu will cause the task to shut down.

Loading previously stored images

You can load 16 bit Data files into !FastGrab by dragging them onto the !FastGrab icon. If you do this, the file will be processed by ChangeFSI to produce a mode 15 image, and this picture will be displayed as a sprite. You can then use ChangeFSI as normal to process the sixteen bit data. It is not possible to disc slave while working with such files, so you may run short of memory while using !FastGrab in this way.

Appendix A
Hawk V9 Specification.

Physical Size: Single width Eurocard (Podule)

Video Input :   1V pp Composite (PAL) Video through BNC Connector.

PAL Decoding: PAL signal decoded to RGB by single chip PAL decoder.

Video Control: Software Control of Brightness, Contrast and Saturation with 64
                         discrete levels.

Video Conversion: Three six bit Flash A/D converters clocked at 14.8 MHz.

Video Memory: 192K of Dual Port Video RAM.

Resolution: 512 X 256 Pixels at 16 Bits Per Pixel (5Bits each of R and B, 6 of G).

Aspect Ratio: Adjustable.

Pixel formats: 8 bit Byte with colour bits arranged as per desktop Palette.

                        16 bit word with 5 bits Red MSBs, 5 bits Blue LSBs and 6 bits Green.

Image Grabbing: Each line is grabbed under software control.

Access time: Consecutive reads to one line: 250 nS.

Podule Type: EPROM and Paging Register - Synchronous access Video RAM -
                         MEMC Access.

Power Supply :   +12 and +5V DC from Archimedes.

Appendix B
Installation Instructions

The Hawk V9 MkII can be simply installed in any Archimedes fitted with an expansion card backplane provided there is a free slot. If your Archimedes does not have a backplane one can be obtained from most Acorn Dealers. The only tool needed is a screwdriver. For A3000, see note at end.

If you are in any doubt about your ability to install this podule it is suggested that you contact your local Acorn service agent who should be able to assist you.

To install the podule proceed as follows:

1. DISCONNECT THE COMPUTER FROM THE MAINS AND UNPLUG ALL PERIPHERALS FROM IT

2. Remove the top from the computer, this is held in place by five screws (one on each side towards the front and three on the back). Once the screws are removed, the top slides off to the rear.

3. Remove a metal expansion card blanking panel from the rear of the computer, making sure that this position corresponds with a spare socket on the expansion card backplane. If an Econet interface is fitted the card must be plugged into the upper slot. The blanking panel is held in place by two screws - these should be retained for fitting with the card. If a backplane is not fitted one should be fitted before proceeding further.

4. The expansion card can now be plugged into the backplane. To achieve this, it is necessary to insert the expansion card through the space left by the blanking panel at the rear of the machine. The expansion card should be pushed firmly into the multi-way socket on the backplane and secured to the rear panel of the computer using the screws removed from the original blanking panel. With earlier Archimedes machines (prior to the 400/1 Series) the expansion card will stick out at the rear of the computer by approximately 2mm, in this case the two metal spacers supplied with the expansion card should be fitted between the back panel and the computer.

5. Once the expansion card has been fitted the lid of the computer can be replaced. The blanking panel removed from the computer should be put in a safe place so that it can be refitted if the expansion card is removed. The single-width blanking panel supplied with the Hawk V9 may be fitted to cover the remaining gap at the rear of the computer.

6. Any peripherals can now be reattached and the computer switched on. To check that the expansion card is correctly installed type *podules at the Star prompt (e.g. after pressing f12 from the desktop): This should give a display similar to the following :

          *Podules
          Podule 0: ---Hawk_V9---
          Podule 1: No installed podule
          Podule 2: No installed podule
          Podule 3: No installed podule

The exact details will vary depending on which slot the V9 has been installed in and what other podules are fitted. If this appears correct proceed as described in Section 2 of this manual: If there are any problems, check firstly that the machine is correctly configured - e.g. that the Hawk V9 has not been "Unplugged" in software. Also check that the board is firmly plugged into the backplane.

Another possible fault is that the computer has not seen the module "colours" or ColTrans. This is supplied with RISC OS on the !System directory and it is important that this directory has been "seen" by the system. The RISC OS manuals should provide more information about !System.

A3000 Users
For details of using the A3000 version of the Hawk V9 Mkll, refer to the separate info sheet, which contains important and specific installation instructions:

Suitable video signals
The Hawk V9 should function correctly with any composite video signal to the 625 line PAL standard. Such signals should be readily available from Video Cameras, CamCorders and most video recorders. The exact connection will depend on the equipment in use and a suitable cable may be required. To check this consult the manual for your video equipment and if necessary your video supplier: They should also be able to supply you with a lead.

The Hawk V9 input has a BNC connector on it:

When the live desktop display is running, disturbances in the signal e.g. stopping a video recorder or changing channel on a tuner may cause the program to stop.

1MM   The Hawk V9 should still function when shuttled (Fast Fwd and Reverse) or paused video recorder signals are used although the colours may be disturbed under these circumstances. However, operation under these conditions cannot be guaranteed as they are dependent on the quality of your video equipment:

Appendix C
Hardware Adjustments - Important Information

The following adjustments can be used to change the way the Hawk V9 functions under certain circumstances: It must be stressed that these adjustments should only be made by people who understand what they are doing as failure to make them correctly may prevent the Hawk V9 from functioning correctly.

Video Input Termination
The Video input is terminated in 75 Ohms. This can be removed if required, by removing link LK1 which is situated a short way behind the video in connector on the panel.

Aspect Ratio
The aspect ratio is factory set to 1:1 with a square picture being digitised from the centre of a video image:(i:e digitising does not start until someway into the picture). Do not alter any settings: Any cards which are returned to Wild Vision for "readjustment" after user adjustments will not be considered to be under warranty.

External power source
If your version of the Hawk V9 MkII requires connection to an external power source, it is imperative that the link at LK5 is removed from the digitiser before connection to any PSU. Failure to remove this shorting link will cause irreparable damage to your digitiser:

Appendix D
HAWK V9 - Driver Module

General

The Module is resident in podule ROM and is automatically initialised upon power-up or following a Reset.

The SWI Chunk number is : WVCGrab &40EC0

Product Code is : 82

The module provides SWIs to control the digitiser hardware from within user applications. SWICalls

Caution : These SWIs are under review; anyone contemplating using them in application software should contact Wild Vision for updated information.

WVCGrab_ReadFrame

This SWI will read a frame from the digitiser into Archimedes memory: The output will follow this sprite format:

Control Block	Palette Area (optional)	Sprite Image	Plotting mask (optional)

The Sprite Control Block contains the following:

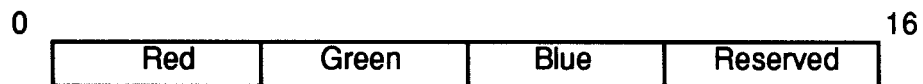| Word	Content
1	Offset to next sprite
2 - 4	Sprite name, up to 12 characters with trailing nulls
5	Width in words -1
6	Height in scan lines -1
7	First bit used (left end of row)
8	Last bit used (right end of row)
9	Offset to sprite image
10	Offset to transparency mask or to offset to sprite image if no mask
11	Mode sprite was defined in
12 ...	Palette data (optional)

On Entry:

R0   ==> Address of output Data Block or pointer to sprite block.
R1   Image X Size (should divide exactly into 512)
R2   Image Y Size (should divide exactly into 256)
R3   Control bits   b0 -   Set, gives 8 Bpp output as single Bytes
                                        -    Clear, gives 12 Bpp output in 16 bit words (12 LSBits)
                            b1 -   Set, Reads data from framestore only:
                                    -    Clear, Acquires a new frame before reading data.

On Exit:

R0   ==> Sprite Data

If the SWI was called for output in 8 Bpp then the data is output as a sprite: If output was requested in 12 Bpp then raw data is dumped to memory starting at the address specified
The format for 12 Bpp is:

```
0                                                        16
  +----------+----------+----------+----------+
  |   Red    |  Green   |   Blue   | Reserved |
  +----------+----------+----------+----------+
```

WVCGrab_ReadSprite

This SWI reads a sprite from digitiser memory: It differs from the previous SWI in that the data is read at full resolution from a defined area of the image: The data defining the sprite is setup in the sprite block before calling. The data returned is always in 8 Bpp Sprite format.

On Entry:

R0   ==> Sprite Block
R1   X Offset from left of screen
R2   Y Offset from top of screen (downwards)
R3   Control Bit b1 -   Set, Reads data from framestore only.
                                             -    Clear, Acquires a new frame before reading.

On Exit :

R0   ==> Pointer to Sprite Block (or error)

WVCGrab_ReadLine

This SWI reads a line from digitiser memory into main memory. The data is output in raw format with either 8 bpp bytes or 16 bit words of 12 bpp (LSBits)

On Entry :

R0	==> Destination Memory
R1	X line length (Must divide exactly into 512)
R2	Y co-ordinate of line working down screen.
R3	Control Bits b0 - Set, 8 Bpp output as single bytes
	- Clear 12 Bpp output as 16 bit words
	b1 - Set, read data from framestore only
	- Clear, Acquire a new frame before reading

On Exit :

R0	==> Destination memory block:

WVCGrab_MemBase

When addressing the Hawk V9 directly, it is useful to know exactly where in Archimedes address space the hardware is stationed: There are two addressing modes used with the Hawk V9; MEMC for accessing video data; and simple for registers.

On Entry :

Undefined

On Exit :

R0	Address of simple podule space
R1	Address of MEMC Podule space

WVCGrab_Refresh

This SWI enables/disables refresh under the control of an internal event. Usually every 1/50th second. The module should set this up as enabled on initialisation. The SWI can be subsequently called to disable and re-enable.

Refresh is performed by cycling through 256 row addresses using refresh cycle. RAS/ only goes low. The frequency of refresh determines how often refresh is performed:

On Entry :

R0	=	0 disable refresh
		1 refresh every 1/50th second
		2 refresh every 2/50th second

WVCGrab_PALRead

This SWI returns the current settings for the brightness, contrast and colour saturation.

On Entry :

Undefined

On Exit :

R0	=	Brightness
R1	=	Contrast
R2	=	Colour saturation

WVCGrab_PALWrite

This SWI is used to set the PAL control settings, namely Brightness, Contrast and Colour Saturation: The circuitry used is currently write only, therefore a RAM copy is stored for subsequent reads using PALRead.

The actual values used are in the range 0 Õ 63, but should bit 6 be set, then no data is written.

On Entry :

R0	<>	b6	=	Brightness
R1	<>	b6	=	Contrast
R2	<>	b6	=	Colour Saturation

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