TWAIN

Linking Applications
and Images

David Pilling

Software

TWAIN and the TWAIN drivers were written using Acorn's ANSI C compiler release 5, and the Objasm assembler.

This manual was produced with the OvationPro DTP program.

Credits and thanks to;
John Ferguson for designing the sprites and templates

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If you have any comments, suggestions, bug reports or complaints or would like further copies of this program or details of the many pieces of software available for Acorn/RISC OS, please write to;

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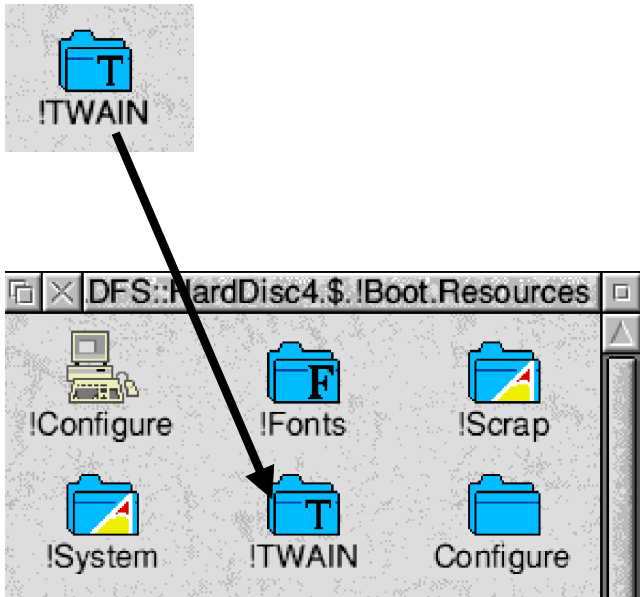URL: http://www.netlink.co.uk/users/pilling

From time to time enhanced versions of programs will appear. You can upgrade your copy to the latest one by sending your original disc with return postage to the above address

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Installing TWAIN

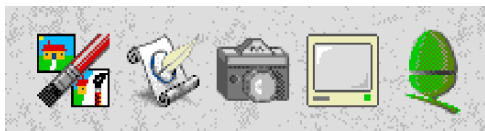❶ Drag the !TWAIN directory from the floppy disc to your hard disc. A good place to put it is with other resource directories.

❷ Double click on the !TWAIN on your hard disc. Note this simply makes it the current copy of !TWAIN nothing else is supposed to happen. You only have to do this the first time you install TWAIN.

❸ Double click on the program you want to scan from.

❹ The scanning program will appear on the icon bar.

❺ Click on the scanning program icon bar icon. The main window will appear.
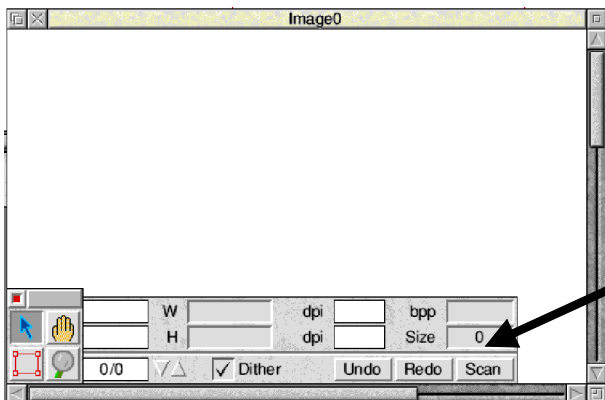
❻ Click on the Scan button on the scanning software info palette.
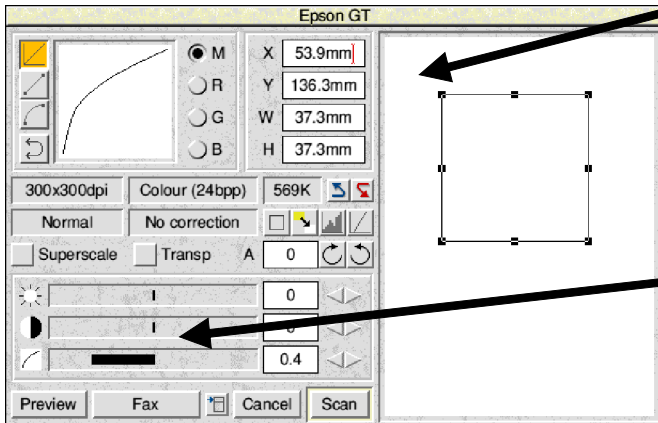
7 The scanner driver window will appear. This window comes from inside !TWAIN so you now know !TWAIN is working.

8 Click the *Menu* button at this point over the scanner driver window.
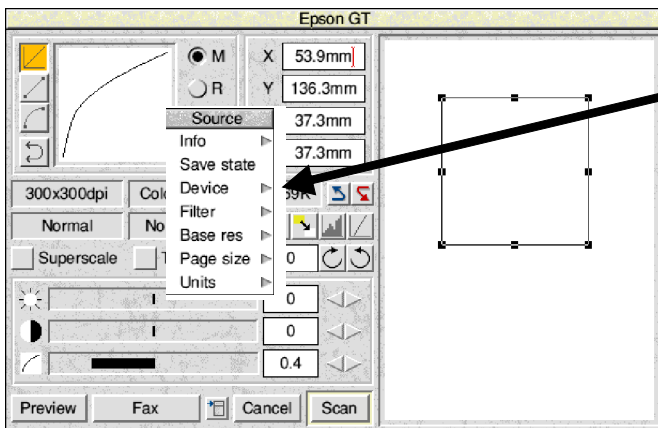
9 The main menu will appear. Follow the entry *'Device'* and click on the appropriate entry for your scanner.

10 Click on the scanner driver 'Preview' button and your scanner will start to scan.

5

Scanning something

1 Click on the Scan button on the scanning software info palette. Other software will have different ways of starting scanning. Perhaps a menu with 'Scan...' or 'Acquire...' on.

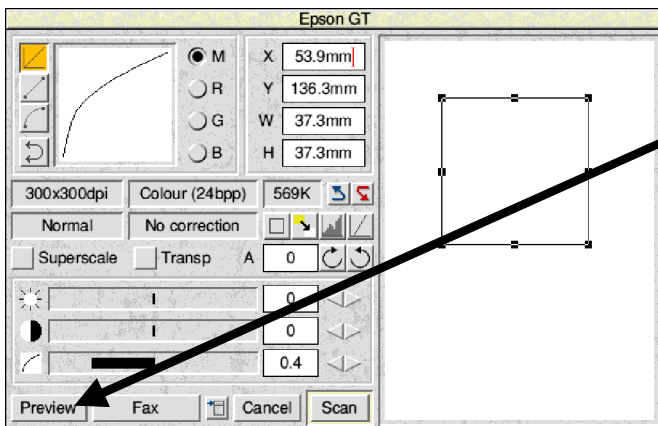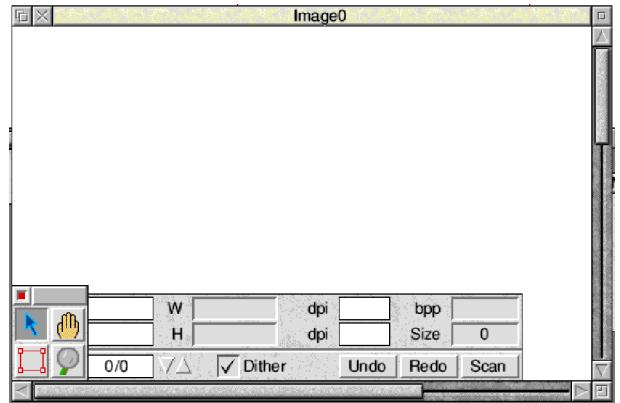**2** The scanner driver window will appear.

3 Click on the scan type icon and choose the sort of scan you want to make from the menu which will appear.

4 BW means a black and white scan. Dots in the image will either be totally black or totally white. Such images take up little memory and are suitable for copying black and white printed documents. Grey scale images have 256 shades of grey between black and white. They take up more memory. Colour images come in two types "8bpp" images use as much memory as Grey images but have colours taken from a set of 256. Finally "24bpp" images give you as much colour detail as possible but use lots of memory. After you make your choice from the memory the text in the driver window will change to show you the type of scan.
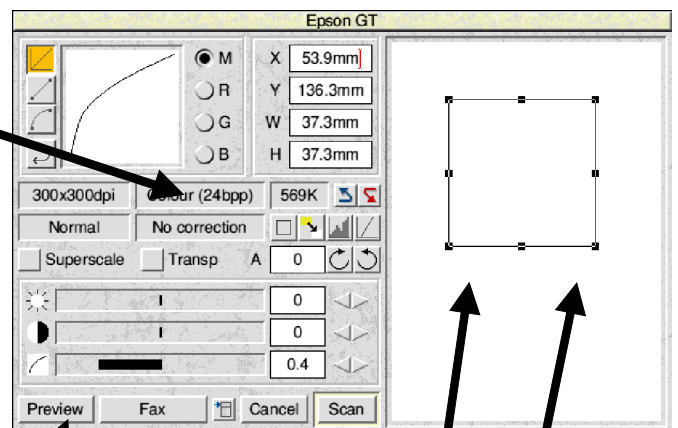
5 Click on the Preview icon The scanner will scan.

6 a preview scan will appear in the preview area on the right of the scanner window.

7 By clicking and dragging with select on the handles of the rectangle superimposed on the preview area you can adjust the area of the final scan.

6

8 Click on the resolution icon and choose the resolution of the final scan. Resolution is measured in dots per inch, the higher the resolution the higher the quality of the final image, but the greater the amount of memory used. The resolution of the screen on Acorn computers is 90 dots per inch. Because of the difference in the ways printers and scanners represent dots you usually need only scan at a fraction of your printers resolution when scanning in grey or colour. There is nothing to gain by scanning at too high a resolution or at a resolution higher than your scanners optical system is capable of.

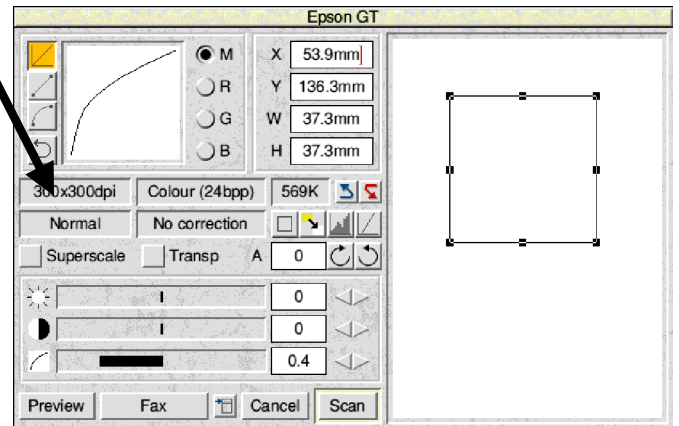**9** Use the three sliders to adjust the brightness of the preview image to your requirements. The three sliders are for Brightness (how bright the image is), Contrast (the difference between the darkest and lightest parts of the image), and Gamma (how rapidly the image changes from dark to light).
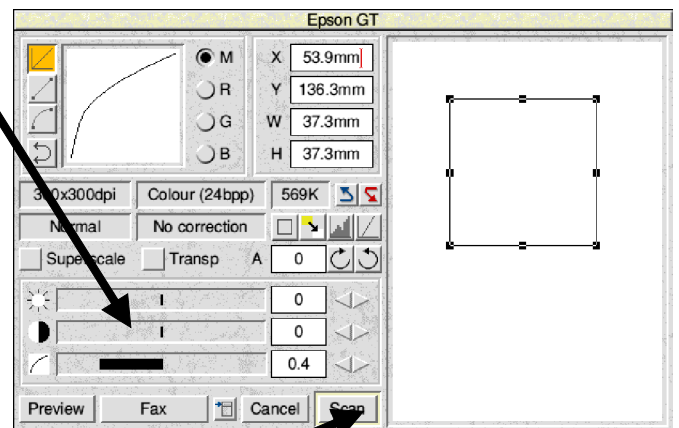
10 Click on the scanner driver 'Scan' button and your scanner will start to scan. When the scan is finished, the final image will appear in the program you started scanning from.

Gamma curve displayed - Master, Red, Green or Blue **16**

Gamma curve window **15**

Gamma curve control type, either brightness, contrast and gamma sliders **19** or editable points joined by lines or curves **16**

Type of scan. Click for menu **12**

Invert gamma curve button (makes image negative) **16**

Click for menu to change resolution **13**

Colour correction. Click for menu **21**

Sharpness. Click for menu **20**

Enable interpolation by driver **21**

Enable transparency adapter **21**

Brightness, Contrast and Gamma sliders. Change image brightness **19**

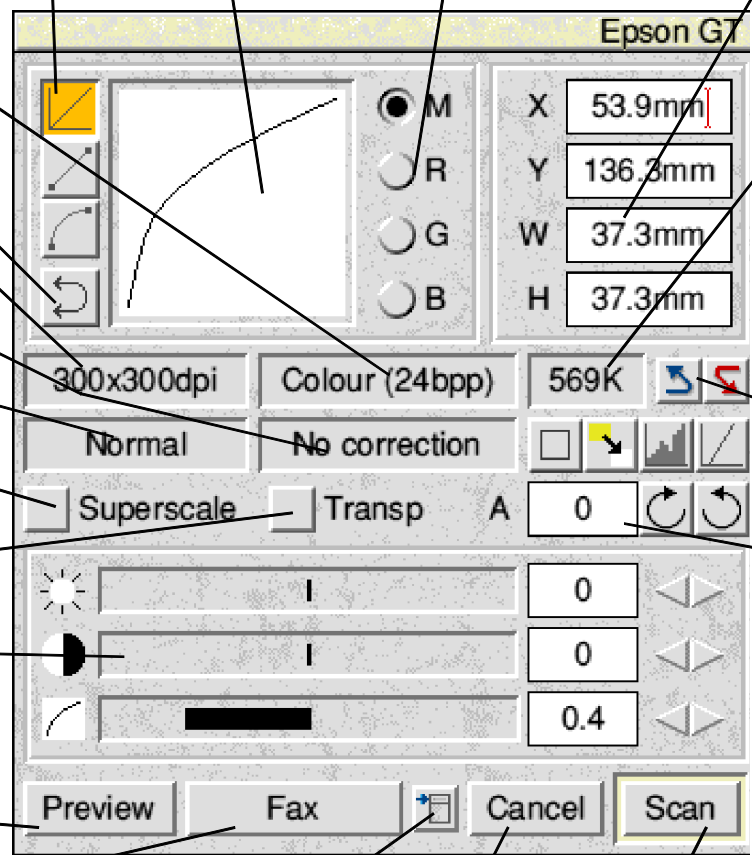Carry out preview scan **10**

User defined scan button. Click to carry out scan of name shown **14**

Click to open user defined scan menu **14**

Close window **12**

Start scanning **12**

Epson GT

M   X 53.9mm
R   Y 136.3mm
G   W 37.3mm
B   H 37.3mm

300x300dpi   Colour (24bpp)   569K

Normal   No correction

Superscale   Transp   A   0

0

0

0.4

Preview   Fax   Cancel   Scan
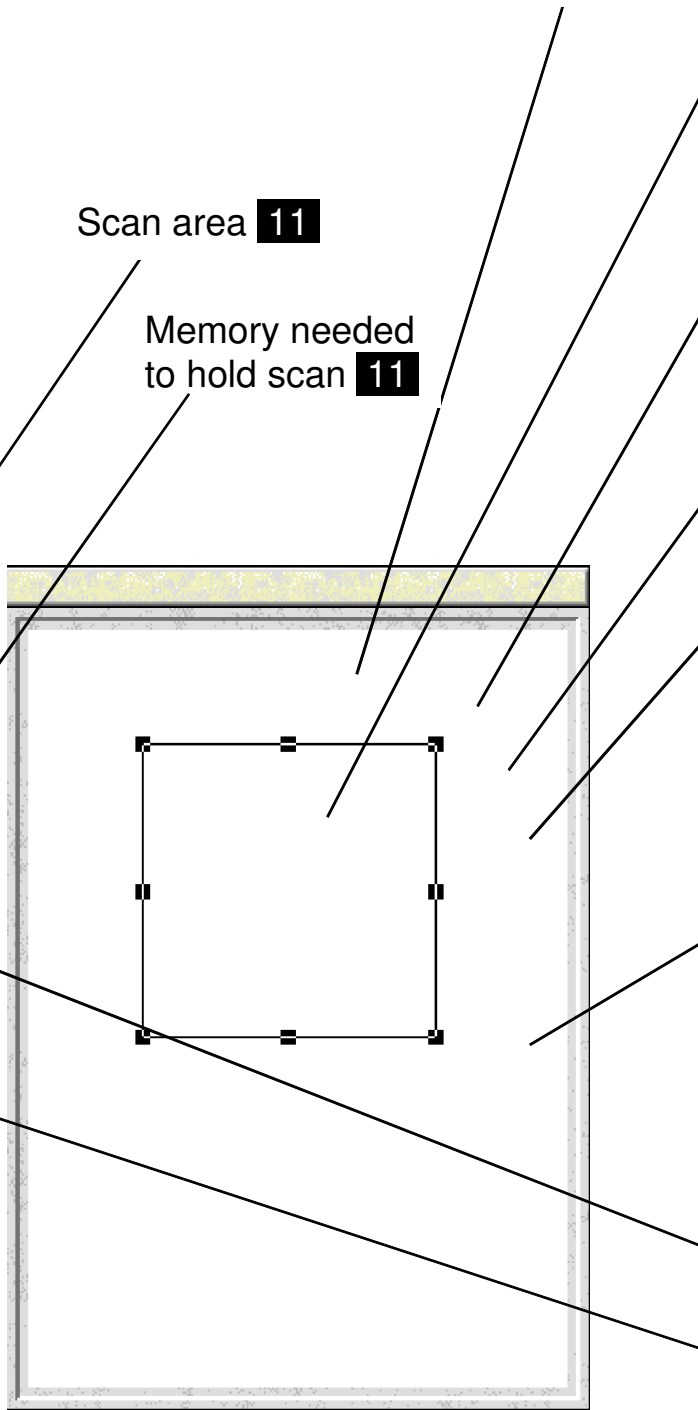
Preview window. After clicking on the preview button this shows what is in the scanner, and allows you to accurately set scan area and image brightness **10**

Area selected for scan. Drag the handles with *Select* to change. Click and drag in the middle of the area to move it. A drag with *Adjust* will select a new area **10**

Scan area **11**

Memory needed to hold scan **11**

Pressing *Menu* over the preview window will display a menu allowing you to control the scale the preview is shown at **11**

Holding down **Shift** and dragging with *Select* over the preview window allows you to move it around when scaled up **11**

Holding down **Control** and dragging with *Select* will draw a box, on release the preview will be scaled so the box fills the window. Holding down **Control** and clicking with *Adjust* steps back through previous magnifications **10**

Holding down **Control** and **Shift** and dragging with *Select* will draw a line, on release the preview will be rotated to make the line vertical or horizontal. Holding down **Control** and **Shift** and clicking with *Adjust* resets the angle to zero **23**

Undo/redo for driver window settings **12**

Angle scan will be rotated through **23**

Set area to scan to object area of preview **11**

Linear equalisation **18**

Histogram equalisation **18**

Remove colour tint **19**

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Preview Button

The Preview button makes the scanner do a preview scan. A preview is intended to be quick, not use much memory and give you a rough idea of what you are scanning. Once completed it will be displayed in the preview window on the right hand side of the driver.

If you hold down **Control** whilst clicking on Preview then the scan will be returned to the application the scanner driver window was launched from. This is the way the older version of the TWAIN drivers worked.

Clicking on Preview with the *Adjust* button will transfer the preview scan values to the main scan window.

Preview Window

The results of a preview scan are displayed here. When you open the scanner window any previous preview scan will reappear.

The rectangular selection shows the area of the final scan. By dragging on the handles with *Select* you can change the area.

By dragging with *Select* over the area of the main rectangle you can move it around.

A drag over the preview window with the *Adjust* button will create a new rectangle based on the point you first click at. This can be a quicker way of setting up the area to scan.

Notice that if you start a drag and decide you wish you'd not done so, you can get out of it by pressing **Escape**. Whilst a drag operation is going on, you can fine tune the pointer position with the (shifted) cursor keys.

Holding down **Control** and dragging with *Select* allows you to mark an area. When the mouse button is released the preview window will magnify so that the dragged out area fills it.

10
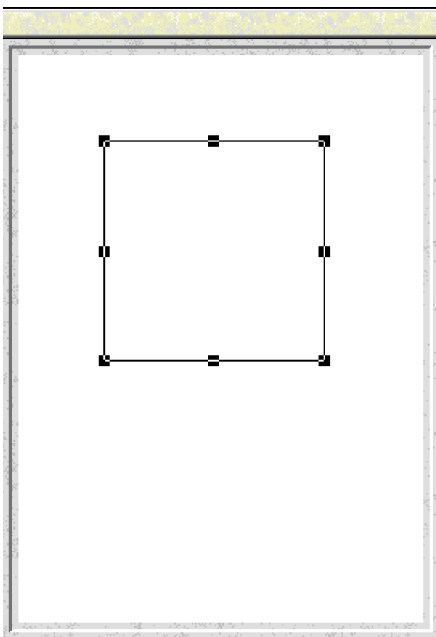
Scale

Fit area

✓ 100%
150%
200%
300%
400%
500%
100

Holding down **Control** and clicking with *Adjust* will step through previous magnifications used.

Holding down **Shift** and dragging with *Select* allows you to move the contents of the preview window about. This is only useful when the preview window is magnified.

Pressing *Menu* over the preview window opens a menu allowing you to control its magnification. The first entry zooms the window so that the rectangular selection just fills the window and is centred. The other entries allow you to pick a magnification or enter a value of your own.

Area Icons

X	53.9mm
Y	136.3mm
W	37.3mm
H	37.3mm

These show the coordinates of the rectangular selection to be scanned. You can put the caret in them and enter values accurately.
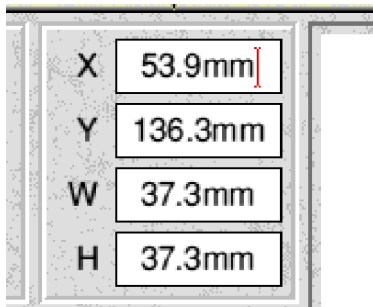
In any icon where you can type a value, you can also type in an expression. For example;

10+20 or 6*2.123

Operator precedence is unary +/-, (and), / and *, units and %, + and -

More advanced examples;

100mm+10%   5/6"

here " is short for inch. Other supported units are px (pixels), in (inches) pt (points), pi (picas), centimetres (cm)

Automatic Area Selection

Clicking on the Area icon will make the scanner driver analyse the preview image and attempt to automatically set up the rectangular selection for scanning.
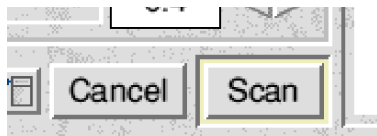
Image Size

569K

The image size icon is updated continuously and shows the amount of memory needed to hold the result of the scan currently set up.
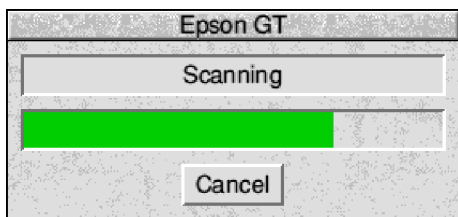
Undo and Redo

This pair of icons allow you to step backwards and forwards through the previous settings in the scanner driver window. This is useful if you click on an icon which changes things in a way you don't like.

Cancel and Scan

The Cancel button closes the scanner driver window. The Scan button starts scanning.

Whilst scanning is taking place the scanning progress window will appear. The moving green bar indicates the fraction of the scan completed. You can stop the scanner by clicking on the Cancel button.

Scan Type

Clicking on this icon will produce a menu of the available scan types.

The types include - Black and white (BW) where each image pixel is either on or off and 1 bit is used to store each pixel. Black and white dithered (BW Dithered), this is like black and white but shades of grey are represented by varying the density of black and white pixels. This is similar to the 'half toning' process used to print images.
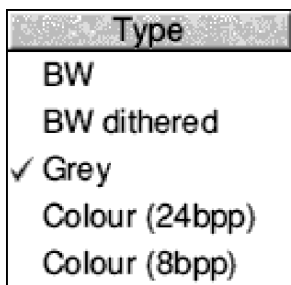
Grey scale images use 1 byte for each pixel and display 256 shades of grey between black and white.

Colour images can either be full colour, 3 channel red, green, blue each with 8 bits and 256 levels - i.e. 24 bits. Or alternatively 8 bit colour. For these the image will have a palette of 256 colours. This palette is chosen to correspond to the standard Acorn 256 colour mode palette.

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Resolution

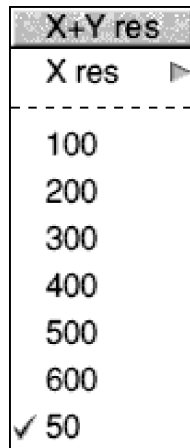The resolution icon shows you the X and Y resolutions that will be used for the scan. The X axis is horizontal, usually across the direction of the scan, the Y axis vertical, along the direction of the scan.

By clicking on the icon you can open a menu which allows you to change the resolutions. Resolution is measured in dots per inch.

Clicking on this menu changes both the X and Y resolutions to the same value. Normally this is the best setting and some scanners will only allow equal X and Y resolutions.

The last entry on the menu is writable and you can type in any resolution value you want.

By following the top entry on the menu you can access another menu which allows just the X resolution to be changed.

Any arrangement of X and Y resolutions can be obtained by changing X and Y using the first menu and then X using the second menu.
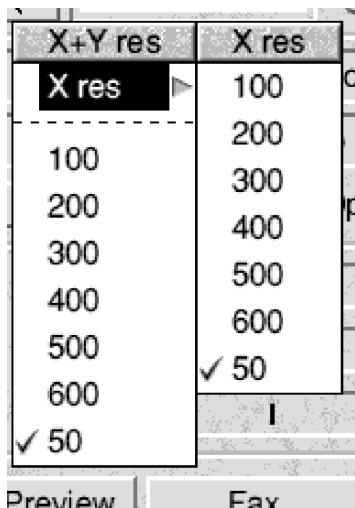
Greater resolution produces an image that uses more memory. The hardware in a scanner is limited in the resolution it can scan at. This limit is called the 'optical resolution'. Often the optical resolution in the X direction will be half that in the Y direction - so the maximum resolution will be quoted as something like 300x600 dpi.

Scanners can usually scan at higher 'interpolated' resolutions than their optical resolution. To do this they have to generate the values of the extra dots in the image. So if one dot has a brightness of 200 and its neighbour a value of 100, the interpolated dot might be given a value of 150.

On the whole such interpolation is of limited value and often better done in the application you use for processing images. One reason is

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that doing this avoids the time delay in moving the extra data over the scanners connection with the computer.

User defined scans

There are many settings associated with a given scan - brightness, resolution, etc. It is a problem to remember all of them, and maybe impossible to get back to a scan you were happy with. User defined scans provide a way of saving all the scan settings. You can quickly get back to a known position and you can easily do the correct type of scan for the current item of interest. For example you'll probably always use the same settings for copying A4 documents, and they'll be different for those you use for scanning 6x4" photographs.

Clicking on the user defined scan button (showing the name 'Fax' on the left) with **Select** executes that type of scan immediately with the saved settings. The settings in the main scan window are preserved until the next time the scan window is opened.

Clicking on the menu icon to the right of the user defined scan button opens the user defined scan menu.

'Scan' gives a menu of user defined scans, selecting one from it will cause that scan to be executed immediately. As a short cut, this sub-menu can also be accessed by clicking **Menu** over the user scan button.

'Button' gives a menu of user defined scans, by selecting from it you can change the name displayed on the user scan button.

The entry *'Save new'* allows you to enter a name and save the current scan window settings as a new user scan.

'Save as' leads to a menu of all the names of existing user defined scans, by clicking on one

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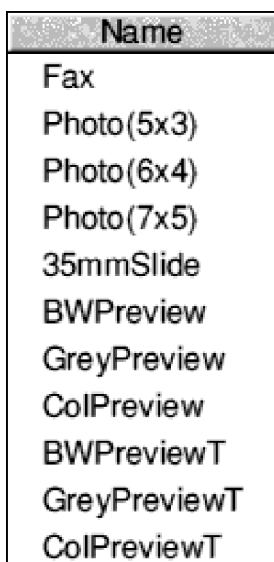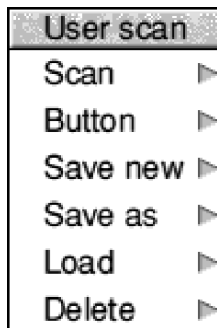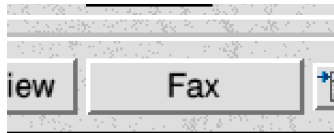
you can overwrite the saved settings with those of the scan window.

'Load' again gives you the menu of existing user defined scans, clicking on one will load the settings to the scan window.

'Delete' allows a user defined scan to be deleted.

Some of the user defined scans have special purposes. The group BWPreview, GreyPreview, ColPreview are executed when you click on the Preview button when the scan type is Black and White, Grey or Colour. These scans cannot be deleted but can be redefined. The other group with an 'T' added to the names are similar in purpose but used when the 'transp' button is selected.

As a short cut clicking on the user defined scan button with **Adjust** will load the associated settings to the main scan window.

Gamma curve window

A 'gamma curve' or more correctly a 'transfer curve' shows how the brightness of the image which comes out of the scanner varies as a function of the brightness of the original image.

The input brightness runs along the X axis and the output brightness along the Y axis.

It is obvious that the higher the curve is the greater the overall brightness of the image. Similarly the steeper the curve, the greater the contrast - because smaller changes in input will give bigger changes in output.

The three icons to the top left of the gamma window change how you control the curve. The first one, enables the brightness, contrast and gamma sliders. These provide a simple and intuitive way of changing the image brightness. You don't have to understand anything more about the gamma curves than this.

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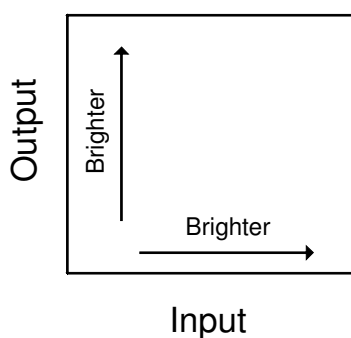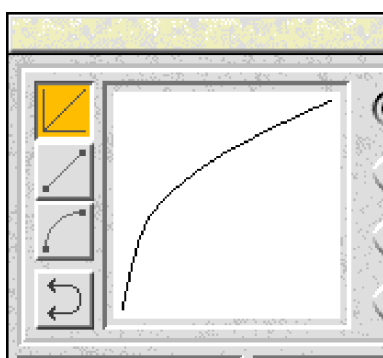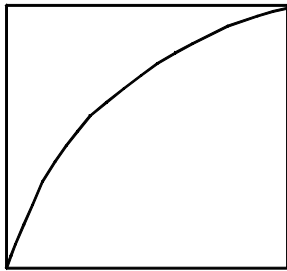
Typical gamma curve
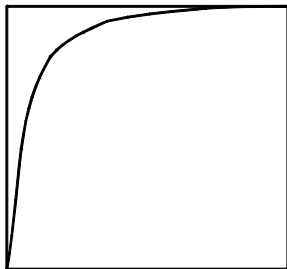
Curve giving brighter scan
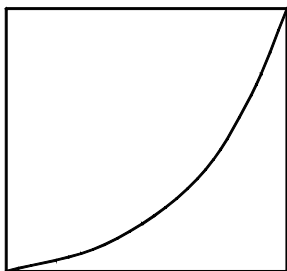
Curve giving dark scan
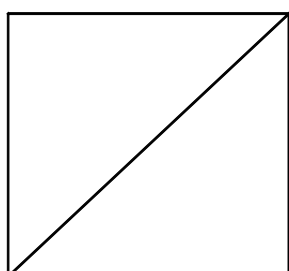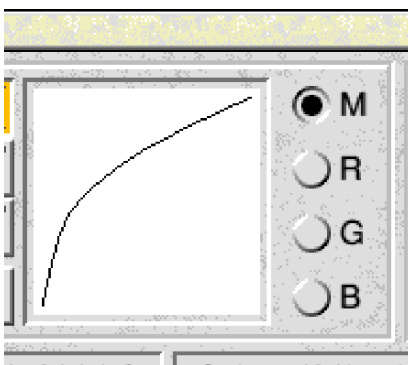
Curve giving no modification

The second and third icons enable direct editing of the gamma curve. Small handles will appear that you can drag around with the **Select** button. The difference in the two tools is that one joins the points with straight lines, and the other with smooth curves.

Clicking on a handle with **Adjust** will remove it. Clicking with **Select** anywhere except on a handle will create a new one.

The final icon to the left of the gamma window will invert the gamma curve. The effect of this is to make the image a negative - black becomes white and colours are replaced with their complements.

As you change the gamma curve the effect on the image will be shown in the preview area.

Gamma curve type

The four buttons M, R, G and B control which gamma curve is shown in the window. The 'M' button displays the master curve. This controls the overall brightness. For grey and black and white images there is only a master curve. For colour images there are in addition R (red), G (green) and B (blue) curves, one for each colour

The Master curve is applied to the image data and then the appropriate colour curve.

The advantage of having two sets of curves is that colour correction can be achieved independently of the overall brightness control.

Some scanners (usually older ones) scan using 8 bits for each colour channel. For these if you scan using a gamma curve that does not change the image at all i.e. a 45 degree line from bottom left to top right you will get all the brightness information available in the scan, and you can then use your image processing software to adjust brightness. This is useful because you can experiment easily - a lot more
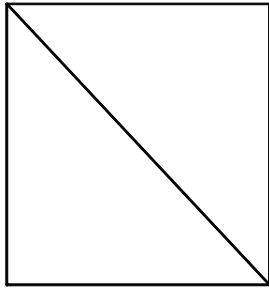
Curve giving negative scan
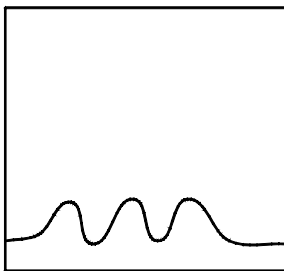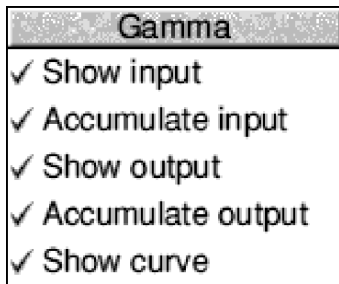
Typical input distribution
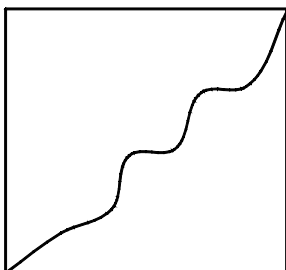
Accumulated input distribution
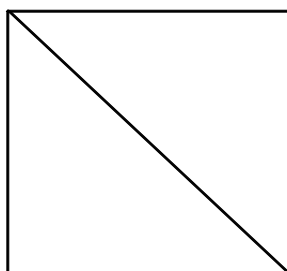
Linear output distribution

quickly than scanning repeatedly.

Other scanners scan using perhaps 10 or more bits internally, since the final image will always have just 8 bits, one setting of the gamma curve can produce information that is not available from another setting.

Pressing **Menu** over the gamma curve window will open a menu. This allows you to control the curves shown.

In addition to the gamma curve (which is controlled by the last entry on the menu), you can also control the display of curves which show the distribution of brightness levels in the currently selected area of the preview image, both before and after the gamma curve correction is applied. The data will either be for the overall brightness when the M curve is selected or for the R, G, or B components when those gamma curves are selected.

These distributions can be shown in two forms, either as a simple fraction of the number of pixels in the image, or as a cumulative fraction of the total number of pixels.

For a cumulative fraction the final point on the right will always be at 100%, because when all the input points have been counted they will always amount to 100% of the total.

The distribution of values in the original image is shown along the X axis, and the distribution after application of the gamma curves is shown along the Y axis.

One interesting fact is that if the gamma master curve is arranged to follow the cumulative input distribution, then the cumulative output distribution will be linear (a straight line).

This is the often desirable situation where the values of brightness in the final image are evenly distributed - so there are equal numbers

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of pixels with each of the possible brightness values.

A gamma curve which gives such a distribution performs 'histogram equalisation'. When you click on the button shown left, the driver will set up the gamma curve for histogram equalisation.

This sort of equalisation is good for images that contain the full range of brightness values. It is less good for an image that should be bright or dark overall.
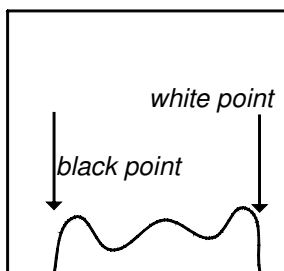
Poor contrast image

The brightest pixel in an image is called the white point, similarly the darkest is the black point. You might expect the white point to be 100% and the black point 0%. However images of poor contrast often won't cover the full range - the black point will be above 0% and the white point less than 100%.

Linear equalisation arranges things so that the limited range of input brightness covers the full range of output brightness.

The button shown left sets up linear equalisation for the selected area of the preview image.

The gamma curve for linear equalisation consists of a line from the black point to the white point on the input X axis and 0 to 100% on the output Y axis. It follows that clicking on this icon is a way of finding the white and black points, and generating a gamma curve which can be further refined.
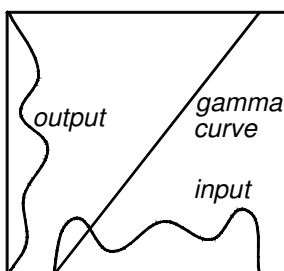
Linear equalisation
(note output covers full range of brightness)

Note that you can temporarily set up a rectangular selection which only covers a part of the area of the final scan and use it to generate histogram or linear equalisation.

The linear and histogram equalisation buttons have an effect when used with the RGB curves selected but in general it is not useful, and you should make sure that the M curve is selected before using them.

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Removing colour tints

The button shown on the left when clicked on, calculates the overall colour of the rectangular selection and then sets the RGB gamma curves to remove it.

As an example of how to use this, the following process can be used to scan negatives (assuming you have a transparency adapter)

(1) Ensure the invert gamma curve button is not selected.
(2) Do a colour preview of the negative.
(3) Mark off an area of the film background colour, and click on the tint button. Then reset the rectangular selection to the area of interest.
(4) Select the M button and adjust the gamma curve, typically this will be steeply bowed upwards. The histogram equalisation button might be used to generate this curve.
(5) Click on the invert gamma curve button.

At this stage the negative should be correctly processed and you can click on scan.
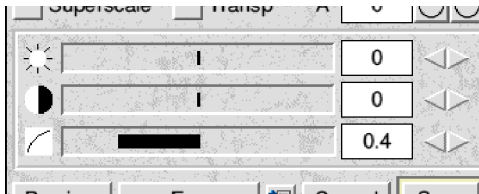
Brightness, Contrast and Gamma

The group of three sliders control Brightness, Contrast and Gamma. Each can be changed by either clicking or dragging on the slider, entering a value or using the up/down arrow icons.

Brightness adds an overall shift to the brightness. Contrast changes the gradient. Gamma can be looked at as changing the rate of change of the gradient.

Gamma has another use, with the Brightness and Contrast values set to zero it can be used to accurately set up a pure gamma curve. For such a curve, input (i) and output (o) are related by output=input raised to the power gamma ($o=i^{\gamma}$). This feature allows you to set a specific gamma value. For example a gamma value of 0.4 typically gives the best results on monitors.

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Black and White images and brightness control

Much of the above discussion about gamma curves and and brightness does not apply to black and white images. For these the full range of input values is converted into one of two output values - black or white. The input value at which the output transition occurs is called the threshold.

When you select a black and white scan, the three sliders for brightness, contrast and gamma are replaced by just one for the threshold value. The gamma curve becomes a threshold or step curve and cannot be edited.
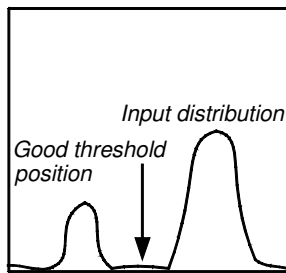
Setting the threshold value correctly can be critical. For example if you are trying to copy a form with dark blue text on a light blue background, if the threshold is too low you'll end up with a pure white scan and if it is too high an all black one. Putting the threshold point between the two shades of blue will give the most useful result. Examining the non-cumulative input distribution may help find the optimum threshold value.

Usually the preview scan for black and white scanning will be set up to be grey scale. This is so that the scanner driver can show you the result of different threshold values. A black and white scan can never be processed to appear differently.

Setting the threshold
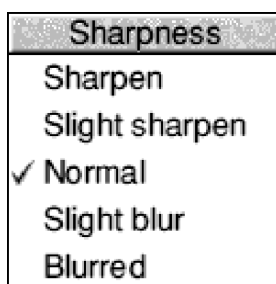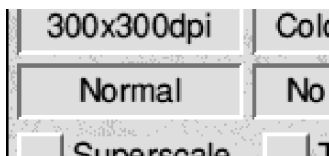
Image Sharpness

Clicking on the icon (showing 'Normal' left) opens a menu that lets you set the sharpness of scans

Blurring may be used to remove the visible dots when scanning printed originals.

Not all drivers provide this option.

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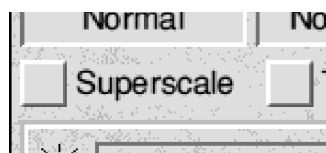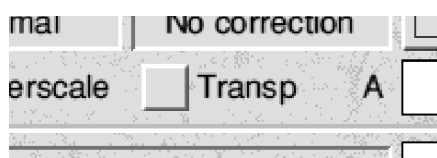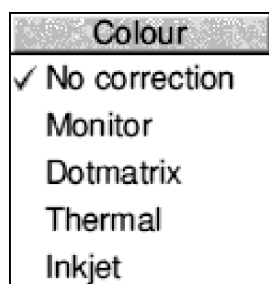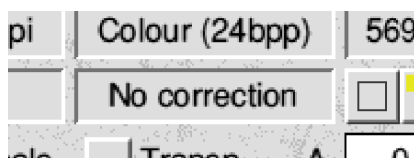
Colour Correction

Clicking on the icon (showing 'No correction' left) opens a menu that lets you set the colour correction for images.

The corrections offered are built into the scanner.

Not all drivers provide this option.

Transp

When this button is selected the scanner will use any attached transparency adapter. Note that this setting is saved in user defined scans. That means you can't just select the transp icon, click on the user defined scan button and get a scan using the transparency adapter - unless the user defined scan called up happens to have this option set. (see the section Advanced Configuration for more).

Superscaling

The hardware inside a scanner is only capable of scanning at a fixed resolution (called the 'optical resolution') - at least in the horizontal direction. Usually though you will want to scan at variable resolutions, and the scanner driver allows you to do this.

To do this there must be some way of converting the fixed resolution scan from the scanner into a variable resolution one. Normally scanners can do this conversion internally. However the techniques used sometimes give poor quality images.

A typical example, is if you scan a colour picture from a magazine or book, and choose a low resolution like 100dpi, and you then see so called 'moire fringes'. These are caused by the

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scanner simply passing on say every sixth line or pixel.

Superscaling allows the resolution conversion to be done by the scanner driver instead of the scanner hardware.

The Superscaling icon controls if this feature is used or not.

A consequence of using Superscaling is that scans of less than the optical resolution, will be slower than before - because more data has to be transferred from scanner to computer, and that scans of greater than the optical resolution will be faster, this time because less data has to be transferred.

The above fringes are also called 'aliasing effects', a term which comes from signal processing. When a signal is not sampled at a high enough rate to accurately reconstruct it, spurious 'alias' signals are generated.

It is worth noting that you may see fringes, because you are displaying a 600 dpi image on a 90 dpi screen. The aliasing then is a result of the display, and not the image. Increasing the display zoom, e.g. by clicking on 'Rational' on the scanning software magnify tool, will make these effects go away.

A sub menu on the main scanner driver menu allows you to set the 'base' resolution for super scaling i.e. the resolution the scanner will be told to scan at. Usually this should be the optical resolution of your scanner. Typically 300, 400 or 600 dpi.

Another menu allows you to set the type of filter used to do the scaling.

See the next section but one for more details.

Angle

This writable icon and associated icons for increasing and decreasing its value shows the angle the image will be rotated through as it is scanned. Positive angles follow the mathematicians definition and are measured anticlockwise.

The maximum angle allowed is +/- 20 degrees. Rotating through large angles will make the driver use a lot of memory.

This facility is provided to allow you to correct for objects being put in the scanner at an angle.

In addition to entering the angle in the icon, by holding down **Control** and **Shift** and dragging over the preview window with *Select* you can draw a line. The idea is to lay this on top of a feature in the material you are scanning which should be vertical or horizontal. On releasing the drag the preview will rotate in such a way as to attempt to orient the feature correctly.

An alternative approach is to lay an edge of the selected area along some feature in the preview window and click on the icons for changing the value of the angle until they are parallel.

Clicking on the icons changes the angle by 0.01 degree, however by holding down **Shift** whilst clicking the value will change by 0.1 degrees.

Clicking on the angle icon with *Adjust* will zero it. So will **Control Shift** *Adjust* on the preview.

The Main Menu

Clicking with *Menu* over the left hand side of the scanner window, anywhere but on an icon with an associated menu, will open the main menu. This provides a way of changing things that you should only want to alter occasionally.

The first entry leads to a standard info box, which will tell you the version of the driver.

'Save state' saves the drivers current settings to disc. This is normally done each time you start a scan. It can be useful if you want to retain the current settings, but don't want to start a scan immediately.

'Device' lets you set how the driver will talk to your scanner. Either the SCSI id for a SCSI bus scanner or the parallel/printer port.

Device

✓ Printer port
  SCSI 0
  SCSI 1
  SCSI 2
  SCSI 3
  SCSI 4
  SCSI 5
  SCSI 6
  SCSI 7
  SCSI auto(?)

The final SCSI option *'SCSI auto'* can be useful. If you select this the driver will attempt to work out the scanners SCSI id, by interrogating all the devices on the SCSI bus. If it succeeds the question mark will change and show the number of the SCSI id.

The main use of this is a way of testing to see if the scanner is present and responding to the driver.

For this feature to work it is necessary for the scanner driver configuration file to know the name your scanner presents to the SCSI inquire command. Sometimes when there are lots of scanners that will work with the same driver, this won't be the case (see the section Advanced Configuration for how to fix this).

The original idea of the auto setting was that it would avoid having to configure the SCSI id manually. However the existence in the Acorn world of some SCSI cards that crash if all SCSI id's are interrogated prevents it being used as the standard configuration.

Filter

  Hermite
  Box
  Triangle
  Bell
  B-spline
✓ Lanczos
  Mitchell

The next entry *'Filter'* allows the filter used for superscaling to be set.

Don't worry about the names, in general Lanczos and Mitchell give the best results. You can try the others and see if you prefer their effect.

```
┌─ X+Y res ──┐
│  X res   ▷ │
│ - - - - - -│
│   100      │
│   200      │
│   300      │
│ ✓ 400      │
│   500      │
│   600      │
│   400      │
└────────────┘
```
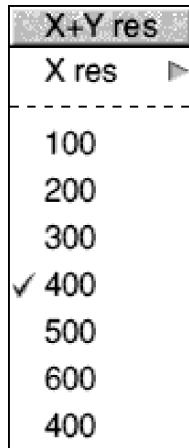
'Base res' is the resolution the scanner will scan at when super scaling is in use. Usually your scanners optical resolution should be used.

```
┌─ Page size ─┐
│   A0        │
│   A1        │
│   A2        │
│   A3        │
│ ✓ A4        │
│   A5        │
│   A6        │
│   A7        │
│   A8        │
│   Letter    │
│   Legal     │
│   Tabloid   │
│   35mm      │
│   Custom  ▷ │
└─────────────┘
```
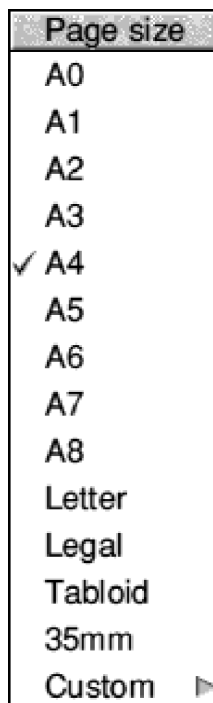
'Page size' is the size of the preview area on the right of the scanner driver window.

Normally you'd choose this to be the same size as the area your scanner can scan, or perhaps slightly larger.

The final entry on the menu 'Custom' allows you to set up an arbitrary page size.

Note that page size does matter, scan sizes will be forced to be less than the maximum size the scanner can scan and sometimes this size is defined by the page size. It is not a good idea to try to make the scan size bigger than the scanner can scan.
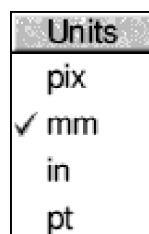
'Units' sets the units used for displaying the size of the area to scan.

```
┌─ Units ──┐
│   pix     │
│ ✓ mm      │
│   in      │
│   pt      │
└───────────┘
```

Introduction

TWAIN is an image acquisition standard for communication between image capturing devices and software applications, developed by a coalition of companies including Aldus, Caere, Hewlett-Packard, Kodak and Logitech, TWAIN was originally released in Spring 1992 for Windows and the Macintosh. TWAIN for RISC OS was released at the end of 1993. In brief TWAIN does for scanners what printer drivers do for printers.

Without a system like TWAIN, every application has to support every scanner. In practice most application authors give up and support no scanners at all. Scanner support is then left to dedicated programs, as a result the market is broken up and software is not as good as it could be, and scanners cost more than they should.

With TWAIN, applications need only provide support for TWAIN. Each scanner requires a different driver, but any driver will work with any TWAIN application. So the amount of work is much less.

A scanner is a 'data source', the drivers for such devices are sometimes referred to as 'sources'

Installing TWAIN

TWAIN is provided on a single floppy disc. Usually this disc will just contain an application directory !TWAIN. You should drag this to where you want to install TWAIN. !TWAIN should be considered similar to !System, !Scrap, or !Fonts. Before you can use the resources contained in it, it has to be 'seen', a desktop disc window has to have been opened on it. If you try to use TWAIN before it has been seen, you will get an error message.

Using TWAIN

All TWAIN compliant applications, will have two standard menu items, 'Select source' and 'Acquire'. The first allows you to choose which data source you are

```
Select source... ⇧F10
Acquire...        F10
```

going to acquire images from. If you only have one scanner, or only one installed TWAIN source, there is no need to worry about selecting a source. The second allows you to start the process of acquiring an image.

Select Source

Choosing this, will open the TWAIN source manager window.You can choose a data source by clicking on the icons. Finally, clicking on OK, will tell your program which source to use for acquiring images.

TWAIN in General

Mostly you will have only one data source, and so all the information in this section will be redundant. You don't have to mess about selecting which scanner to use. Just click on Acquire...

Installing another source.
To install another TWAIN source, hold down the SHIFT key and double click on !TWAIN. You will see a directory 'Sources' double click on this. Sources may now be installed by dragging them into this directory.
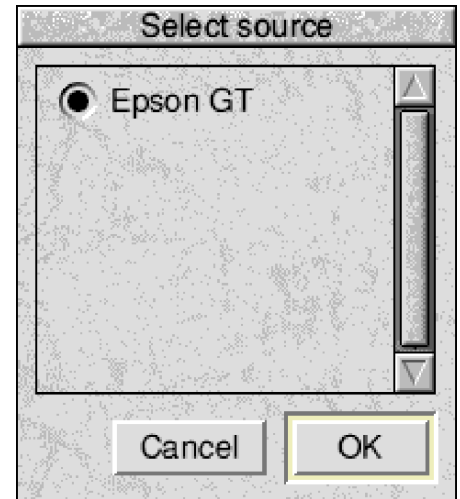
Using TWAIN with applications
Most programs will let you open the scanner driver window from a menu or a button. For example;

Sleuth OCR - click on icon bar, menu over window, Scan sub menu, click on Acquire.

Photodesk - menu on icon bar icon, Clipboard, menu on clipboard window, Scanner sub menu, click on Acquire.

David Pilling's scanning software - click on scan on info palette, or main menu, File sub menu, click on Acquire.

Once you have a scan in the application you can usually mark off an area. For example the rectangular selection tool in David Pilling's scanning software. Selecting Scan or Acquire again will result in the selected area being passed back to the scanner driver. This means you don't have to manually transfer the size of the area into the scanner driver window.

This provides an alternative way of working, open the scanner driver window from an application then click on the Preview button whilst holding down the control key (or set up the user defined scan button to do the sort of preview you want). The scan will end up back in the application. You can then mark off the area of interest. Again open the scanner driver window and now the area you selected will be set up. Use the scanner driver to set the scan resolution etc. and then finally click on Scan.

This is the way the older TWAIN scanner drivers had to be used. It is a good way of working if you don't have a lot of free memory.

Note that in Photodesk 2 a scan only goes into Photodesk's preview window with the facility to mark off an area if it is in black and white.

Preview scans

When you click on Preview one of the user defined scans BWPreview, GreyPreview or ColPreview will be carried out depending on the type of scan currently selected.

Some thought needs to be given to the values used for these scans. The preview scan is held in memory whilst the scanner driver window is open. So the preview has to be of a size reasonable for your computer. By default 50dpi resolution is used and 8 bits per pixel for colour. These give a preview size of about 260K. If you have a machine with lots of memory you can get much better results by using more resolution or 24bpp for colour. Note that 24bpp previews will only work on Acorn computers that support 'deep' colour modes - i.e. RISC PC, A7000 etc. Preview scans should not modify the scan results, i.e. they must have zero brightness and contrast value, unity gamma and zero rotation angle.

To redefine a preview scan;
(1) Pop up the user scan menu, follow *'load'* and click on the name of the preview scan to redefine.
(2) Click on the resolution or scan type icons and set the values wanted.
(3) Pop up the user scan menu again, and this time follow *'save as'* and again click on the name of the scan to redefine

Installing a Transparency Adapter

You should define 3 new user scans called BWPreviewT, GreyPreviewT and ColPreviewT. These should be based on the three standard preview scans, but their areas made smaller. Typically the transparency adapter for an A4 scanner cannot scan the full A4 area. In fact if you're only going to scan 35mm slides it may be more sensible to set the preview area to just cover the part of the scanner that will be of interest.

The transparency adapter will be used when the 'transp' button is selected. So preview scans should have the button set as part of their definition.

Some scanners refer to the transparency adapter as 'the option' or just 'option'. Older versions of the drivers therefore called this button 'option'. For compatibility the preview scans can also be suffixed with an 'O'.

Scanner driver configuration file

You can examine the inside of the scanner driver by holding down SHIFT and double clicking on the scanner driver icon inside !TWAIN.Sources. There will be a resource directory for each country of the form 'UK', 'D' etc. inside this directory, there is a text file 'Config' that holds the configuration of the source. Each line in the file consists of a tag and a value.

Almost all of these values are changed by the scanner driver window. You should

Advanced Configuration

not find yourself hacking this file to switch something obvious like SCSI id's.

A few standard tags which do need to be changed by hand are as follows;

`Card 0`

The SCSI card used by the driver. Values other than zero only make sense if you have more than one SCSI card plugged in at the same time.

`CacheSize 65000`

This is the amount of memory the driver uses to read data from the scanner. If you have a lot of memory making it bigger is a good idea, if you don't have much memory making it smaller may help. However beware, for some scanners e.g. Epsons and HP's the size should not exceed 64K i.e. 65535 bytes. For other scanners there may be a minimum size and making it too small can result in excessive backtracking. (backtracking is what happens when the scanner has to wait for the computer, scanning stops, and then when it restarts the scanner moves backwards a small amount to cover the ground it missed whilst stopping).

`SCSIbits 0`

This allows configuration of various SCSI bus related behaviour. If you don't understand what follows you don't need to.

Bit 0	Issue SCSI RESET at start of scan	(contributes 1)
Bit 1	Use *devices stuff at scan start	(contributes 2)
Bit 2	Issue SCSIControl 1 to avoid disconnect	(contributes 4)
Bit 3	Use background command completion	(contributes 8)
Bit 4	Issue scan completion command at end of scan	(contributes 16)
BIt 5	Use background commands	(contributes 32)

If background command are enabled, and your SCSI card supports them, and you have a SCSI card in a DMA podule slot, it supports DMA and DMA is enabled scanning can be faster because the driver will process data whilst the scanner is providing more.

```
Vendor EPSON SC
MaxProd 2
Product ANNER\sGT-5000
Product ANNER\sGT-9000
```
This group of tags allow the SCSI auto feature to find the scanner. The corresponding strings from the *devices display have to be present. Note that MaxProd is the number of Product entries. The \s sequence represents a space.

```
PreviewFile ScanJet
ScrapPath <Wimp$ScrapDir>.TWAIN
```

These control where the preview image is saved on disc. If you don't want the preview saved then remove the name after the PreviewFile tag.

Hardware Problems

Make sure the scanner is unlocked. Some transparency adapters will only work with the lid closed. Some slide scanners will not initialise correctly if a slide is in place when they are switched on. Check the scanner driver devices menu and see if the driver is talking to the correct device for your scanner. Ensure that you are scanning a sensible area - one that the scanner is capable of scanning.

Scanners connect via either the SCSI bus or the printer/parallel port.

SCSI Blues

If the scanner is the last device in the SCSI chain it should be terminated. Termination can consist of a terminator plug in one of the SCSI sockets on the scanner, or a feed through terminator (the lead plugs into the terminator, the terminator plugs into the scanner). SCSI scanners will have a switch on the back which allows the SCSI id to be set. Usually this will number from 0 to 7. Occasionally positions 8 to 16 will be provided and give the same id as 0 to 7 but with internal termination enabled.

The first step should be to press **F12**, and type *devices. Note which SCSI id's are in use, and then set the id on the scanner to an unused one.

Now connect up everything. If you're adding the scanner to the end of a SCSI chain, switch off termination on the device previously at the end of it.

After switching on, again press **F12**, and type *devices. The scanner should have appeared. If it does not, then it is unlikely to work, and you should concentrate on finding out why it is not appearing rather than trying to make it scan.

If you find one device appearing on all SCSI id's then it is likely that two SCSI devices have been given the same id. Note that *devices will also list the lun's for each SCSI id and it is usually not a problem if the same device appears on all the lun's for one SCSI id. Don't mix up lun's and id's (of the three numbers at the left of the *devices display, id's are on the right).

If the scanner does not appear, check the physical connections. A problem which easily arises is for 2 pins on the latest 50 pin mini connectors to end up in one socket. Sometimes taking the SCSI card out and replacing it will provide a fix (if there are poor connections).

It is worth checking with the vendor of your SCSI card if you have the latest version of the card firmware or if they know if their card works with a given device.

Most SCSI cards come with SCSI manager software. Often this will let you set flags for each SCSI id. Frequently setting 'block mode' off will increase the chances of scanners working. Other flags can be useful, but not so often.

Parallel Problems

Remove any dongles from the printer port these usually are not bidirectional and so won't work with scanners.

Don't try to drive your scanner via a 'Turbo driver' printer cable, these have the wiring mixed up inside.

It has been known for software which uses a dongle to upset the printer port - even when a dongle is not in use. Software cannot permanently affect your computers hardware but in the event of parallel port problems you should run as little software as possible after switching the computer on and before testing the scanner.

Software Problems

Try to just have one copy of !TWAIN on your system. If you have two things will work but only the first copy seen will be used. You can double click on one !TWAIN to make it the current one.

If you get something like "type 2 error" it means a divide by zero has occurred. This might be because you've tried to scan an area of zero width. But it is often a sign of SCSI problems because the driver is not able to read back the correct scan size.

If you get totally lost, and all the values on the window become mixed up, then a quick way to reset everything is to click on either the user defined scan button or the preview button with *Adjust*, or equivalently pop up the user defined scan menu and load a user defined scan.

Finally

You will often find more information in the !ReadMe file on the TWAIN driver disc.