



Photo finish

A good-looking photomontage is dependent on the choice of suitable images. Ken McMahon's guide to CDs and web-site resources will help you find those perfect pictures.

Montage, as you know, is French for cut out lots of pictures and stick them together to make an exciting new composition from what, looked at individually, was a fairly mediocre bunch of snaps. If only the English language were as elegantly economical.

Photomontage is one of those things which benefits hugely from the digital treatment, being not only very much easier, but also offering a multitude of opportunities for creativity. Despite my earlier comment, to produce a good photomontage you need to have a smattering of interesting images to begin with. In contrast to photography which is used for illustrative purposes, clients often want a montage to convey something less concrete, like a concept or a mood, so it's often a case of finding the right kind of shot as much as the right subject matter.

My approach used to be to scour old books, magazines, cereal packets, videos, wallpaper sample books and friends' holiday snaps for appropriate material. While it can be quite good fun, this approach is often time consuming and not always successful. And thankfully, with the growth of digital royalty-free photolibraries, it is increasingly becoming less necessary.

Treated like royalty

Until recently, paying for commercial photography to add visual "oomph" to your page was an expensive business. Stock photo libraries typically charge from £100 to thousands of pounds for a single picture and you only get to use it once.

The idea behind royalty-free distribution is that you pay once and then use the picture as often as you like within the terms of the licence. Royalty-free pictures



The Photodisc site holds over 50,000 images

are usually sold as CD-ROM collections. The charges typically range from about 25p to £3 per image, making it a more attractive alternative to the arrangement previously mentioned.

Of course, you'll probably use only a few of the 100 or so images on a CD costing between £100 and £200, but this is still excellent value compared to commercial stock photo libraries, or to hiring a professional photographer to get the exact shot you need. In fact, buying a CD collection is usually even cheaper than taking the pictures yourself, once you've added up the cost of film, processing and your own time. Of course, only someone with more money than sense would pay £100 or more for a collection of pictures they hadn't seen.

How do you know that a certain CD will have something you can use? Where do you start to look for a picture of the pyramids at Giza, taken at sunset, with camels in the background and a fez-seller in the foreground? The answer is on the web.

Instant images

These days, most vendors of CD-ROM collections sell their products via the web and some allow you to download individual images. This way, you really can have your cake and eat it. If you do a lot of foody design, say (cookbooks, menus and so on), you can buy entire CDs; but if you want a picture of Mount Everest, rather than spend a hundred quid on a "Mountains of the World" CD, you can pay a smaller fee for the particular picture you want.

Many of the royalty-free picture libraries on the web allow you to download low-resolution images for nothing (you'll probably have to register to do this). You can use these in your visuals and if your client likes them, just download the individual image or order the CD on which it appears.

CD collections

What follows is a small selection of CD-ROM collections and web sites that offer royalty-free images. Next month, we'll use some of it to create a montage in Photoshop.



There are llamas galore at the Corel web site

■ Photodisc

www.photodisc.com

Photodisc has over 50,000 high-resolution images, all available for immediate download from its US web site. It also has one of the best search engines of any of the online photolibraries. Seventeen thousand images are available on CD. Series include animation, backgrounds and fine art. On the US web site each of these 100-image CDs costs \$249.

There's a UK section at www.photodisc.com/uk with special offers like the vol.43 Business Occupations 2 which has 336 images and costs £229 (ex VAT). The drawback with the English bit is that there's no searching and no online ordering: you have to call an 0800 number.

The sheer quantity of images means you can usually find something that matches your search. I tried "Egypt And Nile" and got 25 pictures of Feluccas. "Communication AND Computer AND Network" scored four pictures of the same SCSI cable taken from different angles with different backgrounds! You can get a Starter pack for £29 which has 20 high-res pics and 10,000 low-res images: when you find what you're looking for, you download the high-res version or order the CD.

■ Corel Professional Photos

www.cmmi.com

www.corel.com

This web site is just a shopfront for the Corel CD photo collection, among other products distributed by Channel Market Makers.

You cannot search for images or download them individually. However, the CDs are very cheap, which makes them ideal for home or commercial use where budget is the watchword. At £19.95 each,

the CDs contain 100 images in Kodak's Photo CD format.

Photo CD stores images in five resolutions, the highest of which is adequate for quality print reproduction at 10in x 8in. There are over 700 titles which you can buy as bundled Super Ten Packs: these really are exceptional value for money at £39.95, the cost of two individual titles. The Super Ten Pack titles include Aircraft, Animals, Architecture, Business and Industry, Cars, England, Food, Gardens, Sport & Leisure, Textures, Travel and Underwater.

Corel's Photo CD images are not of the same excellent quality as the drum-scanned images used by Photodisc and Digital Vision, but for most purposes they will be good enough.

The Corel web site has a searchable database of more than 71,000 images, also in Photo CD format. These can be purchased individually, although if the picture you want is on one of the CDs it obviously makes sense to buy that. You can download at any of the Photo CD resolutions up to the maximum 3,072 x 2,048 (roughly 10in x 8in at 300dpi) which costs \$24.99 — the lower resolutions are cheaper and the thumbnails are free. To give you an idea of the scope of the Corel library, it has over 100 images of African antelopes, for instance.

■ Adobe Image Club Graphics

www.adobe.com

This is part of Adobe's online shop and sells a range of typefaces as well as Digital Vision's royalty-free CD collection.

Each disc contains 100 drum-scanned images at three resolutions, the highest of which produces a 30Mb file — big enough for 10in x 8in quality print reproduction.

Ken's question corner

Q I found your November column highly illuminating but one question puzzles me: is it possible to bypass the output bureau when preparing photos for printing?

I produce a monthly newsletter, for a local charity, which is printed (offset litho, 750 copies/month) from 600dpi laser copy (i.e. not from film). We would sometimes like to use photos. Is it possible to produce acceptable halftones directly by scanning monochrome and/or colour prints, incorporating them directly into the camera-ready copy?

I realise that print quality would be reduced, relative to film, but we cannot afford to have them professionally

scanned-in each month or individually screened, all ready for pasting up onto the copy.

I suppose what I'm asking is whether I can get away with the same process, resolution and so on, as when printing photos on a laser printer. Your advice would be very welcome.

Graham Lewis

A Yes, it is perfectly possible to print acceptable black-and-white halftones on a 600dpi laser printer. If your layout package allows you to set a halftone screen resolution, experiment with settings between 75 and 90 lpi, which will give you a good compromise between resolution and greyscales. (If it doesn't, don't worry — the printer's default

halftone screen will work fine). Most newspapers use a 66- or 75-line screen.

The limitation is not the resolution of your laser printer but the capability of the process used by your printer. Some printers, particularly those at the cheaper end of the market, use plastic or paper plates which can't "hold" the halftone dots so well: the ink spreads and images become heavy and blotchy. The paper you use will also affect this "spread". Coated art papers will minimise this.

Your printer will be able to give you advice about the best halftone screen resolution to use. He should be able to provide you with some paper samples and, if he's nice, may proof a spread from your next issue (for a small charge).

Titles cost \$249.99 and include Amazing Creatures, Business in Action, Children Now, Globes and Maps, and Industry and Technology. Digital Vision also has a Design Elements Library including Floral Design Elements and — one for all you fork fetishists — Culinary photo objects. There's a starter kit which costs \$12.99 and has 3,000 low-res previews. Like the Corel collection there's no online search option, and you can't purchase images individually.

Alternatively, you can visit Digital Vision's own site at www.discography.com where you can search categories. In Business and Industry, an eight-CD category containing some of the titles mentioned above, searches for "telephone" and "computer" yielded 29 and 84 hits respectively.

The CDs are all priced at £199 and Digital Vision will also give you the starter pack free of charge.

■ **Other sources of royalty-free pics are:** www.cd-enterprises.co.uk — reseller of CD collections.

www.picture-gallery.com — Flat Earth Picture Gallery.

www.handbook.co.uk — UK multimedia handbook, contains directory of London-based stock photo libraries with links. www.icemail.com/shop/item1999.html — seven 100-image CDs for \$16.95 each or \$99 the lot (0800 order line).

www.digital-directory.com/stock.html — directory of stock agencies including royalty-free CD collections.

www.lifestyle.co.uk/ebab.htm — directory of UK photography sites.

Feedback

■ Dave Renton sent me an email about the lack of PC-based output bureaux and the problems he's encountered finding places

which will run files from the less well-known PC layout packages. If anybody out there offers an output service from something other than XPress and PageMaker, please let me know and I will compile a nationwide PC bureau guide. Also, Dave asks: "Are you

Digital Vision's site has an excellent search facility

going to be writing about duotones in a future article? This is a great way to add an extra dimension to a two-colour document but can be costly if you don't get it right. I have recently been working on a newsletter, supplied by a designer, that used two colours throughout, but I had to spend two hours' worth of studio time correcting all the duotone pictures."

The big mistake I once made with duotones was to forget to set the screen angle of the second colour, with the result that the coloured halftone dots printed over the black ones and I got a weak-looking mono halftone. It's true, though, that duotones are an excellent way to add a touch of class to a two-colour document, and I'll work on producing a quick guide for publication in a future issue.

■ Following on from our top ten plug-ins feature a couple of months ago, Andrew Buckle would like to spotlight some of the less well-known plug-in sources like www.netins.net/showcase/wolf359/adobe_pc.htm which contains a bucket-load of Filter Factory-produced plug-ins, including... well I never, a whole load produced by Mr Buckle himself. You'll find lots of other freeware and shareware graphics resources here, too.



PCW Contacts

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Character building

So what font do you want? If your own fonts don't have quite what you're looking for, or the characters you need, it's worth making or editing your own. Ken McMahon shows you how.

Given the proliferation of digital fonts over the past years, why would anyone want to create their own or edit an existing face? There is often a practical reason: for instance, you might need special characters which don't appear in the standard character set.

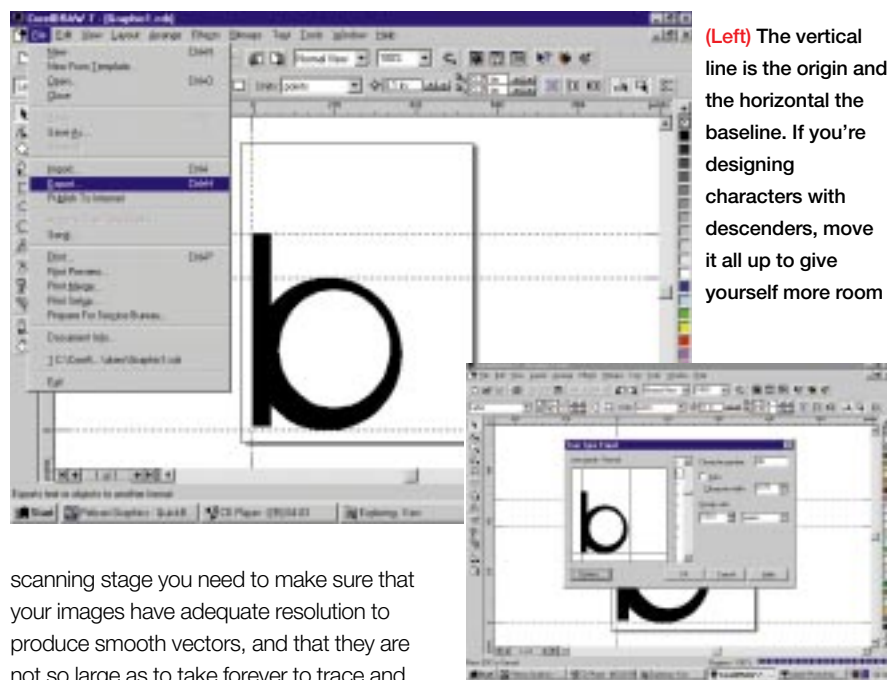
I recently worked on a job that had to be translated into several European languages. Two of them, Turkish and Polish, required only a few non-standard accented characters so it was a relatively quick and easy job to create them; the only difficult bit was typing in the text. As all this had to be done on a Mac, I couldn't take advantage of Windows' multi-language support, so next time I have to produce foreign language translations I'll think twice.

I also had to provide Greek and Russian versions and producing these fonts would have been more time consuming, although not impossible. As there wasn't time, I paid out over £300 just for these two fonts, so producing your own can save you a bundle.

If your symbol and dingbat fonts don't have quite what you're looking for, you can make your own. For instance, if you wanted to produce a guide to, say, youth hostels, all those little icons which show you a hostel's facilities are easier to incorporate as text than graphics. You can even turn your company logo, signature, fingerprint or footprint into a font.

If you have a copy of CorelDraw 7, producing fonts like this is easy. About the only prerequisite for exporting a graphic to either Adobe PostScript Type 1 or Microsoft TrueType font format, is that it be a combined object with no open paths and no fill or outline colour.

Your source can be scanned line-art, clipart or an existing vector graphic. At the



(Left) The vertical line is the origin and the horizontal the baseline. If you're designing characters with descenders, move it all up to give yourself more room

scanning stage you need to make sure that your images have adequate resolution to produce smooth vectors, and that they are not so large as to take forever to trace and produce complicated paths (although these can always be simplified). Scanning an A4 original at 200-300dpi works well. You can modify characters in an existing font and this is one of the easiest routes to success, if what you're starting with already looks good.

How to modify existing fonts

I'll quickly run through how to do this. It is simple and needs only slight modification if you're using your own original rather than a character from an existing font. The first thing to do is make a backup copy of the font you're going to modify: bad haircuts you have to live with, but mistakes with your fonts needn't be a long-term predicament.

Choose your character and make it big so you can see what you're doing: at 720pt a character will fit nicely on an A4 page. Before you can edit and export your character, you must convert it to curves.

(Above) CorelDraw 7's TrueType export filter allows you to append individual characters to an existing font. The preview window shows the revised character with baseline, origin and width markers

Next, define the basepoint of your character. This is the bottom left co-ordinate of an imaginary box, enclosing and just touching the extreme edges of an uppercase character. To put it another way: if you pull down a horizontal guide to the baseline and a vertical guide to the left edge, the base point is where the two lines cross. You define the base point by dragging the origin from where the rulers intersect at the top left of the Draw window to the actual point on the page.

If you make the base point about 30 points up and in from the bottom left corner of the page, it will leave space for your

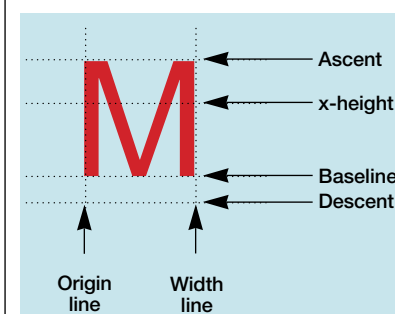
Typeface of the month

Manito™ was designed by Garrett Boge in 1989. It simulates rough-hewn, woodcut characters and its name means Great Spirit. It has no lowercase characters, just caps and small caps, and makes a good display face for publications with a natural, environmental or ethnic theme. Manito is available on the current Adobe Type on Call CD 4.2 and costs £17. At the time of going to press Manito had only just been released, so by the time you read this it may be available as one of the package deals Adobe offers for specialist display fonts. Go to www.adobeshop.com/uk for the latest details or call Adobe Direct on 0131 458 6842.

THE WEIGHT, SUBSTANCE, AND
MANITO
STYLE OF WOODCUT LETTERS

A B C D E F G H I J
K L M N O P Q R S
T U V W X Y Z &
1 2 3 4 5 6 7 8 9

Anatomy of a character



next character is positioned on the width line of the preceding character.

The *ascent line* marks the top of capital letters and is usually also the height of ascenders of lowercase letters. The *descent line* marks the lowest point of letters like g and p. The *x-height* marks the top of lowercase letters like x and o. Faces with taller x-heights are perceived as larger and more readable than those with smaller x-heights. The *baseline* is the line on which capital letters sit. The intersection of the origin line and the baseline is the basepoint. *Width* is a moveable vertical line which specifies the width of a character. The origin line of the

720pt character. The exact location of the base point doesn't matter, but if you are creating lots of characters it's important that certain things like the x-height and height of ascenders and descenders remains constant (unless you want your font to look a mess). It's a good idea at this stage to set up a grid: mine just shows the baseline, left extremity and x-height. You're now ready to set about your modifications.

Once your modifications are complete,

you must select all and create a combined object. The final stage is to export the character. Select Export from the File menu and fill out the options in the TrueType or Type 1 Export dialog box. You can scroll through to pick the character number for your creation, and the existing respective characters are displayed. The character number for "b" is 98, but if you are creating a new character you only need to find a vacant parking space for it. Don't be

p300 >

Questions and answers

Q What is the difference between TrueType, Type 1 and Type 3 fonts? Which should I use on my Windows 95 PC: can I use any or all of them?

A Type 1 and Type 3 fonts are Adobe PostScript font specifications. Type 1 differs from Type 3 in that it provides "hinting" information which improves the look of characters at small sizes and on low-resolution output devices, by subtly changing the width of ascenders and descenders and the shape of other parts of characters.

To use Type 1 and 3 fonts you need the Adobe Type Manager control panel which rasterises the fonts for screen display. Microsoft included TrueType in Windows 3.1 in 1991 and began rewriting its TrueType rasteriser. Windows 95 and NT 3.51 use version 1.66 of the TrueType rasteriser and the major improvement, apart from speed and reliability, is that it permits font smoothing — anti-aliasing of screen fonts to give the impression of smoother curves (see *Hands On*, October '96).

A new standard, OpenType, developed by Microsoft and Adobe, aims to make competitive font technologies a thing of the past. The OpenType format is a superset of Type 1 and TrueType technologies. An OpenType font can contain Type 1 data, TrueType data or both. The Type 1 data can be rasterised by a Type 1 rasteriser (ATM) or converted to TrueType and rasterised by the TrueType rasteriser. What this means for users and developers is that they can use and view the same font on any platform. OpenType has exciting implications for web publishers.

You can use TrueType and Type 1 (and OpenType when it arrives) fonts on your Win95 machine, but it is a bad idea to have TrueType and Type 1 versions of the same font installed.

Q I have been emailed a word document in Greek to which I need to make some corrections before forwarding to a printer who will output it to film and then print it. The problem is, when I view the document, all I see is row upon row of narrow rectangle characters. Has something happened to the file in transit, or am I doing something wrong at my end?

A There is almost certainly nothing wrong with the file, other than that you are viewing it with a typeface with a Latin character set. Win95 provides excellent support for a number of languages including Bulgarian, Belarusian, Czech, Hungarian, Greek, Polish, Russian and Slovenian. To access them, click on Add/Remove Programs from the Control Panel and select "multi-

language support". Make sure a check mark appears against the language you want, click OK and restart. This installs the fonts to view foreign language documents. If you want to key-in text using these fonts, you will need to install the relevant keyboard character map. Select Keyboard from Control Panels and select the language from the pull-down menu. This time there's no need to restart. An En (for English) flag will appear on the taskbar next to the clock. Clicking on this provides a selection of all the current keyboard maps. Select Greek and, if you are in Word, the Times New Roman Greek font will be selected. Now open and edit your Greek document.

Q What's the copyright position when sending documents to an imagesetter for output? We have invested in fonts, but often the bureau can't output our files unless we supply a copy of the fonts which they don't hold.

A Providing fonts to a bureau constitutes software piracy. Only you are licensed to use the fonts. Practically, it is difficult to get stuff output by a bureau unless they have the same fonts as you. It seems unreasonable to expect a bureau to hold every font, or to buy them in specially just to print out your one A5 bromide.

One solution with TrueType fonts is to embed them in the document. To see if your application supports embedding, take a look at the options in the Save Dialog box. If you are using Type 1 fonts, you can also embed them by printing the file to disk and selecting "embed fonts" from the print dialog options. One problem you might find is that some font vendors can prevent embedding. Check this using Microsoft's free font properties extension which is available at www.microsoft.com.

If you're interested in digital typography and fonts there's web stuff worth looking at: the site www.microsoft.com/typography has lots of technical information about TrueType fonts, the OpenType specification and links to related sites. You can find more about TrueType at www.truefont.demon.co.uk/kdt.htm. This is the web site of Kendrick Digital Typography, a commercial organisation dedicated to what it calls "digital fontology". See www.desktoppublishing.com for lots of font-related information and an excellent and comprehensive links page to other typographical sites. The adobe web site at www.adobe.com has examples of the entire Adobe type library as well as details of other Adobe products. All the major font foundries like Bitstream, ITC and Linotype also have easy-to-locate web sites. ■

intimidated by the number of options, most of which can be left on their default settings, particularly if you are modifying characters in an existing font. If you are creating an entire font you can experiment with the settings, manually adjusting the character width, grid size, space width and other properties to get best results.

Font editors — fantastic!

Draw 7 does an excellent job, making the creation of individual characters straightforward, but if you intend to do lots of font design work, consider a grown-up

piece of kit. MacroMedia's Fontographer justifiably calls itself the industry standard and version 4.0 is available for Mac and PC.

Fontographer can autotrace bitmaps and produce TrueType, Type 1, Type 3 and Adobe Multiple masters. The Mac version can produce TT and T1 fonts for Mac and PC, enabling cross-platform conversion, but the PC version only produces PC fonts. So if you need fonts for both platforms, you should go for the Mac version.

Another long-standing favourite is DTP Software's Type Designer. DTP recently merged with US Font utility developer Pyrus.

Now, DTP handles the European distribution of Pyrus products, including Fontlab 3.0 which supports TrueType, Type 1 and Multiple Master formats, and gives control over kerning and hinting parameters.

Other Pyrus tools include Sigmaker, a package for turning your signature into a font character.

PCW Contact

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Flight of fancy

Ken McMahon scans the horizon for images to improve and resolutions to ponder. It's all part of what you need to achieve the best possible results from scanning and image editing.

Following on from last month's plug-in fest comes news of a Quark XPress plug-in that automatically detects and corrects the kind of costly cock-ups I talked about in September. Preflight Pro, from Extensis, checks your Quark docs for nasties like blank pages, overflowing text boxes, RGB pictures and the like, and will collect the whole shooting match, including fonts, for bureau output.

The bad news is that Preflight Pro is not available for the PC version of XPress. Even worse, Extensis has no plans for a PC version, arguing that the professional market, at which Preflight is targeted, is primarily Mac-based, which is no less comforting to PC XPress users for being true. You can always let them know how you feel about being left out in the cold at www.extensis.com. In the meantime, if anyone knows of an equivalent for the PC, let me know.

A friend in need

Following on from using plug-ins to improve your image, when a friend called in to ask my advice on how to scan several hundred colour prints for a document he was producing in PageMaker, it occurred to me that no amount of plug-ins will help if you've gone badly wrong in the scanning department. My friend had decided on a given resolution for his RGB images on the basis that they would fit conveniently onto a single 1.4Mb floppy disk, so I could see I had a lot of explaining to do.

Here, then, is everything you wanted to know about scanning but were too busy colour correcting to ask. If there's anything I've missed, please let me know.

I'm assuming that having installed the



The same picture at resolutions of 300, 200, 100 and 50ppi printed with a halftone screen of 150lpi. Can you spot the difference between the first two?

scanner that came free with your image-editing software you don't need any advice on purchase, installation and maintenance. So I'll confine my comments to this: These days, virtually all flatbed scanners are 32-bit colour, start at around £200 and can do virtually anything from holiday snaps to OCR, depending on the bundled software. There are, surprisingly, quality and speed differences between machines in the same price bracket: check out the scanner group test in the August 1997 issue to see what I mean. But probably of more importance for most people is the ease of use of the twain software module: can it be used as a plug-in and a standalone module, and what features does it have? For the past couple of years I've been using a Umax which, I must confess, I just love to bits.

As far as the hardware is concerned: does it have an optional transparency unit, automatic document feeder and a SCSI

through port so you can daisy-chain other devices? Bear in mind that if you intend to scan a lot of trannies, it will be fiddly and results will not be great, so you might be better off with a dedicated tranny scanner.

Question time

So, you're sitting there, staring at the preview window, and a number of questions come to mind. The first thing you need to get your head around is resolution. Measured variously in dots per inch (dpi), lines per inch (lpi) and pixels per inch (ppi), different terms are often used to describe the same thing, and the same term is sometimes used to describe different things. Generally speaking, ppi refers to the pixel resolution of an electronic image and also to describe the maximum resolution of an output device, but lpi refers to the resolution of a halftone printing screen, about which more later. Often, dpi is

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Questions & Answers: grainy scans, copyright, terrible transparencies

Each month I'll be answering questions about graphics and DTP, so write to the email address shown in the "PCW Contacts" box [page 301]. This month we'll stick to scanning, but in the future anything goes.

Q I want to scan in some newspaper cuttings including black-and-white photos, but when I scan the clippings as greyscale images, the pictures look very grainy and the text is virtually illegible. What am I doing wrong?

A The problem is that the pictures have been reproduced using a coarse halftone screen (probably 60lpi) and the scanner picks this up. Scanning and printing screened pictures can lead to moiré interference patterns caused by interaction of the two halftone screen patterns.

Some scanning modules have a de-screen option which removes the screen pattern at the scanning stage. If yours doesn't, all is not lost, as most image editors will have a de-screen filter. If yours doesn't, still don't give up. De-screen filters work by blurring the image until the dot pattern disappears. If the screen is coarse and noticeable you'll have to do a lot of blurring, which will be to the detriment of picture quality. Retrieve the situation with careful unsharp masking which counteracts the blurring without bringing the dots back. Improve the quality of the text by scanning it separately in line-art mode, converting it to greyscale and reassembling it with the picture.

Q I've been scanning pictures from old magazines to use in posters advertising events. I've done a lot of editing, using parts of images in montages and applying special effects filters, so the originals are almost unrecognisable. What's the situation as

far as copyright is concerned when using published material in this way?

A The stuff you're using is almost certainly protected by copyright, and by reproducing it you are in breach of it. Modifying the images doesn't alter the fact that you are using them without permission. Contact the publishers to ask for permission to use it. If they don't own the copyright, they will know who does.

Don't assume you will always have to pay to use copyrighted material. Often, an organisation or individual will be happy to grant permission in return for a credit, particularly if you intend to use their pictures for a non-profit or charitable purpose or if they will get publicity for it.

If you are discovered using copyrighted pictures, the most likely outcome is that the owner will insist on you paying for use, and, having broken the law, it does not put you in a strong negotiating position. Having said that, who's to know? I'll admit to making use of a particularly striking bit of sky, sea, tree, car or whatever happens to catch my eye, regardless of its pedigree (I've even scanned bits of *PCW*).

If the result of your efforts is unrecognisable from the original and you have, as it were, created a new image, it seems to me that the situation isn't as straightforward as wholesale reproduction of someone else's picture. They've been doing it in the music business for years, and yes, some got sued for their efforts. Surely it's now generally accepted that no-one is getting ripped off and this kind of thing is all in the interest of expanding creativity.

Q We bought a transparency unit to add to our 300dpi flatbed scanner. We are scanning 35mm trannies at the original size at the maximum resolution. Printed at the original size (24mm x 36mm) this looks fine, but they look

awful if we enlarge them. Is there a way to achieve better results, or do we need a better scanner?

A The problem with most flatbeds is that they are not able to scan something as small as a 35mm trannie with enough resolution to enlarge it to a reasonable viewing size. This is not a problem with prints or other reflective material which are quite large to begin with.

When you enlarge your 36mm x 24mm 300ppi image by a factor of two, the resolution halves to 150dpi which you will just about get away with for print reproduction. But take it up four times to 144mm x 96mm (about A5-sized) and you have a 75dpi image which is good for little except on-screen viewing. To reproduce a 35mm transparency at this size you would need to start with a resolution of 1,200ppi.

Scanners boast a maximum resolution of 1,200ppi or greater, but read the small print: look for the maximum optical resolution, which will probably be 600dpi. The manufacturers quote the higher figure, but this is misleading as it is interpolated. The scanner optically produces a 600ppi image which is then converted to 1,200dpi by inserting averaged pixels based on the value of existing adjacent ones. You can do this resampling yourself in most image-editing software, so having the scanner do it for you doesn't really save any time. While resampling works up to a point, the more "fake" pixels you add, the fuzzier your image looks. If your scanner has added pixels, it doesn't leave much scope for you to do it again.

So, yes, you need a higher resolution scanner, but check the optical resolution and don't get taken in by the interpolators. If you intend to scan a lot of trannies, check out a dedicated transparency scanner like the Nikon Coolscan and Supercoolscan models, or the Agfa Duoscan.

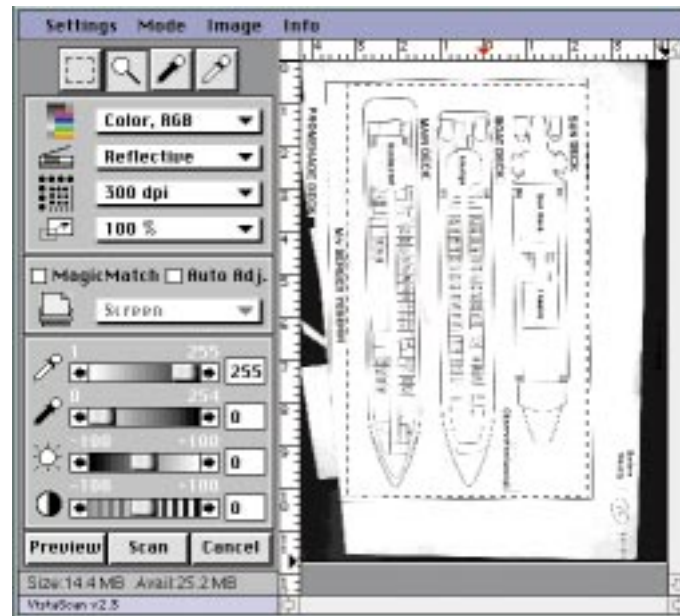
substituted in either of these two instances.

The easiest way to understand the behaviour of resolution in electronic images is to start with the notion that an image has fixed horizontal and vertical dimensions (as you'll discover, this is about the only thing that is fixed). For example, a particular scanned picture might measure 800 x 500 pixels. The output size depends on the

resolution: at 100ppi it measures 8 x 5in, at 200ppi 4 x 2.5in, and so on.

Sticking with greyscale images for the moment (colour images work exactly the same way, but there are three greyscale channels in an RGB image, four in a CMYK one), to simulate the various grey tones using only black ink, or toner, printers use a halftone screen which represents the

greyscales using black dots of varying size. Laser and inkjet printers do this by creating a matrix made up of individual printer dots. A 600dpi laser printer could reproduce 16 shades of grey using a 4 x 4 halftone dot matrix, giving it an effective halftone screen resolution of 150lpi (600/4). There is a trade-off between halftone screen resolution and greyscale depth. If we were to increase



The VistaScan 2.3 module has all the attributes of a good scanning interface — big, magnifiable preview window, well presented information, and lots of flexible, easy-to-use pre-scan configuration controls

the halftone dot matrix to 6 x 6, giving 36 shades of grey, the effective halftone screen resolution would drop to 50dpi.

High-resolution imagesetters used by output bureaux have sufficient resolution to produce the effect of continuous tone at the maximum useful halftone screen resolution. In *PCW*, for example, all the halftones are printed with a 150lpi screen. In very high quality reproduction 170lpi screens are used, and in newspapers, where if you look closely you can see the dots, halftone screens are typically in the 60-90lpi range.

Come the resolution...

What does this mean for scanning resolution? The rule of thumb is that to avoid problems you need to scan your images with twice the pixel resolution than the halftone line screen. So for reproduction in *PCW* with a 150lpi halftone screen, scans need to have an output resolution at the output size of 300ppi. For a 600dpi laser printer where the best trade-off between resolution and greyscales is at 100dpi, the pixel resolution of your image should be 200ppi.

The twice halftone screen resolution method leaves a wide safety margin and you can get away with a lot less without running into trouble. I have used 175ppi images for printing with a 150lpi halftone screen without problems. Why cut corners, you might ask? For one thing, big scans take up a lot of disk space and can be slow to work on. It can also happen that you scan an image and return it from whence it came, only to discover at a later date that it doesn't have sufficient pixel resolution for reproduction at the size you want.

Aside from resolution you'll need to decide scanning mode, and this is quite straightforward. For black and white pictures, use greyscale; for colour pictures, use RGB and then convert to CMYK for commercial printing or output to a colour inkjet printer; and for text, the A-Z, zebras and anything else consisting of just black and white lines, use line-art mode. Scan line-art at 600ppi at the output size for laser printers and 1,200dpi for output to film for commercial printing. Never use halftone mode, which applies its own halftone screen at scanning time, seriously curtailing your future options.

Crop in as close as possible to the image you want on the preview window. Scanning white space around the image is a waste of time and memory. If you have a lot of pics to scan, set up your acquire module to do as much of the work for you as you can, including adjustment of the image, flipping, inverting and so on. And when the image is scanned, save it immediately before doing anything so that if you make a mess, you don't have to rescan.

■ *Next month I'll be pushing my creative and technical abilities beyond their limits by attempting to create my own fonts, so if you want to know how to do that or you just fancy a cheap laugh at my expense, don't miss it. Comments and suggestions for future columns are most welcome.*

PCW Contact

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Plug-in the gap

Plug-ins add a lot to image editors and, once installed, you'll never want to do without them. Ken McMahon charts his ten favourites, for Windows and Mac, and checks their effects.

Third-party plug-ins can provide special effects that would be impossible in an unadorned image editor. They can also save you a lot of time and frustrating effort by producing complicated effects like drop shadows, glows, lighting and textured backgrounds at the stroke of a key.

These are my top ten plug-ins, in no particular order of merit. With one or two exceptions they are all available for Windows as well as MacOS platforms.

Many of them conform to Adobe's plug-in architecture so you'll be able to use them with image editors that also conform to the standard. The Andromeda Series filters, for example, will work with Adobe Premier, PageMaker, Corel PhotoPaint 7, Fractal (MetaTools) Painter 4 and Micrographics Picture Publisher 6. You need to be sure that both the plug-in and your package are compliant.

About the only drawback of plug-ins is that they are fairly memory-hungry, and they also add to the time taken for the host application to boot. Only load the ones you need for a particular session.

KPT3

Kai's Power Tools set the standard for Photoshop plug-ins when version one was released about four years ago. Not that there's anything standard about it. KPT is a sublime combination of powerful image creation and effects filters with a unique interface. In fact, to call KPT a plug-in does it an injustice, since it is one of the most sophisticated fully-featured image editors in existence. You can achieve stunning results straight off, but KPT is one of those applications that grows with you, becoming

better as you become more experienced.

Released early last year, version 3 added another huge leap in performance and features over what was previously available. The modular design was expanded and existing modules like the Gradient Designer and Texture Explorer were joined by Spheroid Designer and Interform, which create "offspring" textures from a pair of "parent" textures. Another addition was Lens f/x, which takes the form of a glass viewing instrument with buttons and sliders which you position over the image to view the underlying modified image.

KPT is the Photoshop plug-in to have. Get it, then think about whether you need any of the others.

KPT Actions

Newly released from MetaTools, Actions, as its name suggests, extends the functionality of Photoshop 4's recordable macro facility — the Actions Palette — to KPT3 filters, so it will be of interest only to those lucky people who are regular users of Photoshop and KPT. This is basically a timesaver for people who produce complicated visual effects by combining several KPT filters.

Actions comes with more than 100 predefined scripts, which you can use as Kai intended, or you can pull them apart to discover how it's done, and edit them to achieve your own individual style.

The Actions are categorised into four groups: button, backgrounds, frames and text, and there are four folders of examples of the kind of results they produce. An unexpected bonus was that Actions worked pretty well with Alien Skin Eye Candy, so it's a fair bet it will work with other plug-ins too.

Alien Skin Eye Candy

The forerunner to Eye Candy was Alien Skin's Black Box 2, which gained respect from Photoshop users the world over for its basic yet productive approach to plug-in effects production. Eye Candy maintains this approach. There are 21 filters including chrome, carve, cutout, drop shadow, firefiles, fur, glass, glow, motion trail and star. Selecting any one of these pops up a large dialog box with sliders to control attributes like pixel length, opacity and direction.

A pull-down menu provides a selection of presets so you can get good-looking results quickly, or choose your own settings and save them as a preset. And there is a fair-sized zoomable preview window in which you can check results before committing yourself. In contrast to KPT, which you could muck about with all day (not necessarily a criticism), if you don't get the result you're looking for in five minutes, you probably need to try something else.

Adobe Gallery Effects version 1.5

Gallery Effects is a selection of 48 plug-in filters from Adobe, designed to provide natural media-type special effects. There are three volumes, each comprising 16 filters, though they are not really grouped into any kind of category. Notables are Craquelure, which makes photographic images look like they have been projected onto a badly weathered stone wall; Texturizer, which provides a canvas-textured look; and Glass and Ripple, both of which make it look like your image is on the other side of one of those crinkly-glass bathroom doors.

Other nice natural media effects which

Third-party plug-ins: Details & Contacts

Plug-in	Platform	Developer	Supplier	Price	Web
KPT 3	Win95/NT, MacOS	MetaTools	Principal 01756 704000	£129	www.metatools.com
KPT Actions 1.0	Win95/NT, MacOS	MetaTools	Principal 01756 704000	£49	www.metatools.com
PhotoTools 1.0	Win95/NT, MacOS	Extensis	CU 0181 358 6657	£99	www.extensis.com
IntelliHance 3.0	Win95/NT, MacOS	Extensis	CU 0181 358 6657	£99	www.extensis.com
MaskPro	MacOS	Extensis	CU 0181 358 6657	£249	www.extensis.com
Gallery Effects 1.5	Win 3.1/95/NT, MacOS	Adobe	Adobe Direct	*	www.adobe.com
Andromeda 1-4	Win95/NT, MacOS	Andromeda	Principal 01756 704000	**	www.amdromeda.com
Genesis	Win95/NT	Positron	Leapfrog 0171 439 1019	£295	www.3dgraphics.com
Eye Candy	Win95/NT, MacOS	Alien Skin	Principal 01756 704000	£105	www.alienskin.com

* Free with Photoshop ** 1 = £79, 2 = £75, 3 = £120, 4 = £120

need no explanation include coloured pencil, grain, rough pastels, halftone screen, neon glow and sponge. Application is about as straightforward as it gets: you select the filter, and adjust one or two sliders controlling things like brush size and the degree of the effect. A thumbnail preview provided though the window is a little small to be able to make a decent decision without going the whole hog. Gallery Effects only works with RGB images, so you will have to convert CMYK to RGB and back.

With a little imagination, and used in conjunction with Photoshop's powerful selection, layer and channel functions, it's possible to achieve subtle effects with Gallery Effects. The User Guide has lots of excellent examples to demonstrate this.

Extensis PhotoTools 1.0

Extensis takes its plug-ins seriously. In addition to Photoshop Plug-ins, the company also produces Quark Xtensions and, would you believe it, a PageMaker plug-in. PhotoTools is a collection of eight mini-applications together with its own interface in the form of additional toolbars

and palettes. In fact, the transformation to the familiar Photoshop interface is so drastic, it comes as a bit of a shock when you see it for the first time.

The lynchpin of the PhotoTools suite is the Phototext module, which enhances Photoshop's unbelievably bad text capabilities. The Phototext dialogue allows you to create, colour and position text, and add tracking, leading, horizontal scaling and type styles, all within a live preview window so you can see exactly what's going on. Anyone used to the try it, undo it, try it again Photoshop text method will find this a huge relief. The other bits include a bevel editor which provides all the standard effects for beveled button and text creation, a glow filter for trendy backlit text, a drop shadow creator and an emboss filter.

There's also a "lite" version of IntelliHance which works on RGB images only. All the tools have nice, big real-time preview windows which give you a clear view of the proceedings. If you tend to work a lot with text, PhotoTools could save you a lot of effort; and the other tools, if you don't already have them, make the basis of a

good plug-ins toolbox. The additional toolbars and menus don't add much, so it's a relief that you can turn them off.

Extensis IntelliHance 3.0

If your scans frequently look like they've been smeared with mud and left in the sun to dry, then IntelliHance could be the plug-in you've been waiting for. This is true, if all your attempts to improve matters using colour balance, contrast and brightness controls, unsharp mask and despeckel filters simply serve to make the mud a slightly more acceptable shade of brown.

IntelliHance takes your sad snaps, and by analysing their shortcomings and intelligently applying a combination of the aforementioned remedies, makes them sparkle. At its simplest, you just press the button and let IntelliHance get on with it. If you want more control, you can bring up the Preferences dialog and choose from pull-down menu presets for brightness, saturation, sharpness and so on. And if you're really brave, or just plain reckless, you can fine-tune, which gives you much greater control over the image-enhancing techniques used; though if you're sufficiently confident to try this, you would probably be better off using Photoshop's existing functions.

IntelliHance does an excellent job with the minimum of fuss. It would make an excellent add-on for PhotoDeluxe users who want to get the best from the holiday pics, or for more professional users looking for a quick and easy route to image enhancement.

Extensis MaskPro

This one is currently for Mac users only, but Extensis is developing a Windows version which it says will be available later this year. MaskPro makes the whole business of creating clipping paths and image masks



IntelliHance 3.0: More control is provided using the preset options on the left. The nice big preview window toggles between before and after views using the Control key



PhotoOptics' preview windows are just too small, but there's a useful colour neg reversal filter

One for all you space FX fans: Genesis is at its best creating special effects from scratch



much less of a strain than it can be — as anyone who has tried to draw around individual hairs with the pen tool will testify. By defining a palette of “drop” and “keep” colours, and using MaskPro's magic brush tool, you can quickly create a border around part of your image based on the proximity of the pixels to the chosen drop and keep colours. You can redefine the drop and keep colours and adjust the brush parameters as you go, to take account of tricky areas where drop and keep colours are similar.

There is also a brilliant incremental undo: Command-Z turns into a rewind button, undoing everything in its path seemingly without limit. With a border around your intended mask area, it's a simple matter to remove the other unwanted bits of the image, and MaskPro then offers to create a clipping path for you. At this stage you can specify threshold and tolerance values, and the path is sent to the clipboard.

MaskPro is no quick fix, but once you get the hang of it, it makes the creation of clipping paths and masks almost a pleasurable experience.

Genesis

Genesis vfx from Positron is a brand-new plug-in which I can confirm works with Photoshop 3 LE, albeit at a snail's pace on a 486/66. It's designed for Photoshop and Kinetix 3D StudioMax, and although there are plans to release it for other packages, I'd say it's a fair bet it won't currently work with anything else. Genesis is an effects

generator in the KPT mould and, although not quite in the same league, it can produce stunning visual effects. The interface consists of a large preview window, below which tabbed panels provide functions for generating elements and adding lighting and noise effects. Over 100 predefined effects are included, demonstrating heat distortion, lens flare, glows, slighting particle animation and a host of other out-of-this-galaxy type stuff.

Andromeda Series 1-4

This is a set of superbly designed plug-ins. Series 1 provides standard photographic effects like starbursts, halo, reflection and velocity. Series 2 is a 3D surface-mapping plug-in: you can map images onto a selection of 3D objects, and add realism with viewpoint and shading control. Series 3 produces engraving effects using line-art screens; options include mezzotints, ellipses, lines, waves and spokes. Series 4, Techtures, produces beautiful, lifelike, textured effects using a combination of texture and special-effects engines.

■ All the developers mentioned have web sites with free demos to download and galleries showing what can be done. See the table above for details.

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The small print

Do your small print projects turn out just as you had hoped? Or are you about to make your first attempt? Either way, take a tip from Ken McMahon to achieve good-looking results.

So, you want to design and produce your own business stationery, marketing material, conference programme, product catalogue, no-smoking signs and suchlike. If the blurb on any of the DTP layout packages (from Quark XPress to the cheapest budget package) is to be taken at face value, then this can be done in a matter of minutes. While the results may not win you awards, your stuff will stand up to anything produced by the professionals.

Although it may take a little longer than "a matter of minutes", it's true that these days even the most budget-priced packages, running on the humblest desktop PC, can be used to produce astounding-looking artwork. What they neglect to tell you on the packaging is that the quality of your results depends more on how you approach the task than the size of your hard disk and the stature of your software.

As with most other projects, proper planning and adherence... well, a relaxed grip, anyway... to a few fundamental guidelines will go a long way towards ensuring that your print job looks and costs what you expected. This month, we'll take a look at how you can prepare the ground to ensure that everything goes smoothly and according to plan, and at what you can do, practically, to ensure that your print project isn't derailed by technical shortcomings.

Planning the cost

Even if your project is modest, say some headed stationery, you'll need to cost it and plan a schedule. If it's a 128-page colour catalogue and you omit this vital first stage you'll probably end up paying for it more than once (perhaps literally). Working out how much it is going to cost will not only

save you money – you will be able to get comparative print quotes and take the cheapest option – but will also make you consider the design elements earlier. When you receive the invoice is not the best time to discover that your beautiful full-colour letterheads have cost 50p a sheet.

Often, the colour format of your project is dictated by the material it contains. If you want to include colour photos you'll have to print in four-colour process (CMYK); usually the most expensive option. If your company logo is blue and green you'll have to opt for two "spot" colours in addition to black for the text. But with a little imagination it is possible to cut the cost without compromising too much on the quality.

Colour pictures can be restricted to parts of the document. For example, if you want to make a good initial impression it might make sense to have the cover of your project printed in four-colour process and the rest in black. "Self-covered" documents, where the same material is used for the cover as for the inside pages, are cheaper to print than those with a heavier, card cover. If your budget is tight but you want to produce an upmarket publication, printing in a single colour (it doesn't have to be black) on better quality paper and opting for a matt laminate finish can be a less expensive but nonetheless classy-looking option.

The time to consider these things is now. Before a picture is chosen and before you get anywhere near your PC, you should have a clear idea of how your publication is going to look and what it is going to cost.

Consider the content

The next consideration is content. Your approach to this depends largely on the nature of the document you are producing,

but generally speaking the trap into which most people fall is trying to squeeze too much in. Authors fill books on this subject as there's a lot to be said. What most of it boils down to, however, is that if you want people to read your stuff you have to make it easy for them and keep them interested.

Turn-off number one is column upon column of tightly packed text with nothing to break it up. Don't fall into the trap of assuming that you must fill every square inch of the page with type or pictures. An easy way to lighten up a layout is to leave the outer column empty; so on a four column grid you only use the inner three. You can then bleed your pictures and put captions in the outer column.

Pictures

There are plenty of things you can do with pictures to liven up a layout. The first thing is pick the right ones. If you've got no pics to begin with, consider yourself lucky. There's a growing list of sources for general illustrative pics, and CD collections of copyright-free images like those produced by Corel, are an excellent and relatively cheap source.

If you have a flatbed scanner, then you can use virtually anything, from your holiday snaps to old magazines. But here is a word of warning about copyright: you must make sure you don't infringe it. It's definitely not a good idea to go around scanning and reproducing pictures from books and magazines without permission.

You can only go so far with plagiarism and even though technically it's probably a bit suspect, I would argue that it is fair game to use *bits* of other people's pictures provided they are not recognisable as the original. So if you spot a particularly

Tips for good-looking design



Leaving plenty of space on the page not only makes it easier on the eye, it gives you more flexibility to accommodate things like logos, pictures and captions. You can use pull-quotes to break the text up or, as here, to add visual interest and grab the reader's eye

- **Steal:** why make up your own design (a difficult and time-consuming process) when there's so much excellent design knocking around which you can appropriate for your own? Try to pick something suitable: using something like Hello! magazine as a template for your annual report is probably not good; try and look out some other annual reports.
- **Try to establish a consistent theme throughout your publication.** Use one font for the headlines and another for the body copy and stick with them. Don't change type sizes or leading to try and squeeze too much copy onto the page; either cut the copy or make more pages. Place page titles and running heads in the same position and use the same colours on reverse-out straps.
- **Avoid script fonts unless it's a wedding invitation or menu.**
- **Leave some (perhaps lots) of space on the page and leave one column blank — not the middle one.**
- **Avoid the temptation to make everything too big.** Type has a tendency to look smaller on the screen than it does on the page. Ten-point type is plenty big enough for body copy and if you don't have enough copy to fill, increase the leading rather than the type size.
- **Pay attention to detail.** Sloppiness in this area will let you down badly. Make sure columns of type align (use baseline grids if your layout package has them). Make sure that repeating items are in the same place and in the same colour on every page and that captions, crossheads etc, are in the correct style. Set style sheets are a big help here.
- **Break up long tracts of type with crossheads, pictures and pull-quotes.**

spectacular or appropriate piece of sky, for instance, or a small element of a picture which would work well as a background tile, then I would say "go for it".

More often than not you have to work with what you've got but even the dullest set of amateur snaps can be considerably improved by a little imaginative cropping. Get rid of dull or distracting background detail by removing it using a clipping path in an image editing package.

You can make a design feature of cut-outs by running type around them. Book publisher, Dorling Kindersley, has defined

an entire publishing style based on cut-out images on a white background.

Proofing

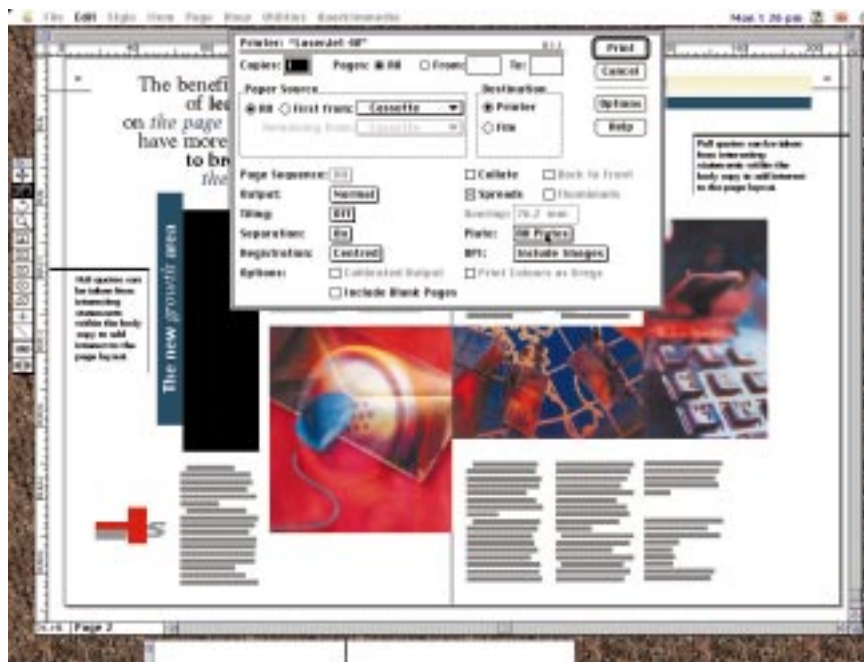
Now is a good time to think about proofing. For mono publications you can get an excellent idea of how things are going to look just by placing the film on a sheet of white paper, or by photocopying it. Colour proofing is more complicated and, of course, far more expensive.

You have three options, in increasing order of cost: digital proofing is the cheapest but the least reliable because the

p260 ➤

Ten ways to avoid disaster

1. Make sure your work has been properly read for errors. First, read it yourself and then get someone else to read it.
2. Ensure that any scanned pictures, logos and so on are all in CMYK format and not RGB. If there are RGB images in your document they will print as a composite image on the black plate and your film will be useless.
3. Do not unintentionally mix spot and process colours. If you intend your job to print in four colours, make sure you don't have any specified as spot colours. In addition to the CMYK plates you will get one film for each spot colour you have defined. Your bureau will throw a party on the additional profits generated by your expensive mistake and you will have to return the following day to have the whole job run out again.
4. Any scanned pictures, illustrations and other associated files must be sent to the bureau along with your layout document: if they are missing, the screen resolution preview (low resolution and horrible) will be used and it's "double-cost film" time again. A good bureau should spot this kind of problem, though, and let you know about the missing files before it runs the film.
5. Find a good bureau. It will save you time and money as well as a nervous breakdown.
6. Make a dummy using laser prints. This will help you avoid things like folds that don't work and reply forms that end up on the back of important information that needs to be kept. You can also send the dummy to the printers so they know exactly what the finished article should look like. Tell them, too, in writing. You can't be too careful about this sort of thing.
7. Print colour separations on your laser printer. This will highlight potential problem



An easy way to check that you are not about to mess up, big-time, with your colour separations is to output them to your laser printer (for this to work you will need a PostScript printer). If, in addition to the CMYK plates you have half a dozen spot colours, you're in trouble

areas 2 and 3 (above) while you've still got time to do something about it and before it costs you anything.

8. Send laser proofs to the bureau so that it will realise straight away if there is a problem; this could be running out the wrong file, for instance. It is also a good idea not to send your single-page flyer to the bureau on the same disk as the 48-page colour brochure you did last year!

9. Keep backups and save your work at

regular intervals. Some applications have an autosave function which is worth switching on. It's easy to get carried away and work for a couple of hours without saving and that's when disaster will surely strike.

10. Get proofs! Proofing isn't an expensive luxury – it's essential. Build the cost of proofing into your budget and allow time (and money) to make changes if the proofs highlight a problem: otherwise, there's no point in having them.

proof is not made from the film itself but by imaging the file to a dye-sublimation colour printer. Cromalins or Matchprints are made from the final film using a photographic process and give very accurate results. Wet proofs are produced on a special proofing press and have the big advantage over the previous two methods in that they are produced in exactly the same way (offset litho) as will be the finished job.

How to work out the cost

Assuming you are not charging for your time, the main cost components of any printed job is the cost of the printing itself and the cost of producing the artwork or film. Once you have finished your bit (design and production) you will need to run the job out to film, from which the printer makes the printing plates which go onto the press.

When you obtain quotes for printing,

ensure that the printer is aware that you are supplying colour-separated film rather than camera ready artwork.

It is cheaper to run out film as spreads (two adjacent pages) rather than as single pages. So assuming your publication is A4-size, get your bureau to run out A3 spreads. As a rough guide, an A3 film costs around £11, so if you output spreads your film costs will be around £5.50 per colour, per page. You can save even more money on film and print by using imposition software which will "impose" your pages into sections (or groups) in the correct position for printing.

Stationery

For a small business, it's hardly worth getting business stationery printed by a commercial offset litho printer. Short-run stationery, especially colour, can be

extremely costly. We print all our business stationery on a colour inkjet printer and it looks great. We can print it as we require it and it works just fine in a mono laser printer. But beware of doing this with some colour lasers because the colour image has a tendency to deposit itself on the rollers and thence to subsequent sheets in your mono laser printer when you output letters.

■ Ken McMahon is our new Hands On Graphics & DTP columnist. His predecessor, *PCW*'s features editor, Gordon Laing, can be emailed as Gordon_Laing@vnu.co.uk.

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For auld **Laing** syne

Although there'll be many a wet pillow among readers, Gordon Laing this month ends his tenure of the column but leaves you with his ten golden rules for top graphics and DTP doings.

This month marks the end of an era in the world of Hands On Graphics and DTP. December 1993 saw the début of this column, where I promised to gossip about all things graphicky. No less than 44 fun-packed episodes later and it's time for me to hang up my graphics tablet and move on to pastures new. The Graphics and DTP column will continue, so if you've got a burning question about how to make the sky in your photos blue, retouch junior's red-eye or create your own fonts, please continue to contact us at the usual address [see page 276]. In the meantime, as a parting gesture, here are my top ten golden



Using dots of only four colours, it is possible for printers to simulate full-colour output

rules for getting the most out of graphics and desktop publishing.

Font frenzy

It's safe to admit that the first time you designed a page layout you tried to fit every single one of your fonts onto it — I know I did. And why not — I paid for them, didn't I?

While it's true that you have, hopefully, paid for your fonts, that doesn't make it a good idea to use them all at once. Why? Because it looks a mess. Explore any good-looking poster, advertisement, magazine or newspaper page and you'll probably see only one or two different fonts in use.

These fonts have been carefully chosen to get across the same tone and message as the words. Should they look serious, official, frivolous or trendy? There's a suitable typeface for every occasion and you'll only confuse the matter if you try to use too many simultaneously.

Instead, stick to one or two different fonts and try using bold or light variations. Also bear in mind that some fonts work better than others when printed small as body copy or large in headline style.

Mac or PC? That is the question

The Apple Macintosh was there at the birth of desktop graphics and publishing, and during these early days almost all designers, printers and repro services invested and standardised on Macs. These people are not going to swap over to PCs in a hurry and this has resulted in a bit of a split between professional and consumer graphics work.

The trouble is compatibility. While the same applications are now available on both platforms, you've got to make sure everything else is exactly the same to prevent costly errors and reprints.

One Times font may not be quite the same as another. What may be only fractionally different on a single character could add up to a whole letter or word over the entire page, causing potentially disastrous reflow.

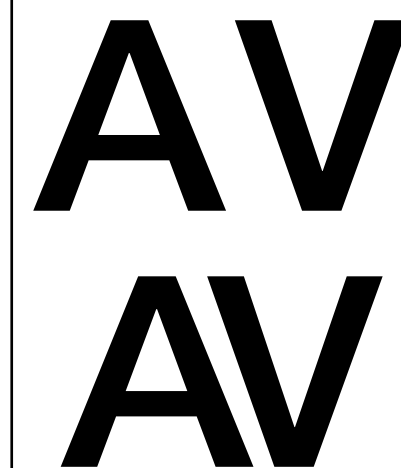
This can be avoided by making sure you buy the same fonts from the same source, but most professionals won't take the risk and prefer to just stick to Macs from beginning to end.

When working across platforms, stick with PC-formatted media since the Mac can read these without problems. Bear in mind that Windows will see only the first eight characters of a Mac filename and won't know what it is without a dot and a three-letter file extension. Macs will also see only the first eight characters of a Windows 95 long filename.

Scanner settings

It would be fair to think you'd need a 600dpi printer to do justice to a 600dpi scanner, but this is rarely the case. The problem is that each of the scanner's dots can be any colour, whereas a printer dot is usually one of only four colours, or even just black in the case of a mono printer.

To simulate shades and colours, printers group dots together: the denser the group, the darker the appearance and vice-versa. The trouble is that each scanner dot may require many printer dots to do it justice. However, you'll be surprised at how low a scanning resolution you can get away with. The smaller the file, the less space it will require for storage and the quicker the printing time. Experiment by scanning the same photo at, say, 50, 100, 150 and 200dpi and look for the difference in the quality of your printed output.



Kerning brings adjacent characters closer, particularly useful in pairs such as A V

High scanning resolutions should be used when you want to print something bigger than the original. If it looks okay printed actual size when scanned at 50dpi but you want it twice the size, rescan it at 100dpi. This above applies for greyscale or colour photographic images. Black-and-white line art should be scanned at your printer's resolution since each scanned dot can be perfectly represented by a single black printer dot.

Colour spaces

Ever had one of those conversations with someone where you're describing something as rusty orange, when they stop you and point out that it is clearly pillar-box red, or worse still, lime green? We all have very different ideas about colour, and computers are no different. There's the added problem that different computer devices describe colours in different ways, and worse, some may not produce the same range as others.

Agreeing on colours is easy. Companies such as Pantone offer books packed with standard colours with specific numbers, just like paint charts from a DIY store. It doesn't matter whether you think it's sky blue and the other person is convinced it's navy, so long as you agree that Pantone X is the right one for the job.

Getting computer devices to agree can be a bit trickier. The trouble is that monitors, scanners and printers create colours differently and often don't offer the same range. The solution is to employ a colour management system and to calibrate each component so that what you scan looks the

same on the screen as it does on the printed page. These systems will also warn you if you're trying to reproduce a colour that's beyond the printer's capabilities.

Clone zone

Regular readers know I love retouching photographs: sensibly eliminating dust and scratches, or stupidly adding moustaches and extra noses to my nearest and dearest. Whatever retouching you're doing, there's one big tip that will make your work considerably more convincing.

More often than not you'll want to paint with the same colour as found in the region of your work. The obvious thing would be to use the eyedropper tool to pick up a nearby colour and just carefully paint with it. The trouble with this is that you are painting with a solid colour over a subtle but clear pattern of natural texture photographic grain. Imagine wanting to repair a scratch over some sand, grass or a face and trying to literally reproduce complex blades, grains or skin by hand.

Fortunately, most paint and retouching applications offer a clone tool which literally copies a small area and allows you to paint with it. The idea is that you grab a bit of skin near the scratch, say, and paint over the scratch with it: you retain all the texture and photographic grain. It's quick, easy, and utterly convincing with a bit of practice.

Try regularly to pick up new areas with which to paint, since pattern repetition becomes obvious. And besides, the area you're painting over is often changing colour and brightness.

Making selections

Selecting areas in photographs can be a little tricky. It's done either by grabbing similar colours or by manually drawing around the desired portion. Charmingly-named Magic Wands are used to select areas of similar colours to a user-defined tolerance, while those with a steady hand may want to draw a shape manually or use editable vector paths.

Learn the lingo

Every specialised subject area attracts equally specialist jargon to describe it. Typography alone has numerous terms such as leading (pronounced "ledding"), kerning and point sizes.

Points (pts) are the standard units of size in graphics and 72 points make up one inch. While it's correct to describe a one-

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inch thick line as being 72 points thick, a 72-point character falls short of one inch in height. This is because the measurement of type takes into account a small amount of space above and below the character itself.

Leading refers to the amount of space in-between lines of text. It gets its name from the days of hot metal printing when strips of lead were inserted between lines of type to separate them.

Kerning is the adjustment of space between individual characters, while tracking is applied to an entire block of text. Adjacent capital A and V characters usually need a little kerning to bring them closer together (see page 275), while applying even a tiny amount of tracking across a page of text can often squeeze in many more words.

Which bitmap format?

A bitmap image is basically a grid full of coloured dots, and a bitmap file is just a header describing the size, shape and colour depth of the grid. A footer confirms the end of a file, with a wad of noughts and ones sandwiched in-between describing the colours of the dots. Since many dots are of similar or even identical colour, it's possible to describe several in one go, thereby saving memory.

Compression of this kind can save loads of space and can be employed with varying degrees of ruthlessness. LZW, or run length encoding, will only describe bunches of dots if the colours are the same, offering moderate but full-quality, lossless compression. Most bitmapped file formats offer LZW or RLE compression as an option, while the GIF format employs it as standard.



Manually choosing a monitor may be the only way to get rid of your flickery display



A final blatant excuse for a personal photo: Gordon Laing considers life after Graphics & DTP

JPEGs support 24-bit colour and variable levels of lossy compression. This means information is lost forever, so save images as a JPEG at your own risk or keep an uncompressed TIFF version for backup.

As far as compatibility is concerned the classic TIFF format rules, supported by virtually every application across almost every platform.

Sort your system

Flickering displays, or those set to run at unnecessarily low resolutions in few colours, really wind me up. The real pain is there's rarely any need to spend extra money: it's just a case of a system being supplied without having been properly set up.

For a flicker-free, steady display you want a refresh rate of at least 70Hz and a non-interlaced mode. Many computers, capable of much higher specs, are supplied running at a flickery 60Hz. So what can you do about it?

First, check your Display properties and see whether your specific graphics driver has left a convenient refresh rate control. If there's no sign, have a look for a suitable monitor or display utility that may have been installed with your graphics drivers, usually hanging around in the Programs sub-menu of the Start menu.

Infuriatingly, plug-and-play monitors rarely help. To prevent them defaulting to 60Hz, you may have to specify a different monitor model than the plug-and-play version selected in your display properties. Check your monitor specs and choose something similar: most new 15in or 17in monitors can display a resolution of 1,024 x 768 non-interlaced at 70Hz or higher, so you could choose something like an NEC

4FG monitor which has the same specs. This somewhat backhanded method can sometimes be the only way to trick your system into selecting a higher refresh rate. If your monitor has any difficulty in displaying the settings you've selected it will go blank for a few seconds, but hopefully return with your old settings. If it doesn't, restart your machine in safe mode, change the settings back and restart.

You have to laugh

Rule number ten is simple, and one which I hope has become obvious during the years I've been writing this column: make sure you have a laugh! While designing serious fax headers or page layouts, remember to take time out to create greetings cards, calendars or just muck around with someone's photo.

What you can achieve with a modest PC these days is utterly remarkable in terms of professional quality and, more to the point, great fun.

I hope I've answered your questions, dispelled a few myths and perhaps put you on to a few ideas. Most of all, I hope you've enjoyed reading the columns as much as I've enjoyed writing them, and thanks for putting up with the blatant excuses I've made for slipping my photo in at every opportunity.

So, ladies and gentlemen, "Gordon Laing has now left the building...", but he'll hang around as Features Editor for a while.

PCW Contacts

Any questions, tips or suggestions? Write to the usual PCW address, or email graphics@pcw.co.uk.



Putting on the style

Gordon Laing goes typetastic and puts fonts on the presentation catwalk with a style to suit any occasion without being over-dressed. But beware of font overload on your resources.

This month I'm returning to our old friends, fonts. Yes, I've been away from the subject for a while so it's time to have another look. Rather than delve into formats and character maps, I thought it would be worthwhile to go back to design basics and consider which typefaces are best suited to which tasks. But first a little graphics news.

The big story this month is the unbelievable release of Adobe Illustrator 7 for Windows! Yes, the high-end drawing product we all thought had been abandoned for good on the Windows platform has made a surprise reappearance in a brand new version. It has been brought up to date with the Mac, too.

As if that weren't enough, Adobe has also announced new versions of its Streamline tracing utility, and Dimensions, its wonderful 3D modelling tool. And equally surprising, they're both available for Windows as well as Mac. I'm particularly excited about Dimensions as it is one of my favourite graphics apps, and this is its debut on the Windows platform.

At the time of writing, Adobe wasn't entirely certain how it was going to package, bundle or price the three products, and at the press announcement

we suggested that in a Corel-style move, Dimensions and Streamline should be available separately but both bundled free with the larger Illustrator. Somehow I doubt this will happen, but thanks to the magic of magazines, publishing and staggered printing, we have a full review of Illustrator and its new companions in this very issue of PCW. Remarkable!

What's your type?

A wise person once said: "Typographic arrangement should achieve for the reader what voice tone conveys to the listener." No matter how powerful the written words with which you are dealing, the font style, the type size and the arrangement of these words on the page can make or break your message.

If you want someone's attention, huge characters may not necessarily be the best approach. An enormous amount of empty white space with tiny type in the middle may be more striking. A long line of text may bore or confuse the reader, who will end up looking elsewhere. Try playing around with the leading (space between lines of text) and the kerning or tracking (space between individual characters), both of which can make a difference to how your type looks.

How about the fonts themselves? Most of us have more fonts than we know what to do with, so many people end up trying to get their money's worth by fitting as many varieties on a single page as possible. Unfortunately, not only does this end up looking like a proper dog's dinner, but often, the actual type styles chosen are totally unsuitable for the message your words are trying to convey.

A quick lesson in style is to try to stick to the least number of fonts as possible on a single page. For variety, use different weights from the same family: set a headline or attention-grabbing text in bold, for example. Take the Helvetica, Arial or Futura families for instance, which consist of many different weights of type, from stick-thin to the fattest, boldest characters you've ever seen. Because they're based on the same shapes, they work well together.

Once you've toyed with the idea of trying different weights of the same font, you have to decide what style of font you're going to go for. Should it be official-looking, ornate, twirly, messy, quirky, neat or abstract? This, of course, is down to what you've written and the kind of response you want from the reader. A company report shouldn't really be in anything other than a nice, respectable font, whereas a party invitation is the ideal place to try out all those letters made from sausages and bananas. On the other hand, a serious message in a trivial font, or vice versa, can offer a striking contrast that is almost guaranteed to start people thinking.

The best advice is to try many combinations until you get the effect you are looking for. It is also a good idea to show it to other people in order to judge their response — which is often unexpected!



Adobe Illustrator 7 remarkably arrives for Windows, and is reviewed in this issue

Suitable	Not so suitable
Annual Report	Annual Report
Cool Designs	Cool Designs
It's party time!	It's party time!
Mushroom flan	Mushroom flan
TRENDY RECORDS	Trendy Records
I hereby resign	I hereby resign
Final Demand	Final Demand
I love you	I LOVE YOU

It's a matter of taste what fonts you want to use for which effect, but the above may give you some ideas of occasions when one may be more suitable than another. From the top: • The Annual Report of a large, official company should probably be set in a serious font like Times, as opposed to the Orange font, which looks a little trivial. • A cool design company may want to use a trendy font such as Meta, rather than conservative-looking Times. • If it's party time, you can wheel out wild fonts like Twang and avoid the somewhat staid Palatino. • The handwriting-styled Elli is perfect for food descriptions, whereas plain Helvetica just sits there. • Dolce Vita was used by the trendy record label Talkin' Loud, which wouldn't be seen dead using New York. • When it's time to resign, a sober font like Palatino, perhaps italicised, would be better than Mekanik — unless you're a type designer, of course! • No-one likes receiving final demands, which is why Courier, looking like a machine, is more suitable than the rather pally BrodyEF. • The phrase "I love you" should never really be typed, but when it must appear in print, a nice script font like Pablo (based on Picasso's own handwriting) would be far better than the rather sinister-looking TapeType. (All these fonts are available from FontWorks.)

Type trouble

Type can cause you trouble even before you start using it. I'm talking about the actual font files themselves and what they are doing to your precious system.

Many graphics applications offer a generous quantity of free fonts which you may, understandably, decide to install... after all, they are free. However, all font information sits in your system files, which occupy precious memory.

If you've got hundreds of fonts and are wondering why you keep getting all those "out of memory" messages, then you may

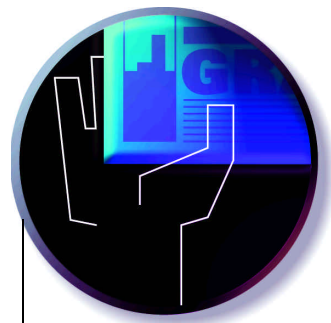
want to embark on a bit of Spring cleaning. Many utilities, including Adobe Type Manager, allow you to organise your fonts into groups.

Sometimes there's the facility to disable fonts, too, which could benefit your system's performance.

PCW Contacts

Any questions or problems? Contact Gordon Laing at the usual PCW address or email graphics@pcw.co.uk.

FontWorks 0171 490 5390



Get the picture?

Gordon Laing show us around the gallery of graphics file formats. Exhibits include TIFF, GIFF, JPEG and PCX and our critic gives the low-down on the pros and cons of each.

This month I ask the question: "Why are there so many different graphics file formats?" but I'll make it interesting... honest! There's more than one way to describe and store a picture, and some formats are better than others for different applications. Maybe you want the highest quality, the greatest compatibility, the most flexibility, or perhaps the tightest compression. Whatever, there are lots of graphics file formats out there and it can be a real maze finding your way around and deciding which is the best for you. Hopefully, by the end of this month's column you'll have a much better idea, and be able to make the right choice from that currently imposing Save As dialog box.

Computers are happiest handling digital information, which is either on or off, with no mucking about with maybe, perhaps or sort of. The easiest way for a computer to handle images is with a bitmap description, which is nothing more than a rectangular grid of coloured dots. The grid can be of any size, and the dots or pixels any number of possible colours. The quality of a bitmapped image is down to its number of

dots (the resolution) and colours: the higher the resolution, the greater the detail; the more colours, the greater the smoothness of shades and perceived realism.

The number of possible colours is dependent on the number of bits allocated to each dot or pixel. The simplest number of colours is monochrome (black and white) which can be described with a single bit of information per dot or pixel. Eight bits per pixel offers a choice of 256 colours (calculated by 2^8), 16 bits per pixel can supply 65536 colours (2^{16}) while 24 bits per pixel boasts a whopping 16,777,216 colours (2^{24}). Clearly, a bitmap file in 24-bit colour is going to be three times bigger than the same size bitmap in 8-bit colour, or 24 times bigger than the same bitmap in black and white. Full-colour photographic images look best in 24-bit colour, but some images like logos or screenshots can get away with 16- or 8-bit colour, saving storage space and processing time.

The higher the resolution, the greater the detail captured, but bear in mind that more dots or pixels mean a physically larger file occupying more storage space and taking

longer to process. That's why high resolution, full-colour images are so large.

Bitmaps are everywhere. Your on-screen Windows or Mac desktop is a bitmap image, typically at a resolution of either 640 x 480, 800 x 600 or 1,024 x 768 pixels. Common screen colour settings are eight or 16 bits per pixel. The space to store these screen images is in your video card's memory which defines the maximum resolution or number of colours in which you can work. Dropping one allows you to increase the other, but if you want more colours and higher resolutions you're going to need more video memory. Two megabytes of video memory is common and capable of displaying a 1,024 x 768 pixel resolution in 16-bit colour, or 800 x 600 resolution in 24-bit colour. If you want 1,024 x 768 in 24-bit, you'll need another 1Mb or 2Mb of video memory.

After all the cunning page descriptions employed to drive printers, the final result is a bitmap image on paper. Printers typically work at much higher resolutions than on-screen, with most models offering 300 to 600 dots per inch (dpi): for a 10 x 8in sheet of paper at 600dpi this means a bitmap

measuring 6,000 x 4,800 dots; and if that seems huge, just consider that most laser printers are black-and-white devices, therefore operating at one bit per pixel. The bitmap described would only measure 3.6Mb in mono, but in full 24-bit colour it would be a massive 86.4Mb.

Fortunately, most colour printing can get away with much lower resolutions due to the involving nature of colour to our eyes. Consider your TV set, which looks great with its 24 bits of full colour but is, in fact, only operating at a low resolution of 640 x 480 pixels. The full colour and moving images distract our brain to perceive reality.

Scanners and digital cameras also convert real-life objects into bitmap images. Digital cameras usually offer one or two fixed resolutions, with the typical entry-level models offering 640 x 480 pixels in 24-bit colour. Flatbed scanners, mostly used to digitise photographs or sheets of paper, usually operate at between 300 and 600dpi, and in anything from 1- to 24-bit (or higher) colour. Like the laser printers, a 10 x 8in scan at 600dpi will produce a 6,000 x 4,800 pixel image, amounting to 3.6Mb in mono, or 86.4Mb in 24-bit full-colour.

The question of what resolution to scan at is a subject in its own right, but briefly you should use the highest optical resolution for monochrome images, but select considerably less for colour reproduction. Remember that if you're going to reproduce the image larger than real life, you should scan at a higher resolution, while if you're going to reproduce smaller than life size, then you should use a lower resolution. If you've got your own printer, it's worth scanning the same image at a variety of resolutions and printing them out to compare the differences. You'll be surprised at how small a resolution you can get away with, which is certainly worth knowing to save memory and processing time.

By now you've realised the importance of bitmap files and how large they are in terms of resolution and number of colours. But what about bitmap file formats? You've scanned your picture, or manipulated an image in something like Photoshop, only to find this huge array of options in the Save As box. Essentially, a bitmap file has only to start with a header describing the size of the bitmap and the number of colours it uses before a huge wad of bits follows, describing each individual pixel or dot from top to bottom, one row at a time. So what are the differences between the formats?

Bit of a TIFF

Probably the most common bitmap file format is the Tagged Image File Format, or TIFF. Originally developed by Aldus, it is one of the most compatible and widespread formats in use today. It's a fairly basic description but in certain instances can handle up to 32-bit CMYK colour for printing or 48 bits for ultra-precise RGB work. Normally eight bits is considered sufficient for numbers of grey levels but the 48-bit format allows 16 bits for extra smoothness and high dynamic range.

TIFFs can also support various types of compression, the most common being run length encoding (RLE), which looks out for portions of the image using the same colours. An uncompressed raw file would describe the colour of each dot individually, but if you've got, say, 50 identically coloured dots in a row, then a compression routine could save space by assuming that the next 50 dots were all the same shade of red. RLE routines perform this task (very effective for certain images) and, better still, do not degrade the quality of the image. This is known as "lossless compression", as opposed to "lossy compression" where there is a variable loss of quality.

TIFF also supports other compression formats which, along with the higher colour options, can sometimes cause incompatibility with lower-end graphics packages. Some can only recognise and display TIFFs up to 24-bit colour or those compressed using LZW (as used in the popular ZIP compression format).

Got DIBs on it

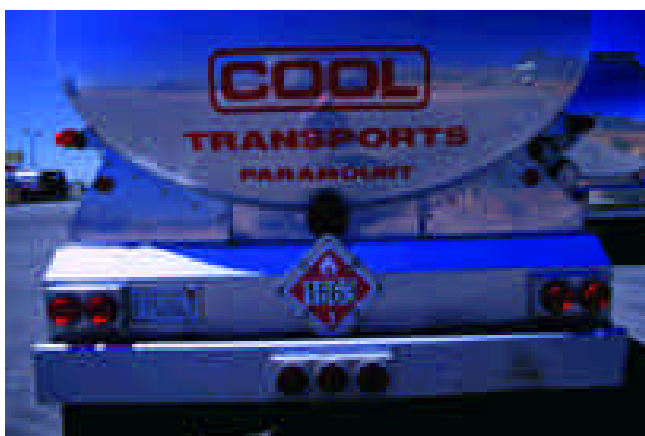
Perhaps the most obviously named bitmap format is BMP which can support up to 24-bit colour and sometimes optional RLE compression. BMPs (also known as DIBs) are, incidentally, used by Windows 3.x and 95 for its backdrops. To create a new backdrop, take your image and save it as a BMP format in the Windows folder. Next time you go to change your backdrop, this image will be available.

Like BMP, PCX (also known as the PC Paintbrush file format) can support colours up to 24-bit and compression using RLE. By now the question of compatibility will have cropped up in the back of your mind. Launch your favourite graphics application and see which formats it supports. Paintbrush, which comes with every version of Windows, supports BMP and PCX files. The very reasonably priced

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We started with a 300dpi greyscale image of 686Kb. **Left to right:** Saved firstly as a TIFF with LZW compression measuring 450Kb; secondly, saved as a JPEG with high compression measuring 47Kb; thirdly, saved as a GIF measuring 592Kb; and finally, an LZW compressed TIFF again, but this time reduced to 50dpi to measure 20.8Kb. Greyscale images are in 8-bit anyway, hence there is no loss in quality when saved as a GIF



We started with a 300dpi CMYK colour image measuring 3.81Mb. **Clockwise from top left:** The image saved as a TIFF with LZW compression measuring 2.59Mb; secondly, saved as a JPEG with high compression measuring 99Kb; thirdly, saved as a GIF measuring 430Kb; and finally, an LZW compressed TIFF again, but reduced to 50dpi to measure 74Kb. Notice how the GIF image loses subtle shades when downgraded to 8-bit

PaintShop Pro can handle almost anything you throw at it although, in my view, Adobe Photoshop is the king of file formats, capable of opening the most obscure colour spaces and compressions.

GIF it to me

The ubiquitous Graphics Interchange Format (GIF) was developed by CompuServe as a compressed format for quick exchange while online. Compression and getting the information transferred as quickly as possible is clearly very important in all online applications and the GIF was the first popular format of this kind. It employs compulsory LZW compression but sadly does not support anything above 8-bit colour. However, the recent GIF89a export filter, available for some applications, will support 24-bit RGB images and transparent areas for use in HTML web documents.

The JPEG line

Equally, if not more popular than the GIF on the web, is the Joint Photographic Experts Group (JPEG) format. To confuse matters a

little, JPEG is in fact a compression system which can be applied to any file format but typically finds itself used on images. However, there is a JPEG bitmapped file format in wide circulation, supporting 24-bit colour and using the same compression system as its name.

Prior to JPEG compression, we had the choice of RLE and LZW algorithms which worked well on simple images but not continuous-tone colour photographic pictures. JPEG was designed to better handle real-world full-colour images. It is a lossy system, which throws away pieces of information the human eye can't easily see.

When saving an image with JPEG compression, the user is given several choices of quality from low but highly compressed, to high but only compressed a little. At the highest compression, file sizes can shrink to tiny sizes, but the quality is noticeably poor. On the other hand, JPEG offers excellent quality at more modest levels of compression.

It is up to the user to experiment to see what levels of compression they find acceptable, although bear in mind that once

lossy compression has been performed, there is no going back; the discarded information is lost forever. For this reason, make sure you have a safe copy of your original image stored in a lossless format such as a TIFF, and experiment with duplicates.

We have merely scraped the surface of bitmapped graphics file formats here, but you now have an idea of what is involved. Which format you choose will depend on your particular requirements, but please bear compatibility in mind, particularly when crossing platforms or going to a very basic system. After that, consider compression in terms of storage or bandwidth — no-one wants to wait around all day downloading an image, and bear in mind that if it is only ever going to appear on-screen, you can get away with resolutions of around 75dpi.

Best of luck!

PCW Contact

Any questions? Write to me at the usual PCW address or email graphics@pcw.co.uk.



Colour coded

Don't feel blue when your on-screen colours aren't printing out right. To put you in the pink again, Gordon Laing explains why and tells you how to cope with it using colour coding.

Good news for graphics fans: our annual DTP and monitor group tests appear in this issue. The former covers low-cost products as well as the heavyweights. In our monitor test this year we have concentrated on 17in monitors only, since these make up the bulk of current standalone display purchases. Our group test is broadly split down the middle into those models featuring maximum horizontal scanning frequencies of around 65kHz or 85kHz. This specification defines the highest signal the monitor can lock on to and display. As the group test explains in more detail, there's more than just the scanning frequency involved to display a certain image.

In real terms, a 65kHz monitor will be able to display a resolution of up to 1,024 x 768, non-interlaced at a refresh rate of 75-80Hz. An 85kHz monitor will be able to display a resolution of up to 1,280 x 1,024, non-interlaced, also at a refresh rate of 75-80Hz. Again, as the group test explains, interlacing produces an undesirable image for computer applications, while refresh rates above 70Hz are considered flicker-free. In my opinion, a good monitor is essential; far more important than blowing all your budget on speed and storage. Whatever your software application, you'll be staring at your monitor all the time, so it's worth getting a good one. If you're using graphics applications, the need for a quality display is immediately apparent.

It's also worth bearing in mind that your monitor is displaying only what the graphics card is feeding it. The best monitor in the world will flicker if your graphics circuitry is

I know we're supposed to support new formats and standards but the plug-and-play monitor specification is a bit odd. It's supposed to allow the monitor to feed back its capabilities to the graphics card to stop you selecting too high a display mode, and to allow your system to arrive at the perfect setting for your equipment. But you often end up with a non-interlaced refresh rate of 60Hz at your selected resolution, which flickers.

Often the best solution is not to select a plug-and-play monitor from the list at all, instead going for a model you know matches your monitor's specs. If you can't find your model on the list, I'd recommend selecting either an NEC 4FG or NEC 5FG, which support modes up to 65 and 85kHz respectively; go for the one which matches your model's maximum horizontal scanning frequency. Now you should be able to go back into your graphics card utility and select a higher refresh rate. If you accidentally opt for something beyond your monitor's specs, the display will go blank, but fortunately Windows 95 and NT will return to your previous settings after ten seconds or so, asking which you'd prefer.

Colour coding

Colour has been the subject of numerous Graphics & DTP columns in the past, but popular demand has brought it back into the picture. It is a fascinating topic, ranging from perceptions of colour to the physics of

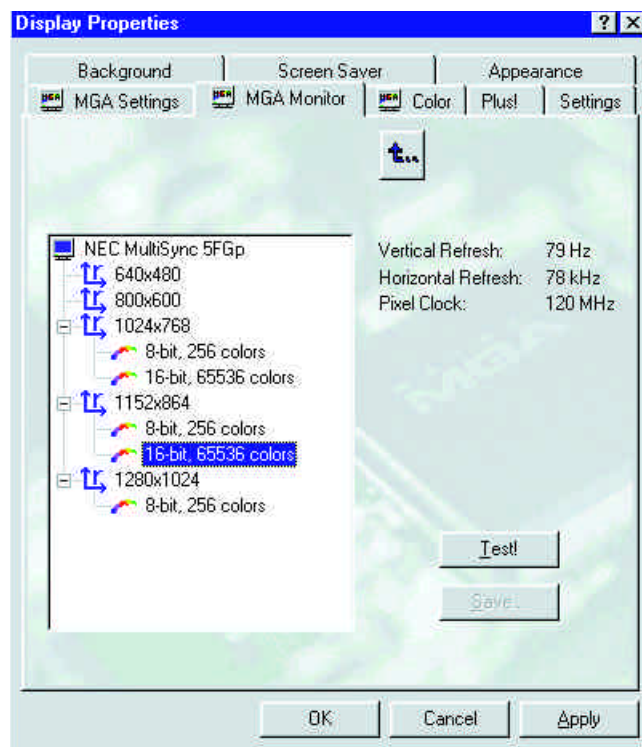


Fig 1 The popular Matrox Millennium graphics card adds its own extras to Win95's display properties. Select a suitable monitor and the card will feed it as high a refresh rate as it can handle

telling it to, so before blaming the tube in front of you, check out those display settings from Windows (the Mac OS tends to enforce a 75Hz refresh rate on resolutions above 640 x 480). You may have to use the utility which came with your graphics card, but a little nosing around here and there will, hopefully, reveal a control panel with refresh-rate settings.

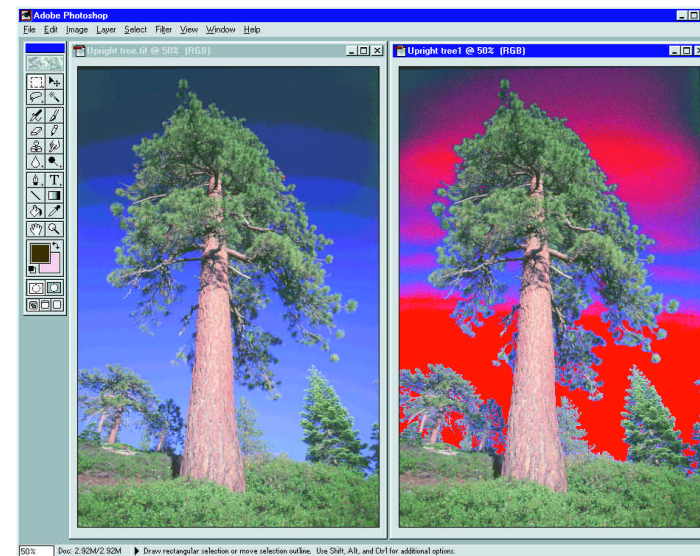


Fig 2 The tree on the left is an original RGB scan containing colours the CMYK process cannot print. A "gamut preview" in Photoshop highlights the problem areas (indicated in red on the tree on the right). The original RGB colours have been lost, as this screenshot had to be converted to CMYK for printing

light. This time it is the turn of the over-used acronym WYSIWYG (you know the one; What You See Is What You Get) and the miracle that is modern graphical computing.

WYSIWYG works to a certain extent. We all take for granted the idea of designing a page layout or even just a carefully-formatted document, and seeing it print out with the same size and styled fonts in the right places. It's fairly cunning if you examine what it entails but the whole thing falls apart when colour is involved. All you really want is for the colours you scan to be the same on-screen as when you print.

But there are two problems. Firstly, different devices (such as monitors and printers) create colours using different means and, believe it or not, many simply cannot produce the same range as others.

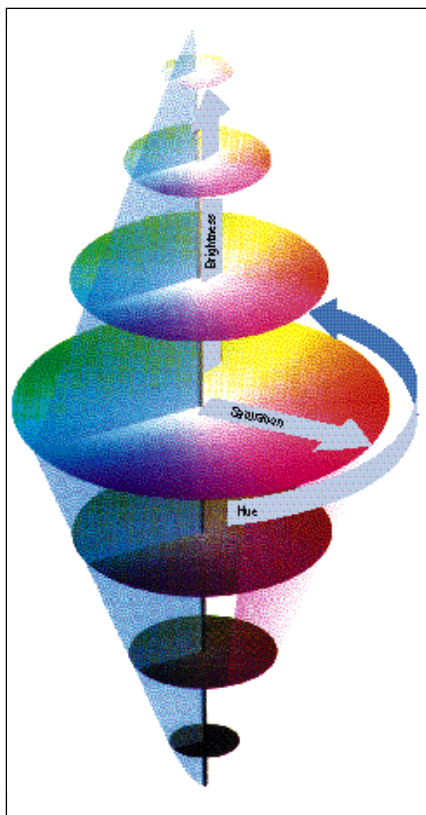
The second problem is down to your device's settings. You could have a dull red on-screen, thanks to having your brightness dial too low, and wonder why the printer is outputting a bright red. You should additionally consider that the kind of lighting surrounding you will greatly affect your colour perception. The solutions are to understand the colour capabilities of your devices, followed by calibration and compensation.

So, back to the bad news that not all devices can produce the same range of colours. Monitors produce colours by combining the light emitted by the red, green and blue phosphors on the inside of the glass tube. This is known as an additive process. Printers produce colours by using inks which absorb certain colours of light, leaving the eye to see which colours remain after reflection. This is known as a subtractive process.

It would be impractical to print different inks for each shade of every colour in your document, so a technique was developed whereby most colours could be simulated by printing various-sized dots with three colours of ink: cyan, magenta and yellow. In theory, placing equal amounts of these inks should absorb all light to give the impression of shades of grey or black, but in practice you get a muddy brown. Since black is so important (consider the abundance of black type), this three-colour printing process is usually accompanied by a separate black ink. This is a four-colour process, known by the initial letters of the inks involved, apart from black which is referred to as K to avoid confusion with B for Blue. Hence the four-colour printing process used to make virtually every colour magazine and poster is known as CMYK.

Unfortunately, the CMYK colour model is only capable of reproducing a limited range of colours. The RGB (red, blue, green) colour model is capable of a wider range but still nowhere near the complete range of the human eye. The range that a device can display is known as its "gamut", and if you try to get it to reproduce a colour that falls outside its gamut, you'll be disappointed.

It is possible to create a profile of a device's capabilities: say a scanner with reflective or transparent media, or an inkjet with shiny or plain paper. Such profiles could be used to calibrate and compensate for any imperfections (remember, the limited CMYK model is further limited by impurities in the ink and of course the paper on which it's being printed). Profiles could also be used to warn an application that you're working outside its gamut. Photoshop, for instance, can let you know if you're working



with a colour that your chosen printer has no intention of reproducing.

For this reason, many illustrators whose work is only going to appear in print don't bother using the RGB or indexed colour modes of applications like Photoshop, but instead start working in CMYK. That way, they know they're not using colours which won't reproduce when their precious work makes the inevitable conversion to CMYK.

Don't get me wrong, though. There's no need to avoid RGB modes from now on. You could be working on an image which is only ever going to appear on-screen, like a web page or CD-ROM title. Also bear in mind that CMYK files are one-third larger than RGB, so if you have your warnings activated you could work cautiously but more quickly in RGB and convert later.

Colour scanners are RGB devices with specific gamuts, too, which begins to make you wonder how any of the colours on your prints even remotely resemble those with which you started. There is a light at the end of the tunnel, however, with colour management systems (CMS).

A CMS system lets you measure the gamut of your devices compared to a standard colour space, such as the CIE model (Figs 3 & 4). To measure a device's gamut, you must scan, display or print a standard reference target, typically consisting of many natural colours, and compare it to a

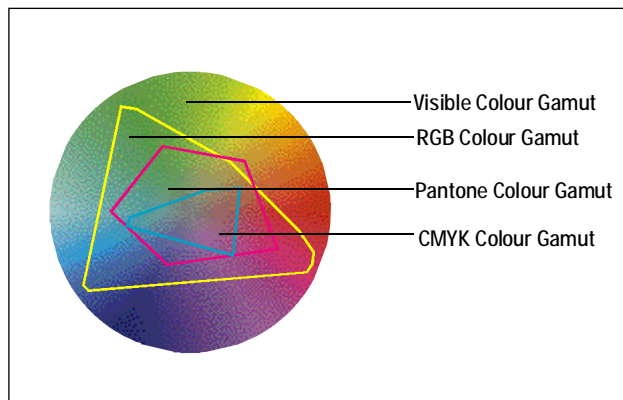


Fig 3 (far left) The CIE colour model of hue, saturation and brightness from which most colour pickers are derived

Fig 4 (left) A section of the CIE model overlaid with the ranges (gamuts) supported by various processes. Notice how some gamuts are wider than others

reference "perfect" version, usually supplied on disk with the target. The differences between the original and what your device produces can be used to make a unique profile, or tag, which can then be used to correct for that device's characteristics.

What happens is that an original bright red may be reproduced by a device as dull orange. This is incorporated into the profile for that device, which tells the CMS to take dull oranges from that device and turn them into bright reds. The CMS can, in some instances, modify your graphics card's output to make your monitor reproduce colours as accurately as possible.

If you're serious about colour matching, it's worth employing the aid of a CMS and regularly calibrating your system. Many decent graphics applications come with a CMS; either one of their own or, quite commonly, one devised by Kodak called KPCMS. My particular favourite is Agfa's FotoTune, which allows you to create profiles for each device and use them as exports or filters in Photoshop to convert RGB files into CMYK.

Alternatively you could use spot colours, like those offered in the standard Pantone library. Pantone offers a catalogue full of colour swatches from which you choose the ones you want: pure ink which produces a pure, solid, known colour without all that faffing around mixing cyan, magenta and yellow and wondering whether it's going to turn out right. There are many spot colours which exist outside of the CMYK gamut, allowing you to print, say, bright green, metallic silver or gold.

As explained earlier, using one ink per colour is only practical if your document consists of less than, say, four colours. However, many magazine covers and posters add one or two spot colours to their existing four-colour CMYK printing process for impact, to provide vibrant colours which liven up the image.

If your budget can stretch to six inks but you're not bothered about spot colours, you could consider using colour systems like Pantone Hexachrome, a six-colour process with a wider gamut than CMYK. Pantone also offers a CMS called ColourDrive for Windows 95 which I'll cover in detail, along with Agfa FotoTune and Kodak Precision CMS, in a forthcoming column.

Digital update

Last month I tried out Sony's consumer DSC-F1 digital camera and reckoned it was the best in its league. Bear in mind "its league" involves a working resolution of 640 x 480 pixels, which may not be sufficient for some needs. The optional DPP-M55 colour printer didn't arrive in time for my review, but I've since had a chance to play with it.

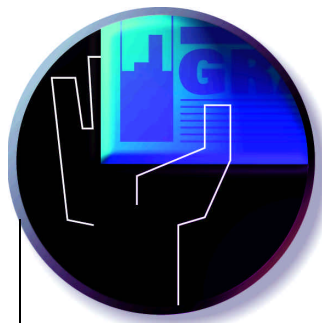
Printing from the camera is easy: select the images you want from the DSC-F1, select Print from the menu, and point the camera at the printer. A little infra-red beaming later, and the printer does its thing. It takes just over a minute for the print to arrive, which isn't bad for dye-sublimation technology. As you'd expect from continuous tone dye-sub technology, the colours look excellent; just like real glossy photos. However, even at the small printing size of 113 x 84mm, the low 640 x 480 pixel resolution is quite apparent, particularly so with regards to fine detail.

Digital photography is not yet quite there for many users, but the novelty of making your own colour prints minutes after taking the original photos is certainly pretty cool.

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Retouch and go

Gordon Laing shows how to save what might have been the perfect photo, ruined by blots on the landscape: don't bin it, scan it, and use every trick in the book to total unwanted tourists.

This month, I finally get to bore you with my holiday snaps, thinly disguised as a feature on the tricks and morals of photo-retouching.

But first, the news. Intel's Pentiums with MMX enhancements have finally been announced, so in last month's *PCW* we tested eight MMX PCs. We tried out Adobe Photoshop 4 and CorelDraw 7, both featuring MMX code, on a Pentium 200MHz with MMX. We timed filters, image rotations and colour-mode changes under Photoshop and a screen redraw of Corel's Snowbarn file at a resolution of 1024 x 768 in 16-bit colour. We then swapped the MMX chip for a standard 200MHz Pentium without MMX, and repeated the tests.

The Photoshop results showed speed increases of up to 45 percent, but Corel's faster redraw was thanks mostly to MMX's doubled Level-1 cache. Slightly disappointed, we later discovered that the graphics-card drivers will have to be updated to make use of MMX chips, and only then will we see redraw improvements.

Those wanting a top-of-the-range PC

today, particularly for multimedia applications, should go for an MMX model. But the rest of us should be content to wait until we're running mostly 32-bit apps under NT4, then make the more significant upgrade to a Pentium Pro chip — soon to be seen with MMX enhancements too.

Anyone seeking a major hardware upgrade for graphics work should still consider more RAM before plumping for a faster chip. The photo-retouching I describe here involved working on 28Mb files, using a PC fitted with 32Mb. By the time Windows 95 and Photoshop had their share, the system almost ground to a halt. After one very slow day, I took 32Mb of RAM from my home PC to boost my work PC to 64Mb. The difference was amazing, with operations taking mere seconds rather than minutes.

As my main subject this month involves photography, this is a good time to mention digital cameras. Users of Casio's popular, but slightly toy-like, QV-10a and QV-100 cameras may be interested in considering third-party lenses. The Kerridge Computer Company offers a kit for either camera,

featuring a 1.5X telephoto and 0.65X wide-angle lens for £64 (plus VAT). A 2X and 4X macro lens kit is also available for the QV-10a at £64 (plus VAT), while a 2X-only macro lens for the QV-100 costs £49.50 (plus VAT).

Kerridge also offers a lighted base and stand, to photograph transparencies with the aid of the optional macro lens. We haven't yet had the opportunity to test these products but those still making their choice of digital camera could do worse than opt for Sony's new DSC-F1, reviewed in this month's First Impressions (*page 70*). It's a 640 x 480 pixel model with flash, LCD display, infra-red port and the kind of sexy styling at which Sony excels, for £595 (plus VAT).

The morals of manipulation

When I was 14, I stopped mucking around and started taking serious photos. I remember recoiling in horror when I first saw one of my photo pals use a filter: rendering the sky that graduated shade of tobacco so popular in those days. But now,

this picture would be inaccurate! The event had not been recorded properly and anyone looking at the picture would be falling for a lie!

Suffice it to say, this extreme response disappeared as soon as I had a go myself. Suddenly, photography had become much more than just finding something nice-looking, pointing the camera at it and clicking. It had finally dawned on me, the number of ways in which a photographer could manipulate a picture without even changing position or lenses. More to the point, it became much more fun.

Later, I found myself spending much longer in the darkroom than outside taking the pictures. Dodging and burning to bring out otherwise hidden details became an obsession. As regular readers will know, my darkroom now resides within my PC and applications like Photoshop, but the principles, goals and morals still remain.

A touch of professionalism

Digitally painting out dirt and scratches can be seen by all as beneficial. You can selectively darken, lighten or even recolour areas of a picture, even though some may consider this to be cheating a bit. Take a one-off trip to a far-off land, for instance: an otherwise perfect photo could have been marred by an overcast sky. Many would consider themselves fairly beaten. But while there's nothing better than capturing the perfect shot, first time, there's still no need to bin a less-than-ideal pic. Why not scan it in and add a blue sky? Or at least darken the area to bring out more detail in the highlights? You may at first share the same horror I experienced when witnessing my first filter, but if you can get over this you'll never look back (the professionals use every trick in the book until they get the picture they want).

This neatly brings me to the biggest graphics job I've ever completed: printing a collection of holiday photos taken during the past two years. Wanting the very best final results, I chose to use professional slide film: Fuji Velvia (50 ASA) and Fuji Provia (100 ASA). Choosing slide film, however, proved to be a bit of a mistake since the 10in x 8in prints I desired were going to cost over £10-a-go at professional labs. Besides, I had originally wanted 12in x 8in prints to show the full 35mm frame, but these had been even more expensive. Consequently, the processed slides just sat there in their sleeves... until now. Towards the end of last

year I decided to use my PC to scan the films and print them out the next time I got my hands on a decent colour printer. At the same time I could make any digital enhancements I desired.

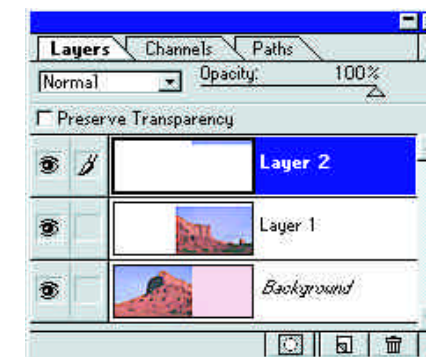
Admittedly, I'm still not keen on the idea of selecting an overcast sky and replacing it with deep blue (the guilt still twinges, deep down). Nevertheless, I suddenly found myself to be not so bothered about man-made aberrations in my otherwise perfect field of view: those horrible signposts, telephone wires, fences, tracks, or even stray holidaymakers, could be easily wiped out using my PC.

Look — can you see the join?

Of course, you should still try to make life easy for yourself by trying to line up your shot to minimise the amount of post-processing work required. For instance, I once came across an extremely long fence crossing my entire field of view; I couldn't climb it, so instead I walked right up to it and pointed the camera along it. There's still a nasty fence to get rid of, but rather than crossing my entire frame, it only measures a couple of millimetres wide.

I also saw opportunities to digitally join two photos to produce a panoramic shot. Here, the usual tips apply; try to use a tripod, or lean on a fence to make sure the shots line up vertically. In one case I had to make do without a support and discovered later, at the joining stage, that the shots were about ten percent off so one of them needed an extra portion of sky. But after a little copying, pasting and smudging between the joins, I am pleased with the results I achieved.

Incidentally, there is an excellent tutorial on the CD that comes with Photoshop 4, which shows how to create a complex



Far left Utah's Monument Valley is just begging for a panoramic shot. I took two photos with my 35mm camera and stuck them together using layers in Photoshop 4 (above)

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Clockwise, from top left: Central Park with a lamppost, then without. My terrifyingly white legs... but hey, who are those two blokes by the rock? I'll get rid of them! Monument Valley by moonlight and a cunning car headlight trail; but perhaps it looks better without? A tranquil Californian beach scene... but hang on, spot that fella with the rucksack? He's history! All the above retouching was easily done with Adobe Photoshop's clone tool

panoramic shot, taking multiple frames and foreground parallax into account.

Before letting my photos and their captions do the talking, a short word on the PC hardware employed. I needed an excellent 35mm film scanner and was not let down by the superb Nikon Super CoolScan, a 2700dpi 36-bit model which quickly produced 28Mb (maximum) files. This was connected to an Adaptec 2940UW SCSI card, which also controlled a

secondary 2Gb Quantum SCSI hard disk.

The 166MHz Pentium PC I described earlier was fitted with 64Mb RAM. I used Photoshop 4 under Windows 95 and, to maximise performance, set Windows virtual memory to 2.5 times the amount of RAM for both minimum and maximum quantities, thus preventing Windows wasting time resizing its swap file. I also set Photoshop's scratch disk to the physically separate Quantum hard drive, independent from the

drive that Windows was using for its own virtual memory. I can't wait to go away on holiday again!

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