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FOR PHOTOGRAPHY ENTHUSIASTS

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AUSTRALIAN CAMERA FOR PHOTOGRAPHY ENTHUSIASTS

MARCH/APRIL 2017

Editor Paul Burrows
pburrows@nextmedia.com.au

Art Director Kristian Hagen

Production Editor Edgar Kramer

Advertising Traffic Diane Preece
dpreece@nextmedia.com.au
Te: 02 9901 6151

Advertising Sales Lewis Preece

Divisional Manager & National Advertising Sales
Jim Preece jpreece@nextmedia.com.au

Group Editor Jez Ford
Production Manager Peter Ryman
Circulation Director Carole Jones

CAMERA SUBSCRIPTIONS
1300 361 146 or +61 2 9901 6111
Locked Bag 3355, St Leonards NSW 1590
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nextmedia

Level 6, 207 Pacific Highway,
St Leonards, NSW, 2065.
Ph: (02) 9901 6100
Fax: (02) 9901 6198
www.nextmedia.com.au

Chief Executive Officer David Gardiner
Commercial Director Bruce Duncan

Camera is published by nextmedia Pty Ltd
ACN: 128 805 970, Level 6, 207 Pacific Highway, St Leonards, NSW, 2065

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Featured on this issue's front cover is Olympus's new OM-D flagship, the much-anticipated E-M1 Mark II. Our comprehensive test begins on page 22 and, as you'll read, this Micro Four Thirds format powerhouse lives up to expectations.

Camera magazine is a member of the Technical Image Press Association. Visit **www.tipa.com**

CHANGING TIMES

ON THE 15TH OF March in 1982, a recently-graduated high-school teacher walked into a set of small, non-descript offices in Brookvale – on Sydney's northern beaches – to begin a new career. The prospects of a job in the state's education system had looked grim, so the newspaper ad seeking a cadet journalist with a keen interest in photography presented a more promising alternative.

A few weeks earlier I'd attended an interview – coaxing my cantankerous 1963 Mini 850 all the way from the deep south of Cronulla – where all those years of reading *Amateur Photography* while at high school in the UK paid off. When, much later, I was given my confidential application form it was marked at the top "Highly possible" and, alongside the appraisal for Photographic Knowledge was written "Excellent." AP's weekly publication was a drain on meagre pocket money resources – there was *Motor* and *Autocar* to buy as well (both weeklies too) – but 35 years on, it's looking like a pretty good investment. Thirty-five years! It's gone in a flash, I can tell you.

Back then this magazine was called *Camera Craft* and the lead time was around six weeks, so I didn't actually first appear in print until the May 1982 issue. Being untried, I was only let loose on a few accessories and a slide projector, but by the time the June 1982 issue came out I'd graduated and my first camera test was the Minolta X-700. The X-700 was a milestone for Minolta too, being its first high-end 35mm SLR with a polycarbonate bodyshell and programmed exposure control plus it introduced a new logo on the faceplate. It subsequently became our second winner of the Australian Camera Of The Year award which had been introduced the year before and, of course, is still running as the expanded Camera Magazine Imaging Awards.

The 35mm SLR was the weapon of choice for enthusiasts back then and this was reflected in many of the ads which appeared in the May 1982 issue – for the Praktica B200, Pentax LX, Cosina CT7, Canon AE-1 Program, Chinon CE-4, Minolta XG-M, Leica R4, Nikon FE and F3 plus 35mm accessory lenses from Vivitar, Makinon and Cimko. Many of these brands are now long gone and many more have disappeared over the last 35 years, including Agfa, Bronica, Contax, Konica, Polaroid (the original), Kodak (the original again), Hanimex, Petri, Yashica, Zenit and most recently, to all intents and purposes, Mamiya. Autofocusing effected the first cull – the investment required to be competitive just too much – and, a decade or so later, digital imaging's huge financial demands accounted for any struggling survivors. But there have been some great revivals too – most notably Olympus and Fujifilm – and newcomers such as Panasonic, Sony, GoPro and Phase One.

Not surprisingly then, the one word that sums up the last 35 years in the photography industry is "change". Back in 1982 fully-auto exposure control was the big deal, but we were already looking forward to autofocusing – that ad for the AE-1 Program included an autofocus 35-70mm zoom with built-in active rangefinder, motor and batteries – the fully-integrated camera (eliminating clunky add-ons) and even electronic imaging via still-video systems. Still-video was short-lived, but around long enough to convince everybody the future was filmless. Meanwhile, film had been trying to become more accessible, first with Disc – ahead of its time – and then the original APS – too little, way too late. Digital capture arrived as a work-in-progress and it took well over a decade for it to get close to film's picture quality, but the panic set in early among the camera makers, so photo-chemical imaging died a premature death. I still maintain that the theory of any new technology is always nearly ten years ahead of a truly workable practice.

But change is what's made the last 35 years exciting, fascinating, absorbing, sometimes perplexing and, on more than a few occasions, challenging… especially when trying to predict the future. Essentially, the 150+ years of photography has been all about designing more compact, convenient and capable cameras – it's driving the mirrorless revolution right now – making photography more accessible to everybody. It's ironic that the most successful device in this quest is not even a camera, but every smartphone user is a potential convert which perhaps should be an industry-wide strategy to ensure it's not just the digital compact camera that's a casualty. There is, however, plenty to be optimistic about such as actioncams, camera drones, mirrorless in all its various interpretations and the video/still convergence, but also the return to the traditional camera store (both online and on-street) and the firts stirrings of a real film revival.

"May you live in interesting times" is famous for being a Chinese curse, but the interesting times that have been my 35 years with this magazine – so far – have been nothing but a blessing. I would be remiss if I didn't acknowledge the unwavering support over all this time of Jim Preece, who joined just a few months after me as advertising sales manager and is now head of the divisional group in Next Media to which *Camera* belongs. He has always championed the value of editorial integrity and independence, and that makes an editor's job a thousand times easier. It's also ensured *Camera's* reputation as a respected source of accurate and unbiased information – culminating in our admission, in 2010, to the prestigious Technical Image Press Association (TIPA) global group of photography magazines – something that's now even more valuable in this era of so-called 'digital influencers' whose affiliations are often undisclosed.

Finally, many thanks to you, *Camera* readers, a few of whom, I know, have been with me since 1982. Without you we wouldn't have a magazine, so I'm as committed as ever to making sure we help guide you through photography's ever-changing landscape *en route* to ever-better pictures.

Paul Burrows **Paul Burrows, Editor**

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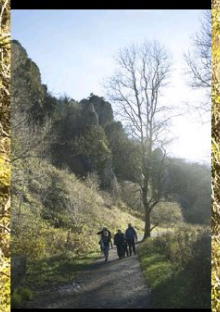


The Photogenic Places feature sees John & Carolyn Neilson taking us on a journey of discovery around South Australia's Lake Albert district.

The new and highly-anticipated GFX 50S mirrorless digital medium format camera from Fujifilm.

EKTACHROME IS BACK... KODACHROME LESS LIKELY

KODAK ALARIS –THE UK-based entity spun out of the old Eastman Kodak Corporation in 2013 – has announced plans to revive its E6-process Ektachrome colour transparency film. Amid all the futuristic tech of this year's Consumer Electronics Show in Las Vegas, Kodak revealed that there's now sufficient demand globally to re-introduce a film product that was discontinued in 2012.

"We are seeing a broad resurgence of excitement about capturing images on film," says Steven Overman, Kodak's chief marketing officer and president of its Consumer and Film Division.

"Kodak is committed to continuing to manufacture film as an irreplaceable medium for image creators to capture their artistic vision. We are proud to help bring back this classic."

Ektachrome 100 film will be available in the 35mm format (and 36-exposure lengths) later in the year. The USA-based Eastman Kodak will also produce Ektachrome in the popular cine film formats.

While the film revival isn't anything on the scale of vinyl records just yet, there are plenty of signs of a growing revival, spearheaded mainly by the instant print category. Kodak Alaris says the resurgence in the popularity of analog photography has convinced it to consider re-introducing other discontinued film products, but sadly Kodachrome isn't likely to be among them.

The highly specialised processing required for this film stock – which also isn't very environmentally friendly – makes Kodachrome much more difficult to re-introduce and it's unlikely that even substantial demand globally would make it a viable proposition financially.

WILL FILM'S REVIVAL MATCH VINYL'S?

THE RETURN OF the analog LP record to the music world has been a phenomenon that has taken many by surprise. It started small, but now many recording artists are releasing on vinyl – some before using any other platform – and even company's as big as Sony are building turntables again. What's it all about and will we see the same thing happen with analog photography… otherwise known as film?

The real audio aficionados contend that vinyl sounds better in terms of being a more realistic representation of a musical performance rather than the more clinical approach of digital's binary language. You'll often hear the descriptor 'warmer' used to describe recordings on vinyl which really just means it sounds more realistic or perhaps even more natural as, of course, we have analog ears. We also have analog eyes, but images are a different matter even though digital capture also imposes a structure on them that isn't natural.

The second key factor in vinyl's revival has been the experiential element… the lovely big album cover artworks, cover notes you can actually read and then the whole procedure of preparing the record, placing it carefully on the turntable, starting it spinning and then gently lowering the tone-arm (always much more pleasurable when done manually). A few seconds of crackle – just to help build the anticipation – and then the music begins. It's a return to something reassuringly pleasurable to anybody who experienced it first time around, and an introduction to something mysteriously exciting to those encountering it for the first time.

It's the involvement factor that's more likely to drive film's resurgence which, so far, hasn't amounted to much beyond the amazing popularity of instant print products. This maybe all about to change now that Kodak Alaris – the UK operation that's custodian of all the original Kodak film-based properties – has announced it will re-introduce Ektachrome 100 colour transparency stock for both photography and cinematography.

This is a reversal (no pun intended here) of what's been depressingly regular news for the last decade or so… namely the cessation of the production of many film types, especially colour transparency. Despite this, a small but hardy band of enthusiasts has steadfastly remained dedicated to shooting film, ferreting out 'new old stock' from all over the world to keep silver-halide photography alive. Kodak's Ektachrome announcement moves things up a gear or two. The company may no longer be the powerhouse it once was, but it's still a major corporation and if it thinks there's a brighter future in film photography, it's time to sit up and take notice. There are potential implications from Ektachrome's return all over the place in terms of the viability of introducing related products (including cameras), and it'll only take a couple of others to join the party and we'll have a full-scale revival on our hands.

As digital imaging delivers so many conveniences, what does film have to offer now? Well, there is definitely a particular 'look' created by the random nature of a film's structure – all those uniquely-shaped silver halide crystals suspended in one or more gelatin layers – but it's the experiential elements that are likely to be the main attraction. There's the loading and unloading of film, a more considered technical approach given there's a finite number of frames available, and that frisson of anticipation that accompanies the delay between the exposure and the delivery of the image. Plus there are even more sensory delights for those venturing into the darkroom. The bespoke nature of silver halide prints may also be a convincing factor for a return to shooting film, especially for B&W work.

It's still hard to say whether we'll see anything quite on the scale of what's happening with vinyl records, but it began slowly too. The return of Ektachrome may just be the kick-start that's needed.

Paul Burrows, Editor.

NEW LUMIX FLAGSHIP DELIVERS '6K PHOTO'... AND MUCH MORE

UNVEILED AT LAST year's Photokina and launched at this year's CES in Las Vegas, Panasonic's new Lumix G flagship raises the bar again in terms of mirrorless camera capabilities both for still photography and video-making.

Featuring a more streamlined bodyshell than its predecessor, the Lumix GH5 is still a comparatively compact camera which again will be the attraction when competing against the likes of Canon EOS 5D Mark IV.

The magnesium alloy body is fully weather-sealed and has a new OLED-type EVF with an increased resolution of 3.68 megadots and a magnification of 0.76x. The monitor screen is an 8.1 cm LCD panel with a resolution of 1.62 megadots, touch controls and a full range of tilt/swing adjustments. As before, there are two SD memory card slots, but both are compatible with UHS-II speed SDXC types.

Panasonic's already impressive DFD (Depth From Defocus) contrast-detection autofocusing has been upgraded to operate at 480 fps with 225 focusing points and sensitivity down to EV -4.0 at ISO 100. Continuous shooting is possible at up to 9.0 fps with full AF adjustment, and up to 12 fps with the AF locked to the first frame. As the GH5 now records 4K video at either 60 fps (NTSC) or 50 fps (PAL), its '4K Photo' modes have been upgraded to operate at 60 fps as well. Furthermore, '6K Photo' functions are provided – running at 30 fps – which delivers still frames with a resolution of around 18 megapixels (up from 8.3 MP) with 4K, taking these high-speed photography modes to a new level of usability.

In addition to recording 4K video at 50/60p, the GH5 is also the world's first mirrorless camera to record 4K video internally in 10-bit depth with 4:2:2 colour (either UHD resolution at 25/30p or Cinema 4K resolution) at 24p. This gives over a billion colours and four times the tonality of 8-bit. Equally importantly, it provides significantly more editing flexibility in post-production.

Available down the track – via a firmware upgrade – will be 10-bit 4:2:2 colour for 1080p Full HD recording at 50/60p. The GH5 can also record a 10-bit 4:2:2 colour to an external recorder via its HDMI connector or, 8-bit 4:2:2 colour while simultaneously recording 8-bit 4:2:0 colour internally for back-up. A second firmware upgrade scheduled for later in 2017 will give 4K recording at a bit rate of 400 Mbps and 200 Mbps for Full HD via ALL-Intra compression (and with 10-bit 4:2:2 colour). The GH5 can record 1080p footage at faster frame rates up to 180 fps for enhanced slow motion effects.

Notably too, there is now no time limit on clip durations with any recording setting so the only factor here is the capacity of the loaded memory cards or the external recorder.

Not surprisingly, the GH5 is packed with pro-level video functions, including luminance level adjustment (in both 8-bit and 10-bit), synchro scan (SS) mode, SMPTE-compliant time coding, waveform and vectorscope monitoring, colour bars, Cinelike profiles (plus Like709 for HDTV and, optionally, V-LogL) and a master pedestal control.

The GH5's new Micro Four Thirds size 'Live MOS' sensor has a total pixel count of 21.77 million and lacks an optical low-pass filter to help optimise resolution. The read-out speed has been increased by 1.7x compared to the GH4's sensor and there's a new 'Venus Engine 10' processor which is 1.3x faster to enable the 50/60p 4K recording. It also delivers a number of new image data processing capabilities, including 'Multi-Pixel Luminance Generation', 'Intelligent Detail Processing' and 'Three Dimensional Colour Control' which collectively enhance sharpness, detailing and colour reproduction. Noise reduction is also upgraded and Panasonic claims noise-free images across the camera's sensitivity range of ISO 200 to 25,600. Five-axis sensor-shift image stabilisation gives up to five stops of correction for camera shake. Built-in WiFi is integrated with Bluetooth 4.2.

The Lumix GH5 is expected to be available in Australia by the end of March and is priced at $2999 for the camera body, but is also available packaged with either the Leica DG Vario-Elmarit 12-60mm f2.8-4.0 ASPH Power OIS zoom (equivalent to 24-120mm) or the Lumix G X Vario 12-35mm f2.8 II ASPH Power OIS zoom (equivalent to 24-70mm). Both these kits are priced at $3999. For more information visit www.panasonic.com.au

FUJIFILM'S TOP X SERIES CAMERAS GET NEW CLOTHES

BOTH FUJIFILM'S 'APS-C' format mirrorless flagships are now being offered in special Graphite editions. The X-Pro2 Graphite Edition and X-T2 Graphite Silver Edition have new high-grade metallic finishes created via a multi-layering process.

The X-Pro2 Graphite Edition is packaged with an XF 23mm f2.0 R WR lens which is also finished in the same graphite colour. This kit is priced at $3699.

The X-T2 Graphite Silver Edition is priced at $2799 for the camera body only and is accompanied by matched accessories comprising a leather camera strap, aluminium hotshoe cover and a dedicated version of the EF-X8 bundled accessory flash unit. The body colour on this model is created by first applying a matte black undercoat over which is sprayed a graphite silver layer created using 'Thin Film Multilayer Coating Technology' which applies very thin layers of ultra-fine particles while the camera body is rotated at high speed. Finally, a layer of clear varnish is applied to give a glossy finish.

Both graphite coloured models are unchanged from the standard black versions in terms of their feature sets and specifications.

For more information visit www.fujifilm.com.au

KP FOR PENTAX

PENTAX IS QUICKLY becoming the D-SLRs most active supporter as it launches yet another new model. The KP continues the Pentax tradition of packing a lot of features into a compact and affordable body. The KP employs magnesium alloy covers, is fully weather-proofed and also insulated to allow shooting in sub-zero temperatures. The styling is a mixture of retro with modern and a largely dial-based control layout with interchangeable handgrips (there's a choice of three). The pentaprism-type optical viewfinder provides 100 percent subject coverage and a 0.95x magnification plus it has interchangeable focusing screens. The 7.62 cm monitor screen is adjustable for tilt.

On the inside is a new 25 megapixels 'APS-C' format CMOS sensor – which goes without an optical low-pass filter – mated with the latest 'PRIME IV' processor. The effective pixel count is 24.3 million and the native sensitivity range is equivalent to ISO 100 to a staggering ISO 819,200. In-camera sensor-shift image stabilisation provides correction for camera shake over five axes and for up to five stops, plus the KP has the 'Pixel Shift Resolution System' for enhanced colour reproduction and detailing. It also has the 'AA Filter Simulator' to help correct for moiré patterns and which also works by shifting the sensor.

Continuous shooting is possible at up to 7.0 fps for a burst of 28 maximum-quality JPEGs or eight RAW files. There's a single memory card slot for the SD format with UHS-I speed support.

The KP has the 'SAFOX 11' autofocusing which uses 27 measuring points, 25 of them cross-type arrays. Operating sensitivity is down to EV -3.0 at ISO 100 and area modes are available which employ 3x3 or 5x5 point clusters when shooting with the continuous AF mode. Tracking can be set to one of four subject/scenario modes. Exposure control is based on an 86,000-pixels RGB metering sensor with the choice of multi-zone, centre-weighted average and spot measurements.

The standard 'PASM' exposure control modes are supplemented with Pentax's sensitivity-priority and shutter-and-aperture priority options. There's a built-in pop-up flash which can act as an optical controller for a wireless TTL flash set-up. The camera's focal plane shutter has a speed range of 30-1/6000 second, but there's now also the choice of a sensor-based shutter which has a top speed of 1/24,000 second (and also enables silent shooting).

Other notable features include multi-shot HDR capture, a multiple exposure facility, an intervalometer (for time-lapse sequences of up to 2000 frames), horizon correction and a dual-axis level indicator, composition correction, and built-in WiFi. The KP records Full HD video at 50 fps with interlaced scan or 25 fps with progressive scan plus there's a 24 fps speed mode. Time-lapse movies can be recorded in the 4K resolution of 3840x2160 pixels and using Motion JPEG/AVI compression. The new Pentax D-SLR has built-in stereo microphones plus a 3.5 mm stereo audio input.

The Pentax KP is available in Australia now and is priced at $1499 for the body only, and with a choice of black or silver finishes. For more information visit **www.pentax.com.au**

MAKEOVER FOR LEICA'S DIGITAL RF CAMERA

LEICA HAS SIGNIFICANTLY reworked its digital rangefinder M camera to create the next-generation M10 which is not only the most compact version, but also returns to a conventional model numbering system. After the M9 model, Leica adopted its factory codes to designate new digital M models, but the 'Typ' coding hasn't always been easy for consumers to understand.

Although the traditional M styling is retained, the M10 has an all-new magnesium alloy bodyshell which is slimmer than the previous M Typ 240 model. The top and bottom plates remain brass components. A dial for setting the ISO now accompanies the one for selecting shutter speeds. The classical optical rangefinder is retained, but with a larger field-of-view (increased by 30 percent) and a higher magnification (now at 0.73x). Additionally, the eyepiece's eyepoint has been increased by 50 percent, making the viewfinder easier to use for spectacle wearers.

On the inside is a full-35mm format CMOS sensor Leica says has been "developed especially for this camera" and which has a "unique pixels and micro-lens architecture". It has an effective pixel count of 24 million and a sensitivity range equivalent to ISO 100 to 50,000. There isn't a low-pass optical filter to help optimise the resolution and Leica's 'Maestro II' processor enables continuous shooting at 5.0 fps for a burst of 100 JPEGs or 30 RAW files. These long bursts are possible thanks to a 2.0 GB buffer memory. The M10 captures JPEGs in one of three image sizes and RAW files in the Adobe DNG format, but it has no video recording capabilities (although live view is available). There's a single memory card slot for the SD format. The LCD monitor screen is fixed and has a resolution of 1.04 megadots. It's protected by a scratch-resistant 'Gorilla' glass faceplate. A first for a digital M body is the inclusion of a WiFi module, enabling wireless file transfer and remote camera control via the Leica M-App (for iOS devices).

The rest of the M10 is essentially pure Leica M – manual focusing via a split-image rangefinder, centre-weighted average metering, aperture-priority auto or manual exposure modes, and a top shutter speed of 1/4000 second. Multi-zone and spot metering options are available using the imaging sensor.

The Leica M10 is available with black or silver chrome finishes and is priced at $9700 (body only). It is available in Australia now. For more information visit **https://en.leica-camera.com**

EPSON LAUNCHES NEW 17-INCH SURECOLOR PRINTER

TAKING ON CANON'S imagePROGRAF PRO-1000 is the latest addition to Epson's new generation of SureColor photo printers, the P5070. It's also a desktop model, but can handle paper widths of up to 17 inches for making prints up to A2 in size. It uses a ten-colour 'Ultrachrome HDX' pigmented ink set with large, 200-millilitres-capacity cartridges – to promote more economical printing – and newly formulated pigments. Epson says that the new black inks are 1.5x denser than previously and so deliver a wider dynamic range. Improved resin encapsulation technology has been employed to give better gloss uniformity and "optically clearer, sharper images". Epson claims that its new-generation pigmented ink technology delivers up to twice the print permanence than before.

The P5070 has a ten-channel version of Epson's 'PrecisionCore TFP' print head which includes a new ink-repellant surface coating, along with improved dust and static control to reduce the likelihood of nozzle clogging. Additionally, printless nozzle checks can be performed which saves wasting both ink and paper. Incidentally, there's 360 nozzles per colour channel – with variable-size ink droplets as small as 3.5 picolitres – to deliver improvements in both the printing speed and the detailing in a print.

There are two colour configurations; one with a Light Light Black ink and another which uses Violet ink. The Light Light Black configuration is designed to give smoother and more neutral tonal transitions when printing in B&W using the Epson Advanced Black And White print mode. When the Violet ink is used, the colour gamut is expanded to give a 99 percent Pantone coverage which Epson claims is currently the best in the industry.

The P5070 can accept paper rolls and has a power-driven roll media spindle which enables the production of panoramas and roll printing up to around 30 metres in length. There's an internal high-speed, single-pass rotary cutter. A high-capacity cassette for cut papers can hold up to 100 sheets of premium photo paper in sizes up to A2+. Fine-art media up to 1.5 millimetres in thickness (including posterboard) can be accommodated via front paper feed. Automatic switching between the roll and cassette sheet feeds allows both to be loaded at the same time. Four-sided borderless printing is available at all standard paper widths from eight inches to 17 inches.

The Epson SureColor P5070 is available now, priced at $2695. Various packages are available, including one which includes an optional in-line spectrophotometer (for automated colour management) and an extended five-year warranty.

For more information visit the website at www.epson.com.au

LEXAR COOKS UP MORE GIGS

SO, IF YOU have a spare two-and-a-half grand to spend on a memory card, Lexar will happily sell you one of its new 512 GB capacity CFast devices. Yup, 512 *gigabytes*. That's an awful lot of storage space, but with 4K video now well-and-truly here and 8K on the horizon, it's probably going to look merely adequate in years to come. Likewise with 100 MP still cameras, of which there will surely be more down the track. Lexar says that when shooting at 200 fps (i.e. for slow-motion sequences) on a high-end, production-level video camera, it's easy to fill up an entire 256 GB card in just 17 minutes. The new Lexar Professional 3500x series 512 GB CFast 2.0 card has a claimed maximum read speed of up to 525 MB/sec and a write speed of up to 445 MB/sec. CFast cards are incompatible with standard CompactFlash types, and are currently used in the Canon EOS-1D X Mark II, Hasselblad H6D 100c and a number of pro-level video cameras and recording devices. The Lexar Professional 3500x CFast 2.0 card line is also available in 32 GB, 64 GB, 128 GB and 256 GB capacities. The new 512 GB card is priced at $2550. More information at www.lexar.com

BRIEF EXPOSURES

Chinese drone manufacturer **DJI** has reportedly purchased a majority stake in Hasselblad. DJI already held shares in the Swedish camera maker, but has been convinced to increase its involvement with the immediate goal being to provide the funding necessary to produce the X1D digital medium format mirrorless camera, following unexpectedly high demand. Hasselblad has struggled financially for the last few years, but the X1D has the potential to turn around the company's fortunes.

PHOTOGRAPHY EXHIBITIONS & EVENTS

10 March to 27 August: Exhibition. *Bill Henson.* Recent photographs selected by the photographer, including portraits, nudes and landscapes. Part of the NGV Festival Of Photography. At NGV International, 180 St Kilda Road, Melbourne, Victoria 3000. Gallery hours are 10.00am to 5.00pm daily. Admission is free. For more information telephone (03) 8620 2222 or visit www.ngv.vic.gov.au

17 March to 18 June: Exhibition. *William Eggleston Portraits.* The first comprehensive exhibition devoted to Eggleston's portraits of suburban life in southern USA. Part of the NGV Festival Of Photography. At NGV International, 180 St Kilda Road, Melbourne, Victoria 3000. Gallery hours are 10.00am to 5.00pm daily. Ticketed event. For more information telephone (03) 8620 2222 or visit www.ngv.vic.gov.au

17 March to 16 July: Exhibition. *Ross Coulter: Audience.* A photographic series documenting audience members pictured in more than 70 Melbourne galleries and museums from 2013 to 2016. Part of the NGV Festival Of Photography. At NGV International, 180 St Kilda Road, Melbourne, Victoria 3000. Gallery hours are 10.00am to 5.00pm daily. Admission is free. For more information telephone (03) 8620 2222 or visit www.ngv.vic.gov.au

17 March to 30 July: Exhibition. *Zoë Croggon.* A new body of visual work created using photographs, video and a specially produced wallpaper. Part of the NGV Festival Of Photography. At NGV International, 180 St Kilda Road, Melbourne, Victoria 3000. Gallery hours are 10.00am to 5.00pm daily. Admission is free. For more information telephone (03) 8620 2222 or please visit www.ngv.vic.gov.au

31 March to 30 July: Exhibition. *Patrick Pound: The Great Exhibition.* Images exploring the art of collecting and the way things can hold and project ideas. Part of the NGV Festival Of Photography. At the Ian Potter Centre, NGV Australia, Federation Square, Melbourne, Victoria 3000. Gallery hours are 10.00am to 5.00pm daily. Admission is free. For more information telephone (03) 8620 2222 or please visit www.ngv.vic.gov.au

14 April to 23 June: Exhibition. *David Stephenson – Human Landscapes.* Includes a number of Stephenson's early works from the 1980s, including majestic pinhole photographs of the sea and sky, and expansive panoramas as well as his stark yet poignant works shot in the Antarctic in the 1990s. At the Art Gallery of NSW, Art Gallery Road, The Domain, NSW 2000. Gallery hours are 10.00am to 5.00pm daily (open to 9.00pm on Wednesdays). Admission is free. For more information visit the website at www.artgallery.nsw.gov.au or telephone (02) 9225 1744.

39 April – 9 July: Exhibition. *Head On Portrait Prize 2017.* At the Museum Of Sydney, corner Bridge and Phillip Streets, Sydney, NSW 2000. Gallery hours are 9.30am to 5.00pm daily. For more information telephone (02) 9251 5988 or visit www.hht.net.au For more information about the Head On Photo Festival visit www.headon.com.au

31 May – 8 October: Exhibition. *Wildlife Photographer Of The Year.* One hundred images from the finalists and winners in the 2016 edition of the world's biggest wildlife photography competition. At the Australian National Maritime Museum, 2 Murray Street, Darling Harbour, Sydney, NSW 2000. Entry is $20 which includes admission to the museum's permanent galleries. Museum hours are 9.30am to 5.00pm daily. For more information telephone (02) 9298 3777 or visit www.anmm.gov.au

24 June to 8 October: Exhibition. *Mervyn Bishop.* A celebration of a central figure in Australian photography, and his contribution to art and photojournalism over half a century. At Yiribana Gallery, the Art Gallery of NSW, Art Gallery Road, The Domain, NSW 2000. Gallery hours are 10.00am to 5.00pm daily (open to 9.00pm on Wednesdays). Admission is free. For more information or visit www.artgallery.nsw.gov.au or telephone (02) 9225 1744.

28 October – 18 February 2018: Exhibition. *Robert Mapplethorpe: The Perfect Medium.* Images ranging from early Polaroids to refined studio works from the 1980s. At the Temporary Exhibitions Gallery, the Art Gallery Of NSW, Art Gallery Road, The Domain, NSW 2000. Gallery hours are 10.00am to 5.00pm daily (open to 10.00pm on Wednesday). Entry fees apply. For more information telephone (02) 9225 1744 or visit www.artgallery.nsw.gov.au

25 – 30 September 2018: 2018 Photokina World Of Imaging. The world's largest exhibition of new imaging products and processes. At the Köln Messe, Cologne, Germany. Visit www.photokina-cologne.com for more information.

LEICA OPENS FIRST BRANDED STORE IN AUSTRALIA

AUSTRALIA HAS ITS first Leica Store, a dedicated retail outlet selling all things Leica, including imaging products and sports optics.

Located on the second floor of the historic Queen Victoria Building (QVB) in the heart of Sydney's CBD, the 80 square metres Leica Store houses a sales and product hands-on area, in addition to a gallery wall displaying the works of Leica photographers.

"We are excited to have opened a dedicated store that embodies Leica Camera in Australia. This space offers an opportunity for full immersion into the brand, inspiring through showcasing all that can be achieved with our world-class Leica optics," says Ryan Williams, Managing Director of Leica Camera Australia Pty Ltd.

The Leica Store is at Shops 40-42, Level 2, Queen Victoria Building, 455 George Street, Sydney. Opening hours are 10.00am to 6.00 pm Monday to Wednesday, Friday and Saturday; 10.00am to 9.00pm on Thursdays, and 11.00am to 5.00pm on Sunday. For more information visit www.leica-store.com.au

FUJIFILM REVEALS FULL GFX SPECS... DELIVERIES START NOW!

SINCE ANNOUNCING ITS mirrorless digital medium format camera system back at last year's Photokina in Germany, Fujifilm has kept a tight lid on the first GFX camera's full specs and pricing. Now all is revealed and, by the time you read this, the first shipment of bodies and lenses should be landing in Australia.

Let's cut to the chase regarding pricing first. The GFX 50S body delivers on the promise of being "well under $10,000", but that's in US dollars of course. In Australia it just scrapes under at $9999 which still makes it a lot cheaper than Hasselblad's rival X1D and in the ballpark in terms of competing with the top-end full-35mm D-SLRs from Canon and Nikon. The standard GF 63mm f2.8 R WR lens (equivalent to a 50mm) is priced at $2399 so that's a shade under $12,500 to jump into a digital medium format system… only Pentax's 645Z offers a similarly affordable route, but it's a significantly bigger and bulkier camera than the GFX 50s. There are two other lenses available immediately – a 32-64mm f4.0 zoom (equivalent to 25-51mm and priced at $3499), and a 120mm f4.0 macro lens (95mm and $4199) – but Fujifilm is promising three more lenses by the end of 2017; namely a 23mm f4.0 ultra-wide (equivalent to 18mm), a 45mm f2.8 wide-angle (36mm) and a 110mm f2.0 short telephoto (87mm). There's also an adaptor for H-Mount lenses (which, of course, Fujifilm has some involvement with) and which give the GFX system a lens-shutter option.

A number of the GFX body's major features have already been well-documented since Photokina 2016, including the interchangeable EVF, the new G Mount with a fully-electronic 12-pin interface, and the 44x33 mm 51.4 MP (effective) CMOS sensor which is designed by Fujifilm – or "customised," as the company nicely puts it – and fabricated by Sony. What's now revealed is a 425-point contrast-detection AF system (in a 17x25 pattern), 256-zone metering and a continuous shooting speed of 3.0 fps with no limit on the JPEG burst length. The sensitivity range is equivalent to ISO 100 to 12,800 with expansion up to ISO 102,400 and a one-stop 'pull' to ISO 50. The camera's focal plane shutter has a speed range of 60 minutes to 1/4000 second, but there's the option of a sensor-based shutter which boosts the top speed to 1/16,000 second, or 'electronic first curtain' operation. Flash sync is up to 1/125 second.

The GFX 50S captures a maximum image size of 8256x6192 pixels with the option of one smaller size, but a total of seven aspect ratios – 4:3, 3:2, 16:9, 1:1, 5:4, 7:6 and 65:24 (i.e. the 'true' panoramic ratio). JPEGs can be captured at one of three compression levels while RAW files are captured with 14-bit colour (RAF format) and there's the option of RAW+JPEG recording. The GFX 50S has dual memory card slots for the SD format, both with UHS-II speed support for SDXC devices.

Not surprisingly, quite a number of JPEG processing features from the top-end X Series cameras have found their way into the GFX 50S, including the 'Film Simulation' presets (with the latest ACROS B&W modes), 'Grain Effect' and the 'Lens Modulation Optimiser'. New is something called 'Colour Chrome Effect' which is designed to boost the colour saturation without compromising tonality. Other notable features include five auto bracketing modes (including for the 'Film Simulation' presets), a multiple exposure facility, intervalometer and WiFi.

The GFX 50S records Full HD 1080p video with stereo sound and the availability of various functions such as the 'Film Simulation' presets. There's a stereo audio input for external mics and an output for monitoring via headphones. An uncompressed video output is available from the camera's HDMI connector for recording to an external recorder.

Physically, the GFX 50S looks and feels a bit like a supersized X-T2, although it's neither big nor bulky for a digital medium format camera. The fully weather-protected magnesium alloy bodyshell – which is actually smaller overall than either the Canon EOS-1D X Mark II or the Nikon D5 – weighs in at 920 grams with the detachable EVF attached. It sports a pair of dials – for shutter speeds and ISO settings – and a top-deck monochrome LCD read-out panel. The 8.1 cm LCD monitor screen has a resolution of 2.36 megadots, has a three-way tilt adjustment (like the X-T2) and provides touch controls including for autofocusing. There's an optional vertical grip which holds an additional battery and a tilt adapter for the EVF. Interestingly, there's a monitoring facility for the age of the batteries, scaled from zero to four.

For more information visit the website at **www.fujifilm.com.au**

BY PAUL BURROWS

FUJIFILM GFX 50S

Form an orderly queue please. Fujifilm's new mirrorless digital medium format camera system is landing now and we've had a sneak peek ahead of conducting our full review.

BODYSHELL: Magnesium alloy covers with full sealing (at a total of 58 points) against dust and moisture plus insulation to allow shooting at temperatures down to -10 degrees Celsius. Large main dials for shutter speeds and ISO setting, with front and rear input wheels. Top panel monochrome read-out panel. Unlike on the X-T2, exposure compensation consigned to a rear-mounted button with setting via the rear input wheel. Battery compartment adds depth, but overall the GFX 50S is still smaller than either the Canon EOS-1D X Mark II or Nikon D5. EVF is detachable which drops the body weight down to just 825 grams.

EVF: Detachable module using a 0.5-inch OLED panel with a resolution of 3.69 megadots. Magnification is 0.85x (35mm equivalent) and the display is adjustable for brightness and colour. Five lens elements in eyepiece which has strength adjustment and a proximity sensor for auto switching between the EVF and the LCD monitor screen. Optional tilt adaptor EVF-TL1 provides tilt and swing adjustments.

DUAL MEMORY CARD SLOTS: For SD, SDHC and SDXC cards. Both slots support UHS-II and UHS-I speed devices. Can be individually assigned to file types.

BATTERY: New NP-T125 lithium-ion pack is good for 400 exposures according to Fujifilm. Optional VG-GFX1 vertical grip holds an additional battery pack and can be used for recharging. There's a monitoring facility for the age of the batteries, scaled from zero (youngest) to four (oldest).

SENSOR: "Customised" by Fujifilm in terms of the design of the microlenses and the handling of the data from the photodiodes. Sony-fabricated CMOS with an imaging area of 32.9x43.8 mm with an effective pixel count of 51.4 million which gives a pixel size of 5.3 microns. No optical low-pass filter. The bigger pixel size delivers an enhanced signal-to-noise ratio and better sensitivity which is equivalent to ISO 100 to 12,800 with extensions to ISO 50 and ISO 102,400. RAW capture gives 14 stops of dynamic range. Ultrasonic vibration for self-cleaning

PROCESSOR: Dedicated 'X Processor Pro' engine – but the same generation as used in the X-T2 and X-Pro2 – delivers 3.0 fps continuous shooting at full res, 1080p video recording at 25 or 24 fps and in-camera processing for functions such as the 'Film Simulation' picture presets.

CAPTURE SETTINGS: Plenty of options here starting with JPEGs at three compression levels and two image sizes. Maximum image size is 8256x6192 pixels and there's a total of seven aspect ratios – 4:3, 3:2, 16:9, 1:1, 5:4, 7:6 and 65:24 (i.e. the 'true' panoramic ratio). RAW files are captured with 14-bit RGB colour (RAF format) and there's the option of RAW+JPEG recording. RAW files are automatically captured with a 12 MP thumbnail JPEGs. In-camera RAW-to-TIFF conversion.

EXPOSURE CONTROL: Based on a 256-zone metering system (from the sensor) with multi-pattern, centre-weighted average, fully averaged and spot measurements. Program, aperture/shutter-priority auto and manual control modes. Up to +/-5.0 EV compensation and auto bracketing over two, three, five, seven or nine frames at up to +/-3.0 EV per frame.

HDMI VIDEO OUT: Uncompressed video (8-bit, 4:2:2 colour) available for recording to an external device via Type D Micro HDMI connector.

LENSES: Three GF Series lenses are available immediately, another three by the end of 2017. Given Fujifilm's track record with the XF lenses, there'll be more in 2018 with a longer telephoto probably heading the list. All the GF lenses are weather-proofed. Current line-up is a 63mm f2.8 standard prime (equivalent to 50mm), 32-64mm f4.0 zoom (25-51mm) and a 120mm f4.0 macro lens (95mm). On the way is a 23mm f4.0 ultra-wide (18mm), a 45mm f2.8 wide-angle (36mm) and a 110mm f2.0 short telephoto (87mm).

VIDEO: Full HD 1080p recording at either 25 or 24 fps (PAL standard) with stereo sound, giving a bit rate of 36 Mbps. MOV format with MPEG-4 AVC/H.264 compression. HD 720p recording also available, but no 4K option. Processing options include the 'Film Simulation' presets.

LENS MOUNT: New G mount is a stainless steel three-claw bayonet fitting on the camera body (brass on the lenses) with 12 contact pins for fully-electronic communications. External diameter is 76.5 millimetres, internal is 65.0 millimetres. Flange back distance is 26.7 millimetres. Mirrorless design allows a minimum back focusing distance of just 16.7 millimetre which delivers considerable flexibility when it comes to lens design.

CONNECTIONS: USB 3.0 via Micro USB terminal, Micro HDMI (Type D), 2.5 mm connector for wired remote trigger, 3.5 mm minijacks for stereo audio in and out, PC flash terminal, DC power input.

MONITOR SCREEN: Large 8.1 cm LCD panel adopts the three-way tilt adjustments introduced with the X-T2 plus there's adjustments for brightness and colour balance. Image can be enlarged by up to 16.7x to assist with focusing. Resolution is 2.36 megadots and touchscreen controllability extends to 'Touch AF' tap-to-focus.

SHUTTER: The world's first focal plane shutter specifically designed for a digital medium format mirrorless camera (although, of course, the GFX 50S is the first such camera anyway). The speed range is 60 minutes to 1/4000 second with flash sync up to 1/125 second. The shutter is rated up to 150,000 cycles. There's also an 'electronic first curtain' shutter to reduce vibrations or a fully-silent sensor-based shutter which extends the top speed to 1/16,000 second and eliminates all vibration.

EXTRAS: 'Film Simulation' presets (including ACROS and Classic Chrome), 'Grain Effect' and 'Colour Chrome Effect' processing, 'Lens Modulation Optimiser', five auto bracketing modes (AE, ISO, white balance, dynamic range and 'Film Simulation' presets), multiple exposure facility, intervalometer, tethered shooting, built-in WiFi, copyright info and dual-delay self-timer.

AF SYSTEM: Contrast-detection system using 425 measuring points arranged in a 17x25 pattern. Single-point, Zone and Wide/Tracking modes. Choice of 17x25 and 9x12 point patterns for single point selection. Focus point 'joystick' selector carried over from the X-T2 and X-Pro2. Zone mode options are 3x3, 5x5 and 7x7 point clusters.

ACCESSORIES: In addition to the battery grip and tilt adapter for the EVF, there's an adapter for Hasselblad's H-Mount lenses (which are made by Fujifilm), giving the GFX system a lens-shutter option. There's also a stereo microphone, view camera adaptor, the EF-X500 on-camera flash (launched at Photokina 2016) and a hard-wired remote release.

PRICES: $9999 for the GFX 50S body, but you're obviously going to need a lens (or two). Prices are $2399 for the 63mm f2.8 standard lens, $3499 for the 32-64mm f4.0 zoom and $4199 for the 120mm f4.0 macro.

More info from www.fujifilm.com.au

ON THE BEACH

The Picture

Part of a 30-page special feature in the surfing lifestyle magazine *White Horses*, focusing on up-and-coming young surfers. The location is Little Narrabeen Beach on Sydney's upper north shore, and the surfers are (from left) Sophia Chapman with sisters Jesse and Tru Starling.

The Photographer

After a long career as a corporate and advertising photographer, Bruce Usher now works as a freelancer primarily concentrating on editorial assignments for a wide variety of magazines as well as shooting for annual reports and brochures. He is also a regular contributor to sister publication *ProPhoto*, profiling the life and work of other professional photographers.

The Equipment

Nikon D700 D-SLR with a 50mm standard lens, hand-held and using available light which had a pleasing warmer quality thanks to the early-morning shoot time.

The Technique

Bruce says he wanted a "natural but different emotive portrait" of the surfers and it was helpful that the three girls all knew each other really well so were quite relaxed, "It also helped that there was no one else around. Warming them up didn't take long as they are focussed young athletes. Then we tried out a few ideas, but I really didn't feel anything was working in terms of creating an emotional element. Eventually I decided just to keep it really simple and have them walking along the beach together just as they would if I wasn't there. In fact, I told them to pretend I wasn't there!"

How It Was Done

Bruce deliberately chose to have the sun as a backlight so the ocean was almost monochrome and contrasted nicely against the pinks and mauve tops. As he walked backwards, framing the shot in the viewfinder, he asked the girls to start walking and simply be as natural as possible. After a few trial runs, the trio really relaxed and Bruce simply kept shooting as they walked and talked.

"In the end it was about the framing, watching the background and having plenty of patience... I just let them go and tried not to distract them. As it happens this was the best of all the images and while a few others were certainly useable, they didn't have quite the same intimacy or naturalness."

Tricks Of The Trade

Successful portrait photography is all about good communication mixed in with plenty of patience and the ability to work fast when everything comes together.

"It's really important to give yourself time to get to know your subjects. This shoot took about 90 minutes in total – and it was a last-minute assignment too – but we still spent quite a bit of time just standing around and chatting so I could learn a bit about them and they could start to feel comfortable with me. I think this is probably the most important part of a portrait shoot… the more it happens, the better the final result."

Also, if an idea isn't working, be ready to move on and try something different. Being flexible is also a key element of portrait photography, especially when shooting on location.

Degree Of Difficulty (Out of 10)

Under pressure in terms of the time available and with the beach soon to get much busier, Bruce had to work quickly and he had three subjects so there was the added challenge of getting them to interact with each other in a way that looked natural and relaxed. All these demands clearly add up to a '10'.

Can You Try This At Home?

A great many amateur photographers are daunted by portrait and people photography, but the potential rewards in creative terms are immense. And there's arguably more variety offered by portraiture than in any other field of photography. You can definitely start at home with family members and using domestic locations.

Keep things simple to start with, developing both your photographic and communication skills… and then there's actually an exciting world of more advanced techniques just waiting to be explored.

OLYMPUS
OM-D E-M1 MARK II

REPORT BY **PAUL BURROWS**

The Mark II OM-D has been slightly restyled with a much deeper handgrip which makes it look bulkier than before, but it's actually pretty much the same size as its predecessor.

SPEEDING FINE

The mirrorless assault on the high-end D-SLR steps up a notch as Olympus gives its OM-D flagship even more fire power, further leveraging its significant size advantage.

If you're already a fan of the Micro Four Thirds take on the mirrorless camera then, right now, you've never had it quite so good. The 'in-house' rivalry between chief proponents Olympus and Panasonic is delivering some truly fine products. If you're thinking of making the move to mirrorless – and, frankly, it's getting harder to resist – the MFT route is looking like a good one. The smaller sensor is really no longer an issue, but the smaller hardware delivers real benefits… MFT is arguably the best interpretation of the mirrorless concept that there is.

However, it's the D-SLR that's everybody's target right now and, in particular, the higher-end models – or, more specifically, their users who have been, traditionally, a bit of a conservative bunch when it comes to the reflex mirror and optical viewfinder. Olympus knows this well… which is why the OM-D cameras look so much like neat little classic reflex cameras, harking back to the glory days of its much-loved 35mm OM System. Back in 2013, the original E-M1 was the first mirrorless camera to make a serious pitch for the enthusiast-level – or even professional – D-SLR user and the momentum here has since gathered with the likes of Fujifilm's 'APS-C' format X-T1/X-T2 models and, of course, Sony's A7 full-35mm line-up. Time for Olympus to up the ante again.

The Mark II version of the E-M1 still looks very much like an OM System camera – the lower-profile EVF housing is pure OM-4 – and there's still the OM-style power lever, but there's been a bit of a departure with the addition of a much more substantial handgrip as part of a taller bodyshell overall. The bigger grip makes the Mark II look bulkier than its predecessors, but if you compare the actual dimensions, there's very little difference. It's a little heavier, but still a featherweight compared to the D-SLRs with which it can comfortably compete – such as Nikon's D500 and the Pentax K-1. It's in this league not just because of its extensive capabilities, but also its price which has definitely bulked up, but then Olympus has added so much more to the Mark II it probably actually deserves a new model number. It's a whole lot more than a mere upgrade.

The taller grip makes for much more comfortable handling especially with bigger lenses such as the new M.Zuiko Digital PRO Series 12-100mm f4.0 IS zoom (equivalent to 24-200mm) which launched along with the Mark II. The body comprises a mixture of magnesium alloy and aluminium components, fully sealed against the intrusion of dust and moisture, and insulated to enable operation in subzero temperatures down to -10 degrees Celsius. The main dial and the front/rear control wheels have been reshaped for improved ergonomics and the monitor screen – still a 7.62 cm TFT LCD panel – is now adjustable for swing as well as tilt. As before, it also provides extensive touchscreen operations so the E-M1 Mark II again offers various methods of controllability via its external controls, menu system and the monitor-based 'Super Control Panel'. In other words, both traditionalists and progressives are catered for, or you can mix-and-match for whichever combination delivers the best efficiencies and comfort. As before, there's extensive scope for customisation and not just of the external controls (nearly all of them too), but also the displays in both the EVF and the monitor screen (more about this shortly).

TAKE A CARD

The electronic viewfinder (EVF) is largely unchanged from the previous model so it's still an LCD panel with a resolution of 2.36 megadots and a magnification of 0.74x (35mm equivalent). However, the refresh rate has been doubled to 120 fps and Olympus says the latency is now only six milliseconds (down from ten). It's adjustable for brightness and colour temperature, plus there's the option of a 'Simulated Optical Viewfinder' (S-OVF) display which essentially extends the dynamic range to replicate the look of an optical finder. S-OVF also operates like an optical finder so it includes only the traditional read-outs (exposure settings, etc.) and doesn't provide any digital previewing capabilities, but of course, the live view feed to the monitor screen is still available for this. A proximity sensor set in the EVF's eyepiece enables automatic switching between viewfinder and monitor.

The E-M1 II steps up to dual memory card slots which occupy their own compartment in the side of the handgrip. These are for SD format devices and both slots support the UHS-I speed types, but only Slot 1 has UHS-II speed support. The file management options include automatic overflow when one card is filled, the assignment of specific file types to the individual slots or the simultaneous recording of files to both slots for back-up purposes. The Mark II also has a bigger battery with a little over 35 percent more capacity, enabling up to 440 shots per charge which can be more than doubled if you make use of the camera's various 'Sleep' energy-saving settings. The battery power icon is now accompanied by a very useful read-out of the remaining power level as a percentage value. There's an optional vertical grip battery holder – the HLD-9 – which takes a second battery pack to give an extended shooting range and, of course, replicates all the key right-

ONE OF THE DUAL QUAD-CORE PROCESSORS IS ENTIRELY DEVOTED TO CRUNCHING THE AF NUMBERS DURING CONTINUOUS SHOOTING – WHICH IS PRETTY DEMANDING AT 18 FPS.

The menu system has been slightly redesigned, but is still top-heavy in terms of the 20-page Custom Menu.

Front/rear wheels can be quickly switched between duties via this lever… aperture/speed to ISO/WB.

The body construction is a combination of magnesium alloy and aluminium, fully sealed against dust and moisture with insulation to enable shooting in subzero temperatures.

hand controls including the front/back input wheels.

TURBO CHARGED

On the inside, the E-M1 Mark II is essentially an all-new camera, starting with its 21.8 megapixels 'Live MOS' sensor which has an effective pixel count of 20.4 million, giving a maximum image size of 5184x3888 pixels. To optimise the available resolution, there's no optical low-pass filter (OLPF) and the noise reduction processing has been enhanced to allow a native sensitivity range equivalent to ISO 200 to 25,600 (with a short extension down to ISO 64).

The new sensor is mated with Olympus's latest generation 'TruePic VIII' high-speed image processor which really turbocharges this camera's key operations via its dual quad-core design, Consequently, 4K video recording is possible – in the higher Cinema 4K resolution of 4096x2060 pixels – at 24 fps with a massive bit rate of 237 Mbps. Olympus has given videographers as much to celebrate with the E-M1 II as photographers and the rest of its extensive video capabilities are covered in the Making Movies panels.

For still photography, the new processor delivers the possibility of continuous shooting at a blistering 60 fps when using the camera's sensor-based shutter, and as fast as 18 fps with AF/AE adjustment between frames. When using the conventional focal plane shutter, the fastest continuous shooting speed is still a snappy 15 fps and full AF/AE adjustment is available at 10 fps. Interestingly, Olympus has added a 'Pro Capture' mode – available when using the sensor shutter – which starts buffering frames the moment the shutter release button is pressed to its half-way position with the idea being that you're less likely to miss the decisive frame when shooting an action sequence. Pre-capture will continue while the shutter release is held at the half-way position, but it's a rolling sequence so only the last 14 frames will actually be recorded once the button is depressed all the way. There's the choice of 'Pro Capture H' (at up to 60 fps with the AF fixed to the first frame) or 'Pro Capture L' (at up to 18 fps with continuous AF adjustment) modes, and you can set a frame limit of up to 99. You can also specify the number of pre-release frames, but 14 doesn't represent a very long time – especially at 60 fps – so this is probably best left at the maximum.

If you're familiar with Panasonic's later Lumix G cameras, you'll realise this looks a lot like how the '4K Photo' modes work, except at the E-M1 II's full resolution (although '6K Photo' on the GH5 delivers close to 19 MP frames). The limitations are a minimum aperture of f8.0 and you have to use an Olympus M.Zuiko Digital lens.

SHIFTING UP

Image stabilisation is via sensor shift with five-axis correction for up to 5.5 stops of camera shake, but up to 6.5 stops with the aforementioned 12-100mm f4.0 PRO lens as it incorporates an optical stabiliser to provide additional assistance (as does the 300mm f4.0 PRO supertelephoto). There's a choice of modes for panning or the system can be left to detect the camera movement and set the appropriate correction automatically.

As with the E-M5 Mark II, sensor shifting delivers another feature called 'High Res Shot' which builds up the image resolution via multiple captures made with both half-pixel and full-pixel shifts. 'High Res Shot' captures a series of eight images with the sensor shifted in one-pixel increments for the first four – so that all colours are captured at each position, cancelling out the effects of the Bayer pattern filter – and half-pixel increments for the next four. The eight exposures are then combined in-camera which takes a couple of seconds to complete. There's the option of creating 25 MP JPEGs sized at 5760x4320 pixels or, more interestingly, 50 MP ones at 8160x6120 pixels. RAW images made with 'High Res Shot' increase the resolution to 80 megapixels and are 10,368x7776 pixels in size. It's still a requirement that the camera be mounted on a tripod and the subject is largely static in nature – obviously in-camera image stabilisation isn't available – but Olympus is working on the HRS processing to better deal with certain types of movement such as water which extends the facility's usefulness for landscape photography in particular.

GETTING SET

As is the case across the OM-D range, the E-M1 Mark II offers a bewildering choice of JPEG capture options – four resolution levels, seven resolution settings and five aspect ratios. Four settings are configurable in the main shooting menu, created from the custom menu which provides a selection of four medium image sizes and two small sizes to accompany the largest size. If you then change the aspect ratio – back in the main shooting menu – all the preselected image sizes change accordingly. There are two RAW+JPEG settings which are automatically configured from however you set up your first two JPEG quality modes.

There probably isn't a better way of doing all this, but the toing-and-froing between menus seems a bit unnecessary and, in fact, is a characteristic of all the Mark II's set-up procedures partly because it offers so much choice in everything, but partly because Olympus's approach is 'opt in' rather than 'opt out' so if you want a particular feature or element of a display, you're going to have to find it and tick the box to activate it.

For example, there are 14 'Art Filter' special effects – some with variations and all of them adjustable – which can be combined with one of nine 'Art Effects', a number of them also adjustable. You can then add these – with the main variations – to the nine 'Picture Mode' presets plus the 'Colour Creator' setting and, in 'Art Effect' bracketing, end up with a total of 37 versions of a JPEG image! The 'Colour Creator' function has appeared on all the OM-D models so far and, when selected, the front input wheel adjusts the hue while the rear wheel varies the saturation. There's also a 'Highlight & Shadow' control which allows you to adjust the brightness of the highlights and/or the shadows around a central point. Again, the front wheel tweaks the highlights while the rear dial works on the shadows.

The colour 'Picture Mode' presets have adjustable parameters for sharpness, contrast, colour saturation and tonal gradation which can be set to Normal, Auto, High Key or Low Key. The Monotone 'Picture Mode' is adjustable for contrast, sharpness and gradation, plus there's a set of contrast control filters (yellow, orange, red and green) and a choice of toning effects (sepia, blue, purple or green). Just one modified 'Picture Mode' can be stored as a custom preset. In addition to the 'Art Filter' bracketing, there are auto bracketing modes for exposure, flash, sensitivity, white balance and focus. Similar to what's offered on the latest Lumix G bodies, the focus bracketing can be programmed for sequences of up to 999 shots with adjustable focus steps – a.k.a. the "focus differential" – from narrow to wide. Alternatively, there's a focus stacking function – only available with selected M.Zuiko Digital lenses – which captures eight images at different focusing points which are then combined into a single JPEG frame.

As before, the Mark II has an intervalometer for creating time-lapse sequences and multi-shot HDR capture. The intervalometer allows for up to 999 frames to be recorded at intervals of up to 24 hours. HDR capture can be via two auto modes which record four frames at two different amounts of exposure variation to give either "high contrast" or "super-high" contrast. Alternatively, there's a choice of presets – three, five or seven frames at +/-2.0 EV; and either three or five frames at +/-3.0 EV. Multiple exposures – still only double exposures – can be made with the option of an 'Auto Gain' exposure adjustment. There's also 'Keystone Compensation' for in-camera perspective control (in both the vertical and horizontal planes); 'Live Composite' shooting which combines a reference background exposure with subsequent multiple exposures that only record any changes to bright light sources (such as stars) and can be monitored in real-time; and Live Bulb/Time shooting which again allows you to see the exposure progressing in the monitor screen (with the option of a histogram for assistance). Particularly useful for long exposures, but also when using longer lenses, is the 'Anti Shock' mode which switches the camera to 'electronic first curtain shutter' operation and allows for a delay time to be set (up to 30 second) so all physical vibrations can die away before the exposure commences. You're limited to a top shutter speed of 1/320 second here, but obviously this is unlikely to be an issue when making long exposures. The delay timer is also available when shooting with the sensor shutter alone, in which case the speed range is 60-1/32,000 second. Even with mirrorless cameras vibration is being recognised as a key issue, especially with pixel densities on the increase.

FOCUSING ON AUTOFOCUS

Autofocus is the latest battlefield in mirrorless versus D-SLR (and possibly the latter's last bastion)

As the Olympus Micro Four Thirds flagship, the E-M1 Mark II has the unenviable task of taking on Panasonic's Lumix GH5 in the video arena and, like its predecessor, this camera is seriously orientated towards pro cinematographers. In fact, if you want a mirrorless camera solely for making videos, the GH5 essentially offers everything you'd find on a pro-level camcorder. That said, Olympus has followed on from the E-M5 II which has been popular in the video world, equipping the E-M1 II with an impressive suite of high-end features and capabilities.

For starters it records 4K video in either the pro-orientated Cinema 4K resolution of 4096x2160 pixels at 24 fps – giving a massive bit rate of 237 Mbps – or in the Ultra HD resolution of 3840x2160 pixels at either 25 or 24 fps (PAL standard, but the NTSC speeds are available too). Full HD 1080p can be recorded at 25 fps or 24 fps with the options of inter-frame (IPB) compression or intra-frame (ALL-I) compression to optimise image quality. Full HD can also be recorded at 50 fps with, logically, IPB compression, but there are no faster speeds to creating slow-mo footage. Automatic partitioning of files at the 4.0 GB size allows for recording clip times of up to 29 minutes and 59 seconds, theoretically at least. You can also make time-lapse movies in 4K, FHD or HD.

Built-in stereo microphones are supplemented with a stereo audio input and there's also a stereo audio output for connecting headphones. Both are standard 3.5 mm stereo minijack connections. Sound levels can be adjusted manually and there's a built-in attenuator for shooting in very noisy locations. The wind-cut filter can be set to Low, Standard or High. You can also adjust the levels sent to the headphones. Additional electronic stabilisation – which shifts the image across the sensor slightly – is available when shooting video and, as with the E-M5 II, makes for remarkably smooth hand-held shooting. The electronic stabilisation results in a crop of the image – made prior to downsampling – so there's the option of just using the sensor-shift IS which maintains the full horizontal frame coverage.

The Mark II's video capabilities have been significantly up-graded, including 4K recording in both the Cinema 4K and Ultra HD resolutions.

An uncompressed and 'clean' video feed (8-bit, 4:2:2 colour) is available at the camera's HDMI terminal for recording to external devices with the option of adding the info displays when feeding to an external monitor. There's time-coding, a flat 'Movie Picture Mode' profile for footage which will be colour graded in post-production, and a slate-tone marker for synchronising sound and vision.

You can use continuous AF with tracking, all the 'PASM' exposure modes, the 'Picture Mode' presets (if the flat profile isn't selected), most of the 'Art Filter' effects, a choice of four 'Movie Effects' (called Art Fade, One Shot Echo, Multi Echo and Old Film), the Highlight/Shadow control, lens vignetting correction, the grid guides, the real-time histogram display and the focus peaking display in a choice of colours. Auto ISO adjustment is available with the auto and semi-auto exposure modes, but not manual.

Touch controls are available for AF point selection, pull focusing, exposure adjustment, audio recording levels, headphone levels and power zooming. This eliminates any operational noise, but you still need a light touch to avoid creating any noticeable vibrations in the image.

Olympus really has stepped up a good few rungs with this camera's video capabilities and the performance in the 4K resolutions is truly excellent, ably assisted by the effective stabilisation, reliable autofocusing and surprisingly good sound quality from the built-in mics. The E-M1 Mark II is still primarily designed for photographers, so that it's also a pretty handy video camera – even for more serious productions – is a big bonus.

so a lot of effort is going into improving the performance of sensor-based systems. Fujifilm has made big leaps forward here – with the X-T2 in particular – and so now has Olympus as the E-M1 Mark II has a new hybrid contrast/ phase-detection system which uses 121 cross-type points (with either method of measurement). This 11x11 points pattern gives increased frame coverage (close to 80 percent overall), and the camera automatically switches between contrast-detection and phase-detection as actually demanded by the subject type and the lighting conditions.

One of the dual quad-core processors is entirely devoted to crunching the AF numbers during continuous shooting – which is pretty demanding at 18 fps – and ensure more accurate subject tracking. There's a new control algorithm for tracking too, plus a manual adjustment for the 'C-AF Lock' which ranges from +2 'Loose' to -2 'Tight'. This is essentially the same as Nikon's 'Lock On' for focus tracking and determines whether the continuous AF stays focused on the subject when there's an interruption caused by an obstacle or refocuses. As with the recent upgrade to Nikon's focus tracking, the Olympus system can determine whether a subject's movement is at a constant speed or more erratic.

There's also an 'AF Limiter' facility which enables the focusing range to be preset in the camera – between zero and 999.9 metres – and this will then apply to the attached lens. Up to three ranges can be set and stored, and it's another option for speeding up the AF operation if you don't need the full focusing range of a lens.

Switching between single-shot and continuous AF operation is performed manually, with a full-time override available for the former when the focusing mode is set to 'S-AF+MF'. Point selection is either automatic or manual with selectivity varied via a choice of two 'Group Target' settings which employ clusters of five points (in a + pattern) or nine (in a 3x3 pattern). Similarly to Panasonic's latest Lumix G models, you can now use the touchscreen monitor to select an AF point/area while still looking through the viewfinder. Olympus calls this the 'AF Targeting Pad' and it can be switched off.

Face detection AF can be fine-tuned to focus on either the left or right eye or whichever one is nearest the camera. Finer focusing is available when using the 'Zoom AF' mode which magnifies the image by 3x, 5x, 7x, 10x or 14x. A 'Super Spot AF' mode does the same thing, but at the centre of the frame only.

Manual focusing is assisted by a magnified image (again up to 14x) and/or a focus peaking display which can be set to red, yellow, black or white; and at low, normal or high intensity. Curiously, focus peaking is switched on or off in one section of the custom menu, but configured in another.

INTO THE LIGHT

Exposure control is based on the 324-point 'Digital ESP' multi-zone metering which is currently used across the OM-D range. There's the choice of centre-weighted average or spot measurements, the latter maintaining the Olympus tradition of being adjustable for either the highlights or the shadows.

The auto exposure control modes are backed by an AE lock, up to +/-5.0 EV of compensation and, of course, auto bracketing which can be applied over sequences of two, three or five frames with adjustments of up to +/-1.0 EV, or over seven frames with a variation of up to +/-0.7 EV. As before, all the exposure-related adjustments can be preset to be made in 0.3, 0.7 or full-stop increments.

As noted previously, there's the option of using a conventional focal plane shutter – with a speed range of 60-1/8000 second – the hybrid 'electronic first curtain shutter' – which commences the exposure from the sensor – or a fully-sensor based shutter. This last option is fully silent as well as free from any mechanically-induced vibrations. The so-called 'mechanical shutter' – although, of course, it's fully electronically controlled – is rated for 200,000 cycles.

The E-M1 Mark II lacks a built-in flash, but as before, is bundled with a neat little on-camera unit which is also weather-proofed. It's called the FL-LM3 and it has a metric guide number of 12.9 (at ISO 200) and a flash output angle equivalent to a 12 (i.e. 24mm) lens. It also has a tilt/bounce head and can serve as the optical controller for a wireless TTL flash set-up using the more powerful Olympus FL Series flash units.

> IN THE E-M1 II'S SILENT SHOOTING MODE – WHICH IS TRULY TOTALLY SILENT – 68 FRAMES WERE CAPTURED IN 1.157 SECONDS, GIVING A SHOOTING SPEED OF 58.7 FPS. IMPRESSIVE.

Sensibly, the E-M1 Mark II is stripped of its predecessor's subject modes, but it retains the 'iAUTO' point-and-shoot option which performs automatic scene mode selection as well as a wide range of other adjustments. A series of basic manual overrides called 'Live Guides' are available in 'iAUTO' and provide some control over colour saturation, colour balance, brightness, background blur and the blurring/ freezing of moving subjects. These are accessed via a touch tab on the monitor display and the adjustments are applied via touch-operated slider-type controls.

The control options for white balance are unchanged from the previous model. The auto correction has a 'Keep Warm Colour' option for use when shooting under tungsten lighting, but this needs to be preset in the custom menu. There are seven lighting presets (including for underwater) and provisions for storing up to four custom measurements. All have fine-tuning, set using slider-type controls for the amber-to-blue and green-to-magenta colour ranges.

THE PRICE HAS DEFINITELY BULKED UP, BUT THEN OLYMPUS HAS ADDED SO MUCH MORE TO THE E-M1 MARK II IT PROBABLY ACTUALLY DESERVES A NEW MODEL NUMBER. IT'S A WHOLE LOT MORE THAN A MERE UPGRADE.

Manual colour temperatures can be selected over a range of 2000 to 14,000 degrees Kelvin. White balance bracketing is performed over a sequence of three frames and in either the amber-to-blue or green-to-magenta colour ranges.

IN THE HAND

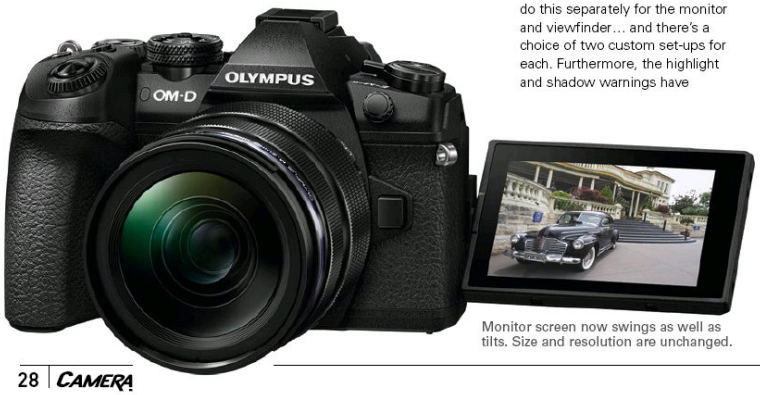
The basic controllability of the E-M1 Mark II centres around its main mode dial, front and rear input wheels, a multi-function selector (similar to the arrangement on Nikon's D500) and a four-way navigator on the rear panel which Olympus calls the "arrow pad". However, as noted earlier, there's huge scope for customisation of just about all the external controls, including, as on the previous model, a nifty lever on the camera back which allows for quick switching between input wheel operations – from the default exposure adjustments to ISO (front) and white balance (rear).

An alternative *modus operandi* is the 'Super Control Panel' which is available as a stand-alone display in the monitor or is superimposed over the live view image, and provides direct access to a huge selection of capture-related functions. There's also a 'Live Control' screen which isn't quite as comprehensive as the SCP – although it still provides direct access to all the important capture functions – but leaves the main image area clear. The function icons are arranged along the right-hand edge of the frame with the available settings along the bottom edge. Touch control is available with the SCP panels, but not the LC screen which is navigated conventionally using the four-way keypad.

If you suffer from choice stress, the E-M1 Mark II is going to challenge you to stay calm. These control screens, for example, have to be individually activated for the camera's main operating modes – namely 'PASM', iAUTO and the 'Art Filters' – which means accessing a sub-submenu, and this is the way all things can be switched on or off. You want only four thumbnails on a page? Fine, you tick that box only. You want the options of nine, 25 or 100 thumbnail pages? Then you'll need to tick these boxes as well, and so it goes on over all aspects of the camera's control. This means a pretty complex menu system, in particular the Custom Menu which is dauntingly extensive and covers a total of 20 pages. There's been a redesign here, with the chapters labelled 'A' to 'J' – as per the function sets – and continuous scrolling between them and the pages which makes for fast navigation, but there's still a lot here that would be more logical to include in the Shooting Menu which is only two pages. As it is, a lot has to preset in the Custom Menu in order to configure the Shooting Menu. Canon employed a similar design in its D-SLRs for many years, before trimming down its way-too-long custom menus by moving many items to other pages. For instance, the E-M1 Mark II could well do with a dedicated menu page for the various focusing-related settings.

Having said all this, many users will set up the camera the way they want it and never need to venture back into the depths of the Custom Menu – especially as you can create and store three camera set-ups, then selectable from the main mode dial as C1, C2 or C3 – and Olympus's approach means you can personalise absolutely every element of shooting, the displays and playback.

Talking of displays, the live view screen – in both the monitor and the EVF – can be configured with a real-time histogram, dual-axis level indicators, highlight and shadow warnings and a superimposed grid (from a choice of five). You won't be surprised to learn that you can do this separately for the monitor and viewfinder… and there's a choice of two custom set-ups for each. Furthermore, the highlight and shadow warnings have adjustable thresholds and the real-time histogram includes an internal section – displayed in green – which shows the brightness values within the selected focusing point or cluster of points.



Monitor screen now swings as well as tilts. Size and resolution are unchanged.

The review/replay screens can also be configured to include a thumbnail image with a full set of histograms (i.e. brightness and RGB channels), a larger brightness histogram superimposed over the image, highlight and shadow warnings and a 'Light Box' display for the side-by-side comparison of two images complete with zooming for closer scrutiny.

Touch controls are available for browsing, zooming and scrolling through the thumbnails. The in-camera editing functions comprise Shadow Adjust (i.e. dynamic range), Red-Eye Fix, Trim Aspect, B&W, Sepia, Saturation, Resize, e-Portrait and RAW-to-JPEG conversion. The 'Art Filter' special effects aren't available post-capture.

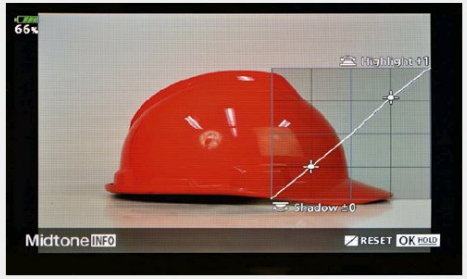
SPEED AND PERFORMANCE

The E-M1 Mark II is all about speed and there are no fewer than seven drive modes, depending on the shutter type plus the anti-shock and silent shooting options. Additionally, you can configure the high and low speed settings to a selected frame rate if you don't need the top speeds.

With our reference SD memory card – Lexar's 128 GB SDXC UHS-II/U3 (Speed Class 3) '2000x' device – loaded in the speed-compatible Slot 1, we firstly timed the camera with the focal plane shutter operating. Here the E-M1 II captured a burst of 50 JPEG/large/superfine images in 3.382 seconds which represents a shooting speed of 14.8 fps… as close to the quoted 15 fps as really makes no difference. At this speed, the shutter makes a whirring sound which is actually quite low because, of course, there isn't a reflex mirror clattering up and down.

Timing the silent shutter operation was a bit of a challenge as our custom-built timing rig works on sound – i.e. it stops the

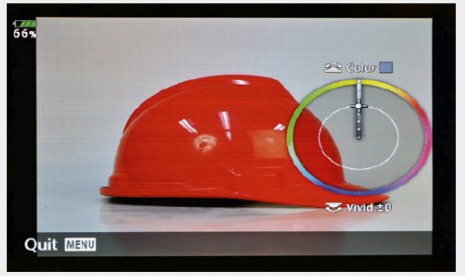
▶ The full 'Art Filters', 'Colour Creator' and 'Picture Modes' auto bracketing sequence… should you ever need 37 variations of the same shot.



Above & below: The live screen can be configured with a real-time histogram, dual-axis level indicator and function indicators. Not shown in these images is the grid guide (there's a choice of five).

Highlight/Shadow function enables the brightness of the highlights and/or the shadows to be adjusted around a central point, and works in a similar way to Photoshop's Curves.

'Super Control Panel' provides quick and easy access to a whole host of capture-related function with touchscreen selection.



The 'Colour Creator' function is similar to Photoshop's Saturation/Hue adjustment.

timer when the continuous shutter noise either stops completely or there's a slight pause.

The E-M1 II's silent shooting is truly totally silent so we had to do a set-up modification which revealed that 68 frames were captured in 1.157 seconds, giving a shooting speed of 58.7 fps. Impressive. It should be noted that the EVF can't keep up with this either, so the first frame is all you see and it's also hard to know when the camera has stopped shooting as there's no frames-remaining counter for the buffer such as Nikon provides with its high-end D-SLRs. However, in both cases, the buffer subsequently emptied extremely quickly and, with the focal plane shutter, the camera will go on shooting, but at a slower rate.

With the high-speed silent shooting, the camera stops when the buffer is full, but it empties so quickly with an UHS-II speed card, you're ready to go again almost immediately. The test files averaged around 14.6 MB in size and just these two timing trials alone accumulated 1.6 GB of data.

While still on the subject of speed, the autofocusing is also impressive in both its response time and its tracking accuracy, even with fast-approaching subjects. Ten-frames-per-second with continuous AF adjustment definitely puts the E-M1 II in the big league as far as sports-orientated D-SLRs are concerned and it joins the Fujifilm X-T2 in offering a viable mirrorless alternative for high-speed action photography. Of course, 18 fps with continuous AF is available if you use the sensor-based shutter, albeit with the risk of some rolling shutter effects when panning quickly. What's important to note here though, is that the AF tracking is good enough to work reliably at 18 fps, delivering a very high proportion of pin-sharp frames from a sequence. There's definitely scope for Olympus to offer more flexibility with fine-tuning tracking via, like Canon, scenario-based control over the type of movement, the sensitivity and the point-switching speed. Like the X-T2 too, the E-M1 II feels strong enough to deal with the wear and tear that's inevitable in sports and action photography where getting

the shot always takes precedence over babying the gear.

While the increase in resolution over the previous model is fairly modest, there are other factors to consider when it comes to image quality, including advances in the newer sensor's design, the way that data is handled both off the sensor and downstream. Consequently, the E-M1 Mark II delivers a number of improvements in IQ, most noticeably to the definition, detailing and dynamic range. Superfine quality JPEGs have bags of crisply resolved information with silky smooth tonal gradations and pleasing colour reproduction across the spectrum. Of course, there's plenty of scope for adjusting colour, contrast and sharpness via the 'Picture Mode' presets, but the starting point is a good one. Noise characteristics aren't a lot different from the previous model – remember that the pixels are actually smaller on the new sensor and some are being used for autofocusing – but everything still holds together well up to ISO 3200. From ISO 6400 onwards, there's a progressive softening of details and an increase in graininess, but overall the E-M1 II's low light performance is as good as it gets in the Micro Four Thirds world and on a par with the best in the 'APS-C' format.

THE VERDICT

Is this the best mirrorless camera you can buy right now? The competition for that crown is really hotting up with the likes of the X-T2, Lumix GH5 and Sony's A7R II, but let's say the E-M1 Mark II easily gets a seat at the top table.

Its predecessor was the first serious attempt at luring higher-end users away from D-SLRs, but the Mark II model is a much more compelling argument, primarily because of its far superior AF system – now definitely in the D-SLR big league – and its remarkable high-speed shooting capabilities. To this can be added the distinctive 'OM' characteristics of the styling and handling… it's a real toss-up as to which is the prettier camera between this and the X-T2. The sometimes clumsy interface is still a flaw – the menu system really does need a complete overhaul – but regular users will surely get used to it and, after initial set-up, it shouldn't trip you up again. Certainly in the field, the E-M1 II's operability is both efficient and comfortable. The price has gone up quite a bit, but you're getting a lot more for your money too. The X-T2 is a little cheaper, but the Olympus has a number of extras to make up for this, plus it's significantly more capable in the video department.

When we reviewed the Nikon D500 we concluded it was the D-SLR brigade's best weapon against the mirrorless assault on the high-end of the category; being compact, fast and with class-leading autofocusing. The E-M1 Mark II is more compact, faster and has class-leading autofocusing too. Game over.

VITAL STATISTICS

OLYMPUS OM-D E-M1 MARK II $2799 body only

Type: Fully automatic, interchangeable lens digital camera with Micro Four Thirds System bayonet lens mount.

Focusing: Automatic hybrid system using contrast-detection and phase-difference detection via imaging sensor with 121 focusing points for each (all cross types). Focus points may be selected manually or automatically by the camera. Group Target area modes with either five- or nine-point clusters. Manual switching between one-shot and continuous AF modes. Face/eye detection and auto tracking. Continuous manual override available with single-shot mode. In-camera AF limiter (three settings). Low light/contrast assist via built-in illuminators. Focus assist via magnified image (3x/5x/7x/10x/14x) and focus peaking display (Red, Yellow, White or Black; High, Normal or Low intensity).

Metering: 324-point 'Digital ESP' (i.e. multi-zone), centre-weighted average, spot (2.0%) with highlight/shadow bias, and TTL flash. Metering range is EV -2.0 to 20 (ISO 100/f2.8).

Exposure Modes: Continuously-variable program with shift, shutter-priority auto, aperture-priority auto, metered manual, TTL auto flash and TTL flash. iAUTO fully automatic control with auto scene mode selection.

Shutter: Electronic, vertical travel, metal blades, 60-1/8000 second plus B (up to 30 minutes). Flash sync to 1/320 second. Sensor shutter has a speed range of 60-32,000 second. Exposure compensation up to +/-5.0 EV in 1/3, ½ or full stop increments.

Viewfinder: EVF with 2.36 megadots resolution, 100 percent coverage and 0.74x magnification (35mm equivalent). Adjustable for brightness and colour balance. 7.62 cm LCD TFT monitor panel with 1.04 megadots resolution, tilt/swing adjustments and touch screen controls. Auto/manual switching between EVF and monitor screen.

Flash: No built-in flash. External flash units connect via hotshoe or PC terminal. Compact FL-LM3 accessory flash unit supplied; GN is 12.9 (ISO 200) with 12mm coverage (equivalent to 24mm). Auto, fill-in, red-eye reduction, slow-speed sync, second curtain sync and wireless commander modes. Manual control down to 1/64.

Additional Features: Magnesium alloy bodyshell sealed against dust and moisture and with insulation for operation down to -10 degrees Celsius, AE/AF lock, auto exposure bracketing (over two, three, five or seven frames), depth-of-field preview, programmable self-timer (2 and 12 second delays, 1 to 10 frames, variable interval times), audible signals, auto power-off, hard-wired remote triggering.

DIGITAL SECTION

Sensor: 21.8 million (total) pixels Live MOS with 17.4x13.0 mm imaging area and 4:3 aspect ratio. No low-pass filter. Sensitivity equivalent to ISO 200-25,600 (extendable to ISO 64).

Focal Length Magnification: 1.97x.

Formats/Resolution: Four JPEG compression settings, RAW output (12-bit lossless compression) and RAW+JPEG capture. Seven resolution settings (four available at any one time) at 4:3 aspect ratio; 5184x3888, 3200x2400, 2560x1920, 1920x1440, 1600x1200, 1280x960 and 1024x768 pixels. Seven resolution settings (four available at any one time) at 3:2 aspect ratio; 5184x3456, 3216x2144, 2544x1696, 1920x1280, 1584x1056, 1296x864 and 1008x672 pixels. Seven resolution settings (four available at any one time) at 16:9 aspect ratio; 5184x2920, 3200x1800, 2560x1440, 1920x1080, 1536x864, 1280x720 and 1024x576 pixels. Seven resolution settings (four available at any one time) at 1:1 aspect ratio; 3888x3888, 2400x2400, 1920x1920, 1440x1440, 1216x1216, 960x960 and 768x768 pixels. Seven resolution settings (four available at any one time) at 3:4 aspect ratio; 2912x3888, 1824x2432, 1440x1920, 1104x1472, 864x1152, 720x960 and 576x768 pixels. 24-bit RGB colour for JPEGs, 36-bit RGB colour for RAW files. RAW files captured at 5184x3888 pixels.

Video Recording: Cinema 4K at 4096x2160 pixels and 24 fps, 16:9 aspect ratio, MOV format with MPEG-4/H.264 AVC compression (IPB), UHD at 3840x2160 pixels and 25 or 24 fps, 16:9 aspect ratio, MOV format with MPEG-4/H.264 AVC compression (IPB). Full HD at 1920x1080 pixels and 50, 25 or 24 fps; 16:9 aspect ratio, MOV format with MPEG-4/H.264 AVC compression (IPB or ALL-I). Superfine, fine and normal quality modes. HD at 1280x720 pixels and 50, 25 or 24 fps; 16:9 aspect ratio, MOV format with MPEG-4/H.264 AVC compression (IPB or ALL-I). Superfine, fine and normal image quality modes. HD at 1280x720 pixels and 30 fps; 16:9 aspect ratio, AVI format with Motion JPEG compression. Stereo microphones with auto/manual adjustable levels, wind filter and attenuator. Stereo audio input and output. Time code support and slate tone. Uncompressed 8-bit 4:2:2 colour output via HDMI connection (4K/2K).

Recording Media: Dual slots for SD/SDHC/SDXC memory cards with UHS-I support. Slot 1 has UHS-II support.

Continuous Still Shooting: Up to 117 frames at up to 15.0 fps (JPEG/large/super fine) or up to 84 RAW frames. Up to 60 fps with the sensor shutter and silent shooting (18 fps with continuous AF adjustment). Up to 8.5 fps with 'Anti-Shock' sequential shooting. 'Pro Capture' mode pre-captures up to 14 frames prior to full shutter release.

White Balance: TTL measurement via image sensor. Auto measurement, auto warm, seven presets and four custom settings. White balance compensation (amber-to-blue and/or green-to-magenta) in all presets plus white balance bracketing over three frames. Manual colour temperature setting from 2000 to 14,000 degrees Kelvin.

Interfaces: USB 3.0 (Type C), micro HDMI (Type D), 3.5 mm stereo audio input, 3.5 mm stereo audio output, 2.5 mm remote input.

Additional Digital Features: Five-axis sensor-shift image stabilisation, sensor cleaning, Adobe RGB or sRGB colour space, flicker detection, focus stacking (eight shots), long exposure noise reduction, high ISO noise filter, 'Keystone Compensation' digital perspective control, eight 'Picture Modes' (i-Enhance, Vivid, Natural, Muted, Portrait, Monotone, e-Portrait, Underwater), one user-defined 'Picture Mode', adjustable 'Picture Mode' adjustments (Contrast, Sharpness, Saturation and Gradation – Auto, Normal, Low-Key, High-Key), Monochrome mode has four contrast filters and four toning effects, 'Colour Creator' function, 'Highlight/Shadow' function, 14 'Art Filter' adjustable effects applied at capture (Pop Art, Soft Focus, Pale & Light Colour, Light Tone, Grainy Film, Pin Hole, Diorama, Cross Process, Gentle Sepia, Dramatic Tone, Key Line, Watercolour, Partial Colour and Vintage), nine 'Art Effects' (Soft Focus, Pin Hole, White Edge, Frame, Star Light, Blur, Shade, B&W, Picture Tone), four 'Movie Effects' (Multi Echo, One Shot Echo, Art Fade and Old Film), multiple exposure facility (with auto exposure adjustment), 'Live Composite' function, 'Live Bulb/Live Time' modes, anti-shock shooting, intervalometer (up to 999 frames) and 4K time-lapse movie clips, multi-shot HDR capture, HDR bracketing, multi-shot 'High Res' capture (25 or 50 MP resolution via pixel shift), auto bracketing modes (AE, WB, ISO, flash, focus and 'Art Filters'), panorama mode, 'Super Control Panel' screen, real-time histogram display, guide grids (choice of five), dual-axis level indicator, highlight and shadow alerts (adjustable thresholds via histogram), adjustable image display time, auto image rotation, slide show (with a choice of music and transitions), playback zoom (up to 14x), 4/9/25/100/ Calendar thumbnail displays (also available in slide show mode), 'Lightbox' side-by-side comparison display, in-camera editing functions (Gradation, Red-Eye Fix, Aspect, B&W, Sepia, Saturation, e-Portrait and Resize), in-camera RAW-to-JPEG conversion, in-camera RAW image overlay, copyright info, silent shooting, DPOF and PictBridge support, built-in WiFi, tethered shooting option.

Power: One 7.4 volt/1720 mAh rechargeable lithium-ion battery pack (BLH-1 type). Optional HLD-9 vertical grip holds an additional BLH-1 pack.

Dimensions (WxHxD): body only = 134.1x90.9x68.9 mm.

Weight: body only = 498 grams (without battery pack or memory card).

Price: $2799 body only. $3699 with M.Zuiko Digital 12-40mm f2.8 PRO zoom.

Distributor: Olympus Australia Pty Ltd, telephone 1300 659 678, www.olympus.com.au

REVIEW BY TREVERN DAWES

CANON
PIXMA ENDURANCE G3600

LONG TERM VISION

If you're fed up with continually buying expensive replacement ink cartridges for your printer, Canon is offering a refillable model using bulk inks. Trevern Dawes explores the economics and the photo print performance.

Early in 2015 Epson released the WorkForce ET-4500 and ET-4550 A4 multi-functional inkjet printers. This reversed the strategy of selling cheap printers with expensive small genuine ink replacement cartridges to selling more expensive printers with far cheaper and more convenient bulk inks in refillable tanks. As a direct competitor for the Epson WorkForce models, Canon's PIXMA Endurance G3600 is cheaper in terms of the initial outlay, but has slightly more expensive inks.

The PIXMA G3600 supports PIXMA Cloud Link – including Instagram and SlideShare – in addition to existing services such as Facebook, Dropbox and Google drive. Direct connection from smartphones using the Canon Print Inkjet/SELPHY app and print documents is available. However, there are no fax, AirPrint support or Ethernet facilities. The G3600 has a one year warranty compared to two years for the Epson WorkForce range. Because the inks are integrated into the printer, rather than attached on the side, the G3600 is smaller and could be regarded as more elegant. By occupying a relatively small footprint on a desktop, the printer has immediate appeal.

The G3600 is designed to provide five years of usage or a duty cycle of 15,000 pages. It is promoted as being able to print up to 7000 A4 size pages in colour and 6000 in black and white from a set of inks. The total amount of ink equates to about 30 times as many prints compared to a set of conventional cartridges. Print resolution extends to 4800x1200 dpi, colour postcard prints (100x150 mm) take about 60 seconds and borderless prints are possible in popular sizes up to A4.

The PIXMA G3600 is manufactured in Vietnam and has a matte black polycarbonate casing which is neatly styled and quite compact. Ink levels are shown in front-facing, transparent reservoirs which are easy to monitor. Tiny triangular markers at the base of the reservoirs denote low ink levels and then it's time to top up. The rear paper holder folds into the top while the print-receiving tray folds out 100 mm with one section and has a small flip-over extension for another 50 mm. When paper is placed in the rear feeder, it is positioned snug to the right-hand guide and the left-hand guide moved in. The two adjustable slider guides work together to centre the paper in the print pathway. Strangely, there is no cover or lid to protect the output tray area. This design oversight could potentially cause dust problems and surely enforce the need to cover the printer with a lint-free cloth when it's not in use. Power and USB connections are at the rear. At the top right-hand side are a line of basic controls – namely On/Off, Wi-Fi, Stop, and Start for Black and Colour.

The four-colour ink set is a hybrid type. The black is a pigment and the colours are dyes. As the tanks are air-sealed, drying out of the inks over many months cannot occur.

GET SET

Several YouTube videos can be viewed to compliment the 'Getting Started' instruction sheets and assist with the set-up. This includes installation of the print heads (the G3600 does not have pre-installed print heads) and ink loading. The videos are well worth looking at regardless of whether you are an experienced user of inkjet printers or a beginner.

After removing all the orange protective tapes, the knob at the front of the print head compartment is used to open the locking cover. The black and colour print heads are clearly marked as 'B' and 'C'. Take each print head, remove their protective strips (while avoiding touching the actual head and contacts) and place into position. Close the lid with a firm click and press down the two blue buttons on the top.

It doesn't make any difference which ink tank is filled first, provided each ink is filled correctly. Open a tank cover and prize off the rubber sealing cap. Remove the cap off the plastic bottle, turn the bottle upside down and insert the nozzle into the top of the tank. The small, spill-resistant nozzle will only release ink by gently squeezing the bottle to pump into the tank. Replace the rubber seal to ensure a tight closure and close the cover lid.

> CANON DOES CLAIM THE PIXMA G3600 TO BE A PHOTO PRINTER AND, IN TERMS OF PRINT QUALITY, IT CERTAINLY IS.

Thereafter the installation of the software takes about 20 minutes. As per all inkjet printers, a small amount of ink is required to initially charge the print heads. This will result in a slower output compared to replacement inks. Expect the ink charging to be a noisy affair. If the printer is to be moved, it must be kept level as any tilting is likely to result in ink spillages.

PRINT MAKING

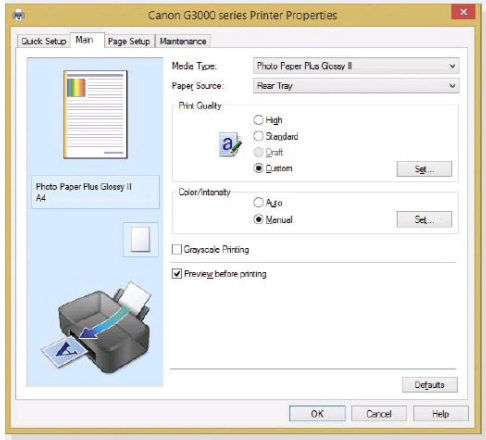
For general colour printing the 'Quick Setup' and 'Auto' method performs admirably. The digital print files used for this review all have Adobe RGB 1998 colour space so the pathway of 'Colour Intensity', 'Manual', 'Matching', 'ICM', 'Input File' and 'Adobe RGB (1998)' was adopted. Either way produced good results on both matte and gloss media. Since the printer is essentially dye-based, the best results will be on gloss or semi-gloss media with a flawless surface.

Although locking into ICC profiles is not a feature of multi-functional printers, the generic paper profiles will suffice for Canon branded papers and those of a similar type. If fine-art papers are preferred, adopt the closest routine and if there is a consistent colour cast – or the prints are lighter or darker – then manual adjustments can be made. New settings may be saved to a convenient name, such as "Fibraprint gloss" or "250 gsm 2s Matte".

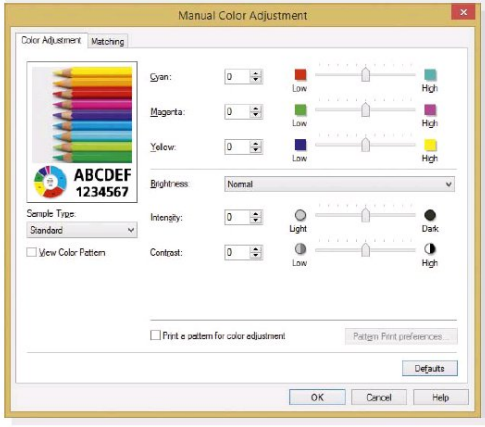
It would require extensive use to discover if the traction feed system might eventually baulk or take sheets through without printing (a common situation), but the PIXMA G3600 worked smoothly and positively during the two weeks of testing, including a long run of greeting cards from stacked paper.

The Epson ET-4500 we reviewed in early 2016 did not make any claims to be a quality photo printer yet the four colours can produce remarkably good prints that, in many cases, rival output from printers with multiple ink cartridges. Canon does claim the PIXMA G3600 to be a photo printer and, in terms of print quality, it certainly is.

Paper type selection is rather general and can be applied to a variety of stocks. These list up as 'Photo Paper Plus Glossy 11', 'Glossy 11', 'Pro Lustre', 'Semi Gloss' and 'Matte'. The 'Quick Setup" panel covers 'Media Type', 'Printer Paper Size' and 'Print Quality', while 'Print Quality' can be set to 'High', 'Standard', 'Draft' or 'Custom'. In the 'Main' panel, the



The 'Main' panel.



The 'Manual Colour Adjustment' panel allows variations to be made.

'Preview Before Printing' facility should always be selected. This is an invaluable final check that can save paper and ink.

The CD-ROM that is supplied with the printer contains a very useful feature called "My Image Garden". Details are available in the download version of the instruction manual. Here, there is scope to explore aspects such as capture and print single frames from video, printing labels for CDs/DVDs, organising photos for calendars and cards, correction and enhancement of images and scanning.

PRINT SPEEDS

A postcard print made with the 'Standard' (Level 3) quality setting took 35 seconds (timing print head activity) and at the 'High' (Level 5) setting took 1:25 minutes. An A4 colour print at the 'Standard' setting took 1:25 minutes, and at 'High' took 4:05 minutes. The higher print resolution does create a finer dot structure that is evident under a magnifier, but there may be little difference in image quality at a normal viewing distance. It will be up to the individual and the intended purpose to determine if longer printing times with higher resolutions are warranted.

For printing plain black text using the 'Document' setting, an A4 page was delivered in a very quick six seconds. No arguments about this laser-type speed and the clarity of the text.

The printer has a default setting of 'Do Not Use Quiet Mode'. In this setting, the printer can be rather noisy, but in the 'Maintenance' panel there are options for 'Always Use Quiet Mode' and 'Use Quiet Mode During Specified Hours'. Also in the 'Maintenance' panel are the 'Auto Power Off' choices to disable or enable (the maximum time setting is 240 minutes).

THE G3600 IS PROMOTED AS BEING ABLE TO PRINT UP TO 7000 A4 PAGES IN COLOUR AND 6000 IN BLACK AND WHITE FROM A SET OF INKS.

BLACK AND WHITE

The normal practice for basic inkjet printers is to use all the inks to produce a black and white print. This tends to result in a print with a slight colour cast. If a deliberate sepia effect is required then variations can be applied as a colour print to warm up the image in 'Colour Adjustment'. However, if a perfectly neutral black and white print is preferred with maximum black density, then the printer must be forced, if possible, to use the black ink only.

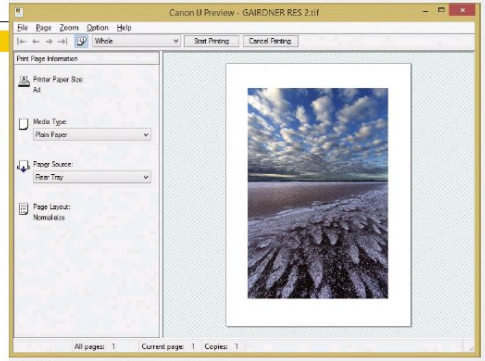
Many multi-functional printers and basic A4 printers will not allow the black ink only technique to be used for photographs, but the G3600 is a welcome exception. This can be achieved by selecting 'Business Document' and 'Plain Paper', irrespective of the inkjet paper to be used. The highest resolution allowed by 'Plain Paper' is Level 2. By increasing the 'Intensity' and lowering the 'Contrast' values, a reasonably good result can be produced. The changes in values will vary from one paper type to another.

The dot structure will be coarser and the blacks noticeably denser, but expect bronzing and gloss differential characteristics to occur with gloss and lustre media because of the pigment ink. Print times are fast with an A4 print, taking just 35 seconds.

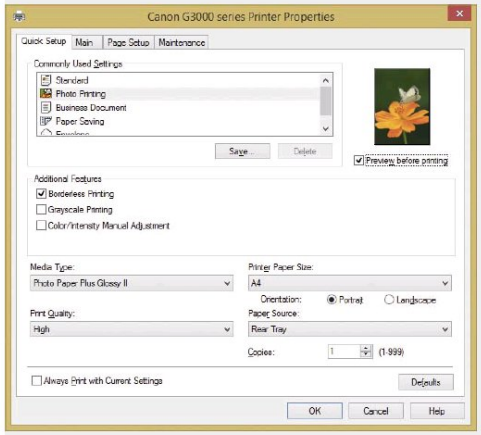
This alternative black ink method goes back a long way with inkjet printing, but it may not suit all tastes and ought to be regarded as the best way to overcome colour cast situations. Any settings created for this method can be named and saved for quick retrieval, as can any regular printing selection.

PANORAMAS

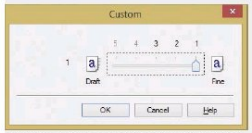
The maximum paper size that can be accommodated by this printer is 216x676 mm. As a matter of convenience, an A2 sheet of 230 gsm matte was cut to 594x216 mm and a panoramic image sized



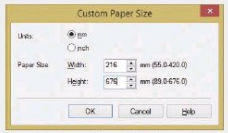
The 'Maintenance' panel for the printer.



The 'Quick Setup' panel is the easy, auto way to print making.

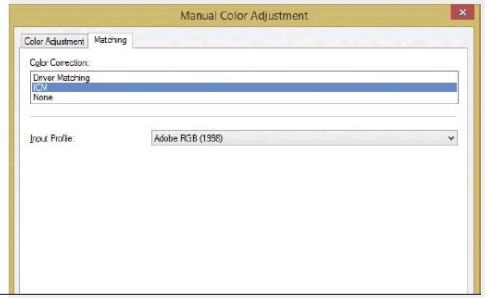


Print quality ranges from 'Draft' to 'Fine'.



The 'Custom Paper Size' panel.

The 'Matching' panel is the place to lock print files assigned Adobe RGB (1998) colour space.



at 562x172 mm. printed at the highest resolution available for matte paper (i.e. Level 2). This took 6:30 minutes and produced a very pleasing result. Because the output tray extends only 150 mm, remember to be ready to catch the print if the printer is on the edge of a desk. Panorama printing may not be an anticipated facility on an A4 printer, but it's useful to know it's available with the G3600.

As a photocopy machine, the process could hardly be any more straightforward. The original is placed face down on the platen, the lid closed and 'Black' pressed for a monochrome copy or 'Colour' for a colour copy. Total time for a black and white copy is 30 seconds and 40 seconds for colour.

Scanning of documents or photos on the platen incorporates all the usual features of a flatbed scanner. Maximum resolution for colour and greyscale is 1200 dpi and results can be saved to a nominated designation. The lid for the copy platform has a short lift-up capacity to handle magazines, books and other heavyweight originals up to about ten millimetres in thickness. Documents larger than A4 can be accommodated by scanning in sections and then stitched together via software provided.

LONGEVITY

Canon doesn't mention the longevity ratings of the G3600's inks any more than Epson does for its Workforce ET range. If these ratings are not specified or promoted, then we might reasonably conclude that they are probably not very favourable.

For casual printing where long print life is not required, there should be no concern, but professional and enthusiast photographers might not be too happy if the ratings are not specified. Consequently, projects involving producing prints for traditional photo albums or D-I-Y books – when a longer life is critical – should ideally be done on inkjet printers that utilise archival inks.

The pigment ink in the PIXMA G3600 should rate at least 100 years under glass, but the colour dye set would be considerably less. If the Canon dyes were ChromaLife 100 or similar, they would rate about 30 years under glass or, as the name applies, about 100 years in dark storage. Unfortunately, there is no way, as yet anyway, of knowing how long the PIXMA G3600 inks might last.

While the use of third-party inks is never recommended by the manufacturer, lack of an ink rating could encourage owners to chase up more savings with alternative inks.

THE COMPETITION

The Canon PIXMA G3600 is priced at $499 and competes directly with Epson's WorkForce ET-4500 at $599 and the ET-4550 at $699. Ink bottles for the Epson printers (all 70 millilitres) cost $24.99 for the black and $16.99 for each of the colours. The Canon bottles are $29.99 for 135 millilitres of black ink, and $24.99 each for 70 millilitres of the other colours. All these printers perform essentially the same with a few feature variations and warranty differences.

The Canon inks work out at about 35 cents per millilitre which represents a considerable saving over small cartridges costing about $2 per millilitre. Of course, what is saved by the bulk ink facility is challenged by the initial outlay and here is where one does the sums, not only between the Canon and Epson brands, but also comparisons against the standard multi-functional types with "special" prices – sometimes below $50 – that just happen to incorporate pigmented inks or long-life dyes.

THE VERDICT

The move from a cheap multi-functional printer to a unit like the PIXMA G3600 will probably only appeal to those who have a reasonable amount of work to handle, such as a busy small office or an enthusiast print maker. Casual printing of only a few prints per week would hardly warrant the outlay.

The maximum print size of A4 (or legal if you buy larger sheets or rolls and cut) may not be a limitation in terms of exhibition or display prints for short term purposes. Although the four-colour ink system is no impediment to print quality (in many cases hard to separate from the same print files assigned to printers with six-colour or more ink systems), the matter of ink longevity could cause intending buyers to look elsewhere.

From a photographer's point-of-view the Canon PIXMA G3600 could be a handy printer to act as a companion to an A3+ or A2 inkjet printer. The larger format printer attends to those tasks where image permanence is important while the G3600 looks after general work, such as document scanning and/or copying, correspondence, reports, student projects, greeting cards or other applications where print longevity is not essential.

All things considered, the PIXMA G3600 is a neat package, easy to use and one that delivers quality output with a cost effective ink system. Convenience, compactness and versatility are the key attributes.

VITAL STATISTICS

CANON PIXMA G3600 $499

Printer Type: A4 format multi-function inkjet printer using three colours of dye-based inks and a pigmented black ink delivered via line from refillable internal ink tanks. Colours are cyan, magenta, yellow and black. A4 document scanner and photocopier functions.
Ink Cartridges: No cartridges. Printer has internal ink tanks which are refillable. Initial supply and replacement ink supplied in 135 millilitres bottles for the black, 70 millilitres for the other colours.
Maximum Resolution: 4800x1200 dpi.
Paper Sizes: Postcard through to Legal size (216x356 millimetres). Custom sizes - width 55-215.9 mm, length 89-676 mm.
Interfaces: High-speed USB, Wi-Fi (up to 802.11n), PIXMA Cloud Link, Google Cloud Print.
Main Features: Integral refillable ink tanks, Canon FINE print heads (320 nozzles for black, 384 nozzles for CMY colours).
Dimensions (WxHxD): 445x330x163 mm.
Weight: 5.8 kilograms.
Price: $499 (includes a set of ink bottles). Replacement ink bottles cost $29.99 for the black, $24.99 for the colours.
Distributor: Canon Australia, telephone 1800 804 240 or visit www.canon.com.au

A PHOTOGRAPHER'S GUIDE TO LAKE ALBERT, SA

WATER COLOURS

Gateway to the beautiful Coorong region, the small South Australian town of Meningie on the shores of Lake Albert is the starting point for a day trip that's packed full of varied photo opportunities. John Neilson is at the wheel.

PHOTOGRAPHS BY JOHN & CAROLYN NEILSON

Sunset over Lake Albert. Leica M Typ 240.

One hundred kilometres south-east of Adelaide, where the long and snaking Murray River finally empties into the sparkling Southern Ocean, are two shallow blue freshwater lakes called Albert and Alexandrina. They're surrounded by a wild, untamed and exciting piece of Australia that's rich in both Aboriginal and European history.

Known as the smaller of the Lower Lakes, Albert is an important waterway and a breeding ground for some of the rarer birds of Australia. Listed as an Important Bird And Biodiversity Area (IBA), you can regularly see endangered Orange-bellied Parrots, Fairy Terns and Bitterns as well as Sandpipers, Cape Barren Geese, Shelducks and Cormorants. Lake Albert is also home to one of the great Australian birds, the majestic pelican.

Our tour begins on the lake's northern edge in the pretty little town of Meningie which is situated on the Princes Highway. Heading south on the sealed Narrung Road, the first stop is a pelican viewing area where you can photograph rows of the birds enjoying life perched on man-made post and rails. The best time for this is early morning when the sun is beaming on your back. A fast shutter speed is needed if you want to freeze a pelican in mid-flight or coming into land. You can often see groups of these large graceful birds practising their Olympic-style synchronised swimming, bringing smiles to all those who witness it.

A few kilometres further up the road is the Meningie Cheese Factory Museum with collections of many things from agricultural machinery to domestic appliances. With an entry fee of just $5, a visit to this volunteer-run museum reminds you of how hard and uncompromising rural life was before our mod-cons. The people at the museum have created a very pleasant place to while away a few hours with the vintage Radio Collection, in particular, reminding you of days spent outside listening to ABC commentator Jim Maxwell calling the cricket.

THE COORONG

As the road wanders south, Lake Albert constantly comes in and out of view. At the Marks Point turn-off the road heads to the salt waters of the Coorong. A few shacks cling to the water's edge, creating the perfect environment for a lucky few to spend lazy afternoons with a fishing line in the water.

1. Meningie Jetty photographed at dusk. Mamiya Leaf Credo 40.
2. Pelican formation. Canon EOS 5D Mark III
3. Narrung Car Ferry. Leica M Typ 240.
4. Vintage radios on display at the Meningie Cheese Factory Museum. Leica M Typ 240.
5. Marks Point. Mamiya Leaf Credo 40.
6. Meningie Jetty on Lake Albert. Mamiya Leaf Credo 40.

This is another great location for photography with rippling sapphire waters, rusty old fences, flocks of quiet birds and the huge wind-swept sand dunes across the water. The Coorong National Park was formed in 1966 to give many species of birds, animals and fish protection during times of drought. The 470 square kilometre park incorporates a large dune system, lagoons and coastal vegetation that is popular with walkers, four-wheel-drivers and boaties. When in one of the local restaurants, venture outside your culinary comfort zone and partake in the 'Coorong Mullet' with its unusually light fishy taste.

Picking up the Narrung Road again provides another photo opportunity, this time just outside Narrung itself. In the diluted afternoon sun, the dilapidated stone ruins of an old sandstone homestead look magnificent. Passing through the tiny Narrung township, you'll reach the Point McLeay Road which then heads towards the Aboriginal community of Raukkan.

Situated on the low lying green hills of the Narrung Peninsula, this community has an interesting connection with our currency. If you happen to have $50 note in your pocket, take it out and study the front. David Unaipon – a Ngarrindjeri man – is the Aborigine who is featured on this note. Having been born in the small Point McLeay Mission, he went on to become one of the most celebrated Aborigines in Australian history. David was the first Aboriginal writer to be published, and spent a great deal of his life championing Aboriginal causes. He also invented a shearing implement that modern shearing tools are still based on, and spent some time trying to find the elusive answer to perpetual motion.

Also featured on the $50 note at the bottom left corner, is the next photo opportunity. Built in 1869 – and one of the only buildings left standing on Australian bank notes – is the Mission church at Point McLeay. It's a beautiful heritage sandstone building built in the tradition of most South Australian buildings of the time.

FERRY AND LIGHTHOUSE

Backtracking to the Narrung Road, a left turn onto the Poltalloch Road continues the circumnavigation of Lake Albert. Before long, the highway is broken by a small narrow passage of water that joins this lake to Lake Alexandrina. A modest but free car ferry transports you across the flats from Albert to Alexandrina. There probably aren't too many places in Australia which still offer a free ferry trip.

By now you will probably have plenty of photographs of pelicans, but it's still hard to resist another opportunity to shoot more as these birds frolic on the water alongside the ferry.

A few hundred metres on is the only inland lighthouse in Australia which was built to help guide paddle steamers across Lake Albert and Lake Alexandrina. Point Malcolm Lighthouse – also known as the Mundoo Light – stands proudly on the hill overlooking the passage. Visible from up to 16 kilometres away, the seven metre tall structure finished service in 1931. The sweeping 360-degree view across both shimmering lakes is breathtaking and well worth the trip alone.

Carrying along the Poltalloch Rodd as it passes through rolling green hills, there are photo opportunities everywhere in the form of eerie dead trees, contented livestock and sparkling blue water. Reaching the long and lonely Princes Highway, a right turn takes you towards Meningie. Out of nowhere, a sun-glinted pink lake appears. Late afternoon is the best time to shoot the waters of the Pink Lake, the dramatic colouration created by blooming algae.

After arriving back in Meningie, the circuit has taken most of the day, but it's time well spent visiting some very interesting and varied sights that many tourists miss because they stick to Highway 1.

In Meningie itself, there's a curious statue of an ostrich wearing a saddle, situated at the water's edge. South Australia's only bushranger was called The Birdman Of Coorong (his actual name was John Francis Peggotty) and conducted his ambushes riding on these birds, a feat only made possible by his very small stature. It sounds like a great idea for a movie script.

If you're at the lake in the evening it will be well worth waiting near the short jetty for the sun to set. If the photography gods are smiling, both the sky and the water will be full of rich, warm colours. Appropriately though, you may have to wait for the ever-present pelicans to stop interrupting the view.

Lake Albert is a very rich and remote unpopulated area which just begs to be explored. Don't forget your ND and graduated filters, and be prepared to edit hundreds of interesting images after your trip. If you stay in the area for a few days, you'll have the opportunity to revisit locations at times that are better suited to photography or in different weather conditions. The pictorial potential here is vast. And, as in the movie *Storm Boy* – which was filmed in the Coorong region – you're bound to make friends with a few pelicans.

For more information please visit www.murrayriver.com.au/meningie, meningiecheesefactorymuseum.webs.com and www.meningie.com.au

All photographs by John & Carolyn Nielson, copyright

BEING THERE

Do you have a favourite place in Australia for photography?

We'd love to hear about it. We need between ten and 12 good quality images and around 1500 to 1200 words describing the region, the best spots for photography, how to get around and a few tips for visiting photographers (with regard to weather, seasonal changes, road conditions, available services, etc.).

So, if you fancy yourself as a travel writer, here's your chance (and, yes, you will get paid). Images can be in any form, either film or digital files, but the latter need to be of sufficient quality for magazine reproduction (i.e. at 300 dpi resolution and at least 15x20 cm in size). Please also remember to add the text file to the disc… a number of submissions have turned out to be pictures only.

Send your submission to Camera Magazine, Next Media Pty Ltd, Locked Bag 5555, St. Leonards, NSW 1590. If you want to discuss a possible location, send a brief outline via email to pburrows@nextmedia.com.au

SUBMISSIONS UPDATE

For readers interested in contributing to 'Photogenic Places', below is a list of the locations that have been covered by articles submitted, but not yet published. Check here to avoid doubling up. As a rough guide, we're now suggesting you concentrate on a smaller area rather than providing a regional overview, perhaps with a more detailed description of what's available to see and photograph.

- Fraser Island (Queensland)
- Mungo National Park (NSW)
- Murrindindi (Victoria)
- Busselton (Western Australia)
- Penguin Island (Western Australia)
- Strahan (Tasmania)

1. Shimmering water. Canon EOS 5D Mark III.
2. The Pink Lake. Leica M Typ 240.
3. Pelicans roosting on man-made posts in Lake Albert. Mamiya Leaf Credo 40.
4. Point Malcom Lighthouse. Canon EOS 5D Mark III.
5. Point McLeay Church. Mamiya Leaf Credo 40.

TALENTED TRIO

Reports by Poul Burrows

Three of Nikon's recent new Nikkor lens releases showcase the latest optical design and technologies... and an on-going support for D-SLRs.

PC Nikkor 19mm f4.0E ED

Nikon's widest-angle perspective control lens proves to be surprisingly versatile... and highly addictive.

While it's true that perspective control (PC) lenses have applications beyond just architectural photography, you need to be very dedicated to pursuing technical perfection to make an investment of over $3000 on a wide-angle prime... and a manual focus one at that. However, what you get with the PC Nikkor 19mm f4.0E ED is an effective solution to a number of technical problems, albeit an expensive one.

The 19mm is the widest angle PC lens to be offered by Nikon – the previous widest was 24mm – and it has an expansive 97 degrees diagonal angle-of-view when used on a full-35mm D-SLR (which Nikon calls the 'FX' format), reducing to 73 degrees when used on an 'APS-C' (a.k.a. 'DX') D-SLR. It makes a lot of sense to go wide with a PC lens as this is where its technical corrections can be most useful... when shooting tall structures, for example. Nikon already offers a line-up of three PC-E series perspective control lenses – a 24mm f3.5, a 45mm f2.8 and an 85mm f2.8 – but the 19mm benefits from a number of recent developments in lens technologies and design. For starters, compared to the PC-E lenses, manual aperture selection is now performed from the camera body so the 19mm doesn't have an aperture collar. It has a special fluorine coating on the exposed front and rear element surfaces to help repel moisture and grease, but this lens isn't fully weather-proofed... it's a bit hard to do with all those mechanical adjustments, but there is a rubber gasket around the lens mount. However, the biggest upgrade on this model is that it's now possible to rotate the tilt and shift movements independently so, if required, they can be applied in different planes. It makes for a more mechanically complex design, but also increases the potential usefulness when shooting architecture, interiors and even landscapes.

Getting Into The Swing

Tilt? Shift? What are we talking about here? For starters, perspective control lenses are often also called tilt/shift lenses (Canon even uses the designator 'TS' on its models) and these two adjustments are collectively known as 'movements' and 'displacements' respectively. The rotational capability enables these adjustments to be applied in both the vertical and horizontal planes (or even at an angle in between).

Back in the days of large format cameras – which comprised of a lens standard and a film standard connected by a set of bellows – these adjustments were applied to the camera which was fitted with a normal lens. The flexibility of the bellows enabled the lens and the film to be tilted, swung or shifted independently of each other, enabling much greater control over both perspective and sharpness than is possible with a rigid-bodied camera. Hence the need now for special perspective control lenses with mechanical adjustments which allow the optical axis to be moved in relation to the focal plane (i.e. either tilted or shifted). The shift adjustment allows for the correction of *convergence* which otherwise makes tall buildings appear as if they're toppling over. The tilt adjustment enables the plane of sharpness to be adjusted (literally tilted from the normal perpendicular) which has the effect of giving an extended depth-of-field without the need to select smaller apertures. A tilt adjustment applied in the horizontal pane is, logically, called a swing.

The rotational adjustments on Nikon's PC Nikkor 19mm allow you to apply either tilts vertically

IN PRACTICE

Swinging the lens has the effect of rotating the plane of sharpness to increase the depth-of-field even with a large aperture. Each of these images were taken with an aperture of f4.0, but the difference in depth-of-field is clearly evident... increasing when the swing moves the plane of focus so it's more closely aligned with the subject plane, but much less when it's angled further away.

Applying a tilt adjustment has the effect of 'lying down' the plane of sharpness to increase the depth-of-field. Tilting the lens away from the subject plane dramatically decreases the depth-of-field and creates a visual appearance similar to that of the 'Miniature' digital filter. Neither the focusing nor the aperture (f4.0) were changed, but small shifts – in the vertical plane – were applied to reposition the subject within the frame.

Perspective Control – What's It All About Then?

Perspective is determined by the position of the camera in relation to the subject and isn't directly related to the focal length of the lens (although this does, of course, dictate the angle-of-view). However, when shooting a large subject – such as a building, for example – often a wide-angle lens is used to get it all in the frame and, inevitably, the camera is angled up (or, if it's a long building, angled to the right or left). This means that the focal plane (i.e. the plane at which the imaging sensor or film is located) is no longer parallel to the subject plane and so, due to the variation in subject distance, the subject's shape is distorted. This is where the shift adjustment comes in. It allows for the optical centre of the lens – and, obviously, its whole imaging circle – to be moved in relation to the centre of the sensor (or film frame) which alters which part of the scene or subject will be recorded. In the example of the tall building, shifting the lens upwards allows for more of it to be included in the frame without having to angle the camera backwards.

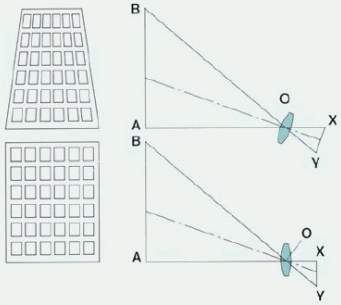
With the light rays from the subject all travelling exactly the same distance to the focal plane from the lens, there's no distortion.

Additionally, all of the subject will be in focus even when using a comparatively large aperture setting. What's at work here is something called the Scheimpflug Rule and it requires that the subject plane, lens plane and focal plane must all intersect at a common point in order to ensure the greatest possible subject sharpness.

How does this work when all three of these planes are absolutely parallel as in the above example? Simple. This common point then occurs at infinity.

However, the Scheimpflug Rule can also be met when the subject plane isn't parallel to the focal plane… which is what happens when the lens is tilted or swung. Then the plane of focus – and its associated depth-of-field – will become more closely aligned with an angled subject plane, thereby enabling sharp focus to be obtained front-to-back, even with a large aperture. If you think of the plane of sharpness as a piece of paper that, when held vertically, represents next-to-no depth-of-field (i.e. just the thickness of the sheet), but when it's laid down over the subject – which is the effect of the tilt adjustment – then everything covered by it, from front to rear, will now be sharply rendered… which, in visual terms, represents great depth-of-field even at, say, f4.0 or even f2.8.

Importantly, a tilt/swing adjustment doesn't change the shape of the subject as there's no displacement of the optical axis involved. The big advantage, of course, is that an extended depth-of-field can be obtained when still using large apertures which has real benefits in terms of shooting in lower light levels. If you apply a tilt or swing away from the subject plane, the effect will be to greatly reduce the zone of sharp focus with a rapid fall-off on either side so the visual appearance is similar to that of the 'Miniature' digital special effect (and different from a shallow depth-of-field).



Perspective control allows for the correction of converging verticals (top) which occur because the film plane (X-Y) is tilted in relation to the subject plane (A-B). Shifting the lens (bottom) allows the film plane to be adjusted so it becomes parallel with the subject plane… vertical lines will then appear straight.

or swings horizontally, and either lateral shifts (i.e. left or right) or horizontal shifts (i.e. up or down which, in view camera terms, was called the rise or fall). And, as just noted, these can be done independently… so, for example, you can correct for vertical convergence *and* maximise depth-of-field at the same time.

Super smooth microdrives perform the tilt/swing and shift adjustments; the former through a range of +/-7.5 degrees and the latter over +/-12 mm. These may look like pretty small adjustments, but in lens movement terms they actually represent a considerable amount of correction. There's a switch to lock the tilt/swing mechanism at its zero position and locking knob to hold it at any other setting. A pair of levers facilitate the rotations – either the tilt/swing mechanism separately or the whole lot, moving around the lens mount. The former rotates though 90 degrees to the left with a click-stop at 45 degrees while the latter rotates though 90 degrees either left or right with click stops at 30-degree intervals. Being able to rotate the lens around its mount also allows the vertically-orientated adjustments to be applied when the camera is still held horizontally or, naturally, vice versa.

In The Field

For technical reasons, it's not possible to have autofocusing with a tilt/shift lens and, for a long time, only stop-down metering was possible for manual exposure control. However, Nikon's electromagnetically controlled diaphragm allows for full open-aperture metering – so the viewfinder image is always at its brightest – and auto aperture control means that any exposure mode can be used, including program.

Shifting the image circle upwards (a.k.a. applying a rise adjustment), enables the focal plane to be kept parallel with the subject plane, eliminating the convergence which makes a chimney stack appear to be toppling backwards. Given the position of the sun, some ghosting was inevitable in the first frame. Believe it or not, both images are taken from exactly the same spot.

Appling a vertical shift (right) has the effect of straightening vertical lines so they remain parallel to eliminate convergence.

As aperture setting (and control) is from the camera body, there's a long list of older Nikon SLRs (both digital and film) which can't support this lens. In fact, full and unrestricted compatibility extends to the D3, D4 and D5 pro-level full-35mm D-SLRs; the D810, the Df and the D500. To quote Nikon, "With other cameras, some combinations of shift and rotation may not be available due to the lens contacting the camera body".

The adjustment gear housings add some bulk and weight, plus the various controls sprouting from the barrel can look at bit daunting at first, but the most alarming visual aspect of the PC 19mm is the huge exposed dome of the front element. The bespoke bayonet-fit lens cap is shaped like a dessert dish – and is just as big – so there's a lot of very valuable polished glass on show when it comes off.

> "There's a fairly steep learning curve associated with using the PC Nikkor 19mm, but it really doesn't take too long to get the hang of it."

Be very, very careful when shooting and get into the habit of replacing the cap immediately you're finished, otherwise it could all end in tears. The fluorine anti-grime coating needs to work overtime here.

The PC 19mm's optical construction comprises 17 elements in 13 groups, including two aspherical types for correcting distortion and three made from extra-low dispersion (ED) glass for minimising chromatic aberrations. Nikon's advanced 'Nano Crystal Coat' anti-reflection multi-coatings is applied to help reduce ghosting and flare. The minimum focusing distance is 25 cm and the diaphragm has nine blades to give smoother out-of-focus effects.

At 885 grams it's a comparatively heavy lens for a prime wide-angle and, although the shape looks awkward, in practice the PC 19mm handles surprisingly comfortably and feels very well balanced, especially on Nikon's bigger full-35mm D-SLRs. It's also not nearly as difficult to use as you might first expect either, especially when you see through the viewfinder exactly what each adjustment is actually doing visually. The extra control – especially over sharpness – quickly becomes addictive. Now that depth-of-field isn't harnessed to the aperture setting, there's much more freedom as far as exposure control is concerned so, for example, you can use larger apertures in situations where the only option otherwise would have been to use a higher ISO setting, thereby increasing noise with its attendant implications for image quality. Or you can maintain a faster shutter speed, maintaining hand-held shooting in a situation which would otherwise have required using a tripod. Additionally, being able to use larger apertures without reducing depth-of-field avoids the diffraction issues associated with apertures smaller than f11 which actually reduce sharpness.

Of course, the 19mm focal length has inherently loads of depth-of-field, but you can really exploit it with a tilt adjustment when you want everything in the shot – from just in front of the camera out to infinity – to be pin-sharp… as might be the case with a vertically-orientated landscape shot where there's a much going on in the foreground as in the far distance. Then there is the creative potential if you choose to deliberately reduce the depth-of-field if you apply a tilt or swing *away* from the subject plane, so the divergence with the plane of focus is increased. The sharpness

All adjustments centred.

Right swing.

Right lateral shift.

fall-off becomes quite pronounced and you end up with a visual appearance similar to that created by the 'Miniature' digital special effect that's available on many D-SLRs or mirrorless cameras.

Performance

A critical requirement for a perspective control lens is that it has a big enough image circle to ensure optical performance is maintained across the frame even with the largest shifts. This is actually very evident with the PC Nikkor 19mm as there's absolutely no brightness fall-off even with the maximum displacement applied at f4.0. However, as with any wider-angle PC lens, there is a limit to some combinations of a tilt or swing along with a shift before some slight shading appears in one or other corner. For example, an extreme right swing combined with an extreme left shift… although, in practice, this isn't something you're likely to do anyway. As many of the applications for this lens are highly technical, the demands on the optical performance are considerable, but the PC 19mm delivers. Thanks to the larger image circle, the centre-to-corner uniformity of sharpness is very good even at f4.0 when the lens is centred, but truly excellent at f5.6 and beyond. As it happens, there's minimal loss of sharpness due to diffraction at f11 or f16, but it becomes more evident at f22 and f32. There's a very slight loss of sharpness in the corners at the extremes of the shifts, but it's minimised in the aperture range of f5.6 to f11. Small tilts or shifts don't affect either the overall sharpness or brightness. The PC 19mm is exceptionally well corrected for distortion with just a hint of barrel-type bending at the frame's edge when the lens is centred. Ghosting and flare are reasonably well suppressed, but given that huge expanse of curved front element, they're unavoidable at times. Chromatic aberrations are well controlled even when the lens is shifted. The typically 'punchy' Nikkor contrast characteristics enhance definition, complementing the 19mm's exceptional resolving power which results in crisply rendered fine details and textures.

The Verdict

There's a fairly steep learning curve associated with using the PC Nikkor 19mm, but it really doesn't take too long to get the hang of it and then it just becomes a case of experimenting with exactly how much tilt/swing and/or shift is needed to optimise sharpness and correct for convergence. You'll generally find a little goes a long way.

Obviously too, this is a lens primarily designed for professional applications, but it's also a huge amount of fun to use and its usefulness for landscape photography, in particular, is undeniable. From an amateur's perspective (no pun intended), the PC 19mm is an expensive lens, but for anybody in the pursuit of technical excellence – achieved in-camera – it's arguably a justifiable investment. Minimising the need for any post-camera corrections is a definite time-saver and also preserves the integrity of an image file.

Additionally, the 19mm focal length is extremely versatile – and not just for landscapes – and the optical performance is supreme in all departments… so any cost-benefit analysis would have a positive outcome.

VITAL STATISTICS

PC NIKKOR 19mm f4.0E ED

$3299

Estimated average street price

Format: Full-35mm (Nikon FX) and 'APS-C' (Nikon DX) sensor D-SLRs, 35mm film SLRs.
Angle-of-View: 97 degrees diagonal, full-35mm sensor size. 73 degrees diagonal, 'DX' format when the effective focal length is 28.5mm.
Construction: 17 elements/13 groups.
Minimum Focus: 25 cm.
Aperture Range: f4.0 – f32.
Overall Length: 124 mm.
Maximum Diameter: 89 mm.
Filter Diameter: Screwthread filters cannot be fitted.
Weight: 855 grams.
Lens Mount(s): Nikon F (E-type AF, but manual focus only).
Features: Up to 7.5 degrees of tilt, up 12 mm of shift, 90 degrees left/right rotation for shifts (with click-stops at every 30 degrees), 90 degrees left rotation for tilts (with a click-stop at 45 degrees), three ED (extra-low dispersion glass) elements, two aspherical elements, 'Nano Crystal' anti-reflection multi-coating, fluorine anti-grime coating on external element surfaces, depth-of-field scale, 9-blade diaphragm, electromagnetic diaphragm control.
Price: $3299 (inc. GST). Estimated average street price.
Distributor: Nikon Australia Pty Ltd, telephone 1300 366 499 or visit www.mynikonlife.com.au

AF-S Nikkor 105mm f1.4E ED

Nikon builds the world's fastest 105mm short telephoto prime lens… and it's excellent, but expensive.

So imagine, if you will, a bunch of Nikon lens engineers sitting around the lunch table, wondering what to do next. "I know," says one, "let's build the world's fastest autofocus 105mm prime." Loud choruses of approval from the others. If somebody from the finance department had been there, their response might have been a bit more muted, possibly along the lines of, "Er, why?" But obviously he or she wasn't because now we have this marvelous thing that is the AF-S Nikkor 105mm f1.4E ED.

At first it does very much look like this lens started out as a nice little challenge for the designers, after all it's unlikely Nikon was being swamped with requests for a super-fast 105mm short telephoto. And it's most definitely a showcase for many of Nikon's lens tech smarts, but until it was announced did we even know that we really needed it… especially at just over three grand? Now it's here though, the 105mm f1.4 looks like A Very Good Thing.

This focal length is actually suited to quite a range of applications such as portraiture, people, fashion, interiors and street photography.

All these uses benefit from being able to open the aperture all the way to f1.4, not just for shooting in low light situations, but also because the wafer-thin depth-of-field at this aperture offers plenty of creative opportunities with selective focusing.

The 105mm joins Nikon's family of f1.4 speed 'Gold Ring Series' autofocus premium primes which also comprises 24mm, 35mm, 58mm and 85mm models. It's primarily designed for use on the full-35mm 'FX' format Nikon D-SLR bodies, but can be fitted to the 'APS-C' 'DX' format models when the focal length effectively becomes 157.5mm.

The 105mm f1.4 showcases Nikon's ability to build truly fine lenses. High performance primes are very fashionable right now.

If you like sharpness, Nikon's 105mm f1.4 is your lens. These two images captured at f16 and ISO 200 with the camera mounted on a tripod and the mirror locked up. Some shooting discipline is needed to make sure sharpness isn't compromised by camera shake or any other source of vibrations.

Bottom image is the depth-of-field available at f16 and in stark contrast, at f1.4 (centre). Just a tiny focus adjustment makes a big difference with the wafer-thin depth-of-field at f1.4, as can be seen in the frame on the top. Compare the centre TLR in both shots… in the centre frame the outer edges of its lenses are all that's sharp while, at top, only the inner edges are sharp. You can also compare the 'Rollop' name badges. The focus was changed by the smallest of adjustments that the manual collar would allow!

On location test images captured with a Nikon D3 at ISO 200 with shutter-priority auto exposure control. The camera was hand held. Sharpness is again excellent across the frame and there's negligible distortion or chromatic aberrations.

Tele Tubby

Externally, it's nearly as wide as it's long, and it weighs a solid 985 grams thanks to the 14 elements – a couple of them being sizeable lumps of glass – housed within. Three elements are made from extra-low dispersion (ED) glass to minimise chromatic aberrations and Nikon's 'Nano Crystal Coat' anti-reflection coatings are applied to help reduce ghosting and flare.

The exposed element surfaces have a flourine coating to help repel moisture and dirt, plus there's a rubber gasket around the mount to prevent water or dust entering there. While Nikon doesn't actually state that this lens is weather-proofed, the barrel actually doesn't have too many possible entry points so it will probably cope with a sprinkling of rain. The 105mm f1.4 uses Nikon's electromagnetically-controlled diaphragm so aperture control is performed electronically from the camera body. This means there's no mechanical linkage so compatibility is limited to Nikon D-SLRs of a fairly recent vintage, dating back to the likes of the D3, D300, D7000, D5000 and D3100 (i.e. roughly mid-to-late 2007 onwards).

The girth – and its weight – mean the 105mm f1.4 feels better balanced on one of Nikon's bigger D-SLR bodies which means you're handling around two kilos of gear, but it's well worth the effort. Given everything that Nikon has put into this lens, you won't be surprised to learn that its optical performance is phenomenal. It needs to be because it's moving into Zeiss territory in terms of the price tag, but it really is just as good. The sharpness is exceptional across the frame and, importantly, even when shooting at f1.4, but the corner sharpness actually gets even better when you close down to f2.8 and stays that way to about f11. After this, diffraction comes into play, although it's all relative so you still won't see a lot of difference even at f16. There's virtually zero distortion – just a very slight hint of pin-cushioning – and chromatic aberrations are very well controlled, even when shooting at the maximum aperture. Vignetting is a bit more obvious here, but you can always deal with this in-camera. Flare is very effectively suppressed, although the large expanse of front element makes it advisable to use the supplied hood in bright sunny conditions. The nine-blade diaphragm delivers smoothly uniform out-of-focus effects and the transitions from sharp to blurred are also creamily smooth, giving a convincingly three-dimensional look with a shallow depth-of-field. However, focusing at f1.4 is an exacting business and it's actually best done manually if you want to be precise about exactly which part of the image needs to be sharp. Depth-of-field here is measured in millimetres so even tiny adjustments can make a big difference.

The Verdict

Put simply, the 105mm f1.4 is delicious. Hard to justify in many ways, but still delicious which is probably justification enough. It is a lot more versatile than you might imagine at first, but the 85mm f1.4 is arguably even more so, and the 105mm's minimum focusing distance of one metre means it's a bit limited for any macro work.

Nevertheless, the superb performance does represent a very pursuasive argument, but then again, with the PC 19mm only another $200 more, if you have got this sort of money available to spend on a new lens, there's much more fun to be had with tilting and shifting.

VITAL STATISTICS

AF-S NIKKOR 105mm f1.4E ED

$3099

Estimated average street price

Format: Full-35mm (Nikon FX) and 'APS-C' (Nikon DX) sensor D-SLRs, 35mm film SLRs.
Angle-of-View: 23.1 degrees. 15.2 degrees with the 'DX' format when the effective focal length is 157.5mm.
Construction: 14 elements/9 groups.
Minimum Focus: 100 cm.
Aperture Range: f1.4 – f16.
Overall Length: 106 mm.
Maximum Diameter: 94.5 mm.
Filter Diameter: 82 mm.
Weight: 985 grams.
Lens Mount(s): Nikon F (E-type AF).
Features: Three ED (extra-low dispersion glass) elements, 'Silent Wave Motor' ultrasonic autofocusing drive, internal focusing, 'Nano Crystal' anti-reflection multi-coating, fluorine anti-grime coating on external element surfaces, 9-blade diaphragm, electromagnetic diaphragm control. Bayonet-fit lens hood supplied.
Price: $3099 (inc. GST). Estimated average street price.
Distributor: Nikon Australia Pty Ltd, telephone 1300 366 499 or visit www.mynikonlife.com.au

AF-S Nikkor 70-200mm f2.8E FL ED VR

How does Nikon's very latest AF-S 70-200mm f2.8 zoom stand up against its pioneering predecessor from nearly two decades ago?

Along with the 24-70mm f2.8, the 70-200mm f2.8 zoom is a staple in the kits of many photographers, both amateurs and pros. Nikon's latest 70-200mm f2.8 is the third-generation model, but back in 1999 I purchased the first AF-S series 80-200mm f2.8 zoom – the spiritual predecessor to the new lens – which I'm still using today. It's been such a reliable workhorse – and the optical performance is hard to fault – I see no real reason to change, but it's interesting to see what differences around 18 years of subsequent developments in lens design and technologies have made.

For starters, the two lenses are pretty similar in size and weight, although the new 70-200mm is slightly lighter and has a much more contemporary approach to the design of its tripod mounting bracket. Like Panasonic's 100-400mm telezoom, just the foot detaches rather than the whole collar, but Nikon hasn't been quite as clever and arranged it so all the barrel controls stay in the same place when the camera is rotated to the vertical position. In fact, on the new 70-200mm, they end up being inaccessible unless you can squeeze a finger in between the lens barrel and the tripod mounting plate. On my 'old' 80-200mm there are rather fewer of these controls, primarily because it doesn't have an optical stabiliser – probably the one compelling reason for an upgrade – which the 70-200mm has had from the off. On the new model – officially designated the AF-S Nikkor 70-200mm f2.8E FL ED VR, with this last set of initials standing for 'Vibration Reduction' – the image stabiliser delivers up to four stops of correction for camera shake and has both Normal and Sports modes, the latter for panning as it switches off correction in the one or other plane (i.e. when the camera is held either horizontally or vertically).

As already noted, my original AF-S 80-200mm has Nikon's ultrasonic 'Silent Wave Motor' ring-type autofocusing drive – in fact, it was the first SWM-equipped model – which is in the new 70-200mm as well, but no doubt much improved in terms of speed. My 80-200mm has five elements – out of its total of 18 – made from extra-low dispersion glass – that's the 'ED' in the new lens's long model name and it has six. More significantly though, it also has a fluorite element (yep, the 'FL' initials) which is rather superior at correcting for chromatic aberrations. It also has what Nikon calls a "High-Refractive Index" (HRI for short, but wisely somebody stopped them adding this to the model name as well) which corrects for spherical aberrations and curvature of field. There are, incidentally, 22 elements in all, packed into the new 70-200mm's barrel, so a good proportion of them are special types designed to enhance all aspects of the optical performance; including sharpness, contrast and colour rendering. The new lens also has Nikon's 'Nano Crystal Coat' multi-coatings to deal with internal reflections, something that wasn't so much of an issue when the film-era AF-S 80-200mm was being designed.

> "There are 22 elements packed into the new Nikkor 70-200mm's barrel, and a good proportion of them are special types designed to enhance all aspects of the optical performance."

The new 70-200mm also has fluorine coatings on the exposed element surfaces front and rear to help repel moisture and grease which has added importance on this lens because it's weather sealed, including a beefy rubber gasket around the lens mount. This is a luxury that my 80-200mm doesn't have, but over the 18 years that I've been using it, it's been subjected to some pretty shocking weather conditions and has continued to work reliably.

The barrel tubes are aluminium compared to the magnesium alloy of the new lens which also has a smooth matte finish rather than the 'crinkle' look that was the hallmark of high-end Nikkor lenses for many years. However, the biggest change externally – even compared to the previous 70-200mm f2.8 VR II model – is that the zooming and focusing collars have swapped places. There doesn't appear to be any major reason for this, except perhaps that it makes more sense to have the focusing collar closer to the camera body, especially when shooting video. Maybe because I'm so used to having it the other way around, I actually found the new arrangement much less comfortable.

A set of AF stop buttons make a re-appearance on the new 70-200mm, located between the control collars and arranged at 90-degree intervals.

My 80-200mm has these too, except for some unknown reason, only three instead of four. They're simply focus lock buttons on this lens, but on the new 70-200mm they can be switched between stop or start duties (hence another extra control on the lens barrel). By the way, the two lenses share a focus limiter switch and a focus mode switch, but on the newer model, the latter has a third position enabling an instant AF override of manual focusing as well as vice-versa.

Test images captured with a Nikon D3 at ISO 200 with shutter-priority auto exposure control at 1/500 second with optical image stabilisation activated. VRII gives up to four stops of correction for camera shake depending on the focal length. Overall sharpness is excellent across the aperture range and there's a typically Nikon 'punchiness' to the contrast. Distortion is negligible across the full focal range. Close-up capabilities are improved.

My lens also has a manual aperture collar, something that's now disappearing as Nikon switches to an electromagnetically-controlled diaphragm in its latest Nikkor lenses.

This allows for more accurate setting – especially frame-to-frame with continuous shooting – but it's actuated electronically from the camera rather than via a mechanical linkage. Consequently, while my trusty 80-200mm can be used on any Nikon SLR back to the original F, the new 70-200mm can't be used with any 35mm film body and only on the digital bodies which date from around the middle of 2007. Problem? Probably not for most contemporary users.

The new lens has a closer minimum focusing distance of 1.1 metres, compared to 1.5 metres on my 80-200mm and 1.4 metres on the previous incarnation of the 70-200mm. This may not look like much on paper, but 40 cm can make quite a difference with close-up focusing.

Making Advances

One thing that's become very apparent in this comparison is that Nikon's original AF-S 80-200mm f2.8 model was actually a pretty advanced design for its day. It's not really all that far behind the latest-generation 70-200mm f2.8 except for the optical image stabilisation and weather-proofing, and it's worth noting that the first AF-S 70-200mm f2.8 – which was launched back in 2003 – had both these features.

Despite the external differences, the two lenses handle pretty similarly and the 80-200mm's SWM autofocusing is still fast by any standard. However, it is in the area of performance that the progress of the last two decades can be seen. The AF is definitely slicker – we used the two lenses on the same body to make the comparison – and the handling of flare is quite superior, to the benefit of overall contrast and colour. It's also sharper particularly in terms of the corner-to-centre uniformity at f2.8 – something that's been steadily improving with each generation – and there's less vignetting when shooting wide-open too. The correction for chromatic aberrations is also noticeably better at the widest aperture, and it's actually very well controlled overall on the new lens. Likewise distortion which is noticeably better corrected at either end of the focal range. But in terms of colour and contrast… well, geez, the old AF-S 80-200mm f2.8 is still standing up very well, and it also has a nine-blade diaphragm so the out-of-focus effects look just as smooth as those of the current lens.

There's undoubtedly been progress, but perhaps it's not quite as dramatic as might have been expected.

The Verdict

On one hand Nikon should be pretty pleased that a 16-year-old AF lens still looks so good – and has proven to be hugely reliable despite plenty of fairly hard use – but on the other hand it really wants you to buy new stuff. If you own the previous AF-S 70-200mm f2.8 VRII, upgrading to the next model could be a little harder to justify – although the improved stabilisation and sharpness are big plusses – but if my experience is any indicator, it's undoubtedly a good long-term investment. And with Nikon still seemingly wholeheartedly committed to the D-SLR, perhaps an even safer choice.

VITAL STATISTICS

AF-S NIKKOR 70-200mm f2.8E FL ED VR

$3599

Estimated average street price

Format: Full-35mm (Nikon FX) and 'APS-C' (Nikon DX) sensor D-SLRs, 35mm film SLRs.
Angle-of-View: 34.2-12.2 degrees. 22.5 to 8.0 degrees with the 'DX' format when the effective focal range is 105-300mm.
Construction: 22 elements/18 groups.
Minimum Focus: 1.10 cm.
Aperture Range: f2.8 – f22.
Overall Length: 202.5 mm.
Maximum Diameter: 88.5 mm.
Filter Diameter: 77 mm.
Weight: 1430 grams.
Lens Mount(s): Nikon F (E-type AF).
Features: Magnesium alloy barrel tubes with weather sealing, six ED (extra-low dispersion glass) elements, one fluorine element, one HRI (high refractive index) element, 'Vibration Reduction', optical image stabilisation, 'Silent Wave Motor' ultrasonic autofocusing drive, internal focusing, focus limiting switch, 'Nano Crystal' anti-reflection multi-coating, fluorine anti-grime coating on external element surfaces, 9-blade diaphragm, electromagnetic diaphragm control. Bayonet-fit lens hood supplied.
Price: $3599 (inc. GST). Estimated average street price.
Distributor: Nikon Australia Pty Ltd, telephone 1300 366 499 or visit www.mynikonlife.com.au

CANON EOS M5

REPORT BY PAUL BURROWS

The EOS M5 is a pretty looking thing and smaller than it looks. Comfortable to handle too.

MIXED BLESSINGS

See, that didn't hurt too much, did it? Canon finally reveals that it knew how to build a very competitive mirrorless camera all along. Good news for Canon fans, bad news for the rest of the mirrorless world.

Regular readers will know we've been prodding Canon for quite a while about the need to get onboard the mirrorless camera train before it's too late. Mirrorless is here to stay so the longer Canon stayed dabbling on the sidelines – sorry, the previous EOS M models just didn't cut the mustard – the harder it was going to be to catch up with the likes of Fujifilm, Olympus, Panasonic and Sony.

They've already snatched away some valuable market share and time was running out, but perhaps we shouldn't have worried because along comes the EOS M5… which is verging on brilliant. There are still some issues, as you'll read, but nevertheless a hungry Canon cat is now prowling among the rest of the mirrorless camera pigeons… especially those with 'APS-C' size sensors.

Before we get to the EOS M5 itself, there are a couple of implications to think about. Firstly, Canon still has a lot invested in D-SLRs, but whether it likes it or not, it has now confirmed that mirrorless is the future in interchangeable lens cameras, especially in the entry-level and enthusiast categories. The M5 very convincingly illustrates just why. It also provides some indication of how much of a force to be reckoned with Canon will be when it moves further up-market and perhaps even ventures into Sony A7 full-35mm sensor territory.

So where does this leave arch-rival Nikon? The 1 Nikon system has some plus points, but we're done with very small sensors in mirrorless cameras – something else that the EOS M5 illustrates pretty well – and, you may have noticed, there hasn't been a new 'CX' format Nikkor lens for quite some time. Quite simply, Nikon needs to get going with a proper sized sensor in a mirrorless camera very soon, or it will be left behind… it simply can't afford to let Canon, in particular, get too far ahead here.

MONEY MATTERS

So, back to the EOS M5. Canon's biggest achievement here is its size. It's as petite as Olympus's OM-D E-M10 Mark II, but with the larger 'APS-C' sensor and Canon has still found room for a built-in EVF, a tilt-adjustable monitor screen – sized at 8.1 cm too – a built-in pop-up flash and a dial-based control layout.

Not so small is the price tag which, at around $1599 for the camera body alone, creates expectations that the M5 can't actually meet. It's more expensive than either Olympus's E-M5 Mark II or the Panasonic Lumix G85 – both much better equipped – and, in the 'APS-C' sensor category, Fujifilm's X-T10 or Sony's A6300.

The OM-D E-M10 II is a massive $600 cheaper *with* a lens. It's not that Canon has omitted anything that's truly important, but it's skimped on quite a few of the extras that photographers still want – a multiple exposure facility, white balance bracketing, intervalometer for stills, anti-flicker, weather-proofing (pretty much standard at this price point), in-camera panoramas, limited AF area mode choices, and on the video side, 4K recording (see the Making Movies panel for a run-down of the camera's video capabilities).

While the M5 is being described as the "little brother of the EOS 80D" in terms of its imaging stage, it's actually a bit behind its D-SLR cousin in terms of its overall capabilities… which, of course, could be deliberate. Perhaps Canon isn't quite ready to kick the D-SLR habit just yet, but the M5's feature set also betrays some confusion about exactly who it's aimed at… for example, a 'selfie' screen position option on a $1600 camera body? Hello?

Yet the M5 has plenty of stuff that's clearly targeted at enthusiasts – the 'Dual Pixel CMOS AF' with its impressive speed and accuracy tops the list – so perhaps Canon's first objective is to give loyal EOS D-SLR users a truly compact alternative rather than take the mirrorless market by storm. In this regard it certainly meets the mirrorless brief.

DIALLED UP

Like the E-M10 II, the EOS M5 is a pretty-looking thing. It's styled like a mini D-SLR – perhaps there's no surprise here – but with a good-sized handgrip and a swag of external dials, including one for setting exposure compensation.

There's an extra control wheel located on the top panel called the 'Quick Control Dial' which is multi-functional and is switched between functions via a button in its centre. The defaults are for ISO and white balance plus, with manual exposure control, manual aperture setting. Additional functions can be added, namely mode selection for the metering, autofocusing and drive options. The quick switching between the ISO and WB settings is pretty handy in the field, and then the dial itself is used to make the adjustments. There's extensive scope for customising the external controls, including the other dials and the four quadrants of the rear-panel navigator so the M5 can be set up to avoid needing a trip to the menus. It also has a 'Quick Set' control screen – which itself can be customised – with function tiles arranged either side of the live view image. It's made even more useful via touch operations which are fully implemented on the M5's

THE TOUCH SCREEN IS GREAT FOR THOSE USERS WHO LIKE DOING THINGS THIS WAY, BUT THE EXTERNAL CONTROLS WORK EFFICIENTLY ENOUGH TOO, SO TRADITIONALISTS WILL FEEL AT HOME

TFT LCD monitor panel, including autofocusing and shutter release. As noted earlier, this is nice big 8.1 cm display with a resolution of 1.62 megadots and good range of adjustment for tilt (including, ahem, downwards through 180 degrees for taking you-know-whats). The EVF is a little less impressive being a tad on the small side with 0.62x magnification, but it's still a bright and breezy 2.36 megadots OLED-type display which refreshes at 120 fps to minimise lag. A proximity sensor on the eyepiece enables auto switching between the viewfinder and the monitor screen, or manual switching can be assigned to one of the customisable keys.

The bodyshell is polycarbonate and feels very well screwed together. The pop-up flash occupies the central housing and various connections are located on either side of the body. The battery and memory card share the same compartment in the baseplate which means accessing either may be tricky – or impossible – when the camera is mounted on a tripod plate. The lens mount is Canon's EF-M fitting which is exclusive to the mirrorless models, but after a slow start the range of compatible lenses is increasing – including the excellent 28mm f3.5 true macro with built-in LED lighting and optical stabilisation – and there's an adaptor for EF/EF-S optics. However, the M5 body is so compact and lightweight it's easily overbalanced by the bigger D-SLR lenses.

PIXELS & PROCESSING

On the inside is the same 22.3x14.9 mm CMOS sensor as is used in the 80D with a total pixel count of 25.8 million, but it's mated with Canon's later-generation 'DiG!C 7' processor which delivers, among other things, continuous shooting at 9.0 fps.

The effective pixel count is 24.2 million, giving a maximum image size of 6000x4000 pixels. There's a choice of four image sizes for JPEG capture with two levels of compression and crops for the 4:3, 16:9 and 1:1 aspect ratios. Unlike with the 80D, RAW images are captured in the maximum size only, but still with 14-bit colour. The RAW+JPEG capture can be configured for any size JPEG.

An optical low-pass filter is retained to counter moiré effects, and the native sensitivity range now spans all the way from ISO 100 to 25,600 (which is an extension setting on the 80D). The memory card slot is for the SD format with support for UHS-I speed SDHC and SDXC types.

The processing options for JPEGs are pure EOS D-SLR, starting with a set of eight 'Picture Style' presets which include the later Fine Detail mode (first seen on the EOS 5Ds models) and an Auto setting. The adjustable picture parameters also include the newer tweaks for more control over sharpness which are labelled Strength, Fineness and Threshold. There are also adjustments for colour saturation, hue and contrast while the Monochrome preset replaces the first two with B&W contrast filters and toning effects. Up to three user-defined 'Picture Styles' can be created and stored in-camera.

There's a selection of eight 'Creative Filter' effects which are accessed from the main mode dial and serve as standalone fully automatic modes for image capture. However, with the exception of the HDR option, all are available post-capture as in-camera editing functions. HDR capture is only available on the EOS M5 as a 'Creative Filter', but at least it's still proper triple-shot exposures which are subsequently merged in-camera, and there's a choice of additional effects called Art Standard, Art Vivid, Art Bold and Art Embossed.

Dynamic range issues can still be addressed using Canon's 'Auto Lighting Optimiser' (ALO) processing – as per all the EOS D-SLRs – or the alternative 'Highlight Tone Priority' (HTP) processing. The main difference between the two options is that the latter only corrects for the highlights and so leaves the shadows unchanged.

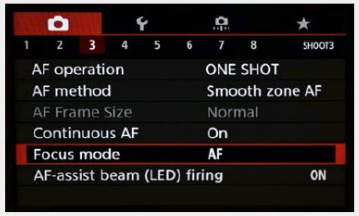
Selectable in-camera lens corrections are provided for vignetting, chromatic aberrations and diffraction with, most likely, that for distortion continually operating in the background.

LOOKING SHARP

As noted earlier, the EOS M5's sensor employs Canon's 'Dual Pixel CMOS AF' design which employs a pair of photodiodes at each pixel point. The second set is for sensor-based phase-difference detection autofocusing which obviously really comes into its own with a mirrorless camera, delivering impressive speed and improved subject tracking reliability. The latter is also helped by the system's 80 percent coverage of the frame.

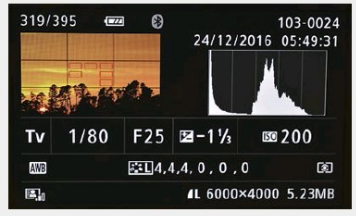
Up to 49 points are available for individual selection, but the M5 lacks the various 'Zone' area options which are provided with the 80D's optical AF system. However, there is a 'Smooth Zone' mode which encompasses a cluster of nine points and automatically selects however many are required by the subject matter. Very usefully, the 'Smooth Zone' can be moved or positioned via touch control with autofocusing performed at the same time… and virtually instantaneously too. In the single-point mode the focusing zone to be adjusted to one of two sizes, although even the biggest is still quite small. Face recognition AF is also available.

A magnified image – either 5x or 10x – is available with both AF and MF operation and there's also a focus peaking display in a choice of colours and intensities to further assist with the latter. In practice, there's not a lot to complain about here, and the 'Smooth Zone' area mode proves to be pretty clever,



The menu design is virtually identical to that of Canon's D-SLRs.

The 'Creative Filter' special effects can be applied post-capture. At-capture settings function as fully automatic modes.



The replay options include histograms plus a highlight warning, focus points (shown in the thumbnail) and guide grids.


Live view screen can be configured with a dual-axis levels display, live-view histograms (either luminance or RGB channels) and guide grids.

The 'Quick Set' menu can be customised and works particularly efficiently with touch control.

> THE M5's 'DUAL PIXEL CMOS' AUTOFOCUSING IS TRULY FAST AND VERY RELIABLE, NO MATTER WHAT THE SUBJECT'S SIZE OR POSITION IN THE FRAME.

While Canon's latest top-end D-SLRs now have 4K video recording, it's yet to filter down to the lower ranks so it's hardly surprising that the mid-level mirrorless camera doesn't have it either. It's no biggie right now, but will certainly be expected on whatever Canon does next in the mirrorless sphere. That said, the rival models from Panasonic and Sony do already have 4K video and it's a bit hard to see truly serious video-makers picking the EOS M5 over, say, the Lumix G85 or Sony's A6300.

As with still photography; compared to its D-SLR cousin, the EOS 80D, the M5 has a pared-down features list for videography so, for example, it lacks the option of switching between inter-frame and intra-frame compression regimes. However, if you like shooting video clips for fun then the EOS M5 has everything you're likely to need plus some handy extras such as the touchscreen autofocusing and a time-lapse function (but, curiously, there's no intervalometer for shooting full-size stills). Electronic image stabilisation is also available when shooting video and gives five-axis correction which is welcome when using non-stabilised lenses.

Like the 80D, the M5 is actually region specific as far as the PAL and NTSC TV standards are concerned so Full HD 1080p video is recorded at either 50 or 25 fps in the MP4 format using MPEG 4 AVC/H .264 compression. HD 720p resolution footage can also be recorded at 50 fps. The M5 has built-in stereo microphones supplemented by a stereo audio input for connecting an external mic. Sound levels can be adjusted manually and there's both a wind-cut filter and an attenuator (for shooting in particularly noisy locations).

Continuous AF operation is available with face recognition and subject tracking, while exposure control can be either fully automatic – including with auto scene mode selection – or fully manual. Exposure compensation can be applied while shooting.

Most of the processing functions for still photography are also available for shooting video, including the 'Picture Style' presets, lens corrections and the 'Auto Lighting Optimiser' and 'Highlight Tone Priority'. The sensitivity and white balance can also be set manually. Manual focusing is assisted by a magnified image and a focus peaking display in a choice of colours and intensity levels. However, again the 'Dual Pixel CMOS AF' works exceptionally well, delivering nicely smooth transitions without either hunting or hesitation. The caveat here is that it only works this smooth when using Canon's newer 'STM' type (Stepping Motor) lenses. The M5 has automatic file partitioning at 4.0 GB so recording continues seamlessly as this file size is exceeded, but the overall maximum clip length remains at the 29 minutes and 59 seconds limit imposed by European taxation laws for video cameras.

Video recording is started and stopped using a dedicated button located below the thumbrest on the camera's back panel which is fine when you actually want to shoot video, but it's all too easy to trigger it accidentally and then you're left wondering why there's no response to any of your control inputs!

If there's some element of Canon still protecting its D-SLR business by not fully exploiting the EOS M5's photographic potential, bear in mind the company also makes some hugely competent dedicated video cameras… so there's perhaps no need to actually go any further with its video potential either.

varying selectivity and coverage to match the subject (i.e. if it can't get a fix with one point, it keeps increasing the focusing area until it does).

The fastest continuous shooting speed of 9.0 fps is achieved with the autofocusing fixed to the first frame, but the M5 still manages a respectable 7.0 fps with frame-by-frame AF adjustment.

Exposure metering is also sensor-based with the option of multi-zone evaluative, centre-weighted average, selective area and spot measurements. The program and semi-auto exposure control modes are supplemented by an AE lock, up to +/-3.0 EV of compensation and auto bracketing over three frames with up to +/-2.0 EV of adjustment. Auto bracketing can be combined with exposure compensation settings to give a maximum possible adjustment of 5.0 EV in either direction.

Nine subject programs are available for manual selection or there's a 'Scene Intelligent Auto' mode which automatically determines whether you're shooting people or scenes and the lighting conditions.

What is called the 'Creative Auto' mode on the EOS 80D becomes 'Creative Assist' on the EOS M5, but is essentially the same thing. Exposure control is still fully automatic, but with the provision of basic overrides for depth-of-field, brightness, contrast, saturation and hue (a.k.a. colour tone). Plus you can switch to B&W capture with the choice of sepia, blue, purple or green toning. 'Creative Assist' is essentially training wheels for the step up to using the standard 'PASM' control modes and the 'Creative Style' presets.

The M5's built-in flash is pretty low powered with a metric guide number of just five at ISO 100, but it has all the important modes including slow speed sync and first/second curtain sync switching. There's no provision for manually adjusting the output. The maximum sync speed is 1/200 second and the full shutter speed range is 30-1/4000 second. As on Canon's D-SLRs, there's an 'electronic first curtain' (i.e. the sensor) which helps reduce vibrations, but no fully sensor-based operation for silent shooting. The white balance control options are pretty much standard fare with the option of manual colour temperature setting, but no bracketing and no choice of auto correction modes (i.e. for maintaining a warmer tone).

As noted at the start of this review, it's all the little frills that have been deleted in all sorts of areas that make the M5 less capable overall than the EOS 80D despite costing the same.

IN THE HAND

It's a bit of a pity because the basics are all absolutely spot on… including the size, styling and handling. It feels great in the hand and the ergonomics promote both comfort and efficiency. The touch screen is great for those users who like doing things this way, but the external controls work efficiently enough too, so traditionalists will feel at home too.

Both the EVF and the monitor displays can be configured with a dual-axis level display, real-time histograms (either brightness or RGB channels) and guide grids. The 'Quick Set' menu is also displayed in both so you can make adjustments when using the EVF, but via the conventional methods. As mentioned earlier, the 'Quick Set' screen can be customised to include only the settings you want.

The M5's menu system is pure EOS D-SLR which means individually tabbed chapters and pages which are selected individually rather than via continuous scrolling. The front input wheel (or navigator pad) cycles through the tabs, the Quick Control Dial (or the rear input wheel) through each page. While you need to use two controls, navigation can ultimately be quicker especially when moving between chapters.

Another Canon-esque idiosyncrasy is the need to first press the 'Set' button in order to access sub-menus and settings – as well as to subsequently confirm any action – rather than the more commonly used right-click.

The playback screens include a thumbnail with either just a brightness histogram or accompanied by the RGB channel graphs as well. You can also add the active focusing point (s), a highlight alert and a guide grid which are available for the full screen playback image too. There's a choice of four thumbnail pages (for six, 12, 42 or 110 images), zooming (from 2.0x to 10x) and a slide show with adjustable image display times and a selection of transitions. Additionally, the slide show can be set to only replay selected images – for example, according to the date of capture, the folder name or the star rating. The touchscreen controls allow for faster browsing and the selection of a thumbnail while the thumb-and-forefinger pinch or spread actions transition all the way through the smallest thumbnails to the maximum magnification.

> THE EOS M5 PROVES THAT CANON CAN BUILD A COMPETENT MIRRORLESS CAMERA AND, ON BALANCE, IT'S A TRULY DELIGHTFUL MACHINE THAT'S VERY ENJOYABLE TO USE.

The in-camera editing functions can be accessed via a conventional menu or a 'Quick Set' menu with the convenience of easy selection via the touch screen. In addition to most of the 'Creative Filter' effects, the options here include resizing, cropping, red-eye correction, photobook set-up and RAW-to-JPEG conversion.

Canon has supplemented the M5's WiFi to include the Smart Bluetooth 'always on' connectivity – the tech Nikon markets as 'SnapBridge' – which adds to the wireless control options with your smartphone (including activating WiFi). When you use WiFi from the camera, there's the convenience of quick NFC-enabled hook-ups and the Canon Camera Connect app (which supports both Android and iOS) allows for extensive remote control capabilities.

SPEED AND PERFORMANCE

Loaded with our reference SD memory card – Lexar's 128 GB SDXC UHS-II/U3 (Speed Class 3) '2000x' device – the EOS M5 captured a burst of 31 JPEG/large/fine images in 3.581 seconds which represents a shooting speed of 8.65 fps. This isn't very far off Canon's quoted spec and the burst length is actually five frames longer. The test files had an average size of 10.0 MB.

We've already commented about the speed of the M5's autofocusing and it's worth repeating here that it's truly fast and very reliable, no matter what the subject's size or position in the frame.

Canon has gone straight to the top of the class in terms of mirrorless camera AF performance and, if 'Dual Pixel CMOS AF' wasn't actually developed with this application ultimately in mind, the 'by-product' of the desire to make live view work better in D-SLRs has paid off handsomely.

With 24.2 MP on tap, the M5 delivers richly detailed images with lots of crisply-defined details and nicely smooth tonal gradations. The best-quality JPEGs look very good indeed, but especially so when using the Fine Detail 'Creative Style' which appears to apply more intelligent sharpening and noise reduction.

Colours are well saturated, but not overdone, and the dynamic range is exceptional up to ISO 1600. Noise is well managed also up to ISO 1600 with both the colour saturation and sharpness holding together enough to enable decent sized enlargements. From ISO 3200 upward though, definition is progressively reduced and colour (chroma) noise manifests itself as unpleasant blotchiness in the areas of continuous tone so the two highest sensitivity settings are really out of play.

Nevertheless, the EOS M5 is still a competent high ISO performer while, up to ISO 1600, the JPEG image quality is truly excellent. As with all Canon's D-SLRs, yet more can be squeezed out of the RAW files – including the dynamic range – with post-camera processing.

THE VERDICT

Sooooo… the EOS M5 proves that Canon can build a competent mirrorless camera and, on balance, it's a truly delightful machine that's very enjoyable to use and delivers excellent results.

However, it's let down by the many little omissions that are, nonetheless, often wanted by the more adventurous photographer. If you're currently running an EOS 80D or something higher, you may well want to wait for whatever comes next which is likely to be loaded to the gunwales with high-end goodies. However, if you really want a Canon-badged mirrorless camera right here, right now – and one that is still very capable in all the important areas – then the M5 fits the bill.

If you're currently outside the Canon EOS clan – and so the branding is less important – then the M5 is a bit on the pricey side, especially compared to the rival Micro Four Thirds models from either Olympus or Panasonic (and particularly the superb Lumix G85). In the 'APS-C' sensor category, better value can be had from both Fujifilm and Sony so it's down to whether you're happy to pay a premium for the Canon badge. The EOS M5 certainly has a more up-market feel and its smallness is remarkable which is undoubtedly a key attraction, along with the excellent control ergonomics, the sensational AF performance and the very pleasing image quality. Has Canon done enough with the M5? Well, even with all the cheaper alternatives on offer, we'd still have one.

VITAL STATISTICS

CANON EOS M5 $1599

with EF-S 18-55mm IS STM zoom. Estimated average street price.

Type: Enthusiast-level mirrorless digital camera with Canon EF-M bayonet lens mount.
Focusing: Automatic via 49-point wide-area system using phase-detection method on 'Dual Pixel CMOS AF' imaging sensor. Focus points may be selected manually or automatically. 'Smooth Zone' area mode automatically selects up to nine points. One-shot and continuous (AI Servo) modes with manual switching. Continuous AF with predictive function, tracking and face detection. Sensitivity range is EV -1.0 - 18 (ISO 100). AF assist in low light/contrast situations is provided by built-in LED illuminator. Manual assist via magnified image (5x or 10x) and/or focus peaking display (red, yellow or blue with high or low intensity).
Metering: TTL using the imaging sensor with evaluative, selective area, spot or centre-weighted average measurements, and E-TTL II auto flash. Metering range is EV 1 to 20 (ISO 100).
Exposure Modes: Continuously-variable program with shift, shutter-priority auto, aperture-priority auto, 'Creative Assist', metered manual, E-TTL II auto flash. Auto scene mode selection with 'Scene Intelligent Auto' (15 possible subject/lighting scenarios) and nine manually-selected subject/scene programs – Self Portrait, Portrait, Landscape, Close-Up, Sports, Food, Panning, Handheld Night Scene and HDR Backlight Control.
Shutter: Electronically-controlled vertical travel focal plane type, 30-1/4000 second plus 'B'. Flash sync to 1/200 second. Exposure compensation up to +/-3.0 EV in 1/3 stop increments.
Flash: Built-in flash with GN 5 power (ISO 100/metres), 15mm (24mm equivalent) angle-of-output and E-TTL II exposure control. ISO standard hotshoe. Flash compensation up to +/-2.0 EV in 1/3 stop increments and FE lock. Auto, red-eye reduction, fill-in, first/second curtain sync and slow sync modes plus three manual power settings (Maximum, Medium, Minimum).
Viewfinder: Electronic type using OLED-type panel with 2.36 megadots resolution. Coverage = 100% vertical/horizontal. Magnification = 0.62x (35mm equivalent). Automatic/manual switching between the EVF and the LCD monitor screen. Eyepiece strength adjustment built-in. 8.1 cm LCD monitor with 1.62 megadots resolution, touch controls and tilt adjustments (including a full 180-degree turn with reversed image).
Additional Features: GRP bodyshell and chassis, auto exposure bracketing (up to +/-2.0 EV over three frames), depth-of-field preview, AE lock, programmable self-timer (one to 30 second delays, one to ten shots), audible signals, economy mode, wired remote triggering, five custom functions, wireless remote control (via WiFi and camera app).

DIGITAL SECTION

Sensor: 25.8 million pixels CMOS with 22.3x14.9 mm area and 3:2 aspect ratio. Sensitivity equivalent to ISO 100-25,600.
Focal Length Increase: 1.6x.
Formats/Resolution: Two JPEG compression settings plus RAW lossless compression. Four resolution settings at 3:2 aspect ratio; 6000x4000, 3984x2656, 2976x1984 or 2400x1600 pixels.Four resolution settings at 4:3 aspect ratio; 5328x4000, 3552x2664, 2656x1992, or 2112x1600 pixels. Four resolution settings at 16:9 aspect ratio; 6000x3368, 3984x2240, 2976x1680 or 2400x1344 pixels. Four resolution settings at 1:1 aspect ratio; 4000x4000, 2656x2656, 1984x1984 or 1600x1600 pixels. RAW images are captured at 6000x4000 pixels with 42-bit RGB colour. RAW+JPEG capture is possible.
Video Recording: Full HD = 1920x1080 pixels at 50 or 25 fps (progressive scan) and 16:9 aspect ratio. HD = 1280x720 pixels at 50 fps and 16:9 aspect ratio. MP4 format with MPEG 4 AVC/H .264 compression. Stereo sound recording with auto/manual level control with attenuator and wind filter. Stereo microphone input provided. Clip duration limited to 29 minutes and 59 seconds, but a new file is automatically started every time the 4.0 GB file size limit is reached.
Video Features: In-camera electronic image stabilisation with five-axis correction when combined with lens OIS, time-lapse movie recording.
Recording Media: SD/SDHC/SDXC memory cards with UHS-I support.
Burst Rate: Up to 26 frames at 9.0 fps in JPEG/large/fine mode, up to 17 frames in RAW mode (with UHS-I speed memory cards).
White Balance: Auto/manual with six presets and one custom setting, white balance correction (plus/minus nine levels; blue-amber and/or green-magenta bias) and manual colour temperature setting (2500-10,000 degrees Kelvin).
Interfaces: USB 2.0/AV, micro HDMI (Type D), 3.5 mm stereo audio input.
Additional Digital Features: Built-in sensor cleaning, 'Touch Shutter' control, 'Touch AF' controls, 'Exposure Simulation' preview, real-time luminance/RGB histogram displays, sRGB or Adobe RGB colour spaces, eight 'Creative Filters' effects applied at capture (Grainy B&W, Soft Focus, Fish-Eye, Art Bold, Water Painting, Toy Camera, Miniature and multi-shot HDR capture), HDR capture effects (Natural, Art Standard, Art Vivid, Art Bold and Art Embossed), eight 'Picture Style' presets (Auto, Standard, Portrait, Landscape, Fine Detail, Neutral, Faithful and Monochrome), three user-definable 'Picture Styles', adjustable 'Picture Style' parameters (Sharpness – Strength, Fineness and Threshold; Contrast, Saturation and Colour Tone), B&W contrast filter effects (Yellow, Orange, Red and Green), B&W toning effects (Sepia, Blue, Purple and Green), long exposure noise reduction (Auto, On, Off), high ISO noise reduction (Off, Standard, Low, High, Multi Shot), anti-flicker, 'Highlight Tone Priority' processing for dynamic range expansion (Off, On), 'Auto Lighting Optimiser' processing for exposure/contrast correction (Off, Low, Standard, Strong), in-camera lens corrections (Peripheral Illumination, Chromatic Abberationand Diffraction – stored data for 30 lenses), grid displays (choice of three), dual-axis electronic level display, 'Quick Menu' control screen (with touch control), 'My Menu' set-up, seven 'Creative Filters' effects applied post-capture (Grainy B&W, Soft Focus, Fish-Eye, Art Bold, Water Painting, Toy Camera and Miniature), in-camera editing (Cropping, Red-Eye Correction, RAW-to-JPEG conversion, Print Settings and Photobook Setup), replay functions (Transition Effect, Index Effect, Scroll Display, Highlight Alert, AF Point Display and Playback Grid), auto image rotation, 6/12/42/110 thumbnail displays, zoom playback (2.0x to 10x), copyright information, , slide show (with adjustable image display time and transition effects), image rating (one to five stars), auto power-off (adjustable duration), built-in WiFi with NFC connectivity and low-energy Bluetooth Smart technology, PictBridge and DPOF compliant.
Power: One rechargeable 7.2 volt 1040 mAh lithium-ion battery pack (LP-E17 type).
Dimensions (WxHxD): body only = 115.6x89.2x60.6 mm.
Weight: body only = 380 grams (without battery pack or memory card).
Price: $1599 body only. $1699 with EF-M 15-45mm f3.5-6.3 IS STM zoom lens, $2199 with EF-M 18-150mm f3.5-6.3 IS STM. Estimated average street prices.
Distributor: Canon Australia Pty Ltd, telephone 1800 021 167 or visit www.canon.com.au

THE RAW DEAL

CONVERT RAW FILES LIKE A PRO

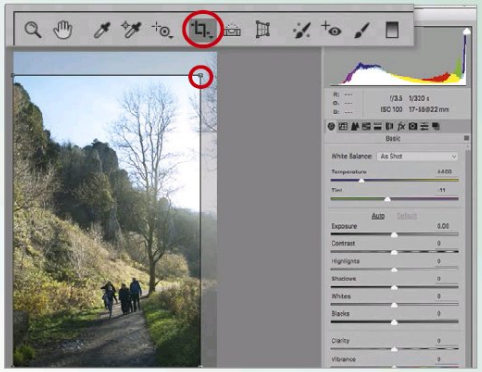
In the first of a new series of articles, Jon Adams explains how you can nail your RAW workflow in Photoshop CC and maximise the quality of every shot you take.

Making great RAW conversions is an essential photography skill to master. It acts as a kind of bridge between taking a shot and carrying out more involved enhancements. And since the controls on offer in a package like Adobe Camera Raw or Lightroom are so comprehensive, it's often the only step you need to turn your pictures into winners.

RAW is a special kind of unprocessed file format that outputs the image directly from your camera's sensor. All cameras shoot RAW files to begin with, but most lower-end models like compacts and smartphones then apply in-camera processing to 'fix' variables like colour, contrast and sharpening to produce a JPEG. While this may be quick and convenient, these variables are the fundamental building blocks that determine how your image looks so, if quality is your aim, it makes far more sense for you to control these parameters and make all the decisions yourself.

If you don't, you're relying on the default presets created by engineers in a camera factory, and they don't know what you want from your image. D-SLRs, mirrorless cameras and higher-end compacts allow you to choose RAW as the capture format, and then make these important adjustments in specialist RAW software. It's a slower process than accepting whatever your camera spits out, but it's easy to do and makes a huge difference to the quality of your images.

Establishing a RAW workflow is a great way to streamline the process, so read on to see how, then follow our step-by-step with your own pictures.

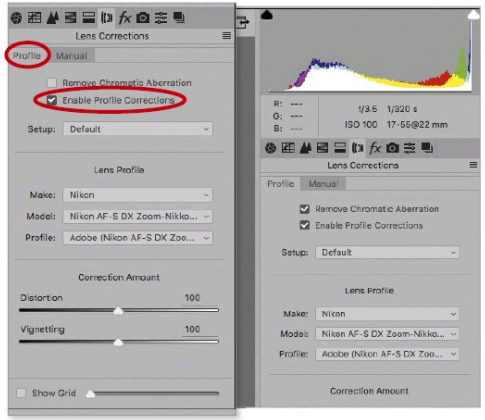


STEP 1

Crop The Image To Improve Composition

Open a backlit scenic shot into Photoshop CC. Use a RAW file (CR2 for Canon, NEF for Nikon, RAF for Fujifilm, and ORF for Olympus) and it will launch the Adobe Camera Raw interface.

When it's on screen, if your image is on its side, hit 'L' or 'R' to rotate the image 90 degrees and get it the right way up. Now select the 'Crop' tool, and hold down the mouse on the icon until the dropdown menu appears. Select the 2 to 3 option to keep your image in the same proportion as the original. Drag the crop over the image to trim off any excess around the perimeter, then double-click inside the bounding box to see the cropped version. Nothing has actually happened to your original RAW – if you want to revert, just click on the 'Crop' tool at any time and hit the 'Esc' key to get back to the uncropped frame.

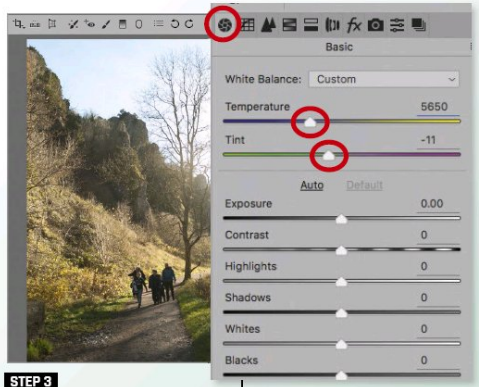


STEP 2

Apply Lens Corrections

Click on the 'Lens Corrections' tab and, under the 'Profile sub-tab, tick 'Enable Lens Corrections'. Your lens will usually be detected from the database of optics and load automatically, but if it doesn't, select the 'Make' and 'Model' from the boxes below. This will correct any distortion and remove vignetting (darkening at the corners of the image) caused by the optics.

Now tick 'Remove Chromatic Aberrations'. Doing this will automatically minimise any coloured fringing on high-contrast edges. Performing this bit of 'housekeeping' early in the process will ensure that any subsequent changes are being made to a corrected image.

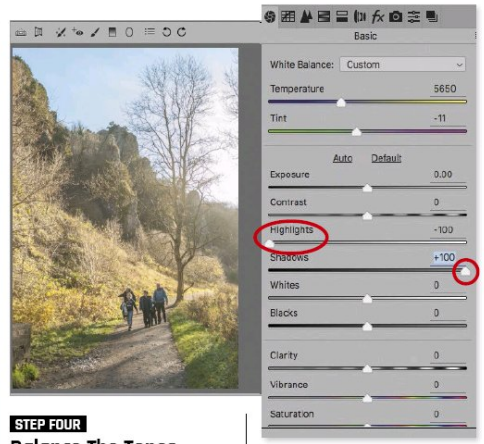


STEP 3

Set The Overall Colour Palette

With the lens corrections made, click on the 'Basic' tab and adjust the colour temperature. Because white balance is a floating value in a RAW file, you can change it, so your colours are not fixed at the value set on the camera.

Click on the 'White Balance' dropdown menu, and pick the appropriate preset for your shot, such as 'Daylight'. Below this, the 'Temperature' slider lets you fine-tune the setting. Moving it left will cool down the image – i.e. make it more blue – and moving it right will warm it up –make it more amber. On our example image here, we've set it to 5650, adding extra warmth. The 'Tint' slider allows you to shift the colour towards green or magenta. Most scenes will require a neutral value between -15 and +15.

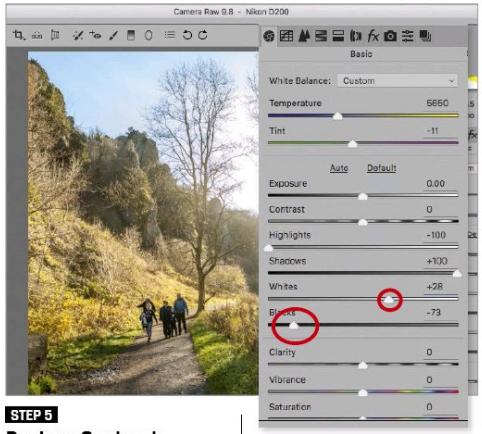


STEP FOUR

Balance The Tones

RAW files are quite 'flat' tonally, and straight out the camera they usually look less refined than JPEGs. But there's loads of detail hiding within and to start revealing it, you can expand the tonal range. To do this, compress the brightest tones by moving the 'Highlights' slider to the left (we've opted for the maximum value of -100 here) and expand the darker tones by boosting the 'Shadows' to the right (again we've maxed out with a setting of +100).

The image will show much more detail across the tonal range, but with such big changes, it will also look a little muddy and washed-out with a lack of contrast.



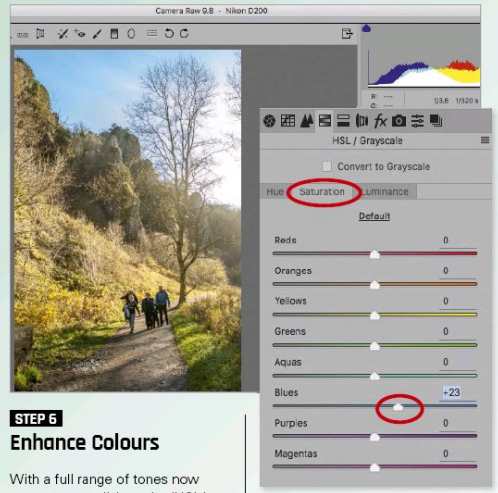
STEP 5

Restore Contrast

To re-introduce contrast, hold down the 'Alt' key and move the 'Blacks' slider to the left. In this Mask view, you'll see the point at which true black is restored. This will fill in the bottom end of the tonal range, and add bite to the image.

On the example image, we've used a setting of -73, but on your own images, stop once you see black start to appear on the Mask. These black areas are pure black and have no detail, so don't let them overpower the image.

Now hold down 'Alt' again and move the 'Whites' slider to the right until you see the brightest areas start to clip. On our example image, a 'Whites setting' of +28 has been used.

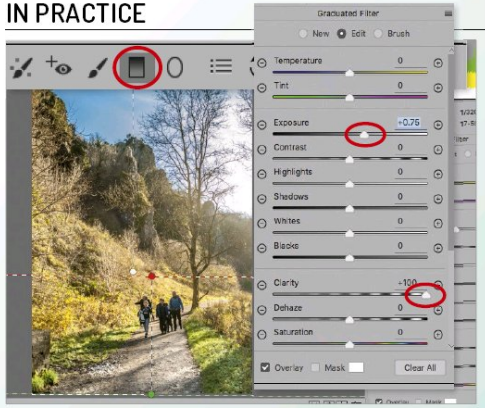


STEP 6

Enhance Colours

With a full range of tones now present, now click on the 'HSL/ Grayscale' tab. Next click on the 'Luminance' sub-tab and you can change how bright or dark the individual colours appear. Which ones you adjust will depend on your picture, but we've reduced Blues to -34 to darken the sky.

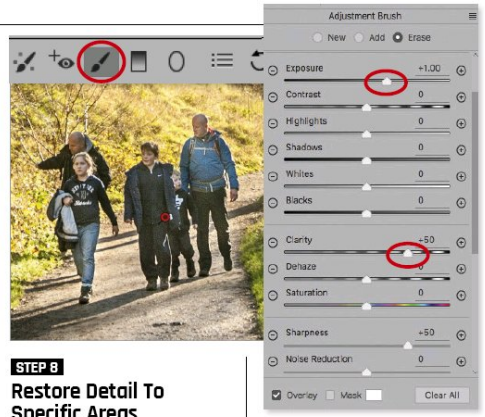
Once you've adjusted the brightness of the individual colours, click on the 'Saturation' sub-tab and you can increase or reduce their intensity. Here, we pushed Blues to +23 to add more punch to the sky.



STEP 7

Add A Grad (Or Two!)

Select the 'Graduated Filter' tool and, in the control panel, set 'Exposure' to -0.50 using the plus or minus buttons alongside the slider (doing it this way will zero all the other sliders). Now increase the 'Clarity' slider to boost definition. Use an aggressive setting of +100, and click-and-drag from the top of the screen to pull down a grad to about the halfway point. You'll see the sky get even richer. If the effect is too strong, reduce Clarity to suit your image. Now pull up another grad from the bottom to around the halfway mark. Once you've done this, increase 'Exposure' to brighten the foreground (we've used +0.75 here) and adjust 'Clarity' to add a little extra definition. If you find the 'Graduated Filter' lines distracting, you can switch them off by unticking the 'Show Overlay' box at the bottom.

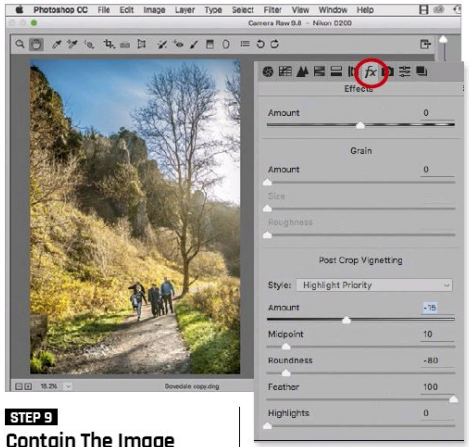


STEP 8

Restore Detail To Specific Areas

The image is coming together well, but one of the key points of interest – the walkers – are still underexposed. To brighten them, zoom in tight with 'Ctrl+Plus' and then select the 'Adjustment Brush' tool. Click the plus icon alongside the 'Exposure' slider until it reads +1.00. Again, this method will zero the other sliders. Now drag 'Clarity' to +50 and 'Sharpness' to +50. At the bottom, set 'Feather' to 100 then paint over the figures, adjusting brush size with the square brackets keys as you paint. If you spill over the edge, click on 'Erase' at the top of the control panel and use a small brush to remove any overexposed areas around them.

Tick 'Mask' at the bottom, and you can see where your adjustment is applied. Click on the 'Hand' tool to exit the 'Adjustment Brush', then hit 'Ctrl+0' (zero) to see the full image.

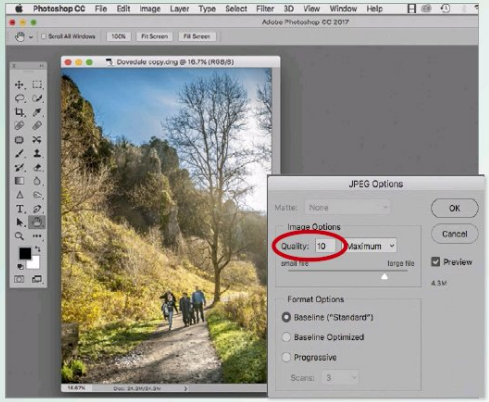


STEP 9

Contain The Image With A Vignette

An option you might like to try is adding a little vignetting. A slight darkening around the edges helps to 'hem in' a picture and direct attention towards the centre.

To do this, click on the 'Effects' (fx) tab and, for a subtle vignette, set the 'Amount' to -15, the 'Midpoint' to 10, 'Roundness' to -80, 'Feather' to 100, and 'Highlights' to 0. To see the picture with/without the vignette effect, just move the 'Amount' slider between -15 and 0. On some images, a brighter vignette can work too. If you want a brighter vignette, move the 'Amount' slider to a positive value.



STEP 10

Open and Save Your Image

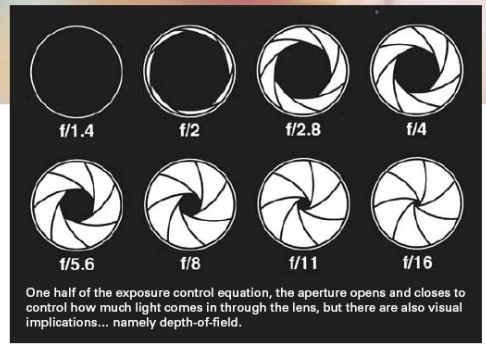
The RAW conversion is now complete. If you click on 'Done', all the adjustments you've made will be saved in a separate sidecar file called an XMP. This is a data file that applies all the settings you've used so, although your original RAW file remains exactly as it was, it will display the changes the next time you open it.

To convert the file into a regular image format like a JPEG, click on 'Open Image' to load it into the regular interface of Photoshop. Then go to 'File > Save As', and use the format of your choice. If you opt for JPEG, use 'Level 10' to get the best trade-off between file size and image quality.

WHY YOU NEED TO KNOW ABOUT DEPTH-OF-FIELD

BY PAUL BURROWS

Modern cameras are jammed solid with automatic functions, but the real creative control comes when you switch to manual and take the decision-making into your own hands. Understanding depth-of-field is the key to unlocking selective focusing as a powerful creative tool.



One half of the exposure control equation, the aperture opens and closes to control how much light comes in through the lens, but there are also visual implications... namely depth-of-field.

While we've never had it better when it comes to cameras that simplify the technicalities of photography – all those special effects and digital filters, for example – but if you really want to be in control of the end result... well, you have to take control. Modern digital cameras retain a full suite of manual controls and, if you're still flying on auto pilot, you'll be amazed what you can achieve with them. It's really not as difficult as it might look and, once you're more involved with the picture-making process, you'll also be surprised at how much more enjoyable and rewarding your photography will become.

Depth-of-field is often perceived as the photographic technicality that causes the most confusion and looks the most difficult to comprehend, but once you grasp the basic principle, it's actually not all that mysterious and certainly very useful in all areas of photography. Importantly, depth-of-field may be one of photography's key technical considerations, but it also has many creative implications.

Starting With F-Stops

Depth-of-field is the area of an image that's sharply rendered from the foreground to the background or, more simply, the front to back depth of sharpness. Depth-of-field is affected by a number of factors which are all lens-related, starting with the aperture settings.

The aperture mechanism in a lens (also called the 'diaphragm') creates an opening which varies in size, thereby allowing progressively more – or less – light to pass through and reach the sensor. Along with the shutter speed, the aperture setting is how an exposure is controlled. The size of the aperture is expressed as an 'f-stop' which is written as the letter 'f' followed by a number. These numbers are determined by a simple equation; the focal length of the lens divided by the diameter of the aperture. You don't really need to know this because f-stops are always marked on the lens or shown in the camera's read-out displays, but it will help you understand why aperture f-stops are numbered in the opposite way to what would seem logical – the larger apertures have smaller f-numbers.

Typically, a modern lens has an aperture range from f2.8 – its largest or widest diameter opening – to f22, its smallest aperture. However, some lenses, may have a larger maximum aperture – say f2.0, even f1.4 – and some may have a smaller minimum aperture of f32. Zoom lenses may have a variable maximum aperture which is related to its focal or zooming range - such as f3.5-5.6 – but some zooms are constant-aperture which means there's no variation in an aperture setting across the zooming range.

Visual Effects

As noted previously, the aperture has an effect on sharpness so you can increase the depth-of-field by using a smaller setting (for example, f16 or f22) or decrease it by using a larger aperture (say f2.8 or even f1.4).

Obviously, this requires manual setting of the aperture, either in the aperture-priority auto exposure control mode – in which case the camera will automatically set the shutter speed needed to ensure a correct exposure – or in the fully manual mode.

Controlling the depth-of-field in this way has visual implications. A shallow depth-of-field is desirable if you want to throw the background out of focus so it doesn't create any distractions or conflict with the main subject in your picture. Alternatively, longer depth-of-field may be required if you want details in both the foreground and background to be in sharp focus such as may be required in landscape photography where both the details in the foreground and background are important.

A very shallow depth-of-field allows for selective focusing so the viewer's eye is only drawn to the very small area of the image that's sharp. This can be a compelling way of telling a story, particularly if the lens's design gives a nicely progressive fall-off in sharpness. A very fast prime – or fixed focal length lenses – with a maximum aperture of f1.0 or even f0.95, will reduce the depth-of-field to a mere sliver when shooting at these settings, giving the potential to create very dramatic visual effects contrasting the sharp with the blurred.

Depth-of-field is also affected by the focal length of the lens. Wide-angle lenses (which have a short focal length, typically in the range of 14mm to 28mm in 35mm format terms) have an inherently greater depth-of-field — at any given f-stop — than telephoto lenses (which typically have a focal length of 200mm to 600mm). Depth-of-field also decreases as the camera-to-subject distance decreases so with macro photography – where sharpness can be very important – it's often a challenge to obtain a wide enough depth-of-field.

Dealing With Exposure

Because changing the aperture also has an effect on exposure, it may not always be possible to just select a larger or smaller setting without making other corrections. In very bright conditions, opening up the aperture may result in overexposure even when using a very fast shutter speed such as 1/4000 or 1/8000 second. In this situation, a neutral density (ND) filter may be needed on the lens to help reduce the amount of light reaching the sensor by another means. These days ND filters are available in a variety of 'strengths' – some are even adjustable – reducing an exposure by as much as ten stops or more.

The alternative problem is the risk of underexposure if you're shooting in lower light conditions and still want to use a small aperture setting to maximise the depth-of-field. There is, of course, a limit to how much you can slow down the shutter speed – as a way of letting more light into the camera to compensate – before camera shake becomes an issue and you'll need to use a tripod. However, with in-camera image stabilisation systems becoming more effective – some now give up to five stops of correction – you may still be able to shoot hand-held in some situations.

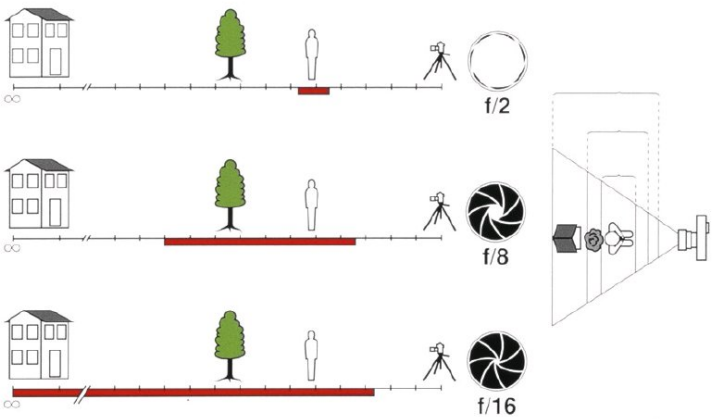
Alternatively, you can increase the sensitivity or ISO setting as a way of increasing the exposure, but noise may become a problem at settings of ISO 1600 or above. If you want very fine details to still be crisply reproduced, you may still have to resort to using a tripod to eliminate any risk of softening caused by the noise reduction process (or blur caused by camera shake).

Another option is to add more light and one of the benefits of digital capture is that this doesn't necessary have to be via using electronic flash. Small to mid-sized LED-type continuous

> "Modern digital cameras retain a full suite of manual controls and, if you're still flying on auto pilot, you'll be amazed what you can achieve with them."

Here you can see the difference in visual terms with the same subject, focal length and focusing distance, but an aperture of f2.0 on the left and f22 on the right. Zeiss 50mm f1.2 Makro-Planar ZF.2 lens on a Nikon D600.

The depth-of-field decreases at longer focal lengths. Here is a comparison between the same image captured at f1.4 on the left and f16 on the right. AF-S Nikkor 105mm f1.4E ED on a Nikon D3.



In this diagram, the red line beneath the distance scale shows how the depth-of-field changes at different aperture settings – wide-open at f2.0, at f8.0 in the middle, and at f16. In other words, the depth-of-field increases as the aperture gets smaller.

Ultra-fast lenses deliver a very, very shallow depth-of-field at their maximum aperture which, here, is f0.95. Voigtländer 10.5mm f0.95 Nokton MFT on a Panasonic Lumix G7.

light sources can be used very effectively, especially for macro work, although the challenge is to make your artificial lighting look as natural as possible.

But Wait, There's More...

Let's talk about the hyperfocal distance. Aaargh! The what? Don't panic, the hyperfocal distance is actually quite an easy concept to grasp and it will help you make the most of the depth-of-field available with a particular lens focal length and aperture setting. To get the idea, think of the depth-of-field as a fixed length, say a ruler for example. However, it doesn't have to stay in a fixed position, you can move it forwards or backwards to alter which parts of the subject or scene are in focus. When you focus on a point, roughly one-third of the available depth-of-field extends in front of that point and the remaining two-thirds extends behind it. If you're focusing at or near infinity – the longest distance setting on any lens – that two-thirds of the depth-of-field behind the focusing point is effectively wasted while the nearer parts of the foreground will be out-of-focus.

The trick here is to instead focus on a nearer point – i.e. in front of your main subject – so the depth-of-field effectively shifts forwards to include more of the foreground, but without losing any sharpness in the background up to infinity.

How do you determine the focusing point which will give you this greatest depth-of-field and which is, incidentally, the hyperfocal distance? Inevitably, there's an equation, but applying this in the field isn't really practical, especially if you're not so hot at maths. In the 'olden' days when lenses all had depth-of-field scales – for a selection of aperture settings – marked above the focusing control collar, you simply adjusted the focusing forward until the infinity symbol was positioned over the appropriate f-stop marking in the scale (rather than at the central focusing index mark). Some modern lenses still have depth-of-field scales, but many zooms, in particular, don't. Fortunately, there's a sure-fire way you can determine the hyperfocal distance in the field. First find the nearest point in the foreground that you want to be sharp and estimate its distance from the camera… or simply focus on it and check the distance setting on the lens. Doubling this distance will then give you the hyperfocal distance as the rule at play here is that everything from half the hyperfocal distance to infinity will be sharp… at a given focal length and aperture, of course. So, for example, if that nearest point is 2.5 metres from the camera, the hyperfocal distance is five metres and focusing at this distance will give you all the depth-of-field you need (i.e. from 2.5 metres to at or near infinity). As before, you'll have more depth-of-field to play around with in the foreground when using a wider-angle lens and/or a smaller aperture setting.

A digital camera provides a back-up, of course, as you can immediately check the image – using the magnifying function – to determine whether everything you want to be sharp, especially in the foreground, actually is. Alternatively, you could also use this method to help determine the hyperfocal distance. Focus on something at or near the background of your scene and take a shot. Magnify the image in the monitor screen and move the enlarged view slowly from the background to the foreground of the scene while checking the sharpness… the point at which the foreground becomes out-of-focus is the hyperfocal distance. While the camera will almost certainly perform some sharpening of JPEGs – and hence the on-screen image – you should still be able to see when details become out-of-focus. And you can always experiment by taking a few images with the hyperfocal distance moved a little closer and/or further away.

It's advisable to use manual focus in these situations, but you can use autofocusing provided it's set up to allow the precise selection of a particular focusing point and its active area provides sufficient coverage of the scene or subject.

No Cost, Plenty Of Benefit

So, depth-of-field isn't really scary at all, but a really useful weapon when you need to take charge of what's in focus in a picture or – perhaps more importantly – what's not. As such it's not only technically important, but has many creative implications. Using the principle of the hyperfocal distance simply extends the scope of what's possible when maximising the depth-of-field available at a particular lens focal length and aperture setting.

What's more it's a control that's right at your fingertips, ready to be exploited at no extra cost, but with the potential to greatly enhance your photography.

The depth-of-field scale on the PC Nikkor 19mm f4.0E ED perspective control lens. This scale allows you to quickly see what the depth-of-field is at f8.0, f16, f22 and f32 – it's easy to see it increasing with the smaller apertures – in relation to focusing distance scale. The D-of-F scale is also very handy for determining the hyperfocal distance in order to maximise the zone of sharpness. Of course, a PC lens is designed to maximise sharpness via its tilt/swing adjustments, but that's another story.

Instant photography – the film sort, that is – simply refuses to die and now even Leica is getting involved. Perhaps the attraction can be found in the reason it all got started in the first place.

Paul Burrows documents the story of Polaroid and the invention which has long outlived the original company

NOWTHAT WE'RE DEEP INTO the era of digital imaging, there's lots of nostalgia surrounding film, including the delay between when a picture was taken and when the actual result could be viewed. Digital capture's instant gratification has given the waiting time between exposure and processing something of a romantic association – the frisson of anticipation regarding success or failure – but in truth, we've always really wanted to see our images straightaway. And this is what drove the development of Polaroid 'instant photography'.

The initial impetus came during a family's Christmas vacation in Santa Fe, New Mexico, in 1943. Born in 1909, Edwin Land was an American scientist who studied both chemistry and physics, and who, by the 1940s had already turned an inventive mind – and a talent for problem solving – into a successful company called the Polaroid Corporation.

After taking a few holiday snapshots of his three-year-old daughter, Jennifer, she asked him why she had to wait before she could see the pictures. The seed was sown and, over the next few hours, Land started devising how a self-processing photographic material could possibly work. He pretty well got the theory right then and there, but he later confessed that it took the next 30 years to solve all of the practical problems, particularly in terms of creating colour prints. Nevertheless, just three months after the first flash of inspiration, Edwin Land exposed and developed a prototype instant photograph which was subsequently transferred onto a transparent plastic sheet. Incidentally, Land is often given the title 'Dr', but never formally achieved this qualification – in fact, he didn't complete any university studies – although he subsequently received many honorary degrees during his lifetime, including from Harvard, Yale and Columbia.

'The Goo'

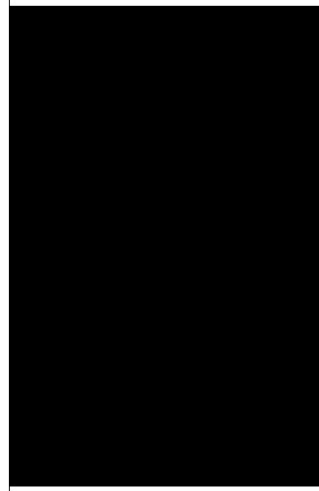
Experiments with instant photography had been performed before Edwin Land tackled the challenge, but the major difficulty had always been how to apply the developer to the film. Consequently, he tackled this problem first, initially devising a primitive foil pouch which would be crushed by rollers in the camera to release the developer.

He also worked on the consistency of the substance and the first trials of the concept used a simulated base made from mayonnaise and egg nog.

From earlier experience with the manufacture of a synthetic sheet polariser, Land knew that if a substance was applied to a surface in a highly viscous, jelly-like form rather than as a liquid, it was possible to obtain a very clean and even coating.

The instant processing reagent was affectionately nicknamed 'the goo', and was a highly complex brew of powerful chemicals, including a rapid-acting developing agent and a photographic fixer (or silver solvent). The same basic concept is still at the heart of instant print photography which, thanks to Fujifilm's Instax system, continues to be popular… and most notably with children who still want to see their pictures immediately after taking them. In addition to the Fujifilm Instax products, a range of recreated Polaroid instant films are available via The Impossible Project, an organisation of enthusiasts who, in 2008, took over part of an old Polaroid production facility in Enschede, The Netherlands. Here they began the long and difficult task of designing selected Polaroid films from scratch as the patents were unavailable, as well as refurbishing compatible cameras and, subsequently, developing an all new camera.

After the demise of the original company in 2001 (and its successor in 2008), the Polaroid brand is currently licensed and used on a range of digital imaging products, including "digital instant" cameras which use a contemporary version of the instant print film based on 'Zero Ink Printing Technology' (ZINK for short). ZINK prints employ heat-sensitive colour dyes in layers and, interestingly, the technology's development actually began at the original Polaroid Corporation in the late 1990s.



Edwin Land photographed in 1946 outside his laboratory in Cambridge, Massachusetts. The original print was made using one of the experimental self-developing films he was working on at the time.

Finding Solutions

But let's go right back to the very beginning. In 1926, as a freshman student at Harvard University, Edwin Herbert Land

The Polaroid system attracted plenty of attention from both news magazines (left) and the photo press. Note the dramatic "Bombshell In Photography" headline.

began studying the nature of light polarisation and the materials that polarise light. As a child, he'd always been fascinated by light and, as young as 13, he started working on a solution to the problems caused by the glare of vehicle headlights.

With street lighting still poor or non-existent across America, dazzling headlights were the cause of many car accidents in the mid-1920s and Land set out to find a way of reducing the glare using the principles of light polarisation. He began experimenting with a material called herapathite, a crystalline substance made of iodine and quinine – discovered in the nineteenth century – which only passed light waves travelling in one plane and filtered out those travelling along any other. If two such crystals were superimposed perpendicularly to each other, all light was blocked from passing through. However, the problem with herapathite was that it wasn't possible to grow the crystals any longer than about three millimetres which was too small to be of any use. Edwin Land's solution illustrates his capacity for lateral thought. He worked out that a better approach was to use very much smaller crystals – in fact, several billion of them per square centimetre – and then coat them in a thin layer on to a transparent sheet. He also found that the best way to obtain an even dispersion of the sub-microscopic crystals was to suspend them in a thick jelly-like substance which was then applied to the sheet... the same principle subsequently applied to his instant film processing reagent.

This breakthrough enabled Edwin Land to make the world's first synthetic sheet polariser, a product with a myriad of applications including windows and, of course, sunglasses. This commercial potential attracted a group of high-powered venture capitalists who provided the finance for the establishment of the Polaroid Corporation in September 1937.

The Challenge

When Land began work on an instant – the term used at the time was *rapid access* – photography system in late 1943, he set himself a tough set of objectives. For ease-of-use, the system had to be dry and work in a wide variety of temperatures, the film had to be sufficiently sensitive for use without supplementary light, the images had to have the same resolution and sharpness as conventionally-produced prints, the finished prints also had to be as archivally stable and, finally, the whole process had to be completed quickly enough to be a desirable alternative to conventional photography.

The project was divided into three key elements; the negative, the developing chemicals and the positive image receiver sheet. Initially, commercially-available B&W negative film was used and the really ingenious component of Land's system was the processing pouch or pod described earlier.

Not only did the sealed pod permit 'dry' processing, it eliminated any oxidation and so allowed the use of more concentrated chemicals which enhanced the efficiency of the film and so gave the necessary 'speed'.

To create the image receiver, Land again applied his experience derived from creating the polariser sheet and devised a positive emulsion employing billions of microscopic crystals which formed catalytic areas called 'galaxies'. Dissolved and unexposed silver grains from the negative are attracted to these microcrystal galaxies which incorporate metal salts to cause a chemical reduction and give black image silver. The incredibly small size of each image 'building block' resulted in excellent sharpness and resolution, a good tonal range and high efficiency for a given ISO.

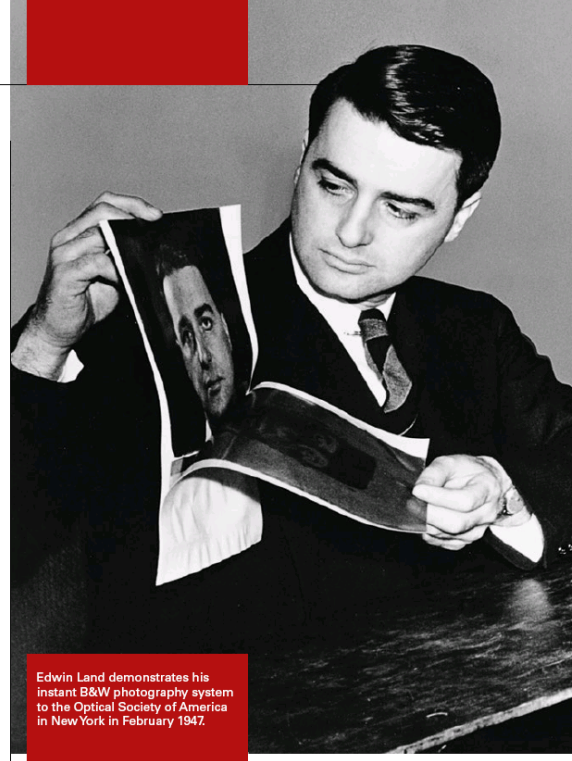
Instant Success

The first Polaroid Land camera, called the Model 95, went on sale on 28 November 1948 and cost as much as a good weekly wage, but this didn't stop it selling as fast as the company could make them.

A special negative film – ironically manufactured by Kodak – was married to rolls of die-cut receiving sheets with a pod of processing reagent attached to the leading edge of each print. After an exposure was made, the positive-negative sandwich was pulled from the camera and passed through rollers which ruptured the pod and spread the 'the goo' between the two sheets. Sixty seconds or so later they were peeled apart to reveal a B&W print with a brownish tone which required coating with plasticiser to prevent fading.

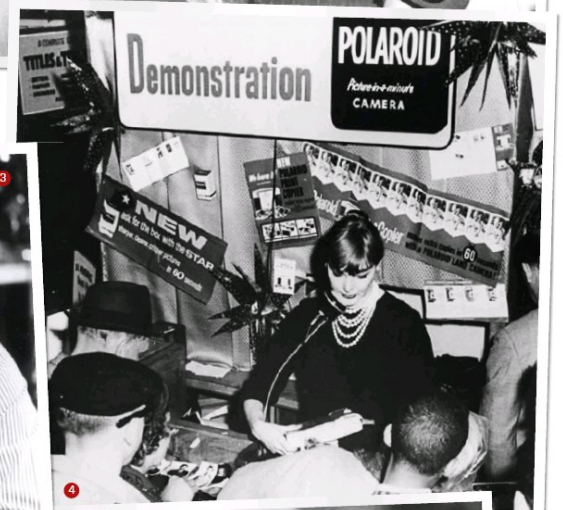
Subsequent refinements gave neutral black and white tones, coating-free films, processing as fast as ten seconds, ISO 3000 sensitivity, negative-plus-positive materials and 'self-contained' peel-apart sheets. However, Edwin Land's next major goal was instant colour photography, a challenge which involved devising a one-step process to replace the 22 steps (then) involved in processing and printing a conventional colour negative film. Again Land set some pretty ambitious objectives including a total process time of less than a minute, and the creation of a film that contained everything needed to deliver a dry, ready-to-handle colour print which didn't need either washing or coating.

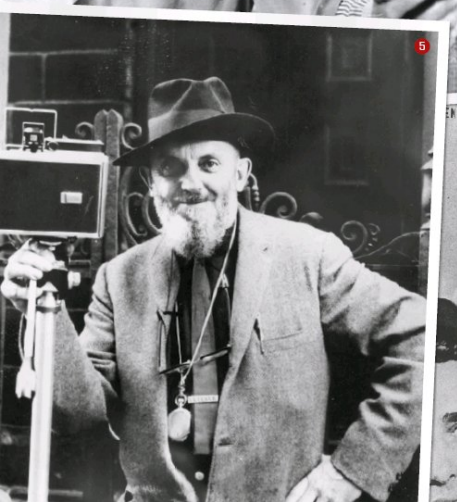
A top-secret laboratory, designated 'SX-70', was established to work on the 'Polacolor' project and it was



Edwin Land demonstrates his instant B&W photography system to the Optical Society of America in New York in February 1947.

"As a child, Edwin Land had always been fascinated by light and, as young as 13, he started working on a solution to the problems caused by the glare of vehicle headlights."





headed by a gifted chemist called Howie Rogers.

Initially, Land and Rogers experimented with the silver diffusion transfer (SDT) process – as used in the B&W Polaroid system – and an additive colour screen comprising extremely thin red, green and blue filter lines. This idea didn't work with SDT technology as the screen blocked out too much light, but it was still patented (in 1946) and later formed the basis of the Polachrome instant slide system introduced in the 1980s.

Attention then turned to the colour-coupler process which is the basis of conventional colour film and involves the transfer of coloured dyes. Land and Rogers considered the idea of placing already-formed dyes in the film (a development of the old Autochrome process), but the key issue was making these dyes move in a controlled way from the negative to the receiving sheet.

Rogers came up with a method of linking each dye molecule to a molecule of developer which could be used to control the final image. This was called the dye developer process and the grains of silver in the negative have a direct one-to-one correspondence with molecules of dye; and whether or not those silver grains were exposed determines precisely whether or not the corresponding molecules of dye (solubilised by the developing agent) will transfer to the print receiver.

In Polacolor negatives the pre-formed dyes were transferred, upon exposure, to a receiving sheet in a carefully controlled manner to form a full colour image in about 60 seconds.

1. Pictured in 1939, Polaroid scientist Bill O'Keefe holds two interlocking polarising discs. Finding a way of manufacturing synthetic polarising sheets – which actually had numerous applications – attracted a group of high-powered investors and Polaroid Corporation was established in 1937 with the resources to explore other projects.

2. Seeing is believing. The Polaroid camera was easy to sell because any demonstration was always convincing. Like to see a photo of yourself right now, madam?

3. TV ads for Polaroid in the late 1970s used actors James Garner and Mariette Hartley, shown here spruiking the colour OneStep. The OneStep was America's best-selling camera for four years.

4. The first Polaroid camera, the Model 95, went on sale in 1948 priced at US$89.75 which represented the weekly take-home pay of many Americans at the time. However, such was the immediate demand that stores quickly ran out of stock and even the demo and display models were sold.

5. Ansel Adams used Polaroid products extensively and also acted as a consultant for the company for many years. This 1959 photograph was taken by one of Land's assistants using a Type 47 Polaroid Land camera.

6. Polaroid was one of the earliest major advertisers on the new medium of television, recognising that instant photography was well suited to being demonstrated on a live broadcast. Steve Allen was one of the many celebrities who helped Polaroid market its products, and this promo photograph was taken in 1954.

The Ultimate Goal

It took 16 years to perfect one-step colour photography, but when Polaroid launched the SX-70 camera in 1972 it was truly revolutionary in both design and operation. The SX-70 was the world's first folding reflex-type camera, the first camera to incorporate a fully automatic exposure system and the first to have built-in electronic monitoring of its functions which prevented operation if something was wrong.

Additionally, it was the first instant camera to have automatic processing and print ejection rather than requiring manual extraction. Furthermore, SX-70 film was the first self-timing, daylight-developing, non-peel-apart instant photography material. It incorporated a multi-layered negative containing pre-formed imaging dyes, a sealed foiled pod containing the processing reagent, and the image-receiving layers. Because the processing 'goo' remained a permanent part of the print it included titanium dioxide pigment which provided a super-bright white background against which the final image was viewed. The highly alkaline reagent was neutralised by polymeric acid in the film's receiving and converted to water which evaporated to the outside of the print leaving a hard, dry and stable image.

The SX-70 camera was equally ingenious including a double-sided viewing/exposing mirror which gave a bright reflex viewfinder, but also allowed a folding design compact enough to fit into a handbag. To meet the camera's considerable power requirements, a flat-form battery was incorporated into each film pack. Just three millimetres thick and weighing 19 grams, this battery delivered a huge amount of power – the SX-70 motor required two amperes of current at six volts – for such a small package.

With the Polaroid SX-70 system, Edwin Land achieved his ultimate goal which had always been to provide "absolute one-step photography." The same basic principle is used in the subsequent 600-series, Spectra and Vision camera systems. In 1978 Polaroid introduced the Sonar Autofocus SX-70 which used ultrasonic sound waves to determine the subject distance and was, technically speaking, the world's first totally automatic camera capable of delivering a sharply focused and well-exposed image. Subsequent derivatives of the folding reflex design were the SLR 680 and the SLR 690, the latter released in 1998 to commemorate the 50th anniversary of the first Polaroid camera. Five years earlier, in 1993, Polaroid introduced an all-new system called Vision (or Captiva in some markets) which was again based on a folding reflex-type camera

Line-up of Polaroid cameras from the 1960s. As this image shows, these were all pretty high-end folder-type models and Polaroid didn't start making cheaper plastic cameras until the Model 20 (seen at the front of this group) in 1965. It originally sold for US$19.95.

"The first Polaroid Land camera, called the Model 95, went on sale on 28 November 1948 and cost as much as a good weekly wage, but this didn't stop it selling as fast as the company could make them."

and a self-developing colour film called Type 500. The imaging area was rectangular rather than square, a deliberate attempt to appeal to a market that was now dominated by the aspect ratio of 35mm film. The Vision cameras were quite advanced and, most notably, ejected the exposed print into a storage compartment in the camera where it developed while the user continued shooting, neatly solving the problem of what to do with multiple developing prints. The system was discontinued in 1997, but the Vision film was used in a variety of other products – including the novel PopShots disposable instant camera – until also being discontinued in 2005. All production equipment was subsequently destroyed so there was no chance for The Impossible Project to resurrect what would have likely now been a popular instant film line.

Nobody can accuse Polaroid of not trying to keep instant photography alive in the 35mm film era, and there was a steady stream of new products – many based on the Type 600 colour film which was derived from the SX-70 system – through the 1980s and 1990s designed to attract new users and re-inspire old ones.

A last-ditch effort came in 1999 with the new i-Zone system which downsized to a film format with an image area close to that of a 35mm frame and was used in a range of brightly coloured or patterned cameras.

Initially i-Zone was actually a massive success, particularly with younger buyers, and Polaroid exploited it with products such as adhesive-backed prints, but then as digital imaging took hold, the business dried up virtually overnight.

On the 50th anniversary of instant photography in 1998 Polaroid Corporation estimated that nearly 60 times every second somebody somewhere snapped a Polaroid print which represented around five million instant photos taken every day.

This was a huge business, but already the writing was on the wall and this was, in fact, actually the beginning of the end.

Polaroid continually worked to expand its instant photography range and in late 1983 there was an ambitious tilt at mainstream 35mm photography with the AutoProcess system which was derived from the earlier PolaVision instant movie film technology. B&W and colour transparency films were available and were developed using a dedicated processing pack in the hand-cranked AutoProcessor unit (a powered version came later). It was another clever idea which didn't quite deliver in the end, but the distinctive and muted 'look' of the colour film became popular with fine-art photographers.

An End... And A New Beginning

Like that other great American photo brand, Kodak, Polaroid wasn't completely blind to the potential impact that digital imaging could have on its film business, and through the 1990s was actively involved in various digital-based projects, including the ZINK thermal printing paper mentioned earlier.

The Polaroid PDC-2000, launched in 1996, was one of the first serious digital cameras (complete with interchangeable lenses and ultrasonic autofocus) and there were a number of Polaroid film scanners, but it wasn't enough to make up for the rapid decline in the instant photography business. In October 2001 Polaroid Corporation filed for bankruptcy protection in the USA and the company's assets were subsequently sold off. The new owners regrouped – and again operated as Polaroid Corporation – but the product planning and marketing strategies remained muddled, resulting in bankruptcy being declared in December 2008. There have been quite a number of corporate manoeuvres since then, but the current owners of the Polaroid brand have carved out an interesting niche in today's camera market, including contemporary interpretations of the instant print.

However, it's Fujifilm – a comparative latecomer, in 1981, to instant photography in the film days – which has established a successful business on a product which owes its origins to Polaroid's one-step self-developing colour print technology. Fujifilm's Instax – which is available in a variety of print sizes, including a just-released square format – created an unexpected revival in instant film photography thanks mainly to the sort of innovative and insightful marketing (plus product design) which could well have saved the original Polaroid. Instax cameras come in a dizzying variety of colours, shapes and styles, but importantly they're also supported by a huge selection of accessories which help enhance the whole experience. Ironically, there's an Instax model that's sold as a Polaroid camera. Instax Mini – the most popular product range – is simply i-Zone re-imagined.

In fact, Instax has been so successful globally, it's convinced Leica to launch its own cameras using the system and bearing the marque's legendary red dot logo... it's the ultimate accolade for instant photography and you'd have to think Edwin Land would have been impressed.

1. Promo picture for Polaroid Model 20 which became better known as 'The Swinger' because it was lightweight enough to be easily carried by the wrist strap. It was specifically targeted at female buyers, especially teenagers, and featured an automatic exposure control system which showed the words "NO" or "YES" in the viewfinder.

2. Polaroid's first colour camera, the SX-70 was launched in 1972 and introduced numerous innovations including sonar autofocusing. It was a folding SLR design which was extremely ingenious both mechanically and electronically.

3. Launched in 1986, the Spectra camera was designed to take Polaroid photography up-market again. The film was derived from the 600 Series (but with a larger image area), and the folding cameras – the top panel collapses – were much better built with more features (including a multiple exposure facility).

4. Limited edition Spectra Onyx (1987) had a transparent top panel to show off the inner workings. A fun collectible today and The Impossible Project currently makes Spectra-compatible colour film.

5. ProPack camera from 1993 returned to the glory days of classic Polaroid folders – although was largely plastic rather than metal – and was compatible with many of the peel-apart film products (ten types in all). A nice (and affordable) addition to any collection of Polaroid cameras.

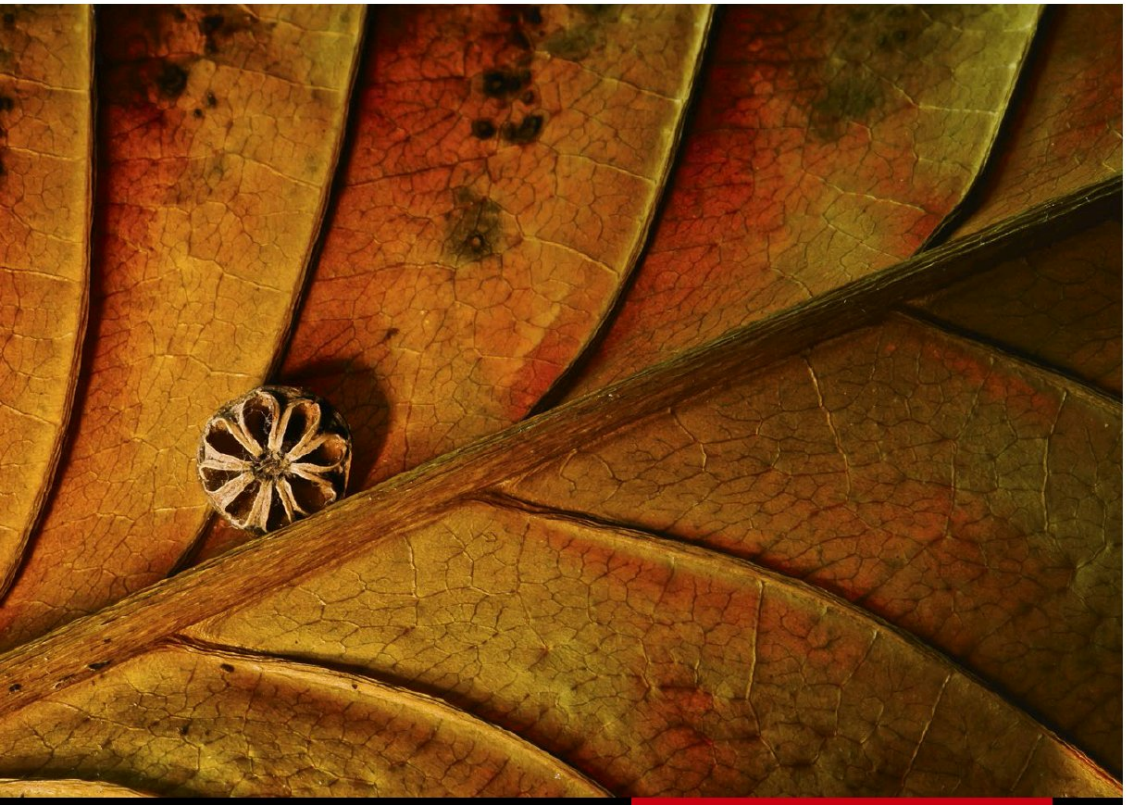
6. Launched in 1993, the Vision system (called Captiva in some markets) was close to the last throw of the dice for the original Polaroid, but the company was bankrupt. The camera was another complex folding reflex design and the Type 500 film (later used in the PopShots disposable camera, but discontinued in 2005) had a rectangular image area.

7. Derived from the SX-70, the SLR 690 was created to commemorate the 50 years of Polaroid instant photography from 1948 to 1998.

THE 2017 FUJIFILM SHOWCASE runs until 30 September 2017. Entries received after this date will be entered in the 2018 competition which starts with the November/December 2017 issue. You can enter the Fujifilm Showcase as many times as you like during the year, submitting up to four photographs each time.

Please make sure you provide all the necessary camera and film/capture details on the entry coupon (which can be copied if you don't want to cut up your magazine). All entries must be accompanied by a fully completed entry coupon.

Why not have a go? Not only can you win some great prizes, but it's also a chance to see one of your pictures in print. Read the accompanying rules carefully and get snapping.



WINNER

Great use of composition, colours and textures have combined to great effect in this highly graphic – and visually very compelling picture – by Chris Carter. Both the cropping and the location of the seed pod create a very well balanced arrangement of the key elements. Chris used a Sony A7 fitted with a 90mm macro lens.

DO YOU WANT TO WIN?

Fujifilm Australia generously supplies the prizes for each issue's successful entrants to the Showcase. The winner of a round wins a Fujifilm 32 GB SDHC memory card, the author of the Highly Commended image receives a Fujifilm 16 GB SDHC memory card and the Commended image wins its creator a Fujifilm 8.0 GB SD memory card. The grand prize for the 2017 competition will be announced shortly.

Note that it is not a requirement that entries to the Fujifilm Showcase be taken on Fujifilm camera equipment.

HIGHLY COMMENDED

This nicely spotted moment creates an image that at first intrigues and then amuses. Appropriately, photographer Paul Watson has titled it Behind The Scene. Paul used a Nikon Df fitted with a Sigma 24-105mm Art Series zoom.

COMMENDED

Sometimes the simplest compositions are the most effective. Here, as the highway heads off into the far distance, Ann Somerville-Charles has convincingly captured the vast openness of the Hay Plains in south-western NSW. Ann used an Olympus OM-D E-M1 fitted with an M.Zuiko Digital 12-50mm zoom lens.

ENTRY GUIDELINES FOR DIGITAL IMAGES

You can enter the Fujifilm Showcase by sending your images files on DVD or USB drive. Alternatively files can be sent directly via email to cameracomp@avhub.com.au The requirements for submitting digital files are as follows.

- 300 dpi resolution, and at a file size which enables a reproduction of up to 20x15 cm. Please avoid submitting overly large file sizes, especially when emailing the images. Up to 4.0 MB in file size is more than sufficient.
- Digital retouching and manipulation is permitted, but the judges will continue to reward good in-camera techniques.
- Full details of the camera, lens and any retouching must be supplied with the image. Images can be titled if you wish, but this isn't essential. Please make sure your DVDs or USB drives are marked with your name and address.
- Up to four images may be permitted per entry.

Please include a self-addressed and postage-paid envelope if you would like your disc or drive returned.

FUJIFILM SHOWCASE

Tell us how you did it! When you enter the Fujifilm Showcase, remember to explain any tips and techniques you used to achieve the result. Also, let us know the type of camera and film. You can also enter by email (see above).

1.TITLE	CAMERA	LENS
2.TITLE	CAMERA	LENS
3.TITLE	CAMERA	LENS
4.TITLE	CAMERA	LENS

NAME

ADDRESS

STATE POSTCODE TELEPHONE

☐ Please return entries. Self-addressed postage and packaging is included.

☐ I do not want my entries returned.

Post your entry to: Fujifilm Showcase, Camera Magazine, Locked Bag 5555, St Leonards, NSW 1590 (or email to *cameracomp@avhub.com.au* – see above for digital submission details).

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DIGITAL SLR CAMERAS BUYER'S CHECK LIST MARCH/APRIL 2017

THIS CHECKLIST is designed to allow direct comparisons between different camera models, here listed in price order within each brand. The published prices are mostly supplied by the distributors as recommended retail prices (RRPs). However, some distributors are no longer supplying RRPs to the media so it has become necessary to determine an 'estimated street price' derived from the range of prices for a model published by retailers. Where this has been necessary, the letter 'E' appears at the start of the entry.

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				Sensor Size			Sensor Type			File Formats			Memory Cards					Exposure Modes						Features												
	Model * single lens kit ** twin lens kit	Price (Body Only Unless Noted With Asterisk*)	Megapixels (Total)	35mm	APS/DX	Four Thirds	CCD	CMOS	Foveon	RAW	TIFF	JPEG	Compact Flash	Memory Stick	SD/SDHC/SDXC* = microSD	Continuous Shooting Speed (fps)	Burst Length (U=Unlimited) Max. Resolution	Autofocus Points	Metering Zones	Program	Subject Programs	Aperture Priority	Shutter Priority	Manual	Shutter Speeds	Built-In Flash	Anti-Dust	HD Video	Mirror Lock-Up	Anti-Shake In Body	Wireless Transmitter/WiFi	Live View	Weather Proofing	Monitor Size (cm)	Weight (Body Only)	Review Issue
E	Canon EOS 1300D*	$599	18.7		•			•		•		•			•	3	110	9	63	•	•	•	•	•	30-1/4000	•	•	•				•		7.62	440	
E	Canon EOS 100D*	$699	18.5		•			•		•		•			•	4	28	9	63	•	•	•	•		30-1/4000	•	•	•				•		7.62	370	Sept/Oct '13
E	Canon EOS 700D*	$799	18.5		•			•		•		•			•	5	22	9	63	•	•	•	•	•	30-1/4000	•	•	•				•	•	7.62	580	Jul/Aug '13
E	Canon EOS 750D*	$949	24.7		•			•		•		•	•		•	5	440	19	7560	•		•	•	•	30-1/4000		•	•			•	•		7.62	555	
E	Canon EOS 760D*	$1,299	24.7		•			•		•		•	•		•	5	940	19	7560	•		•	•	•	30-1/4000		•	•			•	•		7.62	565	
E	Canon EOS 70D*	$1,349	20.9		•			•		•		•	•		•	7	40	19	63	•		•	•	•	30-1/8000	•	•	•			•	•	•	7.62	670	Nov/Dec '13
E	Canon EOS 80D*	$1,799	25.8		•			•		•		•			•	7	110	45	7560	•	•	•	•	•	30-1/8000	•	•	•			•	•	•	7.62	730	Sept/Oct '16
E	Canon EOS 6D	$1,999	20.6	•				•		•		•			•	4.5	1250	11	63	•			•	•	30-1/4000		•	•			•	•	•	7.62	690	Mar/Apr '13
E	Canon EOS 7D Mark II	$2,099	20.9		•			•		•		•	•		•	10	U	65	252	•		•	•	•	30-1/8000	•	•	•			•	•	•	7.62	910	Jan/Feb '15
E	Canon EOS 5D Mark III	$3,349	23.4	•				•		•		•	•		•	6	65	61	63	•		•	•	•	30-1/8000		•	•			•	•	•	8.1	860	May/June '12
E	Canon EOS 5Ds	$4,749	53	•				•		•		•	•		•	5	510	61	105K	•		•	•	•	30-1/8000		•	•				•	•	8.1	845	Sept/Oct '15
E	Canon EOS 5DsR	$5,099	53	•				•		•		•	•		•	5	510	61	105K	•		•	•	•	30-1/8000		•	•				•	•	8.1	845	
	Canon EOS 5D Mark IV	$5,099	31.7	•				•		•		•	•		•	7	U	61	150K	•		•	•	•	30-1/8000		•	•	•		•	•	•	8.1	890	Jan/Feb '17
E	Canon EOS-1DX	$6,899	19.3	•				•		•		•	•		•	12	100	61	100K	•		•	•	•	30-1/8000		•	•			•	•	•	7.62	1340	Nov/Dec '12
E	Canon EOS-1DX Mark II	$8,899	21.5	•				•		•		•	•			14	U	61	360K	•		•	•	•	30-1/8000		•	•	•		•	•	•	8.1	1340	
E	Nikon D3300*	$599	24.7		•			•		•		•			•	5	100	11	420	•	•	•	•	•	30-1/4000	•	•	•				•		7.62	410	
	Nikon D3400*	$649	24.7		•			•		•		•			•	5	100	11	420	•	•	•	•	•	30-1/4000	•	•	•			•	•		7.62	395	
E	Nikon D5200*	$799	24.7		•			•		•		•			•	5	100	39	2016	•	•	•	•	•	30-1/4000	•	•	•			•	•		7.62	505	Jul/Aug '13
E	Nikon D5500*	$999	24.7		•			•		•		•			•	5	100	39	2106	•	•	•	•	•	30-1/4000	•	•	•			•	•		8.1	420	Sept/Oct '15
E	Nikon D5600*	$1,299	24.7		•			•		•		•			•	5	100	39	2106	•	•	•	•	•	30-1/4000	•	•	•			•	•		8.1	410	
E	Nikon D7100*	$1,349	24.7		•			•		•		•			•	6	33	51	2016	•	•	•	•	•	30-1/8000	•	•	•				•		8.1	675	Sept/Oct '13
E	Nikon D7200	$1,549	24.7		•			•		•		•			•	6	100	51	2016	•	•	•	•	•	30-1/8000	•	•	•			•	•	•	8.1	675	Jul/Aug '15
E	Nikon D610	$1,899	24.7	•				•		•		•			•	6	51	39	2016	•	•	•	•	•	30-1/8000	•	•	•				•	•	8.1	760	Mar/Apr '14
E	Nikon D750	$2,249	24.93	•				•		•		•			•	6.5	87	51	91K	•	•	•	•	•	30-1/4000	•	•	•			•	•	•	8.1	750	May/Jun '15
E	Nikon Df	$2,899	16.9	•				•		•	•	•			•	5.5	100	33	2016	•		•	•	•	30-1/4000		•					•	•	8.1	710	Mar/Apr '14
E	Nikon D500	$2,999	21.51		•			•		•	•	•	•		•	10	79	153	180K	•		•	•	•	30-1/8000		•	•	•		•	•	•	8.1	760	Nov/Dec '16
E	Nikon D810	$3,499	37.1	•				•		•	•	•	•		•	5	100	51	91K	•		•	•	•	30-1/8000	•	•	•			•	•	•	8.1	880	Sept/Oct '14
E	Nikon D810A	$4,099	37.1	•				•		•	•	•	•		•	5	U	51	91K	•		•	•	•	900-1/8000	•	•	•			•	•	•	8.1	880	
E	Nikon D4S	$6,699	16.6	•				•		•	•	•	•			11	200	51	91K	•		•	•	•	30-1/8000		•	•			•	•	•	8.1	1180	Nov/Dec '14
E	Nikon D5	$8,949	21.33	•				•		•	•	•				12	200	153	180K	•		•	•	•	30-1/8000		•	•	•		•	•	•	8.1	1235	Sept/Oct '16
	Pentax K-S1*	$799	20.42		•			•		•		•			•	5.4	20	11	77	•	•	•	•	•	30-1/6000	•	•	•		•		•		7.62	499	
	Pentax K-S2	$925	20.42		•			•		•		•			•	5.5	30	11	77	•	•	•	•	•	30-1/6000	•	•	•		•	•	•	•	7.62	618	Nov/Dec '15
	Pentax K-50*	$999	16.5		•			•		•		•			•	6	30	11	77	•	•	•	•	•	30-1/6000	•	•	•		•		•	•	7.62	590	Mar/Apr '14
	Pentax K-3 II	$1,349	24.7		•			•		•		•			•	8.3	60	27	86K	•		•	•	•	30-1/8000		•	•		•	•	•	•	8.1	700	
	Pentax KP	$1,499	24.96		•			•		•		•			•	7	28	27	86K	•	•	•	•	•	30-1/24,000	•	•	•		•	•	•	•	7.62	640	
	Pentax K-1	$2,999	36.77	•				•		•		•			•	4.4	70	33	86K	•		•	•	•	30-1/8000		•	•		•	•	•	•	8.1	924	
	Sony ILCA-77 II	$1,499	24.7		•			•		•		•		•	•	12	60	79	1200	•	•	•	•	•	30-1/8000		•	•		•	•	•	•	7.62	647	
	Sony ILCA-99	$2,499	24.7	•				•		•		•		•	•	6	15	19	1200	•	•	•	•	•	30-1/8000		•	•		•		•	•	7.62	733	Nov/Dec '12
	Sony ILCA-99 II	$4,599	43.6	•				•		•		•		•	•	12	60	478	1200	•	•	•	•	•	30-1/8000		•	•	•	•	•	•	•	7.62	790	

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COMPACT SYSTEM CAMERAS BUYER'S CHECK LIST MARCH/APRIL 2017

THIS CHECKLIST is designed to allow direct comparisons between different camera models, here listed in price order within each brand. The published prices are mostly supplied by the distributors as recommended retail prices (RRPs). However, some distributors are no longer supplying RRPs to the media so it has become necessary to determine an 'estimated street price' derived from the range of prices for a model published by retailers. Where this has been necessary, the letter 'E' appears at the start of the entry.

A dot appearing in a column indicates that the feature is available on the camera model listed. Where a specification or product detail hasn't yet been published or confirmed, the letters TBA (to be announced) or TBC (to be confirmed) are used. If a feature is irrelevant to a particular model – such as mirror lock-up for compact system cameras – then n/a (not applicable) is used. Every effort is made to ensure accuracy; please send any corrections to camera@avhub.com.au

	Model * single lens kit ** twin lens kit	Price (Body Only Unless Noted With Asterisk*)	Megapixels (Total)	Sensor Size: 35mm	Sensor Size: APS/DX	Sensor Size: Four Thirds	Sensor Type: CCD	Sensor Type: CMOS	Sensor Type: Foveon	File Formats: RAW	File Formats: TIFF	File Formats: JPEG	Memory Cards: Compact Flash	Memory Cards: Memory Stick	Memory Cards: SD/SDHC/SDXC + micro SD	Continuous Shooting Speed (fps)	Burst Length (Unlimited Max. Resolution	Autofocus Points	Metering Zones	Exposure Modes: Program	Exposure Modes: Subject Programs	Exposure Modes: Aperture Priority	Exposure Modes: Shutter Priority	Exposure Modes: Manual	Shutter Speeds	Features: Built-In Flash	Features: Anti-Dust	Features: FHD Video	Features: 4K Video	Features: Anti-Shake In Body	Features: Wireless Transmitter/WiFi	Features: Built-In Viewfinder	Features: Weather Proofing	Monitor Size (cm)	Weight (Body Only)	Review Issue
E	Canon EOS M10*	$699	18.5		•			•		•		•			•	4.6	1000	49	384	•	•	•	•	•	30-1/4000	•	•	•			•			7.62	301	
E	Canon EOS M3*	$899	24.7		•			•		•		•			•	4.2	1000	41	384	•	•	•	•	•	30-1/4000	•	•	•			•			7.62	350	
E	Canon EOS M5	$1,599	25.8		•			•		•		•			•	7	U	49	384	•	•	•	•	•	30-1/4000	•	•	•		•	•	•		8.1	380	Mar/Apr '17
	Fujifilm X-A1*	$649	16.3		•			•		•		•			•	5.6	30	49	256	•	•	•	•	•	30-1/4000	•	•	•						7.62	300	
	Fujifilm X-A2*	$749	16.5		•			•		•		•			•	6	18	49	256	•	•	•	•	•	30-1/4000	•	•	•						7.62	300	
	Fujifilm X-A3*	$949	24.3		•			•		•		•			•	6	10	77	256	•	•	•	•	•	30-1/32000	•	•	•			•			7.62	290	
	Fujifilm X-M1*	$1,099	16.3		•			•		•		•			•	5.6	30	49	256	•	•	•	•	•	30-1/4000	•	•	•			•			7.62	280	Nov/Dec '13
	Fujifilm X-T1	$1,699	16.7		•			•		•		•			•	6	47	49	256	•		•	•	•	30-1/4000		•	•				•	•	7.62	390	May/June '14
	Fujifilm X-T20*	$1,799	24.3		•			•		•		•			•	14	62	325	256	•		•	•	•	30-1/32000	•	•	•	•		•	•		7.62	333	
	Fujifilm X-E2*	$1,899	16.7		•			•		•		•			•	7	28	49	256	•		•	•	•	30-1/4000	•	•	•				•		7.62	300	Jan/Feb '14
	Fujifilm X-T2	$2,499	24.3		•			•		•		•			•	14	43	325	256	•		•	•	•	30-1/32000		•	•	•		•	•	•	7.62	457	Jan/Feb '17
	Fujifilm X-Pro2	$2,899	24.3		•			•		•		•			•	8	83	273	256	•		•	•	•	30-1/32000		•	•			•	•	•	7.62	445	May/June '16
	Leica T	$2,300	16.5		•			•		•		•			•	5	12	11	TBC	•	•	•	•	•	30-1/4000	•	•	•			•			9.4	339	Jul/Aug '14
	Leica TL	$2,450	16.5		•			•		•		•			•	5	12	11	TBC	•	•	•	•	•	30-1/4000	•	•	•			•			9.4	339	
	Leica SL	$11,000	26.3	•				•		•		•			•	11	65	49	TBC	•		•	•	•	60-1/8000		•	•	•		•	•	•	7.5	771	Jan/Feb '16
E	Nikon S1*	$299	12		15.9mm			•		•		•			•	15	15	135	TBC	•	•	•	•	•	30-1/16000	•	•	•				•		7.62	197	
E	Nikon J2*	$399	12		15.9mm			•		•		•			•	10	22	135	TBC	•	•	•	•	•	30-1/16000	•	•	•						7.62	238	
E	Nikon J3*	$499	15.1		15.9mm			•		•		•			•	15	22	135	TBC	•	•	•	•	•	30-1/16000	•	•	•						7.62	201	
E	Nikon J4*	$599	18.4		15.9mm			•		•		•			•	20	20	171	TBC	•	•	•	•	•	30-1/16000	•	•	•			•			7.62	192	
E	Nikon J5*	$699	23		15.9mm			•		•		•			•*	20	20	171	TBC	•	•	•	•	•	30-1/16000	•	•	•			•			7.62	231	
E	Nikon AW1*	$799	15.1		15.9mm			•		•		•			•*	15	22	135	TBC	•	•	•	•	•	30-1/16000	•	•	•					•	7.62	201	
E	Nikon V3*	$999	18.4		15.9mm			•		•		•			•*	20	20	171	TBC	•	•	•	•	•	30-1/16000	•	•	•			•			7.62	282	Sept/Oct '14
	Olympus E-PL7*	$799	17.2			•		•		•		•			•	8	36	81	324	•	•	•	•	•	60-1/4000		•	•		•	•			7.62	279	
	Olympus OM-D E-M10*	$849	17.2			•		•		•		•			•	8	70	81	324	•	•	•	•	•	60-1/4000	•	•	•		•	•			7.62	350	Jul/Aug '14
	Olympus E-PL8*	$899	17.2			•		•		•		•			•	8.5	64	81	324	•	•	•	•	•	60-1/4000		•	•		•	•			7.62	326	
	Olympus OM-D E-M10 II*	$999	17.2			•		•		•		•			•	8.5	79	81	324	•	•	•	•	•	60-1/4000	•	•	•		•	•	•		7.62	350	Nov/Dec '15
	Olympus OM-D E-M5 II	$1,299	17.2			•		•		•		•			•	10	19	81	324	•	•	•	•	•	60-1/16000		•	•		•	•	•	•	7.62	417	May/June '15
	Olympus OM-D E-M1	$1,599	17.2			•		•		•		•			•	10	49	81	324	•	•	•	•	•	60-1/8000		•	•		•	•	•	•	7.62	350	Nov/Dec '13
	Olympus PEN-F*	$1,999	21.77			•		•		•		•			•	10	45	81	324	•	•	•	•	•	60-1/8000		•	•		•	•	•		7.62	370	May/June '16
	Olympus OM-D E-M1 II	$2,799	21.8			•		•		•		•			•	15	84	242	324	•		•	•	•	60-1/32000		•	•	•	•	•	•	•	7.62	498	Mar/Apr '17
	Panasonic Lumix GF8*	$699	16.84			•		•		•		•			•	5.8	100	23	1728	•	•	•	•	•	60-1/16000	•	•	•			•			7.62	236	
	Panasonic Lumix GF7*	$699	16.84			•		•		•		•			•	5.8	100	23	1728	•	•	•	•	•	60-1/16000	•	•	•			•			7.62	236	
	Panasonic Lumix GX850*	$799	16.84			•		•		•		•			•*	6	100	49	1728	•	•	•	•	•	60-1/16000	•	•	•	•		•			7.62	239	
	Panasonic Lumix GX85*	$1,199	16.84			•		•		•		•			•	8	100	49	1728	•		•	•	•	60-1/4000	•	•	•	•		•	•		7.62	383	Sept/Oct '16
	Panasonic Lumix G85	$1,399	16.84			•		•		•		•			•	9	100	49	1728	•	•	•	•	•	60-1/16000	•	•	•	•	•	•	•	•	7.62	453	Jan/Feb '17
	Panasonic Lumix GX8	$1,499	21.77			•		•		•		•			•	10	100	49	1728	•		•	•	•	60-1/16000		•	•	•	•	•	•	•	7.62	435	Jan/Feb '16
	Panasonic Lumix GH4	$1,799	17.2			•		•		•		•			•	12	10	49	1728	•		•	•	•	60-1/8000	•	•	•	•		•	•	•	7.62	480	Jul/Aug '14
	Panasonic Lumix GH5	$2,999	21.77			•		•		•		•			•	12	600	225	1728	•		•	•	•	60-1/16,000		•	•	•	•	•	•	•	8.1	645	
	Pentax Q-S1*	$549	12.7		9.5mm			•		•		•			•	5	5	25	1024	•	•	•	•	•	30-1/8000	•	•	•		•	•			7.62	183	
	Sony Alpha 5000*	$699	20.4		•			•		•		•	•		•	3.5	15	25	1200	•	•	•	•	•	30-1/4000	•	•	•			•			7.62	210	
	Sony Alpha 5100*	$899	24.7		•			•		•		•	•		•	6	56	179	1200	•	•	•	•	•	30-1/4000	•	•	•		•	•			7.62	224	
	Sony Alpha 6000	$899	24.7		•			•		•		•	•		•	11	49	179	1200	•	•	•	•	•	30-1/4000	•	•	•		•	•	•		7.62	285	
	Sony Alpha 7	$1,499	24.7	•				•		•		•	•		•	5	77	25	1200	•	•	•	•	•	30-1/8000		•	•			•	•	•	7.62	416	
	Sony Alpha 6300	$1,699	24.7		•			•		•		•	•		•	11	47	425	1200	•	•	•	•	•	30-1/4000	•	•	•	•	•	•	•	•	7.62	361	Nov/Dec '16
	Sony Alpha 6500	$2,099	24.7		•			•		•		•	•		•	11	269	425	1200	•	•	•	•	•	30-1/4000	•	•	•	•	•	•	•	•	7.62	390	
	Sony Alpha 7 II	$2,299	24.7	•				•		•		•	•		•	5	77	117	1200	•	•	•	•	•	30-1/8000		•	•		•	•	•	•	7.62	556	
	Sony Alpha 7R	$2,899	36.8	•				•		•		•	•		•	4	15	117	1200	•	•	•	•	•	30-1/8000		•	•			•	•	•	7.62	407	
	Sony Alpha 7S	$3,299	12.4	•				•		•		•	•		•	5	77	25	1200	•	•	•	•	•	30-1/8000		•	•	•		•	•		7.62	416	
	Sony Alpha 7R II	$4,499	43.6	•				•		•		•	•		•	5	30	399	1200	•	•	•	•	•	30-1/8000		•	•	•	•	•	•	•	7.62	582	
	Sony Alpha 7S II	$4,799	12.4	•				•		•		•	•		•	5	64	169	1200	•	•	•	•	•	30-1/8000		•	•	•	•	•	•	•	7.62	584	

GFX 50S

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Fujifilm has always prioritised image quality in its medium format film cameras. Now, after establishing a solid market position in digital imaging, the company is returning to the world of medium format with the launch of the GFX 50S. By using in-depth knowledge of larger format cameras and applying the same philosophy that has run throughout the development of Fujifilm's digital photographic equipment, this camera achieves new standards in photographic quality. The GFX 50S begins a new chapter in camera history.

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