



A scanner in the works

With the flatbed scanner now a ubiquitous piece of kit we put 11 of the leading models to the test



Originally designed as a tool for the graphics professional, the flatbed scanner has broken free of its specialist shackles and become a popular item for home users. With prices falling and the use of images growing, whether they're sent by email to friends or uploaded onto websites, it could be said that the home computer looks lonely without a scanner by its side. A quality scanner can be bought for as little as £100 these days, and with bundled image manipulation software, it can be as much a fun toy as a useful imaging peripheral.

This month we look at 11 USB scanners, some of which also include parallel cables for connection to older PCs. We tested each to find out how well it resolved images, how fast it scanned and also how well it represented colours. We used a professional drum scanner to image our test target and used this to compare with the scans resolved by the devices on test here. The results, especially where colour representation is concerned, certainly split the group, as you'll discover.

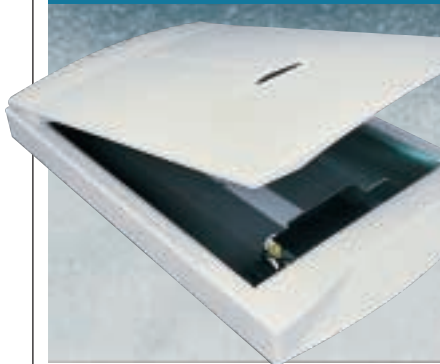
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• *Scanners tested by Lars Goran-Nilsson and Scott Montgomery, and reviewed by Scott Montgomery and Jalal Werfalli*

Photography: Hugh Threlfall

Acer S2W 3300V



THE ACER 3300V looks like any other scanner, or rather how any other scanner used to look – nowadays most manufacturers include manual operation buttons. However, one useful

thing Acer has done is to put the unlock switch on the top, so you don't have to precariously hold the unit upside down to unlock the mechanism.

Like most of the tested scanners the optical resolution is 600 x 1,200dpi with a massive maximum interpolated resolution of 19,200 x 19,200dpi there for those who have a machine that could deal with the file this would produce. The colour depth is 36bit.

The software bundle includes PhotoExpress 3 for scanning images and Presto! PageManager for archiving. Ulead Image Editor is also included to manipulate your scanned images.

The performance was middle of the road, with 20 of the 22 greyscale

distinguished and a resolution of 95 lines per inch. Scanning the cover of *PCW* took two minutes 50 seconds, but when we repeated the scan after the software locked up the system, times in excess of four minutes were the norm. Resolution on small-font text was passable though.

Ultimately, the Acer is eclipsed by stronger competition.

DETAILS

★★★

PRICE £93.99 (£79.99 ex VAT)

CONTACT Acer 01344 392 604

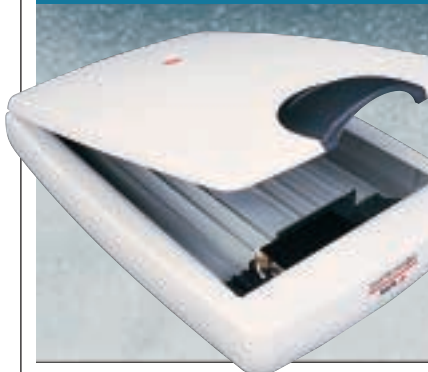
www.acerperipherals.co.uk

PROS Fair performance across all tests

CONS Scan times were a little odd

OVERALL Scanners with manual buttons are likely to appeal more than this

Agfa SnapScan e20



AGFA'S SNAPSCAN E20 is all about ease of use. Simply plug in the USB cable and allow a Windows 98/2000 computer to detect it. In addition, after loading the ScanWise software, you can

use the SnapScan e20 to scan images either directly to your hard disk, email application, word processor, printer or fax machine. If optical character recognition is more your thing, then the multilingual Readiris software will come in handy when converting printed type into editable text.

The colour depth tops out at 36bit while the optical resolution is 600 x 1,200dpi. Performance-wise it took four minutes to scan the *PCW* cover, making it reasonably quick. In the resolution tests, it managed to resolve around 140 lines per inch, while the small-text test lacked crispness with the dot above the i showing evidence of jaggies and a greying centre. As for greyscale coverage, a shift toward the highlight

end of the scale was apparent, making blacks not as black as we'd like to see.

The SnapScan e20 doesn't feel very sturdy compared to others. However, it does come with a choice of translucent handles in the colours of orange, blueberry and graphite to suit your mood or iMac. A copy of Corel Print Office 2000 is also thrown in.

DETAILS

★★★

PRICE £92.83 (£79 ex VAT)

CONTACT Agfa 020 8231 4903

www.agfa.co.uk

PROS Easy to set up; reasonably quick; small

CONS Doesn't feel very sturdy

OVERALL A reasonable flatbed scanner with a small footprint, but there are better alternatives

Epson Perfection 640U



THE EPSON PERFECTION is a compact unit that comes complete with a lilac trim and three QuickStart buttons on the front. These are designated Start, Copy and Scan, and they enable you to

deliver the scanner's input to an assigned application, to the copy utility in the Epson Smart Panel, or to the bundled Adobe PhotoDeluxe Home Edition software.

A single press of the relevant button is all it takes, making the scanner simple to use. The Perfection 640U is TWAIN compliant.

Setting up this scanner isn't that straightforward, partly because you have to locate the driver file on the CD, install it, complete a screen calibration program and then install the software.

Nevertheless, once up and running the results from this somewhat noisy 36bit scanner are commendable. With a *PCW* cover scan time of three minutes 16 seconds it's a fair performer.

When it comes to resolution the Epson had no trouble picking out 140 lines per inch at its optical maximum of 600 x 2,400dpi.

It also proved to be one of the best scanners for resolving small writing, while the greyscale was only slightly trimmed at the highlight end. A little more expensive than some, but the results make the 640U worth it.

DETAILS

★★★★★

PRICE £119 (£101.28 ex VAT)

CONTACT Epson 0800 220 546

www.epson.co.uk

PROS Commendable resolution results; easy to operate once set up

CONS A little noisy and not the quickest

OVERALL A well-rounded scanner



HP ScanJet 3400C



WITH A LID THAT wouldn't be out of place at the bottom of the ocean, this scanner certainly draws some looks. A hole in the lid allows access to three buttons for manual operation of the

scanner. The optical resolution of the unit is 600 x 1,200dpi, with the scanner having a maximum colour depth of 36bit. The maximum enhanced resolution is 9,600dpi and, although it's more conventionally connected by USB, it comes complete with a parallel cable for those running pre-USB motherboards or early versions of Windows 95.

The PrecisionScan LTX software was very intuitive and manipulation of the scan settings was no problem. Settings allow various scan options, exporting the scanned image to any application or saving it to a file.

Performance-wise, the 3400C wasn't too bad. The *PCW* cover was scanned in two minutes 34 seconds and 20 of the

22 greyscales were recognised. The two lost greys were near the darker end of the scale where the 3400C also struggled.

The best resolution it achieved was 95 lines per inch, with the 140 lines per inch test appearing as alternate grey lines rather than the definite white and black we had hoped to see. Small text was well resolved, though.

DETAILS

★★★★

PRICE £69 (£58.72 ex VAT)

CONTACT HP 0990 47 47 47 www.hp.com

PROS Simple setup and use

CONS Unexceptional images produced at 600dpi

OVERALL A good scanner for the novice due to its ease of setup and use

HP ScanJet 4300C



UNLIKE ITS SIBLING, the 3400C, the 4300C has the conventional colours of PC peripherals: bland grey. HP has spiced up the unit with the inclusion of a few manual operation buttons and a

digital readout on the front that allows you to select the number of printed copies of the scanned image you want to see dropping out of your printer – a sort of copying facility. A button to select colour or monochrome scanning is also on the front. The optical resolution is 600 x 1,200dpi and the maximum colour depth is set to 36bit. The software is the same as the 3400C but also includes Corel Print House 2000.

Performance was fair, with the 4300C able to resolve 140 lines per inch. The resolution of small text was fairly good, although not markedly better than the 3400C. Greyscale representation was the same as many of the scanners, with 20 of the 22 greyscales represented. Like the 3400C,

the missing greys were at the darker end, making dark grey and black indistinguishable. Scanning the cover of *PCW* took two minutes 26 seconds; eight seconds faster than its sibling.

Overall, a good scanner with a copying feature that some may find useful. With very simple installation and use, this is another scanner the novice should consider.

DETAILS

★★★★

PRICE £99 (£84.25 ex VAT)

CONTACT HP 0990 47 47 47 www.hp.com

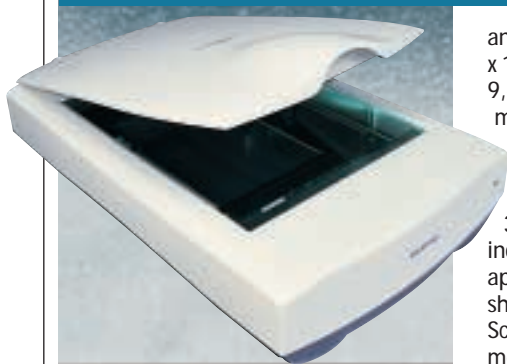
PROS Hardware copying feature

CONS Slight problem recognising shadows in greyscale tests

OVERALL A good beginners' scanner, with a copying option built in



Microtek ScanMaker 3600



THE FIRST OF THREE scanners from Microtek, the 3600 scans at a colour depth of 42bits, ranking it with four others on test here. Although not the most attractive, the 3600 is well built

and boasts an optical resolution of 600 x 1,200dpi that can be interpolated to 9,600 x 9,600dpi. With these stats you might think that the 3600 will be one of the best performers, but it falls just short of this. Scanning at its maximum optical resolution, the 3600 put in an average 95 lines per inch in our resolution test, while the appearance of small text was reasonably sharp. As for the greyscale score, this ScanMaker fared pretty well by covering most of the spectrum from white to an almost pure black.

The smaller of the three Microtek offerings, the 3600 is also one of the slowest scanners on test, taking five minutes three seconds to complete our timed scan. Having said that, it is in fact

quicker than its stablemate, the ScanMaker 4600 which is twice as expensive.

We found the 3600 easy to set up, although it is a little bit noisy. It also suffered from the odd software hang. Despite this, at £69 it shares the budget spot with the HP ScanJet 3400C and has a good selection of software.

DETAILS

★★★★

PRICE £69 (£58.72 ex VAT)

CONTACT Microtek 01908 317 797

www.microtek.com

PROS 42bit; robust; joint cheapest

CONS A bit slow by today's standards; average resolving power

OVERALL If you're on a budget then this is good value, although you may prefer HP's styling and performance



Microtek ScanMaker 3700



THE 3700 HAS the same optical resolution and colour depth of its cheaper relative, the 3600, but differs in that it comes with three buttons on the front of the sturdy chassis. These give

you quick access to the most frequently used functions; scan, copy and email. If you find that these are not to your liking then you can reprogram the buttons through a bundled utility. This provides more flexibility as you can direct the output of a scanning job to any program installed on your PC.

Installation isn't difficult, but it's not what we'd call effortless. The CD that comes with the 3700 contains a number of packages that can only be installed separately, making the task a little slow and perhaps confusing for the novice.

For that extra tenner you don't actually get much more than you get with the 3600. In fact the results are practically the same in that 95 lines per inch were resolved, small text was

reasonably sharp and it was rather noisy in use.

On the other hand it was a little quicker at four minutes 54 seconds for our test scan. If you want to add to the 3700's functionality then Microtek does offer the Microtek LightLid 35 for scanning transparencies.

DETAILS

★★★★

PRICE £79 (€67.23 ex VAT)

CONTACT Microtek 01908 317 797

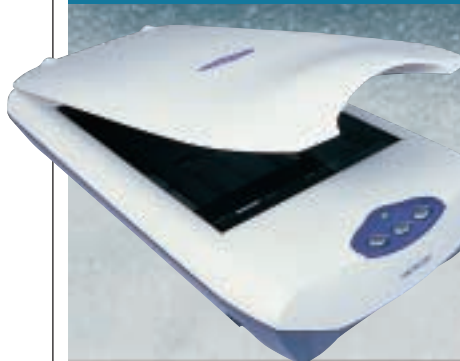
www.microtek.com

PROS 42bit; sturdy; quick access buttons; transparency scanning option

CONS A tad slow; average resolution; clumsy software

OVERALL A little extra cash gets you something better

Microtek ScanMaker 4600



THE OLD ADAGE, 'you get what you pay for' can certainly be applied to this Microtek. Priced at £99 ex VAT the 42bit 4600 simply outperforms its two cousins in all the resolution tests, clearly

separating out 140 lines per inch at its impressive maximum optical resolution of 1,200 x 2,400dpi. As for the small-text assessment the dot above the i was clearly defined and out of the group came the closest to the drum scanner's results. The greyscale is almost fully spanned apart from the purest of whites and is perhaps the most complete of all the scanners here.

It's not all a bed of roses though as the 4600 falls down badly on scan speed – it was the slowest on test, scanning the PCW front cover in six minutes 11 seconds. On top of this, the unit made a high-pitched noise during the scans.

This aside, the 4600 does produce some excellent results and like the 3700 it also comes with the same three

programmable buttons that allow you to launch any application with a single press. In addition, the lid, like all of the Microteks on test, can be raised to accommodate thicker media. A generous software bundle is also thrown that includes Recognita OCR 5.1 and Ulead Photo Explorer 6.02.

DETAILS

★★★★★



PRICE £116.33 (€99 ex VAT)

CONTACT Microtek 01908 317 797

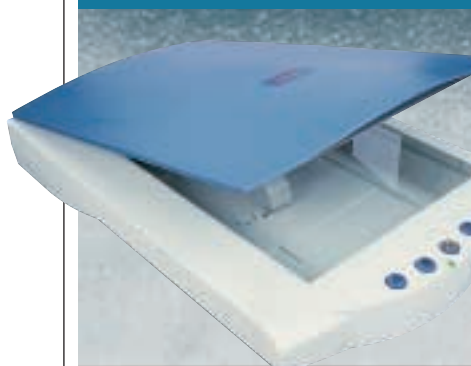
www.microtek.com

PROS High optical resolution; good results; 42bit; buttons

CONS Slowest; high-pitched scan noise

OVERALL A little quicker and an Editor's Choice award would have gone its way. Instead it gets a Highly Commended

Umax Astra 3450



THE ASTRA 3450 is a fairly standard looking scanner, although Umax has moved away from dowdy grey and opted for a blue lid. The other feature that makes the Astra special is that it comes

with a transparency adaptor, allowing transparencies up to 4 x 5in to be scanned. The colour depth on the unit is 42bit and the optical resolution is 600 x 1,200dpi. The maximum interpolated resolution is 9,600 x 9,600dpi.

The scanning software bundle includes Vistascan (for performing the scans themselves) and Presto! Page-Manager for archiving and managing the images. Both are intuitive to use, making this scanner simple enough for novices, while feature rich enough to keep advanced users happy.

Performance was middle of the road, despite a long warm-up time before the first use. The Astra resolved 95 lines per inch and covered 20 of the greyscales,

struggling to distinguish very light grey from white. As for the timed scan of the PCW cover, completion was around three minutes, although the software crashed every time it tried to make the thumbnail image for PageManager, so no accurate result is available.

The transparency scanning facilities will make this tempting to some, but there are better scanners in this test.

DETAILS

★★★★

PRICE £89.99 (€76.59 ex VAT)

CONTACT Umax 01344 871 329

www.umax-europe.com

PROS Transparency adaptor included

CONS Software wasn't stable in our tests

OVERALL An average scanner with transparency capabilities

Visioneer OneTouch 7600 USB



THIS VISIONEER SCANNER is not unlike its more expensive counterpart (below) in terms of performance, although its design is more conventional. It is decked out in the non-

descript grey of PC peripherals but has a splash of colour in the manual operation button on the front of the unit, including a scan-to-fax option, allowing the scanned image to be sent to your fax software for immediate transmission. The optical resolution is 600 x 1,200dpi and the maximum interpolated resolution is 2,400dpi. The maximum colour depth is lower than its sibling, the 8100, at 36bit. The software is the same as the 8100, with PaperPort Deluxe 6 dealing with image scanning and archiving, and MGI PhotoSuite II SE for manipulation of the images.

The performance of the unit was much the same as the more expensive Visioneer alternative, although the 7600 only managed to resolve 95 lines per

inch. It did manage to distinguish 20 of the 22 greyscales and, like its sibling, it was among highlights that it had problems, with three shades of light grey appearing as one colour. Meanwhile, scanning the *PCW* cover only took two minutes and 38 seconds.

Overall, this is almost as good as the 8100, but it's cheaper.

DETAILS

★★★★

PRICE £79 (£67.23 ex VAT)

CONTACT Visioneer 01628 628 080

www.visioneer.com

PROS Pretty good quality and cheaper than the Visioneer 8100

CONS Poor recognition of highlights

OVERALL A good value scanner, with a decent all-round performance

Visioneer OneTouch 8100



THE 8100's LID OPENS sideways, setting it apart from the crowd – although considering desk space restrictions, some users may not agree. For those who want a scanner tucked

away on a shelf, though, this may be a good solution. Visioneer has also opted for a scan button (along with a few other non-software controls) reducing scanning to a simple case of pressing a button.

The optical resolution is 600 x 1,200dpi and with a maximum enhanced interpolated resolution of 2,400dpi, this scanner has the potential for some fine results. The unit is capable of recognising 42bit colour, although the extra colours will only be in the raw data and not realised on-screen within Windows.

Performance wasn't too bad on the 8100. It resolved 20 of the 22 greyscales and coped fairly well with the 140 lines

per inch test target. Scanning small text highlighted a weakness, though the *PCW* cover scan wasn't terrible and completed in two minutes 29 seconds.

The PaperPort Deluxe 6 scanning software is simple to use, and a copy of MGI PhotoSuite II SE is also bundled. Overall, a good looking and fair-performing scanner.

DETAILS

★★★★

PRICE £99 (£84.25 ex VAT)

CONTACT Visioneer 01628 628 080

www.visioneer.com

PROS Length-ways opening means it can be put on a shelf

CONS Not the best scanned images

OVERALL If space is an issue, this is worth a look

Drum versus flatbed scanners

A drum scanner works very differently to a flatbed scanner in many ways. However, the most fundamental of these is that the image to be scanned is attached to a spinning drum, rather than being placed on a flat glass plate for scanning.

The reading element of the drum scanner is a Photo-Multiplier Tube (PMT), where the flatbed scanner utilises a Charged Coupled Device (CCD). In a flatbed scanner the CCD moves across the image scanning information from the picture.

By contrast, the drum scanner reading apparatus



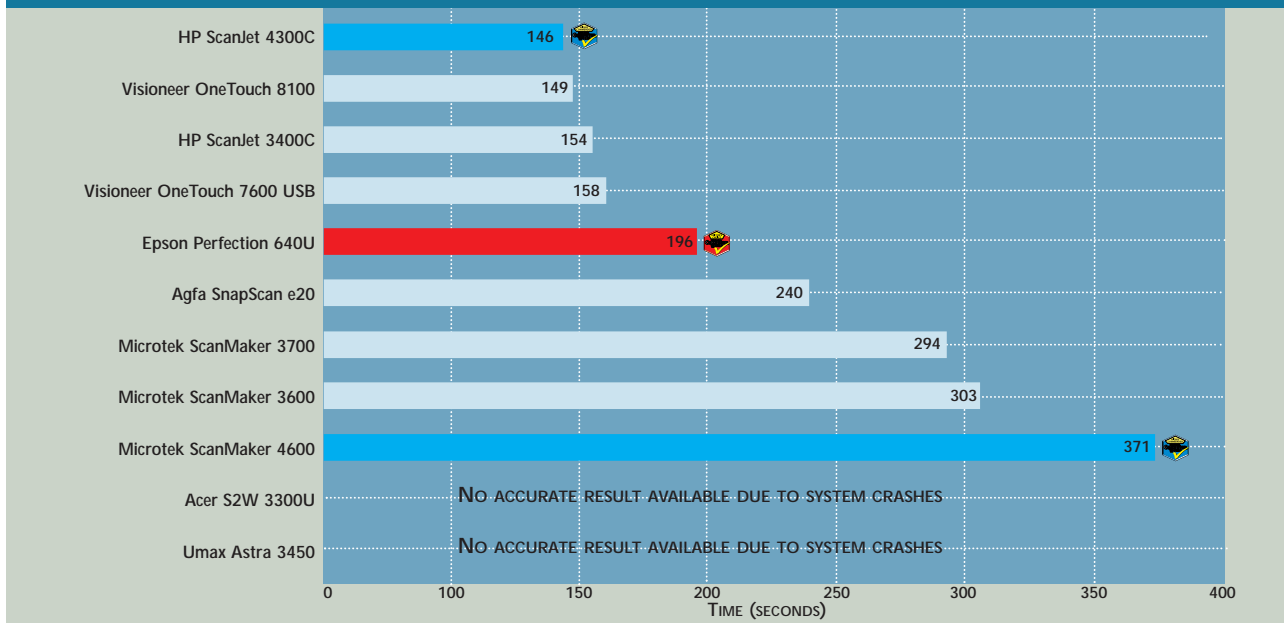
Drum scanners are far too large and expensive to make them practical to use with a PC

slowly scans in the various greys and colours of the image. The information from the reading head hits the tube and is converted into electricity. This is then amplified (thus multiplier) and converted into a digital form. The result is a far denser image quality than can be achieved with a flatbed scanner (maximum optical resolution is up to 8,000dpi), where the

CCD array has a far more limited capacity for gathering pixel information – our tested scanners have a maximum optical resolution of 600dpi.

Why don't we all have drum scanners? There are many reasons, but mainly it is because of size and cost. The average drum scanner won't fit on your shelf and would probably require a whole new desk at least, if not part of your room to store. Then there's the cost issue. With the cheapest ones costing in excess of £5,000, they're not really worth buying just to scan your family photos for putting on the web.

Time taken to scan the cover of PCW

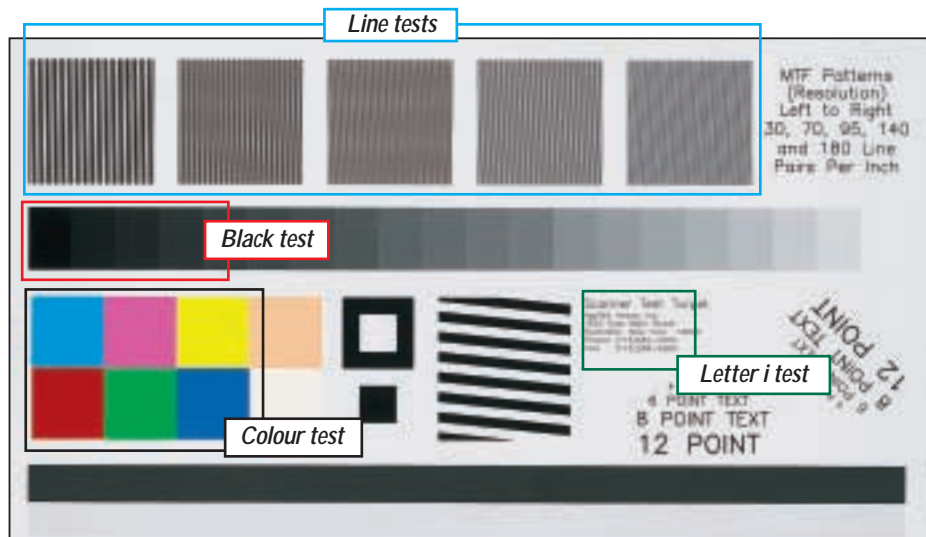


How we tested the scanners

Each of the scanners was set up and its software installed on a standard reference PC and monitor. Throughout the testing all monitor and PC settings were maintained so that no changes could affect scanner performance. The ease with which each scanner could be set up was noted, particularly in terms of any problems with the installation of the software in relation to the hardware itself.

After installation two images were scanned. The first was of a scanner target, which comprised elements to test colour purity, line resolution, greyscale-distinguishing capabilities and text resolving at a variety of sizes. This first scan was performed at the optical resolution of the scanner. The second scan involved scanning in the front cover of the October issue of *PCW*. This scan was performed at a fixed resolution of 600dpi and was timed so that comparisons could be made.

The first scan was loaded into Adobe Photoshop 5 for analysis. The run of 22



The scanner target used as a frame of reference to test each scanner's capabilities

greyscales were masked and Photoshop's histogram function was used to observe the number of distinct scales detected. Each is represented by a peak on the graph returned. In this way, any gaps could also be spotted and the affected areas noted. The second test was more subjective, involving examination at 100 per cent zoom of five sets of vertical lines of decreasing thickness equally spaced over a 1in area.

If the lines appeared as solid black with a white stripe in between each then this was considered a pass. If the white appeared as grey this was a fail. How many lines per inch the scanner could accurately resolve was noted on this basis.

Fine resolution was further tested by examining the dot above a lower-case printed letter i. The level of pixellation, purity of colour and general crispness of the edges was noted for comparison. Finally,

sections of each of the pure colours (red, green, blue, cyan, magenta, yellow and black) were cut from the original scanned image for comparative purposes. General observations on using the bundled software that came with each unit were also noted.

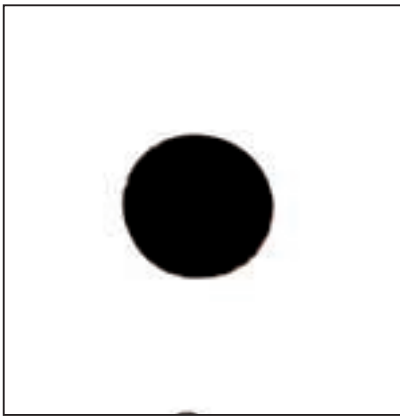
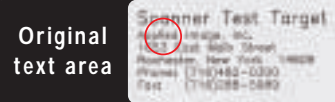
This process of comparison allowed the scanners to be assessed, based on all relevant factors, and the winners picked accordingly.

(See page 196 for results)

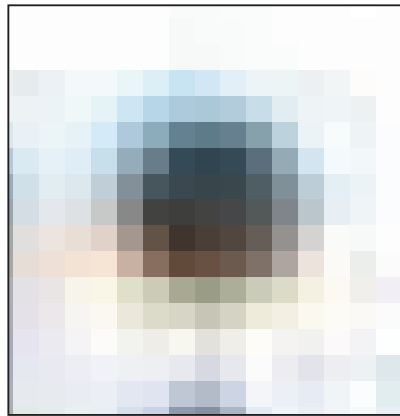
How the scanners compared: Colour reproduction

MANUFACTURER MODEL	R	G	B	C	M	Y	K
DRUM SCANNER							
 ACER S2W 3300U							
 AGFA SNAPSCAN E20							
 EPSON PERFECTION 640U							
 HP SCANJET 3400C							
 HP SCANJET 4300C							
 MICROTEK SCANMAKER 3600							
 MICROTEK SCANMAKER 3700							
 MICROTEK SCANMAKER 4600							
 UMAX ASTRA 3450							
 VISIONEER ONETOUCH 7600 USB							
 VISIONEER ONETOUCH 8100							

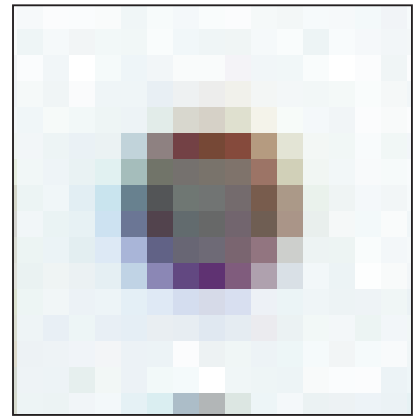
Text resolution



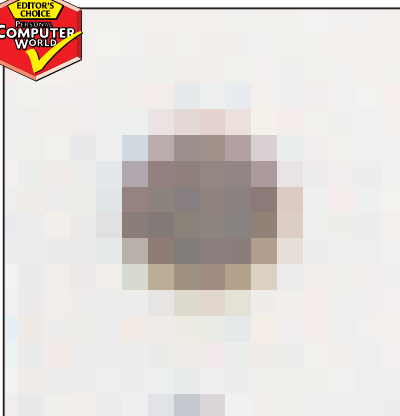
DRUM SCANNER



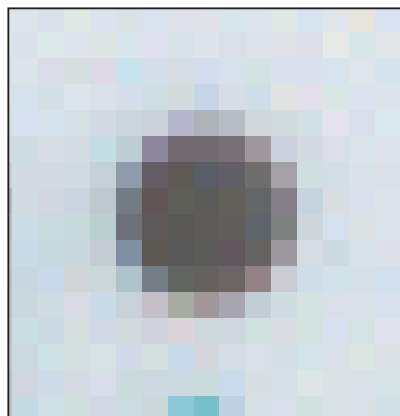
ACER S2W 3300U



AGFA SNAPSCAN e20



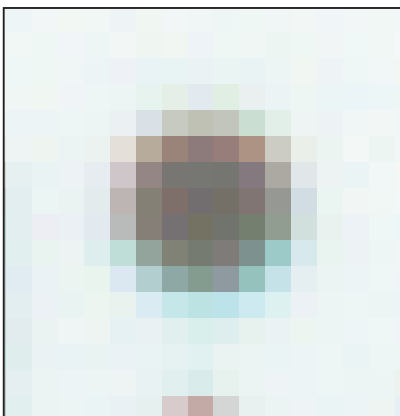
EPSON PERFECTION 640U



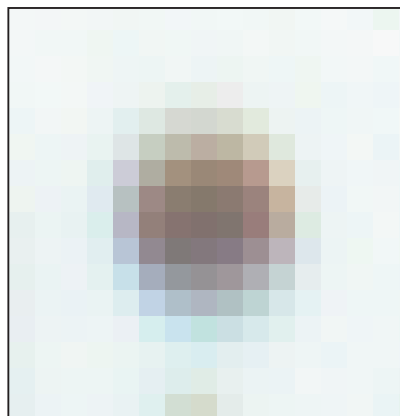
HP SCANJET 3400C



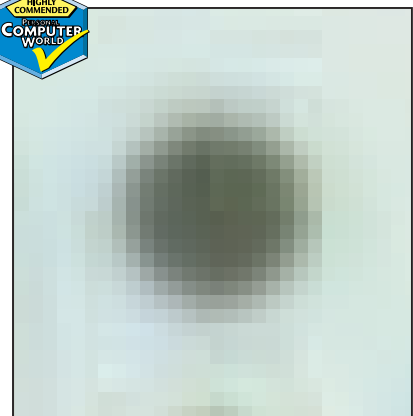
HP SCANJET 4300C



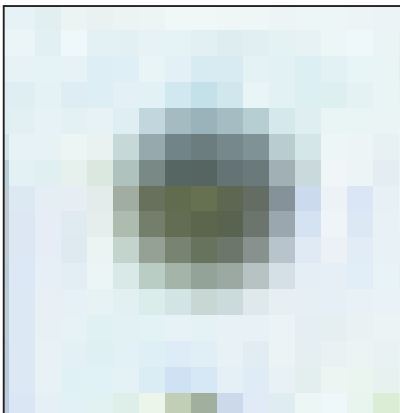
MICROTEK SCANMAKER 3600



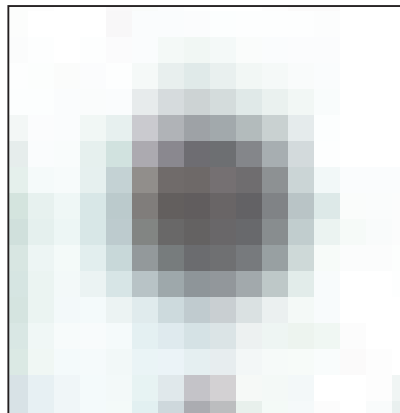
MICROTEK SCANMAKER 3700



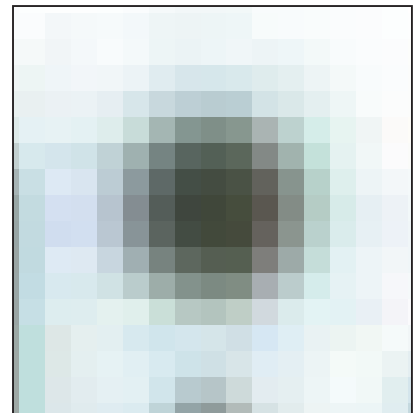
MICROTEK SCANMAKER 4600



UMAX ASTRA 3450

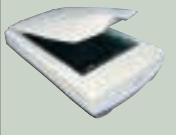


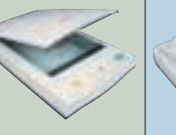



VISIONEER ONE TOUCH 7600 USB



VISIONEER ONE TOUCH 8100

Table of features						
MANUFACTURER		ACER	AGFA	EPSON	HP	HP
MODEL		S2W 3300U	SNAPSCAN E20	PERFECTION 640U	SCANJET 3400C	SCANJET 4300C
Price		£93.99 (£79.99 ex VAT)	£92.83 (£79 ex VAT)	£119 (£101.28 ex VAT)	£69 (£58.72 ex VAT)	£99 (£84.25 ex VAT)
Contact telephone		01344 392 604	020 8231 4903	0800 220 546	0990 47 47 47	0990 47 47 47
URL		www.acerperipherals.co.uk	www.agfa.co.uk	www.epson.co.uk	www.hp.com	www.hp.com
SPECIFICATIONS						
Optical resolution		600 x 1,200dpi	600 x 1,200dpi	600 x 2,400dpi	600 x 1,200dpi	600 x 1,200dpi
Highest interpolated resolution		19,200 x 19,200dpi	9,600 x 9,600dpi	9,600 x 9,600dpi	9,600 x 9,600dpi	9,600 x 9,600dpi
Colour depth		36bit	36bit	36bit	36bit	36bit
Max scanning area		A4	A4	A4	A4	A4
Transparency option		X	X	X	X	X
Dimensions (l x w x d in mm)		412 x 258 x 73	423 x 273 x 70	435 x 269 x 93	495 x 305 x 94	495 x 305 x 89
Weight (kg)		2.1	2.5	2.8	3.6	3.4
OTHER INFORMATION						
Bundled software		Ulead PhotoExpress 3.0, Presto! PageManager, Ulead Image Editor, Club Photo, ABBYY FineReader OCR	ScanWise, Corel Print Office 2000, Readiris OCR software (PC and Mac)	Adobe PhotoDeluxe 4.0 Home Edition, Epson Smart Panel and TWAIN driver	HP PrecisionScan LTX, HP ScanJet Copy Utility, Adobe ActiveShare Image Editing, Trellix Web Creation	HP Precision Scan LTX, HP ScanJet Copy Utility, Adobe ActiveShare Image Editing, Trellix Web Creation, Corel Print House 2000
Scan times in seconds		N/A	240	196	154	146
Scan times in minutes & seconds		N/A	4 mins	3min 16sec	2min 34sec	2min 26sec

Table of features							
MANUFACTURER		MICROTEK	MICROTEK	MICROTEK	UMAX	VISIONEER	VISIONEER
MODEL		SCANMAKER 3600	SCANMAKER 3700	SCANMAKER 4600	ASTRA 3450	ONETOUCH 7600 USB	ONETOUCH 8100
Price		£69 (£58.72 ex VAT)	£79 (£67.23 ex VAT)	£116.33 (£99 ex VAT)	£89.99 (£76.59 ex VAT)	£79 (£67.23 ex VAT)	£99 (£84.25 ex VAT)
Contact telephone		01908 317 797	01908 317 797	01908 317 797	01344 871 329	01628 628 080	01628 628080
URL		www.microtek.com	www.microtek.com	www.microtek.com	www.umax-europe.com	www.visioneer.com	www.visioneer.com
SPECIFICATIONS							
Optical resolution		600 x 1,200dpi	600 x 1,200dpi	1,200 x 2,400dpi	600 x 1,200dpi	600 x 1,200dpi	600 x 1,200dpi
Highest interpolated resolution		9,600 x 9,600dpi	9,600 x 9,600dpi	9,600 x 9,600dpi	9,600 x 9,600dpi	2,400dpi	2,400dpi
Colour depth		42bit	42bit	42bit	42bit	36bit	42bit
Max scanning area		A4	A4	A4	A4	A4	A4
Transparency option		X	✓ (optional)	✓ (optional)	✓	X	X
Dimensions (l x w x d in mm)		440 x 290 x 100	510 x 290 x 117	510 x 290 x 117	460 x 295 x 88	467 x 254 x 102	298 x 425 x 102
Weight (kg)		3	3.6	3.6	2.9	3	2.7
OTHER INFORMATION							
Bundled software		Adobe PhotoDeluxe 2.0, Ulead PhotoImpact 4.2, Microtek ScanWizard 5, Caere PageKeeper 3.0, Caere Omnipage LE	Adobe PhotoDeluxe 2.0, Ulead PhotoImpact 5, Microtek ScanWizard 5, Caere PageKeeper 3.0, Caere Omnipage LE and Recognita OCR 5.1	Adobe PhotoDeluxe 2.0, Ulead PhotoImpact 5, ScanWizard 5, PageKeeper 3.0, Omnipage LE and Recognita OCR 5.1, Ulead Photo Explorer 6.02	Vistascan, Presto! PageManager	MGI PhotoSuite II SE, PaperPort Deluxe 6	MGI PhotoSuite II SE, PaperPort Deluxe 6
Scan times in seconds		303	294	371	N/A	158	149
Scan times in minutes		5min 3sec	4min 54sec	6min 11sec	N/A	2min 38sec	2min 29sec

Editor's Choice

As you can see from the previous pages, scanners all pretty much do the same thing to pretty much the same level of quality. We tried as much as possible to be objective with our testing, although by definition, there had to be some subjective decisions, especially concerning line resolution (see How we did the tests, page 194).

Overall, though, we considered there to be the following features that make a scanner good. First is the image quality at the optical resolution of the scanner (600dpi on most of these). We examined the fine-line resolving capabilities of a scanner through its ability to accurately resolve an increasing number of black lines over a 1in width. This was complemented by a look at the dot above the letter i to see how well the scanner interpreted a small pinpoint and how pixellated it was upon completion.

Greyscale were checked with peaks in the Histogram function in Adobe Photoshop, which highlighted not only how many greyscales the scanner could distinguish, but the lack of a peak also told us in which areas it was struggling. Most scanners achieved 20 of the 22 scales, although the problem ends, ie black or white, differed from scanner to scanner and demonstrated how well each could cope when it came to recognising highlights or shadows.

Colour representation was a problem area as none of the scanners produced a pure colour from the test image. We have reproduced the colours for comparison on page 196 with the drum scanned target, but due to the magazine printing process these may not be accurate.

The final test involved timing a standard A4-sized scan at 600dpi. It could be considered that speed of scanning is the most important issue, but in reality this is only of secondary importance to the quality of the image. There is, after all, no point in fast scanning that results in poor quality. Most of the scanning we performed was at 600dpi, which is twice the level at which the average user will scan. This merely gives us an indication of the scan speed for comparative purposes.

The winners

Of all the group tests of recent issues, this was definitely the most difficult in which to decide on a winner. Why? Because all scanners scan fairly well, and when you fix a price point of around £100, you get a fairly homogenous group with very similar capabilities. As a result, all the cheaper scanners are worth a look as much as the more expensive ones. The HP scanners were the easiest to set up, so if you need a low-cost novice scanner the 3400C is a good bet, although its performance isn't up to the standard of our winners. However, it will be fine for most people's scanning needs. And so to the winners.

Winner of this test's **Editor's Choice** is the **Epson Perfection 640U**. It may be the most expensive scanner in the group, but the extra performance places it a cut above the rest. Ironically, it pipped the Microtek to the post on scan speed. Yes, we said scan time wasn't very relevant, but when all the other factors are fairly similar, a faster scan time becomes a deciding factor. The Epson managed to

scan the *PCW* cover in three minutes 16 seconds to the Microtek ScanMaker 4600's six minutes 11 seconds – quite a difference if you have to do several scans at a resolution of 600dpi. Apart from this factor though, both scanners achieved similar results in the tests, and the price difference is less than a fiver.

For general performance, both managed to distinguish 21 of the 22 greyscales, making them slightly better than the other scanners, each of which could distinguish 20. Resolution on both was excellent, with 140 lines per inch appearing relatively crisp, instead of as a series of grey and black lines (as they did in most of the other scanners). The resolution of the dot above a lower-case i was also better than most. Overall, they are virtually identical in terms of performance. So, taking the scan time into consideration, the Epson gets the Editor's Choice and the **Microtek ScanMaker 4600** the first of our **Highly Commended** awards.

The second **Highly Commended** award goes to the **HP ScanJet 4300C**. At £99 inc VAT it is cheaper than the other two winners. Its ability to resolve lines was equivalent at 140 lines per inch, although its greyscale distinguishing ability was one tone lower, with 20 of the 22 greys distinguished. It is also the fastest scanner we tested at 600dpi, giving a completion time of only two minutes 26 seconds. As one of the easiest scanners to set up, though, it is highly recommendable, and the price isn't too bad either. So why does it win over its sibling? Purely on the marginally better image quality it can produce.



Epson Perfection 640U: a cut above



Microtek ScanMaker 4600: a close second



HP ScanJet 4300C: the fastest on test