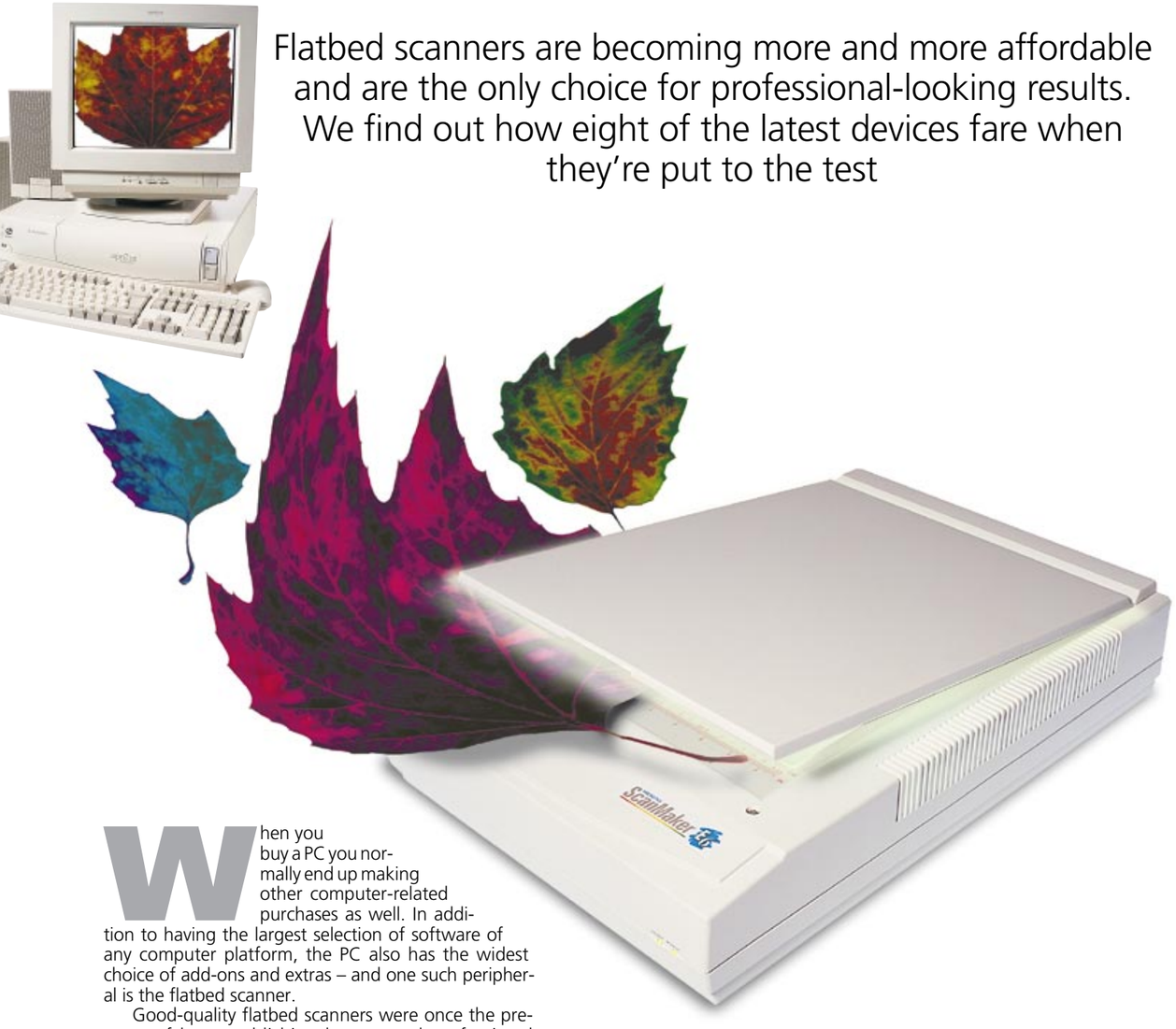
Flatbed scanners are becoming more and more affordable and are the only choice for professional-looking results. We find out how eight of the latest devices fare when they're put to the test



scan and deliver

When you buy a PC you normally end up making other computer-related purchases as well. In addition to having the largest selection of software of any computer platform, the PC also has the widest choice of add-ons and extras – and one such peripheral is the flatbed scanner.

Good-quality flatbed scanners were once the preserve of large publishing houses and professional graphics artists but today's competitive prices mean they are now within the reach of most PC users. You can use a flatbed scanner for many purposes, from scanning in the odd holiday snap to put on your Web page to creating a computerised database of all your correspondence.

There are other types of scanner, such as page-fed and hand-held devices, but the primary advantages of owning a flatbed unit are plain: it provides a steady surface for scanning as well as a consistent, motorised action. A flatbed scanner can also accommodate irregularly shaped objects, so, as long as they're not too large, you can scan almost anything.

As several manufacturers have recently released low-cost models, we thought the time was ripe to go into the VNU Labs and put them under the spotlight. We've looked at eight flatbed scanners ranging in price from £150 upwards. We've also briefly cast our eyes over some of the other scanning systems you can buy.

As always, we've avoided using jargon as much as possible, but don't worry if you come across any terms which confuse you because there's a detailed glossary towards the end of this feature.

How scanners work

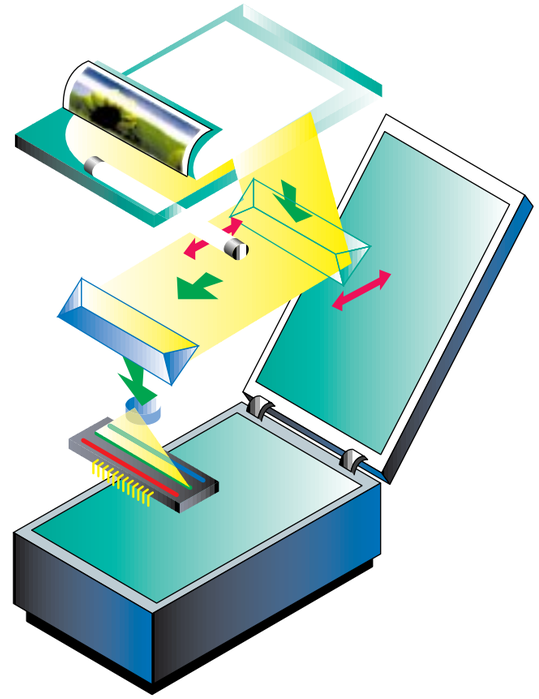
Although the process of scanning is largely invisible there's nothing particularly magical about it; what's more, it is based on the decades-old technology of xerography (photocopying).

A flatbed scanner has a glass plate (the 'bed') onto which original images are placed. Sealed below this are the rest of the scanning mechanics. If you look through the glass bed you should be able to spot a long tube-shaped lamp – the scanner's light source. Just like a photocopier, this lamp is illuminated and passed underneath the image that's been placed face down on the bed. As the image is lit up it is reflected through an array of precision mirrors and lenses (a setup similar to that of a periscope) to the most complicated part of the scanner: the charge-coupled device, (CCD).

The periscope analogy comes in handy again because the CCD is, in effect, the 'eyes' of the scanner. It has lots of sensors that detect the strength and quality of the light shone upon them, and it then converts this (analogue) information into computer-friendly digital signals. As the lamp passes beneath the image to be scanned the scanner sends the CCD's digital signals to the computer, building up a line-by-line digital image.

But how does a scanner pick up colour? Again, there's no great mystery about this although there are two distinctly different systems used. The simplest system uses three different coloured lamps – primary red, green and blue. These can be mixed to create all the colours of the spectrum, so each lamp is passed once under the image and the software then constructs the complete colour range.

The second system effectively works in reverse, with a single white xenon lamp illuminating the image and a three-coloured multi-filter CCD determining the colours.



CanoScan 300

During its four-decade history, Canon has produced everything from calculators to high-end colour photocopiers. With corporate fingers in many pies, Canon's computer-based scanning devices actually make up a very small percentage of the range of products the organisation produces.

The CanoScan 300 is the company's entry-level scanner and, although not the smallest in this test, it does have an attractive compact design.

Like many scanners, connecting the CanoScan 300 to your PC requires you to open up your machine and install a SCSI (small computer systems interface) card. This is not as ominous as it sounds and, as long as you have a Philips screwdriver, it shouldn't take you more than a few minutes.

The software bundle includes a cut-down version of Xerox's excellent TextBridge OCR (optical character recognition) software, which converts scanned text into computer-editable text. As the OCR process is interesting, we've included a detailed explanation of how it works later in this feature.

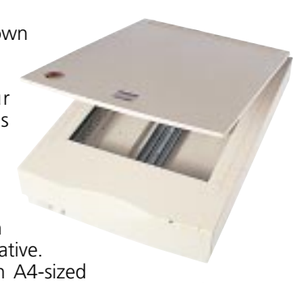
The CanoScan 300 is not the cheapest or smallest flatbed scanner we've seen but it's pretty fast and the quality of its 300dpi (dots per inch) scans was quite acceptable. Its ability to resolve brighter colours was a little lacklustre, however.

CanoScan 300

Build quality	★★★★☆
Performance	★★★★☆
Ease of use	★★★★☆
Value for money	★★★★☆
Overall	★★★★☆

○ £316.08 (inc VAT)
○ Canon: 0181 773 3173

Epson GT-5000



In computing circles, Epson is probably best known for its printers. However, since the 1980s it has also produced flatbed colour scanners and the GT-5000 is the company's latest device targeted at the home scanner market.

Like most flatbed scanners around today, the Epson GT-5000's design is conservative. The lid flips up to reveal an A4-sized image 'bed', which includes measurement graduations along its length.

The GT-5000's true optical resolution (the amount of detail, or dots, it can 'see') is 300x1,200dpi (dots per inch) but this can be interpolated up to 2,400x2,400dpi using software. Interpolation means that your PC fills in the missing detail by making calculations from the information it does have.

Epson has thoughtfully provided an assortment of free software. Rather than simply assembling a disparate collection of cheap utilities, there is a complete version of the excellent Corel DRAW 4, along with PhotoPaint 5 and the basic edition of TextBridge OCR.

Great scans coupled with a good collection of software push the GT-5000 into the realms of the best scanners at this price level.

Epson GT-5000

Build quality	★★★★★
Performance	★★★★★
Ease of use	★★★★☆
Value for money	★★★★☆
Overall	★★★★☆

○ £386.58 (inc VAT)
○ Epson: 0800 289622

Eurebis Emerald Siscan24

Eurebis's headquarters are in Ireland, which is something of a rarity in an industry dominated by giant US and Far Eastern corporations. Its new Emerald Siscan24 flatbed scanner has an impressive set of specifications for a machine that costs less than £150.

Apart from its price, perhaps the most interesting thing about the Emerald Siscan24 is the interface that comes with it. It plugs into a PC's ISA slot (Industry Standard Architecture slot – almost all desktop PCs have at least have one), but it is neither SCSI nor parallel. It even draws current from the PC in order to power the scanner, so the device doesn't hog a separate power socket.

In operation the Siscan24 was exceptionally noisy and at times vibrated like a washing machine during a spin cycle. Obviously, this doesn't provide the most stable base for achieving good results and this was borne out by an analysis of its output. While scanned images seemed okay from a distance, closer inspection revealed a distinct lack of detail.

The Emerald Siscan24 is a cheap scanner in several senses of the word. Although it is truly a low-cost flatbed scanner, its output places it at the low end of the quality scale. It's okay for occasional domestic scanning, but nothing more.

Eurebis Emerald Siscan24

Build quality	★★★☆☆
Performance	★★★☆☆
Ease of use	★★★★☆
Value for money	★★★☆☆
Overall	★★★☆☆

○ £149 (inc VAT)
○ Eurebis:
00 353 1 456 9383

Microtek ScanMaker E6 Standard

Microtek was one of the earlier entrants into the desktop scanning market. The Japanese company was founded in 1980 and has concentrated on making scanners ever since.

The ScanMaker E6 Standard scanner is hefty and well featured. It has an impressive 600x 1,200dpi optical resolution and it's also a 30-bit scanner, meaning that it can determine more than one billion colours. In addition, it has a 330mm-long scanning window so it is able to scan documents or objects larger than an A4 page.

Surprisingly, even though it has a one-pass scanning action, the E6 Standard was quite slow. Set at 300dpi and 24-bit colour, it took 175 seconds to deal with our A4 test image. However, the resulting scan was one of the best of the bunch with plenty of contrast and a good level of detail.

Unfortunately, Microtek has let itself down a little with the supplied manual which, as well as being sparse, is highly generic.

Although this is the slowest scanner of the group, the ScanMaker E6 Standard does produce top-quality scans. It is expensive, but is probably pitched above the average domestic user.

ScanMaker E6 Standard

Build quality	★★★★☆
Performance	★★★★☆
Ease of use	★★★★☆
Value for money	★★★★☆
Overall	★★★★☆

○ £399 (inc VAT)
○ Computers Unlimited:
0181 200 8282

Mustek Paragon 600IISP

Mustek doesn't have a UK presence of its own; instead it uses distributors, one of which is Enta Technologies.

At £159, the Mustek Paragon 600IISP is one of the cheapest flatbeds you can buy. It measures 92x289x405mm, which is pretty compact, but other than its size there is nothing remarkable about the Paragon 600IISP.

The accompanying software can interpolate its basic resolution of 300x600dpi (dots per inch) up to a whopping 4,800x4,800dpi, although this seems to work well only if the original image is very detailed.

When analysed, the Paragon 600IISP's scan of our test image fared very well. The pick-up at all parts of the spectrum was good and it was also the fastest scanner we tested.

On the down side, it's a good job that the Paragon 600IISP is so simple to set up because compared with some of the competing products, the instruction manual that comes with it is absolutely dire.

The Paragon 600IISP is fast and easy to use, and it is supported by a good software package. A good all-rounder at a great price.

Mustek Paragon 600IISP

Build quality	★★★★★
Performance	★★★★☆
Ease of use	★★★★☆
Value for money	★★★★★
Overall	★★★★☆

○ £159 (inc VAT)
○ Enta Technologies:
01952 428888

Plustek OpticPro 4800P

Plustek was formed in 1986 and from the beginning it set out to produce scanners for home and small office use. Since then it has grown rapidly and, as a result, the company's latest mission statement outlines its rather ambitious intention of having a Plustek scanner 'directly, or indirectly, influence every personal computer user in the world by the year 2006'.

So, still some nine years away from that goal, how will the Plustek OpticPro 4800P scanner influence you? The unit has a very slim design but, for the average user, the 4800P's most attractive feature is the fact that it connects to your PC via the parallel port. This means that there's no need to take your machine apart in order to install a special interface card – it's literally a case of plug in, install the software and go.

The software is remarkably simple to use as well. Press the 4800P's single button and up pops a small panel of icons that leads to scanning, faxing and copying utilities.

The OpticPro 4800P is a little slow and it doesn't offer the best results. On the plus side, however, it is beautifully simple to set up and use and is reasonably priced.

Plustek OpticPro 4800P

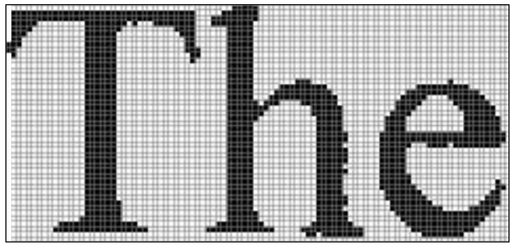
Build quality	★★★☆☆
Performance	★★★☆☆
Ease of use	★★★★★
Value for money	★★★☆☆
Overall	★★★★☆

○ £276.13 (inc VAT)
○ Solution Point:
0345 400300

Optical Character Recognition

One popular application for scanners is to use them for optical character recognition (OCR). When used in conjunction with some good OCR software, your scanner can turn a page of text into an electronic, computer-editable document. But how does it manage this?

When a scanner scans a text-heavy document all it does is build up a line-by-line image of the original. The scanner's driver software has no way of knowing whether it is 'looking' at pictures or text, or a mixture of the two. This is where the OCR software comes in.



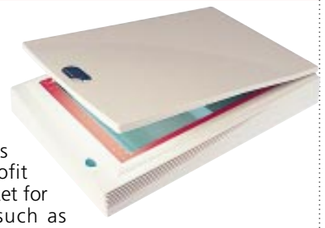
The

Generally speaking, the first thing an OCR package does is to display an image of the scanned page on your PC's screen. Some of the more advanced OCR packages will then attempt to divide the page into areas of text and pictures, while others require this to be done manually. Either way, the reason this is done is to cordon off those areas of the page – the text – that the OCR package can deal with.

Once the text areas have been selected, the OCR process can begin. Over the years software companies have developed plenty of techniques to improve recognition, but at the simplest level an OCR program takes each character in turn, placing an invisible grid over it (*see illustration*) to convert it into a digital 'map' of dots, or pixels. This map is then systematically compared with the OCR package's own map of alphanumeric characters until the most likely match is found.

The accuracy of the recognition depends on many factors. Printed text, such as newspaper articles, tends to be detected well by the software because character shapes are uniform and consistently spaced. Handwriting, on the other hand, has neither of these characteristics so OCR packages have a very hard time deciphering hand-written text.

Primax 4800 Direct



Founded back in 1984, Primax is the archetypal Taiwanese company. It began life manufacturing telephone components but quickly altered its operation in order to profit from the burgeoning market for computer peripherals, such as scanners. The 4800 Direct is its latest entry-level model.

Although it's marginally larger and styled quite differently, the 4800 Direct is essentially the same scanner as Plustek's OpticPro 4800P (*see previous review*). The two models share the same interface (parallel), the same optical and interpolated resolutions (600x300dpi and 4,800x4,800dpi), the same colour depth (24-bit) and even – and this is the real giveaway – the same utility launching software, albeit with a different name, and drivers.

Speedwise, it was only slightly slower than its Plustek counterpart and, not surprisingly, there was little between the two in terms of scan quality.

On top of the basic utilities and drivers, Primax is currently offering MGI's Photosuite and the ReadIRIS OCR package.

The 4800 Direct is almost exactly the same as Plustek's OpticPro 4800P, but it's cheaper and so better value for money.

Primax 4800 Direct

Build quality	★★★☆☆
Performance	★★★☆☆
Ease of use	★★★★★
Value for money	★★★★☆
Overall	★★★★☆

○ £199.99 (inc VAT)
○ Primax: 01235 546020

Umax Astra 600S

Umax is a jack of all trades. The company is involved in software development, producing teleconferencing equipment and even the manufacture of Apple Macintosh clones. It also makes scanners, and the Astra 600S is its newest model. On the packaging, Umax boasts that it is 'the affordable' 30-bit colour scanner.

The Astra 600S was by far the largest of all the scanners we tested, mainly because it is has a very long scan bed. The advantage of such a large bed is that it can accommodate full-size legal documents (8.5x14in). And although it is bulky, the Astra 600S certainly couldn't be described as heavy.

We thought that the supplied software was a little thin on the ground, although there's enough to get you going. Despite the decidedly limp manual accompanying the scanner, installation was trouble-free – you simply insert the SCSI card and pop in the CD-ROM drivers disc.

The Astra 600S produced patchy results with dark images but overall its performance was more than reasonable. If you can buy it at Umax's suggested street price of £199 including VAT, it would be a sound investment.

Umax Astra 600S

Build quality	★★★★☆
Performance	★★★★☆
Ease of use	★★★★☆
Value for money	★★★★☆
Overall	★★★★☆

○ £199 (suggested street price inc VAT)
○ IMC (distributor): 01344 871329

Special thanks to Elizabeth and Victoria Cain

The above scans were performed at 300dpi in 24-bit colour using the drivers supplied with each scanner, and the drivers' default settings for image intensity and brightness level

Alternative scanners

Mustek TWAIN-SCAN Color

Mustek's TWAIN-SCAN Color is proof that a 24-bit colour scanner doesn't have to eat up several filing trays worth of valuable desk space. Measuring just 14cm square and standing a little over 4cm high, it's a hand-held device capable of interpolated resolutions up to 400dpi (or 800dpi interpolated) in true colour.

Another advantage the TWAIN-SCAN Color has over its flatbed counterparts is that it is cheap, making it accessible to those with slimmer wallets. Its scanning quality is also pretty good but you'll need a steady hand to achieve consistent results.

On the down side, its size places a frustrating limit on the width of the images you can scan. If all you want to do is scan in holiday snaps then you won't go far wrong, but larger images have to be scanned in strips which must then be electronically 'stitched' together, which produces variable results.

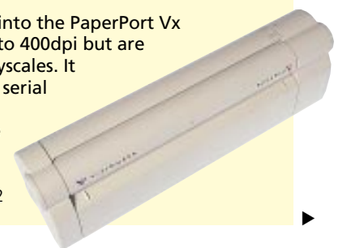
The review unit supplied by Evesham Micros included Recognita's GO-CR OCR software and the iPhotoPlus image-editing tool.

○ £81.08 (inc VAT)
○ Evesham Micros: 01386 765500

Visioneer PaperPort Vx

The PaperPort Vx is neither a hand-held nor a flatbed scanner. About the size of a rolling pin, it's known as a document, or page-fed, scanner. The advantage of this is that it will sit comfortably on your desk (or on top of your monitor) and allow you to do A4-sized scans with the minimum of fuss.

You simply feed a page into the PaperPort Vx entry slot. Scans can be up to 400dpi but are restricted to 256 (8-bit) greyscales. It connects to your PC via the serial port so it can be used on notebooks, and it has some useful applications.



○ £287.88 (Inc VAT)
○ Ingram Micro: 01908 260422

Glossary

Acquire: When you want to use a scanner to get an image on to your PC's screen, you need to use a piece of software to act as a go-between to 'acquire' that image. Most modern image-editing tools have an acquire function.

CCD: Charge-coupled device. This is the part of a scanner that actually 'sees' the image. It is a strip of light sensors that can turn analogue information into computer-friendly digital signals.

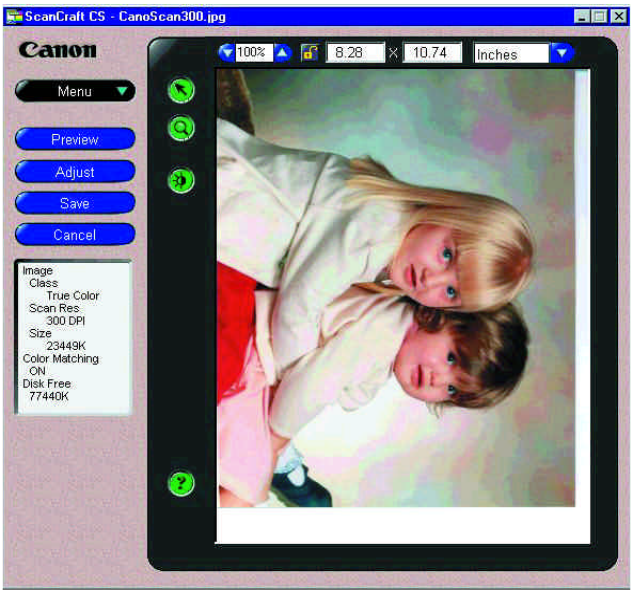
Colour depth: Colour depth is measured in 'bits', and represents the total number of colours that can be 'seen' by the scanner. For example, to store the colour information of a black-and-white image requires only one bit of information per pixel (dot) because the dots are either on or off. The more colours you have, the more bits you'll need. A 24-bit scanner can determine 16.7 million different colours, while a 30-bit device can, theoretically, pick up more than one billion.

Dpi: Dots per inch. A dpi figure simply denotes how many dots across and down the page a scanner can pick up for every inch of the page. A 300dpi scanner, for instance, can see 300 individual dots in every inch of your image.

Flatbed: A flatbed scanner is simply a scanner that lies flat on your desk and scans images placed upon its scanning surface.

Hand-held: A hand-held scanner is literally that: a scanner that you hold in your hand and manually drag across the image to be scanned.

Interface: The piece of hardware (usually a card and cable combination) that sits between a PC and a peripheral allowing them to communicate (also see SCSI and parallel).



Interpolation: Interpolation is essentially a system of statistical guesswork, usually carried out in software. With scanners it means that you can increase a scanned image's true resolution by getting the software to add the missing information (the information in this case being extra pixels).

OCR: Optical character recognition. This a technique by which printed text can be scanned in and turned into a computer-editable document.

One-pass scanning: If a scanner has a one-pass operation it means that scans can be completed in one sweep of the scanning apparatus.

Three-pass scanning: If a scanner has three coloured lamps instead of a single white xenon tube, three sweeps of the scanning apparatus are required to obtain all of the image's colours.

Parallel: A type of interface. All PCs have a parallel interface, and if a scanner connects via the parallel interface, or port, it generally indicates that it can be used on a notebook computer as well (see also interface).

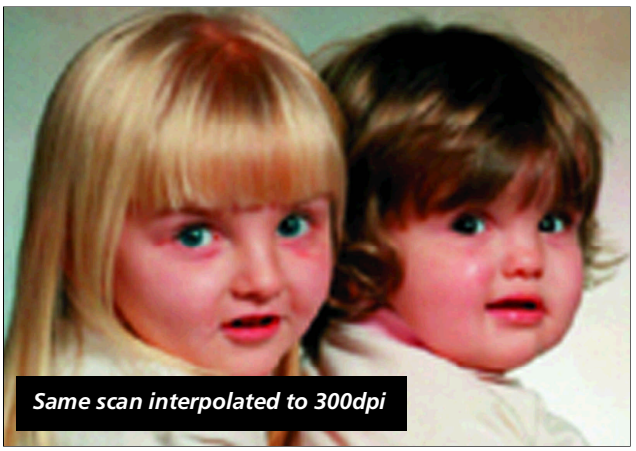
Pixel: Pixels (short for 'picture elements') are the tiny, individually addressable dots on a monitor's screen that light up to form the displayed image. In relation to scanners and images, each dot a scanner picks up translates to one pixel on the screen. Most PCs can display a pixel resolution of 800x600 and greater.

SCSI: Small Computer Systems Interface. An industry-standard interface for connecting peripherals to PCs (*see also Interface*).

TWAIN: Some say it stands for Technology Without An Interesting Name, although there is no 'official' definition. TWAIN is basically the industry-standard software driver for scanners. Today, you would be hard-pressed to find a scanner that doesn't support TWAIN.

Xenon lamp: A xenon lamp produces the pure white illumination essential for producing high-quality scans.

Original scan at 30dpi



Same scan interpolated to 300dpi

Flatbed scanners compared

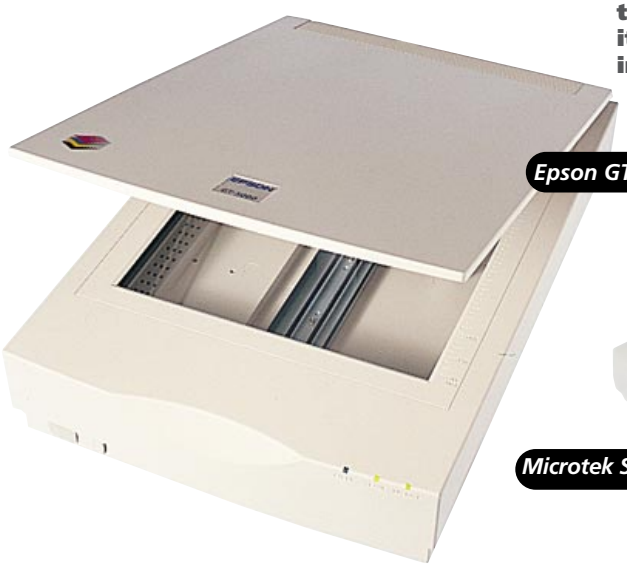
Model	Manufacturer	Price (inc VAT)	Dimensions (height x width x depth in mm)	Interface	Optical resolution (dpi)	Interpolated dots per inch (dpi)	Colour depth	Maximum scan size (mm)	Passes	TWAIN-compliant	Scan time (secs), A4 image, 300dpi, 24-bit	Bundled software
CanoScan 300	Canon	£316.08	79x286x414	SCSI (interface included)	300x600	1,200x600	24-bit	216x296	1	●	82	ScanPrint, ImagePals 2 Go!, TextBridge, PhotoImpact
GT-5000	Epson	£386.58	87x297x443	Parallel (cable and interface included) or SCSI	300x1,200	2,400x2,400	24-bit	216x297	1 or 3	●	110 (single-pass scan); 183 (three-pass)	Corel PhotoPaint 5, Corel DRAW 4, TextBridge, Presto PageManager
Emerald Siscan24	Eurebis	£149	56x292x488	Proprietary card with built-in power supply	600x300	4,800x4,800	24-bit	216x296	1	●	106	Image Edition, TextBridge, Paint Shop Pro 3
ScanMaker E6 Standard	Microtek	£399	119x356x485	SCSI (interface included)	600x1,200	4,800x4,800	30-bit	216x330	1	●	175	PhotoImpact, ImagePals 2 Go!, Omnipage (limited edition), Adobe Acrobat Reader
Paragon 600IISP	Mustek	£159	92x289x405	SCSI (interface included)	300x600	4,800x4,800	24-bit	216x296	1	●	63	Picture Publisher 5.0 and 6.0, TextBridge, ImagePals 2 Go!
OpticPro 4800P	Plustek	£276.13	78x298x426	Parallel (cable included)	600x300	4,800x4,800	24-bit	216x297	1	●	122	Action Manager (scan, fax, copy), Recognita, Image-In
4800 Direct	Primax	£199.99	80x290x430	Parallel (cable included)	600x300	4,800x4,800	24-bit	216x297	1	●	133	TaskBridge (scan, fax, copy), MGI Photosuite, ReadIRIS
Astra 600S	Umax	£199	106x336x540	SCSI (interface included)	300x600	4,800x4,800	30-bit	216x356	1	●	72	Presto PageManager, PageImage, PageType

● = Yes ❍ = No

We weren't particularly disappointed with any of the products in this test, which makes a refreshing change. In most cases the scanners were easy to set up and we found that, in general, the supporting software bundles were sufficient for everyday use. What has been clearly demonstrated – and this is often the case regardless of the product type – is that when buying a scanner you tend to get what you pay for. The cheapest scanner, the Emerald Siscan24, produced what, on the surface, appeared to be reasonable results. Under detailed analysis, however, it had very poor resolving power – it detects fewer colours and less detail than its rivals. At the opposite end of the scale, both in terms of performance and cost, sit Epson's GT-5000 and Microtek's ScanMaker E6 Standard. Choosing one of these as the Best Buy was difficult. However, given its smaller size, useful software bundle, better documentation and slightly lower cost, we've decided to give the award to the Epson GT-5000.

For the reasons already outlined , the ScanMaker E6 Standard comes a very close second and is highly recommended. We'd also like to highlight Mustek's Paragon 600IISP – it doesn't give results as good as either the Epson or the Microtek scanner but it's a fast mover and impressively cheap.

Scott Colvey



Epson GT-5000

Microtek ScanMaker E6 Standard