

Digital DARKROOM

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CHAPTER 1

Setting up a digital darkroom

Whether you're starting from scratch or augmenting your current workspace, the basic tools you'll need for a digital darkroom are a computer, a monitor screen and a printer. You'll also need backing-up systems and, possibly, a scanner.

A calibration device will help you keep the colour and tonal rendition of the monitor screen consistent. There must also be a workspace for setting up your equipment and appropriate editing software.

Your workspace

Whether your workspace is a permanent setup or a collection of portable devices, they must be able to perform the required tasks. While there's no need to work in total darkness, subdued lighting is best for image editing.

Once you've established your requirements, turn to individual components, starting with the computer.

Computer requirements

Regardless of which operating system you use – Windows or Mac OS – a desktop computer provides the best 'bangs for the buck' for power and

flexibility, although a laptop can suffice. Many photographers use a laptop plus a graphics tablet for basic editing while travelling and shooting on location.

If your existing computer isn't adequate you can upgrade one or more sub-systems (CPU, RAM, graphics processor or storage). Concentrate on processor speed, the amount of RAM (random access memory) and the ability to handle graphics.

The best processors (CPUs) have similar specifications to processors used in gaming computers. A quad-core or higher processor with a clock speed of 3.5 GHz to 4.0 GHz is a good starting point.

Gaming computers should also have graphics processing units (GPUs) powerful enough for image editing. You also need at least 16GB of RAM (random access memory) to handle the data throughput – although 32GB of RAM is the 'sweet spot' for serious photographers.

Make sure there's enough storage space for the image data. The built-in solid state drives (SSDs) should be adequate for data coming from the CPU and GPU, and most systems include



Your workspace can be based on a laptop computer when you need a set-up that can be used on location and while travelling. (Image source: EIZO.)



Portable graphics tablets are handy for on-the-spot editing when travelling or on location shoots.

hard disk drives (HDDs) for longer-term data storage. You may need a separate back-up drive for storing work in progress plus another for archiving original files. Back-up drives are essential when working on a laptop.

Monitor requirements

The first rule is: don't let direct light fall on the monitor screen. Direct lighting reduces contrast, fades colours and creates unevenness that can make it impossible to edit properly.

Your monitor is a critical device. It must display an adequate colour range and

reproduce the hues and tones in images with consistent accuracy. That's a big ask – as we'll outline below.

Laptop users are stuck with the monitor attached to the keyboard. While the latest OLED (Organic Light Emitting Diode) screens produce impressive-looking images, they can be expensive and difficult to calibrate and they can't display as high a dynamic range as some advanced IPS (In-Plane Switching) screens. Most photographers prefer high-end traditional LCD screens with IPS technology which can reproduce rich colours.

Some people – particularly laptop users – opt for a supplementary desktop monitor for editing, and ‘park’ editing tools on the laptop’s screen. Dual screens make cut-and-paste editing easier and also allow you to have multiple views open simultaneously.

When choosing a monitor, prioritise colour accuracy over pixel count.

Most software is designed for screens with a native resolution of 1920 x 1200 pixels. At this resolution, text will be reproduced at a comfortable viewing size.

While Quad HD (2560 x 1440 pixels) and UHD 4K (3840 x 2160 pixels) screens will resolve more details, the text may appear too small to be readable.



This illustration shows a professional-level monitor with a shading hood fitted to prevent stray light from falling on the screen. (Product image source: EIZO.)

The Settings menu in the computer should allow it to be adjusted.

Check the screen's colour space. All monitors should be able to display the 'universal' sRGB colour space but they may not cover the Adobe RGB colour space, which encompasses a wider colour gamut. More colour information is preferable when images will be printed. Other colour spaces are

Monitor checklist

When shopping for a monitor, follow these essential steps:

1. See how much you can enlarge a picture on the screen before individual pixels become visible.
2. Check the display's angle of view. Although most of the time you'll be looking directly at the screen, it can be handy to have a display that provides an accurate view for people who view your image from one side when you're working on it.
3. Move an image from side to side and top to bottom of the desktop, watching for changes in colours, brightness, contrast and sharpness. A good monitor should maintain consistency in all four parameters throughout the display area.

only supported by high-end professional cameras but very few printers.

For video, sRGB is the default colour space but videographers should also consider the professional DCI-P3 ('P3') option or Rec. 2020, which is designed for 4K high dynamic range (HDR) displays with high colour depth, such as OLED TV sets. Neither is common in amateur equipment.

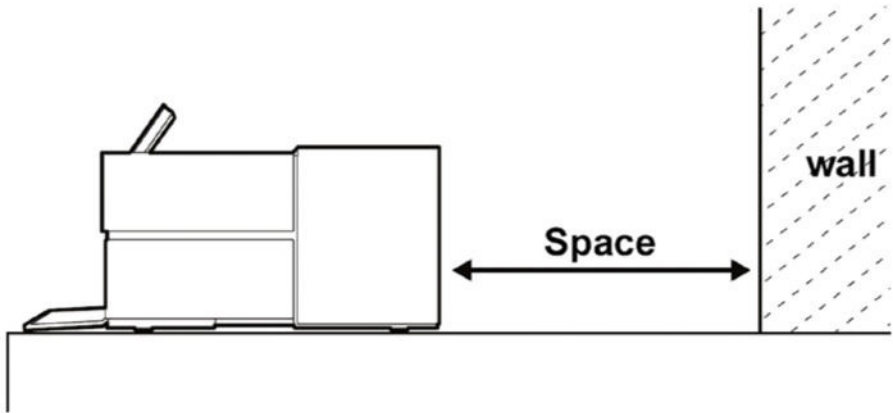
Monitors require regular calibration (see Chapter 3) because screen parameters 'drift' over time. You must be able to adjust brightness ('luminance') and contrast ('gamma'), colour temperature and set the 'white point' (native tint) of the screen. Note: Check monitors before buying as some are sold with one or more of these controls locked, which prevents accurate profiling.

Printer requirements

The three key factors to address when choosing a printer are: the space available for setting it up, the size of the prints you want to make and the surfaces on which you want to print.

Space: Check the footprint (the desk space covered) of the printer in the specifications list and note much space you need to leave for paper to pass through the printer. If the paper hits something while it's being printed it will probably buckle and crease.

Size: While most office printers produce A4 output, desktop photo printers come in two sizes: A3 and A2.



This diagram shows the space required behind an inkjet photo printer to allow paper to pass through as it is printed.

A3 printers can make prints up to 329 mm wide, while A2 printers can extend to 420 mm wide prints.

Most printers can print on longer papers than standard cut sheets using Custom paper settings in the printer driver. A typical A3 printer can make panoramic prints close to a metre long, while an A2 printer extends that to around 1.5 metres.

Surfaces: Inkjet papers typically fall into one of two surface types: glossy or matte. Glossy media include 'lustre', 'semi-gloss' and 'pearl' surfaces, while the matte classification covers everything from smooth to textured 'fine art' papers and also canvas. Your preferences can influence the type of printer inks used: dye or pigment (see Chapter 7).

Note: Some printers come with 'starter' cartridges that have just enough ink to fill the ink lines between the cartridges and the print head, and allow users to make a couple of prints. It's worth checking the printer you plan to purchase as you may need to buy extra cartridges when you buy the printer.



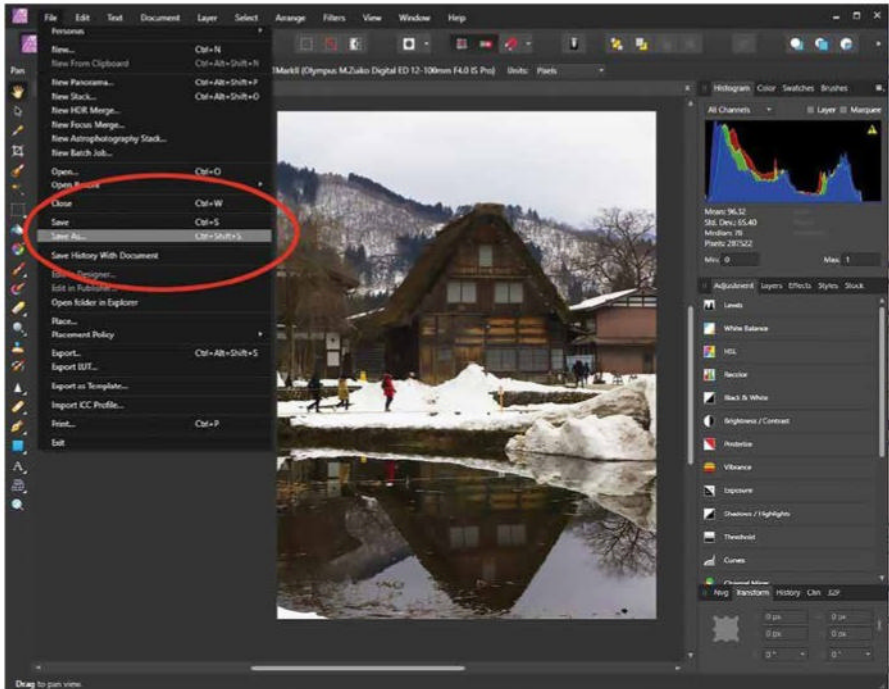
Useful links

Is your monitor good enough?

www.bit.ly/pg32-2

Choosing a printer

www.bit.ly/pg33-1



Affinity Photo has three saving options, one of which will save the 'history' of the adjustments you've made. The file is stored in a proprietary format, which allows you to resume editing where you left off. Note: this option will create much larger files than regular JPEGs.



Portable SSDs are particularly useful for videographers who need to share large files securely between different members of a working team.

Recordable media

Recordable media range from the memory cards you use in cameras and smartphones through to sophisticated RAID (redundant array of independent disk) systems and network attached storage (NAS) which relies on having a separate computer dedicated to data storage. Both systems include multiple bays for housing individual hard disk drives.

While memory cards can be great for temporary backups while the

photographer is travelling, the files should be copied to permanent storage once the trip is over. USB thumb drives are good for temporary backups, particularly of works in progress. But files should always be copied to long-term storage once editing tasks have been completed.

Additional storage drives provide an easy way to store extra copies of files. USB cables make them easy to connect, and **portable drives** are popular with travellers as they're small and light but convenient for backing-up files in transit.



USB thumb drives are great for transferring files between devices, while portable solid state drives (SSDs) provide excellent temporary storage for image and video files while travellers are on-the-move.

Competition with low-cost cloud storage plans has reduced the prices of **external hard disk drives (HDDs)**. Magnetic drives remain cheaper and their capacities are greater than the more compact and durable **solid state drives (SSDs)** which are replacing them, although they're still popular for computer-attached back-up storage. Provided they are conscientious about backing-up, most people only need a couple of external drives.

RAID and NAS systems are popular with professionals who have huge quantities of data to store. They usually come with software for controlling the storage system and can be set up to backup files automatically.

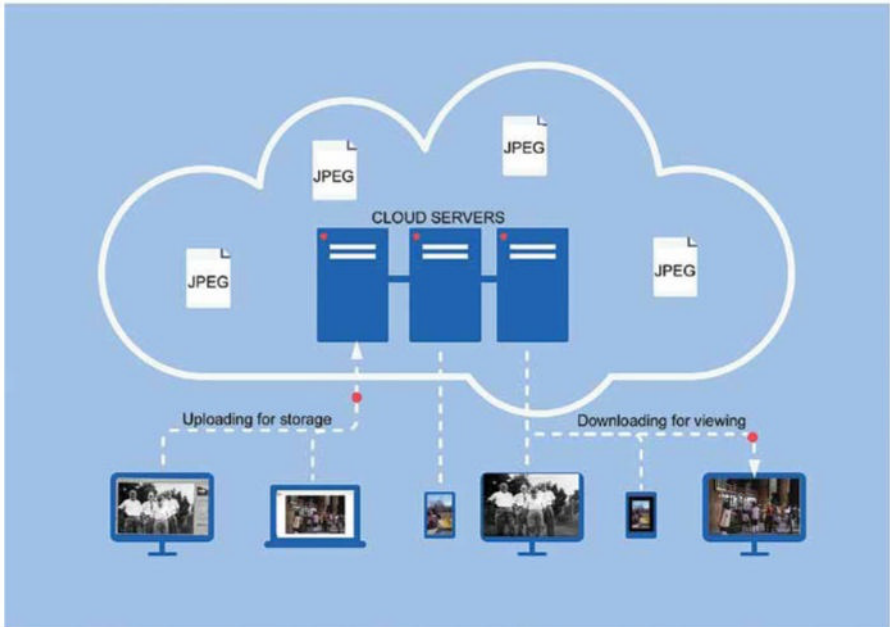
Magnetic HDDs typically remain reliable for between five and 10 years and will fail mainly because their moving parts wear out. In contrast, SSDs generally last for more than 10 years and fail as a result of data corruption due to frequent writing and erasing of files. (This can also occur with memory cards.)

Cloud storage

Cloud storage means storing data online, hosted by server banks that are often a long way from the customer. The 'hosting' company takes responsibility for keeping the data available and accessible and the storage system secure against hackers and other disruptions.



RAID and NAS systems with multiple drive bays are best suited to professional users who have huge quantities of data to store.



Cloud-based systems are best used for temporary storage and for sharing albums with relatives and friends.

Users can choose from services like Google Drive, Dropbox, Microsoft's One Drive and Apple iCloud Drive, which have different features and prices.

Companies like Western Digital often bundle 'My Cloud' storage with their data storage devices free of charge. Included software provides a web-based interface to guide the user through the setting up process and copying files to the user's personal account for subsequent viewing and managing.

The device manufacturer should keep your data safe and not on-sell your personal data. Nor should they send you spam based on the files you store or shut down without giving you notice your files will be deleted. This isn't always the case with independent services.

When choosing a cloud service check what types of files it will accept and how large each file can be. Some services won't accept raw files, while others will down-size your files or compress them. Either action would be a reason to exclude them as an option for archiving your files.

Above all: *don't view cloud storage as your only storage solution.*

Avoiding problems

No backup system is totally fail-safe, although some systems have tried-and-proven reliability.

Professional photographers use a three-fold backing up system: one copy of the file remains on the computer,

a second copy is stored on an external storage device, while a third copy is stored off-site, either in a cloud storage account or on an external storage drive. Your choice will depend on the quantity of data you need to store and how you plan to access it, when needed.

Full backups will save everything in the folder or on the drive you've selected. From then on you can rely on incremental backups at the end of each day's work. Shorter intervals will be safer when you're working on an important job but make sure the interval between backups isn't so short it interrupts other things you're doing on the computer.

On the other hand, if it's too long, you run the risk of a disk failure or computer crash that leaves you with recent files lost. Finding the happy medium depends on each individual's workflow; but it's well worth the effort.



Useful links

Organise and archive
www.bit.ly/pg33-3

Backup and print
www.bit.ly/pg33-4

CHAPTER 3

Monitor calibration and profiling

When you're editing, the monitor screen should display colours and tones as close as possible to 'real world' values. Although Windows and MacOS include basic built-in calibration utilities, their focus is on producing a usable image; not the colour accurate one you need for printing photos or editing video clips.

Calibrating your monitor and creating profiles is the best way to ensure the results of edits will match your intentions.

Monitor screens differ widely in performance and, over time, the brightness, contrast and colour reproduction of even the best monitors can drift. Calibration lets you keep track of the screen's performance.

Calibration tools

Calibration is carried out with a device known technically as a spectrophotometer, which measures light energy at various frequencies from the brightest white to the deepest black and across the red ('R'), green ('G') and blue ('B') wavebands. The resulting values are used by profiling software to create a 'profile' that characterises the output of the screen.

The two main manufacturers are Datacolor – which makes Spyder calibrators – and X-Rite – which offers i1 and ColorMunki calibrators. Both manufacturers supply the necessary software required for calibration. The process is relatively simple.



The objective of calibration and profiling is to ensure consistent colour reproduction from capture to output.

Screen calibration

Because screens take time to stabilise, you should wait until the screen has been used for approximately 30 minutes before launching the calibration software. All screen calibration instruments work in the same way: the device is suspended in contact with the front of the screen, counterbalanced by a weight that hangs down behind the display. The rest of the process relies on the bundled software.

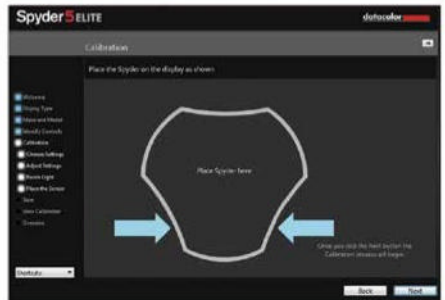
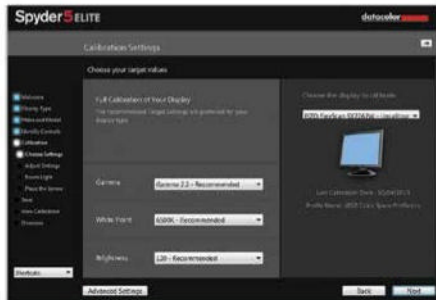
Calibration begins by setting the gamma (contrast level) for the display (in most cases 2.2 works best),

then adjusting the colour temperature to 6500K and establishing the correct black and white point luminance (brightness) levels. Then with the measurement device in place, the software measures how bright key hues are, how cleanly neutral tones (black, white and grey) are reproduced and how the brightness changes with changing input values.

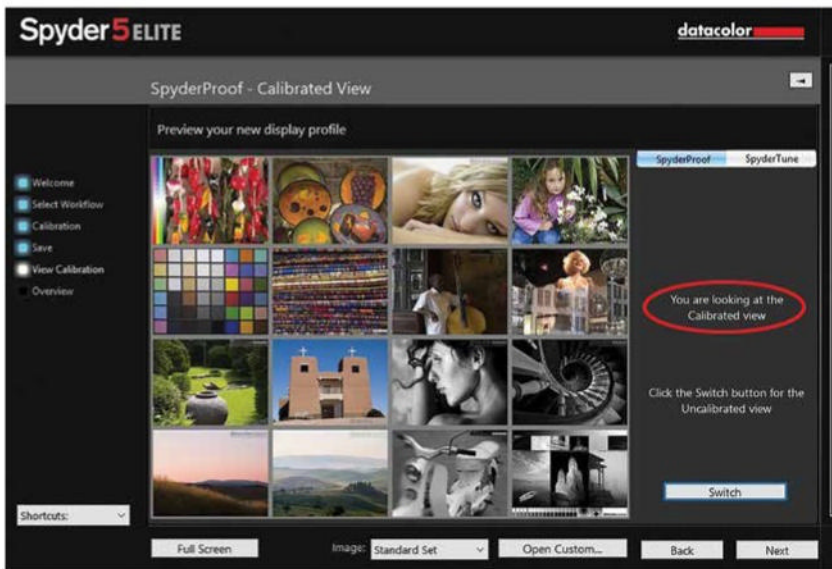
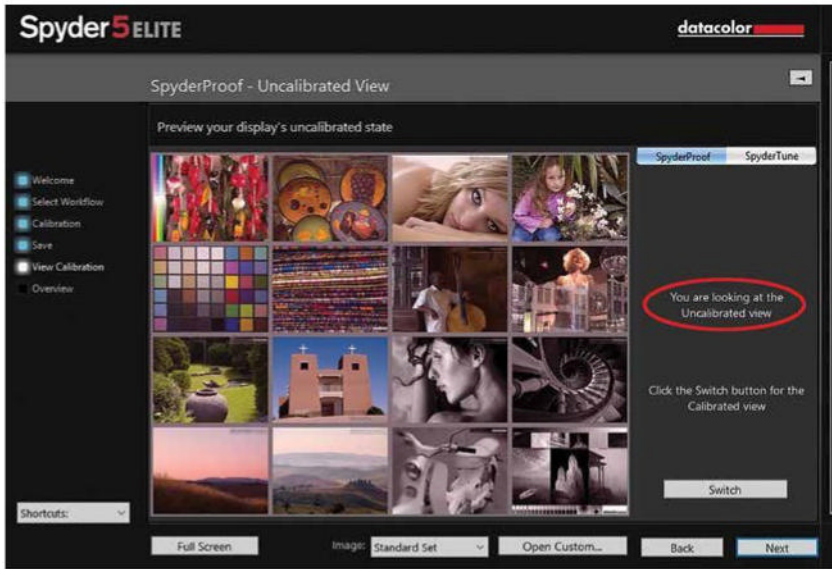
It's a simple operation that guides the user through the process, which normally takes between five and ten minutes. After the measurements are completed, the device is removed and the user is prompted to save the profile.



Room light analysis lets you see if your workspace is too bright for accurate editing.



Four frames from the software application bundled with a popular calibrator showing steps in the setting-up process.



The screen grabs above show the effects of calibrating a very out-of-balance screen (top) and the screen after calibration (below).

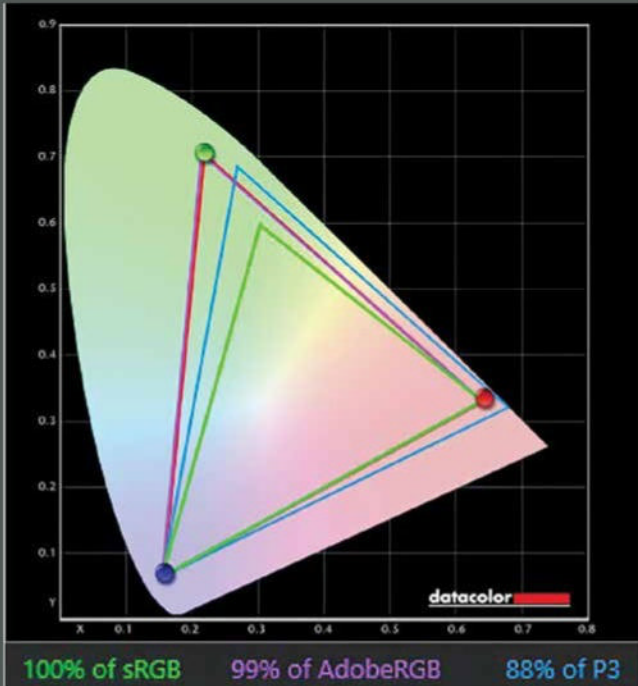
ICC profiles

ICC profiles were established by the International Colour Consortium to describe colour performance by mathematically ‘mapping’ the hue, contrast and saturation output of a specific device (camera, screen or printer). This creates a colour profile that can be used by all devices in the workflow to ensure consistent colour values.

Each profile defines the most saturated colours plus the range of tones the device can reproduce in a specified ‘colour space’ (shown in the diagram on page 18). For a screen, it defines the brightness, contrast and colour values reproduced relative to the screen’s resolution, contrast and gamut (tonal range). A printer profile will specify a precise combination of printer, ink, paper and output settings.



This illustration shows the hardware set-up for screen calibration; the measurement device is placed on the template indicated by the software, while an attached counterweight hangs behind the screen. The screen should be tilted back slightly to keep the calibrator in contact with its surface. (Source: EIZO.)



This graphic shows the gamut (colour range) for a typical monitor used for image and video editing. The sRGB colour space (green triangle) fits comfortably within the boundaries of the monitor's gamut (red triangle) showing the monitor can display all of the colours used in Web applications. The purple triangle on top of the red triangle shows the screen can cover the Adobe RGB colour space, which is used by most photographers. The blue triangle marks the DCI-P3 colour space, which is used for editing professional video footage.

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DOWNLOAD PRINTER PROFILES

ILFORD ICC Profiles are carefully developed by our skilled in-house technicians who specialise in the development of profiles that accurately reflect a true photographic image.

To download profiles relevant to your needs, select your paper range, printer brand & model from the dropdown boxes below.

If you cannot find an appropriate profile, please use the [Generic Printer Settings](#) as a guide or [Contact Us](#) for further information.

GALERIE EPSON Stylus_Pro_3880

DOWNLOAD SELECTED PROFILES INSTALLATION INSTRUCTIONS

PAPER TYPE	ICC PROFILE	SELECT ALL >
Cotton Artist Textured	IGPCAT_EFF3880_EMP.icc	<input type="checkbox"/>
Fine Art Smooth	IGPFAS_EFF3880_EMP.icc	<input type="checkbox"/>
Gold Fibre Gloss	IGPGFG_EFF3880_PSP.icc	<input type="checkbox"/>
Heavyweight Duo Matt	IGPHWM_EFF3880_EMP.icc	<input type="checkbox"/>
Lustre	IGPLP_EFF3880_PSP.icc	<input type="checkbox"/>
Premium Matt Duo	IGPMO_EFF3880_EMP.icc	<input type="checkbox"/>
Metallic Gloss	IGPMG_EFF3880_PSP.icc	<input type="checkbox"/>
Ruske 50k	IGRKP_EFF3880_PSP.icc	<input type="checkbox"/>
Smooth Cotton Rag	IGPSC19_EFF3880_EMP.icc	<input type="checkbox"/>

This screen grab shows part of the list of downloadable profiles for Galerie papers with the Epson 3880 printer. Note the check box for downloading installation instructions.

When profiles are consistent, the output will reflect the colours and tones recorded by the capture device throughout the workflow. Without profiles, variations between devices and media will cause faulty colour reproduction.

Monitor profiles are obtained by measuring how the screen reproduces hues and tones relative to a known specification. Printer profiles are specific to the printer as well as the

paper and ink that is being used. Using the wrong profile can waste paper and ink.

Each printer manufacturer provides 'canned' (pre-loaded) profiles for the papers carrying its brand name, loaded into the printer driver. Manufacturers of third-party papers normally provide them as free downloads on their websites. You can find them easily with a web search by naming the paper brand and adding 'ICC profiles'.

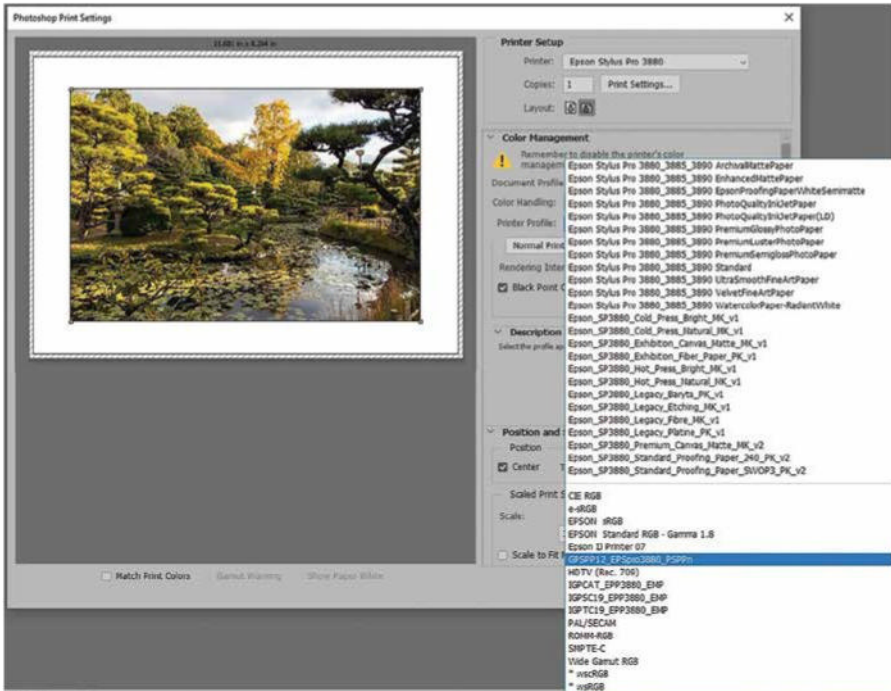


Image editors like Photoshop list ICC profiles in the Document Profile menu in the Colour Management section of the user interface. In this illustration, the profile for printing Ilford's Galerie Smooth Pearl paper with an Epson 3880 printer has been selected. (Note the 'canned' Epson profiles at the top of the list.)

Windows users will typically be prompted to save profiles at: C:/Windows/Sys-tem32/Spool/Drivers/Color. For Mac OS X they are saved in the folder: User Name/Library/ColorSync/Profiles.

Once the profile is stored it will be automatically applied whenever images are opened for editing or printing. This should mean the colours and tones you see on the screen are as close as possible to those that will be reproduced when the image is printed or viewed on another screen.

Some devices also allow users to measure the brightness levels in their workspace before the calibration measurements and take those values into account during subsequent measurements. Note: editing is best carried out in subdued lighting. Make sure no direct light shines on the screen.

Some high-end professional monitors have built-in calibration devices that swing down from the top of the screen at pre-set intervals to check its colour accuracy. They are not as accurate as separate calibrators but provide an easy way to keep screens close to specs in busy workplaces. Re-calibration intervals can be longer with these screens but they still need regular calibration with a spectrophotometer device.

The advantages of profiling

Having a calibrated and profiled workflow saves time and money when printing images, because you'll waste less paper and ink when what you see on the monitor screen is as close as possible to the results when the image is printed. It will also be easier to obtain consistent quality from edited prints if somebody else prints your images – or uses them in an online application.

Using profiles

The media (paper) selection panel in your printer's driver is a fixed list that only contains the names of papers made by the printer manufacturer. The best and most consistent results will come from using these papers.

If you want to use a paper produced by a different manufacture, for example, Ilford's papers with a Canon or Epson printer, you will obtain the best results if you go to the paper manufacturer's website and download the relevant profile for your printer and the paper you've selected.

If the paper manufacturer doesn't offer profile downloads, the best approach is to choose a media selection that is close to the inkjet paper you're using. For example, if you plan to print on a glossy paper, choose the closest of the listed glossy profiles.



This professional 32-inch 4K monitor is shown with its built-in calibration sensor 'reading' primary colours as they are displayed on the screen. A gamut plot of the screen's colour space can be seen in the lower right corner. (Source: EIZO.)

Note: We generally advise readers to avoid using third-party media for which profiles are not available. If the manufacturer doesn't care enough to offer profiles, it indicates they may not care enough about the quality of their media.



Useful links

ICC profiles
www.bit.ly/pg33-5

CHAPTER 4

Software

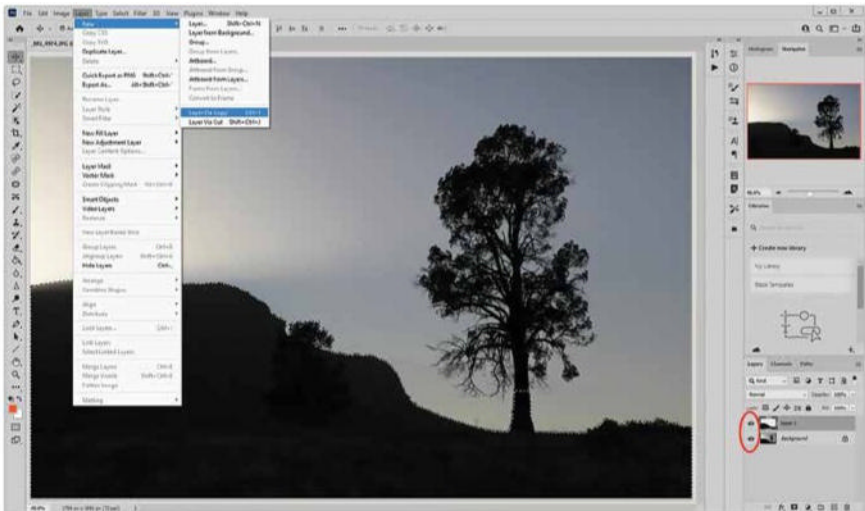
Software choices are important. While you can carry out some basic editing tasks with the software that comes bundled with your computer's operating system, it provides a limited range of editing tools. If you're serious about photography you need a dedicated image editor.

What to look for

Editing applications range from simple apps to software with sophisticated tools that require a steep learning curve. The best

applications provide a clear, intuitive user interface with the following features:

1. Layers support: Layers (see Chapter 6) are discrete overlays on the image that are independently editable. They are created each time you duplicate the main image, copy a selected part or add text to an image. They can also be totally blank. Clicking on one of the eye icons (outlined in red) causes that layer to 'hide' while a second click restores its visibility and lets you work on it.



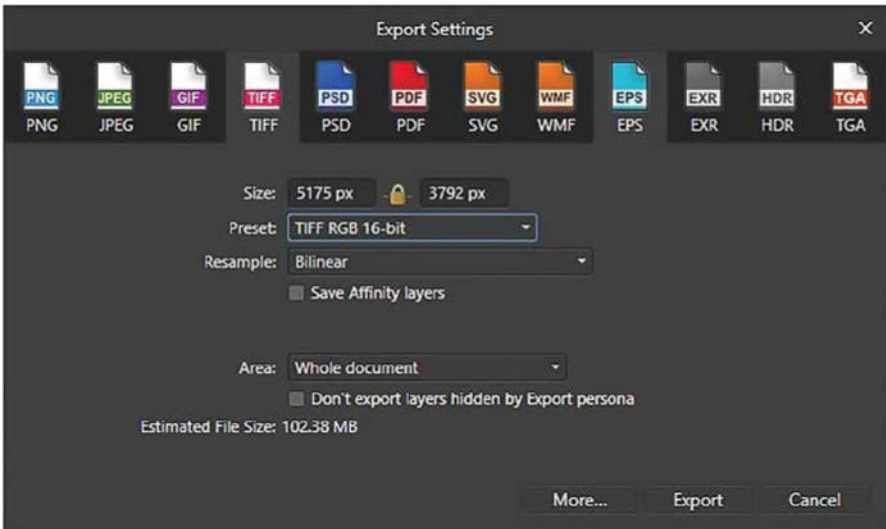
An image that would benefit from Layers-based editing. The foreground has been selected with the Quick Select tool.

Used for non-destructive editing, layers can make edits easy to reverse and are easy to delete if they haven't been successful. Users can create layers to try out edits and show or hide selected layers to see which edit looks best. You can perform tasks like compositing multiple images, adding text to an image or copying part of an image and pasting it onto another image or onto a new place on the original image. You can also apply a layer style to introduce a special effect.

2. Support for popular image formats, particularly JPEG and TIFF files plus the ability to convert between file formats and save copies of images at different sizes in different formats.

Serious photographers will also require conversion software for converting the raw files (see Chapter 5) captured by their camera(s) into editable JPEG or TIFF format.

3. Basic editing tools for cropping and resizing images, adjustable selection tools, brushes for eliminating blemishes and similar artefacts and support for sharpening and blurring adjustments. You also need global Levels and Curves adjustments (see Chapter 6) for correcting tonal and colour balances, saturation and colour balance adjustments and tools for dodging and burning-in, plus an eraser for selective removal of pixels.



This screen grab shows the wide range of file formats supported in Affinity Photo, a powerful image editor for photo enthusiasts.

4. Histograms are graphs that show the balance of tones in images. For JPEGs, the vertical axis represents the number of pixels at each tonal level plotted against a horizontal axis of tones in 256 steps from pure black (0) to the brightest white (255).

Each graph will show peaks in areas where there are a lot of pixels and troughs where the pixel 'density' is relatively low. In a correctly-exposed image, the peak of the graph should be near the centre, with the graph tapering down at each end.

RGB histograms also provide a quick way to check the colour balance before finalising an edit. If the red, green and

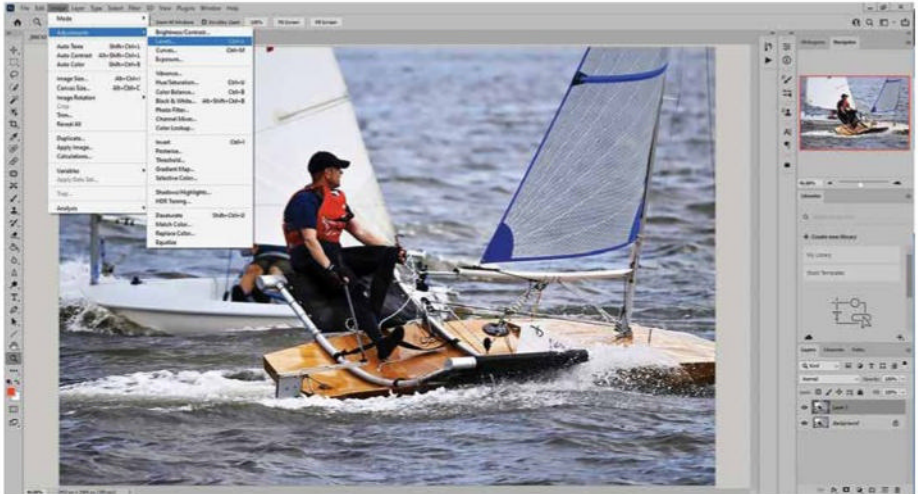
blue channels all peak in the same place, the colour balance is neutral. If any channel peaks too far to the right or left, it indicates a colour cast in the highlights or shadows respectively. Sunset shots, in particular, may benefit from pushing the colour balance towards magenta and yellow to increase the richness of their colours.

Finding the right application

Choosing which software to use will depend on how far you want to become involved in photo editing and also your budget. For those on tight budgets, one of the best freeware editors is GIMP (www.gimp.org), which provides most



The GIMP user interface is highly user-customisable. You can select which features are displayed and where the various subordinate screens are 'parked' on the workspace.



Adobe's Photoshop is a more capable and complex application than this screen grab of the user interface suggests. The dropdown menus in the toolbar provide access to a wide range of adjustments.

of the tools you would find in a highly-sophisticated application like Photoshop.

The acronym stands for GNU Image Manipulation Program and over the years it has developed into a very sophisticated application. GIMP is available in many languages as a 'cross-platform' image editor that can be used with Windows, MacOS and GNU/Linux operating systems, giving it wide appeal.

GIMP provides colour management capabilities and, as an open source application, it is frequently updated to fix problems and add new features.

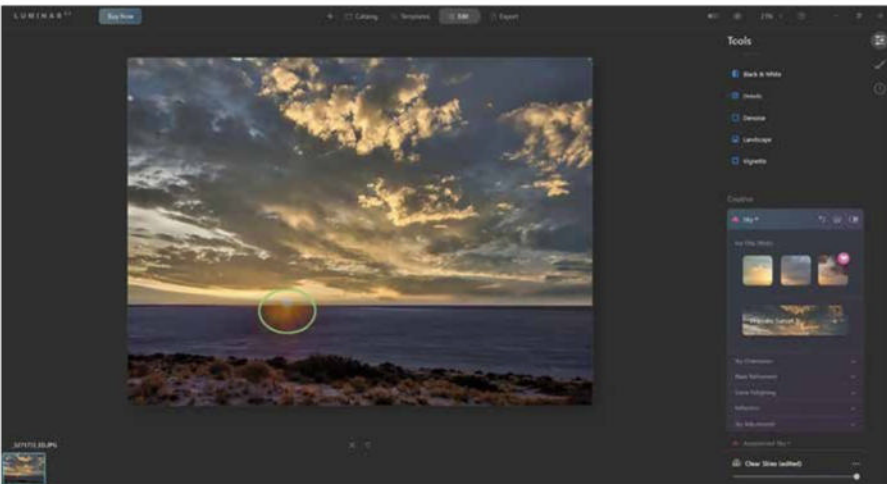
GIMP has the best support since its long development has provided time

for a community of users to provide a support base. But if GIMP doesn't suit you, other freeware applications like Darktable (www.darktable.org), Paint.net (www.getpaint.net) and Photo Pos Pro (www.photopos.com) are worth checking for low cost software.

Professional photographers and advanced amateurs usually prefer Photoshop or Photoshop Lightroom, which are included in Adobe's Creative Cloud suite. Both are subscription-based, which means you're up for a monthly fee. The advantage of a subscription is you're always working with the latest version of the software.



The user interface of Serif's Affinity Photo provides all the tools a photo enthusiast would require and its user interface is straightforward and easy to understand.



Skylum's Luminar software is one of the better AI-based image editors, especially for functions like sky replacement, which is shown in the screen grab above.

Lightroom is simpler than Photoshop and includes an image management function that lets users organise and store image files. However, even it could be uneconomical for occasional and non-professional users. Photoshop is extremely complex with a steep learning curve and many of its functions are irrelevant to hobbyists and difficult to use successfully.

Some of the better amateur applications include ACDSee Photo Studio, Adobe Photoshop Elements, Affinity Photo, Corel PaintShop Pro, Skylum Luminar or Pixelmator. Trial downloads can be found by searching on each product's name. They normally provide 30 days of use before you have to buy the software.

While it's tempting for novices to select so-called 'AI-based' software, this is risky. When you allow computer algorithms to take over virtually every process you don't have much control over the end results.

The size of the downloadable file can indicate how complex the software – allowing for probable compression that will install it with at least 50% more megabytes. Watch out for 'bloatware' that takes up a lot of space without providing a decent range of fully-adjustable tools.

Always try before you buy. Start with applications that offer a free 30-day trial download so you can judge how well the application will suit you. Be wary of applications that require your credit card details before they let you download a so-called 'free' trial. Don't provide credit card details unless you really want the software.



Useful links

The editing toolbox
www.bit.ly/pg33-6

How to choose an image editor
www.bit.ly/pg33-7

Photo editing software
www.bit.ly/pg33-8

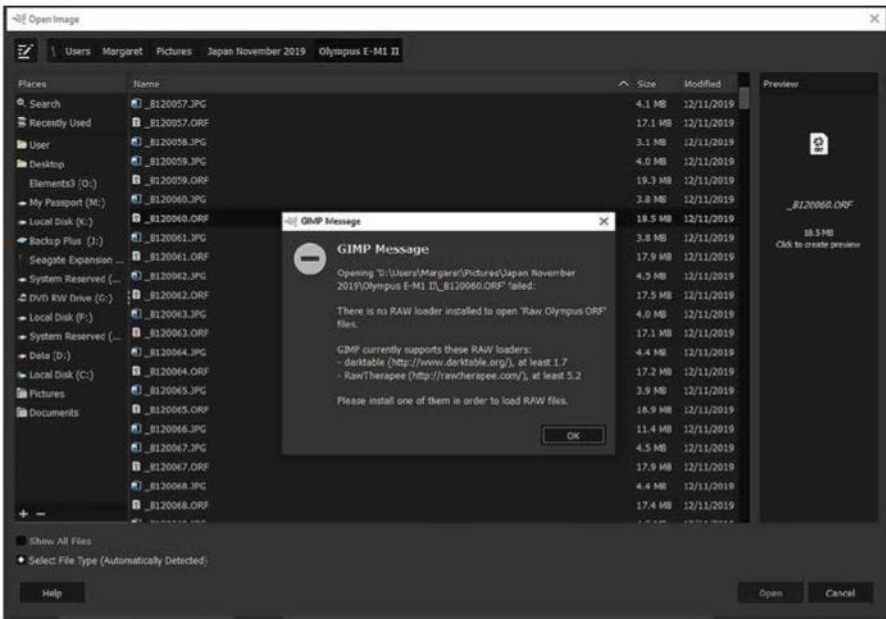
CHAPTER 5

Working with raw files

Raw files come straight from the camera's image sensor and are saved without additional processing. Photographers who use them can apply whatever adjustments they choose before saving the image in a usable format. In this chapter we'll look at the benefits of shooting and processing raw images and show how to extract the best results from raw files.

Raw file formats

While a 'universal' raw file format exists, unlike JPEG, it's not widely supported. The DNG.RAW format is used by Leica and Hasselblad (both professional camera manufacturers) and about 15 camera manufacturers – although not the market leaders.



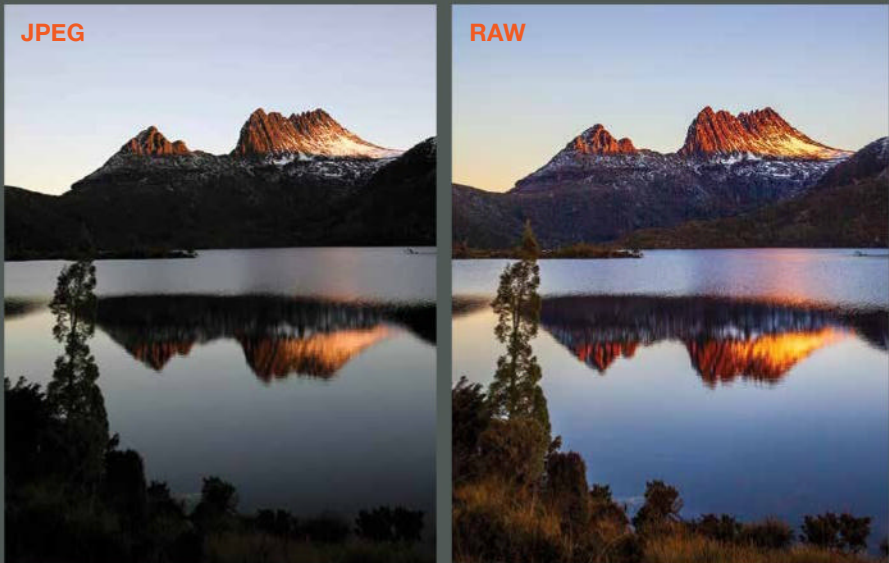
This pop-up message appears if you attempt to open a raw file in the freeware application, GIMP.

Raw vs JPEG

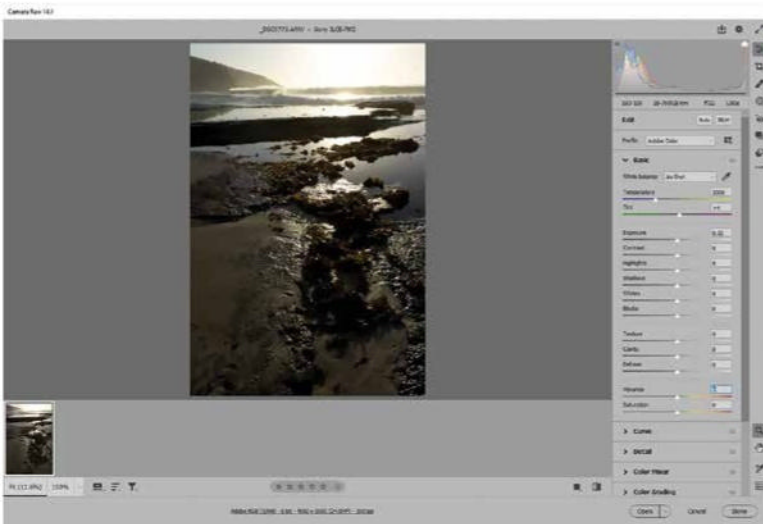
While both file formats record colours as three separate channels: red, green and blue (RGB), because they contain all the image data recorded by the camera's sensor, raw files provide a lot (up to 16x) more data to work with. JPEGs are compressed versions that have been adjusted by the camera's image processor. The compression is 'lossy', which means pixels are discarded, usually in expanses of a single uniform colour like skies, where the loss won't be noticed.

While JPEGs are convenient for sharing online and if you need a 'finished' photo quickly, they can only record 256 separate brightness levels between pure white and the deepest black for each colour channel. Intermediate tones are often lost in subjects with a wide dynamic range – especially in highlights and shadows.

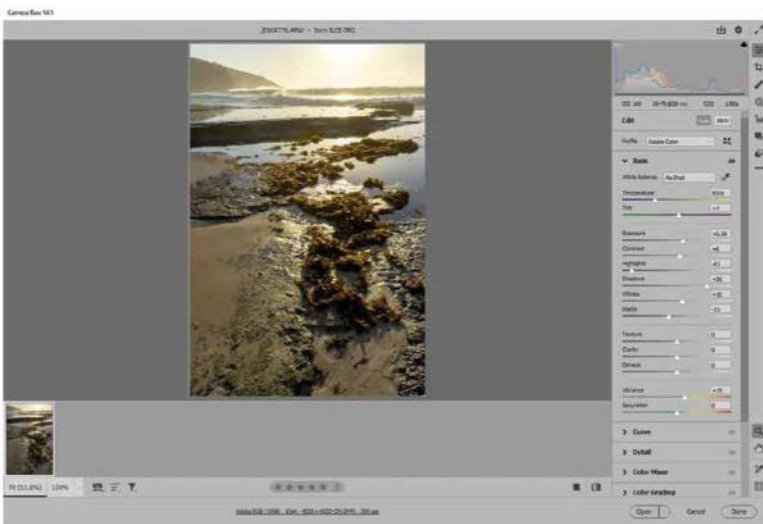
Raw files are larger because they can record more than 4000 discrete tones across the same brightness range. Everything captured by the camera is there to work with so the resulting edits will look better; but you'll need to spend more time processing and editing them.



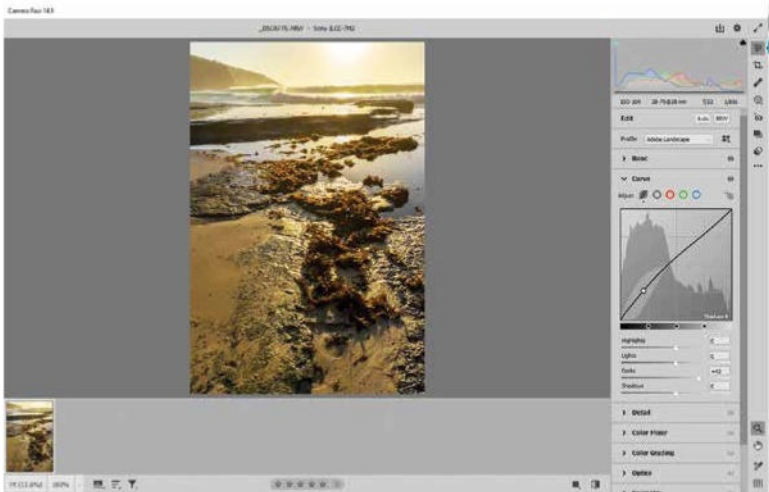
For scenes with a wide brightness range, shooting raw files will give you a wider range of tones to work with when editing the image, as shown in this pair of raw and JPEG images that were recorded simultaneously by the camera.



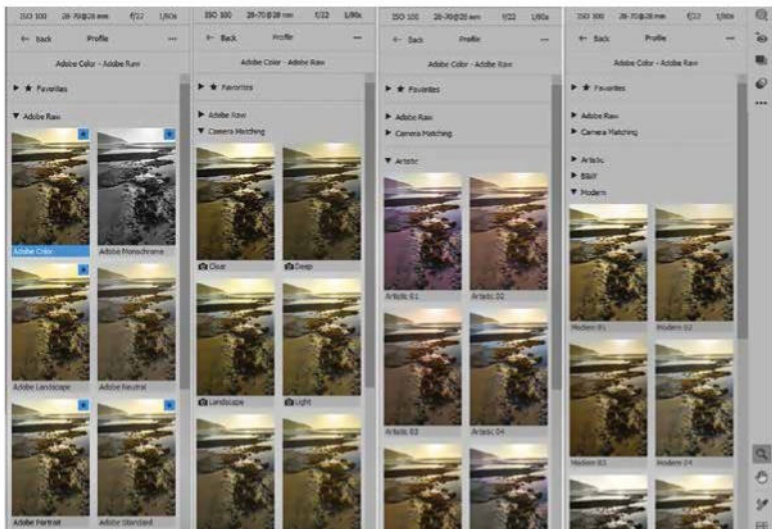
The workspace for Adobe Camera Raw (Version 14.1).



Clicking on the Auto tab applies brightness and colour adjustments based on what the software 'considers' the optimal settings, based on AI analysis. These adjustments are reflected in the changes to the sliders in the toolbar.



The Curves adjustments are less comprehensive than those provided in most image editors but they can be useful for bringing out shadow details, as shown here.



Some of the colour profiles available for use when converting raw files in Adobe Camera Raw.

If you buy a camera from Canon, Nikon, Sony, Panasonic, Olympus or Fujifilm, it will come with software for processing the proprietary raw files – but not other raw files.

Proprietary raw converters range from reasonably competent to clunky, quirky and unproductive, but better alternatives are available, sometimes within the functions of existing software applications. There are plenty to choose from for converting proprietary raw files into editable formats (JPEG or TIFF).

Adobe Camera Raw comes as a function in Photoshop, Lightroom and Photoshop Elements, with the version in Photoshop Elements being scaled back for non-professional users. DxO Photolab is one of the most feature-rich independent raw file converters with modules for applying adjustments related to specific camera models and lenses. Details can be found on the page below.

You can also find raw conversion in Affinity Photo, ACDSSee Photo Studio Home, Corel PaintShop Pro, Phase One Capture One Pro and Skylum Luminar AI, to name a few popular editors. The freeware app, GIMP, doesn't include raw conversion but it provides links to a couple of freeware raw file converters.

DxO Photolab, now in its fifth iteration, is one of the most powerful third-party software applications for serious photo enthusiasts and imaging professionals.

Developed in France by a company with a long tradition of automatic lens and camera body-based image analysis and correction tools, it is available for both Windows and MacOS computers.

The best feature of this software is the inclusion of camera and lens corrections that automatically 'read' these data from image files and apply any useful adjustments. Also built into the software are additional functions, such as DeepPRIME noise reduction and U Point controls for applying local adjustments to small area in the image. No other software has yet matched these capabilities.

The latest version, PhotoLab 5 is priced at US\$219, which is expensive for occasional users. A trial download of the software is available at **www.dxo.com/dxo-photolab**.

Another useful feature seldom found in raw file converters is the Compare tool, which displays before and after views showing the effects of any adjustments. In this case, we have chosen B&W conversion, another feature in the software.

Most software includes lens correction adjustments, which enable users to match the conversion to a particular lens. It's worth checking if the software you have includes this feature. The main problem the developers have is keeping the software up-to-date when new cameras are released.



The White Balance adjustments in the Basic menu panel.



The Detail slider provides a sharpening adjustment that can be used to boost perceived sharpness before additional editing. Further sharpening may be added during the editing process, although it may not be needed.



High-key originals like this misty scene may need noise-reduction adjustments, especially if they are captured in poor ambient lighting. Colour noise adjustments separately address chroma (colour) noise, which is more objectionable than luminance (brightness) noise.

Converting raw files

The following pages cover converting a raw file using Adobe Camera Raw (ACR), which has been popular for a long time and offers one of the widest ranges of adjustments. When you open a raw file in ACR, you'll see a large preview window in the left side of the workspace, showing the entire image.

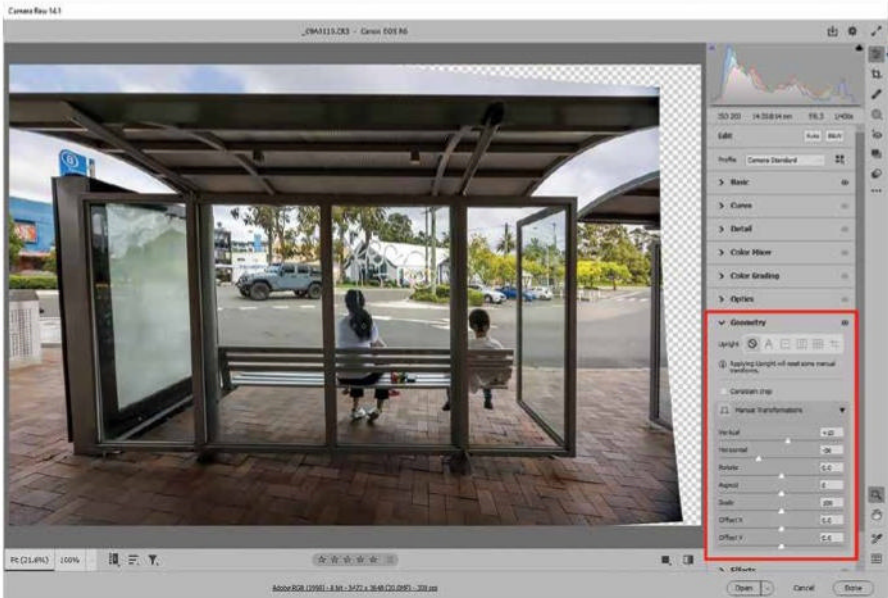
You can adjust the preview by clicking on the Fit and % buttons in the lower left corner or by placing the cursor on the

image and clicking it. A right-click will open a box containing a range of zoom options, shown in the screen grab on this page.

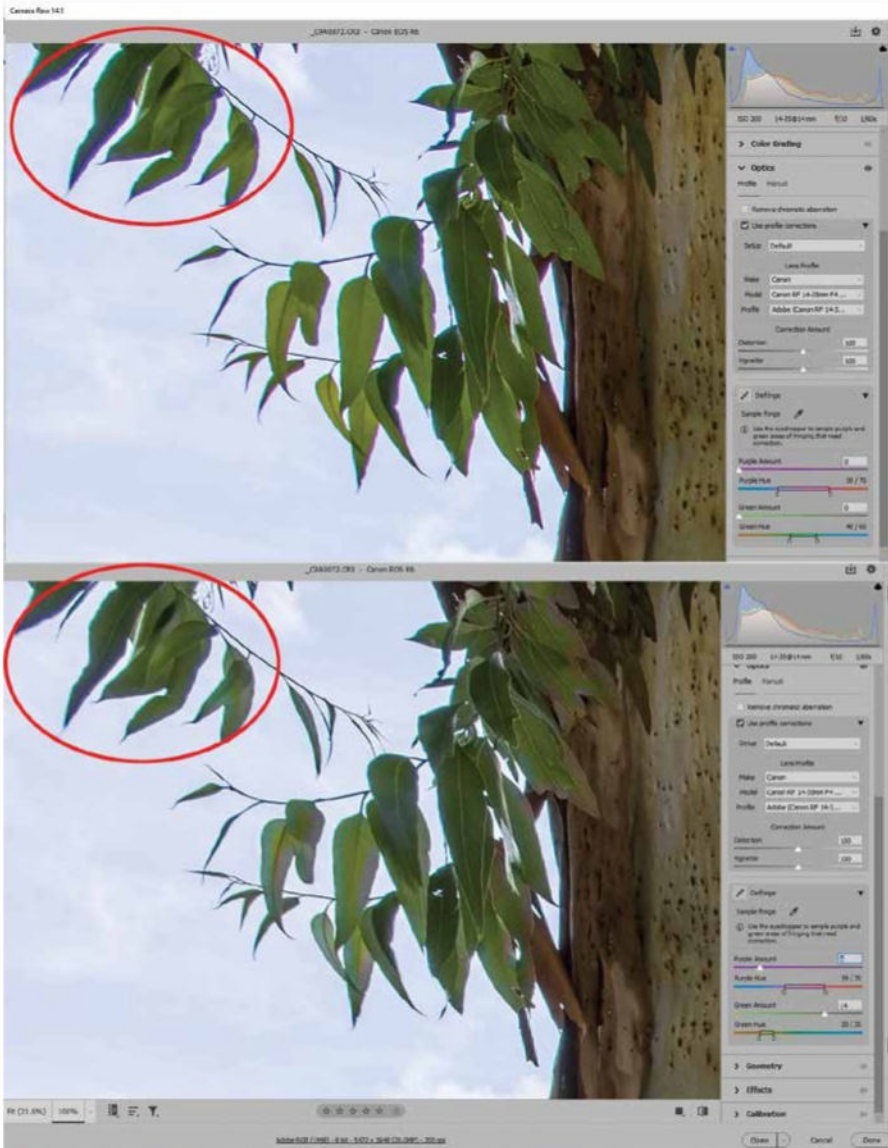
The toolbar down the right hand side of the preview window contains all the basic adjustment tools as well as an RGB histogram showing the relative distributions of the red, green and blue colour channels. Below that is an Edit tab with two modes: Auto and B&W, the latter for converting the image into black and white.



The Optics tab, outlined in red, includes the profiled lens corrections plus sliders for suppressing chromatic aberration and coloured fringing.



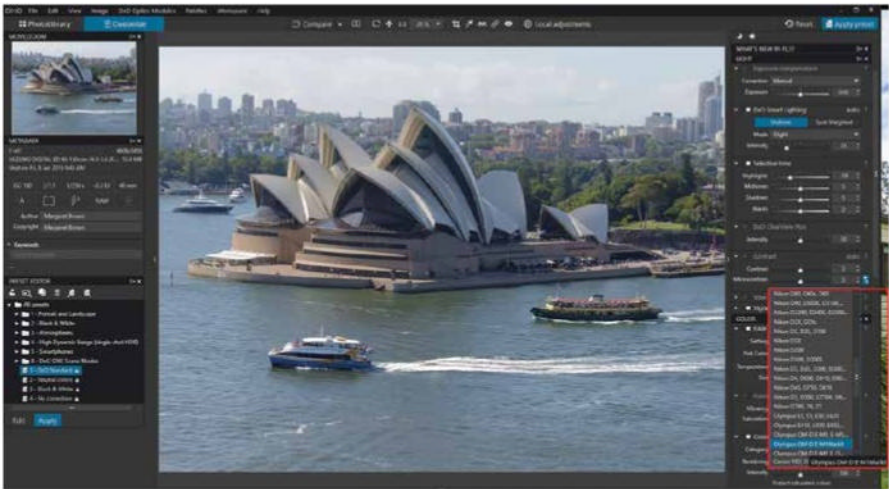
The Geometry tab, outlined in red, provides sliders for correcting horizontal and vertical distortions, rotating the image, adjusting its aspect ratio, scale and changing its positions in the frame (via the offset sliders).



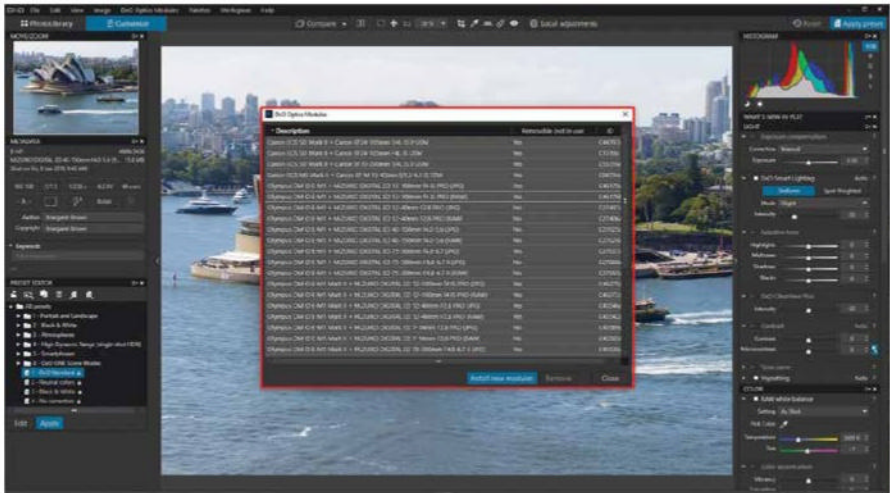
Before and after screen grabs showing the effects of the Defringe adjustments.



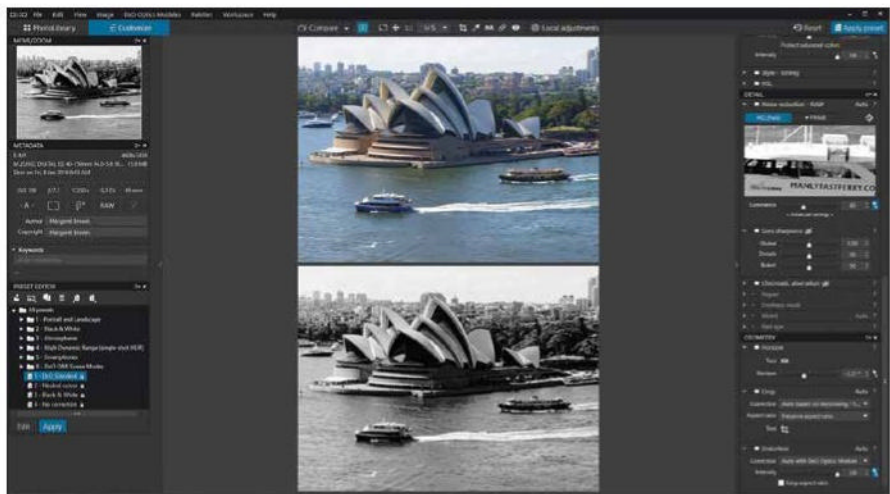
The user interface in DxO PhotoLab has two modes: PhotoLibrary and Customise. This screen grab shows the PhotoLibrary interface, which makes it easy to select files for editing.



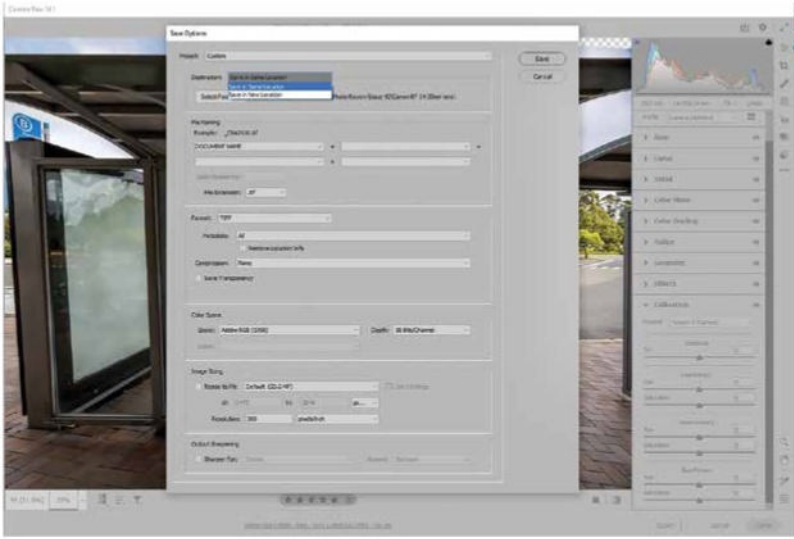
Customised rendering modes for most of the popular cameras provides automatic tweaking of the raw image files to match the camera's settings.



Similar 'profiles' based on extensive testing are available for popular camera and lens combinations.



Another useful feature seldom found in raw file converters is the Compare tool, which displays before and after views showing the effects of any adjustments. In this case, we have chosen B&W conversion, another feature in the software.



The control panel for saving processed raw files provides options for saving in JPEG or TIFF format and allows users to choose where the files will be saved.

Below the Edit tab is a Profile tab, which lets you select a suitable colour 'profile' for the image. The default setting is Adobe Color but the dropdown menu also provides profiles that replicate the camera's colour profile settings, monochrome profiles and 'Artistic', 'Traditional' and 'Modern' settings.

The Basic menu panel starts with White Balance adjustments with a drop-down menu containing the usual in-camera settings, plus an adjustable Temperature slider for tweaking the colour balance if the Auto adjustment isn't satisfactory.

Below it is a set of sliders for tweaking Exposure (brightness), Contrast, Highlights, Shadows, Whites

and Blacks. Changes to these sliders will be reflected in the histogram at the top of the column.

Below these sliders are sliders for Texture, Clarity and Dehaze adjustments followed by a pair for adjusting Vibrance and Saturation. The Texture slider brings out or suppresses textures; move it to the left to soften wrinkles in portraits and to the right to emphasise structures in landscapes.

Clarity adds depth to an image by increasing local contrast, mostly in midtones. Dehaze works like the Texture slider; move it to the left to increase mistiness in a picture and to the right to reduce it.

Vibrance adjusts colour saturation (the intensity of colours) without causing colours to be clipped (lost). Colours with lower saturation are boosted more than highly-saturated colours, allowing skin tones to be enhanced without becoming unnatural looking.

Saturation adjusts the strength of all image colours equally from -100 (mono-chrome) to +100 (double the saturation). This slider must be used cautiously as excessive saturation produces lurid colours.

Clicking on the Curves tab brings up a Curves histogram (see Chapter 6) plus sliders for adjusting Highlights, Lights, Darks or Shadows. The Detail tab provides sliders for sharpening and noise reduction, while the Color Mixer and Color Grading tabs let you correct (or introduce) colour casts.

Clicking on the Optics tab will show you if the lens used has been profiled for the software. If it has, the profile will appear automatically, showing the corrections – mainly distortion and vignetting (edge darkening) – that have been applied. You can also correct chromatic aberration by clicking on the box above.

The Defringe adjustment lets you suppress the coloured fringing shown in this screen grab.

The Geometry tab below it corrects distortions not addressed by lens corrections, such as the distorting

effects of very wide angle lenses, as shown in the illustration on this page.

The Effects tab has two sliders, covering Grain and Vignetting, which can be used to increase either factor. The Calibration tab below it is for tweaking hue and saturation values across individual colour channels and in shadows. This tab would only be used if converted raw files from a particular camera showed an unwanted colour cast.

Clicking on Open opens the file in Photoshop for further editing. Alternatively, the link at the top of the workspace window allows you to save the processed image and set the file format and bit depth for when it is opened in Photoshop. You can choose between JPEG and TIFF (Tagged Image File Format) and 8-bit or 16-bit for TIFF files.

Selecting 16-bit TIFF gives you the most data to work with and is the best option when you plan to make additional adjustments in Photoshop. After all processing is done, it's easy to reduce images to 8-bit for saving as JPEGs to send in emails or display on screens. Stick with 16-bit TIFF files for images that will be printed or archived.



Useful links

JPEG vs RAW

www.bit.ly/pg33-9

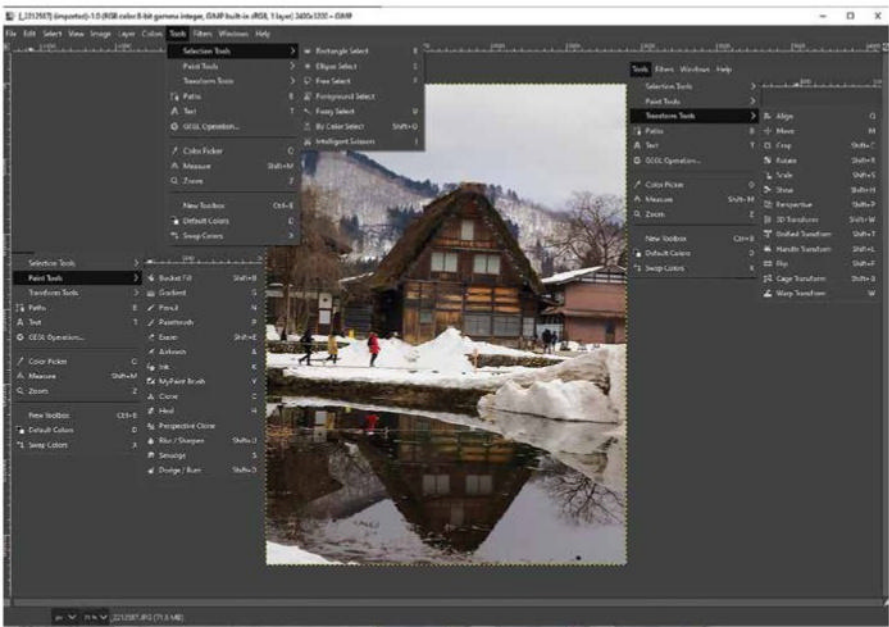
CHAPTER 6

Basic editing tools

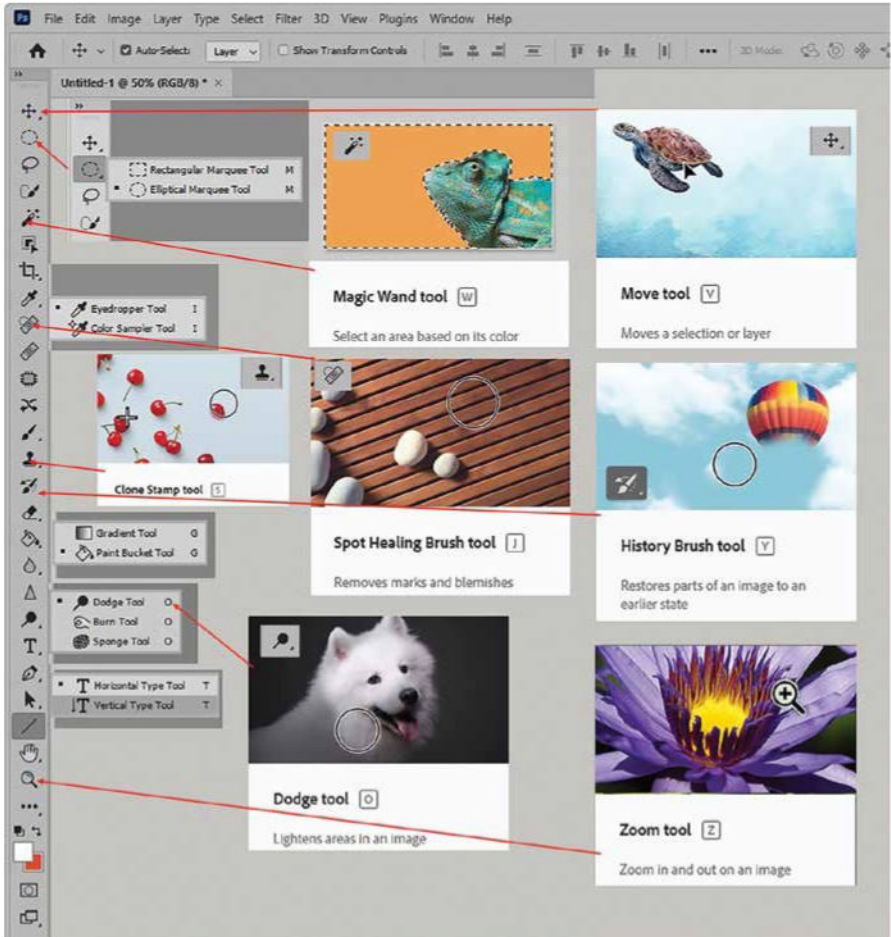
If you've never edited a photo with desktop software, the best way to learn is by choosing and opening an image and working on it. This chapter provides a basic overview of the essential tools found in all software applications. Their locations may differ and different applications may include

different tools and functions, although the basics remain fairly consistent.

In the freeware application GIMP they are accessed from the top toolbar and grouped into three categories: Selection, Paint and Transform, as shown in the screen grab on this page.



This screen grab shows the three main tools' sub-menus in GIMP. Since they can't be opened simultaneously, we have superimposed copies of the Paint and Transform sub-menus on the main workspace to show the adjustments they provide.



The screen grab above illustrates the main editing tools used in the 'digital darkroom'. These tools are common across most image editors.

Most other programs align the editing tools down the left side of the workspace, while the other functions – such as File (for opening files), Edit, Layer, Select, Filters, Window and Help – are arranged across the top of the workspace.

Using the editing tools

The capabilities of the editing tools highlighted in the illustration on page 47 are outlined below.



This tool is used for moving layers around on a background layer. The additional layers are created by selecting and copying parts of the background or by adding text to the image.



Most software provides rectangular and elliptical marquee tools as well as quick selection tools. The Lasso tool is used for outlining a selection, while the Quick Selection and Magic Wand tools below it select areas with similar characteristics. The Object Selection tool at the bottom is used to detect and select a defined object in the frame.



This tool ‘cuts out’ a selected area and discards the pixels outside of the selection. It’s useful for removing unwanted areas (such as uninteresting skies or foregrounds), changing the aspect ratio of a picture and changing its size and resolution.



This tool is used for colour sampling when you need to copy a certain hue and tone to use with one of the filling tools.



These tools let you ‘fix’ imperfections by sampling the pixels in the surrounding area and replacing them with pixels that blend into the rest of the image. Many editors provide a Spot Healing Brush that requires no source point and a Healing Brush that requires you to select the sampling area to be used for healing.



This tool ‘paints’ a selected area from one part of an image over another part of the same image. It is used for removing faults like spots and other blemishes and duplicating areas within the frame to cover up parts you’d like to hide.



HISTORY BRUSH

This tool is used to restore a selected part of the image to a previous state.



ERASER

This brush 'rubs out' areas in the image you want to remove or makes the area more transparent. If you're working with Layers, the layer beneath the one you're working on will show through.



FILL

These tools use the last colour sampled with the eyedropper to fill a selected area. The Fill bucket floods the selected area with the sampled colour, while the gradient tool applies the colour on a gradient from intense through to light. Users can define where the gradient begins and ends with the cursor.



DODGE AND BURN

These tools replicate tools used by traditional photographers for lightening (dodge) or darkening (burn) a selected area in an image. In each case, the tool provides three tonal ranges: Highlights, Midtones and Shadows, which restrict the range of tones over which the adjustment is applied.



BLUR AND SHARPEN BRUSHES

These brushes are used for blurring or increasing the apparent sharpness of selected areas. Brush sizes, strengths and opacities (strength) are adjustable in the top toolbar.



TEXT

This tool is used for superimposing layers of text on an image.



HAND AND ZOOM

The Hand tool allows you to move your image while you're zoomed in to more than 100% and part of the image is out of view. The Zoom tool is used for zooming in and out of the displayed image. The default setting is zooming in with each mouse click and zooming out when the Alt key is pressed.



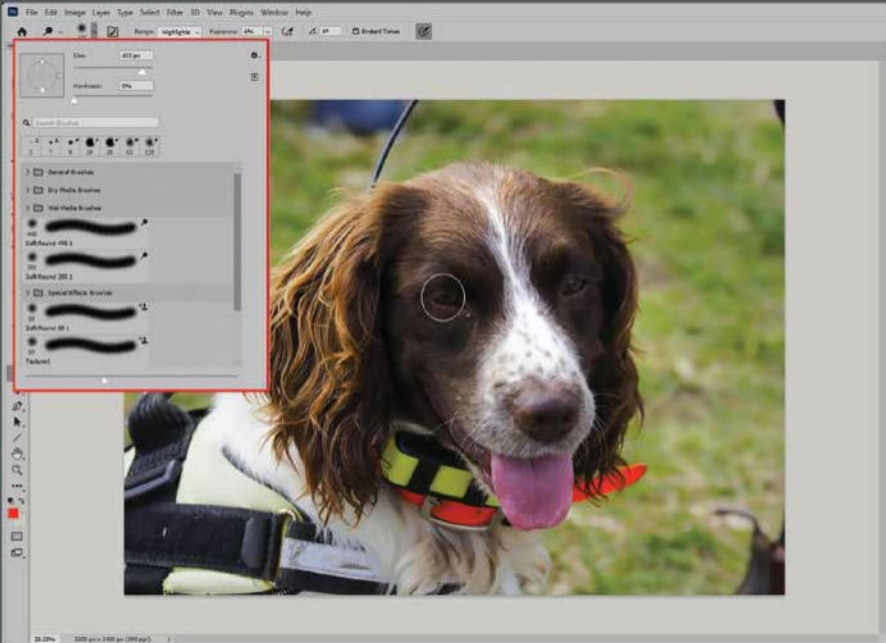
COLOUR SWAP

This tool swaps the colour fills for two Layers. The top colour is the one used when selecting brush or typeface colours or for colour fills.

Brush adjustments

Brushes work like a paintbrush and most software provides a selection of presets with different brush tip diameters, different ranges of edge diffusion ('hardness') and different 'flow' characteristics. Users can also define the brush characteristics independently, using the dropdown box in the tool selections, shown in the screen grab on this page.

Adjustments to the tonal range (Highlights, Midtones and Shadows) and the Exposure (strength of the adjustment) are also made using the tabs to the right of the brush tip adjustments. It's best to start with low exposure values and increase gradually to the strength required. Note: each stroke of a brush tip will have a cumulative effect.



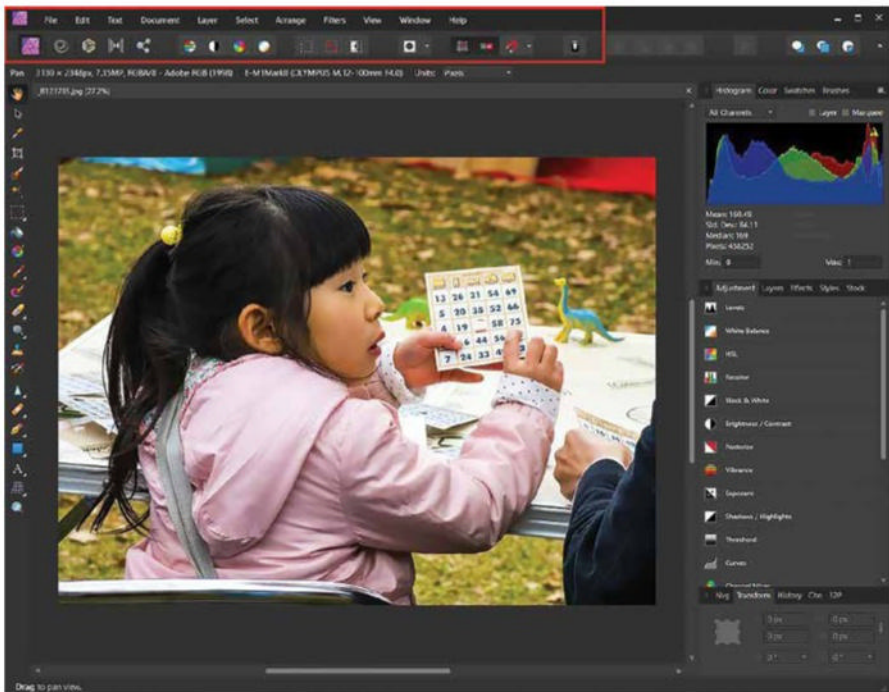
Clicking on the Dodge icon just behind the outlined box opens the dialog box shown in this screen grab, which allows users to adjust the size and hardness of the brush tip.

In most applications, the top toolbar contains the following tabs, which open a specific dropdown menu: File, Edit, Layer, Select, Filters, View, Window and Help.

Serif's Affinity Photos has a slightly different approach. Instead of dropdown menus, it provides five 'Personas' which are separate workspaces dedicated to different tasks and located in the lower of the two toolbars above the workspace. Which Persona is used depends upon how an image is opened.

The Photo Persona, shown in the main screen grab below, handles normal editing functions and presents a 'traditional' arrangement of the basic tools. The Liquify Persona provides facilities for manipulating pixels (which are best avoided in initial edits).

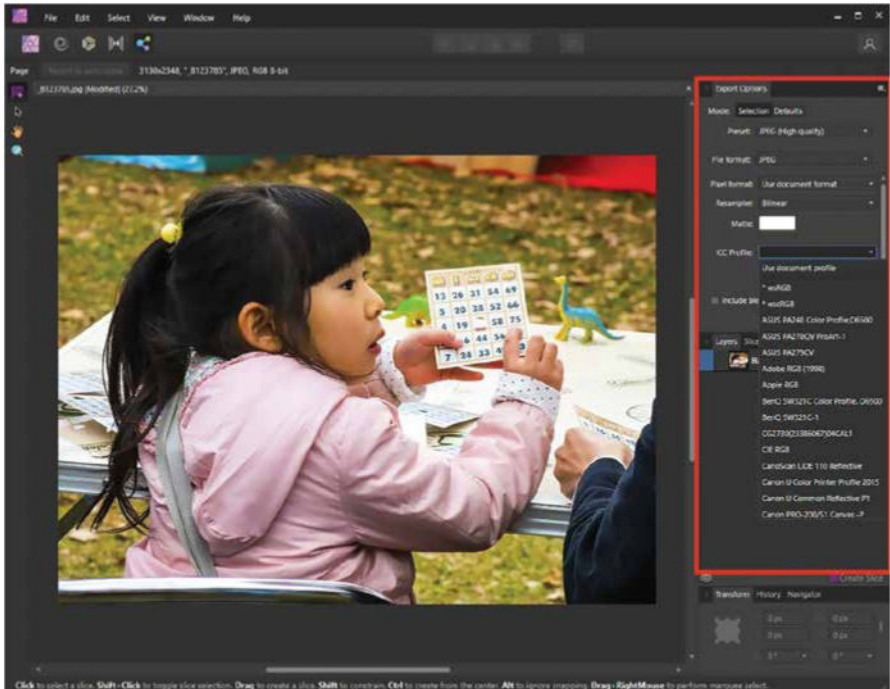
The Develop Persona used for pixel-based editing and processing raw files provides a different set of tools plus a preview window containing a thumbnail image of the photo you're working on.



The two toolbars are outlined in red in this screen grab of the Affinity Photo workspace.



The dedicated toolbar in the Develop persona is outlined in red in this screen grab of the Affinity Photo workspace. Dropdown menus at the top of this toolbar access different adjustment settings.



The Export persona workspace showing the dropdown menu for applying an ICC profile to the edited image.

The Tone Mapping Persona is dedicated to HDR (high dynamic range) processing and should only be used for that purpose.

The Export Persona lets users save images in user-defined folders or 'export' them to a different application. A dropdown menu in the panel allows users to match the ICC profile of the edited image to the monitor on which it will be viewed, or the printer that will be used for printing the photo.

Levels and Curves

Levels and Curves controls provide an easy way to correct the tonal range and colour balance across shadows, midtones, and highlights. Each tool works slightly differently although they have very similar overall objectives so it's up to the user to decide which they prefer using.

Levels adjustments let you control the distribution of the tones in the image by moving the slider on the baseline of the histogram, as shown in the illustration on this page.

With Curves adjustments you have to 'anchor' tones you don't want to change by clicking at the equivalent point on the diagonal line crossing the histogram. Moving anchored points up lightens the selected tones, while moving it down darkens them.

The Curves control can also be used to increase contrast by pulling arrows at the edges of the in towards the centre,

which reduces the tonal range. Curves adjustments can be more subtle than Levels adjustments but you need to be careful to avoid tonal 'drop outs' caused by over-adjustments in any direction.

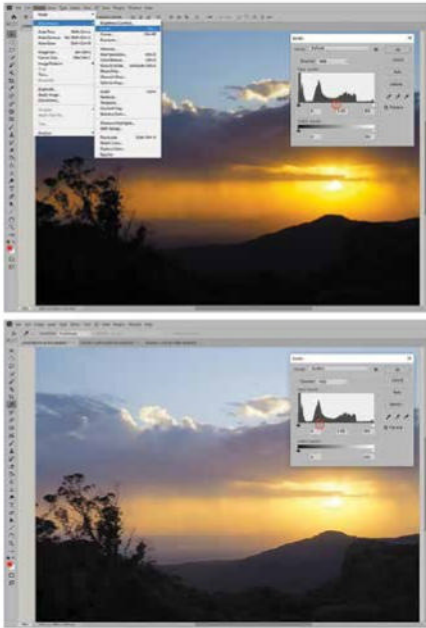
Layers

Think of layers as sheets overlaid on an image that can be adjusted independently, without affecting the image below. For most edits, only two layers are required: the Background (the original image) and the Adjustment layer.

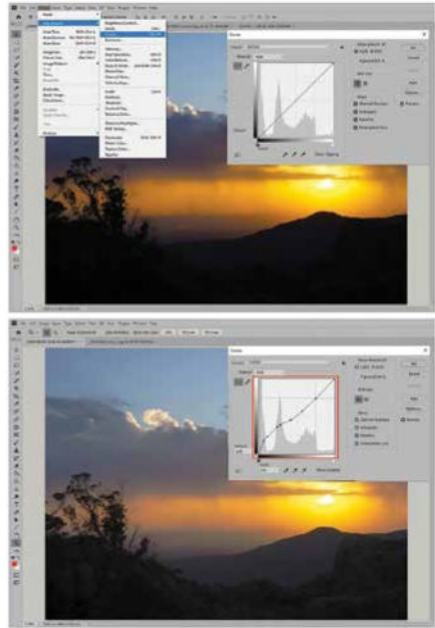
To create an Adjustment layer, click on Layer in the toolbar and select New Layer or New Adjustment Layer (choose the latter if you know what type of adjustment you'll be making.)

When a layer is created it appears in the Layers palette on the right side in the illustration on this page. Icons resembling eyes to the left of each layer box show both layers are visible. You can hide either layer by clicking on its eye icon. Clicking this box again brings the selected layer back into view.

The Opacity slider (outlined in green) in the Layers palette adjusts the opacity of the selected layer. The default setting of 100% is totally opaque. Moving the slider to the left makes it more transparent so you can see through to the layer below. The dropdown menu to the left of this slider provides a variety of blending options. It can be worth exploring some of the options available.



Moving the slider on the baseline of the histogram to the left will lighten the midtones, as shown in this pair of images. Moving it to the right darkens them.



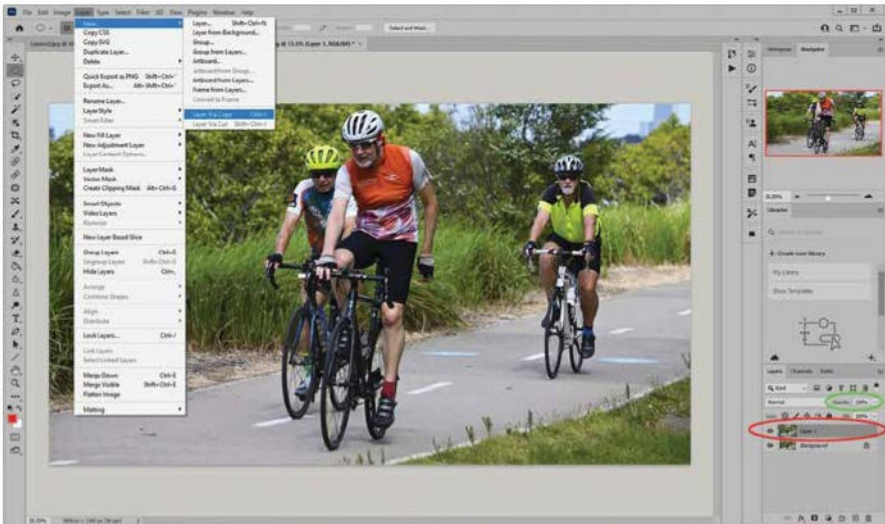
This pair of screen grabs shows the Curves adjustments in use. Compare the unadjusted histogram in the top panel with effects produced with the adjusted histogram in the bottom panel.

Layers can be used as masks when you want to create image composites or cut out objects from an image to use in other images. You can also add a mask to a layer and use it to hide portions of the layer and reveal the layers below. The areas you paint in black are hidden, the areas you paint in white are visible and the areas you paint in shades of grey appear with various levels of transparency, depending on the tone of the grey.

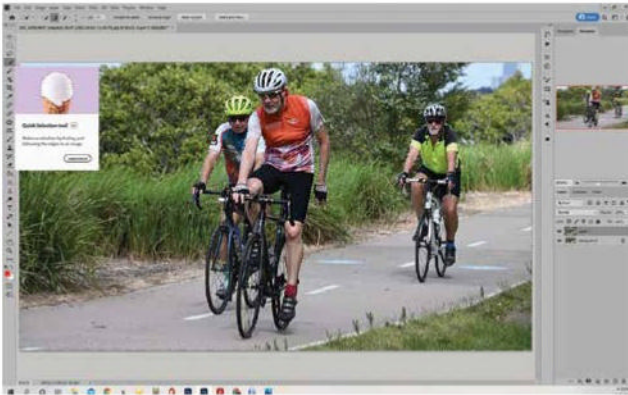
Useful links

Levels adjustments
www.bit.ly/pg33-10

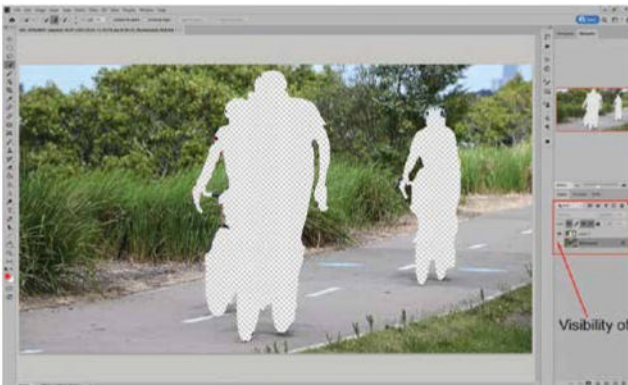
Curves control to adjust colour
www.bit.ly/pg33-11



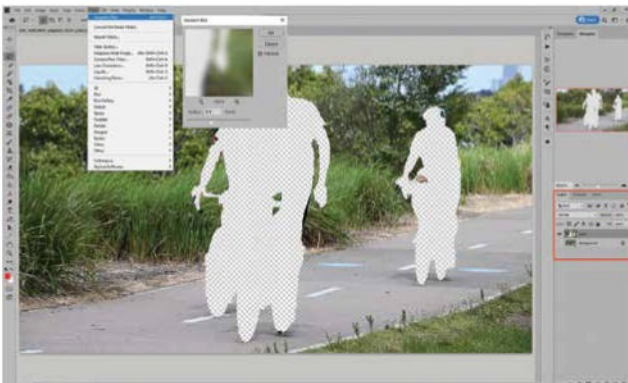
This illustration shows the Layers tool with Layer via Copy selected. Note the palette in the lower right corner; the new layer (circled in red) appears above the background layer. Its shading marks it as the 'active' layer on which adjustments are made. Clicking on the eye icon will make it invisible and shift the adjustment to the layer below. The percentage slider at the top of the palette adjusts the transparency/opacity of the layer, letting you see through to the layer beneath.



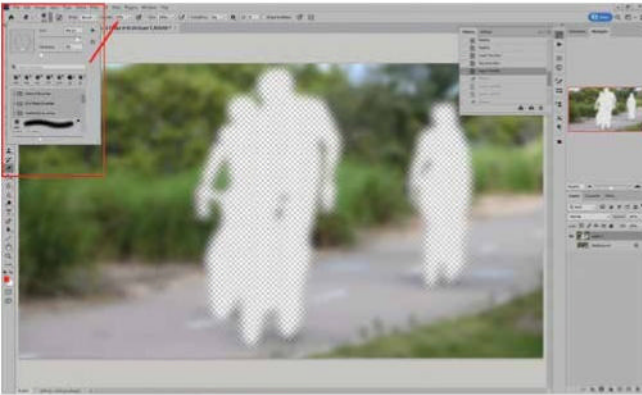
Use the Quick selection brush to select the area you want to blur.



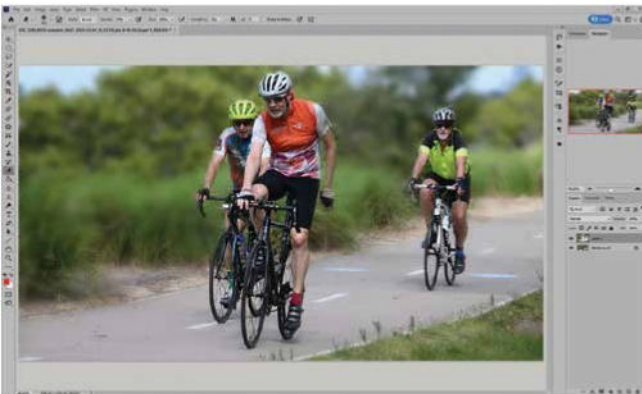
Turn off the visibility of the background so you only see the areas you have selected.



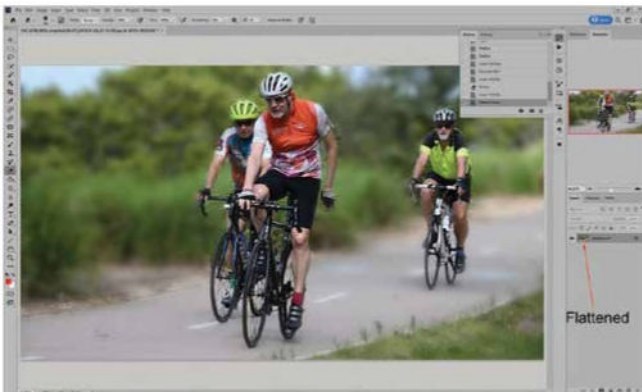
Go to the Filters dropdown menu and select Blur > Gaussian Blur and adjust the strength to apply the blur you want.



Use the Eraser brush at low strength (25% has been set for this case) and gradually cut back the degree of blurring in the lower half of the image to create a more natural transition of blurring.



Restore the visibility of the background Layer so you can fine-tune the strength of the blur.



When you're happy with the result, Flatten the image using the Layer > Flatten image command.

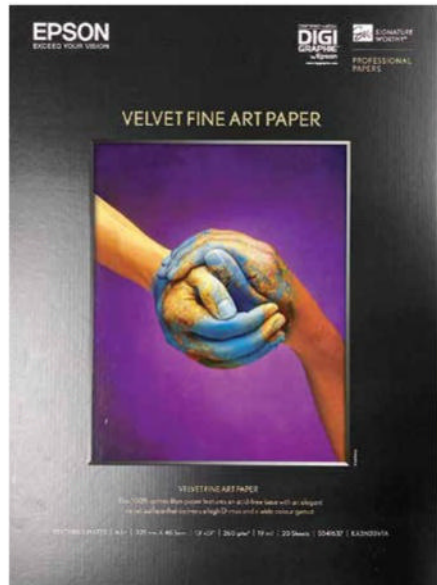
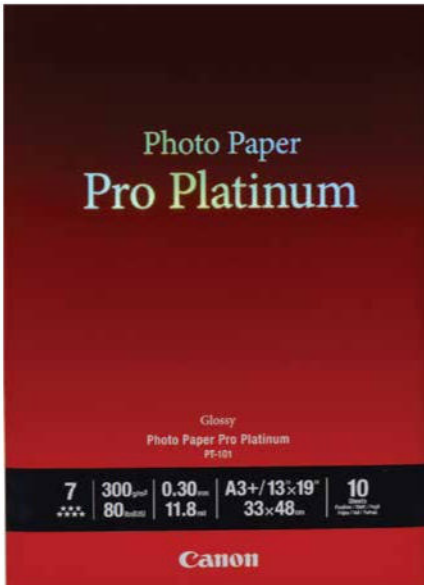
CHAPTER 7

Inkjet consumables

This chapter covers printers and printing media (inks and papers) since printing is an important step in digital darkroom work. As outlined in Chapter 1, your choice of a printer will depend upon the space you have for setting it up, the size of the largest prints you want to make, and whether you prefer the 'look' of matte or glossy media.

Although some A4 printers can do a reasonably good job of printing photos, most have limited ink sets. The best results come from A3 and A2 printers, which use more inks. These printers can also print on smaller paper sizes.

All colour printing requires at least four inks: Cyan (C), a greenish blue; Magenta (M), a purplish red, Yellow (Y)



A preference for glossy or matte prints can affect your choice of printer. Canon's Pro Platinum paper is considered one of the best glossy papers available, while Epson's Velvet Fine Art paper is among the best of the papers with smooth matte surfaces.



A typical A3 printer can print on papers up to 329 mm wide and has a 639 x 379 mm 'footprint' on a desktop. (Source: Canon)



This A2 printer offers most of the capabilities professional users and serious enthusiasts require, including the ability to print on media up to 420 mm wide. Its 'footprint' measures 615 x 902 mm with output trays extended, as shown in this illustration. (Source: Epson.)

and Black (K – for 'key' as it adds a contrast 'key' to bring out the other colours.) Simple CMYK printers use only these four inks. They're fine for everyday office printing but can't reproduce all the subtle hues and tones in images.

Photo printers normally add light ('Photo') cyan and magenta inks and also at least one grey ink ('Light Black'). Some printers add red, green or blue inks to further expand the printer's tonal range.

Separate 'Photo' (PK) and 'Matte' (MK) black inks are often provided, the Photo inks for glossy media and the Matte inks are for non-glossy surfaces. In older printers, swapping between Photo and Matte inks would take a few minutes and use a millilitre or so of ink to 'purge' the ink lines. The latest printers have mostly overcome this problem.

A3 printers are affordably priced, can use a wide variety of paper types and will produce attractive colour and black and white prints. An A3 printer can print snapshots as well as posters, calendars and photo books. Many can also print panoramic images on user-specified papers and a few include special holders for printing on roll paper.

Most A2 desktop printers are designed for photographers, graphic designers, fine art producers and illustrators who require high quality output. The printer shown here can output prints up to

1.5 metres long and is able to print on roll paper or canvas when equipped with an optional roll media holder.

Generally, the more individual cartridges the printer uses the wider – and more subtle – the range of hues and tones it can print. When selecting a photo printer, make sure it uses at least six inks.

Dye or pigment inks?

Your media preferences will influence the type of printer you choose: dye or pigment (no printer can use both types). While both types can be used with glossy and matte papers, each works better with a different range of media.

Dye inks are liquid, which allows them to be easily absorbed by the coated surfaces of glossy and lustre (semi-gloss) papers. Pigment inks consist of microscopic particles of solid colours in a quick-drying carrier liquid. When the ink dries, the particles remain on the paper's surface which is roughened to keep them in place, although they are vulnerable to abrasion.

Dye-ink printers will reproduce the greatest detail and boldest colours on glossy papers. The resulting prints are also more robust because the dyes are absorbed into the paper's surface coating. Although they can be used for printing on canvas, the prints from dye ink printers won't be as good as those from printers that use pigment inks.

Pigment ink printers work best with matte and lightly-textured papers but they are also ideal for heavier 'fine art' media, including canvas. But even prints on textured media will require careful handling to prevent the pigments from flaking. Spraying the surface of the print with preservation lacquer is recommended.

Pigment inks normally offer superior fade-resistance and are preferred when long-lasting prints are required. Interestingly, under optimal conditions the latest dye-based inks from Canon (Chromalife) and Epson (Claria) come close to the durability of their pigment-based counterparts.

Paper choices

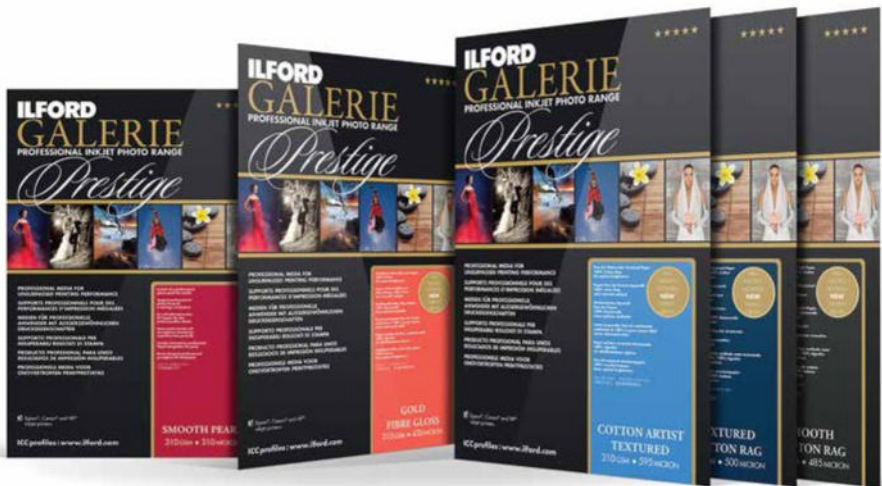
There's no 'right' printing paper for every image and every situation, but you can match your paper choice to the end result on the basis of the following criteria:

Size: This is the easiest to quantify since it is partly dictated by the output size of the printer. Apart from that, the choices are also straightforward: large prints are best for framing, while A4 size is ideal for books and smaller prints are best for sticking in albums.

Thickness: This can also be dictated by the printer as many consumer-level printers can't handle thicker, heavier papers. Check your printer's specifications to find its limits.



Photo quality papers come in a wide variety of sizes, from A4 through to A2 and also on rolls of different widths to suit different printers.



This illustration shows part of the range of different papers from Ilford, an independent manufacturer.

Paper thickness is usually specified in millimeters (mm) or as ‘weight’, which is defined in grams per square metre (gsm) – and there’s no accurate correlation between these measurements. Some manufacturers use gsm, while others use mm.

Heavier papers have a more substantial and tactile feel that implies higher quality, while lighter papers are more easily bound into books. The ideal paper weight for books is between 170 and 230 gsm, depending on the page size. At least 260 gsm is recommended for A3+ prints and 310 gsm for A2 prints that will be framed.

Surface: Paper surfaces range from high gloss through semi-gloss, lustre, pearl and satin to smooth matte. Textured papers are also available, along with ‘metallic’ papers with a special surface that contains particles of mica to reflect light with an iridescent sheen. Other options include ‘baryta’ papers that simulate the surfaces of traditional photo papers, canvas, linen and silk media and papers that simulate the ‘hand-made’ look of traditional Japanese ‘washi’ paper.

For printing an image with a lot of detail, papers with smooth surfaces will reproduce details better than

textured papers. Heavy textures can distract the viewer's attention from the image, although they can work well for images with broad tonal gradations and areas of high contrast.

Tonality: Inkjet papers are usually classified as 'warm' or 'cool' tone. Warm papers retain the pale buff colour of their source materials (usually wood pulp). Cool papers are as close as possible to pure white in colour, often because they contain optical brighteners, although sometimes because cotton rag is used in their production.

Most landscape photos look best on cooler toned papers because they make colours appear livelier and highlight clouds and brighter areas. Portraits and shots of autumn colours usually look

better on warmer paper, particularly when the subject contains warmer hues and subtle tones.

Sample packs

Many manufacturers sell sample packs in A4 or similar sizes to give photographers a low-cost way to try out their papers. Where the brands themselves don't make up sample packs, some professional re-sellers like Image Science make up their own packs, usually containing one or two A4 sheets of each paper type within a particular range of between three and eight different papers. Prices range between \$12 and \$35, depending on the type of paper and the number of sheets in a pack.



Sample packs provide an easy and affordable way to see whether you like the look, feel and tonal reproduction of a paper before you buy it.



Speciality photo papers include 'baryta' surfaces, which replicate the surface appearance and tonality of traditional black and white photo papers.

Once you've chosen a suitable paper, you should be able to find a related ICC profile for the paper that matches your printer on the paper manufacturer's website. If you can't find a profile, use the closest match in your printer's canned profiles and make a test print on a small sheet of the paper. You may need to produce several prints, making small adjustments between them to tweak colours and contrast levels before achieving a satisfactory result.



Useful links

Paper and ink choice
www.bit.ly/pg33-12

How to choose inkjet media
www.bit.ly/pg33-13

Optical brighteners

Optical brightening agents (OBAs) are added to the coatings on inkjet media to make them look whiter, usually in papers made mainly from wood pulp. These chemicals fluoresce under ultraviolet light, emitting visible light at the blue/white end of the visible spectrum, which overpowers the paper's natural buff tone. Prints made on papers with OBAs appear to have a wider colour gamut, increased saturation and denser blacks, although the full benefit of OBAs only shows under light with high levels of UV, such as sunlight or fluorescent lighting.

While bright white papers work well for photo books (where they receive limited light exposure)

and some short-term projects, OBAs lose their fluorescence over time, especially when exposed to bright light, making the paper revert to its natural buff. As this takes place, the printed image will show colour shifts.

OBA-free papers are available for archival work but they are usually more expensive because they contain a high percentage of cotton rag. These papers may not reproduce the original brilliance in printed images, but many fine art photographers prefer them because they maintain consistent colour over time and their natural surfaces complement the printed images.

CHAPTER 8

Setting up your printer

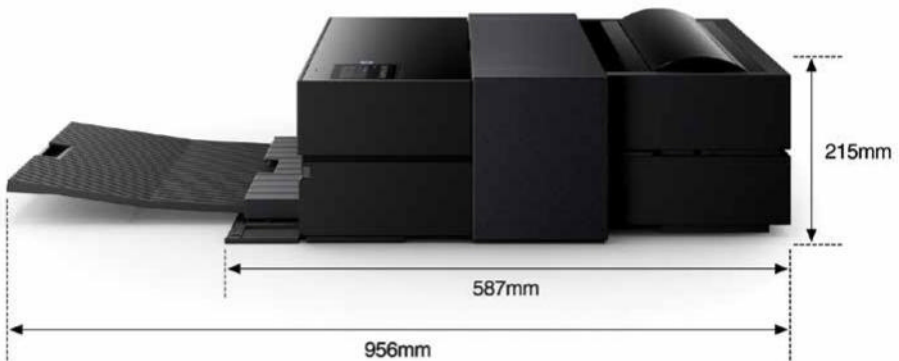
As outlined in Chapter 1, when setting up a printer you must allow enough space behind it for paper to pass through (if necessary) without hitting anything. For printers with rear feed chutes for heavy papers – and also for printers with clip-on roll paper holders – there must also be enough space to feed the paper in or fit the paper holder. Most printer manuals provide data on how much space is needed, although as a rough guide at least 330 mm will be needed for an A3 printer and around 400 mm for an A2 printer.

Printers are normally supplied in a cardboard carton, packed inside a large plastic bag. Once you've lifted it

onto your desktop you must remove the packaging materials (shown in the illustration on page 64). This takes several minutes.

Packed in with the printer is a set-up sheet that guides you through the rest of the process. Alternatively, you can visit the printer manufacturer's website for full instructions.

The printer should come with a mains power cable and a set of ink cartridges. A maintenance tank for mopping up droplets that might get sprayed inside the printer while it's operating may be included. You will probably need to supply a USB cable.



This illustration shows some useful measurements for the Epson P906 A2 printer with the optional roll paper feeder installed.

Once the printer is connected to mains power you can install the ink cartridges and maintenance tank (if required) and follow the instructions on the LCD screen. The cartridges are sealed in plastic to protect the ink from exposure to the air. Open them carefully and avoid touching the chips that interface with the printer.

Colour coded and labelled slots make each cartridge easy to install. Once they're in, the printer will go through

an 'initialisation' process in which the system is checked and ink is drawn up to fill the plastic tubes (ink lines) running between the cartridges and the print head. This process can take up to 15 minutes.

After that, the printer is ready for use. The next steps depend upon how the printer is connected to the device with the images you want to print. Most printers provide at least two of the following connections: USB, Wi-Fi and Ethernet.



Roughly 40 strips of blue sticky tape and several sheets of plastic had to be removed before this printer could be set up.

Your choice will depend on your personal preferences and available connections. From that point onwards everything is carried out through the device interface (the driver in the case of a computer).

Using the printer driver

Driver interface styles differ with each printer manufacturer but most contain three sections (or 'pages'). The Main page covers output quality settings, paper (or media) parameter settings (size, type, orientation and source) and any editing adjustments or enhancements the driver provides. The second page carries page layout settings and the third page covers maintenance items like head cleaning, nozzle checking and print head alignment.

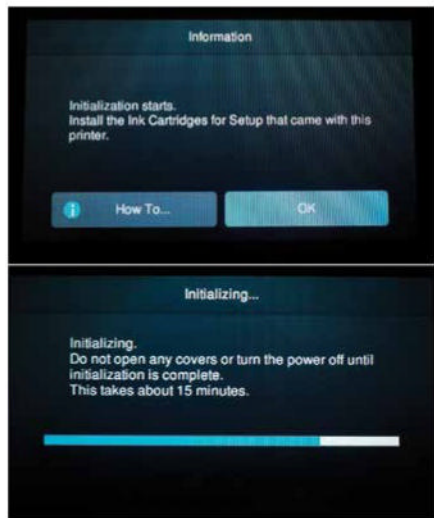
Most image editors interact seamlessly with the driver software. Selecting 'Print' when you have an image open for editing will open a dialog box from which you access the main page of the printer driver. At this point, it's important to check the following settings:

1. Check the correct printer has been selected. This is only important if you have several printers connected to your computer or network.

2. Set up the paper size and orientation. Use the Paper type box in the Main page to select the paper type, size and orientation of the image. This data is usually duplicated in the Page Setup section of the printer driver.

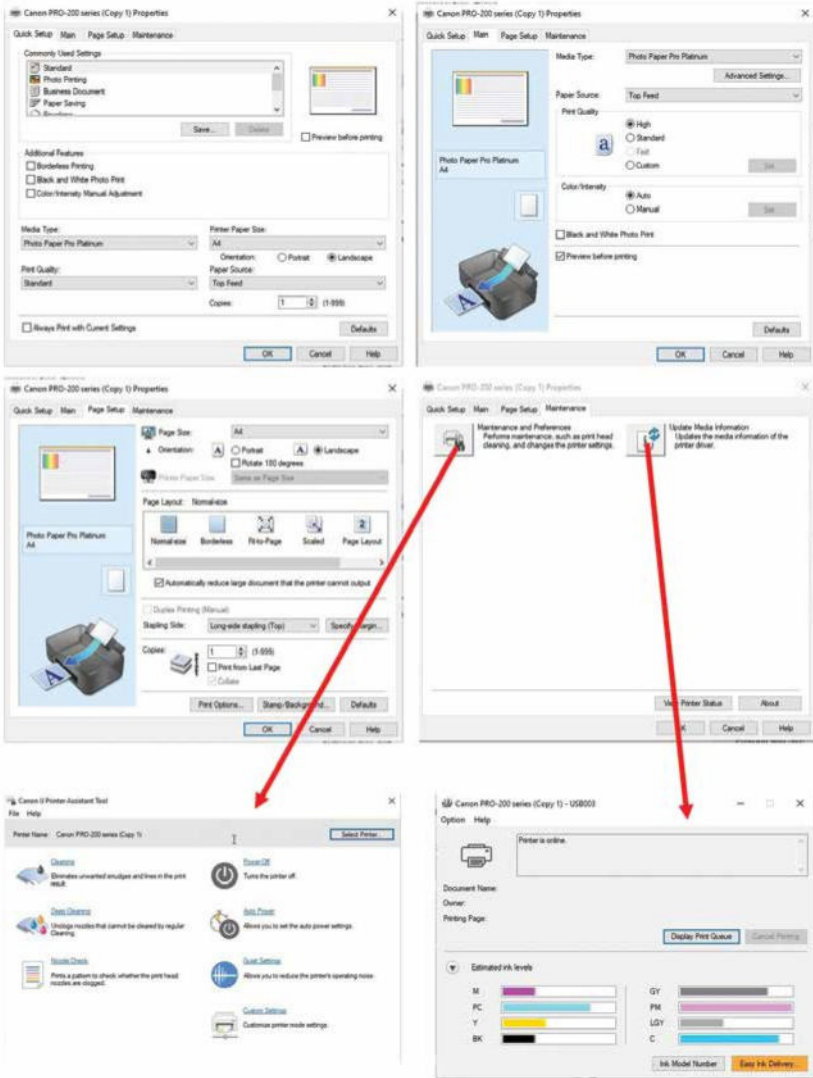


This illustration shows half the cartridges installed in an A3 8-ink printer.



Initialisation fills the ink lines running between the cartridges and the print head.

SETTING UP YOUR PRINTER



The four main pages in the driver software for a Canon A3 printer. Top row: the Quick Setup and Main pages; below: the Page Setup and Maintenance pages. Below them are pull-out pages obtained by clicking on the buttons at the top of the screen. On the left are the Maintenance tasks, while on the right is the ink level monitor.



The User Defined or Custom dialog box in the printer driver must be selected for panorama printing and the dimensions (length and width) of the output will need to be specified.

Wireless printing

A Wi-Fi connection sets the printer to connect to a smart device via wireless router. Most printers provide detailed instructions, whether you're using a QR code, the WPS push button method or handling the connection manually. You'll be required to provide an identifier (SSID/device name), a PIN code or password for the secure connection methods and enter link addresses when setting-up manually.

Many printers support the PictBridge Wi-Fi protocol, which lets

you control the printer from a camera smart device. You can set the output size, paper type, print quality and select borderless or bordered and apply 'photo fix' corrections like red-eye correction and scene-based exposure adjustments. Note: by default, auto correction is applied.

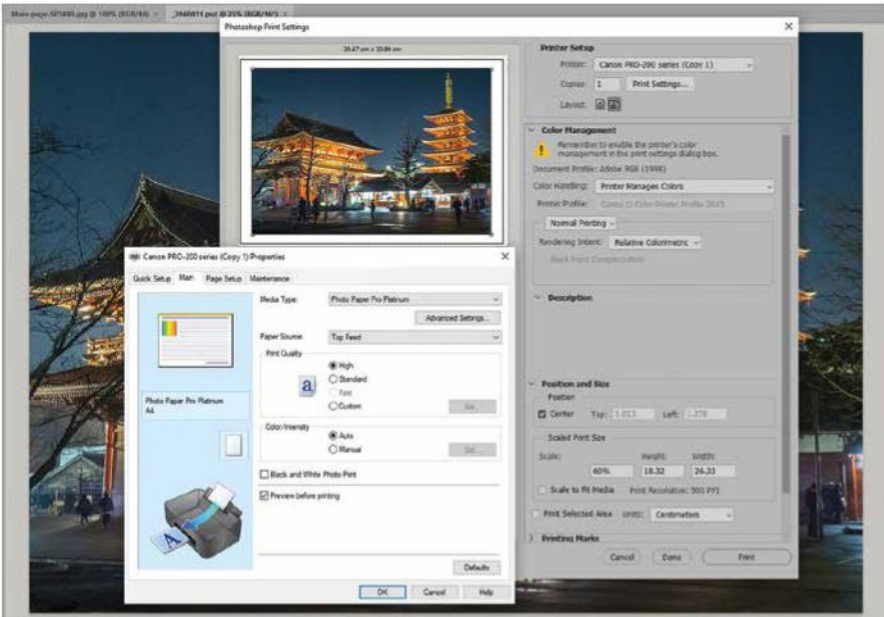
Some printers also support Apple AirPrint, which provides similar capabilities for macOS and iOS devices. Note: AirPrint does not support ICC profiles on some printers.

Border-free or Borderless lets you print the picture to the edges of the paper. Fit on Page fits the image to the paper with a small margin on two sides or all around the image. Margin widths are usually adjustable by keying in the image dimensions or the percentage of the paper you wish it to cover.

You can also set the paper width and height with the User Defined option when printing on non-standard size paper. (Most printers won't allow you to

make borderless prints with this setting.) Always check the Print Preview box before printing.

3. Preview the layout. Print Preview lets you see how the image is laid out on the paper before printing. Note: the image may be at low resolution and its colours and brightness levels are unlikely to match the final print. Pay particular attention to the paper size, type and orientation settings (you can waste paper if these are incorrect).



This screen grab shows the Canon printer driver opening automatically when 'Print' is selected in editing software.

4. Click on the 'Print' button. This will print the photograph.

Some printers offer additional settings, including greyscale, sepia or neutral/warm/cool grey options for monochrome prints, hue, saturation and brightness adjustments, digital camera corrections and 'Photo Enhance' settings that optimise the printer for different image types. It's better to make these adjustments in editing software, which makes it easier

to see the effects of any changes you make and provides a wider range of adjustments.

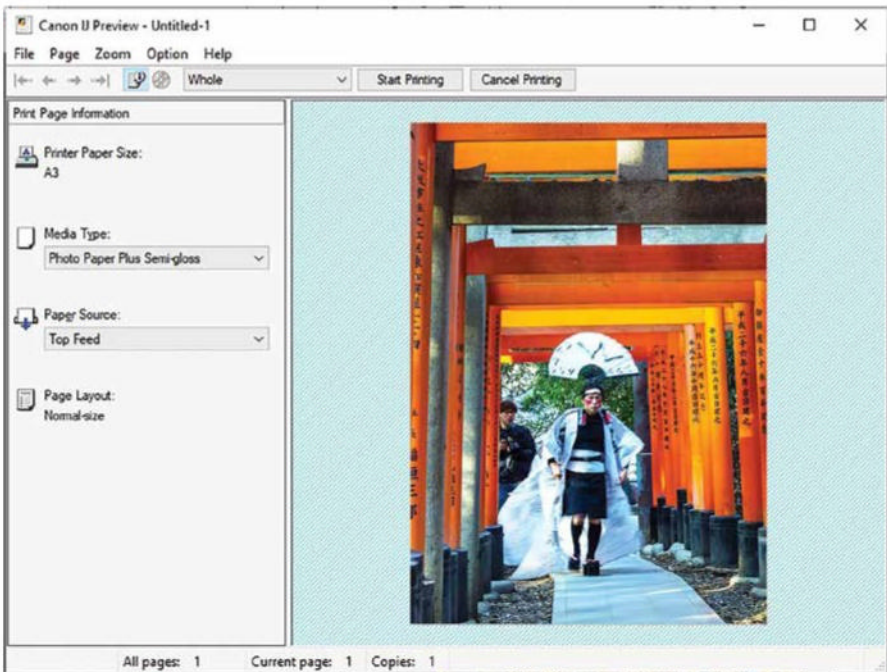
Useful links

Printer driver

www.bit.ly/pg33-14

Why your prints don't look right

www.bit.ly/pg33-15



This screen grab shows a preview thumbnail for a borderless A3 print with a Canon printer. Previewing is particularly important for borderless printing as it shows whether the image will fill the paper completely.

CHAPTER 9

Printing black and white photos

Monochrome prints have always had a special role in fine art photography because they stand out in our world of colour images. Images containing only tones between deep black and bright white evoke different responses in viewers. For some they convey a sense of history; for others a sense of drama or a return to the basics of the photographic art.

Even today, in our colour-rich world, almost all cameras include selectable monochrome modes, most editors offer monochrome conversion and prestige manufacturer, Leica, even sells dedicated monochrome cameras. Monochrome printing, therefore, has a role to play in digital darkroom work.

You need the right shot, effective editing, the right printer and the right media to create an eye-catching B&W photograph, and you needn't start with a monochrome image. In most cameras, selecting the B&W or monochrome shooting mode will discard the colour information when JPEG files are saved, giving you much less image data to work with.

(Raw files always capture all image data, including colour information.)

The best results will be obtained when you start with a full-colour image file containing maximum image data. You can convert it into a true monochrome image in several ways, outlined below.

Monochrome conversion methods

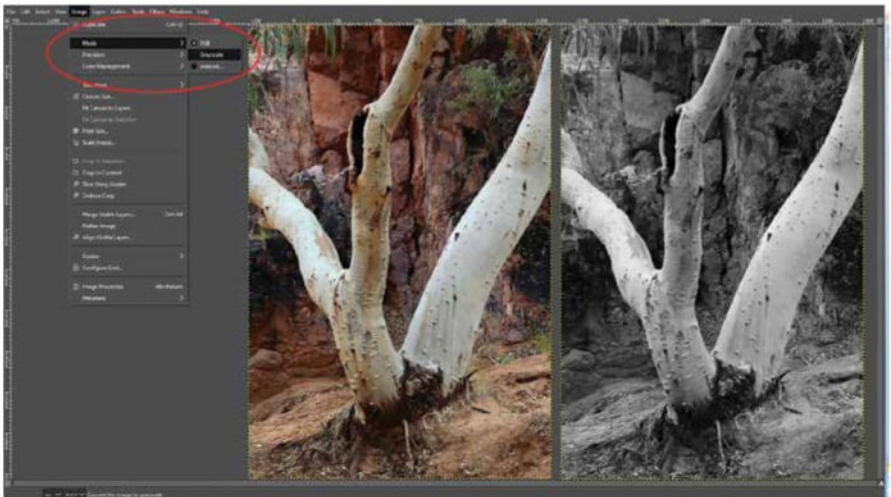
1. Greyscale conversion.

The simplest way to convert a colour image to monochrome is to select the grayscale option in the Image dropdown menu, as shown in the screen grab on the opposite page.

Another simple method is to open the image in an editor and drag the Saturation slider in the colour adjustment menu all the way to the left. This will remove all colours from the image. Unfortunately, a desaturated image may be slightly darker and can lose detail compared to the same image in true greyscale. Another main problem with both conversion methods is the lack of tonal adjustments for tweaking your photo.



Even simple editors include a monochrome mode, often with a range of selectable options covering different levels of contrast or brightness and different colour filters. The screen grab shown here is from Adobe Photoshop Express, a simple freeware online editor.



This screen grab shows the simple greyscale conversion method in GIMP, with a converted image superimposed to show the result.

2. Monochrome conversion modes

in editing software provide adjustments for changing the emphasis on different tones with colour sliders. Moving the slider to the left will darken areas in the image with that colour, while moving it to the right lightens them. This method provides a much wider range of adjustments.

Most software provides additional settings for applying colour filters and adding tints like sepia and blue or brown toning. Coloured inks will be required to print the end results of this type of conversion to obtain the necessary tonal subtlety.

Printing monochrome images

The secret to a good black and white print is controlling the dynamic range. We recommend working with 16-bit TIFF images because they contain the maximum amount of image data you can extract from a raw file. Otherwise use the highest JPEG quality setting and be careful with the adjustments you make.

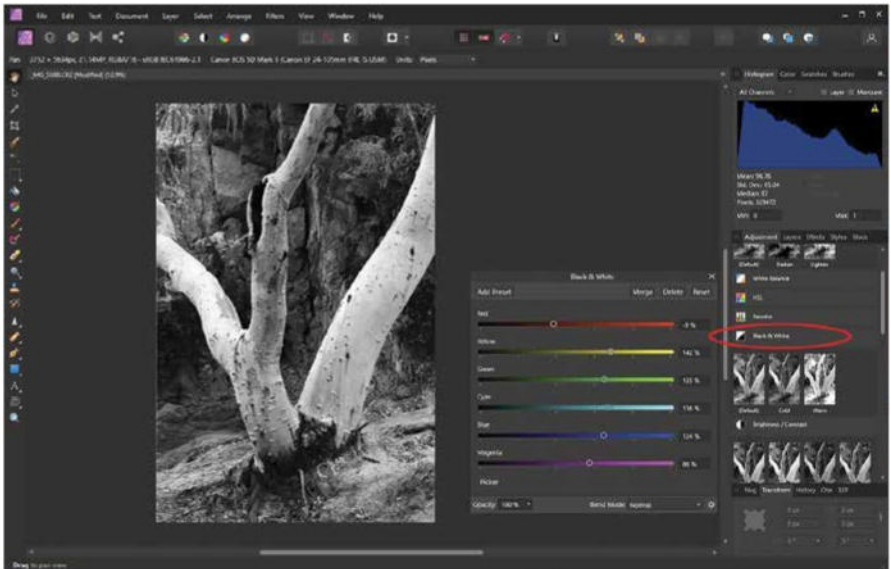
To reproduce the full tonal range of a B&W image, you need at least one grey ('light black') ink. Two grey inks – light and dark – will reproduce a wider range of intermediate grey tones. But even with these printers you should leave the printer in colour (RGB) mode so it can use the coloured inks to add

depth and intensity to the tones.

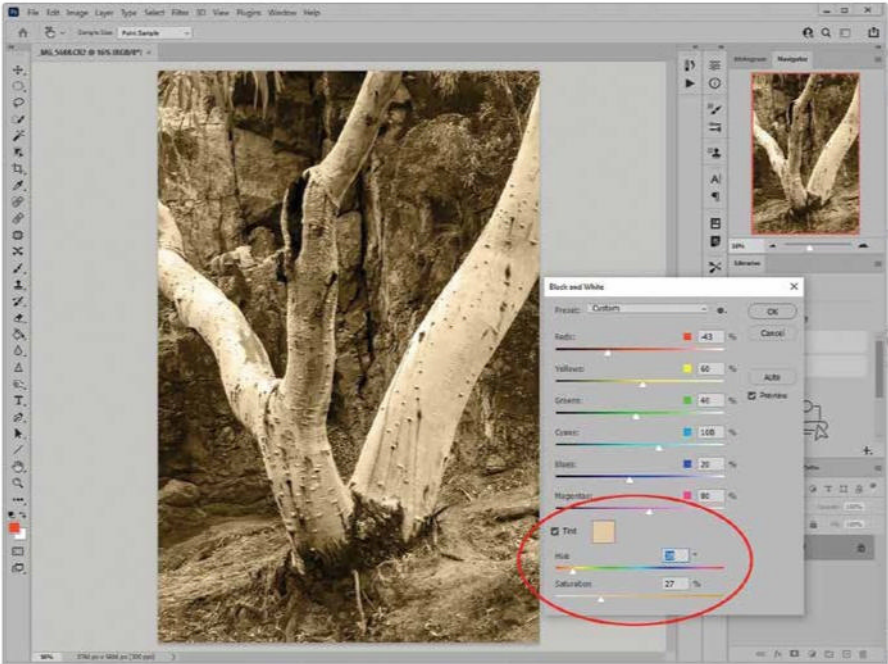
It's best to avoid the Grayscale mode unless you've run some preliminary tests and are happy with the results. One big problem with printing B&W photos results from using the coloured inks to cover the full tonal scale of the image. This can produce colour shifts that range from negligible to obvious. Some printers let you print with black ink only and, although that can be successful with certain images (such as high-contrast scenes), it can compromise the finer details in a subtle image.

Epson's photo printers come with dedicated B&W settings that allow users to fine-tune image tones and/or introduce colour toning effects. The Advanced B&W driver in Epson's printers gives users four Colour Toning options: neutral, cool, warm and sepia and allows them to adjust the tone across five levels from light (the hardest) to darkest (the softest).

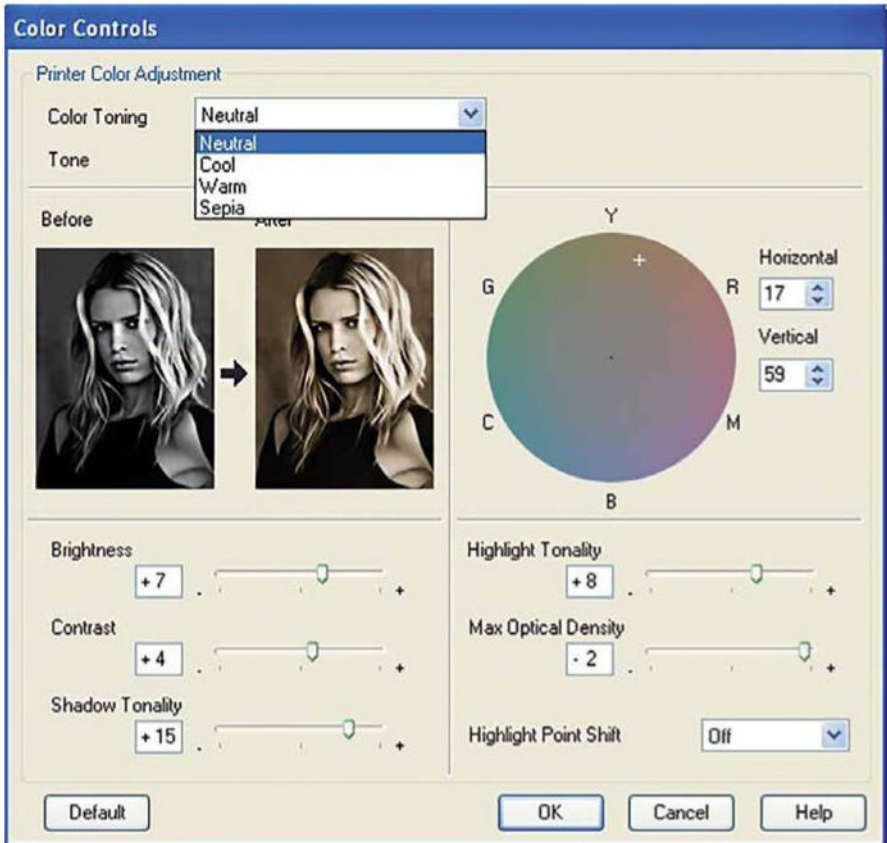
Purchasers of Epson's specialist photo printers can access a free download of Epson's Print Layout software, which has a more output-focused interface and can work as a plugin with Photoshop. This software includes the Advanced B&W Printing mode on the main page, instead of requiring users to open it separately.



This screen grab shows the adjustments available when the Black & White mode (circled in red) is selected in Affinity Photo.



Tints can be added to B&W images to convert them into sepia tone (shown here) or tones based upon any colour in the printable range, shown in the circled area in the dialog box.



The Advanced B&W driver in Epson's photo printers gives users four Colour Toning options: neutral, cool, warm and sepia and allows them to adjust brightness and contrast, highlight and shadow tonality and apply a colour tone by moving the white cross about in the colour circle on the right side of the dialog box.

Papers

The same papers can be used for printing monochrome images as for colour printing, although tests have shown the best results come from printing on semi-gloss and matte papers. Glossy paper can produce quite varied results and reflections will always be problematic with B&W photos.

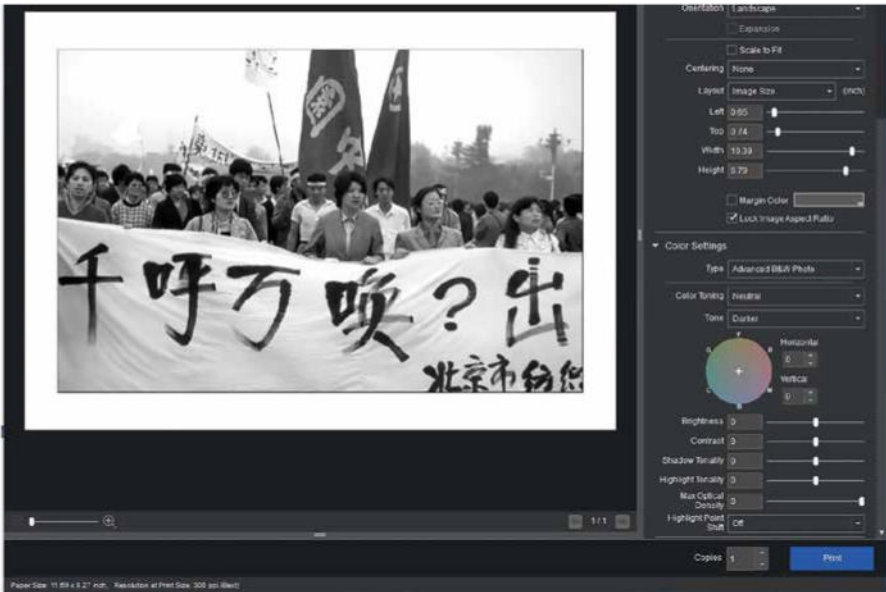
Fine Art papers can produce attractive looking B&W prints, but make sure your printer can handle them. Textured papers

won't suit subjects containing a lot of detail but can work when the texture highlights the tonal distribution in the image.



Useful links

B&W printing tips
www.bit.ly/pg33-16



This screen grab shows Epson's Print Layout software in use. The Advanced B&W Printing controls are in the lower right corner.

Easy to follow, expert advice on how to bring out the best in your photos by setting up a “digital darkroom” for photo editing, printing and archiving.

Digital Darkroom starts with the equipment you need to set up; the most suitable computer, editing software, monitor, printer, backup and archiving tools for photography. Monitor calibration and profiling tips will ensure your images have consistent colour values throughout the editing, output and archiving processes.

This handy guide shows you the key features to look for in a dedicated image editor, how to use photo editing tools most effectively, how to work with raw files and when to use jpeg.

Digital Darkroom offers reliable advice on printer and ink types, paper options, optical brighteners, and other factors that affect the quality of your photo printing.

In addition, we show you how to set up your printer and printer driver for optimum photo prints, including how to convert and print black and white photos.

About the Author

Margaret Brown is technical editor of *Photo Review Australia* magazine and website and has been writing on photography for more than 30 years. She is author of the popular and extensive *Photo Review Pocket Guide* series and the Australian Consumer Association’s Choice Guide to Digital Photography.

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