

SPECIAL BEST BUYS ISSUE: 100 PAGES OF HOT CAMERA REVIEWS FROM AUSTRALIAN CAMERA MAGAZINE

AUSTRALIAN

2026 ISSUE A\$14.95

CAMERA HANDBOOK

THE CAMERAS...



Leica
M EV1

Hasselblad
X2D II 100C

OM System
OM-5 Mark II

PLUS



Fujifilm
X-T30 III



Nikon
Z5II



Ricoh
GR IV



Panasonic
Lumix S1 II

THE LENSES...



OM System
M.Zuiko Digital ED 50-200mm
f/2.8 IS PRO

Panasonic
Lumix S 100-500mm
f/5.0-7.1 OIS



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NIKKOR Z 24-70mm f/2.8 S II

NIKKOR Z 14-24mm f/2.8 S

* As of February 24, 2026, among 70-200mm f/2.8 interchangeable lenses for full-frame mirrorless cameras available.

^ As of August 22, 2025, among 24-70mm f/2.8 interchangeable lenses for full-frame/FX-format mirrorless cameras.

Statements based on Nikon research.



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The last 12 months have been very exciting in the world of new cameras and lenses so it was quite a task to select the best reviews from our regular issues of Australian Camera Magazine for inclusion in our 2026 annual. Fujifilm alone created plenty of interest with its X Half and GFX100RF models, but we decided to go with the much more conventional X-T30 III because of its affordability and now even better value for money. Likewise the OM System OM-5 Mark II which also has upgrades that improve both the user experience and the performance. Not everybody has the budget for the Hasselblad X2D II 100C or Leica's M EVI, but they're included because both are significant in one way or another. The 'Blad because of its end-to-end HDR workflow and the Leica because it was brave to put an EVF in a camera previous best known for its optical finder, but it actually integrates beautifully. The Panasonic Lumix S1 II got the nod for being the

most accomplished hybrid all-rounder right now – against some stiff competition – and, of course, we couldn't go past the Ricoh GR IV because the GR series cult compacts just keep getting better and better. Nikon's Z mount line-up has plenty of stars, but Z5II is hard to beat because it does everything so well and represents a lot of mirrorless camera for your money... making it another great value proposition. We've also thrown in a couple of the lenses that have impressed us the most recently – both great examples of what can now be achieved in optical design in the mirrorless camera era – and we celebrate historic design milestones with our 'Camera Icons' pages. Enjoy.

Paul Burrows
Editor, Camera magazine

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FUJIFILM X-T30 III



Size and basic styling are unchanged from the previous model so the Mark III X-T30 continues to be one of the prettiest mirrorless cameras on the market. In addition to silver, there's a choice of black and charcoal body colours.

THIRD TIME'S A CHARM

The entry-level X mount mirrorless body steps up to the current-generation processor for more speed and important boosts to its autofocus performance and video capabilities.

Right now, Fujifilm has something for everybody in its X mount 'APS-C' mirrorless line-up. If small-scale video production is your thing, there's the X-M5. If you like an RF-style body shape, there's the X-E5 and, for SLR-lookalike fans, the X-T50. Prefer a more contemporary look? Let me show you the X-S20. And if you're ready to move up to a higher-end camera, the X-T5 soldiers on and there's the X-H2 duo for your hybrid photo/video requirements. And now, if you're on a bit of a budget, prefer something compact, but with an EVF (which rules out the X-M5), and you really don't need a whole lot of bells and whistles, here's the X-T30 III.

The X-T30 line has been the entry

point to the X mount system since being introduced in early 2019 and the subsequent upgrades have been mostly subtle but have added various capabilities to keep the value-for-money aspect an attractive one. That's very much the case with the Mark III model which keeps the small size, SLR styling and dial-based control layout of its predecessor, but on the inside, it steps up to the current generation 'X Processor 5' engine which is both more powerful and faster. The 26.1 megapixels (effective) 'CMOS X-Trans 4' sensor from before is retained, but the processor is the beating heart of a contemporary mirrorless camera so the X-T30 III gets boosts to its autofocus, continuous shooting speed and video recording... up to 6.2K 'open gate' (i.e. using

the full sensor area) and with 10-bit colour. Fujifilm has done a bit since the X-T30 II was launched in October 2021, so its successor gains the full set of current 'Film Simulation' modes with the custom 'FS Recipe' options, and also the physical 'Film Simulation' dial located on the top plate which we first saw on the X-T50 and is now also on the X-M5 and X-E5.

However, before you start thinking this is the bargain of the century, Fujifilm still makes sure there's a decent gap between the X-T30 III and the X-T50 to justify the latter's \$700-odd greater asking price. So, as before, the X-T30 III's body isn't weather sealed – which will probably be a consideration if you're doing a lot of outdoor shooting – plus there's no in-body image stabilisation (IBIS) which may also be something to think about as quite a few X mount lenses don't have optical image stabilisation either.

UPPING THE SPEED

Like all the latest generation X mount bodies, the X-T30 III offers 10-bit HEIF capture among its format options which deliver HDR files, but more efficient compression means that these are no bigger in size than 8-bit JPEGs. Both HEIFs and JPEGs are captured at either Fine or Normal compression levels and at three image sizes plus, of

course, there's the option of RAW+JPEG or RAW+HEIF recording.

The maximum image size for stills is 6240x4160 pixels and there's a choice of three aspect ratios – namely 3:2, 16:9 and 1:1. In-camera conversion is available to turn the HEIF files into JPEGs or into either 8-bit or 16-bit TIFFs. Additionally, RAW files can be converted into either JPEGs or HEIFs.

Still capture at a very zippy 30 fps if you're happy with a 1.25x crop (which still gives a resolution of 16.6 megapixels), and this obviously uses the camera's sensor shutter. Otherwise, the top speed is 20 fps which will still be fast enough for most applications. The quoted burst lengths are 127 frames for best-quality JPEGs or 60 compressed RAW files. These extend to 141 and 81 respectively if you opt for the 1.25x crop at this frame rate which is also available when shooting at 10 fps. The focal plane shutter's fastest shooting speed is 8.0 fps which again slightly extends the burst lengths to 173 best-quality JPEGs or 82 compressed RAW files. Alternatively, RAWs can be alternatively captured with lossless compression or uncompressed; all



BEFORE YOU START THINKING THIS IS THE BARGAIN OF THE CENTURY, FUJIFILM STILL MAKES SURE THERE'S A DECENT GAP BETWEEN THE X-T30 III AND THE X-T50 TO JUSTIFY THE LATTER'S \$700-ODD GREATER ASKING PRICE."



▲ Rear panel layout includes a multi-directional joystick-type controller.

options with 14-bit RGB colour. Incidentally, the sensor shutter also has an 8.0 fps speed setting with the same burst lengths (but obviously with nearly silent shooting). Additionally, if you opt for the FP shutter's mid-speed rate of 5.0 fps, you get virtually limitless JPEG shooting (it's quoted at "1000+" frames) which also extends to compressed RAW capture at the 4.0 fps slow speed setting (there's also a 3.0 fps option).

The X-30 III gains the 'Pre-Shot' function which commences continuous capture immediately that the shutter release button is at the half-way position (i.e. for metering and autofocus). This can be set to 30, 20, 10 or 8.0 fps and captures a rolling one second of frames prior to shutter release.

TASTIER FILMIC LOOKS

For the in-camera processing of JPEGs (and HEIFs), the X-T30 III steps up to the full current selection of 20 'Film Simulation' profiles. Following the X-E5, it has the facility for additionally creating and storing three user-created "recipes" (a term borrowed

from the cinematography world). These are designated 'FS1' to 'FS3' and not only use the usual adjustable profile parameters (such as colour, contrast and sharpness), but also the effects processes – 'Colour Chrome Effect', 'Colour Chrome Effect Blue', 'Grain Effect' and, for the B&W modes, 'Monochromatic Colour' which offers tinting in the ranges of warm-to-cool or green-to-magenta. A processing function called 'Portrait Enhancer LV' takes over from 'Smooth Skin Effect' and works in concert with face detection to soften skin with the option of Weak, Medium or Strong settings.

It's always been possible to apply these effects to a 'Film Simulation' profile, but now they can be integrated into a recipe as a key 'ingredient' rather than an added extra. This is obviously a step beyond just modifying the existing 'baked-in' profiles, although you can still choose to use the custom slots for storing customised adjustments to these.

As always, there's an auto bracketing mode for 'Film Simulation' profiles – which includes the 'FS' trio – and allows for up to three to be applied simultaneously to an



▲ Shutter speed dial is a chunky component. T setting provides access to speeds slower than one second.



▲ Exposure compensation dial is marked up to +/-3.0 EV and you switch to the 'C' setting for the extended range to +/-5.0 EV.



▲ Lever below the shutter speed dial switches the camera to fully automatic, point-and-shoot operation, including subject/scene recognition.

image. These profiles are applied directly to JPEGs or HEIFs, and the data appended to a RAW file as a post-camera processing option (when there's the option to switch between any of them).

In addition to the 'Film Simulation' profiles, auto bracketing is available for exposure, dynamic range processing, sensitivity, white balance and focus. The focus bracketing can be set for up to 999 frames with a shift in the focus from one through to ten steps.

The other in-camera adjustments include 'Dynamic Range Priority' processing, the dynamic range expansion processing, multi-shot HDR capture and Fujifilm's 'Lens Modulation Optimiser' (LMO) which corrects for the diffraction blur which occurs when using very small aperture settings. All other lens corrections are applied automatically. The X-T30 III also has a multiple exposure facility, an intervalometer, in-camera panorama stitching (horizontal or vertical), and auto flicker detection and shutter speed correction. The multiple exposure facility allows for a total of nine frames to be combined with the choice of Additive, Average, Comparative Light or Comparative Dark exposure management options. The intervalometer can be set to record unlimited frames or, alternatively, a specific number of up to 999.

LOOKING AND LEARNING

The newer 'X Processor 5's engine endows the X-T30 III with some significant upgrades to its autofocus, bringing it up to speed with all the other recent X mount bodies such as the X-M5 and X-E5. Consequently, the list of subject recognition mode expands to cover people, animals, birds (including insects), cars, motorcycles and push bikes, trains and aircraft (which encompasses helicopters and drones).

Face/eye detection is the default acquisition and tracking mode for humans, and it will work with people wearing goggles, spectacles or masks; or if the subject is in profile. It can also be set to prioritise either the right or left eye.



However, as across the current range, it remains that human face/eye detection is separate from all the other subjects so there's more to do to switch between them than should be necessary.

Automatic subject recognition is available with the camera's fully automatic point-and-shoot mode, but not as a standalone option with the standard 'PASM' exposure modes.

The hybrid contrast/phase-detection autofocus has 425 selectable measuring points which are arranged in a 25x17 pattern with the option of switching to 117 points in a 13x9 pattern for speedier selection. Low light sensitivity extends down to -7.0 EV at ISO 100, but this is with the super-fast and pricey XF 50mm f/1.0 prime lens, so the more realistic spec is -4.0 EV at f/2.8.

There's a big selection of AF area modes which increase in size from Single-Point (itself adjustable to one of six sizes), through Zone (in 7x1, 7x3, 7x7, 5x5, 5x3 or 3x3 point clusters selected from the 117 points) and to Wide which uses all the measuring points. There's also an 'All' setting which allows you to cycle through these three modes via the rear input wheel. In addition, you can create three custom Zone areas in any size or shape you want. With continuous AF operation, the area modes are Single-Point, Zone, Tracking and All. As is a fixture on both X and G mount Fujifilm mirrorless cameras, the 'AF-C Custom' submenu provides a set of five scenarios for fine-tuning tracking based on how the subject is moving and via three parameters – Tracking Sensitivity, Speed Tracking Sensitivity and Zone Area

▲ Check out the dials... if you like you're a classically styled camera, here it is.

Switching – or there's a sixth option for creating your own customised configuration.

To assist with manual focusing there's the standard magnified image and focusing peaking display options, plus Fujifilm's 'Digital Split Image' and 'Digital Microprism' displays. These are 'virtual' representations of, respectively, the classic split-image rangefinder and the gridded collar or ring which surrounded it in the optical viewfinders of many 35mm SLR's. The 'Digital Split Image' display can be in either colour or B&W, but latter actually makes it easier to see what's going on. However, as we've noted on many occasions previously, it's hard to beat the focus peaking display for useability. It's available in the choice of red, white, blue or yellow colours, set at one of two intensity levels.

LIGHT AND COLOUR

As has been standard across the current line-up of Fujifilm mirrorless cameras for quite a while, exposure control is based on TTL metering using the imaging sensor with 256 measuring points and the choice of multi-zone, centre-weighted average, fully averaged or spot patterns. The spot meter can be linked to the active focusing point or zone. Additionally, the metering will be tuned to the subject type selected with the subject-recognition AF. There's the standard set of 'PASM' exposure control modes, plus a total of 14 subject/scene modes which become available with the camera's fully



▲ Shutter release button retains a cable release socket.



▲ Pop-up flash is activated via a lever below the 'Film Simulation' dial. Flash power is GN 7.0 at ISO 200.



▲ Selector on the front panel switches between the focusing modes.

auto shooting setting.

The auto exposure overrides are an AE lock, exposure compensation for up to +/-5.0 EV and, as mentioned earlier auto bracketing which can be applied over sequences of two, three, five, seven or nine frames with adjustments of up to +/-3.0 EV per frame. The focal plane shutter has a timed speed range of 15 minutes up to 1/4000 second with flash sync up to 1/180 second and a 'B' setting for longer exposure times of up to 60 minutes. The shutter speed dial has a 'T' position, but this isn't a timer setting; rather it accesses the shutter speeds slower than one second.

The sensor shutter runs up to 1/32,000 second, but the sensor's slow read-out speed precludes the use of flash so there's the option of the hybrid 'electronic first

curtain shutter' (EFCS). Here the speed range is also 900-1/4000 second with flash sync up to 1/180 second, but the shutter operation is a bit quieter (although why this should really matter when you're firing a flash – which will certainly attract attention – is a bit of a mystery). There are three additional 'mix-and-match' shutter type settings with the 'M+E', 'EF+M' and 'EF+M+E' combinations all seamlessly switching to the faster shutter speeds as needed.

The white balance control options comprise three auto modes – Auto, White Priority or Ambience Priority – with the latter two primarily for use with incandescent light sources to either correct for, or alternatively, preserve the warmer tones. Alternatively, there's a choice of seven lighting presets

(including one for shooting underwater), the provision for making and storing up to three custom WB measurements, white balance shifting in all modes and presets, and the previously mentioned auto bracketing which is over three frames. Finally, the colour temperature can be set manually over a range of 2500 to 10,000 degrees Kelvin.

IN THE HAND

As well as maintaining an entry-level price tag – comparatively speaking at least – the X-T30 III also keeps the trim dimensions of its predecessors which makes a nice change as successive generations of mirrorless camera all seem to have been at the party pies. There's also a new and very compact kit zoom – the XC 13-33mm f/3.5-6.3 OIS (note that it does have image stabilisation) –

MAKING MOVIES

As noted in the main text, Fujifilm is touting the X-M5 – with its dedicated vlogging mode and three mic audio set-up – at single-presenter video-makers so the X-T30 III is essentially more photo-orientated, but the later-gen processor delivers some pretty handy video capabilities, nonetheless.

The headline act is 6.2K res video in the 3:2 'open gate' aspect ratio at 24/25/30 fps with 10-bit 4:2:2 (or 4:2:0) colour using the H.265 codec with LongGOP compression. Additionally, there's the choice of 8.0, 25, 50, 100 or 200 Mbps bit rates. Using the sensor's full imaging area provides flexibility with framing so, for example, there's the option of using the 9:16 aspect for mobile applications.

Both 4K DCI and 4K UHD are recorded using the full width of the sensor – i.e. downsampled from 6.2K – with either 10-bit 4:2:2 or 4:2:0 colour with the HEVC H.265 codec or 8-bit 4:2:0 colour with MPEG 4 AVC/H.264, both with Long GOP interframe compression. The caveat here is that this is at the 24, 25 and 30 fps frame rates, but at the faster 50 and 60 fps there's a smallish 1.18x crop. Again, there's the choice of bit rates from 8.0 to 200 Mbps.

All these options are also available with 2K recording – in either the 16:9 or 17:0 aspects – but with full-width recording at 50/60 fps while slowmo frame rates up to 200/240 fps come with a heavier 1.29x crop.

Notably, the X-T30 III has the wider F-Log2 profile for video which gives a claimed "13+" stops of dynamic range which translates into an increased exposure latitude. It has a base ISO of 1250 versus 640 for F-Log recording (which is also available and has a dynamic range of 12 stops). Alternatively, of course,

there's the Eterna and Eterna Bleach Bypass cinematic 'Film Simulation' profiles along with HLG HDR recording. As with the X-M5, there's a 'Short Movie' mode for shooting short Full HD clips (15, 30 or 60 seconds) in the vertical 9:16 aspect for replay on smartphones. However, this format is also available with normal recording and with access to higher bit rates.

As per all the recent X mount models, for external recording over the HDMI output, there's 12-bit ProRes RAW or Blackmagic RAW encoding at up to 6.2K and 25/30 fps or 5.2K at up to 50/60 fps. This also supports 4K at up to 50/60 fps and 2K up to 100/120 fps.

On the audio side, the X-T30 III has built-in stereo microphones with auto/manual level controls, a wind-cut filter, a low-cut filter and a limiter. However, the stereo audio input is via a 2.5 mm minijack which means you'll need an adapter for any unit with the standard 3.5 mm plug (which is most of them). Likewise, if you want an audio output for monitoring headphones then this has to be via a USB C adapter (which isn't supplied). These limitations are carried over from the previous model and clearly indicate the Mark III version's priorities, but there's also the absence of IBIS and the single card slot working against the overall convenience of shooting video with this camera. However, there is electronic image stabilisation, but as it moves the image around on the sensor to compensate for camera shake there's a crop involved (up to 1.32x depending on the resolution and frame rate). And, as with the X-M5, there's 'Frame.io Camera to Cloud' support which overcomes the single card slot issue as, for example, it can be used to send video proxies while recording the source footage. Also, like the M5, the X-T30 III has zebra patterns with adjustable brightness threshold, time coding, 'Movie

Optimised Control' for silent operation via the touch screen, front and rear tally lamps, and Webcam streaming support via USB C. To this can be added all the 'Film Simulation' profiles and their adjustment parameters, the monochromatic colour adjustments, the dynamic range expansion processing and high ISO noise reduction plus there's a video-only in-camera correction for lens vignetting (a.k.a. 'Peripheral Light Correction').

The upgraded autofocus has benefits for video as well as photography, enhancing the subject tracking in general – including with the eye/face detection for people – and excellent lock-on characteristics with the AI-based recognition. As with the X-M5, tracking can be initiated by simply tapping on the subject in the touch screen and the camera will then follow any subsequent movement. Also, exclusively for video shooting, there's an additional manual focus assist called the 'Focus Meter' which provides an indicator needle to show whether the focus is in front of or behind the subject. Additionally, this can be used in conjunction with the focus peaking display which is even more helpful. There's also a 'Focus Map' assist which shows what's in focus and what's not across the live view image.

So, for serious video shooters, the X-T30 III is a bit of a mixed bag with what is essentially a very handy set of recording capabilities and features, but which are somewhat compromised by the hardware itself... i.e. no IBIS, tilt-only monitor, limited audio connections and a single card slot. You can get around all of this in one way or another, but obviously Fujifilm would like to steer you in the direction of the X-M5 or the X-S20 if video is a priority. For anybody else, it's more than up to the job.



Test images captured as JPEG/large/fine files using the Fujinon XF 18-55mm f2.8-4.0 R LM OIS and XC 13-33mm f/3.5-6.3 OIS zoom lenses. Velvia/Vivid, Classic Chrome and ACROS+Red 'Film Simulation' presets, shutter-priority auto exposure control and multi-zone metering at ISO 400, 640 and 800. Straight out of the camera, best-quality JPEGs exhibit plenty of well-defined fine detailing, nicely smooth tonal gradations and a wide dynamic range.





ISO 80



ISO 160



ISO 200



ISO 400



ISO 800



ISO 1600



ISO 3200



ISO 6400



ISO 12800



ISO 25600



ISO 51200

The sensor's 'dual gain' circuitry gives two base ISO settings – at 160 and 800 – with the result that noise is markedly reduced at the higher sensitivity settings. The full native ISO range is useable, and the image quality remains good even at the extension settings too. These images are JPEG/large files taken in the aperture-priority auto mode with the aperture set to f11 so the exposure time varies to compensate for the ISO adjustments. Both High ISO and Long Exposure noise reduction are switched off. Fujinon XF 18-50mm f/2.8-4.0 R LM OIS zoom.

which is the smallest and lightest X mount zoom lens that we've seen so far, but still has a pretty useful effective focal range of 20-50mm.

The styling has some obvious DNA from the Fujica ST series 35mm SLRs of the 1970s, and the X-T30 III is close in size that system's entry-level model, the ST605 (although obviously a good deal more capable). The construction comprises magnesium alloy top and bottom covers over a polycarbonate chassis which helps with the lightness of weight (just 378 grams without the battery) but also gives a pretty solid feeling in the hand. As noted earlier, there isn't any weather sealing. There isn't a handgrip either, but given the small size and light weight, you really don't need one, even with a bigger lens attached.

The top panel control layout is all classic dials – which are knurled metal components just like in the good old days – and now,

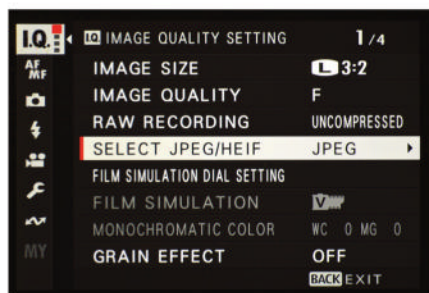
as also mentioned earlier, include one for setting the 'Film Simulation' profiles. This replaces the previous drive mode dial and these functions are now selected via a button.

The 'Film Simulation' dial has six positions for a selection of photo-based favourites – namely Provia/Standard, Velvia/Vivid, Astia/Soft, Classic Chrome, Reala ACE and ACROS B&W – plus a further three 'FS' settings that can be assigned to whichever profiles you'd like to add. Additionally, you can modify the ACROS setting to have any of the contrast filter options. There's also a 'C' setting which will take you to whichever 'Film Simulation' profile you've assigned to it in the main 'IQ' image quality menu. The other dials are for setting shutter speeds and exposure compensation. As across the X-T family, there isn't a dedicated exposure mode dial and you instead set the shutter speeds and/or aperture collar to 'A' for the

semi-auto or program options... the latter obviously having both set to 'A'. It's how the first multi-mode 35mm SLRs worked in the late 1970s and early '80s and is perfectly logical when you think about it.

The rest of the top panel control layout comprises front/rear input wheels (which Fujifilm calls 'Command Dials' and which also have press-in actions), the shutter release which incorporates a cable-release socket and the on/off switch, an 'Fn' multi-function button, a lever to pop up the built-in flash and another lever to switch the camera to its fully automatic point-and-shoot operation. Both levers are located below dials, as there isn't a lot of real estate available.

The rear panel layout is also very straightforward and has a joystick-type controller and a handful of function buttons, including the one for the drive settings. This also gives you access to the auto



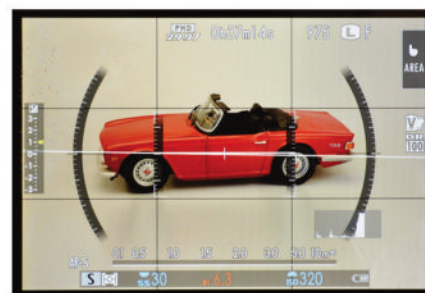
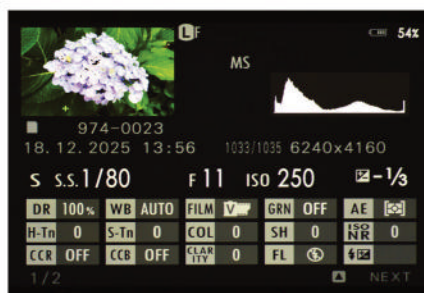
▲ The X-T30 III is the latest Fujifilm X mount mirrorless camera to have the option of 10-bit HEIF capture.



▲ Review/replay screens include a full set of histograms and two pages of capture data, including the lens settings.



▲ Monitor-based 'Info Display' includes a large selection of function settings, the exposure settings, a real-time histogram and an AF point/zone map.



▲ Live view screen is configurable with an extensive choice of elements and read-outs, including a real-time histogram, a highlight warning, either single- or dual-axis level indicators and a choice of grid patterns.



bracketing modes, multi-shot HDR capture, the multiple exposure facility, the 'Advanced Filter' effects and the in-camera panorama stitching function.

In addition to the top panel's 'Fn' button, another four are customisable as is the rear input wheel's press-in action. Additionally, there's the set of four 'Touch Functions' ('T-Fn') which use left, right, up and down swipe actions on the monitor's touch screen to select assigned functions. These and the physical controls can be assigned pretty well everything that the X-T30 III can do – there are, in fact, ten menu pages of items to select from. Furthermore, pressing the front input wheel cycles through a selection of adjustments – apertures, ISO settings, exposure compensation or the 'Film Simulation' profiles (and these vary according to the selected exposure mode).

The touch screen implementation includes focus point/zone/face selection, and, for playback, there are touch controls for browsing, zooming in or out (which also selects the thumbnail pages), or zooming in on the active focus point/zone. When a power zoom lens is fitted, there's also a 'Touch Zoom' function. Additionally, the monitor-based 'Quick Menu' has touch tiles, but the main menus still have to be navigated using the joystick controller along with the front or rear input wheels. The 'Q Menu' is extensively customisable with up to 15 functions on display as the default 'Custom Settings Bank', but you can create an additional seven customised banks which might, for example, be used when shooting specific subjects. You can also reduce the number of displayed function tiles to 12, eight or just four. There's also a

video-specific 'Quick Menu' screen, again with all the same customising options as for photography.

The monitor screen itself is adjustable for up/down tilts, but that's all, and has a resolution of 1.64 megadots. The EVF is unchanged from the previous model so it's a 1.0 cm OLED display with a resolution of 2.36 megadots and a magnification of 0.62x (35mm equivalent). It's shared with both the X-T50 and X-E5 and, as we noted with both these models, it seems quite small until you get used to using it, and then it works fine. Both the EVF and the monitor are adjustable for brightness, colour saturation and colour balance.

The live view screen can also be extensively customised with the key elements comprising 3x3 or 4x6 guide grids, a real-time histogram (either brightness only, or with the RGB channels as well), level indicators – either single- or dual-axis displays – and a highlight warning (or you can use video's zebra patterns which have an adjustable threshold and so can be more helpful). There is a long list of available read-outs and status indicators – just over four Display Custom Setting' menu pages – and you simply tick the boxes as desired. Additionally, you can increase the size of selected icons and adjust the display contrast to enhance legibility in different lighting conditions. This includes a 'Dark Ambient Lighting' setting which gives red-on-black displays to help better preserve your night vision.

As with the previous model, the X-T30 III is powered by the 1260 mAh NP-W126S lithium-ion battery which is also currently used by the X-T50, the X-M5 and the X-E5.

Fujifilm quotes 415 shots when the camera is the Economy power mode, but this drops to 310 shots in the Normal mode which is how you'll most likely run the camera. In-camera battery recharging is available via the USB Type C port which also allows for Webcam video streaming at up to 4K and 50/60 fps. The other interfaces are micro-HDMI (i.e. Type D) and the pesky 2.5 mm minijack input (instead of 3.5 mm) for connecting an external stereo microphone or a wired remote trigger. You won't be surprised to learn that there isn't a stereo audio output.

The wireless connectivity options are via WiFi 2.4 GHz and Bluetooth 5.2 LE with the Fujifilm XApp allowing for both image file transfer and remote control of the camera. Like all the recent Fujifilm cameras, the X-T30 III has 'Frame.io Camera to Cloud' support so high-res images and video clips can be immediately uploaded to Adobe's Frame.io software platform as they're recorded.

SPEED AND PERFORMANCE

With a San Disk Extreme PRO 32 GB SDXC UHS-II memory card and using the sensor shutter, the X-T30 III captured a burst of 158 JPEG/large/fine frames – at the full frame size – in 7.834 seconds which represents a continuous shooting speed of 20.16 fps. With the focal plane shutter, a sequence of 108 best-quality JPEGs was recorded in 13.307 seconds to give a shooting speed of 8.11 fps (and the camera would have gone on shooting for a lot longer, we just chose to stop the timing at this point). The test files averaged 16 MB in size.

Arguably the biggest improvement over

the previous model is the autofocus performance which is faster with more reliable subject tracking – even beyond the subjects covered by the expanded recognition list – thanks to an upgraded movement prediction algorithm.

In addition to the enhanced responsiveness and speed, the T30 III's AF is also very reliable in low light situations. The tracking keeps up with subjects that are fast moving or change direction either continually or erratically. The eye/face detection for humans stays locked-on with a smaller-sized head and if the subject either briefly looks away or looks down.

As is to be expected, the X-T30 III's image performance is very much on a par with the X-M5 with which it shares the same sensor and processor combo. Of course, the 'X-Trans CMOS 4' sensor already has a proven track record in the previous X-T30s models as well as the X-T4s and the X100V. As we've noted previously, the pixel count of 26.1 million pixels count is a real sweet spot for an 'APS-C' format sensor, balancing resolution and a reasonable pixel size. The latter gives a higher signal-to-noise ratio and the subsequent benefits in terms of image quality such as a wider dynamic range. As a result, the best-quality JPEGs from the X-T30 III exhibit plenty of well-defined fine detailing, nicely smooth tonal gradations and a wide dynamic range. As always, the 'Film Simulation' profiles provide plenty of scope for playing with colour and tonality, and here Fujifilm remains unchallenged in its ability to balance colour saturation and tonality to create a specific look, but now with the added capacity to make your own customised recipes.

The sensor's dual-gain output's two base ISOs are set at ISO 160 and ISO 800. The low ISO circuit optimises dynamic range and the high ISO circuit optimises sensitivity (i.e. the signal level) which results in some reduction of the dynamic range (at the highlights end), but reduced noise in the shadows. Consequently, the noise characteristics at the higher sensitivity settings are essentially minus two-and-a-

third stops better off so less noise reduction processing is required to the benefit of both sharpness and saturation. This means that the image quality at ISO 4000 will be pretty much the same as it is at ISO 800, albeit with some reduction in dynamic range. In practical terms then, the full native ISO range is useable, as there's a negligible loss of definition at ISO 12,800 and only minimal softening at ISO 25,600. The dual gain circuitry also gives more flexibility when it comes to exposures as, for example, there's actually a less noise at ISO 800 or 1600 than at ISO 400. This means more latitude if you're deliberately using underexpose to preserve more details in the highlights and then subsequently brightening the shadows which will exhibit much less noise than would otherwise be the case.

THE VERDICT

Like its predecessors, the X-T30 III vies with the lower-end Olympus/OM System bodies in the beauty stakes but is more overtly classical in styling and operation thanks to all the dial-based control layout. Subjectively then, these also make it much more intuitive to use and enhance the involvement factor. It is a thoroughly enjoyable and engaging camera to use.

Perhaps most importantly though, Fujifilm has done a really clever job of maintaining affordability while also making sure that you don't miss out on important features such as state-of-the-art autofocus and faster shooting speeds (plus more flexibility when it comes to shooting video). Yet there's still a clear distinction between this model and the X-T50 if an SLR-style mirrorless camera body is your preference so it's a case of how much you want to spend. However, the X-T30 III is still a lot of camera for your money in terms of its capabilities and performance. What's more, in real world terms it has as much as a great many users will likely ever need or want so to save your pennies for lenses. Incidentally too, the new 13-33mm 'kit' zoom is a real gem and surprisingly flexible given its extra-wide to



▲ 'Film Simulation' dial offers direct on-camera access to the staple profiles and also three custom-made 'FS' recipes.



▲ Both the front and rear input wheels have press-in actions for various functions. The front control cycles through a selection of adjustments – apertures, ISO settings, exposure compensation or the 'Film Simulation' profiles

standard focal range. Consequently, this is a very handy little package if you're making a move into mirrorless from an 'APS-C' DSLR (you'll notice the size difference straight away) or stepping up from a smartphone.

There's a fair bit of competition at this price point for cropped-sensor bodies right now – including Nikon's excellent Z50II – but the X-T30 III gets big plusses for being the smallest, the most stylish and the fastest (albeit with a crop). Plus, if you like a camera with a more classical look and feel, the X-T30 III can't be beaten, especially as it now supports this with a more contemporary feature set. 📸

VITAL STATISTICS



FUJIFILM X-T30 III \$1,679

body only, recommended retail price

Type: Enthusiast-level digital mirrorless camera with Fujifilm X bayonet lens mount.

Focusing: TTL automatic hybrid system using phase-difference detection and contrast-detection measurements. 425 measuring points (in 25x17 or 13x9 patterns). Single-point (six sizes), zone (in 7x1, 7x3, 7x7, 5x5, 5x3 or 3x3 point clusters selected from 117 points), custom zone (three user-defined shapes) and wide/tracking modes. Five 'AF-C Custom' settings for optimising tracking plus a user-definable setting for Tracking Sensitivity, Speed Tracking Sensitivity and Zone Area Switching. Face/eye detection with left/right priority. Subject detection for animals, birds

and insects, cars, motorcycles and bikes, aircraft and drones, and trains. Auto subject detection when the camera is in full auto mode. Focus range limiter. Face/eye detection with left/right priority. Manual switching between one-shot and continuous AF modes. AF+MF mode. Low-light assist via built-in illuminator. Manual focus assist via magnified image, 'Digital Split Image' display (colour or B&W), Digital Microprism' display, or focus peaking display (white, red, blue or yellow; low or high levels). Sensitivity range is EV -7.0 - 18 (ISO 100 and f/1.0).

Exposure Modes: Continuously variable program with shift, shutter-priority auto, aperture-priority auto

and metered manual. 14 subject/scene modes with automatic selection in 'Auto' mode.

Shutter: Electronic, vertical travel, metal blades, 900-1/4000 second plus 'B' (up to 60 minutes). Flash sync up to 1/180 second. Sensor shutter has a speed range of 900-1/32,000 second. Electronic front curtain shutter (EFCS) has a speed range of 900-1/4000 second plus 'B' (up to 60 minutes). Exposure compensation up to +/-5.0 EV in 1/3-stop increments.

Viewfinder: 1.0 cm OLED-type EVF with 2.36 megadots resolution, 100% vertical/horizontal scene coverage and 0.62x magnification (35mm equivalent). ▶



VITAL STATISTICS

Automatic/manual switching between the EVF and the LCD monitor screen. Eyepiece strength adjustment built in. 7.62 cm LCD monitor (1.62 megadots) with up/down tilt adjustment and touch screen controls. Both EVF and monitor are adjustable for brightness, colour saturation and colour balance.

Flash: Built-in flash pop-up flash with GN 7.0 power (ISO 200). Auto, red-eye reduction, fill-in, slow sync, first/second curtain sync, and commander modes. Manual control down to 1/64. Up to +/-2.0 EV flash compensation. External flash units connect via hot-shoe.

Additional Features: Magnesium alloy top and bottom panels over a polycarbonate bodyshell, AE/AF lock, auto exposure bracketing (up to +/-3.0 EV over two, three, five, seven or nine frames), multiple exposure function (two shots), multi-mode self-timer (2 and 10 second delays), audible signals, auto power-off, cable release connection, wired remote trigger.

DIGITAL SECTION

Sensor: 26.1 million (effective) pixels 'X-Trans CMOS 4' (BSI-type CMOS) with 23.5x15.6 mm imaging area and 3:2 aspect ratio. Sensitivity equivalent to ISO 160-12,800, extendable to ISO 80, 100, 25,600 and 51,200.

Focal Length Magnification: 1.5x.

Formats/Resolution: Two JPEG compression settings, two HEIF compression settings, RAW output (compressed, lossless compressed or uncompressed), RAW+JPEG and RAW+HEIF capture. Three resolution settings at 3:2 aspect ratio; 6240x4160, 4416x2944 and 3120x2080 pixels. Three resolution settings at 16:9 aspect ratio; 6420x3512, 4416x2488 and 3120x1760 pixels. Three resolution settings at 1:1 aspect ratio; 4160x4160, 2944x2944 and 2080x2080 pixels. 24-bit RGB colour for JPEGs, 30-bit colour for HEIFs, 42-bit RGB colour for RAW files.

Video Recording:

- MOV format with 10-bit 4:2:2 or 4:2:0 colour (HEVC/H.265 codec, LongGOP compression) at 6240x3510 pixels (6.2K); 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 3:2 aspect ratio. At 4096x2160 pixels (4K DCI); 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio. At 4096x2160 pixels (4K DCI); 60 or 50 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio and 1.18x crop. At 3840x2160 pixels (4K UHD); 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 16:9 aspect ratio. At 4096x2160 pixels (4K DCI); 60 or 50 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio and 1.18x crop.
- At 2048x1080 pixels (2K DCI) at 60, 50, 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio. At 1920x1080 pixels (2K FHD) at 60, 50, 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 16:9 aspect ratio. At 1080x1920 pixels (2K FHD) at 60, 50, 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 9:16 aspect ratio. At 1920x1080 pixels (2K FHD) at 240, 200, 120 or 100 fps (200 Mbps) and 16:9 aspect ratio with a 1.29x crop. At 1080x1920 pixels (2K FHD) at 240, 200, 120 or 100 fps (200 Mbps) and 9:16 aspect ratio and a 1.29x crop.
- MOV format with 8-bit 4:2:0 colour (MPEG 4 AVC/H.264 codec, LongGOP compression) at 4096x2160 pixels (4K DCI); 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio. At 4096x2160 pixels (4K DCI); 60 or 50 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio and 1.18

crop. At 3840x2160 pixels (4K UHD); 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio. At 4096x2160 pixels (4K DCI); 60 or 50 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio and 1.18 crop.

- At 2048x1080 pixels (2K DCI) at 60, 50, 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio. At 1920x1080 pixels (2K FHD) at 60, 50, 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 16:9 aspect ratio. At 1080x1920 pixels (2K FHD) at 60, 50, 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 9:16 aspect ratio. At 1920x1080 pixels (2K FHD) at 240, 200, 120 or 100 fps (200 Mbps) and 16:9 aspect ratio with a 1.29x crop. At 1080x1920 pixels (2K FHD) at 240, 200, 120 or 100 fps (200 Mbps) and 9:16 aspect ratio and a 1.29x crop.
- MP4 format with 8-bit 4:2:0 colour (MPEG 4 AVC/H.264 codec, Long GOP compression) at 4096x2160 pixels (4K DCI); 30, 25 or 24 fps (8.0, 50, 100 or 200 Mbps) and 17:9 aspect ratio. At 4096x2160 pixels (4K DCI); 60 or 50 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio and 1.18 crop. At 3840x2160 pixels (4K UHD); 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio. At 4096x2160 pixels (4K DCI); 60 or 50 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio. At 1080x1920 pixels (2K DCI) at 60, 50, 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 17:9 aspect ratio. At 1920x1080 pixels (2K FHD) at 60, 50, 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 16:9 aspect ratio. At 1080x1920 pixels (2K FHD) at 30, 25 or 24 fps (8.0, 25, 50, 100 or 200 Mbps) and 9:16 aspect ratio. At 1920x1080 pixels (2K FHD) at 240, 200, 120 or 100 fps (200 Mbps) and 16:9 aspect ratio with a 1.29x crop.

Built-in stereo microphones with auto/manual levels adjustment, limiter, wind-cut filter and low-cut filter. Stereo audio input via a 2.5 mm minijack (switchable between mic level and line level).

Video Features: F-Log and F-Log2 gamma profiles, HLG HDR recording, time code (free run or rec run, drop frame correction), electronic image stabilisation (with a crop), 'Short Movie' mode for 9:16 vertical aspect clips (at 15, 30 or 60 seconds), HDMI rec control, 'Focus Meter' MF assist, 'Focus Map' MF assist, focus peaking display, two zebra patterns with adjustable brightness thresholds, 'Movie Optimised Control' for silent operation via touch screen, front and rear tally lamps, Webcam support via USB C.

HDMI Output: ProRes RAW 12-bit 6.2K 3:2 and 5.2K 16:9 at 30, 25 or 24 fps.

Blackmagic RAW 12-bit 6.2K 3:2 and 5.2K 16:9 at 30, 25 or 24 fps. 6.2K 16:9 with 10-bit 4:2:2 colour and 30, 25 or 24 fps. 4K DCI 17:9 with 10-bit 4:2:2 colour and 60, 50, 30, 25 or 24 fps. 4K UHD 16:9 with 10-bit 4:2:2 colour and 60, 50, 30, 25 or 24 fps. Full HD 16:9 or 17:9 with 10-bit 4:2:2 colour and 60, 50, 30, 25 or 24 fps. High Speed Rec HDMI: Full HD 16:9 with 10-bit 4:2:2 colour and 120 or 100 fps.

Recording Media: Single memory card slot for SD, SDHC and SDXC with UHS-I speed support.

Continuous Shooting: Up to 173 JPEG/large/fine frames at up to 8.0 fps or 38 RAW (lossless compressed) frames using the focal plane shutter. Up to 127 JPEG/large/fine frames at up to 20 fps or 34 RAW (lossless compressed) frames using the sensor shutter. Low speed continuous mode captures at 5.0 fps with continuous AF/AE adjustment. Up to 128 JPEG/large/

fine frames at 30 fps or 46 RAW (lossless compressed) frames using the sensor shutter with a 1.25x crop. 'Pre-Shot' pre-capture buffering at 8, 10, 20 or 30 fps for one second.

White Balance: TTL measurement. Three auto modes, seven presets and three custom settings. White balance shifting/tuning in all modes and presets, and white balance bracketing. Manual colour temperature setting from 2500 to 10,000 degrees Kelvin. Auto White Priority maintains whites under incandescent lighting. Auto Ambience Priority maintains warmer hues under incandescent lighting.

Interfaces: USB 3.2 Gen 2 (Type C), micro-HDMI (Type D), 2.5mm stereo audio input/remote trigger connector.

Additional Digital Features: Sensor cleaning, 20 'Film Simulation' presets (Provia/Standard, Velvia/Vivid, Astia/Soft, Classic Chrome, Nostalgic Neg, Pro Neg High, Pro Neg Standard, Classic Neg, Reala Ace, Eterna/Cinema, Eterna Bleach Bypass, ACROS, ACROS+Yellow, ACROS+Red, ACROS+Green, B&W, B&W+Yellow, B&W+Red, B&W+Green, Sepia), three custom 'FS Recipe' slots (FS1, FS2, FS3), adjustable image parameters (Tone Curve – Highlight/Shadow, Colour Saturation, Sharpness, Clarity and Monochromatic Colour – warm-to-cool or green-to-magenta), 'Colour Chrome Effect' (Strong, Weak, Off), 'Colour Chrome Effect Blue' (Strong, Weak, Off), 'Grain Effect' (Roughness: Strong, Weak, Off. Size: Large, Small), 'Portrait Enhancer LV' (Strong, Medium, Weak, off), eight 'Advanced Filter' effects (Toy Camera, Miniature, Pop Colour, High-Key, Low-Key, Dynamic Tone, Soft Focus and Partial Colour [Red/Orange/Yellow/Green/Blue/Purple]), multi-shot HDR capture (Auto, HDR200, HDR400, HDR800, HDR800 Plus), multiple exposure facility (up to nine shots with Additive/Average/Bright/Dark exposure adjustment), in-camera panoramas (120 or 180 degrees), flicker detection and correction, pixel mapping, 'Lens Modulation Optimiser' (LMO) processing, intervalometer (up to 999 frames), dynamic range expansion (Auto, 100%, 200%, 400%), 'Quick Menu' control screen, real-time histogram display, dual-axis level display, grid displays (choice of two), guidance displays, bracketing functions (AE, Film Simulation, Dynamic Range, ISO, White Balance, Focus), high ISO noise reduction (plus/minus four levels), long exposure noise reduction (On/Off), sRGB and Adobe RGB colour space settings, in-camera editing functions (RAW Conversion [18 adjustable parameters], Erase, Crop, Resize, Protect, Image Rotate, Red-Eye Removal, Copy, PhotoBook Assist), slide show, multi-image playback, 9/100 thumbnail displays, zoom playback, silent mode, Instax print, customisable 'My Menu' (16 items), seven custom 'Quick Menu' settings banks, copyright info, Wi-Fi 2.4 GHz and Bluetooth 5.2 LE wireless connectivity, 'Frame.io Camera to Cloud' support.

Power: One 7.2 volt/1260 mAh rechargeable lithium-ion battery pack (NP-W126S type). In-camera battery charging via USB-C.

Dimensions (WxHxD): body only = 118.4x82.8x46.8 mm.

Weight: body only = 378 grams (without battery or memory card).

Price: \$1679 body only. Choice of silver, charcoal or black finishes. Fujifilm X mount camera bodies and lenses are backed by a three-year warranty when purchased from an authorised Fujifilm Australia reseller.

Distributor: Fujifilm Australia, telephone (02) 9466 2600 or visit www.fujifilm.com.au

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OM SYSTEM

OM-5 MARK II



A LITTLE GOES A LONG WAY

The updates are small, but all significant enough to make the Mark II OM-5 a much more attractive proposition, especially given its compactness and affordability. And there's a smart new 'outdoorsy' colour option too.

With likely the bulk of its resources over the last few years going on the OM-1 models and the OM-3, OM Digital Solutions has adopted more of a 'mend-and-make-do' policy with its lower-end mirrorless cameras. The entry-level OM-D E-M10 IV soldiers on seemingly unaffected by time and the Mark II OM-5 can trace its roots directly back to the OM-D E-M5 which began life in early 2012. The E-M5 II (2015), E-M5 III (2019) and the first OM-5 (2022) have all progressively built on

the foundation of compactness, capabilities and affordability. The OM-5 Mark II continues in the same vein and with largely incremental upgrades over its predecessor, but they're all important in one or another and certainly contribute to a more usable – and desirable – package.

Given that all the Panasonic Lumix G models have become a lot more portly with the latest iterations, the OM-5 II still keeps its slim figure and pretty looks which are enhanced by the addition of a nice new dress. It's called "Sand Biege" which may

sound a bit bland, but is actually rather smart and very much fits in with the prevailing OMDS philosophy of getting back to nature. It's definitely more "Sand" than "Biege" and works particularly well with a black lens (it seems unlikely that there'll be colour matched lenses). Since there's no price premium for the special colour, it's certainly the way to travel if you want something a bit different... which is the main reason for having it as it's certainly not going to fool the wildlife. Hopefully there may be some other colour choices down the track. Of course, the silver or black options are still available and, given its small size and neatly-proportioned styling, the OM-5 II looks good in any finish.

Not a lot has changed externally compared to the previous model, but there is a more pronounced handgrip – which feels both more comfortable and more secure to hold – and some small ergonomic tweaks here and there.

TRIED AND TRUE

On the inside, the 20.37 megapixels 'Live MOS' sensor and the quad-core 'TruePic IX' processor from the earlier model are still on duty so all the related specs are largely unchanged too. The sensor's native sensitivity range is equivalent to ISO 200 to 6400 with extensions down to ISO 64 and up to ISO 25,600. The maximum image size is 5184x3888 pixels for both RAWs and JPEG capture, but there's still no 10-bit HEIF option.

As before, there's a big choice of JPEG image size options derived from five resolution settings, three compression levels and five aspect ratios. Three size settings are configurable in the main shooting menu, created from the camera's custom menu which provides a further selection of two 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 according to how you set up the first two JPEG quality modes.

The fastest shooting speed with the sensor shutter is 30 fps, but with the focus, exposure and white balance locked to the first frame. The slower, 10 fps shooting speed with the sensor shutter allows for continuous AF/AE/AWB adjustment. There's 'Pro Capture H' pre-release buffering which records up to 14 frames at 30 fps prior to shutter release (i.e. when the shutter button is at the half-way position). There's also a 'Pro Capture' mode which also buffers up to 14 frames, but operates at 10 fps. However, the burst lengths are pretty short at the 30 fps shooting speed – just 20 Fine quality JPEGs and 18 RAW files – but extend significantly when shooting at 10 fps when essentially there's no limit on the number of JPEGs (except for the memory card's storage capacity) and you can shoot up to around 138 RAWs in a sequence.

Using the camera's focal plane shutter, the top shooting speed is 6.0 fps with



▲ Styling and design are largely unchanged from the previous model, but then there wasn't much that needed changing... it looks great and the ergonomics work well.

continuous adjustment of the autofocusing, exposure and white balance.

As before, the OM-5 II has a single memory card slot for SD devices and provides UHS-II speed support. It's more conveniently located in the side of the handgrip and not in the base so it's still easily accessed when the camera is mounted on a tripod.

The in-body image stabilisation operates over five axes to give up to 6.5 stops of correction for camera shake. This extends further to 7.5 stops with 'Sync IS' which works along with the optical image stabilisation in selected M.Zuiko Digital PRO series lenses. New is a nifty 'Handheld Assist' display in both the EVF and the monitor screen which shows how steady – or not – you're holding the camera. It works in much the same way as Panasonic's 'I.S. Status Scope' display.

MULTI-TASKING

Sensor shifting also drives the 'High Res Shot' capture function which has both hand-held and tripod modes and captures eight frames with half-pixel shifts. The hand-held mode gives a 50 megapixels file at 8160x6120 pixels or 25 MP at 5760x4320

pixels with JPEG capture, along with a JPEG+RAW option. In the tripod mode, the maximum resolution bumps up to 80 megapixels and 10368x7776 pixels with RAW capture, and either the 50 MP and 25 MP options for JPEGs. These frames are combined in-camera with an added benefit being that the resulting single image also exhibits a two-stop reduction in noise.

'High Res Shot' is one of the OM-5 II's 'Computational Photography' modes which are all essentially multi-shot capture functions in one way or another. They have their own menu page and the others are 'Live ND', focus stacking, HDR and a multiple exposure facility... which is actually only for double exposures. Related to the sensor's read-out speed, you don't get the 'Live GND' virtual graduated neutral density filter feature that's on the OM-1s and the OM-3. The 'Live ND' neutral density filter works by capturing a progressively greater number of short exposures – depending on the setting – which has the effect of creating the motion blur normally produced a single long exposure... as would be the case when a neutral density filter was fitted. Because image stabilisation is again



▲ New 'CP' button allows for direct access to the 'Computational Photography' functions via a menu along the bottom of the monitor screen (right).



▲ On/off power lever replicates 35mm Olympus OM design. It's combined with a dual button arrangement for selecting the drive modes and switching between the EVF and the monitor.



▲ Rear control panel keeps it simple and uses a four-way keypad for all navigational duties. The new menu system comes from the higher OM System models and is a vast improvement over the first OM-5.

operating continuously (and each of the multiple exposures is very short), you can still shoot handheld, even when the 'effective' exposure time equates to one second. In other words, 'Live ND' allows you to increase the exposure time without needing to use a tripod, and you don't need to use small aperture settings either. The OM-5 II has settings for up to ND16 which represents a four-stop reduction in the exposure.

The focus stacking function can be set for up to eight frames with the focus adjustment step ranging from one to ten. Conveniently, again the multiple images are combined in-camera.

There are two auto HDR modes – which capture four frames to give either "high contrast" or "super-high contrast" effects – or it can be set manually to make +/-2.0 EV adjustments over three, five or seven frames; or +/-3.0 EV variations over either three or five frames. This delivers either a composited JPEG or a set of RAW files for post-camera processing.

In the same menu chapter – but listed under the 'Other Shooting Functions' tab – is

the 'Live Composite' function that has been on every Olympus OM-D and OM System camera previously and is designed for low-light photography. It combines a reference background exposure with subsequent multiple exposures that only add any bright light sources (such as stars) thereby avoiding any overexposure. It can run for up to six hours, and the 'Live' bit means it can be monitored in real-time in the monitor or the EVF; likewise also the other Live Bulb/Time shooting modes. Image stabilisation is available with 'Live Composite' shooting so you can also use it hand-held (within reason, of course).

Auto bracketing is available for exposure, white balance, flash, sensitivity, the 'Art Filter' effects and focusing. The focus bracketing can be set to capture up to 999 frames – should you ever need this many – with the focus adjustment step ranging from one (narrow) to ten (wide). However, unlike with the focus stacking functions, these frames have to be combined post-camera.

The in-camera processing options for JPEGs start with a set of eight 'Picture Mode' presets – plus a user-defined

Custom option – along with 16 'Art Filter' special effects which, if you count all the possible variations available for the latter, expands that list to 31. Additionally, there are up to nine 'Art Effects' – one of which can be added to an 'Art Filter' (the available selection varies for each). Then you can also add in a 'Colour Creator' function – another long-serving feature in the OM-D/OM world – which is a nifty in-camera method of adjusting hue and/or saturation using the front and rear input wheels. Consequently, it's possible to include all these options in an 'Art Filter' bracketing sequence, giving a grand total of 41 different versions of an image captured in one hit!

There's also a 'Highlight & Shadow' control – another OM staple – which enables the brightness of the highlights and/or the shadows to be adjusted around a central point. Again, the front input wheel adjusts the highlights while the rear control adjusts the shadows.

The various in-camera corrective functions comprise automatic flicker detection and correction, 'Shading Compensation' which reduces vignetting, noise reduction for both high ISO settings and long exposures, and 'Keystone Compensation' which provides in-camera perspective control (in both the vertical and horizontal planes). When making long exposures and/or using telephoto lenses, the camera's 'Anti Shock' mode switches it to the 'electronic first curtain shutter' – the hybrid sensor and focal plane shutter operation – and enables a delay time to be set (from between 1/8 second to 30 seconds) to allow all physical vibrations to die away before the exposure commences. Finally, 'Fisheye Compensation' offers three settings for correcting the extreme distortion when shooting with the M.Zuiko Digital ED 8mm f/1.8 Fisheye PRO lens.

With autofocus technology having advanced so quickly over the last few years, it's here that the OM-5 II betrays its roots in 2022 and even earlier. Most notable is the absence of AI-based subject recognition modes beyond the less advanced face/eye



▲ Main mode dial can be locked at its settings which include positions for the scene/subject modes and the 'Art Filter' effects.



▲ 'Fn Lever' can be assigned various functions, including switching around how the front and rear input wheels behave.



▲ Single memory card slot is located at the side of the camera and is for SD devices with UHS-II speed support.

detection. However, this can be fine-tuned to focus on either the left or right eye, or whichever one is nearest the camera, the updated control algorithms inherited from the previous model enhance reliability with smaller objects and if the subject turns away briefly.

As before, the hybrid contrast/phase-detection AF system employs 121 measuring points for each and which are all cross type arrays. Frame coverage is 80 percent horizontal and 75 percent vertical with 'Group Target' area modes using either five-, nine-, or 25-point clusters. Additionally, you can create a 'Custom AF Target' area which is adjustable for size – from the full 11x11 points down to just one with any shape variation in between. Up to four 'Custom AF Target' areas can then be stored for recall when shooting, for example, a particular type of subject.

The OM-5 II also has the 'Starry Sky AF' mode which essentially focuses the lens at infinity (and adjusts the AF scanning when shooting at night) with the options of Speed or Accuracy settings for hand-held or tripod-mounted shooting respectively. Low light sensitivity extends down to -6.0 EV at f/1.2 and ISO 200.

Manual focusing is assisted by a magnified image (up to 14x and also available with AF) and/or a focus peaking



▲ New "Sand Biege" body colour fits in with OM System's outdoorsy emphasis.

display which can be set to red, yellow, black or white; and at low, normal or high intensities.

The exposure control is based on the 324-point 'Digital ESP' multi-zone metering with alternative patterns for centre-weighted average and spot, the latter with option of being adjusted to emphasise either the highlights or the shadows, a long tradition that goes back to the Olympus 35mm SLRs days, notably the OM-4 and OM-3.

There's the standard set of 'PASM' exposure control modes with the auto overrides comprising an AE lock, up to +/-5.0 EV of compensation and 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. Fully automatic shooting is available via the camera's 'iAuto' mode which has automatic subject/scene selection. Alternatively, you can switch to the 'SCN' setting on the main mode dial and manually select one of 22 subject/scene modes which are conveniently grouped into six main categories – People, Motion, Indoors, Nightscapes, Scenery and Close-Ups. All these modes are fully automatic too, but in 'iAuto' there's a selection of overrides for colour saturation, colour balance, brightness, background blur and freeze/blur motion. These are accessed via a touch tab in the monitor's display and adjusted via slider-type controls on-screen.

MAKING MOVIES

As with its photographic capabilities, for video the OM-5 II also shares all the same basic specs and features of its predecessor which, of course, are dictated by the sensor and processor. There are, however, some notable new features which include a front tally lamp, a red image frame which appears in the finder/monitor when recording, and a couple of new video-centric colour profiles. OM Cinema 1 and OM Cinema 2 are borrowed from the OM-3 and create cinematic looks straight out of the camera. In a nutshell, Cinema 1 is primarily designed for landscapes and natural scenes as it mainly enhances the blues in the shadows and the yellows in the highlights, while Cinema 2 lowers the overall contrast – but not as much as the Flat profile – while also adding some cyan to give, and we quote, a "soft expression". Both are said to have the same highlights range as the OM-Log400 profile which remains if you want to deal with colour and contrast in post-production. The OM-5 II also allows for vertical video shooting (i.e. 9:16 aspect) for social media and a webcam capability (albeit only at 720p res). There are no time limits imposed on clip durations beyond, of course, battery and camera temperature.

Of course, the camera's size and weight are pluses as is the fully-articulating monitor screen which can be turned to face forward.

There's 4K DCI (i.e. 17:9 aspect) recording, but at 24 fps only and 4K UHD at 30, 25 or 24 fps, but only with 8-bit 4:2:0 colour both internally and externally. Nevertheless, 4K DCI at 24 fps gives a very decent bit rate of 237 Mbps. The 4K video recording is with inter-frame LongGOP compression only, but intraframe (ALL-I) compression is available with Full HD at 24/25/30 fps and gives a maximum bit rate of 202 Mbps. The faster FHD frame rates are with LongGOP compression as is FHD at 100/120 fps which the sole high speed frame rate setting. Time lapse video recording is possible in both 2K and 4K and delivers a Motion JPEG AVI file.

The HDMI output delivers uncompressed 8-bit 4:2:2 colour with both 4K and 2K video (8-bit 4:2:0 colour is recorded internally, but is upsampled to 4:2:2 when recording simultaneously).

There's the option of recording high-quality sound with 24-bit quantisation with sampling at 96 kHz. However, there's only a stereo audio input and no output for connecting headphones. Sound levels can be adjusted manually and there's a built-in attenuator for shooting in very

noisy locations. A wind-cut filter can be set to Low, Standard or High. It's also possible to adjust the audio levels sent to the headphones. Additional electronic stabilisation is available when shooting video and enables remarkably smooth hand-held shooting, but it results in a small crop of 1.18x because the image is shifted electronically on the sensor. However, using the up-graded IBIS is equally effective when shooting video.

The OM-5 II's video functionality includes time-coding, flicker reduction, continuous AF with face/eye tracking, the 'PASM' exposure modes, the 'Picture Mode' presets (with the Muted setting delivering a flatter colour rendition), most of the photographic 'Art Filter' effects, the Highlight/Shadow control, lens vignetting correction, the grid guides, the real-time histogram display and the focus peaking display. Touch controls are available for AF point selection, pull focusing, exposure adjustment, audio recording levels and power zooming.

If you're more serious about video, it's hard to go past a Panasonic Lumix G series camera, but the OM-5 II certainly has enough for the casual video-maker to create good-looking clips and will potentially also work well for vlogging and content creation for social media.



◀ Test images captured as JPEG/large/superfine files and using the M.Zuiko Digital ED 12-40mm f/2.8 PRO and 40-150mm f/4.0 PRO zoom lenses. Shutter-priority auto exposure control, multi-zone metering, Vivid 'Picture Mode' preset and ISO settings from 200 to 1600. Straight out of the camera, these files exhibit excellent detailing with linearly smooth tonal gradations, good contrast and pleasing colours across the palette. The dynamic range is also very good and, subjectively at least, on a par with the higher-end models and their stacked sensors.

Here too, you can access a whole bunch of 'Shooting Tips' for a variety of subjects.

The OM-5 II's focal plane shutter has a speed range of 60-1/8000 second with flash sync up to 1/250 second and a 'B' timer for up to 30 minutes. The sensor shutter has a speed range of 60-1/32,000 second, but due to the sensor's read-out speed flash sync is only up to 1/50 second. The hybrid 'electronic first curtain shutter' (EFCS) – automatically engaged for the 'Anti-Shock' shooting – has a speed range of 60-1/320 second, the camera will switch to the FP shutter if faster speeds are required.

The white balance control options comprise two auto modes (the second being the 'Keep Warm Colour' variation), seven lighting type presets (including one for shooting underwater) and provisions for storing up to four custom measurements. As already noted, there's auto bracketing for white balance which operates over three frames. All have fine-tuning which is set via slider-type controls in the monitor screen. Manual colour temperatures can be selected over a range of 2000 up to 14,000 degrees Kelvin.

IN THE HAND

The OM-5 II's control layout is little changed back to the E-M5 III, but there are some notable changes. We've already mentioned the bigger handgrip and it really does make a difference to the handling especially with the longer and heavier lenses. New is a button marked 'CP' which stands for 'Computational Photography' and was introduced on the OM-3. This enables direct access to the CP modes and is used in conjunction with the rear input wheel. It brings up a ribbon menu along the lower edge of the monitor screen which displays all the possible setting options, although in some cases, various things need to be preset via the main menu in order to be available via for selection on-screen.

The top panel layout centres on main mode dial – which can be locked at its settings – and is accompanied by front and rear input wheels. These are actually also standalone dials. The shutter release is located within the front input wheel and there's a dedicated button for setting the ISO, but the one for exposure compensation

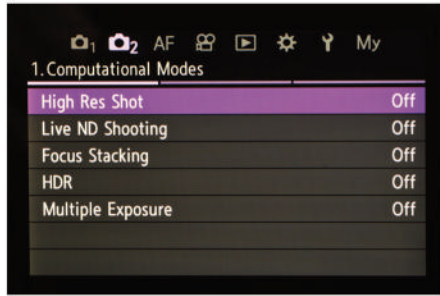


TEST IMAGES – ISO RANGE

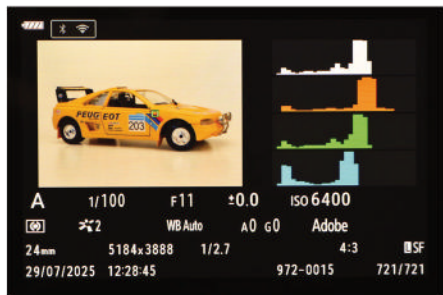
The OM-5 Mark II's native sensitivity range is equivalent to ISO 200-6400 with extensions down to ISO 100 and 64, and up to ISO 12,800 and 25,600. Noise is very well managed across the entire native range and there's only a marginal loss of definition and saturation at ISO 12,800. The ISO 25,600 setting is still usable provided you aren't planning to make big enlargements. These test images are JPEG/large/fine files taken in the aperture-priority auto exposure mode with the aperture set to f/11 so the exposure time varies to compensate for the ISO adjustments. Noise Reduction and the Noise Filter are switched off. OM System M.Zuiko Digital 12-40mm f/2.8 PRO.



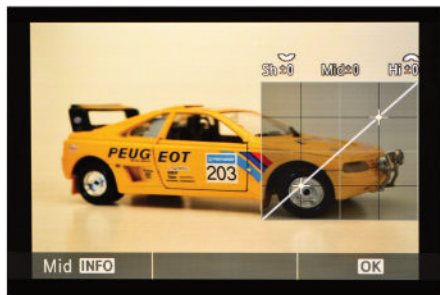
▲ 'Super Control Panel' display in the monitor provides quick and easy access to a whole host of capture-related function with the added efficiency of touch screen selection.



▲ 'Computational Photography' functions have their own menu page, as do all the auto bracketing sequences. Purple-colour chapter essentially covers all the camera's multi-shot capture modes.



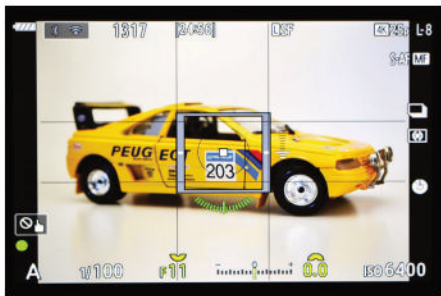
▲ Replay/review screen options include a thumbnail with a set of brightness and RGB channel histograms along with the main capture info.



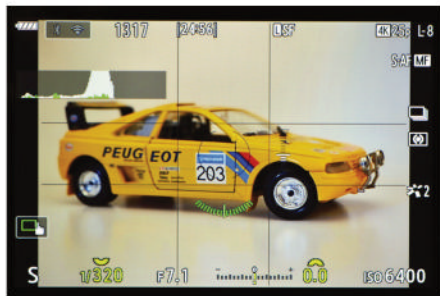
▲ 'Highlight & Shadow' control allows for the brightness of the highlights and/or the shadows to be adjusted around a central point in a similar to Photoshop's Curves tool.



▲ The 'Colour Creator' function works in a similar way to Photoshop's Saturation/Hue adjustment; giving access to 30 hues, each with eight levels of saturation.



▲ New 'Handheld Assist' display shows how steadily – or not – you're holding the camera. It works in much the same way as Panasonic's 'I.S. Status Scope' display.



▲ Live view screen is extensively customisable with a real-time histogram, dual-axis level display, a grid guide and highlight/shadow warnings. The histogram includes an internal section – colour green – which shows the brightness values within the active autofocus point or cluster of points.



▲ Monitor-based 'Super Control Panel' provides a comprehensive set of settings and function icons with the option of direct access via the touch screen.

that was on the first OM-5 has been replaced by the 'CP' button. You can, of course, if preferred, return it to this function via the customisation menu. A total of seven buttons can be re-assigned along with the rear panel's keypad and the 'L/Fn' button which is provided on some M.Zuiko Digital lenses. The twin input wheels are also customisable depending on the exposure mode in use. Additionally, these can be easily switched between different functions via an 'Fn Lever' on the rear panel (also customisable).

Perhaps the most important of the Mark II's upgrades is its menu design which has now trickled down from the OM-1, OM-1 II and OM-3. It's a huge improvement on what went before in terms of its graphic, the function groupings (which are colour coded)

and the ease of navigation which you can do by chapter, page or line. It may look like a small change, but it has a big impact on the camera's operational efficiencies.

As before, there's also the option of the 'Super Control Panel' which is available as a stand-alone display in the monitor or superimposed over the live view image (when it's called 'Live Control'). These cover everything you're likely to need to access when shooting and are included in the touch screen implementation, but the main menu continue to be only navigable using the external controls. The other touch screen operations include focusing point/zone selection – with or without automatic shutter release – and a touchpad facility (which Olympus calls the "AF Targeting Pad") for use with the EVF. It's also available

in review/replay for functions such as browsing and zooming.

The viewfinder is unchanged from the earlier model so uses an OLED panel with a resolution of 2.36 megadots, a magnification of 0.68x (35mm equivalent) and a refresh rate of 60 fps. These specs continue to look pretty tame by current standards, but as with the OM-5, in practice the finder works just fine in terms of its sharpness colour and contrast.

Both the EVF and the monitor are adjustable for brightness and colour balance plus there's a choice of three displays styles for the viewfinder. Two of these essentially replicate the read-outs of a film-era viewfinder (Style 1 replicating the OM-4's white-on-blue display) while the third duplicates the monitor's

7.62 cm LCD TFT panel is adjustable for swing and tilt, and has a resolution of 1.037 megapixels.

The live view screen can be customised with a real-time histogram, dual-axis level indicators, both highlight and shadow warnings (in red and blue respectively) and a superimposed grid (selected from a choice of six and with a choice of colours too). The highlight and shadow warnings have adjustable thresholds and the real-time histogram display includes an internal section – shown in green – which shows the brightness values within the selected focusing point or cluster of points.

Also borrowed from the higher-end models is a 'Night Vision' mode which modifies the image display's brightness to maintain viewing in very low light or at night, but without unduly compromising your night vision. An 'Anti-Flicker LV' facility reduces the flickering on the live view display when shooting under artificial lighting. It can be set to 50/60 Hz depending on the country you're in, or to Auto.

The review/replay screens can also be configured to include a thumbnail image with a full set of histograms (i.e. brightness and the RGB channels), a larger brightness histogram superimposed over the image, and both highlight and shadow warnings. The in-camera editing functions comprise Shadow Adjust (i.e. for dynamic range expansion), Red-Eye Fix, Trim, Aspect, B&W, Sepia, Saturation, Resize, 'e-Portrait' processing and RAW-to-JPEG conversion.

Another small but important upgrade is the adoption of a Type C USB connection, replacing the dark ages Type B and which benefits in-camera battery recharging. However, at USB 2.0 speed, it's still pretty slow for data transfer. The other interfaces are micro HDMI (Type D), a stereo audio input (3.5 mm minijack), a wired remote (2.5 mm), and a PC standard flash hotshoe. The wireless connectivity options are WiFi (the 2.4 GHz band) and Bluetooth LE (version 4.2). The OM-5 II can operate as a UVC/UAC compatible webcam via its USB C connection.

The camera is powered by the same 1210 mAh BLS-50 lithium-ion battery pack as before which is good for a quoted 310 shots per charge (but there are economy settings which will extend this further).

The construction is polycarbonate panels over a magnesium alloy chassis with weather sealing to the same IP53 standard as the OM-1 models and the OM-3. In terms

of the protection against moisture, this certification means that the camera had to be able to withstand water being sprayed on it continuously at a 60-degree angle for at least three minutes. The bodyshell is also insulated to allow operation in subzero temperatures down to -10 degrees Celsius.

SPEED AND PERFORMANCE

Loaded with a SanDisk Extreme Pro 64 GB SDXC UHS-II memory card and using the focal plane shutter, the OM-5 Mark II captured a burst of 80 JPEG/large/superfine frames in 13.153 seconds which represents a shooting speed of 6.08 fps. Switching to the sensor shutter, a burst of 99 best-quality JPEGs was recorded in 9.9 seconds dead which, without needing too much calculation, represents a shooting speed of exactly 10 fps. The 30 fps speed is achieved with Fine quality JPEGs and here a sequence of 28 frames was captured in 0.936 seconds to give a shooting speed of 29.9 fps. The Superfine quality test file sizes averaged 12.6 MB in size while the Fine quality JPEGs – of the same subject matter – were 11.4 MB.

With the AF lacking the AI-derived smarts of the higher-end OM System models – and which, incidentally, Olympus pioneered with the brilliant E-M1X – it's still quick and reliable even in quite low light conditions.

The face/eye tracking works well even with erratically moving subjects and also stays locked on when the subject turns away briefly, or moves away from the camera. You can also select a specific person from among a group. Utilising the large selection of AF area modes – particularly being able to create custom sizes and shapes – is a key to getting the best out of the Mark II's AF as it enables more precise selectivity to better match specific subjects. It's perhaps a bit surprising that there aren't recognition modes for birds and animals – given OM System's "It's In Our Nature" slogan – but it's pretty easy to fine-tune the AF for these subjects and it's certainly quick enough in terms of its responsiveness and subsequent continuous adjustment.

Not surprisingly, the IQ performance doesn't differ very much from that of its predecessor, but there will have certainly been a few tweaks to the image data processing algorithms since that model. Straight out of the camera, the superfine quality JPEGs have excellent detailing with linearly smooth tonal gradations, good contrast and very pleasing colours across

the palette. The dynamic range is also very good and, subjectively at least, on a par with the higher-end models and their stacked sensors. The dynamic range also makes for more flexibility with RAW capture, giving plenty of scope for post-camera exposure adjustments for the highlights and shadows. However, as with all the current OM System models, the JPEG performance is a very big plus.

Noise reduction is well managed – in terms of maintaining both definition and saturation – up to ISO 6400. At the higher sensitivity settings there's some softening of the finer detailing and an increase in graininess, but you can still shoot at ISO 12,800 without any significant loss of image quality. Overall then, the OM-5 II's low light performance is excellent, but as we noted with the previous model, the IBIS – not to mention the lightness of the camera and many of the M.Zuiko Digital lenses – makes it possible to keep on shooting at lower ISO settings in many situations in order to optimise both the sharpness and the colour reproduction.

THE VERDICT

With the base camera now some years old, the OM-5 II belies its veteran roots in a couple of areas, but the original model was a great little package and all the desirable fundamentals remain – size, weight, speed, handling, IQ and affordability. The operational efficiency gets a big boost from the newer and speedier menu system and the overall ergonomics benefit from the better-shaped grip. While there are obviously features to suit shooters who want the camera to do the work – and the pricing will appeal to beginners – the OM-5 II still rewards for effort and has all the capabilities needed for the more experienced photographer to achieve the results they're chasing, both technically and a creatively. Better still, it gets you where you want to go both intuitively and logically.

It's still the prettiest mirrorless camera on the market – yes, even compared to the OM-3 – and one of the most compact of the SLR-style models even in the M43 world. The retro elements of the control layout are well balanced with modern-day functionality, but arguably the best aspect of the OM-5 II is that it's such a thoroughly enjoyable camera to use in any situation. And, while prices seem to be creeping up everywhere with upgraded models, the Mark II OM-5 still represents exceptional value for money. 📸



VITAL STATISTICS

Type: Enthusiast-level interchangeable lens digital mirrorless camera with Micro Four Thirds System bayonet lens mount.

Focusing: Automatic hybrid system using contrast-detection and phase-difference detection measurements via the imaging sensor with 121 focusing

points for each (all cross types). Frame coverage is 80 percent horizontal and 75 percent vertical. Focus points may be selected manually or automatically by ▶

OM System OM-5 Mark II \$1,699

body only, recommended retail.



VITAL STATISTICS

the camera. 'Group Target' area modes with five-, nine-, or 25-point clusters or custom shape/size (up to four can be created and stored). 'Starry Sky AF' with Speed Priority (handheld) and Accuracy Priority (tripod) modes. Manual switching between one-shot and continuous AF modes. Face/eye detection and auto tracking. Eye detection can be set to Right, Left or Near priority. Continuous manual override available with single-shot mode. Low light sensitivity down to -6.0 EV at f/1.2 and ISO 200. Low light/contrast assist via built-in illuminator. Focus assist via magnified image (3x/5x/7x/10x/14x) and focus peaking display (Red, Yellow, White or Black with 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 and f/2.8).

Exposure Modes: Continuously-variable program with shift, shutter-priority auto, aperture-priority auto, metered manual, TTL auto flash and TTL flash. Plus 22 subject/scene modes. Automatic scene detection in 'iAuto' mode.

Shutter: Electronic, vertical travel, metal blades, 60-1/8000 second plus B (up to 30 minutes) and T. Flash sync to 1/250 second. Sensor shutter has a speed range of 60-32,000 second with flash sync up to 1/50 second. Electronic first curtain shutter (EFCS) has a speed range of 60-1/320 second. Exposure compensation up to +/-5.0 EV in 1/3, 1/2 or full stop increments.

Viewfinder: OLED EVF with 2.36 megadots resolution, 100 percent coverage and 0.68x magnification (35mm equivalent). 60 fps refresh rate. Adjustable for brightness and colour balance plus 'Simulated OVF' mode. 7.62 cm LCD TFT monitor panel with 1.037 megadots resolution, tilt/swing adjustments and touch screen controls. Adjustable for brightness and colour balance. Auto/manual switching between EVF and monitor screen.

Flash: No built-in flash. External flash units connect via hotshoe.

Additional Features: Polycarbonate bodyshell over a magnesium alloy chassis and sealed against dust and moisture (up to IP53 standard) 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: 20.37 million (effective) pixels Live MOS (CMOS) with 17.4x13.0 mm imaging area and 4:3 aspect ratio. No optical low-pass filter. Sensitivity equivalent to ISO 200-25,600 (extendable to ISO 64 and 100).

Focal Length Magnification: 1.97x.

Formats/Resolution:

- Three JPEG compression settings (Superfine, Fine and Normal), RAW output (12-bit RGB colour with lossless compression) and RAW+JPEG capture. Five resolution settings at 4:3 aspect ratio; 5184x3888, 3200x2400, 1920x1440, 1280x960 and 1024x768

pixels.

- Five resolution settings at 3:2 aspect ratio; 5184x3456, 3216x2144, 1920x1280, 1296x864 and 1008x672 pixels.
- Five resolution settings (four available at any one time) at 16:9 aspect ratio; 5184x2920, 3200x1800, 2560x1440, 1920x1080, 1536x864, 1280x720 and 1024x576 pixels.
- Five resolution settings at 1:1 aspect ratio; 3888x3888, 2400x2400, 1440x1440, 960x960 and 768x768 pixels.
- Five resolution settings at 3:4 aspect ratio; 2912x3888, 1824x2432, 1104x1472, 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:

- MOV format (MPEG-4 AVC H.264 codec, 8-bit 4:2:0 colour, IPB compression) – 4K DCI at 4096x2160 pixels, 24 fps and 17:9 aspect ratio (237 Mbps). 4K UHD at 3840x2160 pixels; 30, 25 or 24 fps and 16:9 aspect ratio (up to 102 Mbps).
- Full HD at 1920x1080 pixels; 30, 25 or 24 fps and 16:9 aspect ratio (up to 202 Mbps with ALL-I compression, up to 27 Mbps with IPB); Superfine, Fine and Normal image quality modes.
- Full HD at 1920x1080 pixels; 60 or 50 fps and 16:9 aspect ratio (up to 52 Mbps); Superfine, Fine and Normal image quality modes.
- Full HD at 1920x1080 pixels and 120 or 100 fps; 16:9 aspect ratio.
- HD at 1280x720 pixels; 60, 50, 30, 25 or 24 fps; 16:9 aspect ratio (up to 26 Mbps); Superfine, Fine and Normal image quality modes. No clip length limits.

Audio: Built-in stereo microphones with auto/manual adjustable levels, wind filter and attenuator. Stereo audio input.

Video Features: Hybrid IBIS and electronic image stabilisation, flicker scan, time lapse movie recording (4K, FHD, HD), webcam support via USB, OM-Log 400 colour profile, time code support (rec run, free run, drop frame, non-drop frame), grid lines (choice of six), focus peaking display (Red, Yellow, White or Black; High, Normal or Low intensity). Webcam video/audio streaming via USB C (UVC/UAC support).

HDMI Output: 4K DCI 17:9 at up to 30 fps, 4K UHD 16:9 at up to 30 fps, Full HD 16:9 at up to 60 fps.

Recording Media: Single slot for SD/SDHC/SDXC memory cards with UHS-II speed support.

Continuous Still Shooting: Unlimited JPEG/large/fine frames at up to 6.0 fps and up to 149 RAW frames with the focal plane shutter and continuous AF/AE adjustment. Up to 20 JPEG/large/fine frames or up to 18 RAW frames at 30 fps with the sensor shutter. Up to 10 fps with the sensor shutter and continuous AF/AE adjustment. 'Pro Capture High' mode pre-captures 14 frames at up to 30 fps prior to full shutter release, 'Pro Capture Low' pre-captures 14 frames at up to 10 fps.

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 Type C (USB 2.0 speed), HDMI Type

D, 3.5 mm stereo audio input (supports plug-in power), 2.5 mm remote trigger input.

Additional Digital Features: Five-axis sensor-shift image stabilisation with up to 6.5 stops of correction for camera shake (up to 7.5 stops with 'Sync IS' and supporting lenses), 'Handheld Assist' stabilisation display, multi-shot 'High Res Shot' capture via pixel shift with in-camera processing (Handheld Mode = 25 or 50 MP resolution, JPEG or RAW; Tripod Mode = 25, 50 or 80 MP resolution, JPEG or RAW), 'Live ND' built-in ND filter effects (equivalent to ND2, 4, 8 or 16), Adobe RGB or sRGB colour spaces, flicker detection and correction, 'Flicker Scan' for high-frequency light sources, long exposure noise reduction, high ISO noise filter, 'Keystone Compensation' digital perspective control, 'Fisheye Compensation', eight 'Picture Modes' (i-Enhance, Vivid, Natural, Muted, Portrait, Monotone, e-Portrait, Underwater), one user-defined custom '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 (30 colours, eight saturation levels), 'Highlight/Shadow' function, 16 'Art Filter' adjustable effects applied at capture (Pop Art I/II, Soft Focus, Pale & Light Colour I/II, Light Tone, Grainy Film I/II, Pin Hole I/II/III, Diorama I/II, Cross Process I/II, Gentle Sepia, Dramatic Tone I/II, Key Line I/II, Watercolour I/II, Vintage I/II, Partial Colour I/II/III [18 colours], Bleach Bypass I/II, Instant Film), up to nine 'Art Effects' depending on the selected 'Art Filter' (Soft Focus, Pin Hole, White Edge, Frame, Star Light, Blur – Top And Bottom, Blur – Left And Right, Shade – Top And Bottom, Shade – Left And Right), 'Live Composite' function, 'Live Bulb/Live Time' modes, anti-shock shooting, intervalometer (up to 9999 frames), multi-shot HDR capture, auto bracketing modes (AE, WB, ISO, flash, focus and 'Art Filters'), focus stacking, 'Super Control Panel' screen, real-time histogram display, guide grids (choice of six and adjustable for colour), 'Night Vision' mode, 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 (Shadow Adjust, Red-Eye Fix, Trim, Aspect, B&W, Sepia, Saturation, Resize and e-Portrait), in-camera RAW-to-JPEG conversion, in-camera RAW image overlay, copyright info, silent shooting, DPOF support, built-in WiFi 2.4 GHz and Bluetooth LE 4.2 wireless connectivity.

Power: 7.2 volt/1210 mAh rechargeable lithium-ion battery pack (BLS-50 type). In-camera battery charging possible via USB C.

Dimensions (WxHxD): body only = 125.3x85.2x52.0 mm.

Weight: body only = 370 grams (without battery pack and memory card).

Price: \$1699 body only. Silver, black or 'Sand Biege' finishes. \$2199 with M.Zuiko Digital ED 12-45mm f/4.0 PRO zoom lens (silver or black only). OM Digital Solutions provides a two-year warranty for OM System cameras and lenses purchased from an authorised Australian reseller.

Distributor: OM Digital Solutions Australia, telephone 1300 659 678, or visit <https://explore.omsystem.com/au/en/>



Photo: Seiichi Nakamura

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ZOOM H5STUDIO HANDY RECORDER

REPORT BY PAUL BURROWS



▲ Compact and lightweight, Zoom's H5studio portable digital audio recorder offers exceptional flexibility with its modular design and numerous input/output connection options.

SOUND MOVES

Portable audio recording specialist Zoom has packed all its expertise and the latest digital audio technologies into the much-updated version of its popular H5 Studio modular field recorder.

The more you delve into video making with a mirrorless camera or a DSLR, the more you'll find out about the limitations of their audio capabilities... and the more you'll come to realise just how important is the sound side of any production. An external microphone is the least that you can do to improve

audio quality, but an external digital recorder takes things a lot further, and the brand that's made its name in portable digital audio equipment is Zoom. Introduced back in 2014, the original Zoom H5 digital audio recorder was one of the first models with interchangeable microphone models which made it exceptionally versatile. Consequently, it has become a staple for many sound

recording applications including podcasts, interviews, dialogue audio and in-the-field work. The H5studio version incorporates additional features and new audio recording technologies to make it even more of an all-rounder as well as enhancing performance.

It's still a very compact and lightweight unit that's comfortably hand-held – and can also be easily mounted on a camera – but it now has the largest microphones ever fitted to a Handy series model – with 19.4 millimetres diameter diaphragms – which have a wider frequency response, a maximum SPL (sound pressure level) of 140 dB, and an expanded dynamic range of 132 dB.

As before, the H5studio allows for the microphone modules to be interchanged so the standard X/Y capsule – which is supplied with the unit – can be easily swapped for pick-ups that are better suited to specific applications. It also introduces Zoom's

new Capsule System 3.0 which, among other things, supports 32-bit 'float' audio recording. However, the H5studio is still compatible with existing optional modules such as mid-side shotgun-type microphone and an XLR/TRS input unit, along with a new dual-channel wireless module which drives a pair of lavalier lapel mics (for interview set-ups) and is also a System 3.0 component which supports 32-bit 'float' recording.

This is a technology that's designed to eliminate clipped and distorted audio which happens when there are sudden increases (or reductions) in the sound levels... often an issue when recording on location. It also eliminates the need to continually adjust the recording levels manually to correct for changes in the sound level. However, the H5studio also supports the 16- and 24-bit formats which don't need any post-production processing, but do require gain adjustments when recording. Take your pick, and two sets of dedicated gain knobs are provided. For video-makers, there's the provision for connecting optional TCA-1 or BTA-1 timecode adapters, but the H5studio also supports wireless timecode from the Atomos UltraSync BLUE module.

There's a host of physical connections with the audio inputs including a pair of XLR/TRS which both support 48V phantom power and use Zoom's F-series preamps with dual AD converters to support the 32-bit float recording, and deliver the wide 132 dB dynamic range. There's also what Zoom calls "advanced look-ahead" limiters which anticipate potential overloads and so prevent distortion.

IN THE FIELD, THE H5STUDIO IS VERY EASY TO SET UP WITH NICELY TACTILE CONTROLS AND THE COMPREHENSIVE COLOUR DISPLAY WHICH TELLS YOU EVERYTHING YOU NEED TO KNOW AT A GLANCE."

The H5studio can record up to six tracks (i.e. the stereo mics and audio four inputs)

with sample rates of up to 192 kHz. It's also a 4-in/2-out USB audio interface for Mac, Windows, iOS, and

Android, supporting 32-bit float and 16/24-bit

recording. So, for

example, it's possible

to live stream and

also simultaneously

record a back-up

to an onboard

microSD memory

card. Furthermore,

with either the TCA-

1 or BTA-1 timecode

adapters connected,

the Zoom Handy Control &

Sync app for iOS can be used

remotely control start/stop recording

and synchronise timecodes. The H5studio

accepts microSDXC memory cards and now

up to 2.0 TB in capacity and, usefully, has

a 30-second automatic recording back-up

system.

Other notable features include a 5.0 cm

full colour LCD display (which shows input

levels via real-time waveforms), a built-in

loudspeaker, headphone and line-level

outputs (the latter for direct connection to

a camera to sync video and audio), and a

mono mode (for recording narration, vocals

or interviews). However, it's not a touch

screen so menu navigation is still the old

school way.

Onboard power now comes from four

AA-size batteries which Zoom says are good

for around 15 hours of operation, but the

unit's USB C connection supports external

power delivery. With batteries installed, the

H5studio still only weighs a modest 410

grams.

In the field, the H5studio is very easy to

set up with nicely tactile controls – notably

the gain knobs – and the comprehensive

colour display which tells you everything you

need to know at a glance. Zoom has actually

made the H5studio more purely a recording

tool – the previous model, for example,

had some basic audio editing functions –

and this actually streamlines its useability

and its operational efficiency. Perhaps not

surprisingly given the word 'studio' is in the

model name, the sound is indeed studio

quality with very clean highs, a well-defined

mid-range and a rich, solid bass. The stereo

imaging with the standard mic capsule is

both wide and very convincing, and handling

noise seems well suppressed provided you

don't keep changing your grip while using

it handheld. With the H5studio mounted

▶ The X/Y microphone capsule supports

32-bit 'float' audio recording, with their

larger diaphragms enabling a wider

frequency response and a maximum SPL

(sound pressure level) of 140 dB.



on a camera – there's a standard ¼-inch tripod screw socket on the back of the unit as the starting point – you still need to take care with handling and using any physical controls because it is quite sensitive to bumps and knocks. Obviously there's plenty of flexibility when it comes to how you record your video soundtracks – line-level to the camera (which will still be better than using the camera's mics), direct to the H5studio's memory card or to an external recorder – so it will just depend on how much you want to do in postproduction and, of course, how far you want to chase the best possible sound quality. However, in any set-up or situation, the H5studio delivers a command performance. 🎧

The Zoom H5studio Handy Recorder is priced at \$669 and for more information (or to find an authorised dealer) visit <https://www.dynamicmusic.com.au>





HASSELBLAD XPAN

These are the cameras that, in one way or another, had a significant influence on photographers and photography. The XPan didn't change the world, but it changed the way we saw the world and is still a highly sought-after cult camera to this day.

It's telling that, nearly 20 years after production of the 35mm Hasselblad XPan ended, Fujifilm's exceptional GFX100RF fixed lens medium format digital camera pays homage with its panoramic 65:24 aspect ratio setting. The link, of course, is that the XPan was really a Fujifilm camera, the TX-1, and agreement was that this model would be sold only in Japan, leaving the Swedes with the rest of the world.

With its comparatively compact size and big "33x44" sensor, the GFX100RF has perhaps become the nearest thing to the 'digital XPan' that everybody was yearning for as 35mm film's glory days became clearly numbered. The 65:24 aspect represents an imaging area 44x16



Notably, the XPan extended the creativity of the panorama format into many more applications beyond landscapes, such as photojournalism and sports."

millimetres on the Fujifilm camera's 102 megapixels sensor and a healthy 50 MP of resolution at the lens's 28mm-equivalent focal length, but there's also the option of applying further crops to give, effectively, 35mm, 50mm and 63mm. And even at the heaviest crop, the resolution is still a useable 10 MP.

The XPan was an interchangeable lens camera, but there were only ever three lenses to choose from and a great many users stuck with the 'standard' 45mm f/4.0 prime which was equivalent to a 25mm on the 24x65 mm frame. The short telephoto 90mm f/4.0 – equivalent to 50mm – was arguably less versatile and the later 30mm f/5.6 aspherical ultra-wide – which equated to a 17mm – was prohibitively expensive. The XPan's 'double 35mm' format was its unique feature and made it bigger than a conventional 35mm rangefinder design, but not by a significant amount and, handily, it could be switched to take 24x36mm frames at any point on a roll. If you stuck with shooting only panoramas, you got 20 frames from a 36-exposure length of 35mm film.

Hasselblad's first ever 35mm camera, the XPan was launched in August 1998 and although a manual focus model, was largely automated everywhere else including exposure control, ISO setting (via the DX code system) and a motorised film transport. It was considered too expensive to go down the autofocus route as the

XPan lenses were essentially medium format designs in order to obtain a wide enough imaging circle. The mid-roll format switching was made by prewinding the film immediately after it is loaded so it was then essentially exposed 'in reverse' so only the last bit of leader needed to be wound back into the cassette at the end. An important advantage of this arrangement is that if the camera back is accidentally opened – which was actually possible to do unthinkingly with the XPan – all the exposed frames were safely tucked away in the cassette. The camera's frame counter also went in reverse.

The XPan had TTL-OTF centre-weighted average metering backed either aperture-priority auto or manual exposure control. The overrides for the former included an AE lock, up to +/-2.0 EV of compensation and auto bracketing over three frames (in both formats). A metal-bladed focal plane shutter delivered a speed range of 8-1/1000 seconds with flash sync up to 1/125 second. External flash units were synched via a hotshoe or a PC terminal, but the system never included a dedicated flash. Continuous shooting was possible at 1.2 fps in the single frame mode and 0.9 fps in the double frame mode.

The camera's construction employed a combination of aluminium and titanium with a shallow rubberised handgrip on the 'Blad, a wooden one on the Fujifilm TX-1 (which, incidentally, could be interchanged).

Given its size, automation and comparative pricing, the 35mm XPan made panorama photography a whole lot more accessible and certainly much more convenient compared to using the dedicated rollfilm cameras around at the time such as Fujifilm's own 6x17mm format GX617. It was also a lot cheaper to run – you get just four 6x17cm frames from 120 rollfilm. Notably, the XPan extended the creativity of the panorama format into many more applications beyond landscapes, such as photojournalism and sports.

The updated XPan II model arrived in April 2003 and it was sold in Japan as the Fujifilm TX-2. Apart from some variations in finishes, there were no differences between the different branded versions, but there were many improvements over the first model, including the addition of shutter speed read-outs in the viewfinder, a complete redesign of the exposure compensation selector (too easily miss-set previously), a multiple exposure facility and an additional two-second delay setting for the self-timer. XPan II and TX-2 production ended in January 2006, but desirability factor appears undiminished with second hand prices now often exceeding – and by a significant margin in some cases – what either generation model cost when new. Rarity adds a premium to the Japan-only Fujifilm cameras so the later TX-2 is arguably the most desirable model to have, but any of them are a pure joy to own and use. 📷



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LEICA M EV1



VIEWING PLEASURE

It's happened. There's a Leica M camera without the M bit. The traditional messsucher has given way to an electronic viewfinder. The rest of the M EV1 is still a classic Leica M so how do the old and the new get along?

Here's a controversial thought to kick off with. Optical viewfinders really are a thing of the past, and the EVF is very much the present and also the future. OK, so the RF-OVF is now labelled an 'experience' because it's different – and, of course, Leica's famous viewfinder/rangefinder arrangement is truly a piece of photographic heritage – but it's nowhere nearly as convenient to use or as informative as a good, high-resolution EVF. Fujifilm

offers its hybrid arrangement on the X100 and the X-Pro series cameras, but it would be interesting to know how many users switch to the EVF and simply leave it there. You could be forgiven for thinking that Leica might have gone down the hybrid route which would probably been less controversial, but instead it's gone all the way with live view which is telling in itself.

If you've become accustomed to the luxuries of an EVF, the OVF 'experience' can be a strange one to say the least.

▲ External dimensions and classic styling are unchanged from the RF-equipped M11 models as is the construction which – like the other black paint versions – comprises a diecast aluminium chassis with milled aluminium top and bottom covers.

Leica devised – and then steadily refined – its *messsucher* rangefinder viewfinder to deliver something better than what was available at the time, but over time new technologies have also come up with something better... much better, especially for a camera like a digital Leica M. Of course, you're still going to be able to buy the rangefinder versions just as you can still buy a 35mm Leica M. It's worth remembering that Leica has kept building film models after the first digital cameras and, indeed, long before the M6 was revived. Right now you can choose from four M11 digital RF models and three 35mm film models... so the M EV1 certainly isn't the end of the world even if you are an out-and-out purist. What it is, though, is a way into the M system for people who aren't

out-and-out purists, but like the idea of the heritage and history mixed with just a little more modern-era convenience.

The biggest advantage of the EVF here is that you see exactly what the lens sees regardless of its focal length... which is a very big plus with M mount ultra-wides and telephotos. The optical viewfinder in the M11 bodies has a field-of-view just slightly wider than that of the 28mm focal length. The LED brightline frame pairs are for 35mm and 135mm, 28mm and 90mm, and 50mm and 70mm. Anything wider than 28mm requires a dedicated optical finder which is fitted to the hotshoe mount. In practice, this is a pretty awkward arrangement and, at the other end of the focal range, the frames for 90mm and 135mm are quite small which also makes framing and composition more of a challenge. With the exception of the M11-D, the M11s do have a live view feed to their monitor screens, but since this is a fixed panel it can be difficult to use in bright lighting conditions or when there are reflections. No matter which way you look at it – pun half intended – the M EV1's EVF makes a whole lot of sense on many levels.

Perhaps not surprisingly, the EV1's finder is the same 5.76 megadots resolution OLED panel as is used in the Q3 and SL3



THE RF-OVF IS NOW LABELLED AN 'EXPERIENCE' BECAUSE IT'S DIFFERENT, BUT IT'S NOWHERE NEARLY AS CONVENIENT TO USE OR AS INFORMATIVE AS A GOOD, HIGH-RESOLUTION EVF."



▲ Rear control panel is unchanged from the M11 and M11-P so it's simplicity itself. Monitor screen is fixed and has a toughened 'Gorilla Glass' anti-scratch faceplate.

models. It has a magnification of 0.76x, a refresh rate of 60 fps and is adjustable for brightness either manually or automatically based on the ambient light levels. As on any contemporary mirrorless camera, you can choose to use only the EVF, only the monitor screen or have the camera automatically switch between the two using a proximity sensor in the viewfinder's eyepiece (which is adjustable for sensitivity). The eyepiece also incorporates a strength adjustment accessed via a small pop-out wheel alongside and with a range of -4.0 to +2.0 dioptres.

Apart from the fact that the EVF relays the angle-of-view of any lens – a big advantage with one of our favourites, the Voigtlander Ultra-Wide Heliar 12mm f/5.6 – it also has the various live view display components that were previously only seen in the monitor. Leica calls them "Capture Assistants" and you can configure up to four 'Info Profile' screens with whichever set of elements you want, selected from an 'Info Bar', a guide grid (either 3x3 or 6x4), a highlight warning (with a selectable

clipping point), a focus peaking display (in red, green, blue or white and either low or high sensitivity), a dual-axis level indicator and a real-time histogram. You can have them all in one screen or, if you like a cleaner view, cycle through one or more displays as you've configured them. The EVF will also provide previewing of exposure, white balance and colour plus, of course, also a captured image for review or replay. What's more, given there's only manual aperture control on an M mount lens so it's always stop-down metering, you also get continuous depth-of-field previewing too. Additionally, the effects of any filters fitted to the lens can also be gauged.

The biggest change operationally is to the focusing which is still manual, but you're now guided by a magnified image or the just-mentioned focus peaking display. The monitor's touch screen allows you to pick a point on the subject on which to centre the magnified image, switchable between 5x and 10x. You can then move the focus point around in the EVF using the four-way navigator keypad on the camera's back



▲ Eyepiece is similar in design to the Q3's and incorporates a proximity sensor for auto switching between the EVF and the monitor. Strength adjustment applied via the pop-out wheel seen to the right.



▲ Classic shutter speed dial is also a milled metal component. Sensor-based shutter extends the fastest shutter speed to 1/16,000 second.



▲ Shutter release retains the traditional cable release socket.

LEICA M EV1 **ON TRIAL**

panel. However, there's no 'touch pad' operability as such so you can't move the focus point or the magnified area from the touch screen while using the EVF. Electronic image stabilisation activates with the magnified image to keep it steadier and help make it easier to determine sharp focus, especially with longer focal length lenses.

While some people say the focus peaking display can be a distraction, it works well in any lighting – the red or white edging tends to be the most effective – and makes it a lot easier to gauge focus and, since you're seeing the whole frame, also the depth-of-field.

It's worth noting here that the M EV1 can recognise the attached lens via Leica's 6-bit optical coding system – read via a sensor in the camera's mount – and this information is recorded in an image file's metadata. It also has built-in profiles for both Leica M and R mount lenses (the latter fitting via an adapter) for applying selected in-camera corrections, most notably for vignetting.

NEW, BUT THE SAME

Wisely perhaps, apart from the EVF (which is, nevertheless, a very big change indeed), Leica hasn't messed with the rest of the digital M camera formula beyond some small revisions to the external control layout which we'll get to shortly. On the inside, though, virtually nothing changes from the standard M11.

Consequently, M EV1's sensor is the same 60.3 megapixels (effective) BSI-type CMOS used across the M11 family and which incorporates an ultra-thin dual-layer IR/UV filter glass designed to ensure the acute-angle light rays all pass through rather than being reflected, thereby enhancing both the corner sharpness and the colour reproduction.

The sensitivity range is equivalent to ISO 64 to 50,000 and the maximum image size is



▲ Accommodating the EVF module meant that the ISO dial – on the left side the RF models' top plate – had to go.

9504x6320 pixels for JPEGs and 9528x6328 pixels for RAW capture. There are two smaller image sizes, but no compression level settings which is Leica's way of asking do you really want less image quality? As always with all Leica's digital cameras, the RAW files are captured in the Adobe DNG format with 14-bit RGB colour. The sensor is mated with Leica's 'Maestro III' processor and a 3.0 GB buffer memory. Continuous shooting is at 4.5 fps for a burst of up to 100 JPEGs or 15 RAW files. There's a slow speed mode which runs at 3.0 fps. As per the rest of the M11 family, the M EV1 is exclusively a tool for photography.

As per the standard M11, the M EV1 has 64 GB of internal memory supplemented by a memory card slot for SD devices and which provides UHS-II speed support.

The exposure metering is sensor based and there's also the option of using a sensor shutter as well as the hybrid 'electronic first curtain shutter' configuration. There's a choice of four metering patterns – multi-zone, centre-weighted average, highlight-weighted average and spot. As since the film-era M7, the exposure modes are aperture-priority auto or manual with the overrides for the former being up to +/-3.0 EV of compensation which can be set in 1/3,

2/3 or full stop increments. The focal plane shutter has a speed range of 60 minutes to 1/4000 second plus 'B' and 'T' for even longer exposures (there's still a cable release socket in the shutter button). Flash sync is up to 1/180 second. The sensor shutter has a speed range of 60-1/16,000 second. Exposure bracketing is available over three or five frames again with up to +/-3.0 EV of adjustment, but you can shift it up or down to give either +6.0 EV or -6.0 EV and also

THE BIGGEST ADVANTAGE OF THE EVF IS THAT YOU SEE EXACTLY WHAT THE LENS SEES REGARDLESS OF ITS FOCAL LENGTH... WHICH IS A VERY BIG PLUS WITH M MOUNT ULTRA-WIDES AND TELEPHOTOS."



▲ Battery incorporates its own cover with the same safety release arrangement as on the SL and Q series cameras.



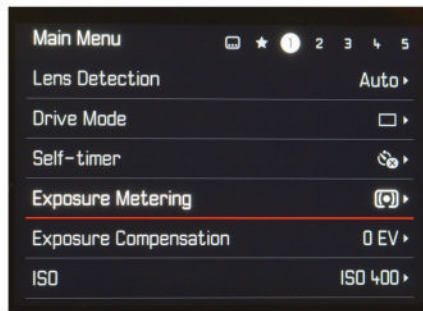
▲ Front panel still has the RF brightness window, but on the M EV1 it houses the self-timer's countdown LED. Smaller round window alongside is the ambient light sensor that determines the auto brightness adjustments for the EVF and the monitor display.



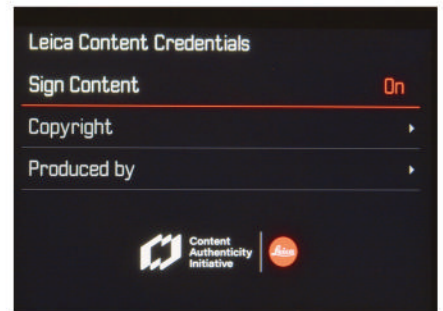
▲ Hotshoe has contacts for Leica's flash units but, logically, unlike with the M11, you now can't fit the Visoflex 2 accessory EVF.



▲ Monitor-based 'Quick Menu' display/control panel offers the speed and convenience of touch screen access for both the exposure settings and the function tiles.



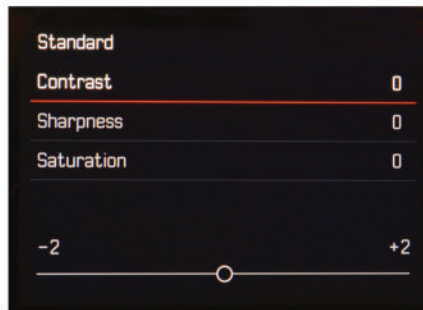
▲ Menu system is logically arranged and easy to navigate. With just five main pages, you won't get lost and everything is easy to find.



▲ Following the M11-P which introduced the feature, the M EV1 offers Content Credentials to encrypt metadata in an image file which confirms its authenticity. Subsequently, any changes to that file will also be recorded using technology created by the Content Authenticity Initiative (CAI).



▲ Five 'Film Style' profiles are available for JPEG capture. Adjustable parameters are for contrast, sharpness and colour saturation.



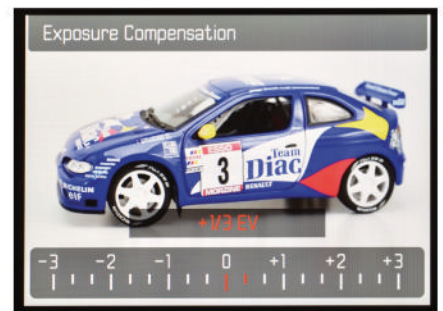
▲ EVF-related submenu settings are obviously new. You can use the finder and the monitor separately or set auto switching between the two.



▲ Live view screen elements include a real-time histogram, guide grids and dual-axis level indicator. You can have them all in one display or in separate displays and, of course, in both the EVF and the monitor. Focus peaking in red is also shown here.



▲ Review/replay screen includes a brightness histogram and basic capture info.



▲ Exposure compensation setting scale overlay is shown when this function is selected from the main menu. Adjustments can be in 1/3, 2/3 or full stop increments.

combine it with the exposure compensation setting so you can extend even further up 9.0 EV in either direction. Will you ever need this? Probably not.

The white balance control options comprise auto correction, a selection of eight lighting presets, a custom measurement (which Leica calls a 'Grey Card'... as in the good old days of determining colour balance), and manual colour temperature setting over a range of 2000 to 11,500 degrees Celsius. However, there's a new option called 'White Balance

Adjustment' which allows for fine-tuning of the colour balance along the green-to-magenta and blue-to-yellow axes. Once set, this adjustment will apply to everything, but you can switch it on and off as desired.

ESSENTIAL ELEMENTS

In terms of the in-camera processing options, the M EV1 still adheres to Leica's *das wesentliche philosophy*... which essentially means just stick to the essentials. So, there's a choice of five 'Film Style' presets which are Standard, Vivid, Natural, Mono-

chrome and Monochrome High Contrast. The colour modes are adjustable for contrast, sharpness and saturation; while the B&W ones have the first two parameters. Perhaps deliberately, there isn't access to the 'Leica Looks' that are available for the Q3 and SL3 series models.

You can also adjust the noise reduction for JPEGs over three settings and, as mentioned earlier, there are three image size settings. One of these is obviously the full effective resolution of 60.3 megapixels, but the two smaller options employ Leica's





ISO 64



ISO 100



ISO 200



ISO 400



ISO 800



ISO 1600



ISO 3200



ISO 6400



ISO 12500

ISO RANGE

As with the previous colour M11 models, noise is very well managed up to ISO 12,500 and, although some chroma noise is evident at ISO 25,000, this setting is still useable and retains pretty good definition. These images are JPEG/large files taken using the aperture-priority auto exposure mode with the aperture set to f/11 so the exposure time varies to compensate for the ISO adjustments. Noise Reduction is switched off. Leica Summilux-M 50mm f/1.4 ASPH.

TEST IMAGES

Test images captured as JPEG/large files using the Vivid and Monochrome High Contrast 'Film Style' profiles, and with the Leica Summilux-M 50mm f/1.4 ASPH and Voigtlander Ultron 21mm f/1.8 Aspherical. With 60 megapixels of resolution on tap, there are exceptional levels of detailing with super-crisp definition and beautifully smooth tonal gradations. Vivid profile delivers a pleasing level of saturation while still maintaining the subtler shades.



ISO 25000



ISO 50000

'Triple Resolution Technology' to give a resolution of either 36.5 or 18.4 megapixels, but without a crop so there's no increase in the attached lens's effective focal length. It works by grouping sets of pixels together which also gives an increase in the dynamic range of up to one stop and a reduction in noise that's equivalent to two stops. Additionally, there's also the convenience of the small file sizes when it comes to image processing and storage.

Alternatively, there are two 'Digital Zoom' settings which equate to 1.3x or 1.8x and deliver, again, 36 or 18 megapixels, but now with a conventional crop of the full frame image so the effective focal length increases accordingly. These 'Digital Zoom' settings

are again available with either JPEG or RAW capture, but with the latter the full size image is still recorded (i.e. the crop is only tagged in the metadata for when the file is processed post-camera).

There's an intervalometer which can be programmed for up 9999 frames, and the camera's self-timer has the option of either two- or 12-second countdowns. Additionally, the handy 'Perspective Control' feature from the original M11 is also on the menu, and corrects JPEGs in-camera for the converging or diverging verticals which occur when the camera is tilted up or down. This function generates a frame in live view which adjusts in real time to show you exactly how the image will be cropped as it's processed.



WISELY PERHAPS, APART FROM THE EVF – WHICH IS, NEVERTHELESS, A VERY BIG CHANGE – LEICA HASN'T MESSED WITH THE REST OF THE DIGITAL M CAMERA FORMULA.”

IN THE HAND

The replacement of the rangefinder viewfinder with the EVF brings a few visual changes – most notably the absence of the OVF window on the front of the camera – but the M EV1 still looks and feels very much like a classic Leica M camera. It's actually 45 grams lighter than the standard black M11, but still has the traditional heft and precision fit. As per the other models in a black finish, the construction combines a magnesium alloy chassis with machined aluminium top and bottom covers.

Accommodating the EVF has meant ditching the physical ISO dial so sensitivity adjustment is now only via the monitor's 'Quick Menu' control screen or the main menu. The lever on the front panel which allowed the brightline frame pairs to be previewed in the optical finder is retained, but now has different functions depending on whether it's flicked left or right. However, logically, Leica has kept the options here related to focusing and framing – namely the focus aids and the digital zoom settings... the latter with frame indicators that look exactly like the classic brightline ones which is a nice touch.

The rear panel control layout is unchanged from the RF models and comprises the aforementioned four-way navigator key pad with a centre 'enter' button, an input wheel – which also has a press-in action that serves as another multi-function control, but has exposure compensation as the default – and a trio of keys accessing the menu system, image replay and a third multi-function option. These can be used to assign the functions that's you'll most likely need in the field such as the ISO and WB settings. The 'Quick Menu' control screen comprises touch tiles for a total of 12 functions such as the metering patterns, white balance modes, drive modes (which include the self-timer, intervalometer and exposure bracketing),

capture settings and Leica FOTOS connection. It also displays all the exposure settings – again adjustable via touch controls – along with info such as the battery power level and the available data storage capacity.

The M EV1's monitor screen is again fixed with a resolution 2.33 megadots and, like the EVF, is adjustable for brightness with the option of an auto adjustment based on the ambient lighting conditions.

The replay/review image includes a brightness histogram and a highlight warning plus there's a zooming function and two thumbnail pages displaying either 12 or 20 images.

The USB C connection is tucked away at one end of the baseplate – alongside the battery/card compartment – and allows for in-camera battery recharging as well as direct access to the internal memory. It also serves as a wired connection to an Apple iPhone (or iPad) for remote camera control, image transfer and a live view feed using the Leica FOTOS app. Of course, you can also do this via WiFi – and the M11-P has both the 2.4 GHz and 5.0 GHz bands – but the hard-wired route is both quicker and more stable (although it requires a dedicated cable). Bluetooth 'always on' wireless connectivity is also available.

The M EV1's battery compartment arrangement is the same as that on the other M11 models (and also SL and Q series cameras) so the compartment cover is actually part of the battery and unloading is a two-stage process. A locking lever releases the pack, but it won't drop out of the compartment until you press on the cover back in slightly which depresses a sprint-loaded lug, enabling the battery to be fully withdrawn. The memory card slot is in the same compartment which means the battery always has to come out first. The 1800 mAh BP-SCL7 lithium-ion battery pack is now good for only around 245 shots as both the finder and the monitor chew up

power. This is down from around 700 shots for the M11 and M11-P when using their optical viewfinders.

Following the M11-P, the M EV1 has 'Content Credentials' using the Content Authenticity Initiative (CAI) technology which encrypts digital provenance information in the image files captured by the camera. Subsequently, the authenticity of these images can be verified at any time using a freely-available, open-source CAI tool. This means that ownership and copyright details can't be tampered with and, any subsequent editing, is recorded so, for example, a photographer can prove that an image is exactly as it was taken by the camera (particularly important for some major photo competitions). Any changes made after capture – even basic edits such as cropping or exposure adjustments – is added to the secure CAI data and so is there for all to see. Leica was first, but more camera makers are getting on-board as well as organisations that use images such as newspapers and press agencies. Ultimately, the goal is that any image published online will have a traceable history which will show what, if anything, has changed since it was taken to reveal any alterations, manipulation or AI-generated elements.

SPEED AND PERFORMANCE

With a SanDisk Extreme PRO 64 GB SDXC UHS-II memory card loaded, the Leica M EV1 recorded a burst of 20 JPEG/large frames in 4.439 seconds which gives a continuous shooting speed of spot on 4.5 fps. The file sizes for this test averaged 24.5 MB.

Not surprisingly, the image performance is the same as that of the colour

M11s which means, at full resolution, exceptional levels of detailing with crisp definition and silky smooth tonal gradations. With JPEG capture, the Standard 'Film Style' profile delivers the classically Leica punchy contrast with true-to-life colours,



while the Monochrome High Contrast setting does exactly what it says on the label, again creating the distinctive Leica B&W 'look'. Of course, the unique optical quality of the Leica M lenses – a result of the carefully-curated in-house glass formulations – is also making an important contribution here.

The 'Film Style' parameters obviously allow for the adjustment of contrast and saturation, but we did most of our testing using the Vivid profile which gives a very pleasing colour reproduction across the spectrum without ever looking excessive.

Even at the two lower resolution settings – thanks to the pixel binning approach – the image quality remains truly excellent and here the definition further benefits from the inherent reduction in noise while the increased dynamic range is particularly noticeable in the enhanced shadow detailing.

The high ISO performance is excellent



so very nearly the full native sensitivity range is in play. The noise reduction processing for JPEGs balances sharpness and saturation very nicely all the way up to ISO 12,500. There's some chroma (colour) noise evident at ISO 25,000, but the definition is still good so this setting is still useable if you aren't planning to make very big enlargements (or are shooting in B&W).

The wide dynamic range delivers plenty of exposure latitude when shooting in RAW, giving plenty of scope for increasing detailing in the brighter highlights or the darker shadows without noise becoming an issue.

THE VERDICT

If you've never used a Leica M camera before, but really like the idea of being part of what is still a pretty exclusive family – with some very illustrious members over the decades – then the M EV1 is the one for you. It's still a distinctly Leica prestige camera in terms of its looks, build quality,

handling and largely manual operation, but it has all the EVF-derived user-friendliness when you hold it up to your eye.

Given how much of the heritage and mystique of the M series is tied up with the RF OVF, it was undoubtedly a brave move for Leica to produce a model with an EVF, but use the M EV1 and it quickly all makes sense. Far from detracting from the M camera experience, the EVF actually enhances it. The real essence of usage and operation are still there, but the enjoyment of the traditional elements is greatly enhanced by the conveniences and efficiencies delivered by the EVF.

Let's face it, the rangefinder viewfinder has been a bit of an anachronism since the popularisation of 35mm SLR with its through-the-lens viewing and focusing, hence its promotion ever since as an 'experience'. But if you want to experience what's really the most important aspect of a Leica M camera – the remarkable optical characteristics and performance of the lenses – the EVF provides a smoother and much more user-friendly route to this objective. Certainly, keep the *messsucher* for the film models, but a digital M simply works a whole lot better with an EVF. 📷

VITAL STATISTICS



LEICA M EV1 \$14,200

body only, recommended retail price

Type: RF-style full frame digital camera with interchangeable lenses using Leica M-bayonet mount (with contacts for 6-bit coding for lens ID).

Focusing: Manual via image magnification (5x or 10x) or focus peaking display (red, green, blue or white colours, and high or low sensitivity).

Metering: TTL using the image sensor with multi-zone, centre-weighted average, highlight-weighted or spot measurements, and TTL flash metering using the imaging sensor with centre-weighted average measurements.

Exposure Modes: Aperture priority auto and metered manual.

Shutter: Electronic focal plane, vertical travel, metal blades. 60 minutes to 1/4000 second plus 'B' and 'T' (up to 60 minutes). Flash sync up to 1/180 second. Sensor shutter has a speed range of 60-1/16,000 second. Hybrid 'electronic first curtain shutter'. Exposure compensation of up to +/-3.0 EV in 1/3-stop increments.

Viewfinder: OLED-type EVF with 5.76 megadots resolution, 0.76x magnification and 60 fps refresh rate. Adjustable for brightness manually and with auto brightness control. Auto/manual switching between EVF and monitor screen. Fixed 7.5 cm LCD monitor with 2.33 megadots resolution and scratch-resistant 'Gorilla' glass faceplate. Adjustable for brightness manually and with auto brightness control.

Flash: No built-in flash. External flash units sync via hotshoe.

Additional Features: Diecast magnesium bodyshell with aluminium top and bottom covers sealed for

dust protection and shower proofing auto exposure bracketing (over three or five frames, up to +/-3.0 EV adjustment), AE lock, dual-mode self-timer (two or 12 second delays), audible signals, auto power off, cable release socket.

DIGITAL SECTION

Sensor: 60.3 million pixels (effective) BSI-type CMOS with 23.9x35.8 mm imaging area. No optical low-pass filter. Sensitivity equivalent to ISO 64-50,000.

Focal Length Increase: None.

Formats/Resolution:

- Three JPEG resolution settings; 9504x6320, 7392x4896 and 5248x3472 pixels.
- Three RAW (Adobe DNG) resolution settings; 9528x6328, 7416x4928, 5272x3498 pixels. RAW+JPEG capture. 24-bit RGB colour for JPEGs, 42-bit RGB colour for RAW DNG files.

Recording Media: One slot for SD/SDHC/SDXC memory cards. UHS-II speed support. Internal memory has 64 GB storage capacity.

Video Recording: No video recording capabilities.

Continuous Shooting: Over 100 JPEG/large frames at 4.5 fps or 15 RAW DNG files. Low speed shooting at 3.0 fps.

White Balance: Auto correction with eight presets, one custom setting, white balance adjustment (green-magenta, blue-yellow), manual colour temperature setting (2000 to 11,500 degrees Kelvin).

Interfaces: USB Type C and flash hotshoe.

Additional Digital Features: Content Authenticity Initiative (CAI) secure metadata, live view, intervalometer (up to 9999 frames), five 'Film Style' presets (Standard, Vivid, Natural, Monochrome and Monochrome High Contrast), adjustable 'Film Style' parameters (Contrast, Sharpness and Saturation), digital zoom (1.3x and 1.8x, equivalent to 35mm and 50mm focal lengths), 'Extended Dynamic Range' dynamic range expansion processing for JPEGs (Off, Medium, High), Perspective Control (On/Off, with real-time framing), real-time histogram, highlight warning (with adjustable clipping), guide grid (choice of 3x3 or 6x4), dual-axis level indicator, automatic long exposure noise reduction, user-defined custom 'Favourites' menu, six 'User Profile' memories, battery power level display, card/internal memory space displays, brightness histogram with playback, adjustable image review time, 12/20 thumbnail displays, playback zoom, copyright information, sensor cleaning, WiFi (2.4 or 5.0 GHz bands) and Bluetooth 4.2 LE wireless connectivity, Apple MFi support via USB C (requires dedicated cable).

Power: One 7.4 volt, 1800 mAh rechargeable lithium-ion battery pack (BP-SCL7 type). In-camera recharging available via USB C.

Dimensions (WxHxD): 139.0x80.0x38.5 mm.

Weight: Body only = 413 grams body (without battery).

Price: Body only = \$14,200 Black finish.

Distributor: Leica Camera Australia Pty Ltd, telephone (03) 9248 4444 or visit <https://au.leica-camera.com> To purchase online go to <https://leica-store.com.au>

HASSELBLAD

X2D II 100C



LOOKING ON THE BRIGHTER SIDE

The cool Swede is now a lot cooler... and way hotter too, as Hasselblad really starts to properly realise the potential of its mirrorless medium format platform.

REPORT BY PAUL BURROWS

Despite Hasselblad pipping it at the post (although just) with the first medium format mirrorless camera, you'd have to say that Fujifilm has made all the running in this category ever since. While the Hasselblad X1D was undeniably prettier and classier looking, Fujifilm's GFX50S was much better executed and subsequently significantly more workable and flexible camera. This has continued into the 100 megapixels models with the GFX100 II even having some sporting applications. But Hasselblad has been steadily making up ground, and the X2D 100C certainly realised more of the potential that had looked so promising back in 2016.

The X2D II 100C goes a whole lot further and really starts to look like a medium format camera that you might contemplate over a full frame model... which has undoubtedly been part of the GFX system's success. Yes, it's still more expensive than any GFX body, but tellingly, it's cheaper than

any Leica digital M. Just saying.

Not only does the Mark II X2D get up to speed with things like continuous autofocus – believe it or not, making its first appearance in a Hasselblad X mount camera – but there are some headline-making features such as ten stops of image stabilisation correction. Yep, ten stops and with a “44x33” size sensor too. Plus, there’s a twist which is both very Hasselblad and gives the new camera a notable selling point with an easy-to-appreciate benefit.

Hasselblad calls it “end-to-end HDR” which means that the camera’s default capture setting is for 10-bit HDR HEIF files – with the option of ‘Ultra HDR’ JPEGs – and it has a high-brightness and high-contrast monitor screen so you can see something of the extended dynamic range when viewfinding and the full range when replaying the HDR files in-camera. It’s probably worth noting at this point that we’re talking proper HDR single images here, and not the multi-shot capture modes which combined under- and overexposed shots to mimic HDR in a single frame that was still technically SDR.

Hasselblad says that the ‘Ultra HDR’ JPEGs have three stops more dynamic range compared to those using the sRGB colour space, and the extended brightness map is embedded in the file to maintain backward compatibility with any viewing screen but provide the extra dynamic range with devices that support HDR.

This is a smart move because these ‘Ultra HDR’ JPEG files immediately have more universal usability than HEIFs which, despite becoming more widespread as a capture option on mirrorless cameras, remain less convenient to share or display. Additionally, HDR capture is with the auto exposure control modes only and using what Hasselblad calls ‘Smart Metering’, which assesses a scene’s brightness levels and range and will automatically adjust the exposure accordingly to optimise the dynamic range.

However, it’s worth noting that, except with very contrasty scenes, the H2D II 100C isn’t simply underexposing to gain more tonality in the brighter highlights, but actually capturing additional highlight data (i.e. and extended highlight ‘headroom’) which is usually clipped with a standard JPEG output. In other words, the DR extension is only into the highlights, but since this has always been the most problematic area with digital capture (blocked-up shadows can always be lightened more easily), it makes a noticeable difference with scenes that have very bright highlights.

OUTER SPACE

In essence, the camera is using the P3 colour space – both for its monitor display and the new ‘Hasselblad Natural Colour



▲ Large monitor screen takes up a lot of the rear panel.

Solution with High Dynamic Range’ (HNCS HDR) image processing – which has a much wider gamut than sRGB and, tellingly, is why photos on a smartphone or a tablet screen always look so good. Bear in mind, we’re only talking about display colour spaces here.

With the H2D II 100C, this combines with the sensor’s ability to capture a wider range of tones, but the key thing here is that Hasselblad takes HDR capture a lot further in-camera by making it both more accessible and more workable in practical terms... because you can see what you’re getting and there’s enhanced flexibility with the outputs. Furthermore, the camera’s RAW files can be processed to take advantage of the P3 colour gamut and the HDR tonal range using the latest version of Hasselblad’s Phocus Mobile 2 app or the Phocus For Mac software. Notably, the app can also apply HNCS HDR processing to RAW files taken with the X2D 100C and the X1D II 50C along with the later CFV 100C and CFV II 50C digital capture backs.

We see the world in HDR – both in reality and now on screens big and small as HDR-optimised displays are starting to become more widely used – so the Hasselblad is enabling in-camera enhancements to colour and contrast that we normally have to do post-camera to produce an image that looks right. It’s why the X2D II 100C is attracting so much interest despite costing north of \$12,000 for the camera body and, while it’s likely others will follow with making HDR photography the standard, Hasselblad has again started something big just as it did way back with its first 6x6cm film format SLR in 1948.

However, it’s worth noting that the X2D II is actually less expensive than the original

X1D was when it was launched and also its predecessor... and it’s a significantly superior camera to either.

PICK THE CROP

The sensor is, of course, essentially the same Sony-made BSI-type CMOS imager that’s used across Fujifilm’s 102 megapixels GFX line-up, but here it’s tweaked for Hasselblad’s specific requirements. It employs a conventional Bayer filter pattern and goes without an optical low-pass filter (OLPF) to help optimise sharpness. As already noted, Hasselblad’s unique colour science gets to work downstream along with noise reduction processing and the like. As it is on the GFX cameras, the effective pixel count is actually 101.8 megapixels... actually closer to 102 MP than Hasselblad’s quoted 100 MP. No matter, you’re still getting the same resolution from either system.

The native sensitivity is equivalent to ISO 50 to 25,600 so the base setting is slightly lower than the previous model’s



THE X2D II IS ENABLING IN-CAMERA ENHANCEMENTS TO COLOUR AND CONTRAST THAT WE NORMALLY HAVE TO DO POST-CAMERA TO PRODUCE AN IMAGE THAT LOOKS RIGHT.”

HASSELBLAD X2D II 100C ON TRIAL

► Top view shows just how shallow is the X2D II body, helped by not having a focal plane shutter (the system uses leaf shutters in the XCD lenses).

ISO 64 while the highest setting is a stop above the Fujifilm GFX cameras' top of ISO 12,800. Interestingly however, unlike Fujifilm, Hasselblad doesn't provide any extensions beyond ISO 25,600, opting not to push noise levels (or the effects of noise reduction processing with JPEGs and HEIFs) to a point which unduly compromises image quality. And, let's be honest, just how often do you shoot at sensitivity settings higher than ISO 25,600? Exactly.

There's a modest increase in the dynamic range compared to the X2D 100C, up to 15.3 stops – from 15 stops – with 16-bit RAW capture at ISO 50. More practically, such a wide DR also delivers benefits at the higher sensitivity settings and when shooting in the compressed image formats.

The maximum image size is 11656x8742 pixels – with a pixel pitch of 3.76 microns – at the standard aspect ratio of 4:3 which Hasselblad dubs '645'... as in the shape of a 6x4.5cm film frame (although this sensor is smaller than the true 645 imager that Phase One uses). There's a choice of crops which Hasselblad also equates with traditional film frame sizes. It's a nice touch which emphasises that the H2D II 100C is purely a stills camera and, like Leica's current M models, also one with a long and illustrious heritage in film photography.

As with Fujifilm's GFX100RF, there's an 'XPan' crop which gives a panoramic 65:24 aspect ratio (i.e. 2.7:1) as per the 35mm rangefinder camera that was another Hasselblad 'big bang'. The other crop options are 1:1 (of course, '6x6'), 7:6 ('6x7'), 5:4 ('4x5'), 11:8.5, 297:210 (which is A4 size), 3:2 ('6x9'), 3:2 Crop ('24x36'... i.e. 35mm or full frame), 16:9 (even though there isn't a video mode), and 2:1 ('6x12'). You can create a 'My Crop Modes' menu of favourite shapes – for speeding up selection – and adjust the opacity of the cropping mask depending on whether you like to see what's happening beyond the frame or find it a distraction.



Also similar to Leica, Hasselblad keeps the capture options to the bare essentials. Beyond the crops, there is only one image size with RAWs captured as uncompressed 3FR RAW files and both JPEGs and HEIFs with set compression ratios. The SDR colour space is sRGB. Lens corrections and noise reduction are all performed automatically by the camera which has no provisions for manual adjustments or to switch them off. There are no adjustable colour profiles either – or even a B&W mode – so here Hasselblad still has the post-production mindset that really held back the earliest X series cameras by compromising their in-camera functionality. That said, the HNCS HDR processing delivers exceptional out-of-the-camera results in terms of the colour rendition and the tonality so you're less likely to want to do very much in terms of any subsequent editing. It's worth noting that the 16-bit 3FR RAW files, in particular, also offer plenty of flexibility when it comes to adjusting exposures and colours. The Phocus software – which is a free download – is necessary to edit HDR HEIF files, but Photoshop and Lightroom can handle the HDR RAW and JPEG files.

Sensor shifting is used to provide the in-body image stabilisation which has five axes

of movement and, as already noted, with up to ten stops of correction for camera shake at the centre of the image frame, and eight stops at the edges. Fujifilm's GFX100 II was previous medium format camera IBIS king with 8.0 stops of correction.

Ten stops with such a big sensor is quite an achievement. However, just whether you can actually make full use of this capability in practice is debatable – as the theoretically-possible shutter speeds will likely be too long even for the steadiest of hands – but obviously it will extend the hand-holding possibilities with some lenses.

SEEING IN THE DARK

Aside from the HDR in-camera workflow, the other significant upgrade is to the X2D II 100C's autofocus which has hybrid phase/contrast-detection measurements that are now supplemented by Light Distance and Ranging (LiDAR). The LiDAR technology comes from Hasselblad's parent, dji, and is employed in drones as part of the collision avoidance measures. It's an active system which bounces pulsed laser beams off the subject to determine its distance, and it works in total darkness so it significantly enhances the low-light AF performance. However, the effective range is around five



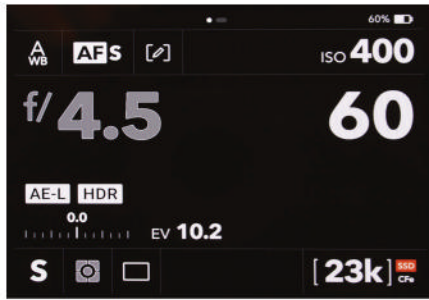
▲ AF illuminator is part of the LiDAR system for low-light assistance. Smaller window closest to the lens mount is the colour temperature sensor which assists the auto white balance measurements.



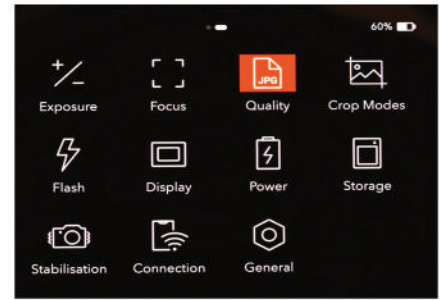
▲ Dedicated buttons for selecting exposure modes and ISO or white balance adjustments. These controls are customisable.



▲ Rear panel control layout now includes a five-way joystick-type controller.



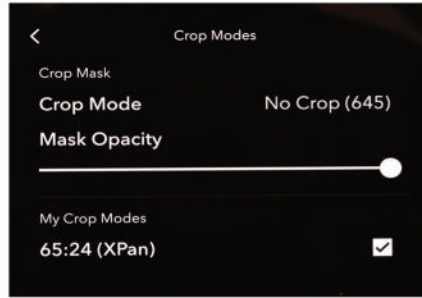
▲ Monitor-based 'Control Screen' has 'quick menu' touch for the key capture-related settings such as white balance.



▲ Main menu is icon based.



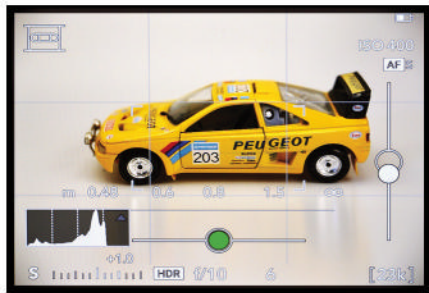
▲ Setting displays are big... very big.



▲ Crop options include, not surprisingly, the XPan's panoramic 65:24 aspect.



▲ HDR capture for JPEGs and HEIFs is the X2D II's default mode.



▲ Live view screen elements include a real-time histogram, 3x3 guide grid, dual-axis level indicator and a focus distance scale. You can have them displayed individually or, as shown here, all at the same time.



▲ Replay/review screens cycle through an info display, brightness histogram and RGB channel histograms.

metres.

There are now 425 PDAF points, giving nearly full frame coverage (97 percent to be precise) and there's also AI-based subject recognition for humans – with face- or eye-detection – pets (i.e. cats and dogs) and



IT'S PART RANGEFINDER CAMERA AND PART REFLEX IN TERMS OF THE DESIGN CUES, BUT SIGNIFICANTLY MORE COMPACT THAN ANY OF THE G MOUNT GFX BODIES."

vehicles which includes motorcycles.

Also new is a choice of area modes called Spot, Extended Spot, Wide and Custom. The Custom mode allows for the adjustment of size and shape (i.e. square or rectangular) and has a 'Tracking Scope' option which limits the subject detection to within the specified zone. The Expanded Spot area mode – which moves the focus target as the subject moves – has 'Arbitrary Tracking' for subjects other than those covered by the AI modes. Obviously, all this is made possible by now having continuous autofocus operation. However, subject tracking is only possible with supporting lenses and only the new XCD 35-100mm f/2.8-4.0 E zoom – launched alongside the camera – can do it straight out of the box, but there's a bunch of primes that are also compatible once they've had a firmware upgrade. These are the XCD 38mm f/2.5 V, XCD 55mm f/2.5 V, XCD 25mm f/2.5 V, XCD 90mm f/2.5 V, XCD 28mm f/4.0 P and the XCD 75mm f/3.4 P.

There's a 100 percent zoom function for checking focus and a full-time manual override for fine-tuning. Alternatively, when focusing manually, AF can be momentarily engaged if the 'Touch AF in MF' function is preselected. Manual focusing is assisted by the magnified image, a focus distance scale and a focus peaking display which is available in a choice of orange, yellow, cyan or white colours, or as an inverse. Another option is a 'Focus Indicator' display in the live view screen which shows the difference between the lens's focus setting and the subject's actual distance along with the direction in which to turn the focusing collar to rectify matters. It turns green when you've nailed it.

Another X series camera first is focus bracketing which can be set for up to 1000 frames – however unlikely the need for this number might be – with the choice Extra Small, Small, Medium, Large or Extra-Large adjustment step sizes. You can also set an exposure delay from 1/8 to 16 seconds.





▲ As with any of the 100 megapixels mirrorless medium format cameras, there's huge scope for cropping without unduly compromising image quality. The image on the right is a huge crop to just 1612x1666 pixels from the original's 8742x11656 pixels – giving a 2.7 megapixels image size – but still has plenty of definition and detail.

Exposure control is based TTL metering with centre-weighted average, centre spot (which is more like a selective area measurement as it covers 25 percent of the frame) and spot. These drive a full set of 'PASM' exposure modes with the auto overrides being an AE lock, up to +/-5.0 EV of compensation and auto bracketing over two, three, five, seven or nine frames with up to +/-3.0 EV variation per frame. Exposure adjustments can be in 1/3, 1/2 or

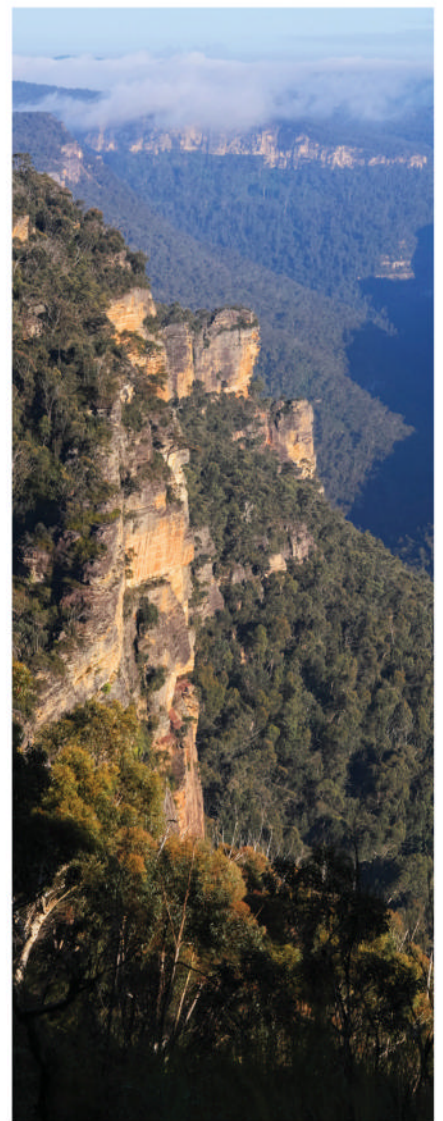
full stop increments except for, curiously, the ISO which is in full stops only.

Continuing a long Hasselblad tradition, the XCD lenses have leaf-type shutters, but the X2D II 100C also has a sensor-based shutter as an alternative. Both run to a timed maximum duration of 68 minutes while the leaf shutters have a top speed of 1/4000 second and the sensor shutter of 1/6000 second. However, the earlier XCD lenses have a top shutter speed of 1/2000 second



▲► The 65:25 aspect crop mode mimics the XPan's double-35mm 2.7:1 aspect panorama frame. Image size is 11656x4304 pixels and the file sizes in the order of 20 MB depending on the subject content.

◀ Test images captured as 'Ultra HD' JPEGs with the Hasselblad XCD 35-100mm f/2.8-4.0 E zoom lens fitted to the X2D II 100C. Obviously, it's not possible to show with a printed image the extended highlights and generally brighter colours that would be evident on an HDR display. Nevertheless, the out-of-the-camera JPEG image quality is superb thanks to the 100 megapixels resolution and the 'Hasselblad Natural Colour Solution' (HNCS) processing. The finest details are still crisply rendered, the colours balance saturation and realism across the spectrum very nicely, and the tonal gradations are beautifully smooth, creating plenty of depth in an image. Not surprisingly, there's a very wide dynamic range. HDR JPEGs are also quite workable in terms of adjusting for highlight or shadow detail.





ISO 50



ISO 100



ISO 200



ISO 400



ISO 800



ISO 1600



ISO 3200



ISO 6400



ISO 12800



ISO 25600

▲ The X2DS II 100C has a native sensitivity range equivalent to ISO 50-25,600. This highest setting is a one-stop extension – via increased gain – with the Fujifilm GFX cameras which use the same sensor, but push even further up to ISO 102,400. There's virtually no visible noise all the way up to ISO 3200 and only a minimal deterioration in either definition or saturation at the higher settings, even ISO 25,600. These images are 'Ultra HD' JPEGs captured in the aperture-priority auto exposure mode with the lens aperture set to f/11 – to optimise optical sharpness – so the exposure times vary to compensate for the adjustments to the ISO. There's no way to switch off any noise reduction processing which the camera is undoubtedly performing behind-the-scenes, but it doesn't appear to cause much of a drop in definition even at the highest sensitivity settings. Hasselblad XCD 35-100mm f/2.8-4.0 E zoom lens.

and, in some models, a slowest speed of 60 minutes. The main appeal of the leaf shutter is that it allows flash sync at all speeds, but they're also extremely reliable and comparatively quiet despite being mechanical (but, of course, electronically actuated and timed). Should one hour and eight minutes still not be long enough, the leaf shutter has both 'B' and 'T' long exposure timers.

The white balance control options comprise auto correction, a set of six lighting presets, manual colour temperature setting over 2000 to 10,000 degrees Kelvin (plus an adjustment for fine-tuning tint) and a 'WB Picker' which allows you to take a colour temperature measurement from a captured RAW image file.

IN THE HAND

With its one-piece machined aluminium alloy bodysell finished in a matte graphite grey, the X2D II looks cooler than cool. Hasselblad started whole hewn-from-the-solid body thing – and since it's been aped by the likes of the Leica T models, Sigma's BF and the Fujifilm GFX100RF – and the distinctive X series styling still looks very clean and crisp. It's part rangefinder camera and part reflex in terms of the design cues, but significantly more compact than any of the G mount GFX bodies. Etched on the top panel is "Handmade in Sweden" which arguably trumps Leica's "Made in Germany" for sheer kudos... although there's also "Made in Sweden" and "Medium Format" etched into the baseplate as well. There's weather sealing and insulation to enable operation in subzero temperatures down to -10 degrees Celsius.

The reshaped and bigger handgrip is extremely comfortable to hold and allows for largely effortless maneuverability even with a bigger and heavier lens – such as the new XCD 35-100mm zoom – fitted. Hasselblad has been steadily refining the operability with each new X series model to provide a better balance between the touch screen and the physical controls which, on the X2D II, now include a joystick-type navigator. It has four-way movements plus a press-in action and, as with most other contemporary mirrorless cameras, it complements the front and rear input



ETCHED ON THE TOP PANEL IS 'HANDMADE IN SWEDEN' WHICH ARGUABLY TRUMPS LEICA'S 'MADE IN GERMANY' FOR SHEER KUDOS...

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HASSELBLAD X2D II 100C ON TRIAL

► Mark II X2D is actually a bit lighter than its predecessor – and a bit cheaper too – but the machined aluminium alloy bodysell is still exudes Scandi coolness and class.

wheels and can be used to navigate the focus points as well as the menus and a monitor-based 'Control Screen' which is part info display and part quick menu. However, Hasselblad still very much does things its own way so there's a learning curve for first-timers even if it really doesn't take all that long to get into the swing of things.

If so desired, you can still drive the X2D II 100C almost entirely from the touch screen – which is arguably the most efficient way – but the hard controls give the same mix-and-match possibilities as most current-era mirrorless cameras. However, there are some distinct differences. The main menu is all icon-based with the submenus a little more conventional, but with most settings via virtual on/off switches. Everything is large – as you can do with a panel size of 9.1 cm – with the settings for things such as shutter speeds, apertures and ISOs in extra-large typefaces and highlighted in orange. The aforementioned 'Control Screen' is mostly all about exposure control, but you can change the white balance, focus settings and drive modes (which include the intervalometer, exposure and focus bracketing, and the programmable self-timer) here too. As has been the case right from the start, depending on the exposure mode, the auto setting is shown in grey digits while the changeable setting is in white. You don't even need to check the P, A, S or M indicators to immediately know what mode you're in. There is a dedicated button for the exposure modes, but they can also be set via the touch screen. On the screen's frame itself is a set of four keys with fairly cryptic markings, but it doesn't take too long to work out what they do. Also, on the camera's back panel are dedicated 'AE-L' and 'AF-D' buttons, the latter standing for



'AF Drive', but it's just a normal AF activation control. The main feature of the top panel is a colour LCD TFT info display which distills the key read-outs from the main panel and has the same grey/white regime for the auto/manual exposure settings. Alongside are the mode button and one for ISO/WB... press once for the sensitivity settings, twice for the white balance options. This pair are customisable as are dedicated multi-function buttons on the front and rear panels along with the press-in actions of the front and rear input wheels and the joystick controller. There's also a custom control ring on selected lenses (including the new 35-100mm zoom). Frankly, that's really as much customisation as anybody is likely to need and, in fact, the way the X2D II's controls are set up by default, you probably won't want to change anything. It works, full stop.

As was noted at the outset, the monitor screen is a high-brightness, high-contrast OLED display with the key numbers being, respectively, 1400 nits peak brightness and a 2,000,000:1 contrast ratio. The resolution is 2.36 megadots and there are tilt adjustments through 90 degrees upwards – i.e. to serve as a waistlevel finder – and 47 degrees down. A big plus is that the four keys related to the monitor's main functions

(i.e. replay, delete and the live view display configuration options) move with it.

The EVF is also a good size and is a micro-OLED display with 5.76 megadots resolution and 1.0x magnification so it's a real joy to use, but it doesn't support HDR viewing or image replay. Nevertheless, when you experience the size, everything else seems pokey in comparison. All the displays – including the one on the top panel – are adjustable for brightness while the monitor also has the option of setting automatic brightness adjustment according to the ambient light levels.

The live view displays – in both the EVF and monitor – include the options of including capture data, a real-time histogram, a focus distance scale, a 3x3 guide grid, dual-axis level indicators and a highlight warning. You can have each of the key elements separately or all combined in one screen which, because of the panel's size, still doesn't look especially cluttered.

Image replay/review comes with the choice of a brightness histogram or separate RGB channel graphs shown as overlays along the bottom edge.

Again, the touchscreen implementation is excellent so simple tapping on the lower part of the screen takes you through the info displays and histogram overlays, browsing is via swiping and zooming via spreading two fingers from the pinch position. The opposite action takes you progressively to nine- or 25-thumbnail pages, but you can use the joystick controller for browsing

A pair of sturdy magnetic covers conceal the camera's connection bay and the memory card slot. The former comprises a high-speed, 10 Gbps USB Type C port and a 3.5mm minijack input for a wired remote trigger. The latter is for CFexpress Type B cards, but as before, there's a massive 1.0 TB of internal SSD memory which, given that you don't need to accommodate meaty video files, is decent amount of storage even when shooting 16-bit RAWs which can top 200 MB in file size... it's enough for somewhere in the region of 4000 shots says Hasselblad.

The battery compartment employs the





▲ Top panel colour display is adjustable for brightness and relays mostly exposure settings.



▲ Does "Handmade In Sweden" trump Leica's "Made In Germany"?

siveness when you hit the shutter button, including the autofocus.

With PDAF measurement now at work with continuous adjustment, the X2D II's autofocus is a marked improvement even over its predecessor. It's very fast and very accurate across virtually the entire frame, ensuring you can make the most of 100 megapixels resolution. The extended image stabilisation obviously also plays an important role here, especially with handheld shooting. The AF system's low-light performance is also excellent and the subject tracking is reliable, especially the eye-detection for humans. This really amps up Hasselblad's appeal for applications such as portraiture, weddings and fashion. Even with frame-by-frame shooting, having the AF immediately adjust to any small movement of the subject – or the camera for that matter – is a big plus. Yes, everybody else has been doing it for ages, but it's still a very significant upgrade here, and greatly enhances the X2D II's AF capabilities and performance overall.

The superlative image quality delivered by the sensor is already well proven in both the Hasselblad and Fujifilm 100 megapixels cameras, but the key point to make with the X2D II is that P3 is a display colour space so you're only going to notice the increased gamut and the brighter highlights with compatible HDR screens. You won't see anything different in a print, of course. What you will see, however, is phenomenal levels of detailing – even with very big enlargements – and still a very wide dynamic range which, as noted earlier, also makes for plenty of exposure latitude in the RAW files to allow for easy recovery of both shadows and highlights. In practice though, the HDR JPEGs also have plenty of editing flexibility too, and despite the compression. And they're also much more manageable in terms of file sizes.

Of course, as we've seen exploited with the GFX100RF, the 100 megapixels sensor provides plenty of scope for cropping without compromising image quality. Additionally, the inherently shallower depth-of-field with a sensor of this size, provides more scope for using selective focusing as a creative tool.

The high ISO performance is exemplary, essentially across the entire native ISO range so there's minimal visible noise up to ISO 3200 and only a small deterioration in the definition and saturation from here up to ISO 25,600. Better still, we're talking mostly luminance noise here which is more 'structural' than chroma (colour) noise – in other words, it's more uniform in size – and also more easily corrected post camera. What's more, the dynamic range is still commendably wide at the camera's highest sensitivity settings.

On an HDR display, the 'Ultra HDR'

HASSELBLAD IS STILL DOING THINGS ITS OWN WAY WITH THE DESIGN AND ERGONOMICS – A BIT LIKE THE LEICA SL SERIES FULL FRAME BODIES IN THIS REGARD – BUT IT REALLY WORKS."

same arrangement as Leica uses on the SL series mirrorless cameras and the latest M models, so the compartment cover is part of the battery and unloading is a two-stage process. A locking lever releases the pack, but it won't drop out of the compartment until you press on the cover back in slightly which depresses a sprint-loaded lug, enabling the battery to be fully withdrawn. The 3400 mAh 7.27-volt lithium-ion pack is good for around 325 shots, but you can configure the camera to run longer and certainly 450 shots is a possibility. In-camera recharging is available via the USB C port, but as always, investing in a second – or even a third – battery pack buys peace-of-mind for longer shoots.

► Monitor tilts up through 90 degrees (and also down). Related controls move with it.



The WiFi connectivity (the 2.4 GHz or 5.0 GHz bands) enables remote control with live view and file transfer via the Phocus Mobile 2 app which only runs on iOS 18 (or later) devices. In addition to the HDR image editing capability mentioned earlier, it also enables Hasselblad Natural Noise Reduction (HNNR) processing which is AI-powered and reduces noise in RAW files without affecting either sharpness or colour saturation.

SPEED AND PERFORMANCE

With a fastest continuous shooting speed of 3.0 fps, the X2D II 100C isn't going to challenge the write speeds of either a CFexpress Type B card or its SSD internal memory, even at 100 megapixels res. For the record, the SSD has a maximum write speed of 2370 MB/second. Clearly the Hasselblad isn't built for speed, but it is also worth noting that Fujifilm's 100 MP cameras are all quicker – 6.0 fps for the GFX100RF (also with a leaf shutter), 7.0 fps for the GFX100S II and 8.0 fps for the GFX100 II. Certainly, the two G mount bodies are able to shoot some types of sports action – not so long ago, 8.0 fps was considered fast – and Fujifilm actually promotes this capability so there's a clear different in the two design philosophies here. Nevertheless, the Hasselblad is still quick in terms of its respon-

HASSELBLAD X2D II 100C ON TRIAL

JPEG's simply jump out at you, especially on a bigger screen, so if this is going to be how your images are mostly used then the X2D II has obvious attractions. It seems inevitable that we will soon progress from SDR to HDR in photography – as in video with 4K HDR content, for example – and while Hasselblad is pioneering a full workflow from camera-to-display, others will surely follow especially with higher-end cameras. You may want to wait and see what happens, but HDR isn't the X2D II's only trick and it's undoubtedly the most user-friendly – and usable – X series medium format mirrorless camera to date... so it has a wider appeal more generally too.

THE VERDICT

It's hard not to end up being completely seduced by the X2D II 100C and not just because of the way it looks. Hasselblad is still doing things its own way with the de-

sign and ergonomics – a bit like the Leica SL series full frame bodies in this regard – but it really works. It doesn't take long to get into the groove with this camera and then it's super-efficient and surprisingly logical in all aspects of its operation. The big and bright monitor screen is simply addictive as is the in-your-face (in a good way) EVF. It all soon starts to feel like second nature, and then you don't really want to go back to a more conventional set-up which suddenly seems a bit archaic.

Less of a handful than any of the G mount GFX cameras and quite a few full frame bodies as well, the X2D II handles superbly, but the XCD 35-100mm zoom is one of the bigger 'Blad X mount lenses so this combination ends up being quite bulky. We were sent this lens because it's the only one that talks C-AF with the X2D II body at the moment, but with any of the V-series primes and the even more compact P series

models, you get a highly portable package for applications such as landscape or street photography. The GFX100RF is a smaller and lighter digital medium format option again, but the fixed lens configuration has both pluses and minuses.

On every level, the X2D II is a more versatile camera than any of its predecessors, and it's certainly now a lot easier to use in the field thanks to new features such as the joystick controller. Portability – especially with the more compact P series XCD primes – continues to be a major attribute of the Hasselblad X camera design, with the X2D II's revisions promoting even more comfortable and logical operation. Importantly, underneath the style is plenty of substance, including a very high IQ with, ahem, extra brightness. So, buy the X2D II 100C from the heart because your head will soon be nodding in agreement. 🌀

VITAL STATISTICS



HASSELBLAD X2D II 100C \$12,650 body only, recommended retail price

Type: Professional digital medium format mirrorless camera with Hasselblad XCD bayonet lens mount.

Focusing: TTL automatic via hybrid contrast/phase detection and LiDAR (Light Detection And Ranging) measurements with 425 focusing points with automatic or manual selection. 97 percent frame coverage. Touch AF point selection. AI-based subject recognition for humans (face/eye detection), cats and dogs, and vehicles. Single-shot and continuous AF modes. Spot, Extended Spot, Wide and Custom area modes. Custom area mode has a 'Tracking Scope' option for subject detection only within the specified zone. Expanded Spot area mode has 'Arbitrary Tracking' for subjects other than those covered by the AI modes. Full-time manual override of AF. 100 percent zoom function for focus assist via touch screen or joystick controller. Sensitivity range is EV 1 - 19 (ISO 100). Low light assist via built-in illuminator. Manual focus assist via magnified image, focus peaking display (choice of orange, cyan, yellow and magenta colours, or inverse), focus indicator display and focus distance scale.

Metering: TTL using the imaging sensor with 'Smart Metering' (intelligent exposure adjustment to optimise HDR), centre-weighted average (75:25), centre spot (25 percent of frame) and spot (2.5 percent of frame) measurements. Metering range is -3.0 – 20 EV (ISO 100).

Exposure Modes: Program, shutter-priority auto, aperture-priority auto, manual and TTL auto flash. Full auto mode sets exposure, ISO and white balance according to subject analysis. Exposure compensation up to +/-5.0 EV in 1/3, 1/2 or full stop increments. Aperture and shutter speed settings adjustable in 1/3, 1/2 or full stop increments. ISO in full stops only.

Shutter: Electronic, between-the-lens leaf type, 68 minutes to 1/4000 second plus 'B' and 'T' with XCD lenses. Flash sync at all speeds with the leaf shutters. Sensor-based electronic shutter has a speed range of 68 minutes to 1/6000 second.

Viewfinder: EVF, Micro-OLED panel with 5.76 mega-

dots resolution. 100 percent scene coverage and 1.0x magnification. Adjustable eyepiece strength. Auto or manual switching between EVF and monitor screen. Tilt-adjustable 9.1 cm wide-gamut (DCI P3 colour space) OLED monitor screen with 2.36 megadots resolution, 1400 nits peak brightness (HDR) and 2,000,000:1 contrast ratio. Touch controls, including Touch AF, Move AF Point and 'Touchpad AF' when using the EVF.

Flash: No built-in flash. External units sync via ISO-standard hotshoe (Nikon i-TTL exposure control).

Additional Features: Machined aluminium alloy body with weather sealing and insulation to enable operation down to -10 degrees Celsius, depth-of-field preview, three custom camera set-ups, AE lock, auto exposure bracketing (over two, three, five, seven or nine frames with up to +/-3.0 EV), programmable self-timer (2-60 seconds delay; one, three or five frames), timed auto power-off.

DIGITAL SECTION

Sensor: 102 megapixel pixels (effective), BSI CMOS with 32.9x43.8 mm imaging area. No low-pass optical filter. Sensitivity is equivalent to ISO 50-25,600.

Focal Length Magnification: 0.8x (35mm format), 1.3x (6x4.5cm format).

Formats/Resolution: 14-bit or 16-bit RAW with lossless compression in Hasselblad 3FR RAW format, 8-bit JPEG, 8-bit 'Ultra HDR' JPEG, 10-bit HEIF and 10-bit HDR HEIF. RAW+JPEG and RAW+HEIF capture also available. Images captured at 11656x8742 pixels in the 4:3 aspect ratio. Crop modes for 65:25 aspect ratio (i.e. XPan), 1:1 (i.e. '6x6'), 7:6 ('6x7'), 5:4 ('4x5'), 11:8.5, 297:210 (A4), 3:2 ('6x9'), 3:2 Crop ('24x36'... i.e. 35mm), 16:9, 2:1 ('6x12').

Video Recording: No video recording capabilities.

Recording Media: Built-in 1.0 TB SSD memory, CFexpress Type B memory card slot.

Continuous Shooting: Up to 3.0 frames per second (14-bit RAW, HEIF or JPEG).

White Balance: TTL measurement. Auto correction with six presets, manual colour temperature setting (2000 to 10,000 degrees Kelvin) with +/-100 tint levels, and WB Picker (select colour temperature and tint from a captured RAW image file).

Interfaces: USB 3.1 Gen 2 Type C (10 Gbps), 3.5 mm minijack for cable remote trigger.

Additional Digital Features: In-body five-axis image stabilisation with up to ten stops of correction at the centre of the frame and eight stops at the edges (Normal, Sport and Horizontal modes), sRGB and P3 colour spaces, intervalometer (up to 1000 frames or unlimited frames), focus bracketing (up to 1000 frames; Extra Small, Small, Medium, Large or Extra Large adjustment step sizes; exposure delay from 1/8 to 16 seconds), exposure scale and EV displays, real-time histogram, dual-axis level indicator, 3x3 grid guide, exposure simulation display, RGB/brightness histogram displays (in review/replay), nine and 25 thumbnails pages, replay/review zooming WiFi (2.4 GHz and 5.0 GHz bands), tethered shooting via USB C.

Power: Rechargeable 3400 mAh 7.27 volt lithium-ion battery pack. In-camera recharging via USB C.

Dimensions (WxHxD): Body only = 148.5x106.0x75.0 mm.

Weight: Body only = 730 grams (without battery pack or memory card).

Price: \$12,650 body only. XCD 35-100mm f/2.8-4.0 E zoom lens is priced at \$7448.

Distributor: C.R. Kennedy & Company Pty Ltd, telephone (03) 9823 1555, www.crkimaging.com.au or <https://hasselblad.com.au>



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LUMIX S 100-500mm f/5.0-7.1 OIS



GOING THE LONGER DISTANCE

I'll see your 100-400mm telezoom and raise you a 100-500mm that's pretty much the same size and weight. Panasonic goes longer with its L mount offering in a popular telephoto focal range.

In case you hadn't noticed 100-400mm telephoto zooms are in vogue at the moment. Every mirrorless system now seems to have one or the equivalent depending on the sensor size, with the OM System 50-200mm f/2.8 PRO model being a notable recent example. It's easy to see the appeal – a very useful focal range, comparatively compact dimensions thanks to what's now possible with the mir-

rorless configuration, a high level of optical correction for the same reason and a workable maximum aperture range. However, as it happens, one of the few systems without a 100-400mm zoom is Panasonic's Lumix S – although you can buy an L mount Sigma model – and that gap has now been plugged with a... 100-500mm. What's more, an extra 100mm – that's 20 percent – of telephoto power in a lens that's the same size and weight as a full frame 100-400mm.

We tested Canon's RF 100-500mm f/4.5-7.1L IS USM just after it was introduced in mid-2020 and then used it again at the EOS R5 Mark II launch in July 2024 and on both occasions it truly impressed us by how easy it was to carry and use despite having supertelephoto capabilities. It was – and still is – a compelling example of the size reductions and the enhanced optical performance achievable now that there's no mirror box in the way. It was also surprisingly versatile, and we noted it worked as well as an 'every day' lens as one for subjects such as sports or wildlife.

The Panasonic Lumix S 100-500mm f/5.0-7.1 OIS is smaller and lighter again – although not by significant amounts in either case – and is a bit slower at the shortest focal length, but once again, is a massively capable supertelephoto zoom that's not going to break your back... or the bank. For the record, the Canon much older model is

still around \$700 pricier – and the key specs for both lenses are actually quite similar – so L mount users are ahead right from the moment they head out of the camera store.

Of course, at a shade under 20 centimetres in length and weighing close to 1.3 kilos, this is still a fairly substantial lens which is why it comes with a tripod mounting bracket. It's detachable, but attached to the Lumix S1 II body, for example, your total load is around two kilos so you're likely to want some support if you're shooting for long periods of time. That said, the Lumix S 100-500mm can definitely be used handheld especially as it has optical image stabilisation to work alongside the camera's IBIS – which gives a total of seven stops of correction for camera shake – but obviously there's still some physical effort involved. As with many bigger lenses, a monopod can be an effective solution, providing some additional support without unduly compromising mobility or manoeuvrability.

The Panasonic lens feels solidly built – using mostly polycarbonate barrel components to help save weight – with sealing against dust and moisture and insulation to ensure reliable operation in subzero temperatures down to -10 degrees Celsius. This matches the protection level of the Lumix S bodies, and the zoom also has a fluorine coating on the front element to help repel water and grease while also

making it easier to clean. However, there's a big expanse of exposed glass upfront so fitting a protective filter is a very good idea even if the 82 millimetres screwthread fitting means spending a bit more money. It's definitely a worthwhile investment.

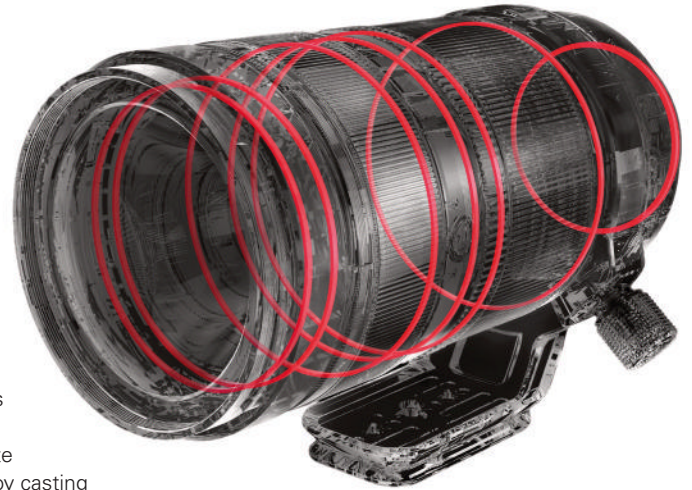
The already-mentioned tripod mounting collar adds around 180 grams to the zoom's weight as it's a quite substantial magnesium alloy casting which includes an Arca-Swiss type foot. When on the lens it can be easily rotated by loosening the locking clamp's knob. There are index marks at the 90-degree intervals, but no click stops so you have to look at what you're doing when making these adjustments.

The 100-500mm is compatible with the Lumix S system's DMW-STC series teleconverters so the 1.4x model gives you a 210-700mm f/8.0-10 and the 2.0x model creates a 300-1000mm f/11-14. Both combos are obviously quite slow, but the Mark II Lumix S cameras have pretty good high ISO performance – courtesy of their 'Dual Native ISO' sensors – so they're workable if you want the longer focal lengths without the much larger outlay of a longer lens.

OPTICAL DESIGN

Nowhere are the benefits of the mirrorless camera configuration – specifically the shorter back focus distance – better appreciated than in the 100-500mm zoom's optical construction. It employs 19 elements in 12 groups which is still complex, but nothing like it would have been if it had been designed for a DSLR. It's also a lot more compact and, additionally, a lot easier to correct optically.

This is the role of the six special elements which comprise two 'UED' (Ultra Extra-Low Dispersion) types, two 'ED'



▲ External construction is sealed against dust and moisture with insulation to allow shooting in freezing temperatures.

(Extra-low Dispersion) types and a pair of 'UHR' (Ultra High Refractive Index) types. The ED elements are made from a type of optical glass that's designed to more precisely control how the different coloured wavelengths of light pass through them – remembering that refraction or bending takes place as light both enters and leaves an element. The objective is to minimise the difference in the degree that the different colours refract – in other words, the amount of dispersion – so they all focus at the same point. This limits both lateral (also known as transverse) and longitudinal (or axial) chromatic aberrations – which manifests itself as colour fringing along high-contrast edges – and also corrects for spherical aberrations. Not surprisingly, this colour fringing compromises sharpness. Obviously, the likelihood of chromatic aberrations increases when there is a larger number of elements which, in turn, means it tends to be more of a problem with telephoto lenses and especially telephoto zooms. Additionally, the fact that there's a longer light path in a telephoto lens – because it's also physically longer – makes it even harder to focus all the wavelengths at precisely the same point. Longitudinal chromatic aberration (LoCA) – when the different colours focus



NOWHERE ARE THE BENEFITS OF THE MIRRORLESS CAMERA CONFIGURATION BETTER APPRECIATED THAN IN THE LUMIX 100-500MM ZOOM'S OPTICAL CONSTRUCTION."



▲ Weather protection measures include a rubber gasket around the lens mount.



▲ The tension of the zooming ring can be adjusted between Smooth and Tight. In practice, the Smooth setting feels tight enough.



▲ Manual focus collar is multi-functional when using AF. For MF, it can be switched between linear and non-linear adjustment.

in front or behind the actual focus point – is more of an issue in longer telephotos and hence extra effort is needed to correct it optically.

The HR elements are made from glass with a high refractive index which allows them to have less curvature which, in turn, minimises field curvature and also spherical aberrations. However, you can get an idea of the challenges facing optical engineers designing a lens like this because the HR elements tend to have much higher chromatic dispersion characteristics so they need to be matched with an element that will correct for this.

The Lumix S camera bodies have automatic correction for distortion, chromatic aberration and vignetting – brightness fall-off at the frame corners – based on stored data for the attached Lumix S lens. This is applied to JPEGs and HEIFs as they're processed in-camera, and embedded in the RAW files so they're available with post-processing, but obviously here you can choose to make corrections manually in whatever editing software you're using. The Panasonic camera body does, in fact, allow for vignetting correction to be switched off, but everything else happens behind the scenes, but as we've noted before with other brand lenses, the objective is to achieve as much as is practicable with optical correction to provide the best possible starting point for any software processing.

Zooming is performed by a telescopic action, extending the barrel length by about 80 centimetres by the time the 500mm focal length is reached. The focusing group moves internally and is driven by a 'Dual Phase Linear Motor' – as used in the Lumix S 100mm f/2.8 Macro – which Panasonic says has around three times more thrust than a voice coil motor (VCM) so it's faster and more precise. The minimum focusing distance is 80 centimetres at 100mm and 1.5 metres at 500mm which gives a maximum magnification ratio of 2.7:1 or just a little larger than one-third life size. This is potentially handy for subjects such as birds

or insects as you're far enough away not to disturb them.

Both the optical design and the focusing mechanism are designed to optically suppress focus 'breathing' which is the slight change in image size that would otherwise happen as the focusing distance changes. This is not a big issue with stills photography, but quite problematic when shooting video. Furthermore, manual focusing during zooming is possible which essentially means that the focus won't shift as you zoom in or out.

IN THE HAND

As already observed, the Lumix S 100-500mm zoom is a big handful of lens, but it's still pretty well balanced even when zoomed out to its longest focal length. The zooming collar has a wide grip and the tension can be adjusted from Smooth to Tight via a narrow control ring located just in front (the Canon RF 100-500mm has the same feature). In practice, though, this didn't seem to make a whole lot of difference, and even at the 'Smooth' setting the zooming action is still quite heavy. Frankly, it's better than being too loose and you soon get accustomed to how much twist you need to apply... and it does allow for quite fine adjustments.

The manual focusing collar serves as a multi-function control ring when you're using autofocus and assigned from the camera's Lens/Others menu. The choices here include manual aperture control, shutter speeds, exposure compensation setting, white balance and the 'Photo Style' picture profiles. For aperture control, the adjustments can be in one-third or 1/12 stop increments, the latter obviously allowing for very fine control which is particularly useful when shooting video as the brightness adjustments will be less noticeable. You can also set the direction in which the control ring rotates to go from the maximum aperture to the minimum.

The directional choices are also available when focusing manually and, additionally, you can switch between linear or non-linear



▲ Size and weight balance well on the latest Lumix S full frame bodies.

adjustment of focus. It's all in the same camera menu. With non-linear adjustment, the amount of focus shift is governed by the rotation speed of the focus collar... in other words, if you turn it quickly, you'll make big adjustments, but turning it slowly allows for more precise control thanks to smaller degrees of adjustment. With the linear setting, the focus is shifted at a constant speed according to the rotational angle of the focus ring. In this mode, the sensitivity (i.e. the amount of focus shift per the rotational angle of the focusing collar) can be adjusted from 90 to 1080 degrees (in 30-degree increments up to 360 degrees) or set to 'Maximum'. In a nutshell, the latter allows for more uniformity of adjustment



▲ Tripod mounting collar is detachable for handheld shooting and saves around 180 grams of weight.



▲ Mounting shoe is integrated and is an Arca-Swiss twin-rail coupling.



▲ On-barrel controls are a focus limiter, AF/MF switch and optical image stabilise mode selector.

which is something video-makers often require when using focusing creatively. The focusing collar also provides a full manual override when you're shooting with AF... so you can fine-tune the focus at any time.

There's only one focus hold button – located on the left side of the lens as viewed from behind the camera – and it's unmarked. Apart from the focus hold function which is the default setting (Panasonic calls it "Focus Stop"), there are six menu pages of alternatives in the Photo mode and seven in the Video/S&Q modes. Among the many options are the 'Crop Zoom' and 'Hybrid Zoom' functions that are available with the Lumix S9 and the S1 II/IE models. The crops are a way of gaining an effective increase in focal length – with both stills and video – by switching progressively down to the medium, small and extra-small sizes at 1.4x, 2.0x and 3.1x respectively. However, it's not just a straight crop because interpolation and scaling are used to maintain resolution. The 'Hybrid Zoom' combines optical and digital zooming into a single continuous action so, after the end of the lens's optical focal range is reached, the digital 'zoom' automatically takes over.

Behind the tripod-mounting collar is a bank of three on-barrel controls for a focus limiter, AF/MF switching and the optical image stabiliser's modes. The limiter can be set to the full focusing range or to a reduced span of five metres to infinity (which will be handy for some sports where you don't



THE LUMIX S 100-500MM ZOOM IS A BIG HANDFUL OF LENS, BUT IT'S STILL PRETTY WELL BALANCED EVEN WHEN ZOOMED OUT TO ITS LONGEST FOCAL LENGTH."



▲ The Lumix S 100-500mm is very similar in size and weight to the full frame 100-400mm telezooms.

need to focus any closer). The OIS can be switched between Mode 1 for general shooting and Mode 2 for panning.

IN THE FIELD

We trialled the Lumix S 100-500mm on the S1 II body which was a nicely balanced combination for handheld shooting and when using a tripod. As already mentioned, this package weighs around two kilos so you do definitely start to feel the load over longer periods of shooting without any additional support. However, with applications such as wildlife and sports, it's much preferable to shoot handheld so you can move quickly with flighty subjects or rapidly respond to changes in the action.

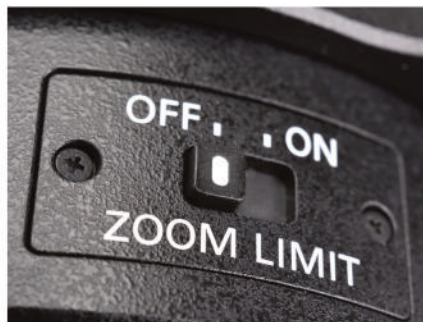
What also becomes apparent is that beyond these obvious applications, the 100-500mm is very flexible especially when it's combined with handy close-up focusing capabilities. It's a long way off being a macro

lens, but even with smallish birds or reptiles and the larger insects such as butterflies or dragonflies, the 1:2 magnification ratio at 500mm is sufficient to give a good-sized reproduction in the frame.

In practice, the slow maximum apertures – which, it should be noted, are the roughly same for all the full frame telezooms with a similar focal range – mean that you do need to keep an eye on shutter speeds even with the highly-effective 'Dual I.S.' stabilisation doing its thing. At 500mm and using the 1/focal length rule for the slowest 'safe' shutter speed, the seven stops IS range theoretically that means you could shoot at 1/4 second without any blurring occurring, but the reality is that the physical effort required is more of a limitation in the field. Nevertheless, everything still looked pretty sharp as low as 1/15 second so there is plenty of leeway when using the lens handheld, assuming that you don't need a



▲ Sole focus hold button is unmarked. It's multi-functional too.



▲ Teleconverters can only be fitted after the 'Zoom Limit' switch is set which restricts the minimum focal length to 150mm to prevent issues with the rear elements.



▲ Front element has a fluorine anti-smudge coating.



◀ Test pictures captured as JPEG/ large/fine files with the Panasonic Lumix S 100-500mm f/5.0-7.1 OIS on a Panasonic Lumix S1 II camera body. Overall sharpness is excellent across the zooming range and at all apertures, although the corners crisp up more by closing down the aperture by a couple of stops. The zoom is very well corrected for distortion and chromatic aberrations. Contrast and colour are also excellent.

faster shutter speed to freeze movement. In this case, it's going to be a case of cranking up the ISO which, especially with the 24 megapixels Mark II S1 models, doesn't unduly compromise sharpness either.

The zooming collar's action is definitely on the stiffer side – so it's unlikely you'll ever want to take it off the 'Smooth' tension setting – but you do get accustomed to it and, on the positive side, you can be assured the focal length won't shift unless you want it too.

PERFORMANCE

In concert with the S1 II, the autofocus is fast and accurate even at this camera's rapid-fire continuous shooting speeds. The camera's manual notes that, at 60/70 fps, it's working on "estimated focus" from one frame to the next, but given any movement at this speed – even with very fast-moving objects – is still quite small, every frame in the burst is still very sharp so the lens is definitely keeping up. This especially true with the subject recognition tracking which stays locked-on no matter what.

Of course, the lens itself is also very sharp optically across the zooming range and at the widest apertures. Diffraction-related softening is noticeable at the smaller apertures beyond f/22 so it most affects the supertelephoto end of the focal range, but the Lumix S bodies have the option of 'Diffraction Compensation' processing for

JPEGs (and for HEIFs in the case of the S1 II and IIE). Otherwise, the uniformity of sharpness across the frame – i.e. centre-to-corner – is good even at 500mm and f/7.1 – but it does improve with closing down the aperture by a stop or two. Importantly, this lens is still exceptionally sharp at its longest focal lengths and also at its closest focusing distances which is important with subjects with fine details such as feathers or fur. The 11-blade diaphragm gives beautifully rounded and smooth-looking out-of-focus effects so, as the depth-of-field progressively diminishes at the longer focal lengths, backgrounds are rendered as mostly just soft colours (or tones with B&W) which very effectively isolate subjects in applications ranging from portraiture to wildlife. This becomes even more important at the longest focal lengths when the compression effect flattens a scene and the background appears to be much closer to the subject.

The uniformity of brightness across the frame is also very good with some slight vignetting at the widest apertures across the focal range, but eliminated by closing down just one stop (although, again, there's in-camera correction for JPEGs and HEIFs). As noted earlier, in this review, the Lumix S1 bodies automatically correct for chromatic aberrations so they're effectively completely eliminated. The same is true for distortion. It simply isn't evident in real-world images and barely measurable with only very slight pincushion-type bending occurring between 150mm and 500mm.

Panasonic doesn't provide any details of its anti-reflection multi-coating methodology for its Lumix S lenses, but the 100-500mm doesn't appear to have any issues with flare and ghosting, both being very effectively suppressed, but the hood will be needed when strong side lighting is splashing the sun's rays across the front element. However, the lens handles backlight subjects well, maintaining good contrast and, with

ALL THIS ZOOM'S CONSIDERABLE CAPABILITIES ARE FULLY EXPLOITABLE RATHER THAN JUST SOME WISHFUL THINKING ON THE PART OF ITS MAKER."

the sun actually in the frame, the 11-blade diaphragm gives dramatic-looking 22-point starbursts when the aperture is stopped down.

THE VERDICT

L mount shooters have a bit of choice when it comes to telephoto zooms with 100-400mm models from Leica and Sigma, along with the latter's 60-600mm or 150-600mm (plus, of course, the monster 300-600mm f/4.0, but this is definitely a more specialised lens). The Lumix S 100-500mm has some clear attractions compared to the 100-400mm zooms by virtue of delivering a 5x zooming range in a similarly-sized package. The telezooms extending to 600mm involve some compromises by going so long (not the least being their size), and the 100-500mm's greater overall flexibility is further enhanced by its useful close-up focusing capabilities. More importantly, it maintains its excellent image quality – in terms of both sharpness and the corrections for distortion and aberrations – across the whole of its focal range. Add in the effective image stabilisation, and all this zoom's considerable capabilities are fully exploitable rather than just some wishful thinking on the part of its maker. Consequently, the Lumix S 100-500mm is impressive all round and an impressive all-rounder. 📍

VITAL STATISTICS

PANASONIC LUMIX S 100-500mm f/5.0-7.1 OIS \$3,699

recommended retail price

Format: Full frame.

Focal Length Multiplier: None.

Effective Focal Length: 100-500mm.

Angle-of-View: 24-5.0 degrees (diagonal).

Construction: 19 elements in 12 groups. Six special elements – two UED (Ultra Extra-Low Dispersion) types, two ED (Extra-low Dispersion) types and two UHR (Ultra High Refractive Index) types.

Minimum Focus: 80 centimetres at 100mm, 1.5 metres at 500mm.

Maximum Reproduction Ratio: 1:2.7 at 500mm.

Aperture Range: f/5.0-7.1 to f/29-40.

Length: 196.1 millimetres.

Maximum Diameter: 92.0 millimetres.

Filter Diameter: 82 millimetres.

Weight: 1285 grams without the tripod mounting bracket.

Features: Weather-sealed construction (dust, moisture and subzero temperatures down to -10 degrees Celsius), fluorine moisture repellent coating on the exposed surface of the front element, optical image stabilisation (up to 5.5 stops of correction for camera shake, up to 7.0 stops with 'Dual I.S. 2'), 'Dual Phase Linear Motor' AF drive, internal focusing, focus limiter (5.0 metres to infinity, full range), switchable focus ring direction of turn, switchable linear/non-linear

focus range operation, alternative focus ring functions, adjustable zoom collar tension (Tight-Smooth), one customisable focus hold button, OIS mode switch (1, 2, Off), 11-blade diaphragm, rotatable and detachable tripod mounting collar with Arca-Swiss plate. Bayonet-fit lens hood supplied. Compatible with the Lumix 1.4x Teleconverter DMW-STC14 and Lumix 2.0x Teleconverter DMW-STC20. 'Zoom Limit' switch sets minimum focal length to 150mm for attaching the teleconverters.

Price: \$3699. Panasonic Australia offers an extended five year warranty (two year standard warranty plus an additional three years) on Lumix lenses sold by an authorised Panasonic Australia reseller.

Distributor: Panasonic Australia, telephone 132 600 or visit www.panasonic.com.au



OLYMPUS OM-1

These are the cameras that, in one way or another, had a significant influence on photographers and photography. Before electronics made down-sizing much easier, Olympus completely redesigned the 35mm SLR to create the small camera that was the start of something big.

It was at the 1972 Photokina that Olympus showed off prototypes of its new M-1... the camera that would revolutionise the 35mm SLR. Dramatically reduced in both size and weight, the M-1 was the work of Olympus's genius camera designer, Yoshihisa Maitani. However, word reached Leica that Olympus had adopted the model designation "M-1" and the German camera-maker objected... even though its M-series cameras were rangefinders and not reflexes. Production had already begun, but the ever-courteous Maitani agreed to a revision and so, when his new baby was officially launched in 1973, it was called the OM-1.

Yoshihisa Maitani was an immensely talented camera designer and engineer. Before the OM-1 he created the hugely successful Pen series of 35mm half-frame compacts and the innovative Pen F half-frame SLRs. Maitani was obsessed with making cameras smaller... and at a time when everything was still largely mechanical so he was really thinking outside the square.

Maitani started sketching out his ideas for a more compact 35mm SLR design in the mid-1960s, and his first challenge was to convince Olympus's management that there was actually a market for it. He recalled, "It took the whole of 1967, from January to December, before they finally understood my concept." This was quite a triumph because, previously, his superiors had

thought it would probably be good enough to simply rebadge somebody else's product!

Once he got the green light, Maitani set about achieving his goal of completely redefining the 35mm SLR. He didn't just want a slight reduction in the size or weight either, he wanted both to be halved, taking the Nikon F as the reference point. In the end, this proved to be over-ambitious, particularly because it would compromise durability, but nevertheless he still wanted something that would look and feel significantly smaller than anything else on the market.

The technical challenges were many, but Maitani noted that, "the interior of an SLR is not all crowded; there are crowded areas and empty areas." The crowded areas were those containing the core functions, such as advancing the film, releasing the shutter or changing the shutter speeds. Maitani hit upon the idea of relocating some of these core functions to the less crowded parts of the camera body and this, for example, led to the OM-1 having its shutter speed selector located around the lens mount. In the digital era, anything can really go anywhere inside a camera, but with a mechanical design, there were physical linkages – shafts, levers and gear cogs – to locate which was why re-arranging the internal configuration of the 1960s-vintage 35mm SLR wasn't as straightforward as it might seem today.

Nevertheless, Maitani was determined to make it work and later stated,

"The concept of using underutilised spaces was our first step on the road to developing a compact SLR."

At the start of the 1970s work continued on the M-1 with the designer and his engineers trading in millimetres as they slowly transformed the concept into reality.

Maitani stubbornly resisted any requests to make the camera any bigger than he had decreed, but begrudgingly yielded when it was obvious it was really necessary such as adding space for a seal to splash proof the battery compartment. Many years later, he still ruefully told audiences, "So the camera we have now is a millimetre taller than the dimensions that I first approved!"

Apart from greatly reducing the size and weight, Maitani also demanded increased durability. For instance, he wanted the shutter assembly to be good for 100,000 cycles when, at the time, 10,000 actuations was considered acceptable. He also wanted both the shutter and the reflex mirror mechanism to be quieter in their operations and create less shock. Alloys replaced brass for the body covers and the pentaprism viewfinder was completely redesigned to eliminate the traditional condenser (further saving weight). Even brass screws were replaced by steel ones which helped save a few precious milligrams.

In addition to being so compact, the OM-1 embodied some neat design elements. It just makes so much sense to have the shutter speed selector on the lens mount... so it feels quite natural to move from here to the aperture collar and back again when changing exposure settings. Equally sensibly, the release lock for the film transport is on the front of the camera rather than in the base so it's easier to reach, especially when the camera is on a tripod. And, of course, the lens release buttons should be on the lens itself... so just one hand is needed to detach it.

Olympus quickly followed up the OM-1 with the 'MD' version, introduced in 1974, which could be fitted with a 5.0 fps motordrive (although this was actually always possible, but the baseplate on the earlier models had to be modified). The semi-automatic OM-2 followed in 1975. The OM-1N appeared in 1979 with a few minor revisions, mostly relating to the fitting of dedicated T-series flash guns via a new hotshoe module (these were detachable on both the OM-1 and OM-2).

Not only did the OM-1 make Olympus into a leading brand in 35mm SLRs, but prompted rivals to all start thinking smaller with their next generations of models, most notable among these being the Pentax M series introduced in 1976. And, all these decades later, the OM-1 still inspires the designs of the latest OM System mirrorless digital cameras. 📷

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Sigma BF Mirrorless Camera Combines Style With Simplicity

A marked departure from any of its previous designs – although arguably just as individual – the Sigma BF is a full frame mirrorless camera which uses the L mount and has a 24.6 megapixels BSI-type CMOS sensor. Sigma describes the BF as “...an uncompromising new vision for the digital camera”. When the camera was launched at Sigma’s headquarters in Tokyo, company CEO Kazuto Yamaki stated, “We need a dedicated camera for everyday life... an everyday system camera for creative minds”. He described the BF as “a modern-day camera obscura” with “radical simplicity”.

The simplicity begins with a one-piece bodyshell milled from a solid block of aluminium in a process which takes seven hours and makes for exceptional solidity. The number of external controls is kept to an absolute minimum – centred around a single, flush-fitting control wheel/keypad – and with just about everything performed via dual-layer interface which doesn’t use conventional menus and instead superimposes two lines of settings and function icons along the top and bottom of the live view image. Instead of using memory cards, the BF is equipped with 230 GB’s worth of internal memory with USB Type C port for files transfers and also for battery recharging or connecting an external microphone or a cable release. Viewfinding is via a fixed 8.1 cm TFT LCD monitor with a resolution of 2.1 megadots and extensive touch screen capabilities. Incidentally, the camera’s rear-panel command dial and function buttons are touch-sensitive controls with haptic feedback.

Still images are captured as JPEGs or as

14-bit lossless RAW files in the DNG format at 6016x4012 pixels. There’s a choice of six aspect ratios and a 1.5x crop which gives an image size of 3840x2560 pixels. Continuous shooting is at up to 8.0 fps for 1000 JPEGs or 250 RAW DNG files (the built-in memory is good for around 14,000 JPEGs, 4300 RAW files or 2.5 hours of 6K video). Video can be recorded at up to 6K res and 30/25 fps, 4K and 30/25 fps or FHD at up to 100/120 fps. It uses the H.264 and H.265 codecs in the MOV format, and there’s an L-Log colour profile option. Electronic image stabilisation (EIS) is available for when shooting video.

The sensor-based shutter has a speed range of 30-1/25,600 second with a ‘B’ timer for up to five minutes. AF is via a hybrid phase/contrast system with subject recognition for humans and animals (specifically dogs and cats). The choice of multi-zone or spot metering measurements drives the standard set of ‘PASM’ control modes, with a sensitivity range equivalent to ISO 100 to 102,400 with extensions down to ISO 6. Additionally, there’s a choice of 13 colour modes including ‘Teal And Orange’, ‘Forest Green’, ‘Warm Gold’ and ‘Sunset Red’. These can be applied to both stills and video.

With the battery installed, the body weighs in at 446 grams and Sigma describes the camera as being “dust and splash resis-

tant”, but not waterproof (mainly as the USB port doesn’t have a cover). A textured front panel serves as a grip (and there is a thumb rest at the rear), but otherwise the camera’s lines are completely clean and uncluttered.

The BF is available in black or silver and, to match the latter finish, Sigma has issued all nine of its compact I series L mount prime lenses with silver barrels (while the black models also get revised cosmetics).

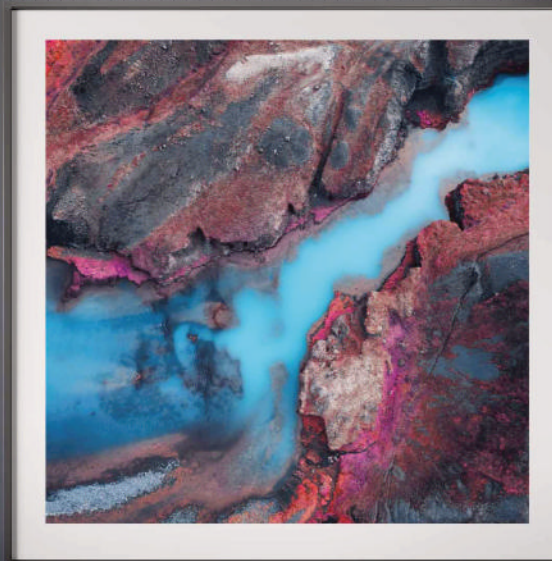
SIGMA BF – The Highlights

- Stylish, one-piece body machined from a solid billet of aluminium
- 24.6 megapixels BSI-CMOS full frame sensor
- L mount supports a wide selection of Sigma lenses, including compact I series
- 230 GB internal memory for up to 14,000 JPEGs or 4300 RAW files
- Intuitive user interface via simplified controls and just three menu screens
- ‘Status Monitor’ displays active setting
- Tactile control using pressure-sensitive haptic buttons
- 13 pictorial and cinematic ‘Colour Modes’
- 6K video with H.264/H.265 codecs, L-Log profile recording, and 100/120 fps for Full HD
- Adobe DNG lossless compression RAW capture



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Using Ilford's original coating technology, Smooth Cotton Pearlescent introduces a subtle sparkle effect that adds another visual dimension to images. Highlights gain a gentle shimmer, tonal transitions remain smooth and fine detail is rendered with clarity and sophistication. The result is a striking print surface that elevates photographs, artwork and exhibition pieces without overpowering the image itself.

Ideal for photographers, artists and printmakers seeking something truly distinctive, this paper combines the timeless quality of cotton rag with a contemporary, luminous finish. It's available in sheet sizes from 4x6 inches up to A2 and also 17x22 inches. Rolls are available in widths from 24 to 60 inches.

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GALERIE



Iford Galerie Textured Cotton Pearlescent

Iford Galerie Textured Cotton Pearlescent is a premium inkjet paper which combines a classic fine-art texture with a luminous and contemporary-looking finish. With a weight of 310 GSM, it's made in Japan from 100 percent

cotton rag and features a beautifully tactile surface that adds depth, character and presence to a print.

Iford's pearlescent coating technology introduces a subtle sparkle effect that enhances both highlights and mid-tones, while the textured surface gives an artisanal feel. The gentle shimmer adds a refined sense of light and dimension, ideal for images where surface character is part of the creative intent.

Designed for photographers, artists and printmakers who want to elevate their work beyond a smooth finish, the Textured Cotton Pearlescent paper delivers timeless quality with a distinctive, eye-catching aesthetic. It's available in sheet sizes from 4x6 inches up to A2 and also 17x22 inches. Rolls are available in widths from 24 to 60 inches.

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Beauty And Brains

Hasselblad X2D II 100C

Back in 1948, Victor Hasselblad revolutionised medium format photography with his innovative modular SLR camera design. It combined unmatched portability with high image quality and, after it evolved into the legendary 500 Series, was extensively used by professional photographers for over 60 years. The same pursuit of performance and portability is behind Hasselblad's medium format mirrorless camera system, as expressed by the current X2D II 100C model with its up-graded electronic platform for faster operation and smoother control.

Designed entirely in Sweden and exuding oh-so-cool Scandinavian style, the X2D II 100C combines all the conveniences and benefits of the contemporary mirrorless camera design, with the traditions and core values of a true Hasselblad product. Put simply, the X series cameras concept is very much in the spirit of Victor Hasselblad's original vision. The X2D II body is built in Sweden at Hasselblad's Gothenburg facility and proudly carries the legend "Handmade in Sweden".

The stylish and slimline machined alumin-

ium body is fully weather-sealed and insulated so the X2D II can operate in subzero temperatures down to -10 degrees Celsius.

The headline feature is what Hasselblad is calling "end-to-end HDR". It means that the camera's default capture setting is for 10-bit HEIF files – with the option of Ultra HDR JPEGs – and it has a high-brightness monitor screen so you can see something of the extended dynamic range when view-finding (and the full range when reviewing the HDR file). Hasselblad

says the Ultra HDR JPEGs have three stops more dynamic range compared to those using the sRGB colour space. The monitor is a 9.1 cm tilt-adjustable touch screen OLED panel with a resolution of 2.36 megadots, a peak brightness of 1400 nits – that's

75 percent brighter than previously – and a contrast ratio of 2,000,000:1. It reproduces the wider DCI-P3 colour gamut and is also calibrated to the D65 industry standard for colour temperature, ensuring a more accurate colour reproduction. The EVF is an OLED panel with a resolution of 5.76 megadots and a magnification of 1.0x for extremely comfortable viewing.

The H2D II 100C has continuous auto-focusing – a first for this system – with AI-driven subject detection and tracking for

humans, animals (dogs and cats) and vehicles. The hybrid phase/contrast-detection – which has 425 PDAF measuring points – also adds a third element called LiDAR which is short for Light Detection And Ranging. It's an active AF system which bounces pulsed laser beams off the subject to determine its distance. A big benefit is that LiDAR works in total darkness so it significantly enhances the low-light AF performance. However, the H2D II 100C also gets an AF assistance lamp to help here too.

The sensor is a "33x44" format (i.e. with a 43.8x32.9 mm imaging area) BSI-type CMOS with a sensitivity range that extends down to ISO 50 and a dynamic range of 15.3 stops. It's capable of delivering 16-bit colour depth which, for the record, delivers 281 trillion colours. The Mark II's camera has in-body image stabilisation (IBIS) with five-axis movements and correction for camera shake which can be up to ten stops... the best of any IBIS system in any format of mirrorless camera.

There's a massive 1.0 TB of internal storage on a solid state drive (SSD) backed by a memory card slot for CFexpress Type B devices.

The H2D II 100C is accompanied by a new zoom lens – the XCD 35-100mm f/2.8-4.0 which is effectively a 28-76mm. It's an 'E' series lens – the 'E' stands for 'Exclusive' – which are the Hasselblad X system's best-performers. It has an optical construction employing 16 elements in 13 groups, including three aspherical types and five with extra-low dispersion (ED) characteristics specifically to meet the resolution demands of the 100 megapixels sensor. The XCD lens system now extensive and, in addition to the flagship 'E' series models, includes the compact and lightweight 'P' series primes and the 'V' series – which stands for 'Versatile' – which are designed to balance portability and performance.

The leaf-type shutters in the XCD system lenses allow for flash sync at up to 1/4000 second (up to 1/2000 second on some models). For available light shooting there's the option of using a sensor-based shutter which has a speed range of 68 minutes to 1/6000 second.

Both wireless and tethered shooting is possible via the Phocus Mobile 2 app, and the X2D II 100C allows for in-camera battery recharging via USB C.

While the Hasselblad X2D II 100C easily qualifies as one of the most stylish-looking cameras on the market – in any sensor format – it also delivers on handling, ergonomics, capabilities and imaging performance.



Hoya Fusion Next Filters – Superior Performance And Protection

Hoya Fusion ONE Next & Fusion ANTISTATIC Next Filters

Hoya has been a name synonymous with high-quality on-lenses filters for over 85 years since the company was established in 1941 as Japan's first specialty manufacturer of optical glass. Hoya continues to develop new technologies and techniques to create superior products for both photographers and video-makers.

The Hoya Fusion ONE Next and the new Fusion ANTISTATIC Next series maintain the company's policy of refining and enhancing the quality and durability of its filters. Both series employ high-quality optical glass with Hoya's water-repellent and stain-resistant 'Super Multi-Coatings' which make filter cleaning easier while also providing effective protection for the front of the lens.

The ANTISTATIC filters feature a specially-developed anti-static coating that acts like a force field around the filter to repel dust. Consequently, less cleaning is required.

The Fusion Next filters are made in Japan using hand-selected silicates that are carefully smelted and blended to yield high-performance optical glass. The 18-layer 'Super Multi-Coating' is applied to both sides to greatly reduce reflections on the surface of the glass and ensure an ultra-clear high transmission rate. This means the filter has virtually no effect on the colour balance, contrast or clarity of the final image. Additionally, the outer ring is black-rimmed to minimise any reflections inside the frame.

The Fusion ONE Next filters are available in screwthread sizes from 37 to 82 millime-

tres diameter while the Fusion ANTISTATIC Next range is available in sizes from 49 to 82 millimetres. Both line-ups comprise Protector, UV and a circular polariser (CIR-PL) filters. The Protector and UV filters feature Hoya's exclusive one-piece, low-profile frame made of from lightweight but robust aluminium and with a front filter thread. The circular polarisers have a two-piece aluminium frame, but are still low-profile and have a front filter thread. The CIR-PL filters enhance colour reproduction by filtering out the vertical light waves in the air, so colour such as the blue of the sky and the greens of foliage are deeper and better defined. It also minimises – or even completely removes – the reflections on surfaces such as glass, water or plastic.

Manfrotto ONE Photo

Designed and manufactured in Italy, the Manfrotto ONE Photo is an aluminium tripod specifically engineered for the requirements of photographers. It provides a strong and stable platform combined with exceptional flexibility while also enabling a faster set-up and subsequent adjustments. Manfrotto's patented 'XTEND' mechanism enables each legs' three sections to be extended (or retracted) in a single action, allowing fast set-ups and adjustments. This is made possible via a single, flip-type clamp that releases all each legs' sections at once unlike the conventional procedure of one-by-one. A bubble level is incorporated to help with levelling the tripod during set-up. Notably too, the leg sections have a rounded rectangular cross section to enhance rigidity and improved resistance to vibrations.

Additionally, adjustable leg angles – set at 20, 50 or 81.5 degrees – and modular feet ensure stable positioning on any surface from controlled indoor environments to uneven outdoor terrain. The standard rubber feet can be

removed to reveal spikes for additional grip when the surface conditions demand it.

A sliding centre column enables quick and precise framing adjustments while also supporting low-angle shooting for close-ups and macro work. For overhead and lay-flat photography applications, the tripod's 'Q90' mechanism makes it possible to switch the centre column from the vertical orientation to the horizontal also in a single action. In the latter configuration, the column can also be slid forwards or backwards to obtain a perfect balance.

Weighing just over 3.0 kilograms, the ONE Photo can support up to 12 kilograms of camera and lens, and extends up to 164 centimetres. Folded down, it measures 65.5 centimetres. Other key features include Manfrotto's 'Easy Link' coupling for attaching accessories and a weight hook for adding ballast to further enhance stability. The ONE Photo tripod can be matched with either the Manfrotto XPRO three-way head or XPRO ball-type head.





Ricoh GR IV Monochrome

Ricoh's GR series digital compact cameras are loaded with 'big camera' features, yet remain comfortably pocket-sized. The latest GR IV Monochrome model continues the tradition with numerous upgrades which include Ricoh's latest-generation 'GR Engine 7' processor, a redesigned optical construction for the lens, new autofocus algorithms and updated in-body image stabilisation.

The long-running Ricoh GR series of premium compact cameras dates back to the heyday of 35mm film and the original R1 model which was introduced in 1994. Since then, each successive model has gained a loyal and dedicated following, thanks to the combination of small size and impressive performance. What's more, this tradition has been maintained in the digital era, and now continues with the latest GR IV and GR IV Monochrome models.

The B&W-only Monochrome is even more of a purist's camera especially in terms of tradition street photography. Apart from the sensor, it shares most of the key features and capabilities of the standard version along with the same smart and slimline magnesium alloy body. However, the 'GR' designation marked on the front of the camera is in black rather than white. On the inside, the main difference is that the sensor goes without an RGB filter layer and so its sensitivity range is equivalent to ISO 160 to 409,600. As there's no demosaicing involved, noise is reduced which improves definition and detailing. Additionally, the Monochrome

model replaces the standard camera's ND filter with a red filter to enhance contrast.

The GR IV Monochrome weighs just 262 grams with its battery and a memory card loaded. The lens has an ultra-compact optical design which has been redesigned employs special elements to include a large-diameter aspherical element to further minimise spherical aberrations and distortion. The focal length is equivalent to 28mm, making it extremely versatile which is further enhanced by the fast maximum aperture and the availability of sensor-shift image stabilisation which operates over five axes and provides up to six stops of correction for camera shake.

Ricoh's latest generation 'GR Engine 7' processor allows for the capture of 14-bit RAW files (in the Adobe DNG format) and continuous shooting at up to 4.0 fps. Conveniently, the GR IV Monochrome has a built-in memory with a huge 53 GB storage capacity (that's enough for a shade under 3500 large JPEGs), and which is supplemented by a memory card slot for microSD format devices.

The GR IV offers six 'Image Control'

picture modes with, variously, adjustable parameters for high/low key adjustment, contrast, contrast (highlight and shadow), sharpness, shading, clarity, toning, grain effect and HDR tone level. A total of three customisable 'Image Control' modes can be created and stored.

There's also a new HDF version of the GR IV which features a 'Highlight Diffusion Filter'. This diffuses highlights to make them softer, creating more expressive images with a sense of depth and emotion. Developed using Ricoh's advanced inkjet technology, the filter reduces overall image contrast by diffusing incoming light. It blurs the whites in bright areas, creating a blurred effect along the image's contrast edges to give a visual look similar to film photography or vintage movies. The effect can be switched on or off as desired.

There's both WiFi 2.4 and 5.0 GHz plus Bluetooth LE version 5.3 connectivity, delivering image transfer and remote camera control via Ricoh's 'GR World' app. Accessories for the GR IV include a wide-angle conversion lens (the GW-4) which delivers the equivalent of a 21mm focal length (and an angle-of-view of 90 degrees).

Ricoh's GR IV Monochrome may be pocket-sized, but it's big on features and, consequently, a compact camera without compromises.

RICOH GR IV MONOCHROME The Highlights

- Ultra-slim and durable magnesium alloy bodyshell
- Seven-element f/2.8-speed lens with a 28mm equivalent focal length
- 'APS-C' BSI CMOS B&W sensor with 25.74 megapixels effective resolution
- Built-in red filter for enhanced B&W contrast
- Ultrasonic sensor cleaning
- Sensor-shift image stabilisation over five axes with six stops of correction
- Built-in neutral density filter
- 53 GB of built-in memory with microSD memory card slot
- Hybrid contrast/phase-detection autofocus with face and eye detection
- Macro focusing down to six centimetres
- Touch screen controls, including for autofocus
- In-camera RAW file development

Sigma And The Art Of Making Fine Lenses

Sigma continues to expand its line-up of high-performance Art series lenses – both primes and zooms – to realise the full image quality potential of high-resolution sensors with both still photography and video recording.

Sigma 20-200mm f/3.5-6.3 DG Contemporary

Sigma's 20-200mm f/3.5-6.3 DG Contemporary is the world's first 10x zooming range model which commences at the 20mm focal length. Consequently, it packs a lot of versatility into



a comparatively compact lens that weigh just 540 grams and is only 117.5 millimetres in length (at 20mm).

The optical construction employs 18 elements in 14 groups with a total of eight special types – one 'FLD' ('F Low Dispersion'), three 'SLD' ('Super-Low Dispersion') and four aspherical

types. The autofocusing uses Sigma's 'HLA' ('High-Response Linear Actuator') drive and the minimum focusing distance is 16.5 centimetres at 28mm to give a maximum magnification ratio of 1:2 (i.e. half life size). In fact, this magnification is maintained from the 28mm to 85mm focal lengths so the 20-200mm can add handy close focusing capabilities to its other talents. It's also weather-sealed and has a fluorine anti-smudge coating on the front element. Other features include a zoom lock and a nine-blade diaphragm.



Sigma 135mm f/1.4 DG Art

The Sigma 135mm f/1.4 DG Art is the world's first autofocus lens to combine the 135mm focal length with the very fast maximum aperture of f/1.4.

The optical construction comprises 17 elements in 13 groups with six of these elements being special types – four using Sigma's 'FLD' glass and two aspherically-shaped. The 'FLD' elements – it stands for 'F Low Dispersion' – are designed to have the same super extra-low dispersion characteristics of fluorite glass but without being as expensive to produce. 'FLD' elements are especially effective at minimising chromatic aberrations.

The lens employs a 'floating' autofocus system – using two focusing groups which move independently of each other – to optimise image sharpness across the focusing range. Dual 'HLA' ('High-Response Linear Actuator') drives provide both high thrust and high speed for fast and precise AF operation. The minimum focusing distance is 110 centimetres, and the very shallow depth-of-field at f/1.4 makes Sigma's super-fast 135mm well suited to applications such as portraiture. Additionally, a 13-blade diaphragm ensures extremely smooth and uniformly circular out-of-focus effects.

The external construction employs both aluminium and magnesium alloy components and is fully weather sealed. Additionally, the front element has a fluorine coating to help repel moisture and grease, and also enable easier cleaning. The tripod-mount collar has an Arca-Swiss type mounting plate which is detachable. The lens weighs 1420 grams and is in 137.5 millimetres in length (Sony FE mount model). The Sigma 135mm f/1.4 DG Art is available in both the FE and L mounts.



Sigma 200mm f/2.0 DG OS Sport

Sigma's 200mm f/2.0 DG OS Sports is prime with this combination of focal length and speed to be made for full frame mirrorless cameras. It's a combination that's useful for a number of applications including portraiture, fashion and sports... especially when shooting in low-light conditions.

The optical design comprises 19 elements in 14 groups which includes two of Sigma's 'FLD' types and two 'SLD' types. The 'FLD' elements – 'F Low Dispersion' – are designed to have the same super extra-low dispersion characteristics of fluorite glass without being as expensive to produce. Along with the 'SLD' elements, these significantly reduce chromatic aberrations and enhance overall sharpness. Both Sigma's 'Super Multi-Layer Coating' and 'Nano Porous Coating' anti-reflection multi-coatings are used to suppress ghosting and flare.

The autofocus drive employs a high-thrust 'HLA' ('High-Response Linear Actuator') motor to enable fast and quiet adjustment. Focusing is performed internally, and the minimum focusing distance is 1.7 metres which gives a maximum reproduction ratio of 1:7.6. The L mount version additionally allows for the switching between linear and non-linear focus adjustments.

Sigma's latest OS2 optical image stabilisation gives 6.5 stops of correction for camera shake, and offers the choice of standard and panning modes. The lens's diaphragm has 11 blades for smoother, more rounded out-of-focus effects.

The external construction uses magnesium alloy barrel tubes and is weather sealed along with a fluorine coating on the front element to help repel moisture and grease. There's a manual aperture collar with the option of either click-stopped – in one-third stop increments – or seamless adjustments. The lens's tripod mounting collar is fixed, but can be fully rotated with soft-stop detents at 90-degree intervals and has an Arca-Swiss type foot plate. The lens is compatible with Sigma's USB Dock UD-11 for firmware upgrades and operational customisation.

NIKON Z5II



NOW WITH EXTRA FIZZ

A new sensor and a faster processor give the next-gen Nikon Z5 a big performance boost for both photography and video... and make the Mark II model fabulous value for money in the full frame mirrorless class.

N

ikon made its reputation on pro-level high-end cameras – essentially starting with the legendary F 35mm SLR – but it's proved to be equally adept at building entry- and enthusiast-level models that are just a little bit ahead of the competition. This has particularly been the case with its DSLRs – think of the D600/610 and D750 which even attracted professional users – and now with its full frame, Z mount

mirrorless system (which Nikon dubs 'FX'). The original Z5 was – and still is – a great all-round package at a very competitive price for a full frame camera, and the Mark II model carries on from here, embodying many of the updates and new features that Nikon has introduced since the original was introduced back in mid-2020. So there are elements from the Zf, Z6II, Z6III and even the pro-orientated Z8 and Z9 are all mixed into the Z5II which, despite an inevitable

▲Externally, the Z5II isn't much different from its predecessor, but inside it's another story, starting with a new sensor and Nikon's much faster, latest-gen 'EXPEED 7' processor.

price hike (although not by as much as you might expect) continues to represent huge value for money... in fact, far better than its predecessor.

The Z5II inherits the 24.5 megapixels BSI-type CMOS sensor that's also used in both the Zf and Z6II models and which is mated with Nikon's latest-generation 'EXPEED 7' processor which means there's some significant increases in speed over the previous model, both for shooting stills and the video frame rates (see the Making Movies panel for a full rundown of the camera's expanded video capabilities).

The maximum image size is 6048x4032 pixels with a choice of two smaller sizes for both JPEG and RAW capture. As with all the recent Z mount bodies 10-bit HEIF capture is provided and the RAW capture settings comprise 'High Efficiency' and 'High Efficiency*' along with a conventional

lossless compressed option. These 'High Efficiency' settings employs a more efficient form of lossy compression – essentially using the H.265 video codec – to deliver close to the same image quality as an uncompressed RAW file, but at either one-third or one-half the file size. HEIF capture is selected by switching the camera's Tone Mode setting from standard dynamic range (SDR) to HLG (hybrid log gamma) high dynamic range.

The JPEGs and HEIFs can be captured at one of three compression levels and with a choice of three aspect ratios – 3:2, 1:1 and 16:9. All the RAW file options capture 14-bit RGB colour. There's both RAW+JPEG and RAW+HEIF capture options.

The 'EXPEED 7' processor enables continuous shooting at up to 30 fps when using the Z5II's sensor-based shutter and at the full resolution, but only using JPEG/large/normal capture. The buffer memory allows for four seconds at this frame rate so you'll get around 120 frames per burst. 'Pre-Release Capture' comes as part of the 30 fps speed package (so again, it's JPEGs only) and can be set to 0.3, 0.5 or 1.0 seconds of buffering prior to full shutter release (i.e. when the shutter button is at the half-way position for metering and autofocus). As on the Zf, there's also a 'Post Release Burst' option which can be used to minimise the subsequent burst length to one, two or three seconds, or 'MAX'.

If you want to shoot fine-quality large JPEGs, the top speed is 15 fps with the sensor shutter and 14 fps with the focal plane shutter, but the burst length extends to 200 frames. The top speed with RAW capture is 11 fps and 10 fps for HEIFs, again with up to 200 frames in a burst.

Continuous AE adjustment between frames is available at 7.8 fps for JPEGs and



▲ Rear panel control layout has both a joystick-type controller and a four-way keypad. Monitor-based 'i-Menu' info display provides direct access to quite a number of functions via touch control.

7.0 fps for RAW files, but the ongoing Nikon curiosity of only AF adjustment at faster speeds – in this case up to 14 fps – appears to continue here.

In-body image stabilisation is provided via five-axis sensor shifting and gives up to 7.5 stops of correction for camera shake at the centre of the frame, and up to 6.0 stops at the edges. There's the choice of Normal and Sport modes, the latter disabling the horizontal correction to allow for panning. As with the recent Z mount models, the Z5II also has 'Synchro VR' which works in conjunction with the optical stabilisation in a lens, adding to the effectiveness of the corrections for pitch and yaw. There's also the option of linking the stabilisation to the active focus point rather than to the centre of the image. 'Focus Point VR' again enhances the effectiveness of the image stabilisation which otherwise progressively reduces towards the edges of the frame (down to 6.0 stops in this case). However, it won't work if you are using the 'Auto Area' AF mode for automatic point selection and it's selecting multiple points. It also doesn't work with the OIS-equipped Nikkor Z lenses, and it isn't available when shooting video.

Sensor shifting also drives the Z5II's 'Pixel Shift Shooting' function which can be set to capture four, eight, 16 or 32 shots with the options of a shutter delay timer (up to ten seconds) and an adjustable interval between shots (up to 30 seconds). The four-shot setting records the full RGGb colour information at each pixel point – which enhances the overall reproduction since there's no interpolation involved – and the eight-shot option is essentially adding multi-shot noise reduction. Step up to 16 shots and you get full colour plus a resolution of 96 megapixels (i.e. 4x24) with the 32-shot setting adding lower noise to the mix. However, the camera needs to be on a tripod and the subject completely static

such as a landscape. Furthermore, 'Pixel Shift Shooting' only captures RAW files so these need to be processed post-camera in Nikon's NX Studio software (which is free) so no JPEG option and no in-camera compositing.

The Z5II has dual memory card slots, both for SD devices and with UHS-II and V90 speed support. The file management options are Overflow, Back-Up or the separate recording of JPEG/HEIF and RAW

Files, or two different sizes of JPEG/HEIF images.

GOOD LOOKING

The in-camera processing for JPEGs starts with the full set (currently) of Nikon's 'Picture Control' presets which now numbers 11 and includes the most recent additions of Flat Monochrome and Deep Tone Monochrome, plus Rich Tone Portrait. In a nutshell, Flat Monochrome delivers softer tones while Deep Tone Monochrome punches them up in the way that a red contrast filter does with film. Rich Tone Portrait is tuned to enhance the reproduction of skin tones with a wider range of tonality while also managing the clipping of the brighter whites so clearly wedding photographers are in mind here.

As before, there's additionally a set of 20 'Creative Picture Control' settings which are essentially special effects, but have the same choice of adjustment parameters as the standard picture presets along with a choice of ten effect levels. There are nine slots for saving the custom 'Picture Controls' created in-camera. Following the Z6III, the Z5II also has the 'Cloud Picture Control' facility for the creation and downloading of 'Flexible Colour Picture Control' profiles for both stills and video. These are created in NX Studio and uploaded to the camera via a memory card, and they allow for much more customisation than is provided in-



NIKON MADE ITS REPUTATION ON PRO-LEVEL HIGH-END CAMERAS, BUT IT'S PROVED TO BE EQUALLY ADEPT AT BUILDING ENTRY- AND ENTHUSIAST-LEVEL MODELS THAT ARE JUST A LITTLE BIT AHEAD OF THE COMPETITION."

NIKON Z5II ON TRIAL

camera. For example, you can adjust the hue, chroma and brightness for up to eight colours using the 'Colour Blender' control while there's a 'Colour Grading' tool for adjusting the colour in highlights, mid-tones and shadows. 'Flexible Picture Control' profiles – or "imaging recipes" as Nikon calls them – created by other photographers can be directly downloaded to the camera from the Nikon Image Cloud and this is already an ever-expanding library of customised looks.

The Z5II also has the 'Skin Softening' function – which was first seen with the Z8 – and has the choice Low, Normal or High settings. It also has the 'Portrait Impression Balance' function which was introduced on the Zf and has three Mode settings that you create using adjustments for colour hue – over a magenta-to-yellow range – and brightness. This also allows for tweaking of the skin tone reproduction and is obviously a more selective – and subtler – tool than trying to do the same thing with the white balance settings.

There's a multiple exposure facility which can combine up to ten shots (with various options for managing the overall brightness) and an intervalometer which can record up to 9999 frames in a sequence. Additionally, there's provision for adding in exposure bracketing at each point for up to nine shots which means, if so desired, you could record up to 9999x9 shots in a sequence.

The auto bracketing functions are for



▲ Top panel control layout keeps to the essentials. Construction is mostly magnesium alloy covers over a high-grade composite chassis.

► There's a dedicated control for switching between photo and video operations. Inside button cycles through the EVF/monitor display options.

exposure, flash, exposure and flash, white balance and the camera's Active D-Lighting process for dynamic range expansion. Additionally, there's a 'Focus Shift Shooting' function which can capture up to 300 frames, adjusting the focus with each via a predetermined step from one (narrow) to ten (wide). These frames can subsequently be assembled post-camera for focus stacking.

The adjustable in-camera lens corrections are for vignetting, diffraction and distortion.

There's also the standard Nikon fare of 'Active D-Lighting' (ADL) processing to expand the dynamic range which, on the Zf, has a range of settings from Low to Extra High; noise reduction processing for both long exposures and high ISO settings; and an 'HDR Overlay' function which combines two images with each exposure adjusted to preserve more detail in the shadows and the highlights. The amount of exposure adjustment is set as HDR Strength from Low to Extra High, or there's an Auto setting

MAKING MOVIES

While Nikon implies that the Z5II is more a photographer's camera than anything else, it actually has an impressive suite of video features and is capable of more than just occasionally grabbing a few clips. The 'EXPEED 7' processor's speed steps it up to 4K UHD using the full sensor width (i.e. oversampled from 6K) at 24/25/30 fps and at 50/60 fps with a 1.5x crop. This can be with 10-bit 4:2:2 colour using the H.265 codec or in H.264 with 8-bit colour. More interestingly, the camera records 12-bit N-RAW footage internally and to V90-speed SDXC memory card which is a first for a Nikon Z mount camera (the Z6III, for example, uses a much faster CFexpress Type B card for this). The N-RAW frame rates with the Z5II aren't as numerous as on the Z6III, but you can record at 4032x2268 pixels – a sort of half-way-house between 4K and 5K, but still with the 16:9 aspect ratio – or at 3984x2240 pixels which represents a 1.5x crop; both at 24, 25 or 30 fps. Usefully, there's a proxy recording capability when shooting N-RAW which creates smaller-sized files for easier guide editing. Full HD video is recorded at up to 100/120 fps for

slowmo effects – again with the choice of 8-bit or 10-bit colour – and here there's a 'Hi-Res Zoom' function which operates at up to 2.0x via cropping into the 4K res so there's no loss of image quality in 2K.

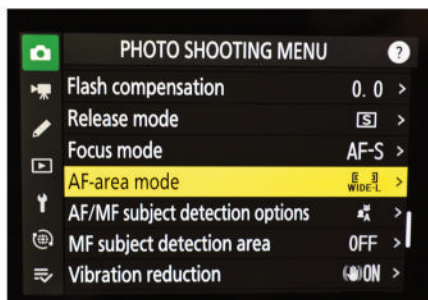
Nikon is starting to leverage more of RED's video know-how since it bought the cinema camera maker a while ago, and this evident with the Z5II's N-Log profile recording which now has the option of processing the files with RED's characterful cinematic LUTs (available as free downloads).

The Z5II has built-in stereo microphones for 24-bit 48 kHz PCM linear audio recording in the MOV and RAW formats. The audio functions comprise auto/manual levels, an attenuator, adjustable frequency response (wide range and vocal range) and a wind noise filter. Both a stereo microphone input (switchable between mic or line level) and a headphone output (with adjustable volume) are provided.

The video feature set also includes the HDR HLG profile, hybrid IBIS and electronic image stabilisation (which gives a 1.25x crop), a 'Product Review' autofocus mode, a video self-timer, time code support (with drop-frame correction), time-lapse movies (2K or 4K), auto flicker

detection and correction (with the high-frequency option), zebra patterns (a choice of two with adjustable highlight threshold and mid-tone range), and a waveform monitor display (which shows the luminance – or brightness – distribution in a scene). As noted in the main text, the variable-angle LCD monitor screen has benefits for video shooters as does the 'Touch Fn' controllability. The newer AF control algorithms and the subject detection modes are as beneficial for video as they are for still photography. Again too, subject detection is also available with manual focusing. All the 'Picture Control' and 'Creative Picture Control' settings can be applied to video which includes the latest Flat Monochrome and Deep Tone Monochrome B&W profiles and the Rich Tone Portrait colour profile for improved skin tone reproduction. The Z5II also supports UVC/UAC streaming over its USB C port.

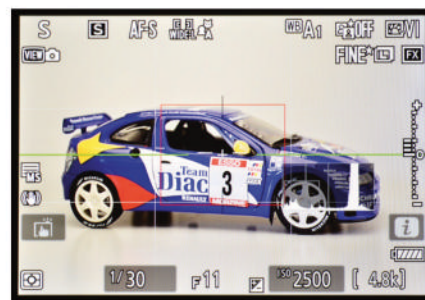
There's definitely enough here for the Z5II to work as a content creator's tool – especially with the features dedicated to this application – but it's definitely more versatile than this with the 4K image quality to back it up.



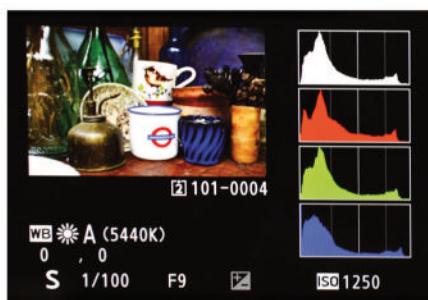
▲ Nikon's menu layout remains one of the most logical and easily navigated around.



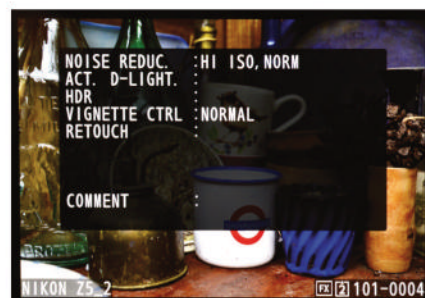
▲ Z5II has 10-bit HEIF capture selected by switching from 'SDR' or 'HDR' in the main 'Photo Shooting Menu'.



▲ Live view screen elements include guide grids, a real-time histogram, dual-axis level indicator and a centre marker. You can individually configure up to five displays so you don't have to have everything on at the same time.



▲▼ Review/replay screens cycle through a wide range of pages, including brightness and RGB channel histograms, and info overlays for all the capture settings.



which adjusts according to the contrast range present in the scene.

STAYING SHARP

The Z5II's hybrid phase/contrast detection autofocus system has 299 measuring points for auto selection (273 for manual



NIKON MAKES SUBJECT RECOGNITION AVAILABLE WITH MANUAL FOCUSING WHICH IS PARTICULARLY HANDY IF YOU'RE USING AN OLDER F MOUNT LENS WITH AN ADAPTER."

setting) which gives a frame coverage of 89 percent vertical and 96 percent horizontal.

The area modes range in size from 'Pinpoint' to 'Auto Area AF' which is essentially using the full point count across the frame. In between are Single-Point AF, two 'Wide Area' modes – either Large or Small – and three 'Dynamic Area' options – Small, Medium and Large – where, if the subject moves, the focusing point automatically switches to any of the surrounding ones. There are additionally two custom 'Wide Area' modes which allow you to create your own shapes from a choice of 33, either square or rectangular from 1x1 to 21x13 points.

The subject recognition is for People, Animals, Birds, Vehicle and Aircraft. These expand into body/head/face/eye detection for humans, body/head/eye detection for animals and birds; and cars, motorcycles, bicycles and trains within the Vehicles category. The Aircraft mode includes helicopters. Additionally, there's an Auto mode which will find any of the nine definable subjects in a frame and, as we've

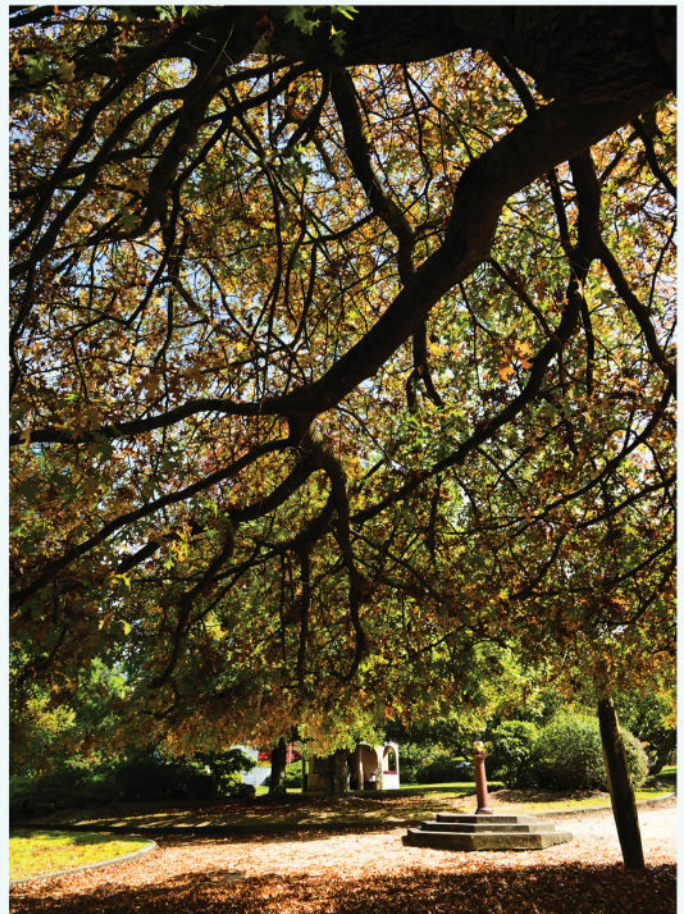
noted previously, Nikon makes subject recognition available with manual focusing which is particularly handy if you're using an older F mount lens with the FTZ or FTZ II adapter. After the subject is identified, the magnified image focus assist kicks in automatically and enlarges this part of the frame so adjust the focus accordingly.

As with all the latest full frame models from the Z9 to the Z6III, the Z5II '3D Tracking AF' which worked to great effect on Nikon's top-end DSLRs and simply follows whatever object is selected with the initial focus lock-on. It then uses the focusing distance and colour to track the subject, but it can also be used with subject detection. Additionally, you can fine-tune the tracking to better match the type of movement – essentially either Steady or Erratic – and the response to a blocked shot – from Quick to Delayed over five steps.

The AF's low light sensitivity extends all the way down to EV -10 (at ISO 100 and f/1.2) without needing to resort to any special AF mode. This is made possible by making the PDAF pixels bigger and also the



Test images captured as JPEG/large/fine files, shutter-priority auto exposure control, Vivid 'Picture Control' preset and the ISO set between 100 and 800. Nikkor Z 24-50mm f/4.0-6.3. There's plenty of well-defined detailing with beautifully smooth tonal gradations and a wide dynamic range... a key benefit of the bigger pixels when you have 24.5 MP res on a full frame imager.





ISO 50



ISO 100



ISO 200



ISO 400



ISO 800



ISO 1600



ISO 3200



ISO 6400



ISO 12800



ISO 25600



ISO 51200



ISO 64000



ISO 102400



ISO 204800

▲ The Nikon Z5II's sensor has a native ISO range of 100 to 64,000 with extensions down to ISO 50 and up to ISO 204,800. The sensor's dual-gain design means the noise reduction at the higher sensitivity settings starts from a higher base ISO and noise is inherently lower. The two base ISO settings are at 100 and 800, and the output circuits optimised for dynamic range and colour saturation (i.e. low gain), and sensitivity (i.e. low noise).

These images were captured as JPEG/large/fine files with the aperture set to f/11 and the exposure time varied to compensate for the adjustments to the ISO. High ISO and Long Exposure noise reduction processing are switched off. Nikkor Z 24-50mm f/4.0-6.3.

processing capabilities of the 'EXPEED 7' engine.

The Z5II retains a conventional focal plane shutter which is rated to 200,000 cycles and has a speed range of 900 seconds (that's 15 minutes) up to 1/8000 second plus both 'B' and 'T' timers for even

longer exposures. Compared to 'B' when the shutter release has to be held down for the duration of the exposure, the 'T' setting allows for one press to start the exposure and a second to end it.

Flash sync is up to 1/200 second. The sensor shutter has a speed range of 30-1/8000 second and allows for silent shooting. The third option is the hybrid 'electronic first curtain shutter' and there's an 'Auto' setting so the camera will automatically switch between the shutter

types as required (such as when setting the faster shooting speeds). There's also a shutter delay timer – which Nikon is now calling an "exposure delay mode" – with settings from 0.2 to 3.0 seconds – to allow for any physical vibrations related to operating the camera to die away.

The metering is sensor-based with a choice of multi-zone 'Matrix' metering, centre-weighted average, highlight-weighted average and spot measurements. Additionally, the multi-zone metering can

be linked to face detection. With centre-weighted metering, the bias assigned to the central zone can be set to Small or Standard (which correspond to 8.0 mm or 12 mm) or you can switch to a fully-averaged measurement which uses the whole frame area equally. The auto exposure modes are supplemented by an AE lock, up to +/-5.0 EV of compensation and auto bracketing (over two, three, five, seven or nine frames with up to +/-3.0 EV of adjustment).

For white balance control there's a choice of three auto correction modes called 'Keep White', 'Normal' and 'Keep Warm'. There also the 'Natural Light Auto' setting which was introduced with the Z system and essentially maintains a colour balance that looks natural to the human eye. There are eight lighting presets plus you can make and store up to six custom settings. Additionally, every WB settings has fine-tuning or you can manually set the colour temperature over a range of 2500 to 10,000 degrees Kelvin. The auto bracketing for white balance adjusts over a sequence of three frames.

IN THE HAND

With the possible exception of the very chunky Z9, Nikon's full frame Z cameras all manage to look both appealing and businesslike at the same time. The Z5II is arguably one of the best looking of the contemporary designs and the most compact, being even smaller overall than the classically styled Zf. There's a substantial handgrip, complimented by a thumbrest at the rear, so the camera is very comfortable to hold and still feels well balanced even with longer, heavier lens fitted.

The body covers are magnesium alloy over a composite GRP chassis with weather

▼ Dual memory card slots are both for SD devices and have UHS-II and Video 90 speed support.



protection which Nikon describes as "dust- and drip-resistant", but the illustration showing all the sealing points suggests it might be a bit more effective than this. The top panel layout comprises a chunky main mode dial with front and rear input wheels and dedicated buttons for setting the ISO, exposure compensation and the 'Picture Control' profiles. This last control is inherited from the Z50II and is very handy if you want to quickly change to a different profile when shooting.

The rear control layout has both a joystick-type controller and a four-way keypad, both of which can be used for navigational purposes or to select the AF points/zones. Also handy, there's a dedicated button here for setting the drive mode or activating the self-timer. Many of the controls are customisable in one way or another – and independently for shooting and playback – plus there's a pair of specifically multi-functional 'Fn' keys adjacent to the lens mount. There's also the multi-function control ring on the Nikkor Z lenses which can be set to manual aperture selection, exposure compensation adjustment or as a full-time manual focus override. Some Z lenses also have customisable 'Lens Fn' buttons.

The quick menu display in the monitor screen – which Nikon calls the 'i-Menu' – can also be customised and includes a total of 12 function tiles. These can be configured from a long list of user-assignable functions and there's the added convenience of touch control so you simply tap and go. The touchscreen implementation extends to the menus, AF point selection/focusing (with the option of auto shutter release), and the replay/review functions. It also includes the 'Touch Fn' feature introduced with the Zf and which has a number of operations, but includes focus point/zone selection while you're using the viewfinder. There's a big choice of touch area settings for both when the camera is held vertically or horizontally, and from full screen to the various quarters. 'Touch Fn' can also be used to switch the eye detection (i.e. between humans or animals), and activate either the guide grid or the level indicator.

Also inherited from the Zf is a fully-articulated monitor screen which can be turned through 180 degrees to directly face you if you're making a video presentation. The TFT panel itself is 8.1 cm in size with an increased resolution of 2.1 megadots, extensive touch controls, and adjustments for both brightness and colour balance.

The EVF is a 1.27 cm OLED panel with 3.686 megadots resolution

and a magnification of 0.8x (50mm lens at infinity). As with the monitor, it's adjustable for both brightness and colour temperature. Once again, Nikon makes a point about the finder's increased brightness which is quoted at 3000 cd/m² (a.k.a. nits) and claimed to be six times brighter than its direct rivals.

There are five live view screen designs for both the EVF and monitor which can be separately customised as desired to include a level indicator, a real-time histogram, a guide grid and a centre marker plus either Simple or Detail info displays. There's a fifth option in the monitor which is an info display for the exposure settings and ten function indicator tiles with touch control for adjusting settings.

The touch screen implement also includes the 'i' menu – which overlays function tiles on the live view image – the main menus and the replay/review functions so there isn't much that you can't do by tapping on the monitor. In addition to the 'Touch Fn' operations mentioned earlier, there's also 'Touch AF' focusing with the option of automatic shutter release once it's achieved.

The Z5II also has the 'Starlight View' setting for the live image which brightens all the dark areas in the frame to assist with composition and manual focusing when shooting at night. There's also a 'Warm Display Colours' mode which switches to black-on-red displays to help preserve your night vision. You can opt for everything to be toned down this way or just the displays and read-outs (i.e. not the live view image or pictures in replay). Usefully too, you can adjust the brightness to give the most comfortable viewing for the ambient conditions.

The review/replay displays include pages of four, nine or 72 thumbnails; zooming up to 32x and a slide show with adjustable frame intervals. Individual images can be displayed full-frame either with or without basic capture info or as thumbnails accompanied by a full set of brightness and RGB histograms, or a highlight warning. Additionally, the autofocus points or zone used to take the shot can also be shown. Cycling through the replay options also brings up five pages of detailed capture data – including the lens model and the taking focal length – which are superimposed over the image. You can record copyright info, IPTC data and voice memos.

The interfaces are USB Type C, HDMI Type D and a stereo audio input and an output (switchable to accept a wired remote trigger). Wireless connectivity is WiFi (either the 2.4 or 5.0 GHz bands) and Bluetooth 5.0 LE (via the Nikon SnapBridge app). The USB C port supports in-camera battery recharging and the Z5II uses the EN-EL15c power pack – shared with numerous other models including the Zf – which is good for



▲ Dedicated buttons for setting ISO and exposure compensation are conveniently located close to the shutter release.



▲ Main mode dial is a substantial control with three positions for saving camera user set-ups (U1, U2 and U3).



▲ Dedicated button gives direct access to the 'Picture Control' profiles and enables quick switching in the field.

around 380 shots (using the EVF). Extended shooting is possible by fitting either the MB-N11 or the newer MB-N14 battery grips which each accommodate two EN-EL15c packs. Notably, the MB-N14 allows for recharging via its own USB C port.

SPEED AND PERFORMANCE

Loaded with a Wise 128 GB SDXC UHS-II/V90 memory card and using the focal plane shutter with the Continuous High Extended mode, the Z5II captured a burst of 199 JPEG/large/fine frames in 14.256 seconds which represents a continuous shooting speed of 13.95 fps. That's as close to the quoted 14 fps as makes no difference. These files averaged around 13 MB in size. Using the sensor shutter and the 'C30' setting, a sequence of 652 normal-quality JPEGs was snapped off in 21.596 seconds which equates to a speed of 30.19 fps. The average file size here was in the order 6.58 MB.

We tested the Z5II with the Nikkor Z 24-50mm f/4.0-6.3 standard zoom which is a very handy little lens and the slower speed not really an issue given how well the camera performs at high ISO settings. As we noted with the Zf – which has the same sensor and processor duo – the autofocus greatly benefits from the faster number-crunching which, compared to the

previous model, delivers much-improved responsiveness and significantly more reliable tracking. This also comes with the updated control algorithms from the Zf so, in particular, smaller subjects – such as a distant person or animal – are detected more quickly and then the tracking will stay locked-on even with quite erratic movement such as changes of direction or speed. In situations where an eye is no longer visible, the system progressively switched to face, head or body detection in order to stay locked on the subject. Additionally, the '3D Tracking AF' works very effectively when shooting subjects that aren't covered by the recognition categories. Not surprisingly given the system's extended sensitivity, the performance low light or low contrast situations is exceptional, maintaining fast initial subject acquisition and then extremely reliable tracking subsequently.

As it does in the higher-end full frame Z cameras, the 'EXPEED 7' processor not only delivers more speed, but also improvements to image quality, including the noise reduction processing and the colour reproduction. Nikon is definitely on a par with Fujifilm when it comes to the sophistication of its colour science which balances realism with a pleasing rendering of both saturation and contrast. And there's now a growing choice of both filmic and cinematic looks to play with.

The out-of-the-camera JPEGs also exhibit plenty of well-defined detailing with beautifully smooth tonal gradations and a wide dynamic range... the key benefit of the bigger pixels when you have 24.5 MP res on a full frame imager.

Additionally, the sensor employs 'dual gain' circuitry so there are two base ISO settings – set at 100 and 800 for stills – for output circuits optimised for dynamic range and colour saturation (i.e. low gain) and sensitivity (i.e. low noise). This results in inherently lower noise at the higher sensitivity settings above ISO 800. Subsequently, less noise reduction processing is required, so the image quality for JPEGs – particularly in terms of the sharpness and colour saturation – is better than would normally be the case. However,

it does also mean that the IQ at 800 could well be better than that at ISO 400 – at least in terms of noise levels – which is one reason why some dual-gain sensors have a lower crossover setting at, say, ISO 500 as on the Z8. However, another plus is increased exposure latitude which is useful when shooting at the higher ISOs... so you can underexpose by up to around four stops to help preserve more detail in the brighter highlights and still be able to lighten the shadows without creating very much noise.

Both saturation and definition remain very good up to ISO 6400, followed by only a small reduction in the overall image quality at ISO 12,800 and even at ISO 25,600. The ISO 51,200 setting is also useable and, while detailing and saturation both start to drop off a little, the visible noise is still finely-grained. As with the Zf, the Z5II's low-light capabilities are extremely good with the 7.5-stops IBIS adding further flexibility with setting shutter speeds.

THE VERDICT

There is just so much to like about the Z5II. It handles superbly and has the classic Nikon ergonomics which just work so well in terms of being both logical and efficient. Then there's a swag of higher end features such as dual memory card slots, high-speed shooting with RAW capture (and even faster for JPEGs), pre-release buffering, an extended list of subject recognition modes for AF tracking and, for JPEG shooters, even more scope to tune the look and mood of their photographs. Better still, the camera is a real joy to use; comfortable, intuitive and engaging.

And while there are some pretty pricey Nikkor Z lenses, there's some very affordable ones too, notably the f/1.4-speed primes and the 24-200mm f/4.0-6.3 zoom, so you can build a useful system without breaking the bank.

If you're still hanging on to a beloved Nikon DSLR, this is the camera to ease you more gently into your mirrorless future... and it's much more capable than any enthusiast-level digital reflex. For anybody else in the market for a full frame model, the Nikon Z5II is unbeatable value for money. 📸



THE 'EXPEED 7' PROCESSOR NOT ONLY DELIVERS MORE SPEED, BUT ALSO IMPROVEMENTS TO IMAGE QUALITY, INCLUDING THE NOISE REDUCTION PROCESSING AND THE COLOUR REPRODUCTION."



VITAL STATISTICS

NIKON Z5II \$2,699 body only, recommended retail price

Type: Enthusiast-level digital mirrorless camera with Nikon Z bayonet lens mount

Focusing: Automatic via 299 points (89 percent vertical/96 percent horizontal frame coverage) using hybrid phase/contrast detection. Area modes are Pinpoint, Single-Point, Dynamic Area AF – Small, Dynamic Area AF – Medium, Dynamic Area AF – Large, Wide Area AF Small, Wide Area AF Large, Wide Area AF – Custom 1 and 2 (with 77 shape/size options from 1x1 to 21x13 points), Auto Area, 3D Tracking and Subject Tracking. Manual or auto (AF-A) switching between one-shot and continuous modes. Body/head/face/eye detection for humans, body/head/eye detection for animals (dogs, cats and birds), subject recognition for cars, motorcycles, bicycles, trains and aircraft. Auto subject detection. Adjustable tracking sensitivity. Sensitivity range is EV -10 - 19 (ISO 100, f/1.2). AF assist provided by built-in illuminator. Low-Light AF in 'Starlight View' live view mode. AF micro-adjustment available. Manual focus assist in live view via subject detection with magnified image, magnified image (up to 16x) and/or focus peaking display (choice of colours – red, yellow, blue or white; and high, standard or low intensities).

Metering: TTL via sensor with multi-zone (Matrix metering), multi-zone with face detection, centre-weighted average (8.0mm or 12 mm centre circle), full average, spot (4.0mm/1.5%), highlight weighted and i-TTL flash. Spot metering can be linked to AF point. Metering range is EV -4.0 to 17 (f/2.0 and ISO 100).

Exposure Modes: Continuously-variable program with shift, shutter-priority auto, shutter-priority auto with auto aperture and ISO adjustment, aperture-priority auto, metered manual, i-TTL auto flash and manual flash.

Shutter: Electronically-controlled, vertical travel, focal plane type, 900-1/8000 second plus 'B' and 'T'. Flash sync up to 1/200 second. Exposure compensation up to +/-5.0 EV in 1/3 or 1/2 stop increments. Sensor-based shutter has a speed range of 30-1/8000 second (not usable with flash). A hybrid 'electronic first curtain' shutter also available. Shutter delay timer (0.2, 0.5, 1.0, 2.0, 3.0 seconds).

Viewfinder: 1.27 cm OLED-type EVF with 3.686 megadots resolution. Coverage = 100% vertical/horizontal. Magnification = 0.8x (50mm lens at infinity). Eyepiece strength adjustment built-in. Adjustable for brightness (18 levels) and colour temperature. 8.1 cm TFT LCD monitor with 2.1 megadots resolution, fully-articulated adjustment, and touch screen controls. Adjustable for brightness (15 levels) and colour temperature. 'Warm Display Colours' (for night vision) and 'Starlight View' (for shooting in very low light) modes. Auto/manual switching between EVF and monitor.

Flash: No built-in flash. External flash units connect via ISO 518 hotshoe.

Additional Features: Magnesium alloy bodyshell sealed against dust and

moisture, auto exposure bracketing over two to nine frames (up to +/-3.0 EV adjustment per frame), AE lock, depth-of-field preview, all exposure adjustments in 1/3 or 1/2 stops, programmable self-timer (two to 20 seconds delay, up to nine frames at 0.5 to three seconds intervals), silent shooting mode, audible signals, wireless remote control, 87 custom functions.

DIGITAL SECTION

Sensor: 24.5 million pixels (effective) BSI CMOS with 35.9x23.9 mm area. Sensitivity equivalent to ISO 100-64,000 (extendable to ISO 50 and 204,800). Optical low-pass filter is fitted. Fluorine coating repels moisture and grease.

Focal Length Increase: None.

Formats/Resolution: Three JPEG compression settings (1:4, 1:8 and 1:16; with size or quality priority); three HEIF compression settings (1:4, 1:8 and 1:16; with size or quality priority); and lossless compressed, High Efficiency* or High Efficiency lossy compressed RAW files. Three resolution settings at 3:2 aspect ratio ('FX' format); 6048x4032, 4528x3024 and 3024x2016 pixels. Three resolution settings at 1:1 aspect ratio (24x24 mm); 4032x4032, 3024x3024 and 2016x2016 pixels. Three resolution settings at 16:9 aspect ratio (36x20 mm); 6048x3400, 4258x2544 and 3024x1696. Three resolution settings in 'DX' format (24x16 mm); 3936x2656, 2976x1992 and 1984x1328 pixels. RAW (NEF) images are captured at 6048x4032 pixels, in either 36-bit or 42-bit RGB colour; or at 6048x4032, 4528x3024 and 3024x2016 pixels with 36-bit RGB colour. RAW+JPEG/HEIF capture is possible (with all JPEG/HEIF compression levels).

Video Recording: NEV format (12-bit RAW) – 4K (FX) at 4032x2268 pixels; 30, 25 or 24 fps and 16:9 aspect ratio. 4K (DX crop) at 3984x2240 pixels; 30, 25 or 24 fps and 16:9 aspect ratio.

MOV format (H.265 HEVC codec, LongGOP compression, 8- or 10-bit 4:2:2 colour) – 4K UHD at 3840x2160 pixels; 30, 25 or 24 fps and 16:9 aspect ratio (up to 360 Mbps). 4K UHD at 3840x2160 pixels; 60 or 50 fps and 16:9 aspect ratio with a 1.5x crop. Full HD at 1920x1080 pixels; 120, 100, 60, 50, 30, 25 or 24 fps and 16:9 aspect ratio (up to 190 Mbps).

MP4 format (MPEG 4 AVC/H.264 codec, LongGOP compression, 8-bit 4:2:0 colour) – Full HD at 1920x1080 pixels; 120, 100, 60, 50, 30, 25 or 24 fps and 16:9 aspect ratio (up to 50 Mbps). Maximum clip duration is 125 minutes for 4K UHD at up to 60/50 fps (H.265, 8-bit colour). Maximum clip length is 125 minutes (4K UHD at up to 60/50 fps, H.265 codec and 8-bit colour). Stereo sound recording (24-bit 48 kHz PCM linear audio in MOV format) with auto/manual adjustable levels, attenuator, adjustable frequency response (wide range and vocal range) and wind noise filter. Stereo microphone input (with plug-in power) and headphone output provided (with adjustable volume).

Video Features: 'Hi-Res Zoom' (up to

2.0x in Full HD, using 4K res), proxy recording with N-RAW, N-Log gamma profile with RED LUT processing, HDR HLG profile, 'Product Review' mode, hybrid IBIS and electronic image stabilisation, time code support (with drop-frame correction), time-lapse movie mode (2K or 4K), auto flicker detection and correction, zebra patterns (choice of two with adjustable highlight threshold and mid-tone range), waveform monitor, focus peaking display, red frame recording indicator, video self-timer, video flicker reduction, video high-frequency flicker reduction, 'ISO Fine Tune' provides 1/6-stop adjustment increments, video recording display zoom (50, 100 or 200 percent).

HDMI Output: 4K UHD 16:9 with 8/10-bit 4:2:2 colour and 60, 50, 30, 25 or 24 fps. Full HD 16:9 with 8/10-bit 4:2:2 colour and 60, 50, 30, 25 or 24 fps.

N-Log or HLG with 10-bit 4:2:2 colour.

Recording Media: Two memory card slots for SD/SDHC/SDXC devices with UHS-II and V90 speed support. Back-up, overflow and assign file type management options.

Continuous Shooting: Up to 120 frames at 30 fps in JPEG/large/normal quality using the sensor-based shutter, with full AF adjustment, but AE locked to first frame. 'Pre-Release Capture' in the C30 (30 fps) and C15 (15 fps) modes at 0.3, 0.5 or 1.0 second with 'Post-Release Burst' at 1.0, 2.0, 3.0 seconds or MAX. Up to 200 frames at 14 fps with JPEG/large/fine quality using the focal plane shutter in 'Continuous High Extended' mode with full AF/AE adjustment. Up to 200 frames at 11 fps in RAW quality using the focal plane shutter, with full AF/AE adjustment. 'Continuous High' shooting at 10 fps. Low speed continuous shooting can be set between 1.0 and 7.0 fps.

White Balance: Auto/manual control with 'Natural Light Auto', seven presets and six custom settings. White balance fine-tuning available for AWB and all presets plus manual colour temperature setting (2500-10,000 degrees Kelvin, in ten degree increments or mired units) and white balance bracketing (up to nine frames). Three auto correction settings – Auto 0 'Keep White' reduces warmer hues under artificial lighting. Auto 1 'Normal' balances subject colour and ambient lighting. Auto 2 'Keep Warm Lighting Colours' maintains warmer hues under incandescent lighting.

Interfaces: USB Type C (3.2), HDMI Type D, 3.5mm stereo audio input, 3.5mm stereo audio output and wired remote trigger connection.

Additional Digital Features: Sensor-shift image 'VR' stabilisation with five-axis movement and up to 7.5 stops of correction for camera shake, 'Focus Point' VR stabilisation, 'Pixel Shift Shooting' (four, eight, 16 or 32 shots with RAW capture, up to 96 megapixels, tripod mode only), sensor cleaning, 'Active D-Lighting' contrast control (Auto, Low, Normal, High, Extra High), auto bracketing functions (AE, Flash, AE+Flash, WB or ADL), focus shift shooting (up to 300 frames), 11 'Picture Control'

presets (Auto, Standard, Neutral, Vivid, Monochrome, Flat Monochrome, Deep Tone Monochrome, Portrait, Rich Tone Portrait, Landscape and Flat), three 'Picture Control HDG' presets (Standard, Monochrome, Flat), 20 'Creative Picture Controls' (Dream, Morning, Pop, Sunday, Sombre, Dramatic, Silent, Bleached, Melancholic, Pure, Denim, Toy, Sepia, Blue, Red, Pink, Charcoal, Graphite, Binary and Carbon), ten effect levels for 'Creative Picture Controls', adjustable 'Picture Control' parameters (Sharpening, Mid-Range Sharpening, Clarity, Contrast, Brightness, Saturation and Hue), with 'Quick Sharp' adjustment (for Sharpening, Mid-Range Sharpening and Clarity), B&W filters and toning effects, nine user-defined 'Picture Control' modes, 'Cloud Picture Control', 'Skin Softening' processing (Low, Normal, High), 'Portrait Impression Balance' (Mode 1, Mode 2, Mode 3), multiple exposure facility (up to ten frames with Add, Average, Lighten or Darken exposure adjustment), intervalometer (up 9999 shots with exposure smoothing and silent mode), HDR dual-shot capture (Smoothing –High/Normal/Low; Exposure Differentiation Auto or 1.0/2.0/3.0 EV), auto bracketing functions (AE, flash, AE and flash, white balance and ADL), sRGB and Adobe RGB colour spaces, auto flicker detection and correction, high-frequency flicker correction, long exposure noise reduction (Off, On), high ISO noise reduction (Off, Low, Normal, High), guide grids (3x3, 4x4, 1:1 and 16:9), real-time histogram, dual-axis level indicator (two display types), auto ISO with auto minimum shutter speed control, in-camera lens corrections (distortion, diffraction and vignetting), image comments input (up to 36 characters), voice memo recording, copyright information, IPTC data, auto image orientation, adjustable image display time, slide show, 4/9/72 thumbnail displays, histogram displays (brightness and/or RGB channels), highlight alert, playback zoom (up to 32x), in-camera editing functions (Trim, Resize, D-Lighting, Straighten, Distortion Control, Perspective Control, Monochrome, Image Overlay, Lighten, Darken, Motion Blend and RAW Processing), WiFi connectivity (2.4 and 5.0 GHz bands), Bluetooth 5.0 LE connectivity (via Nikon SnapBridge app).

Power: One 7.0 volt, 1900 mAh rechargeable lithium-ion battery pack (EN-EL15c type) with in-camera charging via USB C (PD). Optional MB-N11 or MB-N14 battery grips can be fitted.

Dimensions (WxHxD): 134.0x100.5x72.0 mm body only.

Weight: 620 grams body (only without battery pack or memory card).

Price: \$2699 body only. \$3649 with the Nikkor Z 24-50mm f/4.0-6.3 standard zoom lens. Nikon products purchased from an authorised Nikon Australia reseller are covered by a two-year warranty. For more information visit www.nikon.com.au

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RICOH GR IV



▲Spot the difference. The GR IV looks very similar to its predecessor, but quite a lot has changed both externally and internally.

SMALL FORTUNES

It all started a little over 30 year ago with a 35mm compact, but the cult status of Ricoh's ultra-slim compact cameras has really grown in the digital era, especially with the current 'APS-C' format GR series. It's going to continue with the GR IV which boasts a myriad of updates and upgrades to make it the most desirable model so far.

Camera makers would undoubtedly love to know the secret ingredient that – often miraculously – earns a particular model cult status. What is it then? Who knows, but when it happens, it's smiles all the way to the bank. For Ricoh, the GR series of compacts and its many predecessors have been the gift

that keeps on giving... in fact, since 1994 and the original 35mm R1 model. It arrived when higher-end 35mm compacts were enjoy a high level of popularity and there was plenty of competition such as Nikon's more classically styled 35Ti and 28Ti, the Contax T2, the Konica Hexar and the soon-to-arrive Minolta TC-1. Ricoh defied physics with the R1's super-slim design – shallower

than the diameter of a 35mm film cassette in places – and a 30mm wide-angle lens which effectively became 24mm when using the camera's panorama mode (which cropped to 12x36 mm).

Although the R1 wasn't absolutely high-end it was a big hit, convincing Ricoh to go further upmarket with the GR1 which appeared in 1997 with similar styling to the R1, but now, an all-metal body (magnesium alloy) and a 28mm f/2.8 lens and upgraded features, including film prewinding... so you didn't lose any exposed shots if the camera back was opened accidentally as they were safely back in the cassette. Incidentally, the GR1's 28mm lens was considered so good, Ricoh produced a limited run of it separately with the L39 screw mount. However, even more desirable among the 35mm GR series cameras was the GR21 (2001) with a 21mm f/3.5 ultra-wide lens. Subsequently, in 2005, the GR line sailed smoothly into the digital era with the GR Digital which retained very similar styling, but replaced film with a 1/1.8-inch CCD sensor with 8.1 megapixels resolution. The 5.9mm lens was designed to still deliver an equivalent focal length of 28mm. The GR Digital series progressed to the II (2007), the III (2009) and the IV (2011), by which time the sensor size was 1/1.7-inch the resolution was ten megapixels. In 2013, Ricoh started all over again with the GR

designation, but dropping the word “Digital” and adopting a larger ‘APS-C’ size sensor initially with 16.2 megapixels resolution. The GR II appeared in 2015 and the GR III in 2018 with a resolution increase to 24 megapixels, although there have also been several variants and special editions since such as the GR IIIx (2021). So now we’ve arrived at the GR IV – not to be confused with the GR Digital IV – which can trace its ancestry directly back a nearly three decades to the 35mm GR1.

IF IT AIN’T BROKE...

Once again, Ricoh has opted not to mess too much with what’s been an enduringly successful formula. All the special ingredients are preserved – the sleek all-metal body, the 28mm-equivalent prime lens, the photography-orientated feature set and the ‘real camera’ control interface. The Mark IV’s tweaks are mostly comparatively small, but still significant, headed by a new sensor, the latest-generation ‘GR Engine 7’ processor, a redesigned optical construction for the lens, new autofocus algorithms and updated in-body image stabilisation. Did we say small changes? Well, perhaps not so small, after all.

The CMOS sensor gains a minor increase in effective resolution – up to 25.74 megapixels from 24.24 MP – which doesn’t make much of a difference, but the big deal is that it’s now a backside-illuminated (BSI) design. The key benefit here is more uniform sensitivity from the centre to the corners, but there’s also an increase in the ISO range which now extends by a stop to 204,800. The total pixel count is 26.78 million and, for the record, this looks to be the same sensor that’s used in the Pentax K3 III.

The extra megapixels bump up the maximum image size to 6192x4128 pixels at the 3:2 aspect ratio, but you’re not really going to notice any real difference here from the GR III’s 6000x4000 pixels. As before, JPEG capture is available at one of two compression levels and in four image sizes along with alternative aspects of 4:3, 16:9 and 1:1. RAW files are captured with 14-bit



RGB colour in the Adobe DNG format, again with an image size of 6192x4128 pixels and the choice of four aspect ratios. RAW+JPEG capture is available, but as before, there’s only one setting which appends a large/fine file.

Perhaps the biggest changes with the GR IV are to the data storage options with the internal memory increasing from a measly 2.0 GB to a seriously useful 53 GB. However, the memory card slot is now for the microSD format and because these devices are so tiny, they can be difficult to both insert and retrieve from the camera. The main reason for this switch is the adoption of a much bigger battery with a higher capacity – boosted by around 40 percent – to address a long-standing complaint from the users of the previous models about a comparatively short battery life. The new battery is good for around 250 shots per charge (versus 200 previous), but it’s also substantially bigger physically which Ricoh has still managed to accommodate without making the Mark IV camera any bulkier than its predecessor. In fact, it’s fractionally shallower in depth and the tiny five grams increase in the operational weight means you’re not going to notice any difference in feel if you’ve been using the

▲ Bodysell has magnesium alloy covers. Handgrip is modest in size but still provides a comfortable hold.

GR III. Most importantly, it remains pocket-friendly slim and, at 267 grams all up, hardly a handful.

The GR IV’s in-body image stabilisation – which Ricoh calls “Shake Reduction” – upgrades from three-axis sensor shifting to five which, as a result, increases the correction for camera shake from four stops to six (at the centre of the frame). Obviously, this further enhances the camera’s hand-held shooting capabilities, making it even more flexible in low-light situations and enhancing one of its key attractions as a fast and compact camera for street photography.

SEVEN UP

The 18.3mm f/2.8 prime lens – as noted earlier, equivalent to 28mm in the full frame format – now has a seven-element construction (in five groups) with the addition of an extra glass-moulded aspherical type. This brings the total of special elements to three and the revised optical design is aimed at enhancing corner sharpness primarily to compliment the sensor’s more uniform brightness. Additionally, four of the elements are made



▲ Main mode dial locks at its position. New ‘Sn’ setting is for a ‘Snap Distance Priority AE’ exposure mode.



▲ Lens has been redesigned with a seven-element construction to enhance corner sharpness and better seal the extension/retraction movements to prevent dust being sucked in.



▲ Bigger battery with a higher capacity extends the number of shots per charge to around 250, but power shooters will likely still need to carry a spare.



▲ Rear panel control layout is revised to adopt a multi-directional navigator keypad instead of a control wheel. Plus/minus rocker control on the thumb rest makes a welcome return from the Mark II model.

from optical glass which has low-dispersion characteristics to help minimise chromatic aberrations and help optimise sharpness.

There's also been modifications to the physical construction to make for a faster extension after the camera is switched – Ricoh claims a 25 percent increase in the camera's start-up time – and to help reduce the likelihood the dust being sucked in during the process. There's active sensor cleaning, of course, but the new imager also has an anti-static and grime-repelling coating to further assist with keeping its surface spotless.

The GR IV has two crop settings which create the equivalent of 35mm and 50mm but obviously deliver progressively small file sizes which make a difference when you've only got 25 MP on tap to start with.

However, as with the previous models, the sensor goes without a low-pass filter – also known as the anti-aliasing filter – in order to help optimise resolution and to deal with moiré patterns, there's the same 'AA Filter Simulator' function that Ricoh's employs on its higher-end Pentax DSLRs. The 'AA Filter Simulator' uses sensor-shifting and employs a very tiny sub-pixel movement to create the slight blurring – that would

otherwise be done by the optical low-pass filter – to correct for moiré patterns. There are three settings – 'Off' which obviously prioritises resolution; 'Low' which balances resolution and moiré correction by shifting the sensor in a linear direction; and 'High' which oscillates the sensor in a circular motion in order to optimise the blurring effect and, as a result, the correction for moiré.

GOOD LOOKS

The GR IV now has a total of 14 'Image Control' presets with two new additions called Cinema – Yellow and Cinema – Green. As the GR IV only does video as a bit of a side-line (see the Making Movies panel), these more cinematic looks are still primarily for application to stills. There's a swag of adjustable parameters, but the list varies depending on the preset, even among the colour modes.

The major change from the GR III is that the Grain Effect processing can now be applied to the Negative Film and Positive Film options as well as the four B&W modes. Furthermore, you can now vary both the grain size and the intensity (i.e. the density). There are provisions for creating

three custom 'Image Control' presets based on the 'baked-in' options with, again, a varying set of adjustable parameters depending on your starting point. The B&W toning effects are for sepia, red, green, blue and purple while the contrast filter settings are labelled 1 to 4 and increase contrast progressively.

There's a multiple exposure facility with a choice of exposure adjustments (Additive, Average or Bright) and the option to save the frames individually. An intervalometer can be set between two and 99 frames or to an unlimited frames setting. Additionally, there's an 'Interval Composite' mode which merges the sequenced images in-camera to create a single image and is handy for subjects such as the night sky.

The in-camera corrections are for dynamic range, lens vignetting (a.k.a. 'Peripheral Illumination Correction', long exposure noise reduction and high ISO noise reduction. The latter has a Custom setting which allows you to assign the Low, Medium or High reduction processing to individual ISOs from across the full native range (all of them if you wish) and also switch it off individually at any sensitivity too.

'Horizon Correction' is available too and will automatically correct for a tilt of up to 1.5 degrees when the image stabilisation is switched off, and up to one degree when it's active.

SNAP TO IT!

As noted at the outset, the GR IV has new autofocus algorithms to improve the speed and precision of its hybrid phase/contrast detection system. There's a good choice of area modes, namely Auto, Zone Select, Select, Pinpoint and Tracking. Additionally, you can link the AF point/zone with the spot metering. The Auto area mode selects from a 5x5 pattern of measuring points and the Zone Select uses a moveable 3x3 points cluster. Face/eye detection for humans is also available, but there are no other subject recognition modes.

The 'Snap Focus' feature is again available and can be preset to 0.3, 1.0, 1.5,



▲ Memory card slot is now for the fiddly microSD devices, but on the plus side the internal memory has been increased to a handy 53 GB.



▲ A proper rear input wheel – Ricoh calls them e-dials – is now provided with a press-in action for the 'ADJ' operations.



▲ As with the Mark III model, the GR IV goes without a built-in flash, but a TTL hotshoe means you get to fit one if wanted.

2.0, 2.5, 3.5 and 5.0 metres or infinity. With the 'Full Press Snap' option the lens rapidly focuses at the preset distance – that's the 'Snap' bit – when the shutter release is fully depressed. With normal operation, the minimum focusing distance is ten centimetres which is reduced to six centimetres in the macro mode which then ranges up to 15 centimetres. Touch focus is available via the monitor screen and allows you to move the zone or point around at will with or without subsequent autofocus. You can also operate the 'Full Press Snap' mode from here.

The manual focus assists are a distance scale, a magnified image – adjustable between 4x and 16x – and a focus peaking display, but only in white which nonetheless works well enough.

Exposure control is based in TTL metering using 484 measuring points and with the choice of multi-zone, centred-weighted average, highlight weighted and spot measurements. There's the standard choice of 'PASM' control modes, plus new on the GR IV, 'Snap Distance Priority AE' (marked as 'Sn' on the main mode dial). This is a fully automatic exposure mode which allows you to not just set the snap focus distance, but also one of three depth-of-field settings and it then sets the required aperture to match. You can also adjust the program mode's aperture/speed line for shallow or deep depth-of-field (i.e. prioritising either wider or smaller apertures respectively). The auto exposure modes are backed by an AE lock, up to +/-5.0 EV of compensation and auto bracketing over three frames.

The lens's nine-bladed diaphragm closes to f/16 and as it also serves as the leaf shutter so, while the absolute top speed is 1/4000 second, this is only available between f/5.6 and f/16. At the wider apertures it progressively drops down to 1/2500 second at f/2.8. There's also a built-in neutral density (ND) filter which reduces the exposure by two stops. Beyond the slowest timed shutter speed setting of 30 seconds, there's the choice of both 'B' (bulb) and 'T' (time) settings for longer exposures plus a 'BT' option which is a bulb timer that can be set for up to 20 minutes. This means you



▲ Top view illustrates just how slim the GR IV really is. GR IV is actually fractionally thinner than the previous model.

only need to press the shutter button once to start the exposure and it will be ended when the set time has elapsed. It's certainly more convenient to use than the other two, but of course, you'll still need one or the other for even longer exposure durations.

The white balance controls now include two variations for automatic correction which are called Warmth Priority and White Priority and do pretty much what it says on the tin. However, Ricoh's 'Colour Temperature Enhancement' (CTE) auto mode is arguably more flexible as it boosts the predominant colour in an image – rather than trying to correct for it – which is often an important element for creating mood or atmosphere. There are eight white balance presets which include four for different types of fluorescent lighting, and you can create up to three custom WB measurements and one manual setting derived from a scene's prevailing lighting (i.e. using a white card or sheet of paper). Alternatively, a specific colour temperature can be selected from a range of 2500 to 10,000 degrees Kelvin... remarkably, very finely adjustable in ten-degree increments. Fine-tuning is available for everything and over both the blue-to-amber and green-to-magenta colour ranges.

IN THE HAND

Smallness inevitably compromises operability, if only because of the size of the physical controls which can make them quite fiddly to use. Ricoh has been steadily refining the GR camera ergonomics over the various iterations and the Mark IV model has

yet more tweaks... although the key one reverse the changes introduced with the Mark III. So the plus/minus rocker switch on the thumb rest – from the Mark I and II models – makes a return which is very good news because it's a very convenient way of changing settings on-the-fly. Additionally, the III's rear-panel control wheel is replaced by a multi-directional navigator keypad and the rear jog controller – which looked like a proper input wheel but wasn't – is replaced with a proper input wheel that also has a press-in function. Ricoh calls this control the "Rear e-Dial" and the press-in action is now the 'ADJ' adjust operation for quick access to a set of key functions.

Five are available this way – their icons displayed in the top right of monitor screen – selectable from a list of 17 which includes the 'Image Control' presets, ISO, capture format, aspect ratio, white balance, metering and drive modes. Selection is via the rear e-dial or the keypad and the adjustments for each – using displayed submenus – are then made with the plus/minus rocker or, if you prefer, the front e-dial. At other times, the plus/minus rocker engages exposure compensation, which is a very convenient arrangement for quick, on-the-fly adjustments. The navigator keypad's quadrants provide direct access to the white balance settings, the macro focusing mode, the drive and self-timer settings and the ISO adjustments. There just one dedicated multi-function 'Fn' button and it can be assigned a role from a list totalling 37 functions. The rest of the customisation options are more

MAKING MOVIES

This is more of a short story than anything else because, while Ricoh has done a lot to improve the GR IV as a photographic tool, very little changes as far as its video capabilities are concerned. As with the previous models, you get the impression that Ricoh has included video only because it thinks it must. You might have expected 4K by this stage, but no, Full HD is your lot 24, 30 or 50 fps with 8-bit 4:2:0 colour using the MPEG-4

AVC/H.264 codec in a .MOV container. It has built-in stereo microphones, but no provision for connecting an external mic unless you use the USB C port. There are no adjustments for the internal mics so what you get is what you get.

A little button tucked away on the side of the camera switches it to video mode and the shutter release then serves as the start/stop button. The video functionality includes most of the 'Image Control' presets, the dynamic range expansion

processing, vignetting correction and the 'Snap Focus' feature. However, you don't get autofocus tracking for video nor manual adjustments for apertures and shutter speeds (the camera defaults to the program mode, no matter how the main mode dial is set). In other words, for video the GR IV is pretty much a point-and-shoot camera and little more. And... er... that's your lot.





ISO 100



ISO 200



ISO 400



ISO 800



ISO 1600



ISO 3200



ISO 6400



ISO 12800



ISO 25600



ISO 51200



ISO 102400



ISO 204800

▲ The GR IV's native sensitivity range spans ISO 100 to 204,800. The image quality – in terms of definition and saturation – remains little changed from ISO 100 all the way up to 6400. Some noise starts to become evident at ISO 12,800 and progressively increases up to ISO 51,200 but is not excessive.

like personalisation tweaks so, in a nutshell, the GR IV is quite straightforward to set up just how you'd like it to work. As before, the main mode dial locks at each position – the release button is particularly fiddly – and, as noted earlier, now includes a 'Sn' settings for the snap focus exposure mode plus there's three positions for storing custom camera set-ups (labelled U1 to U3).

The touch screen implementation includes the previously mentioned AF operations (including 'Snap Focus'), the main menus, the 'ADJ' function tiles and

◀ These test images are JPEG/large/fine files taken in the aperture-priority auto exposure mode with the aperture set to f/11, so the exposure time varies to compensate for the adjustments to ISO. Both High ISO and Slow Speed Shutter noise reduction are switched off.

submenus, and the replay modes using swipe and pinch actions. The main menu system is logically organised with five main chapters and continuous scrolling within each. Right-click navigation takes you progressively into the submenus and settings, with the keypad's 'OK' button activating your selections. As it has for quite some time, Ricoh still favours a fairly small and fine typeface – including for the on-screen read-outs – which can occasionally be a challenge to read.

The live view screen can be cycled through several display configurations via a 'DISP' button and the customisable elements include a real-time histogram, either a single- or dual-axis level display, a highlight warning and a grid pattern with the choice here being 3x3 or 4x4. You can also customise the playback display to

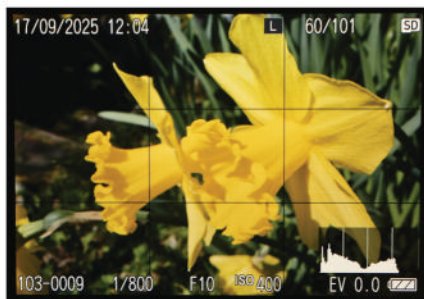
include a histogram, a highlight warning and a guide grid.

The replay/review screens include a thumbnail image along with two panels of capture data and a pair of histograms that show brightness only or a combination of brightness and the RGB channels (i.e. all on the same graph). There's the choice of 20 or 81 thumbnail pages and, in the opposite direction, zooming up to 16x.

As before, the GR IV has a swag of in-camera editing functions for JPEGs, including 'Colour Moiré Correction', 'Levels Compensation' and 'White Balance Adjustment'. Colour Moiré Correction is an option if you don't use the 'AA Filter Simulator' – or can be used even if you have – at the time of capture, and processes the image at Low, Medium or High levels to eliminate moiré artefacts (primarily by



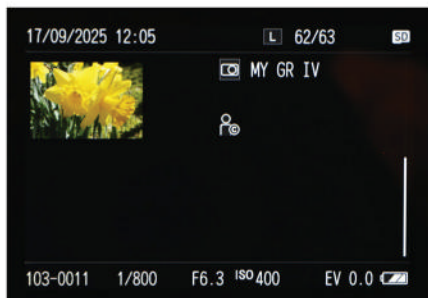
▲ Main menus still use a very fine typeface, but they're logically organised and easy to navigate.



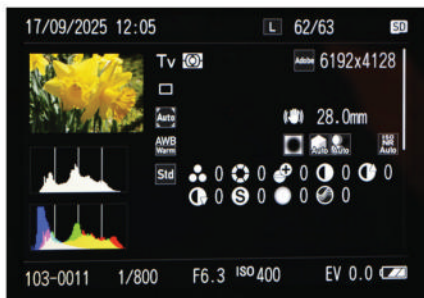
▲ The playback display can be customised to include a histogram, a highlight warning and a guide grid.



▲ Live screen is configurable with a guide grid, level indicator (either single- or dual-axis), highlight warning and a real-time histogram.



▲ The replay/review screens include a thumbnail image along with two capture data panels and a pair of histograms that show brightness only or a combination of brightness and the RGB channels.



desaturating colour edges).

The Levels Compensation works the same way as Photoshop's Levels tool with adjustable sliders for the highlights, mid-tone and shadows which are moved along the 256 brightness levels of a histogram graph. Alternatively, an automatic correction can be applied. The white balance adjustment works in the same way as the at-capture fine-tuning. All these functions show a corrected preview alongside the original image which is very useful. Also useful is a 'Base Parameter Adjust' option which enables post-capture of the brightness, saturation, hue, contrast and sharpness. In the case of monochrome images, the adjustments are for contrast filters, the toning effects, brightness, sharpness and contrast. Unlike the at-capture options, the B&W contrast filters are now colour-related – red, blue or green plus an IR settings – and the toning effect is applied via a slider which moves from blue through to sepia.



THE SMALL HANDGRIP DOES ITS JOB AND, OF COURSE, THERE'S VERY LITTLE WEIGHT TO DEAL WITH, SO THE GR IV IS EFFORTLESS IN PHYSICAL TERMS."

The GR IV's monitor screen remains fixed – another size-related compromise – and is the same 7.62 cm TFT LCD panel as before with a resolution of 1.037 megadots. It's adjustable for brightness, colour saturation and colour balance (over blue-to-amber and magenta-to-green). New is an 'Outdoor View Setting' feature with five presets to better match the display brightness to the ambient light level plus an auto mode.

The GR I and II models had a built-in flash which was deleted with the Mark III camera, but the GR IV is accompanied by a low-profile accessory unit called the GF-2. It's an additional purchase with a metric guide number of three at ISO 100 and, curiously, non-TTL operation although it does have an auto exposure mode. Of course, if you use on-camera flash regularly, you can always attach something bigger and better. Alternatively, you may wish to use the hotshoe for one of the optional optical viewfinders that Ricoh offers and actually work quite well for eyelevel framing and composing while you use the monitor screen for everything else.

Aside from the hotshoe, the only other interface is a USB Type C port which allows for in-camera battery recharging as well as data transfer. The wireless connectivity options are WiFi (switchable the 2.4 and 5.0 GHz bands and low-energy Bluetooth version 5.3. The newish GR World app has replaced the old Image Sync and delivers several new features including remote camera control (albeit with limited functionality at the moment), geo-tagging from your smartphone (via Bluetooth) and the ability to easily organise images into

albums which can then be displayed as widgets on your device's screen.

SPEED AND PERFORMANCE

Loaded with a Sony microSDXC 64 GB UHS-I speed memory card, the Ricoh GR IV captured a burst of 23 JPEG/large/fine frames in 5.815 seconds which represents a shooting speed of 3.95 fps. This as close to the quoted 4.0 fps as really makes no difference. The test files were typically sized at 14 MB. Clearly, the GR IV is no sports camera and it's not meant to be one either so 4.0 fps will probably be fast enough for the way it will mostly be used which is one shot at a time.

Perhaps more importantly, the upgraded autofocus is decently fast and more accurate overall with better tracking when the going gets tough. The Auto area mode provides good frame coverage and is definitely the go-to option for general shooting, but if you need more precision with the selected points, the host of smaller area modes have got you covered. The face/eye detection also works well and stays on the subject as long as the interruptions are short.

The out-of-camera best-quality JPEGs exhibit crisp detailing with smooth tonal gradations and a wide dynamic range which, notably, benefits detailing in the brighter highlights. There is, of course, a vast array of tweaking options for colour and more via the expanded choice of 'Image Control' presets with their big choices of adjustable parameters. With RAW capture, the wider dynamic range gives plenty of exposure latitude – at least four stops – so there's plenty of scope for brightening the shadow areas post-camera without creating much noise.

The image quality – in terms of definition and saturation – remains little changed from ISO 100 all the way up to 6400. Some noise starts to become evident at ISO 12,800 and progressively increases up to ISO 51,200, but the level of detailing isn't unduly diminished and so any of these settings are still useable without unduly sacrificing the IQ.

In reality, it's possible to get away with

shooting at ISO 102,400, although with JPEGs the finer details are lost to the noise reduction processing softening. At ISO 204,800 both chroma or colour noise are markedly increased, reducing the colour saturation and further reducing the definition which limits the enlargement possibilities for printing, but if you've got no other option, it's useable. Overall, then, the GR IV is an excellent performer in low light situations – especially for an 'APS-C' format camera – and this further enhances its street photography cred.

THE VERDICT

It's a challenge to make a camera as compact as the Ricoh GR IV and not create

some compromises to the ergonomics and operation in the process. By reverting to some of control elements of the Mark I and II models along with some fresh revisions for the Mark IV version, it's surprisingly intuitive and logical to use. There's still a few control sequences that will be unfamiliar if you've only ever used a mirrorless ILC or a DSLR before, but they're easily learnt and then the Ricoh is both fast and efficient no matter what you want it to do. And while its specs are run-of-the-mill, the monitor screen is surprisingly good even in bright sunlight. The handling is as you'd expect for a camera of this size, but the small handgrip does its job and, of course, there's very little weight to deal with, so the GR IV is effortless in

physical terms.

And, boy, it is small! In fact, the smallest 'APS-C' format camera you can have, but there's still all the IQ advantages of this sensor size, further enhanced by the new BSI design. Consequently, the imaging performance is brilliant – even at the higher ISO settings – and achieving results that are this good from a camera that's this small remains at the heart of the GR series appeal. There's no question that the Mark IV is better than anything that has gone before – and markedly better in quite a few areas than any of the Mark III models – so the legend will most assuredly continue. But don't buy this camera because it's trendy, buy it because it's brilliant. 📸

VITAL STATISTICS



RICOH GR IV \$2,200

recommended retail price

Type: Enthusiast-level, fixed-lens digital compact camera.

Lens: Ricoh GR 18.3mm f/2.8 (equivalent to 28mm). Seven elements in five groups, including three glass-moulded aspherical types. Built-in EV 2.0 neutral density (ND) filter.

Focusing Type & Range: Hybrid phase/contrast detection using nine focusing points with single-shot or continuous operation. Range is 10 cm to infinity; macro focusing down to 6.0 cm. Snap focus and 'Full Press Snap' (0.3, 1.0, 1.5, 2.0, 2.5, 3.5, 5.0 metres and infinity). Auto, Zone Select, Select, Pinpoint and Tracking area modes. Face/eye detection. Focus limiter (Near Side, Far Side, off). Low light assist via built-in illuminator. Manual focusing assisted by a distance scale, magnified image (4x, 8x or 16x) and focus peaking display. Sensitivity range is EV -1.0 to 18 (ISO 100).

Shutter Type & Speeds: Electronically controlled leaf, 30-1/4000 second plus 'B' and 'T' (30-1/2500 second between f/2.8 and f/5.6). The lens aperture range is f/2.8 to f/16. Built-in neutral density filter is equivalent to two stops. Flash sync up to 1/2000 second. Maximum shutter speed at f5.6 or smaller is 1/4000 second.

Metering: Multi-zone (using 484 measuring points), centre-weighted average, highlight-weighted average and spot.

Exposure Control: Program (with shift), shutter-priority auto, aperture-priority auto, 'Snap Distance' priority and manual. Up to +/-5.0 EV compensation in 1/3 EV increments with 'Auto EV Compensation', and auto exposure bracketing (three frames at up to +/-5.0 EV).

Sensitivity: ISO 100 – 204,800.

Sensor: 23.3x15.5 mm BSI CMOS, 25.74 megapixels (effective). No optical low-pass filter.

Formats/Resolution: JPEG capture at one of two compression levels. RAW capture at 14-bits RGB colour (Adobe DNG). RAW+JPEG capture available.

- Four resolution setting at 3:2 aspect ratio; 6192x4128, 4944x3296, 3504x2336 and 1920x1280 pixels.

- Four resolution settings at 4:3 aspect ratio; 5504x4128, 4400x3296, 3120x2336 and 1920x1440 pixels.
- Four resolution settings at 16:9 aspect ratio; 6192x3480, 4944x2784, 3504x1968 and 1920x1080 pixels.
- Four resolution settings at 1:1 aspect ratio – 4128x4128, 3296x3296, 2336x2336 and 1280x1280 pixels.

Video Recording: MOV format with 8-bit 4:2:0 colour (MPEG-4 AVC/H.264 codec) at 1920x1080 pixels (Full HD), 60, 30 or 24 fps and 16:9 aspect ratio. Built-in stereo microphones.

Continuous Shooting: Up to 4.0 fps for a burst of 18 JPEG/large/fine frames or four RAW files.

Flash: No built-in flash. External flash units sync via a hotshoe.

White Balance: TTL measurement via image sensor. Three auto correction modes (Auto, Warmth Priority, White Priority), CTE – Colour Temperature Emphasis – auto, eight lighting presets, one manual WB measurement, three custom presets, fine tuning (blue-to-amber and green-to-magenta), auto bracketing (three frames) and manual colour temperature setting (2500 to 10,000 degrees Kelvin).

Viewfinder: Fixed 7.62 cm TFT LCD monitor panel with 1.037 megadots resolution and touch screen controls. Adjustable for brightness, colour saturation and colour balance (blue-to-amber, magenta-to-green). 'Outdoor View Setting' mode. Optional optical eyelevel viewfinders available.

Storage: microSD/SDHC/SDXC card with UHS-I speed support plus 53 GB of internal memory.

Interface: USB 3.1 Type C.

Additional Features: Magnesium alloy bodyshell, 'AA Filter Simulator' (High, Low, Off), in-body image stabilisation via sensor shift with five-axis movements and up to 6.0 stops of correction for camera shake (frame centre), sensor cleaning, Adobe RGB and sRGB colour spaces, 14 'Image Control' presets (Standard, Vivid, Monotone, Soft Monotone, Hard Monotone, High Contrast B&W, Negative Film, Positive

Film, Cinema – Yellow, Cinema – Green, Bleach Bypass, Retro, Cross Processing, HDR Tone), three custom 'Image Control' presets, adjustable 'Image Control' parameters (Saturation, Hue, High/Low Key Adjustment, Contrast, Contrast – Highlight, Contrast – Shadow, Sharpness, Shading, Clarity, B&W Toning, B&W Filter Effects, Grain Effect, HDR Tone Level, Colour Tone), 'Dynamic Range Correction' processing (Highlight/Shadow), crop mode (35mm or 50mm equivalent focal lengths), intervalometer (two to 99 frames, or unlimited), 'Interval Composite' mode, multiple exposure facility (with Additive, Average or Bright exposure adjustment), 'Horizon Correction' (up to 1.5 degrees with image stabilisation switched off, +/-1.0 degrees otherwise), vignetting correction ('Peripheral Illumination' correction), single/dual-axis level indicator, depth-of-field preview, real-time histogram, high ISO noise reduction (Auto, Low, Medium, High, Auto, Custom [i.e. individually adjustable for specific ISO settings], Off), long exposure noise reduction (Auto, On, Off), dual delay self-timer (two or 10 seconds), grid guides (choice of two), highlight warning, adjustable image display time, 'Base Parameter Adjustment' in-camera corrections (Brightness, Saturation, Filter Effect, Hue, Toning, Contrast, Sharpness), in-camera RAW-to-JPEG conversion (nine parameters), in-camera editing functions (Delete, Protect, Image Rotation, Image Copy, File Transfer, Resize, Cropping [aspect ratio and slant adjustment], Levels Adjustment, White Balance Adjustment, Colour Moiré Correction, Movie Edit-Cut), Movie Edit-Divide, Save Movie Frame As Image), 20/48 thumbnail displays, zoom playback (up to 16x), slide show, copyright information, audible signals, WiFi (2.4 and 5.0 GHz bands) and Bluetooth LE 5.3 wireless connectivity. Optional wide-angle conversion lens available (21mm equivalent).

Power: Rechargeable 3.85 volts, 1800 mAh lithium-ion battery pack (DB-120 type). In-camera battery recharging via USB C.

Dimensions (WxHxD): 109.4x61.1x33.7 mm.

Weight: 262 grams (including battery and memory card).

Price: \$2200. Available in black only.

Distributor: C.R. Kennedy Photo Imaging Pty Ltd, visit <https://pentax.com.au>

OM SYSTEM M.ZUIKO DIGITAL ED 50-200mm f/2.8 IS PRO



GREAT (FOR THE) OUTDOORS

The equivalent of a 100-400mm focal range with a constant aperture of f/2.8, image stabilisation, useful close-up focusing and a pro-grade construction both inside and out. OM System's 50-200mm telezoom is another convincing argument for the M43 sensor size, balancing easy handling with a big performance.

In keeping with the OM Digital Solution's positioning of the OM System brand as the camera gear for the great outdoors, the 50-200mm f/2.8 is another telezoom in the lens line-up that promotes the enhanced portability that's made possible by the Micro Four Thirds sensor size. It joins the stonking 150-600mm and the upgraded 100-400mm in

leveraging the near-doubling, in effect, of the focal length while maintaining significantly more compact dimensions and a lighter weight. It's a very desirable combination if you're spending a lot of time carrying your equipment around which is often the case when shooting wildlife, birds, adventure or sports.

Unlike these other two models, however, the new 50-200mm is a PRO line model

which means a step up in both the optical and physical constructions to enhance performance and ruggedness. With its effective focal range of 100-400mm, the 50-200mm slots in between the 150-400mm f/4.5 (300-800mm equivalent) and the 40-150mm f/2.8 (80-300mm) PRO models. Being longer than the latter, but arguably less specialised than the former (and certainly a lot more compact), the 50-200mm will definitely tick a few boxes for M43 shooters especially as it combines the 100-400mm focal range with a constant aperture of f/2.8 which isn't on offer in any other mirrorless system in any other sensor format. The constant aperture is, of course, a feature of the PRO zooms along with internal focusing and, in the case of the 50-200mm, internal zooming as well. Keeping these adjustments inside the lens involves a fairly complex mechanism, but it greatly benefits the handling and the balance as the barrel length always remains constant. Additionally, the integrity of the

IT'S A QUITE COMPLEX LENS IN DESIGN TERMS WHICH DELIVERS A NUMBER OF BENEFITS IN TERMS OF BOTH PERFORMANCE AND OPERATION."

protection against the intrusion of moisture or dust is superior as there aren't any barrel tubes telescoping in and out with the risk of actually sucking tiny particles inside. Consequently, the 50-200mm's weather sealing is to the higher IP53 rating, matching that of the OM-1, OM-1 II, OM-3 and OM-5 II camera bodies. This also includes insulation where needed to allow for reliable operation in subzero temperatures down to -10 degrees Celsius. At the other end of the temperature scale, the 50-200mm has the more reflective white finish – only the second OM System model to adopt it after the 150-400mm – to help prevent too much heat building up internally which can then affect the precision of some operations.

Having a faster constant aperture also has an advantage when using a teleconverter so, with the M.Zuiko Digital MC-40 1.4x unit fitted, the 50-200mm becomes a 70-280mm f/4.0 telezoom which is still comparatively fast given the effective focal range is 140-560mm. The 2.0x MC-20 converter gives 100-400mm – which is effectively 200-800mm – at f/5.6 so there's still flexibility when it comes the shutter speeds and sensitivity settings particularly if you're shooting in lower light conditions.

The point to be made here is that

while the 50-200mm PRO is significantly more expensive than the 40-150mm PRO – beyond just the difference in their focal ranges – it's a much more complex lens in design terms which delivers a number of benefits in terms of both performance and operation. Incidentally, only the 150-400mm is more expensive in the current OM System lens line-up, but if you've got the budget, this lens and the 50-200mm would complement each other very nicely in the field.

OPTICAL DESIGN

The 50-200mm's design complexity is very much on show with its optical construction which employs 21 elements in 13 groups, but this includes a total of nine special types. Here there's an alphabet soup of names to describe what these nine elements do – two are 'Super ED' types (which is short for 'Super Extra-Low Dispersion'), two are HR types ('High Refractive Index'), one has ED glass ('Extra-Low Dispersion') type, one is an aspherical element made from ED glass – designated 'EDA' ('Extra-Low Dispersion Aspherical') and which is also a large-diameter type, and three are 'E-HR' types (which stands for 'Extra-High Refractive Index').

So what does it all mean? The ED and HR elements are made from glass formulations – it's a very precise science – that's designed to more precisely control how the different coloured wavelengths of light pass through them – remembering that refraction or bending takes place as the rays both enter and leave an element. The objective is to minimise the difference in the degree that the different colours refract – i.e. the amount of dispersion – so they all focus at the same point. This limits both lateral (also known as transverse) and longitudinal (or axial)

chromatic aberrations – which manifests itself as colour fringing along high-contrast edges – and also corrects for spherical aberrations. Not surprisingly, this fringing compromises sharpness. Obviously, the likelihood of chromatic aberrations occurring increases when there is a large number of elements which, in turn, means it tends to be more of a problem with telephoto lenses and especially telephoto zooms. Additionally, the fact there's a longer light path in a telephoto lens makes it harder to focus all the wavelengths at precisely the same point. Longitudinal chromatic aberration (LoCA) – when the different colours focus in front or behind the actual focus point – is more of an issue in longer telephotos and considerable effort is needed to correct it optically... which is what's happening here.

Despite in-camera – and, indeed, post-camera – correction being possible, OM Digital Solutions' engineers still strive for a high degree of optical correction, especially in the PRO line lenses. As it happens, correction profiles – for chromatic aberrations and distortion among other things – are built into OM System lenses and applied to JPEGs as they're processed in-camera (and embedded in the RAW files). There's no provision for manual adjustment from the camera bodies – OMDS is not alone here, of course – so the objective is to do as much optically as is feasible in order to provide the best possible starting point for any software processing.

To deal with internal reflections – which also become more problematic with a larger number of elements – the 50-200mm has the newer ZERO Coating II (Zuiko Extra-low Reflection Optical) multi-coating on some elements, including the large-diameter front one, and the original ZERO Coating on others. It's a combination designed to optimise the suppression of both ghosting and flare.

Another key difference with the 40-150mm PRO is the inclusion of optical image stabilisation which provides up to 5.5 stops of correction for camera shake. Of course, stabilisation is available in the latest OM System mirrorless bodies – including the OM-5 II – but with OIS in the lens as well, there's 'Sync IS' which extends the correction range to seven stops with enhanced responsiveness for pitch and yaw as the two systems are working together on these axes. Seven stops of correction, by the way, means that at 400mm you could still – theoretically, at least – shoot at a shutter speed of 1/3 second based on the 1/focal length rule-of-thumb for avoiding camera shake when a lens is hand-held. In practice, it'll all come down to just how steadily you can keep a grip on things.

The autofocus drive uses a VCM – voice coil motor – as is used in a number of Canon RF mount lenses mainly for its higher thrust and speed. Consequently, the 50-



▲ Focusing distance presetting can be had with or without a confirmation beep.



▲ Focus limiter has three settings with reduced ranges from 0.78 to 3.0 metres and 3.0 metres to infinity.

OM SYSTEM ON TRIAL

200mm supports continuous AF operation at 50 fps to match the shooting speed of the OM-3 and the OM-1 duo. It'll also support the focus stacking capabilities of these cameras. The minimum focusing distance is 78 centimetres which is maintained cross the full focal range – another feature derived from the more complex internal mechanisms – and, at the effective 400mm, delivers a reproduction ratio of 1:2. That's half life-size which means that the 50-200mm also has pretty useful close-up capabilities. With the 1.4x teleconverter fitted, the maximum reproduction ratio becomes 1:1.4 and with the 2.0x unit it's 1:1 which, of course, is life-size and considered 'true' macro. The closer focusing can be useful for subjects such as birds and insects or for photographing smaller details more generally.

IN THE HAND

In terms of its overall size, the OM System 50-200mm f/2.8 is similar to many full frame system 70-200mm f/2.8 zooms, but of course, you're getting 100-400mm here. It weighs in at a shade over a kilogram without its tripod-mounting bracket which is fully detachable because this lens can be comfortably hand-held in many situations. With the bracket fitted, the weight bumps up to 1.25 kilos which still isn't especially heavy for this class of telezoom. And there hasn't been any skimping on the build quality either so the barrel tubes are magnesium alloy and all the elements are glass (although there's some advanced optical tech gone into making them thinner and hence lighter).

As noted earlier, the weather protection is to the IP53 standard which, OMDS says, will be the case with all future OM System lenses. The IP53 certification requires that the lens can withstand at least three minutes with water being sprayed on it continuously at a 60-degree angle... which is probably better water resistance than most photographers!

The zooming collar is quite deep with a rubberised grip and traverses the 50-200mm

Physical construction employs magnesium alloy barrel tubes.



The 50-200mm f/2.8 PRO is only the second OM System lens to have a heat-dispersing white finish. Shown here on the OM-1 Mark II body, it can be seen how compact it is for what's effectively a 100-400mm telezoom.

focal range with roughly a 90-degree turn. It's nicely weighted, enabling pretty precise but also rapid adjustments to framing. The focusing collar is fly-by-wire (i.e. electronic) and feels like it too, but this is now the standard experience with the majority mirrorless system lenses. There's a total of four customisable function 'L-Fn' buttons located between the control rings and positioned at the points of the compass (i.e. at 90-degree intervals) to optimise accessibility. Whatever function is assigned – from the camera body – all four do the same thing. The default operation is as a focus-hold button, but you can also save this focus distance or preset one for subsequent recall and with the option of a confirmation 'beep'. The 'L-Fn' preset switch and 'SET' button are part of a bank of on-barrel controls just astern of the zooming collar along with an on/off switch for the image stabilisation, an AF/MF selector and a focusing range limiter. The limiter splits

the focusing range into two – the minimum focusing distance up to three metres or three metres to infinity – plus, obviously, a full range setting.

IN THE FIELD

With its rugged construction and robust environmental sealing, this is a lens very much designed to cope with the challenges of working in all weather conditions and the inevitable wear-and-tear of shooting sports... which, when capturing the action is the overriding priority, can be very tough on camera gear indeed.

Along with the OM-1 Mark II body, the total weight is close to 1.7 kilos which isn't excessive, but you'll start to notice it over time, especially with long periods of hand-held shooting. In practice, as with any longer telephoto lens, a monopod can be a good solution, providing some extra support without unduly compromising either manoeuvrability or mobility.



▲ There are 'L-Fn' multi-function buttons located at 90-degree intervals around the barrel. As the default they serve as focus hold buttons, but can be also be programmed to recall a preset focusing distance.



▲ Weather protection measures include a substantial rubber gasket around the lens mount.



▲ Tripod mounting collar can be detached completely which makes the zoom even lighter. Foot is the widely-used Arca-Swiss rail fitting so it will fit directly to many tripod heads.



© Samu Cardenas



Test pictures captured as JPEG/large/superfine files with the OM System M.Zuiko Digital ED 50-200mm f/2.8 IS PRO on the OM System OM-1 Mark II camera body. This is a very sharp lens across the entire focal range, including when shooting at the shortest focusing distances. Corner sharpness holds up extremely well when shooting at f/2.8, but does improve even further in the aperture range from f/4.0 to f/11. Some diffraction-related softening becomes noticeable at f/16 and f/22.



© Ben Knoot



▲Optical design employs a number of thinner elements to help save weight. There are a total of nine special types for provide a high degree of correction for distortion, chromatic aberrations, spherical aberrations and coma.

With both sports and wildlife, fast shutter speeds are often needed to freeze movement and, consequently, camera shake isn't really an issue, and the f/2.8 maximum constant aperture comes into its own... assuming that you aren't chasing as much depth-of-field as possible. Otherwise, the wider aperture does allow you to hang onto faster shutter speeds and/or lower ISO settings for longer regardless of the focal length. And, of course, there are plenty of situations where the shallower depth-of-field at f/2.8 is a plus, helping to isolate subjects from busy backgrounds (and also foregrounds) that would otherwise be distracting. With the inherently deeper depth-of-field of the smaller M43 sensor, the more definite separation between the subject and background delivered by f/2.8 provides more scope for selective focusing than is usually the case with the format's telephoto lenses.

While the zoom's front element has a fluorine anti-smudge coating on its exposed surface it's still worth fitting a filter for full protection and the good news here is that the screwthread fitting is 77 millimetres rather than something with a bigger diameter and a bigger price tag. Additionally, the supplied lens hood allows for adjustable filters such as a polariser or variable neutral density to be accessed via a small opening at its rear. Once you've set the filter, a little sliding cover closes the hatch to maintain the hood's full shading capability.

PERFORMANCE

All that hard work put into the 50-200mm's optical design really shines through in way it performs consistently across the focal range and also at the wider apertures. In a nutshell, this is an incredibly sharp lens, including when shooting at the shortest focusing distances. Corner sharpness holds up extremely well when shooting at f/2.8, but does improve even further in the aperture range from f/4.0 to f/11. Likewise, there's a very slight fall-off in corner brightness at f/2.8 and between 50mm and 70mm, but it's gone if you stop down to

f/4.0. As is always the case with the smaller M43 size sensor, diffraction does cause some loss of definition at f/16 and even more noticeably at f/16.

Flare and ghosting are very well suppressed, but there's a fair expanse of front element that's ready to catch some glancing rays which makes using the deep hood essential if you want to optimise colour and contrast. The correction for distortion is excellent across the focal range, and it's the same for longitudinal chromatic aberration which was very hard to detect anywhere even at f/2.8.

With its VCM drive able to operate at 50 fps, the 50-200mm AF is able to keep up with fast-moving objects ensuring that the extremely reliable tracking that's possible with AI-based subject recognition is fully realised. We tested the lens on the OM-1 Mark II body – a nicely balanced combination in handling terms – and the zoom's autofocus performance in any situation was exemplary. There was no evidence of focus breathing – a very slight variation in the subject size as the focus distance changes – at any focal length which is important if you're shooting video. However, not being a parfocal design, the focus does shift fractionally with zooming which can be easily overcome by using continuous AF to make the necessary correction.

A nine-blade diaphragm gives nicely-rounded and smooth-looking out-of-focus effects, rendering backgrounds into soft backdrops that are particularly effective when shooting wildlife and birds.

THE VERDICT

The telephoto lenses are undoubtedly the most compelling argument for the M43 sensor format, effectively delivering double the focal length than full frame in a much more compact and lightweight package. The OM System 50-200mm f/2.8 PRO is possibly the most compelling of them all; offering a superb combination of portability, versatility, AF performance and image quality.

While OMDS is promoting the outdoorsy applications, the 100-400mm equivalent focal range is actually suited to a much

wider range of applications especially when it's combined with this zoom's faster constant aperture of f/2.8 and its excellent close-up focusing. It also handles well at any focal length thanks to the internal zooming, will take whatever the weather throws at you and really doesn't occupy too much real estate in a photo backpack. On top of all this, is the near faultless optical performance for a telezoom.

At over \$5000, it's certainly a bit on the pricey side, but the 50-200mm PRO does so much so well that it will easily earn its keep every time you press the shutter button. 📸

VITAL STATISTICS

OM SYSTEM M.ZUIKO DIGITAL ED 50-200mm f/2.8 IS PRO \$5,199

Format: Micro Four Thirds.

Focal Length Multiplier: 1.97x.

Effective Focal Length: 100-400mm.

Angle-of-View: 24-6.2 degrees (diagonal).

Construction: 21 elements in 13 groups. Nine special elements – two Super ED (Super Extra-Low Dispersion) types, two HR (High Refractive Index) types, one ED (Extra-Low Dispersion) type, one EDA (Extra-Low Dispersion Aspherical) type and three E-HR (Extra-High Refractive Index) types.

Minimum Focus: 78 centimetres across the full focal range.

Maximum Reproduction Ratio: 1:2 at 200mm (i.e. effectively 400mm, 35mm equivalent).

Aperture Range: f/2.8 to f/22.

Length: 225.8 millimetres.

Maximum Diameter: 91.4 millimetres.

Filter Diameter: 77 millimetres.

Weight: 1075 grams without tripod mounting bracket, 1250 grams with the bracket fitted.

Features: Weather-sealed construction to IP53 standard (dust, moisture and subzero temperatures down to -10 degrees Celsius), fluorine moisture repellent coating on the exposed surface of the front element, optical image stabilisation (up to 5.5 stops of correction for camera shake, up to 7.0 stops with 'Sync IS'), VCM AF drive, internal focusing, internal zooming, focus limiter (0.78-3.0 metres, 3.0 metres to infinity, full range), four 'L-Fn' customisable focus hold buttons (all are set to the same function), 'ZERO Coating' and 'ZERO Coating II' anti-reflection multi-coatings, nine-blade diaphragm, rotatable and detachable tripod mounting collar with Arca-Swiss plate. Bayonet-fit lens hood supplied. Compatible with the M.Zuiko Digital 1.4x Teleconverter MC-14 and 2.0x Teleconverter MC-20.

Price: \$5199.

Distributor: OM Digital Solutions, telephone 1300 659 678, or visit <https://explore.omsystem.com/au/en/>



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PANASONIC LUMIX S1 II



THE ONE THAT YOU'LL WANT

Panasonic serves up another powerful Lumix S hybrid full frame flagship, but now it's speed that's the selling point to underpin extensive feature sets for both photography and video-making.

With the second generation of models, all the Lumix S1 series full frame mirrorless cameras are now full-on hybrid models with, as you might expect from Panasonic, impressive suites of video features. The choice is now whether you want high resolution with the S1R II, high speed with the S1 II or increased affordability with the S1 IIE. Each model's photo and video specs are dictated to some extent by their sensors, but the main shooting capabilities are pretty much

the same across the board so all three can be considered high-end hybrids. Notably, the S1R II and S1 II are priced within a couple of hundred dollars of each other so it really is a case of whether you want more resolution which delivers 44 megapixels stills and 8K video, or more speed for 70 fps continuous shooting at 24 megapixels and 4K video at up to 100/120 fps. Your call.

Otherwise, the S1R II and S1 II have a lot in common, but their sensor designs do deliver some key differences in performance which, depending on your priorities, will

definitely influence which one is right for your needs (see the Making Movies panel for a full rundown of the S1 II's video offerings).

Following Nikon's Z6III, the Lumix S1 II gets more speed – but not a much heftier price tag – by adopting a sensor architecture described as 'partially-stacked'. In fact, given the very similar specs, it's likely the sensors in the Panasonic and the Nikon aren't a million miles away from being pretty much the same. A partially stacked sensor is cheaper to manufacture than a

fully stacked (i.e. multi-layered) design but still delivers some significant performance enhancements due a much faster read-out than a conventional BSI-type CMOS imager. The key design aspect of a partially-stacked sensor is that the read-out and analogue-to-digital conversion circuitry – along with an integrated memory – are arranged along the top and bottom edges of the chip rather than in a completely separate layer. As Nikon also notes when comparing the Z6III sensor's read-out speed with that of the Z6II's, Panasonic says the S1 II's imager is 3.5x faster than the standard 24 MP BSI-CMOS chip used elsewhere in its Lumix S line-up (including the S1 IIE). This allows for continuous shooting at up to 70 fps with 'Speed Priority' checked or 60 fps with 'Image Priority'. Another benefit of the faster read-out is that rolling shutter distortion is greatly reduced. The faster shooting speed comes at the cost of a small reduction in image quality so, for example, 14-bit RAWs at 60 fps, but 12-bit RAWs at 70 fps. However, remarkably, even at 70 fps there's still continuous AF/AE adjustment and you can shoot full-size RAWs, JPEGs or HEIFs (a new capture mode on the S1 II). In comparison, Nikon limits the Z6III's fastest shooting speeds of 30 fps and 60 fps to JPEG capture only. The burst lengths are reasonably long too – up to 180 frames for RAWs or JPEGs (or, indeed, RAW+JPEG capture) and up to 170 frames for HEIFs and RAW+HEIF. Firmware Version 1.2 adds a 30 fps speed which plugs the previously big gap between 10 fps and 70 fps.

There's 'Pre-Burst' buffering at 60 fps or 70 fps – and now also at 30 fps – with the options of setting the recording period to 0.5, 1.0 or 1.5 seconds prior to full shutter release (i.e. when the shutter button is at the half-way position for metering and autofocus). Additionally, there's 'Pre-Burst' buffering at 60 fps or 70 fps with the options of setting the recording period to 0.5, 1.0 or 1.5 seconds prior to full shutter release (i.e. when the shutter button is at the half-way position for metering and



▲ Rear panel control layout includes a joystick controller and a control wheel with four-way navigational actions. Bodysell is magnesium alloy – covers and chassis – with weather sealing and insulation for shooting in subzero temperatures.

autofocusing). These pre-release frames are included in the total burst length so, for example, at 70 fps with the 1.5 seconds 'Pre-Burst' speed, you get 90 frames before and 90 frames after pressing the shutter button (or 90+80 frames with HEIF capture). Curiously though, 'Pre-Burst' shooting isn't available at any slower speed, but then there aren't really any slower but still fast speeds anyway – like 25 fps or 40 fps – as the camera goes straight from 60/70 fps all the way down to 10 fps. Apart from something in-between being all that's needed for some subjects, you're going to hit the buffer limits more rapidly at these fastest speed. All this is with the sensor-based shutter, but the S1 II's focal plane shutter delivers 10 fps along with an increase in the burst lengths, although these are modest in all capture modes except for JPEGs.

The sensor is matched with Panasonic's latest 'L2 Technology' processor which is the product of its tech tie-up with Leica and also does its part in delivering the S1 II's extra speed. The 10-bit HEIF capture uses the

HLG (Hybrid Log Gamma) profile that's also applied to the HDR video recording mode and allows images to be viewed on SDR screens. The various JPEG capture settings are also applied in the HEIF mode so there one of two compression levels and in four image sizes. Plus there's a choice of six aspect ratios – 3:2, 4:3, 16:9 and 1:1 along with the panoramic 65:24 and 2:1 – but the latter are available in the largest image size. Dual memory card slots are provided for data storage; one for CFexpress Type B and the other for SD devices with UHS-II and V90 speed support. Like the S1R II, the S1 II also allows for direct recording to an external SSD (solid state drive) via its USB C port which is particularly handy for the high bit-rate video recording modes (which are over 4.0 Gbps here).

The in-body image stabilisation (IBIS) has five-axis movements and correction for camera shake of up to eight stops at the centre of the frame and seven stops at the edges. In concert with an optically-stabilised lens – which Panasonic calls 'Dual IS 2' – the



▲ Trio of 'Holy Trinity' function buttons – for white balance, ISO and exposure compensation – is perfectly sited for quick access when shooting.



▲ Main mode dial is lockable via its central button. Note the five 'C' positions for storing customised camera set-ups.



▲ Drive mode dial also engages the self-timer and the multi-shot 'High Resolution' capture function.

PANASONIC LUMIX S1 II

correction range is up to seven stops across the frame, but there's added efficacy in the adjustments for pitch and roll, and with longer focal length lenses.

As on all the recent Lumix S bodies, sensor shifting is used to deliver multi-shot 'High Resolution' capture with the option of handheld or tripod modes. You can choose between 'LL' and 'XL' images sizes which, with the 3:2 aspect ratio, deliver 8496x5664 pixels (i.e. 48 MP) or 12000x8000 pixels (96 MP) respectively. The 4:3, 1:1 and 16:9 aspects are also available. In addition to the increased resolution, at 96 MP – which uses eight shots – full RGBG colour is recorded at each pixel point to enhance the accuracy of reproduction. A shutter release delay can be set from 1/8 second to 30 seconds. Conveniently, these frames are combined in-camera as either JPEGs or RAW files (or both). Motion blur processing is available to counter any slight subject movements, with the choice of two settings for prioritising either blur reduction or resolution (so some blurring will still occur with moving subjects such as water and which you might want to keep for effect).

LIKE YOUR STYLE

The in-camera processing options start with a selection of 21 'Photo Style' presets which includes a total for seven for video,



THE NEXT-GEN LUMIX S1 MODELS ALL SHARE THE SAME SMALLER AND LIGHTER WEIGHT BODY THAN THE PREVIOUS SERIES, BUT YOU STILL WOULDN'T CALL THEM COMPACT."



▲ Look at those lovely big dials. Control layout is busy, but well organised and promotes efficient operation.

including three Cinelike profiles – A2, D2 and V2. The photo profiles include L.Classic Neo – which is similar to Fujifilm's Classic Neg – and L.Monochrome S which has less contrast than the earlier L.Monochrome or L.Monochrome D options. Conversely, Leica Monochrome pumps up the contrast with brighter highlights and deeper blacks. There's the provision for creating up to ten customised 'My Photo Style' presets with adjustable parameters for contrast, highlights and shadows, saturation, hue, sharpness and noise reduction. The B&W profiles have specific adjustments for colour tone, contrast filters and grain effect.

Also included in the 'Photo Style' menu is the 'Real Time LUT'. LUTs (look-up tables) are used to create a particular 'look' in cinematography, but they're now finding their way into photography as an expansion of the more traditional film-based profiles which tend to be more pictorial than cinematic. Essentially, with the LUTs, the sky is the limit in terms of moods and magic that you can create. The S1 II allows for a total of 39 to be uploaded to the camera

from a memory card and sourced from the Lumix Lab app (although there are others such as Panasonic's Creator's LUT Website). With titles such as Faded Summer, Vintage Vibe, Gritty Cinema and Leafy Greens you can start get an idea of what can be created visually... think of them as more sophisticated filter effects. These LUTs are also adjustable in-camera for parameters such as sharpness and noise reduction. With video, a LUT is applied during V.Log recording so the grading for colour and contrast is performed in-camera rather than being applied in post-production which can represent big savings in both time and money with pro-level projects.

The camera's corrective measures include long exposure noise reduction and 'i.Dynamic Range' processing with the choice of auto or three manual settings while the lens corrections are for vignetting, diffraction and colour shading.

There's an intervalometer for shooting time-lapse sequences of up to 9999 frames and with exposure levelling. It can also be used to create stop-motion video clips. A



▲ As introduced on the S1R II, there's a dedicated switch for selecting the photo, video and 'Slow & Quick' (variable video frame rate) modes.



▲ Focus mode switch incorporates a button to select the AF area. 'AF On' button does what it says on the label.



▲ Front tally lamp and self-timer countdown indicator (which also serves as the AF assist lamp) are situated above the model number badging.

MAKING MOVIES

As for photographers, the choice for video-makers is between the S1R II's higher resolution and the S1 II's faster speeds. For many, the choice between having 8K at 25/30 fps and 4K UHD/DCI at up to 120/100 fps probably won't be all that hard to make. Otherwise, the two cameras share a very similar videography feature set with the key differences being in the specs related to the faster read-out speed of the S1 II's 'partially stacked' sensor. The bodies and control layouts are the same so the S1 II also has a built-in cooling fan to allow for longer clips lengths at the higher bit rates.

Internal recording in Apple ProRes RAW or RAW HQ is available at up to 5.8K and 17:9 (with a massive bit rate of 4.2 Gbps) or in ProRes 422 or 422HQ (at 1.9 Gbps), all at 24/25/30 fps and, not surprisingly, requiring the speed of a CFexpress memory card. However, 5.8K video can also be recorded at 48/50/60 fps with the H.265 codec and 4:2:0 colour. The full 3:2 aspect sensor area is available for 'open gate' recording at 6.0K (5952x3968 pixels) – down-scaled from the full resolution – for format flexibility (including vertical framing). There's also the option of 5.1K (5088x3392 pixels) at 3:2 if you want the faster frame rates of 48, 50 or 60 fps.

The full width of the sensor is also used for 4K UHD and DCI recording at up to 50/60 fps and with 10-bit 4:2:2 colour, and there's again the option here of using the ProRes 422 or 422HQ codecs also at up to 50/60 fps. Full HD recording is available in the ProRes, H.265 or H.264 and at fast frame rates up to 200/240 fps.

H.265 comes with the LongGOP interframe compression routine, but there's choice of this or All-Intra compression when using H.264. You can also opt for the MP4 format with 10-bit H.265 or 8-bit H.265 coding for 4K UHD up to 50/60 fps and Full HD up to 50/60 fps. Firmware Version 1.2 adds an MP4 Lite option which records at the 3:2 aspect 'open gate' and at 25/30 fps to give a much lower bit rate of 50 Mbps and consequently much smaller files.

The fastest video frame rates involve various crops depending on the resolution and frame shape – for example, 4K UHD at 100/120 fps is cropped at 1.24x and 4K DCI

at 1.17x. Notably though, the S1 II doesn't impose fps-rated crops as much as quite a few of its rivals. In practice, there's an almost bewildering choice of resolutions, aspect ratios, bitrates and codecs in various combinations running to a total of 17 pages of 'Rec Quality' menus (11 of these for the MOV options alone). No wonder then, there's a 'My List' custom menu for corraling the most-used quality settings into the one place. New is a 'Cinemascope' 2.4:1 widescreen aspect at 6K 50/60 fps or 4K 100/120 fps (without a crop). The full height of the sensor is used to deliver the 4:3 aspect ratio for use with anamorphic lenses and the camera will show a desqueezed preview.

The new 'partially stacked' sensor has Panasonic's 'Dual Native ISO' circuitry with the base ISOs set at 200 and 1600 for video using the Cinelike profiles and 640 and 5000 for V-Log recording. For video, the S1 II has 'Dynamic Range Boost' processing which, apparently, isn't the same thing as the GH7's 'DR Boost' and also works differently to the S1R II's 'Dynamic Range Expansion', but it gives a quoted 15 stops of dynamic range (compared to 14.2 stops otherwise). It gives an extra two-thirds of a stop at the highlight end with V-Log recording, but a slower sensor read-out speed means that it's only available at frame rates up to 30 fps.

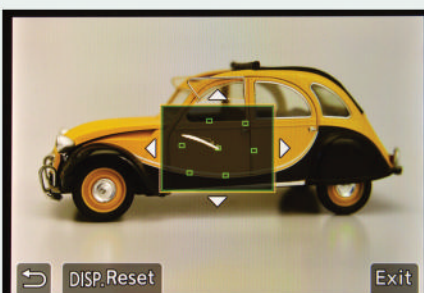
As noted in the main text, there's a choice of seven 'Photo Style' profiles for video; namely Cinelike D2, Cinelike V2, Cinelike A2, Like709, Like2100 HLG and Like2100 HLG Full Range plus the RealTime LUT option. This allows a pre-loaded LUT to be applied to V-Log footage as it's being recorded in-camera. Up to 39 LUTs can be stored in the camera which has the V-Log-to-Like709 conversion installed as standard. The new Cinelike A2 video profile is described as having a wide dynamic range and a rich gradation. It's also possible to add ARRI LogC3 support to the 'Photo Style' profiles via a paid upgrade software key.

As introduced with the S1R II, there's a false colour display which uses a B&W preview with the different brightness levels (i.e. brighter highlights and darker shadows plus the mid-tones) shown in different colours for determining exposures. The rest of the video assists are zebra patterns

(with selectable thresholds), a wave form monitor, a vectorscope, colour bars and a 1.0 kHz test tone, a luminance spot meter, frame markers (a total of ten), and time coding (rec run/free run). On the audio side, it has built-in stereo microphones, a stereo audio input and an output (both standard 3.5 mm minijacks), manual levels adjustment (over an extended range of -18 dB to +12 dB), an attenuator and a wind-cut filter (with High and Standard settings). The S1 II records 24-bit 48 kHz audio via its built-in microphones and at the higher resolution 96 kHz with an external microphone, but there's now also 32-bit 'float' audio recording. This requires the DMW-XLR2 microphone adapter and is designed to eliminate clipped and distorted audio which often happens when there are sudden increases (or reductions) in the sound levels. It also eliminates the need to continually manually adjust the recording levels.

The image stabilisation options for video go beyond IBIS and OIS to add 'Electronic I.S.' which moves the image around on the sensor to counter camera movement. Additionally, there's a 'croppless' EIS mode which uses very edges of the frame that are cropped at output anyway to perform peripheral distortion correction so, in effect, there's no cropping associated with the electronic stabilisation. Also available is 'Boost I.S.' which is essentially designed to provide tripod-level stability when shooting handheld using a fixed view (i.e. not moving the camera). New is the addition of image stabilisation tuned to anamorphic lenses and, in fact, matched to the magnification with settings for 1.30x, 1.33x, 1.5x, 1.8x and 2.0x.

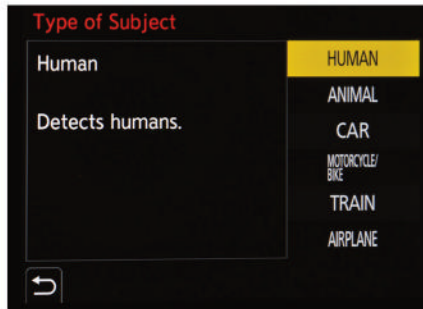
Is the S1 II an even better hybrid offering than the much-lauded S1R II? You'd have to say that it's more flexible in a number of areas given the still-limited applications for the R's 8K video capability. Besides, the 5.8 and 6.0K modes still deliver bags of image quality – but it's still outstanding with oversampled 4K – and there are just so many in-camera options for matching the recording set-up to the type of content and its end-use. Add in what can be done with cinematic looks – in-camera and custom-made – and the creative possibilities match the technical armoury.



▲ Video displays include (from left) a waveform monitor which shows luminance values, a vectorscope which measures colour information, and a set of colour bars which are accompanied by a 1.0 kHz test tone.



▲ For the first time on a Lumix S model, the capture format options are expanded to include 10-bit HEIF files (using the HLG profile).



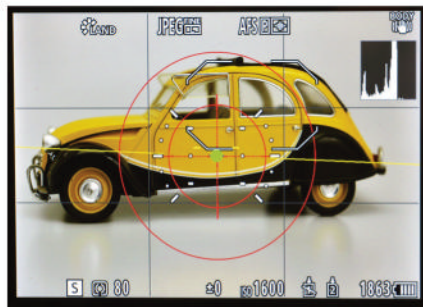
▲ AI-based subject detection covers six main categories, but many can multi-task. Animals, for example, covers dogs, cats and birds.



▲ 'Quick Menu' is fully customisable in terms of the 12 function tiles displayed.



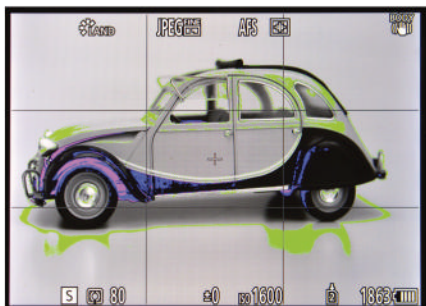
▲ Monitor-based control panel is extensive and has the convenience of touch control. Video mode has its own set of read-outs and function icons.



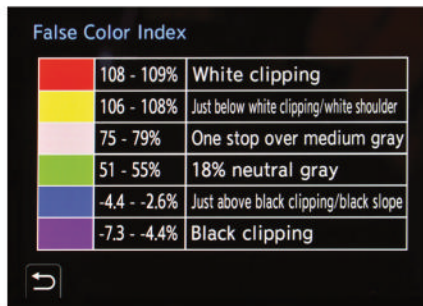
▲ Live view display is extensively customisable with elements such as a guide grid, level indicator, real-time histogram and Panasonic's 'I.S. Status Scope' which shows the degree of camera shake (the green dot is shown centred here because the camera is mounted on a tripod).



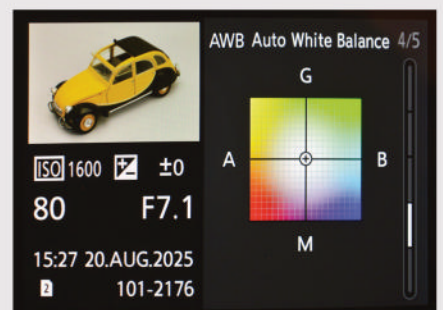
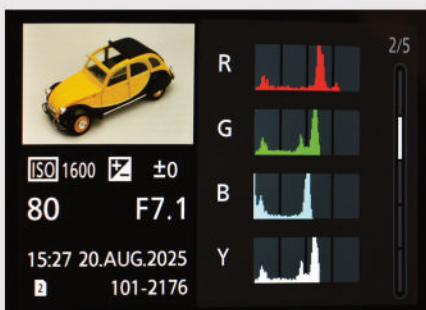
▲ 'Quick Menu' is fully customisable in terms of the 12 function tiles displayed.



▲ As on the S1R II, a false colour display uses colours to represent the luminance levels in a scene and is another method of determining the best exposures. It can be used with both stills and video. Guide Index shows what the colours represent.



▲ Review/replay screen cycles through various sets of info in a panel at the right, including a full set of histograms, the JPEG processing settings, white balance adjustments and lens data.



multiple exposure facility allows for up to four images to be overlaid with an 'Auto Gain' function to adjust the overall exposure. Auto bracketing modes are available for exposure, aperture, focus, white balance and colour temperature settings. The exposure bracketing sequences can be

set to three, five or seven frames, while aperture bracketing is performed over three or five frames or you can select 'All' which then captures a shot at every one of the attached lens's full-stop settings. The focus bracketing is adjustable for the amount of shift (from one to ten steps) over sequences

of up to 999 frames which, of course, is likely beyond what you'll ever want. Focus stacking is now performed in-camera provided the camera has been updated with Firmware Version 1.1.

The S1 II also has the 'Live View Composite' function which is designed

THE S1R II AND S1 II HAVE A LOT IN COMMON, BUT THEIR SENSOR DESIGNS DO DELIVER SOME KEY DIFFERENCES IN PERFORMANCE WHICH WILL DEFINITELY INFLUENCE WHICH ONE IS RIGHT FOR YOUR NEEDS."

for low-light photography and has been on Olympus/OM System cameras for a very long time (where it's called 'Live Composite'). It combines a reference background exposure with subsequent multiple exposures that only add any bright light sources (such as stars) thereby avoiding any overexposure. It can run for up to three hours, and the 'Live' bit means it can be monitored in real-time in the monitor or the EVF. You can also use this procedure as a noise reduction measure when shooting with slow shutter speeds in very low light situations, and the multiple frames are subsequently merged in-camera.

Additionally, the S1 II has the 'Crop Zoom' and 'Hybrid Zoom' functions. These are a way of obtaining an effective increase in focal length – with both stills and video – by cropping the image progressively down to the medium, small and extra-small sizes at 1.4x, 2.0x and 3.1x respectively. However, it's not just a straight crop because interpolation and scaling are used to maintain resolution...which makes the feature quite useful. 'Crop Zoom' works with prime lenses while the 'Hybrid Zoom' combines optical and digital zooming into a single continuous action. After the end of the lens's optical focal range is reached, the digital 'zoom' automatically takes over.

THE EYES HAVE IT

The S1 II employs Panasonic's 'Phase Hybrid AF' autofocus and, as per the S1R II, there's 779 measuring points for phase-detection complements by 315 points for contrast-detection. The latter uses Panasonic's 'Depth-From-Defocus' (DFD) methodology, which is actually quite fast, but not as fast as PDAF which is what's needed for reliable subject tracking. The points coverage is across virtually the entire frame.

AI-based subject recognition is for humans, animals, cars, motorcycles and bicycles, aircraft, and trains. The detection for humans can recognise eyes, faces and bodies – or it can be fine-tuned to look for only eyes and faces – plus there's a new 'Urban Sports' setting which employs pose recognition for activities such as

skateboarding, breaking dancing or BMX bikes. The animal detection works with dogs, cats and birds; with the options of either eye detection or eye/body detection.

The low-light sensitivity extends down to EV -6.0 at ISO 100 and f/1.4. There's a big choice of area modes ranging in size from Pinpoint to Zone, the latter with the choice of vertical, horizontal, square or oval-shaped clusters of points which can be moved around the frame as desired. Additionally, the size of the Zones can be changed so, in the case of the oval-shaped pattern for example, it can be adjusted from just five points up to 97 points. Alternatively, a custom AF area shape can be created and up to four can be stored for future recall. The full set of 779 points is available with automatic point selection, but if you opt to do it manually, there's the choice of 1-Area or 1-Area+ modes, the latter enabling automatic point switching if the subject moves. Additionally, both the 1-Area modes can be adjusted to one of eight sizes to vary the selectivity.

When not using the subject-based tracking, an 'AF Custom Setting' menu enables fine-tuning of the tracking to suit the nature of the subject movement (i.e. speed, direction, etc.). It offers four scenarios (Set 1 to Set 4) with three adjustable parameters – AF Sensitivity, AF Area Switching Sensitivity and Moving Subject Prediction.

Manual focusing is assisted by a magnified image, a simple distance scale or a focus peaking display which has been expanded to offer a choice of ten colours and five levels of intensity. The magnified image is shown either full-screen (at up to 6.0x) or as a picture-in-picture inset panel (again up to 6.0x) and it's also available for focus confirmation when using the autofocus. Finally, 'AF+MF' operation provides a full-time manual override along with whatever means of assistance you've selected.

With supporting Lumix S lenses, the operation of the manual focusing collar can be switched between linear or non-linear. With non-linear adjustment, the amount of focus shift is governed by the rotation speed of the focus collar... in other words, if you turn it quickly, you'll make big adjustments, but turning it slowly allows for more precise control thanks to smaller degrees of adjustment. With the linear setting, the focus is shifted at a constant speed according to the rotational angle of the focus ring. In this mode, the sensitivity (i.e. the amount of focus shift per the rotational angle of the focusing collar) can be adjusted from 90 to 1080 degrees (in 30-degree increments up to 360 degrees) or set to 'Maximum'. In a nutshell, the latter allows for more uniformity of adjustment which is something video makers often require when using focusing creatively.

As across the entire Lumix S range, exposure control is driven by sensor-based metering which has 1728 measuring points with the choice of multi-zone, centre-weighted average, highlight-weighted average and spot measurements. The standard set of 'PASM' exposure control modes are supplemented by a fully automatic 'Intelligent Auto' mode which performs automatic scene detection for portraits, portraits with pets, landscapes, close-ups, night portraits, night scenery, food, sunsets and low-light situations.

The focal plane shutter has a speed range of 60-1/8000 with flash sync up to 1/250 second and a 'B' bulb setting for long exposures of up to 30 minutes. The sensor-based shutter extends the fastest speed to 1/16,000 second and enables totally silent and vibration-free operation. As always, there's the hybrid 'Electronic First Curtain Shutter' which starts the exposure electronically and finishes it with the FP shutter's second curtain. The fastest available speed with EFCS is 1/2000 second,



▼ Dual memory card slots are for CFexpress Type B and SD UHS-II speed devices.



TEST IMAGES

Test images captured as JPEG/large fine files, shutter-priority automatic exposure control, the Vivid 'Picture Style', Leica Monochrome and Real Time LUT (Like709 profile) presets, and ISO settings between 100 and 800. Lumix S 24-60mm f/2.8 and Lumix S 100-500mm f/5.0-7.1 OIS zooms.

The out-of-the-camera JPEGs exhibit accurate colours with good neutrality across the spectrum, including in the skin tones and the more subtle shades. Great definition ensures crisply rendered fine details and the tonal gradations are very smooth from the brighter highlights through to the darker shadows. The dynamic range is excellent and maintained at the higher ISO settings by the sensor's 'Dual Native ISO' circuitry

but it permits the use of electronic flash. Compared to using the FP shutter alone, it will also reduce both noise and vibration, but not completely. External units sync via a Hotshoe only.

The white balance correction options start with a choice three auto settings called AWB, AWBc and AWBw. The latter two either, respectively, reduce or maintain the warmer tones when shooting under incandescent lighting. Alternatively, there are five lighting presets, provisions for creating up to four custom WB measurements and for storing up to four colour temperature settings, selected from an adjustment range of 2000 to 10,000 degrees Kelvin. Fine-tuning is available for all WB settings and, as noted earlier, there is auto bracketing for both white balance and colour temperature. New to the S1 II is AI-assisted auto white balance control for RAW files processed in-camera (i.e. to JPEGs or HEIFs) which,

in particular, is designed to ensure more accurate colours in scenes with mixed lighting sources.

IN THE HAND

The next-gen Lumix S1 models all share the same smaller and lighter weight body than the previous series – closer now to the S5 II duo in size – but you still wouldn't call them compact. That said, they're certainly not the beefiest full frame mirrorless cameras on the market, and a bit of extra real estate works well in terms of both a well-spaced control layout and the handling with longer, heavier lenses. There's a well-sized handgrip which is very comfortable to hold and enables good manoeuvrability. All the dials and control wheels are a good size too, as are the main function buttons which, to Panasonic's credit, are also all well marked so you aren't left wondering – or, indeed, trying to remember – what does what.

The control layout is organised for optimum functionality and efficiency whether using the dials and buttons, the touch screens or a combination of both. As on all the S1 models, directly behind the shutter release is the all-important 'Holy Trinity' of function buttons for white balance, ISO and exposure compensation. They're perfectly placed for speedy on-the-fly adjustments as are both the front and rear input wheels. Video start/stop is via a dedicated button with an anodised red finish, and there's another one on the camera's front panel.

The top panel's main dials are for selecting the exposure modes and the drive modes which includes the self-timer options and the multi-shot high-res mode. Around the base of the latter is the selector – introduced with the S1R II – for quick switching between the photo and video modes and with a third setting for the 'S&Q' (Slow & Quick) variable frame rate video shooting... for slowmo or overspeed

sequences. Both these dials can be locked at their various setting positions.

The real panel controls are also mostly oversized and include a joystick-type controller – now eight-way in its operation rather than just four-way – and a combined control wheel/keypad. The focusing mode selector is another good-sized control has the AF area selector button set in the middle.

This being a Panasonic mirrorless camera, the customisation options are extensive with dedicated control set-ups for both capture and playback (and stills and video). A total of 20 external controls – or their various actions such as in the case of the multi-directional joystick and Control Dial – are customisable plus there's a set of five customisable 'Touch Tabs' located down the right-hand edge of the monitor screen. In most cases, the choice of user-assignable functions is extensive and it can all look a bit of a challenge at first, but most of the changes – if you make any at all – will be set-and-forget.

The monitor-based 'Quick Menu' is also extensively customisable with the 12 assignable function tiles again populated from a very long list of options. There are dedicated 'Quick Menus' for photo and video, plus the display style can either be full screen or combined with the live view image. The customisable 'My Menu' can be up to three pages (giving a total of 24 items), and five custom camera set-ups can be assigned to the C1-C5 positions on the main mode dial.

Furthermore, both the viewfinder and monitor displays can be customised with a number of elements, including a dual-axis level gauge, a real-time histogram, a grid guide (selected from a choice of three), a blinking highlight warning, zebra patterns for the same thing and Panasonic's 'I.S. Status Scope' display. This comprises two concentric circles in the middle of the

NO NEED FOR SPEED? TRY THE LUMIX S1 IIE

If you like pretty well all the features and functions that are on offer in the Lumix S1II, but really don't need 70 fps continuous shooting or the very high video bit rates, then take a look at the S1 IIE. The 'E' apparently stands for 'Essentials', but it could also stand for 'Economy' as you'll save over a grand on this model versus the S1 II. It has exactly the same bodysell, rugged all-metal construction and control layout, but the sensor is a conventional BSI-type CMOS rather than a 'partially stacked' imager. The effective resolution is 24.2 megapixels – so high-res pixel-shifting capture still gives you a 96 MP file – but the top shooting speed is now 'only' 30 fps. That's still plenty quick enough for a great

many applications and it's available with full AF/AE adjustment and with RAW capture too. The S1 IIE also gets the 10-bit H1EF capture mode and the additional 'Urban Sports' AF subject recognition mode.

On the video side, you don't really lose out on too much with the top spec still being 6K 'open gate' recording at 6000x4000 pixels and 24/25/30 fps with 10-bit 4:2:0 colour. Again, up to 50/60 fps is possible with the 5.8K/5.9K cropped aspects and the S1 IIE also gets the extra-

wide 'Cinemascope' aspect ratio. There's the same choice of codecs – i.e. H.264, H.265 and ProRes 422/422HQ – plus internal 12-bit ProRes RAW/RAW HQ recording. The 4K DCI/UHD frame rates

also max at 50/60 fps, but for Full HD, the fastest speed for slowmo effects is 100/120 fps. The Firmware Version 1.1 upgrades for the S1 II are also available for the S1 IIE.

The price difference is quite significant so it's going to be worth carefully considering what you really need – versus what just might be nice to have – if you're looking at Panasonic's new full frame L mount offerings. The Panasonic Lumix S1IIE sells for \$4199 body only





ISO 50



ISO 100



ISO 200



ISO 400



ISO 800



ISO 1600



ISO 3200



ISO 6400



ISO 12800



ISO 25600



ISO 51200



ISO 102400



ISO 204800

ISO RANGE

The S1 II's sensor has a sensitivity range equivalent to ISO 100 to 51,200 with extensions either side to ISO 50 and 102,400 and 204,800. It has a dual-gain output – the low-gain for enhanced sensitivity and the high-gain for lower noise – with the base ISOs set at 100 and 800 for stills, 640 and 5000 for V-Log video, and 200 and 1600 for video with the Cinelike A2, D2 and V2 video colour 'Picture Style' profiles. As a result, noise levels are reduced at the higher ISO settings to the benefit of both sharpness and dynamic range.

These test images were captured as JPEG/large/superfine files with the aperture set to f/11 and the exposure time varied to compensate for the ISO adjustments. High ISO and Long Exposure noise reduction are switched off. Lumix S 24-60mm f/2.8 zoom.

screen within which a green dot jumps around to show just how much the camera is deviating from the lens's optical axis. Even when you think that you're holding the camera absolutely steady, you'll be surprised at how much the green dot is still moving around. There are also dedicated video displays including a waveform monitor, a vectorscope, colour bars a false colour image which is another way of determining exposure levels for video, but

can be equally useful when shooting stills. A 'Night Mode' setting dims both the EVF and monitor displays by applying a red filter over everything so that your night vision isn't compromised. To achieve exactly the opposite, a 'Live View Boost' function brightens the monitor display so it's easier to see when shooting in very low light situations.

The touch screen implementation includes the 'Quick Menu' tiles, the main

menus, the replay/review functions, and various autofocusing operations, including direct point/zone selection and 'Touch Pad AF' to enable the same when using the EVF. This can be set to either Exact or Offset; the latter with a choice of seven settings enabling the AF point/zone to be moved via a dragging action within a prescribed area on the touch screen.

The monitor itself is a 7.62 cm TFT LCD panel with a resolution of 1.84 megadots

and it's adjustable for both tilt and swing when flipped out from the camera back, but can also be tilted up and down on the camera back. The display is adjustable for Brightness, Contrast, Saturation, Red Tint and Blue Tint. You can also manually adjust the backlighting or set it to Auto so it will adjust itself according to the ambient light levels.

The EVF which is a 1.0 cm OLED panel with 5.76 megadots resolution and 0.78x magnification (with a 50mm lens). The refresh rate can be switched between 60 fps or 120 fps, but black-out free viewing is only available at shooting speeds up to 10 fps.

The review/replay displays include a split screen showing a thumbnail along with basic capture info on one side, and a set of five scrollable info panels on the other. These cycle through additional capture data (such as the white balance, image format and 'Photo Style' preset), a set of RGB and brightness histograms, the 'Photo Style' parameters, the white balance mode with any fine-tuning settings, and the lens details including any manually applied in-camera corrections.

Importantly for video users, the S1 II has a full-size (i.e. Type A) HDMI connection and a 10 Gbps-speed USB Type C port. Power comes from the 2200 mAh DMW-BLK22 battery pack (that's also used in the S5 II models) and which here is good for around 350 shots per charge. In-camera battery charging – and powering – via USB C is available, and the S1 II is compatible with DMW-BG2 battery grip which was introduced with the S1R II. This adds a second battery pack which can be 'hot swapped' as the camera will automatically switch to its battery.

The wireless connectivity options comprise both the 2.4 and 5.0 GHz WiFi bandwidths, and Bluetooth LE version 5.0: with the Lumix Lab app allowing for remote camera control from a smartphone or tablet as well as file transfers and now the post-camera application of LUTs. Additionally, the

S1 II also supports the 'Frame.io Camera to Cloud' cloud service so high-res images and video clips can be directly and immediately uploaded to Adobe's Frame.io software platform (but you'll need to create an account first).

Tethered shooting via USB C is enabled with the Lumix Tether app, but as with the S1R II, it's also possible using the Capture One image editing software which is a big plus for studio shooters in terms of a more efficient workflow. Via the Firmware Version 1.1 upgrade, tethering can also be wirelessly via WiFi or a USB-LAN adapter.

The sturdy body construction employs diecast magnesium alloy front and rear frames with sealing against dust or moisture, and insulation for shooting in subzero temperatures down to -10 degrees Celsius. And, as far as overheating is concerned, Panasonic taking no changes with its high-bit-rate hybrids, so the S1 II also has a built-in fan for sensor cooling during long video sessions. Similar to both the S1R II and S5 II, the fan is in front of the EVF housing with the inlet vent located above the lens mount and the outlet vents on either side.

Another commendable preventative measure enables the shutter to be set to automatically close over the sensor when the S1 II is switched off. This greatly reduces the likelihood of issues with dust getting into the camera body when you're changing lenses.

SPEED AND PERFORMANCE

Loaded with a SanDisk Extreme Pro 128 GB CFexpress Type B memory card and using the focal plane shutter, the S1 II captured a burst of 120 JPEG/large/fine frames in 11.3 seconds, giving a shooting speed of 10.6 fps. Switching to the sensor shutter – again at the JPEG/large/fine quality setting – a burst of 180 frames was captured in 2.577 seconds which works out at 69.85 fps. The test image files averaged 11.3 MB in size.

We've already seen the latest version of Panasonic's hybrid AF system at work in the S1R II and so, not surprisingly, it puts in a good performance here too, even at the faster maximum shooting speed.

Overall, the autofocus is responsive, lightning fast and a very accurate. The subject tracking is exceptionally reliable and can handle both smaller-sized objects and erratic movements in terms of



THE CONTROL LAYOUT IS ORGANISED FOR OPTIMUM FUNCTIONALITY AND EFFICIENCY WHETHER USING THE DIALS AND BUTTONS, THE TOUCH SCREENS OR A COMBINATION OF BOTH."

rapid changes in both direction and in speed. The low light/contrast AF performance is also excellent, maintaining responsiveness with fast, locked-on tracking. Aside from when using the useful list of recognised subjects, there's plenty of scope for fine-tuning the tracking in other situations and for tailoring the AF area to better suit a particular subject or situation.

Twenty-four megapixels on a full frame sensor is already proven to give a good balance of resolution, sensitivity and dynamic range. The bigger pixels have a higher signal-to-noise ratio which is always a good starting point for enhanced performance at higher ISO settings. The out-of-the-camera JPEGs from the S1 II deliver an accurate colour reproduction with good neutrality across the spectrum, including the skin tones and more subtle shades. There's excellent definition with crisply rendered fine details along with very smooth tonal gradations from the brighter highlights to the darker shadows. There's also lots of scope for playing with the visual dynamics of an image with the built-in 'Photo Styles' and the ever-expanding possibilities of the custom LUTs.

The dynamic range is also excellent and is helped at the higher ISO settings by the sensor's 'Dual Native ISO' circuitry. The dual base ISOs at 100 and 800 for still photography represent a three stops improvement in the noise characteristics at the higher sensitivity settings (i.e. above ISO 800). Consequently, there's very little fall-off in either the definition or the saturation up to ISO 12,800, and only slight falloffs at ISO 25,600 or even 51,200. In practice, the entire native sensitivity range is in play as the colour saturation remains good all the way through, as does the overall sharpness. Inevitably, the extensions to ISO 102,400 and 204,800 exhibit visible softening of the edges to the detriment of overall sharpness, although the colour reproduction still holds up pretty well. Overall, the noise reduction processing for JPEGs is well-judged, balancing sharpness and grain very nicely



▲ Monitor screen has tilt and swing adjustments.

which is maintained through to the higher ISOs.

The extra dynamic range – especially at the base ISOs – ensures that the RAW files have plenty of exposure latitude so you can underexpose to preserve the highlights and the shadows can be subsequently brightened quite a bit with post-camera processing without noise becoming particularly noticeable.

THE VERDICT

With exactly the same body, control layout and base feature set along with very similar pricing, you might think that the Lumix S1R II and the S1 II are too close for comfort, but there are key differences which set them apart. There's no doubt both are power-packed hybrid mirrorless cameras which work effectively for photography and video-

making, but both have particular strengths.

It's tempting to assign the higher-res S1R II as being more photo-orientated and the faster S1 II as more suited to videographers by virtue of having higher frame rates and more aspect ratio options, including widescreen. Yet the 24 megapixels 'partially stacked' full frame sensor has notable benefits for photography too, even if 70 fps might be just a bit OTT for many users. It balances detailing and dynamic range, enhances high ISO performance and keeps file sizes more manageable. It is undoubtedly more of an all-rounder as a stills camera, but everybody benefits from the efficient ergonomics, logical controls, snappy autofocus and an ever-expanding choice of creative looks. There's also the growing system of L mount lenses with not just Panasonic's tastier recent offerings

– the compact 100-500mm telezoom, for example – but also those from Sigma and, if you have the budget, Leica too.

The trio of Mark II S1 models certainly put Panasonic back in the game in terms of top-end full frame hybrid mirrorless cameras and with some key features that the competition doesn't offer (especially for video). These cameras are premium priced too, but that fabulous old-school design, reassuringly solid construction and an unmatched feature set mean that you get a lot of camera for your money. The S1 II's sensor-related attributes – chiefly faster shooting with reduced rolling shutter artefacts for both stills and video – makes it even more of a value proposition. The Lumix S system is really coming of age. 📸



VITAL STATISTICS

PANASONIC LUMIX S1 II \$5,299

body only, recommended retail price

Type: Enthusiast-level and semi-professional digital mirrorless camera with L bayonet lens mount.

Focusing:

- Automatic hybrid phase/contrast-detection system ('Phase Hybrid AF') with 779 PDAF points and 315 CDAF points.
- Contrast detection AF via Depth-From-Defocus (DFD) calculations.
- Manual switching between one-shot and continuous AF modes, the latter with auto tracking.
- Four 'AF Custom' sets for fine-tuning subject tracking with three parameters – AF Sensitivity,
- AF Area Switching Sensitivity and Moving Subject Prediction.
- AI subject detection for Humans (Eye/Face, Eye/Face/Body, Urban Sports), Animals (Birds, Dogs or Cats – Eye or Eye/Body), Cars, Motorcycles/Bicycles, Trains and Aircraft.
- Area modes for Zone (Vertical/Horizontal), Zone (horizontal/vertical/central), 1-Area, 1-Area+Supplementary and Pinpoint.
- Adjustable 1-Area point switching speed. 'AF Point Scope' for active point/zone enlargement (up to 6.0x).
- AF assist via magnified image (up to 6.0x), either full image or picture-in-picture.
- Sensitivity range is EV -6.0 - 18 (ISO 100 and f/1.4). AF assist provided by built-in illuminator.
- Manual focus assistance via magnification (either full image or picture-in-picture, up to 6.0x), distance scale and focus peaking displays (Light Blue, Dark Blue, Yellow, Orange, Light Green, Dark Green, Pink, Red, Violet, White; and five levels of intensity).
- Non-linear or linear manual focus control with supporting lenses.
- 'Touchpad AF' via the touch screen for AF point/zone selection when using the EVF.
- AF micro-adjustment for individual lenses.

Metering: 1728-point multi-zone, centre-weighted average, highlight-weighted average, spot and TTL flash. Metering range is EV 0 to 18 (ISO 100 and f/2.0).

Exposure Modes: Continuously variable program with shift, shutter-priority auto, aperture-priority auto, metered manual, 'Intelligent Auto' (with automatic scene detection (nine modes), TTL auto flash and TTL flash.

Shutter: Electronic, vertical travel, metal blades,

60-1/8000 second plus 'B' (up to 30 minutes). Flash sync to 1/250 second. Sensor shutter has a speed range of 60-1/16,000 second plus B (up to 60 seconds). Hybrid 'Electronic First Curtain' shutter has a speed range of 60-1/2000 second plus 'B' (up to 30 minutes). Shutter delay timer (1, 2, 4 or 8 seconds). Exposure compensation up to +/-5.0 EV in 1/3-stop increments. Shutter delay timer (1, 2, 4 or 8 seconds).

Viewfinder: OLED EVF type with 5.76 megadots resolution. Coverage = 100% vertical/horizontal. Magnification = 0.78x. Refresh rate switchable between 60 and 120 fps. Eyepiece strength adjustment built in. Auto/manual switching between EVF and monitor screen. 7.62 cm TFT LCD monitor with 1.84 megadots resolution, tilt/swing adjustments and touch controls. Monitor screen is adjustable for brightness, contrast, saturation, red tint and blue tint. Night Mode red 'filter' for both EVF and monitor.

Flash: No built-in flash. External flash units connect via Hotshoe or PC terminal.

Additional Features: Magnesium alloy body sealed against dust, moisture and sub-zero temperatures down to -10 degrees Celsius; AE/AF lock, auto exposure bracketing (three, five or seven frames and up to +/-1.0 EV adjustment per frame), multi-mode self-timer (2 and 10 second delays, one or three shots, or custom set delay time), shutter delay timer (up to eight seconds), switchable exposure adjust increments (0.3 or 1.0 EV), audible signals, silent mode, auto power-off, wired remote trigger.

DIGITAL SECTION

Sensor: 24.1 megapixels (effective) partially stacked BSI-type CMOS with 35.8x23.8 mm imaging area and 3:2 aspect ratio. An optical low-pass filter is fitted. Sensitivity equivalent to ISO 100-51,200 (extendable to ISO 50, 102,400 and 204,800).

Focal Length Magnification: None.

Formats/Resolution:

- Two compression settings for JPEG and HEIF (HLG) capture, RAW output (lossless compression) and RAW+JPEG capture.
- Four resolution settings at 3:2 aspect ratio; 6000x4000, 4272x2848, 3024x2016 and 1920x1280 pixels.
- Four resolution settings at 4:3 aspect ratio; 5328x4000, 3972x2848, 2688x2016 and

1712x1280 pixels.

- Four resolution settings at 16:9 aspect ratio; 6000x3368, 4272x2400, 3024x1704 and 1920x1080 pixels.
- Three resolution settings at 1:1 aspect ratio; 4000x4000, 2848x2848, 2016x2016 and 1280x1280 pixels.
- One resolution setting at 65:24 aspect ratio; 6000x2208 pixels.
- One resolution setting at 2:1 aspect ratio; 6000x3000 pixels.
- Four resolution settings with 'APS-C' format capture at 3:2 aspect ratio; 3984x2656, 2880x1920, 2064x1376 and 1920x1280 pixels (4:3, 16:9 and 1:1 aspect ratios also available).
- 24-bit RGB colour for JPEGs, 30-bit RGB colour for HEIF files, 42-bit RGB colour for RAW files.

Video Recording:

- MOV format (Apple ProRes RAW HQ/RAW) at 5760x3040 pixels (5.8K); 30, 25 or 24 fps (up to 4.2 Gbps) and 17:9 aspect ratio (requires CFexpress Type B memory card). At 4096x2160 pixels (4K DCI); 60, 50, 30, 25 or 24 fps (up to 4.2 Gbps) and 17:9 aspect ratio (requires CFexpress Type B memory card).
- MOV format with 10-bit 4:2:2 colour (Apple ProRes 422 HQ/422, and All-Intra compression) at 5760x3040 pixels (5.8K); 30, 25 or 24 fps (up to 1.9 Gbps) and 17:9 aspect ratio. At 4800x3600 pixels (4.8K); 30, 25 or 24 fps (up to 1.9 Gbps) and 4:3 aspect ratio (anamorphic). At 4096x2160 pixels (4K DCI); 60, 50, 30, 25 or 24 fps (up to 1.9) and 17:9 aspect ratio. At 3840x2160 pixels (4K UHD); 60, 50, 30, 25 or 24 fps (up to 1.8 Gbps) and 16:9 aspect ratio. At 1920x1080 pixels (Full HD) at 120, 100, 60, 50, 48, 30, 25 or 24 fps (up to 901 Mbps) and 16:9 aspect ratio
- MOV format with 10-bit 4:2:0 colour (HEVC/H.265 codec and LongGOP compression) at 5952x3968 pixels (6.0K); 30, 25 or 24 fps (200 Mbps) and 3:2 aspect ratio ('open gate' recording using the full frame area). At 5952x2512 pixels (6.0K); 60, 50, 30, 25 or 24 fps (up to 300 Mbps) and 2.4:1 aspect ratio ('Cinemascope' widescreen). At 5888x3312 pixels (5.9K); 60, 50, 48, 30, 25 or 24 fps (up to 300 Mbps) and 16:9 aspect ratio. At 5760x3040 pixels (5.8K); 60, 50, 48, 30, 25 or 24 fps (up to 300 Mbps) and 17:9 aspect ratio. At 5088x3392 pixels (5.1K); 60, 50, 48, 30, 25 or 24 fps (up to 300 Mbps) and 3:2 aspect ratio ('open gate' recording using the full frame

area). At 4800x3600 pixels (4.8K); 60, 50, 48, 30, 25 or 24 fps (up to 300 Mbps) and 4:3 aspect ratio (anamorphic). At 4096x2160 pixels (4K DCI); 120, 100, 60, 50, 48, 30, 25 or 24 fps (up to 300 Mbps) and 17:9 aspect ratio. At 4096x1728 pixels (Cs4K); 120, 100, 60, 50, 48, 30, 25 or 24 fps (up to 300 Mbps) and 2.4:1 aspect ratio ('Cinemascope' widescreen). At 3840x2160 pixels (4K UHD); 120, 100, 60, 50, 48, 30, 25 or 24 fps (up to 300 Mbps) and 16:9 aspect ratio. At 1920x1080 pixels (Full HD) at 120 or 100, 60, 50, 48, 30, 25 or 24 fps (up to 150 Mbps) and 16:9 aspect ratio.

- MOV format with 10-bit 4:2:2 colour (MPEG 4 AVC/H.264 codec and ALL-Intra or LongGOP compression) at 4096x2160 pixels (4K DCI); 120, 100, 60, 50, 48, 30, 25 or 24 fps (up to 800 Mbps ALL-Intra, up to 200 Mbps LongGOP) and 17:9 aspect ratio.
- At 4096x1728 pixels (Cs4K); 120, 100, 60, 50, 48, 30, 25 or 24 fps (up to 800 Mbps ALL-Intra, up to 200 Mbps LongGOP) and 2.4:1 aspect ratio ('Cinemascope' widescreen).
- At 3840x2160 pixels (4K UHD); 120, 100, 60, 50, 48, 30, 25 or 24 fps (up to 800 Mbps ALL-Intra, up to 200 Mbps LongGOP) and 16:9 aspect ratio.
- At 1920x1080 pixels (Full HD) at 240, 200, 120, 100, 60, 50, 48, 30, 25 or 24 fps (up to 800 Mbps ALL-Intra, up to 200 Mbps LongGOP) and 16:9 aspect ratio.
- MOV format with 8-bit 4:2:0 colour (MPEG 4 AVC/H.264 codec LongGOP compression) at 4096x2160 pixels (4K DCI); 60, 50, 48, 30, 25 or 24 fps (up to 150 Mbps) and 17:9 aspect ratio. At 4096x1728 pixels (Cs4K); 60, 50, 48, 30, 25 or 24 fps (up to 150 Mbps) and 2.4:1 aspect ratio (widescreen). At 3840x2160 pixels (4K UHD); 60, 50, 30, 25 or 24 fps (up to 150 Mbps) and 16:9 aspect ratio. At 1920x1080 pixels (Full HD) at 60, 50, 48, 30, 25 or 24 fps (up to 50 Mbps) and 16:9 aspect ratio.
- MP4 format with 10-bit 4:2:0 colour (HEVC/H.265 codec and LongGOP compression) at 3840x2160 pixels (4K UHD); 60, 50, 30, 25 or 24 fps (up to 100 Mbps) and 16:9 aspect ratio.
- MP4 format with 8-bit 4:2:0 colour (MPEG 4 AVC/H.264 codec and LongGOP compression) at 3840x2160 pixels (4K UHD); 60, 50, 30, 25 or 24 fps (up to 100 Mbps) and 16:9 aspect ratio. At 1920x1080 pixels (Full HD) at 60, 50, 30, 25 or 24 fps (up to 28 Mbps) and 16:9 aspect ratio. Unlimited clip durations.
- 'APS-C' cropped shooting available in 3.3K 4:3 aspect (anamorphic), 4K DCI 17:9 aspect, 4K UHD 16:9 aspect and Full HD 16:9 aspect in MOV format and ProRes 422HQ, ProRes 422, H.265 and H.264 codecs; or in MP4 4K UHD (H.265/H.264) and Full HD (H.264).
- Built-in stereo microphones with adjustable sound levels, level limiter, gain level adjustment and wind noise canceller. Stereo audio input (for mic-level and line-level) and output. 48 or 96 kHz 24-bit sound recorded in both the MOV format. Optional DMW-XLR2 microphone adapter provides two XLR microphone inputs (giving four channel audio) with 32-bit 'float' level adjustment with 48/96 kHz for two channel stereo and 48 kHz for four channel monaural.

Video Features:

- Built-in cooling fan, dual on/off record buttons, front and rear tally lamps, time lapse movies, stop motion animation, proxy recording (with MOV format and up to 4K DCI res),
- 'Crop/Hybrid Zoom' (up to 2.1x with 4K and 4.2x with 2K), external video recording to SSD via USB C (including Apple ProRes RAW HQ and RAW at 5.8K with 10-bit 4:2:2 colour up to 30 fps [up to 4.2 Gbps] and ProRes 422 HQ/422 at 5.7K up to 60 fps [up to 1.9 Gbps], and at 4K DCI up to 120 fps [up to 1.9 Gbps]);
- variable frame rates for 5.9K, 5.8K, 4K DCI/UHD

and FHD recording with 10-bit colour (5.9K = 60 fps maximum sensor output to 24/25/30 fps, C4K/4K = 120 fps maximum sensor output to 24/25/30/50/60 fps, FHD = 120 fps maximum sensor output to 24/25/30/50/60 fps),

- anamorphic recording with desqueezed previews, 'EIS' electronic image stabiliser, 'Boost EIS', anamorphic lens IS, red frame recording indicator, blue frame streaming indicator,
- Webcam video streaming (USB C up to 4K at 25/30 fps, WiFi up to FHD at 50/60 fps), USB tethering (up to 4K at 50/60 fps),
- 'Dynamic Range Boost' processing, master pedestal level (for setting black level, 31 steps), knee control (Like709 colour mode), luminance level adjustment (8-bit and 10-bit), wave form monitor/vector scope, false colour display, colour bars, luminance spot meter, synchro scan, time coding with Rec Run and Free Run modes,
- Atomos AirGlu wireless timecode sync support, colour bars (SMPTE, EBU and ARIB standards), 1.0 KHz test tone, SS/Gain (Shutter Duration/ISO, Angle/ISO, Shutter Duration/ISO), zebra patterns (two types with adjustable thresholds), synchro scan, centre marker, V-Log/V-Gamut recording;
- 'Cinelike' A2, D2 and V2 gamma profiles; HLG HDR, Like709 – gamma curve/knee control,
- V-Log View Assist, HLG View Assist (for Like709), LUT View Assist,
- VariCam-style video info display, adjustable headphone volume.

HDMI Output: ProRes RAW HQ or RAW to supporting Atomos or Blackmagic external recorders, ProRes 422 HQ/422, H.265 and H.264 codecs. 6.0K 3:2 with 10-bit 4:2:0 colour and 30, 25 or 24 fps. 5.9K 16:9 with 10-bit 4:2:0 colour and 30, 25 or 24 fps. 5.7K 17:9 with 10-bit 4:2:0 colour and 60, 50, 48, 30, 25 or 24 fps, 4K DCI 17:9 with 10-bit 4:2:2 colour and 60, 50, 30, 25 or 24 fps. 4K UHD 16:9 with 10-bit 4:2:2 colour and 60, 50, 30, 25 or 24 fps. Full HD 16:9 with 10-bit 4:2:0 colour and 120, 100, 60, 50, 30, 25 or 24 fps.

Recording Media: Dual slots for CFexpress Type B and SD with UHS-II and Video Speed Class 90 support.

Continuous Shooting: Around 300 JPEG/large/fine frames, 200 RAW frames or 180 HEIF frames at up to 10 fps using the focal plane shutter with continuous AF/AE adjustment. Around 180 JPEG/large/fine frames, 180 RAW files or 170 HEIF files at up to 60 fps (image quality priority) or 70 fps (speed priority) using the sensor shutter with continuous AF/AE adjustment. A 30 fps shooting speed is available via Firmware Version 1.2. Medium speed continuous mode captures at 5.0 fps and low speed continuous capture at 2.0 fps using either the FP shutter or the sensor shutter. Pre-shot capture buffer using the sensor shutter at 30, 60 or 70 fps for 0.5, 1.0 or 1.5 seconds or shutter at 60 or 70 fps for 0.5, 1.0 or 1.5 seconds.

White Balance: TTL measurement. Three auto modes (neutral, maintain warmer tones or reduce warmer tones), five lighting presets and four custom WB settings. White balance compensation (amber-to-blue and/or green-to-magenta) in all presets, and white balance bracketing over three frames. Manual colour temperature setting from 2500 to 10,000 degrees Kelvin with four custom settings. AI AWB adjustment for in-camera RAW processing.

Interfaces: USB Type C (USB 10 Gbps), HDMI (Type A), 3.5 mm stereo audio input, 3.5 mm stereo audio output, 2.5 mm wired remote input.

Additional Digital Features:

- Sensor-shift five-axis image stabilisation with up to 8.0 stops of correction at frame centre (up to 7.5 stops with 'Dual I.S. 2' which operates along with lens-based optical stabilisation),

- four/eight-shot 'High Resolution' capture (JPEG, RAW or RAW+JPEG, 48 or 96 MP with hand-held or tripod modes, motion correction processing, shutter delay and in-camera compositing),
- tethered shooting via Capture One software,
- sensor cleaning,
- 'Light Composite' mode,
- dual-axis level display,
- grid guides (choice of three),
- digital zoom (up to 4.0x),
- Adobe RGB and sRGB colour spaces,
- 21 'Photo Style' presets (Standard, Vivid, Natural, L. Classic Neo, Flat, Landscape, Portrait, Monochrome, L. Monochrome, L. Monochrome D, L. Monochrome S, Leica Monochrome, Cinelike A2, Cinelike D2, Cinelike V2, Like709, V-Log, 'Real Time LUT' facility [up to 39 can be uploaded], Like2100 Hybrid Log Gamma, Like2100 Full Range),
- ten user-defined 'My Photo Style' presets, adjustable 'Photo Style' parameters (Contrast, Highlight, Shadow, Colour Saturation, Colour Tone, Hue, Filter Effect, Grain Effect, Colour Noise, Sharpness, Noise Reduction, Dual Native ISO, Sensitivity, White Balance and LUT, LUT 1, LUT 2), LUT Opacity, LUT Opacity 1, LUT Opacity 2),
- eight filter effects (Expressive, Retro, Old Days, High Key, Low Key, Sepia and Bleach Bypass), simultaneous recording with and without the filter effect, auto bracketing functions (exposure, aperture, focus – up to 999 frames – and white balance),
- focus stacking,
- 'Intelligent Dynamic' processing (Off, Low, Standard, High, Auto),
- intervalometer (up to 9999 frames), stop motion recording for animation,
- 'Crop/Hybrid Zoom' (up to 3.1x), 'Quick Menu' control screen with customisation,
- multiple exposure facility (with overlay and auto exposure adjustment),
- manual lens corrections (Vignetting Compensation and Diffraction Compensation),
- long exposure noise reduction (On/Off),
- customisable 'My Menu' (24 items),
- luminance/RGB histogram displays,
- highlight alert,
- adjustable image display time,
- auto image rotation, slide show (with variable display times and background music),
- playback zoom (up to 16x), zoom from AF point/zone, 12 or 30 thumbnail displays,
- thumbnail calendar display,
- in-camera editing/processing (RAW-to-JPEG and RAW-to-HEIF conversion),
- resize, rotate, rating, protect, video divide),
- picture sort modes (file name or date/time),
- WiFi (2.4 and 5.0 GHz bands) and Bluetooth 5.0 (LE) wireless connectivity,
- integrated Frame.io to Cloud support.

Power: One 7.2 volt/2200 mAh rechargeable lithium-ion battery pack (DMW-BLK22 type). In-camera recharging and powering is via USB C. Optional DMW-BG2E battery grip adds a second battery pack.

Dimensions (WxHxD): 134.3x102.3x91.8 mm body only

Weight: 718 grams body only (without battery or memory card).

Price: \$5299 body only. \$6799 with Lumix S 24-105mm f/4.0 Macro OIS zoom lens. Panasonic Australia offers an extended five-year warranty (two year standard warranty plus an additional three years) on Lumix camera bodies sold by an authorised Panasonic Australia reseller.

Distributor: Panasonic Australia, telephone 132 600 or visit www.panasonic.com.au



CANON F-1 AND NEW F-1

These are the cameras that, in one way or another, had a significant influence on photographers and photography. Canon was late to the pro 35mm SLR party, but it soon made up for lost time and F-1 models put the brand on top in this sector, establishing a legacy which carried through the following decades to today.

Of all the major camera milestones in the 20th century 1959 and the Nikon F is certainly one of the biggest and, arguably, did as much for 35mm photography – especially among professional photographers – as Leica's 35mm rangefinder system. Nikon has the professional 35mm SLR all to itself for over ten years and was onto the second-generation F2 by the time Canon got into gear with a credible competitor. The cheekily named F-1 was unveiled at the 1970 Photokina and went on sale in March 1971, roughly six months before the F2 arrived.

Canon had had plenty of time to study the F system's strengths and weaknesses, and as would subsequently be the case in the future, decided to be a lot less conservative. There were similarities between the F-1 and the F2 – interchangeable viewfinders and focusing screens, for example – but while Nikon preferred to play it safe and give the market more of what it had traditionally wanted, Canon opted to show the market what it was likely to need. The new FD lens mount was designed to be future proof – for as far as could be seen ahead at the time – by enabling automatic aperture control when the rest of the camera industry was going down the aperture-priority auto exposure control path (i.e. auto shutter speed control). Cleverly, Canon kept the purists happy with a purely mechanical – and hence manual

control – camera body, but the progressives could add shutter-priority auto exposure control via the EE Servo Finder metering. With Canon's early emphasis on appealing to sports and action photographers – which has remained ongoing – shutter-priority AE had a lot more appeal than aperture-priority control. And right from the beginning there was an emphasis on speed, including ways of making the reflex mirror operate faster while also minimising shock and vibrations. The first motordrive unit delivered 3.0 fps, but 1972 Canon offered a special high-speed version of the F-1 using a fixed, semi-silvered mirror to enable continuous shooting at 9.0 fps – very fast for the day – and with the motorised film transport integrated into the camera body (which no longer had a film advance lever). The monster battery pack took 20 AA-size batteries and to make for an even bigger rig, there was a 250-exposure bulk film back.

In 1976 there was a small model refresh which is most commonly called the F-1n, but the new version never actually carried this model designation. Canon itself just calls it the "later version". Among the updates were a multiple exposure facility and an extended film speed setting range to ISO 3200 (from ISO 2000). A much more significant upgrade came in 1981 with the New F-1 – although still just marked 'F-1' on the camera and also known, confusingly, as the F-1N – which had a new body design, revised control layout and an electro-mechanical shutter with an

◀ Canon New F-1 (1981) fitted with the standard eye-level prism. In this configuration, the camera was fully manual. The AE Finder FN provided aperture-priority exposure control and the AE Power Winder FN or AE Motor Drive FN added shutter-priority exposure control.

extended range of slower speed settings. Curiously, the slower speeds – over 8-1/60 second – are electronically-controlled and the fast range – from 1/125-1/2000 second – are mechanically-timed. Of course, this meant that the camera could still operate without a battery if need be. The exposure control options are governed by the attached components – the AE Finder FN delivered aperture-priority auto and fitting either the Motor Drive FN or the AE Auto Winder FN added shutter-priority auto. The motordrive is good for 5.0 fps, and there was the option of longer-lasting NiCd battery packs as an alternative to the AA battery holder now slimmed down to take 12 cells. Again there was a dedicated high-speed version of the New F-1 – initially built for the 1984 summer Olympic Games in Los Angeles – with a pellicle mirror and now capable of very rapid 14 fps.

Metering was upgraded to the more reliable SPC measuring cells and the titanium-curtained shutter was rated to 100,000 cycles. All aspects of the construction were designed to maximise reliability and durability, and many areas – such as the shutter release and dial junctions – were weather-sealed well before such protection was even a thing. The body construction – a diecast metal chassis with machined brass top and bottom plates – was supremely rugged, but for this camera Canon also introduced new, more advanced manufacturing processes which greatly enhanced the precision of its build. With all the issues of the previous model now effectively addressed, the New F-1 established Canon's reputation for building professional cameras that were always just a little more technologically advanced without compromising the core values of reliability and durability. A few years later Canon again showed its capacity for making hard decisions, introducing a new all-electronic lens mount that would allow it to move ahead with technologies such as autofocus. Consequently, the New F-1 stayed in production for many years after the introduction of the EOS system in 1987, allowing professionals invested in big systems of FD lenses plenty of time to make the transition.

The New F-1 undoubtedly helped build the trust that allowed Canon to subsequently be more adventurous in its professional cameras – as evidenced by the first EOS-1 model in 1989 – and also established the brand's strong reputation in this category that endures to this day. 📷

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