Digital cameras

We put 20 of the best digital cameras through our vigorous tests, while David Bailey reveals how to make the most of digital photography

CONTRIBUTORS Jim Martin, Alyn Sparkes, Tim Danton, Stewart Mitchell
PHOTOGRAPHY Hugh Threlfall

Digital cameras have hit the mainstream in the past 12 months. Both business and home users have been attracted by a winning combination of falling prices and ever-increasing photo quality. You can now buy a camera that produces stunning results for under £200, but there are reasons to pay more, as we discover.

In fact, digital cameras have a natural split at the £300 mark. Entry-level cameras – those in the sub-£300 group – are best suited to anyone without a camera or people converting from APS or 35mm compact cameras. They have fully automatic modes to make 'point and shoot' photography possible, while the best offer extra controls if you need them.

The more expensive cameras are best purchased as replacements for complex 35mm cameras or even SLRs. With manual adjustment available for settings such as focus, aperture and shutter speed, these allow more demanding photographers to achieve the best images. They boast huge resolutions, with up to 4.9-megapixel CCDs.

Generally, the more you pay, the higher a camera's megapixel rating. Not that this is a solid rule, as we seen two 4-megapixel cameras for under £300, and recommend a

David Bailey gives his insights into digital photography on p98.

2-megapixel camera over one with twice its resolution. Why? Because megapixels are only part of the quality story. The lens and other controls play an equally important role in creating good images. David Bailey gives more insight into this with his special one-off guide to getting the most out of digital photography on p98.

The overall image quality of digital cameras has markedly improved from when we did this group test last year (*see Labs, issue 86, p110*), and the price of well-specified and simple-to-use cameras has tumbled. There's no better time to make the swap from film to digital and, with prices ranging from £112 to £739, this Labs is bound to offer the right camera for you.

How we test

Details of our comprehensive digital camera tests

When it comes to digital cameras, we take a very different approach to our normal tests. There are no benchmarks we can run to generate a performance result so we evaluate each camera by taking a selection of photos in controlled conditions on a tripod, as well as some more general-purpose shots without the stability of a tripod – the kind most people take in real life. We try to use the cameras in a wide range of situations, from bright outdoor conditions to dark indoor shots.

We also employ all the functions available on the cameras to get a good idea of their flexibility and usability. We use the advanced photographic controls on the £300+ cameras to assess their ranges and usefulness. Most of the cameras include continuous shooting and movie modes, but a stills camera is mainly used to shoot single stills, so we concentrate on this area in our tests.

INDOOR PHOTOS

We take three indoor shots in the confines of our photography studio, which is used for most of the product shots in *PC Pro*. The main scene is set up to include differing textures, strong primary colours, blacks and whites, reflective items and both large and small text. The shot is framed identically for each camera and taken with both forced and suppressed flash. Where available, we use manual and tungsten white balances to account for the lighting used.

We also take an indoor shot using the camera's macro mode. This is composed of a bank note with some coins and a ruler, for measuring the area captured. We set each camera on the tripod to be exactly square against the desk to enable us to accurately detect any barrel distortion in the image.

OUTDOOR PHOTOS

We take the outdoor shots from the roof of the *PC Pro* offices, which overlook London's West End and include landmarks like Centre Point and the Millennium Eye.

The direct sunlight and huge depth of field stress the camera's light metering, focus and exposure settings. We take two shots here – a wide landscape scene and a close-up portrait, the latter to primarily test skin tones. Many thanks to our very own Claire Kearney for offering to be our model for the day.

The ever-changing lighting conditions outdoors means the sky looks different in every shot (for details, and the photos, see overleaf).

WHAT WE LOOK FOR

After uploading the images onto our usual test rigs, we scrutinise them for issues like barrel distortion, colour fringing and tonal range. We use two 19in Iiyama Vision Master Pro 454 monitors placed side-by-side rather than printing images out. Although this still doesn't guarantee perfect colour accuracy, it offers the best real-world solution.

We also look for specifics in each shot. The indoor shot without flash is checked for general colour accuracy, resolution and errors such as noise and compression artefacts. The shot with flash is checked for the spread and range of the flash and again for colour balance errors.

We calculate the area covered in the macro shot and check focus across the image, particularly in the corners. The outdoor photos are examined for accurate skin tones, exposure, colour and detail capture. We concentrate on the model's hair in the portrait shot for resolution, which gives a good indication of a camera's overall ability to capture fine detail.

COMPARING CAMERAS

Due to the wide price range and functionality of the cameras on test, they're split into two groups. The first includes cameras up to £300, and the second those costing over £300. This means that we compare like with like as much as possible, but the scores at the bottom of each review aren't comparable between the two groups. However, you can compare all the cameras' image quality in the quality graphs (*see p81*).

Since there are two distinct groups, we test each in a slightly different way when taking the shots described above. The cameras in the lower price bracket have all functions set to auto, as this reflects the point-and-shoot nature in which the majority of people will want to use them. With the more expensive cameras, however, we make use of their advanced functions to obtain the best possible pictures. For example, we used focus and exposure locks as well as shutter and aperture priority modes.

Many thanks to Belkin (**www.belkin.co.uk**, 0800 2235 5460) for providing a USB Memory Stick reader, SanDisk (**www.sandisk.co.uk**) for providing a USB CompactFlash reader and Cruzer USB SD/MMC card reader, and Crucial (**www.crucial.com/uk**, 0800 013 0330) for providing a 128MB MMC card.

Quality results

There obviously isn't room in the magazine to print all of the pictures we took, but the selection shown is intended to highlight the difference in quality between the great and not so great.

Image 1 shows part of our indoor scene taken on the Fujifilm S602. The camera impressed us by correctly reproducing colours in tricky lighting conditions and capturing fine details. Similar praise is commanded by the Nikon 5700's attempt (**image 2**), which shows superb resolution for detail capture, while the BenQ DC2110's (**image 3**) poor effort proves you get what you pay for.

Image 4 depicts a typical outdoor landscape shot – this was taken on the Sony DSC-S85. Colours are vivid, skin tones natural and resolution impressive. The image is a little underexposed, but the Sony did a better job than most. Again, the Nikon 5700 justifies its high price by capturing the kind of detail shown by **image 5** and this is contrasted in **image 6** where the Ricoh RR30 puts in a poor performance for a camera costing almost £300.

Image 7 is an example of our macro shot, taken on the HP 812. While it couldn't get as close as the more expensive cameras, there wasn't too much barrel distortion.

Image 8 was taken on the Nikon 4500 and shows virtually the whole image – no other camera got this close. The Panasonic LC20B (**image 9**), on the other hand, could only capture a much larger area and, although it isn't easily seen in this small image, there's a lot of unwanted barrel distortion.

Image 10 is a cropped portion of our portrait shot. This was taken on the Olympus C-4000 and shows the superb quality that can be achieved from this bargain camera. Skin tones are realistic and accurate metering has meant that highlights aren't burnt out. The Fujifilm S602 produced one of the best portrait shots and the incredible detail can be seen in **image 11**. The BenQ DC2110, however, again came under fire for its poor detail capture. In **image 12**, you can see colours are incorrect and detail capture is poor.

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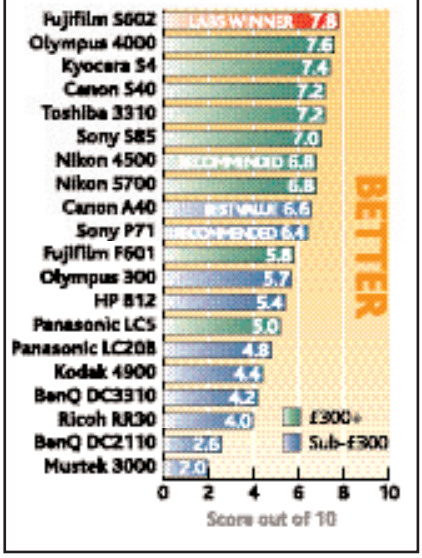
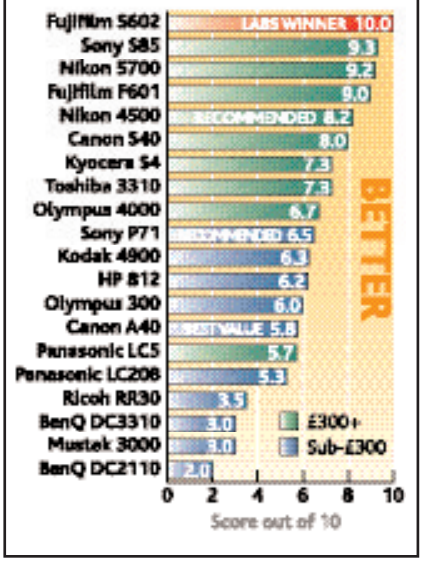
While you can rely on our definitive verdict, all the images we took are on our website so you can judge for yourself. Simply go to www.pcpro.co.uk and click through to digital cameras in the Labs section.

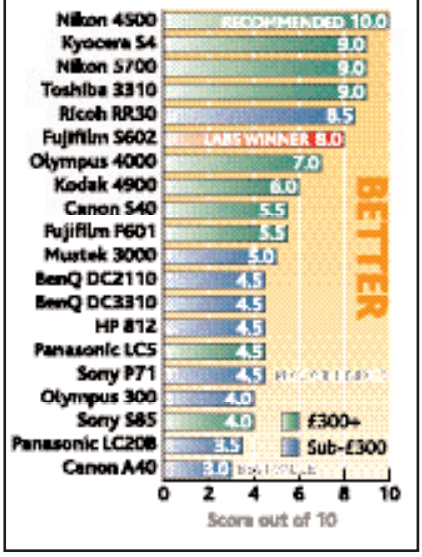
INDOOR QUALITY



OUTDOOR QUALITY



MACRO QUALITY



FEATURE TABLE

PC PRO BEST VALUE

PC PRO RECOMMENDED










	BenQ DC2110	BenQ DC3310	Canon PowerShot A40	HP Photosmart 812	Kodak EasyShare DX4900 Zoom	Mustek MDC 3000	Olympus Camedia C-300Zoom	Panasonic Lumix DMC-LC20B	Ricoh Caplio RR30	Sony Cyber-shot DSC-P71
Overall score	63	74	117	100	96	74	110	97	83	114
Price (inc VAT)*	£142 (£167)	£245 (£288)	£177 (£208)	£259 (£304)	£259 (£304)	£112 (£132)	£255 (£300)	£195 (£230)	£287 (£337)	£265 (£311)
Supplier	dabs.com 0800 138 5182	dabs.com 0800 138 5182	www.internetcamerasdirect.co.uk	dabs.com 0800 138 5182	dabs.com 0800 138 5182	Redstore.com 0870 870 4457	dabs.com 0800 138 5182	Jessops 0116 232 6000	Ricoh 020 8261 4031	dabs.com 0800 138 5182
Manufacturer's website	www.benq.co.uk	www.benq.co.uk	www.canon.co.uk	thenew.hp.com	www.kodak.co.uk	www.mustek.co.uk	www.olympus.co.uk	www.panasonic.co.uk	www.ricoh-cameras.co.uk	www.sel.sony.com
Basic warranty	2yrs RTB	2yrs RTB	1yr RTB	1yr RTB	1yr RTB	2yrs RTB	1yr RTB	1yr RTB	1yr RTB	1yr RTB
OPTICS										
Optical zoom	✖	✖	3x	3x	2x	✖	2.8x	3x	3x	3x
Focal length (35mm equivalent)	43	38	35-105	37-111	35-70	45	36-100	35-105	35-105	39-117
Aperture range	f/2.8-f/8	f/3-f/13	f/2.8-f/13.4	f/2.6-f/9	f/2.8-f/8	f/2.8-f/11	f/2.9-f/8.6	f/2.8-f/8	f/2.6-f/9.7	f/2.8-f/8
Shutter speeds (seconds)	1/4-1/1,000	1/30-1/500	15-1/1,500	12-1/2,000	16-1/2,000	1/30-1/2,000	2-1/1,000	1/2-1/1,000	8-1/2,000	2-1/2,000
Lens manufacturer	Not stated	Not stated	Canon	Pentax	Ektanar	SJ Optic	Olympus	Leica DC	Ricoh	Sony
CCD AND RESOLUTION										
CCD megapixels (effective)	2.1 (1.92)	3.3 (3.14)	2.1 (2)	4.1 (3.92)	4.1 (4)	2.1 (2)	3.34 (2.95)	2.1 (1.92)	3.34 (3.24)	3.34 (3.14)
Captured bit depth	24-bit	24-bit	24-bit	30-bit	24-bit	24-bit	Not stated	Not stated	24-bit	Not stated
Maximum optical resolution	1,600 x 1,200	2,048 x 1,536	1,600 x 1,200	2,272 x 1,712	2,448 x 1,632	1,600 x 1,200	1,984 x 1,288	1,600 x 1,200	2,048 x 1,536	2,048 x 1,536
Other resolutions	2,048 x 1,536***, 800 x 600	1,024 x 768, 640 x 480	1,024 x 768, 640 x 480	1,136 x 848	2,136 x 1,440, 1,800 x 1,200, 1,224 x 816	2,048 x 1,536***, 800 x 600	1,600 x 1,200, 1,280 x 960, 1,024 x 768, 640 x 480	1,024 x 768, 640 x 480	1,280 x 960, 640 x 480	2,048 x 1,365 (3:2), 1,600 x 1,200, 1,280 x 960, 640 x 480
File format	JPEG (EXIF 2.1)	JPEG (EXIF 2.1)	JPEG (EXIF 2.2)	JPEG (EXIF 2.1)	JPEG (EXIF 2.1)	JPEG (EXIF 2.1)	JPEG (EXIF 2.1), TIFF	JPEG (EXIF 2.1)	JPEG (EXIF 2.2)	JPEG (EXIF 2.1), GIF (text mode)
Number of compression settings	3	3	3	3	2	✖	2	2	2	2
Video capture (format)	AVI (Motion JPEG)	QuickTime (Motion JPEG)	AVI (Motion JPEG)	MPEG-1	✖	AVI (Motion JPEG)	QuickTime (Motion JPEG)	QuickTime (Motion JPEG)	AVI (Motion JPEG)	MPEG-1
Video capture resolution	320 x 240, 20 seconds	320 x 240, 30 seconds; 160 x 120, 30 seconds	320 x 240, 18 seconds; 160 x 120, 48 seconds	288 x 216, 60 seconds	✖	320 x 240, 30 seconds	320 x 240, 33 seconds	320 x 240, 20 seconds	320 x 240, 120 seconds	320 x 240, unlimited
MEMORY										
Technology	SmartMedia	CompactFlash Type I	CompactFlash Type I	SD	CompactFlash Type I	CompactFlash Type I	SmartMedia	SD/MMC	SD/MMC	Memory Stick
Memory supplied (MB)	16	16	8	16	16	16	64	8	8 (integrated)	16
Photo capacity (highest quality)**	22	40	7	5	13	24	2 (TIFF), 14	8	4	10
Photo capacity (lowest quality)**	188	280	87	56	53	200	340	64	41	240
SHOOTING MODES										
Time to ready (seconds)	5.4	4.6	3.6	5	3.1	5.6	4.4	3.2	2.9	4.2
Continuous shooting (number of frames, fps)	✖	4, 2fps (1,024 x 768); 8, 2fps (640 x 480)	5, 2.5fps (1,600 x 1,200); 50, 2.5fps (640 x 480)	✖	✖	10, not stated	11, 1.2fps	5, 5fps	16, 7fps	16, 25fps
Self-timer	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Panorama assist	✖	✖	✔	✖	✖	✖	✖	✖	✖	✖
CONTROLS AND FUNCTIONS										
Focus method	Auto	Auto	Auto	Auto	Auto	Auto	Auto, spot	Auto	Auto, manual	Multipoint, centre, preset distances
Focus assist lamp	✖	✖	✔	✖	✖	✖	✖	✖	✖	✔
Shutter-priority mode	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
Aperture-priority mode	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
Full manual exposure	✖	✖	✔	✖	✖	✖	✖	✖	✖	✖
Exposure compensation	+/- 1.8EV	+/- 2EV	+/- 2EV	✖	+/- 2EV	+/- 2EV	+/- 2EV	+/- 2EV	+/- 2EV with auto bracketing	+/- 2EV
Light-metering modes	Centre weighted	Centre weighted, average, spot	Evaluative, spot AF	Centre weighted	Multipattern, centre weighted, centre spot	Auto	iESP, spot	Centre weighted	256-segment multipattern, centre weighted, spot	49-point multipattern, pre-flash, spot
Manual white balance setting	✖	✖	✖	✖	✖	✖	✖	✖	✔	✖
Equivalent ISO rating	100-200	100	50-400	100-200	100-400	Not stated	100-400	100-400	125-800	100-400
Manual ISO selection	✖	✖	✔	✖	✖	✖	✔	✔	✔	✔
Integrated flash (modes)	Auto, red-eye reduction, fill in, off	Auto, red-eye reduction, fill in, off	Auto, red-eye reduction, red-eye reduction auto, fill in, off, slow sync	Auto, red-eye reduction, fill in, off	Auto, red-eye reduction, fill in, off	Auto, fill in, off	Auto, red-eye reduction, fill in, off, night mode	Auto, red-eye reduction, fill in, off	Auto, red-eye reduction, fill in, off, slow sync	Auto, red-eye reduction, fill in, off
Audio recording	✖	✖	✖	✔	✖	✖	✖	✔	✖	✖
Macro mode focus range (cm)	20-60	30-70	16-76	14-infinity	7-70	✖	20-80	20-70	1-60	10-50
Macro area covered (mm) (H x W)	142 x 107	121 x 91	147 x 110	128 x 96	94 x 63	139 x 104	98 x 74	87 x 65	19 x 14	103 x 77
PHYSICAL FEATURES										
Viewfinder	Optical	Optical	Optical	Optical	Optical	Optical	Optical	Optical	Optical	Optical
LCD (size, pixels)	1.5in, 100,000	1.8in, 120,000	1.5in, 120,000	1.5in, not stated	1.5in, 91,124	1.8in, 61,600	1.8in, 61,000	1.5in, 110,000	1.6in, 80,000	1.5in, 123,000
LCD/viewfinder coverage (%)	90/80	90/80	100/80	100/not stated	85/85	90/85	Not stated	Not stated	100/75	Not stated
Separate status LCD	✔	✖	✖	✖	✔	✖	✖	✖	✖	✖
Standard tripod thread	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Add-on lenses	✖	✖	✔ (with adaptor)	✖	✔	✖	✖	✖	✖	✖
Remote shutter connection	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
Hotshoe for external flash	✖	✖	✖	✖	✖	✖	✖	✖	✖	✖
Weight with media & batteries (g)	250	250	350	250	300	300	300	290	210	284
Dimensions (mm) (W x H x D)	104 x 70 x 43	99 x 71 x 43	110 x 71 x 38	95 x 41 x 70	116 x 67 x 42	116 x 75 x 43	118 x 66 x 50	99 x 66 x 41	114 x 33 x 55	125 x 58 x 44
Connection type	USB	USB	USB	USB	USB	USB	USB	USB	USB	USB
BATTERY AND ACCESSORIES										
Battery type included	2 x AA	1 x lithium ion	4 x AA	2 x AA	2 x AA	4 x AA	2 x NiMH AA	2 x NiMH AA	2 x AA, lithium ion optional	2 x NiMH AA
Charger included	✖	✔	✖	✖	✖	✖	✔	✔	✖	✔
AC adaptor included	✖	✔	✖	✖	✖	✖	✖	✖	✖	✖
Software supplied	ArcSoft PhotoImpression, ArcSoft PhotoBase, ArcSoft VideoImpression	ArcSoft PhotoImpression, ArcSoft PhotoBase, ArcSoft VideoImpression	ArcSoft PhotoImpression, ArcSoft VideoImpression, RAW image converter 1.2, ZoomBrowser EX 3.3, PhotoRecord 1.4, PhotoStitch 3.1, RemoteCapture 2.2	HP Imaging Software, ArcSoft PhotoImpression	Kodak Picture Software	Ulead Photo Express SE, Ulead Photo Explorer, Ulead COOL 360	Olympus Camedia Master 4	ArcSoft PhotoImpression	Ricoh Gate	PIXELA ImageMixer 1
Carry case	✔	✔	✔	✖	✖	✔	✔	✖	✖	✖
Lens cover	✖	Sliding	Built-in	Built-in	Built-in	✖	Sliding	Built-in	Built-in	Built-in
Other	Wrist strap, video cable	Wrist strap, video cable	Wrist strap, video cable	Wrist strap, video cable	Wrist strap	Wrist strap, video cable, mini tripod	Wrist strap, video cable	Neck strap, video cable	Wrist strap, video cable	Wrist strap, video cable

*Prices were correct at time of going to press. **With interpolation. ***With memory supplied.

BenQ DC2110

PRICE £142 (£167 inc VAT) SUPPLIER dabs.com 0800 138 5182

VERDICT **Despite its cheap price, the BenQ DC2110 is a poor showcase for a 2-megapixel CCD. It's completely outclassed by the Canon PowerShot A40.**

BenQ's DC2110 is the second cheapest camera on test this month, offering 2.1 megapixels for what looks like a veritable bargain price of £142. With the same pixel count as Canon's PowerShot A40, you're looking at a maximum optical resolution of 1,600 x 1,200 before you even think about interpolation. So what's the catch? Well, for one, there's no optical zoom, whereas the A40 includes a 3x zoom.

Much more importantly, we also quickly discovered that £142 doesn't buy you much in the way of image quality. Surprisingly, given that outdoor photos are normally better than indoor ones, the outdoor shots suffered more – their overall quality, and detail capture in particular, was so poor it would make even a disposable film camera's shots look fantastic.

Indoor shots were again disappointing, though, with colour reproduction problems both with and without flash. Photographing the still life setup with the flash gave the picture a yellow tinge and severe colour fringing. Without the flash, the colours were significantly better, but the fringing was still widely visible.

At least the DC2110 is simple to use, albeit partly due to the limited controls. There's a mode selector dial on the top around the shutter button, and two small rubber buttons to select the flash mode and enable macro focusing. The macro mode isn't particularly useful, though, with a smallest area of 142 x 107mm and coloured artefacts appearing on highlights. The camera's rear holds the power switch and the menu-access buttons – one to turn on the 1.5in LCD and a four-way pad for navigating menus and playback.

As well as a basic single-shot mode, the DC2110 includes a movie mode that can shoot up to 20 seconds of 320 x 240 footage. However, it has no facility for taking bursts of images and, with a wait of around 15 seconds between single shots, you won't get another chance if you miss the action you're after.

BenQ surprised us with its memory generosity, supplying a 16MB SmartMedia card compared to the 8MB we've come to expect with budget cameras. Even at maximum quality, that's enough space for 22 photos.

But storage space isn't everything and, while £142 is certainly an attractive price for a digital camera, the BenQ DC2110 is a poor advert for the technology. If you only need a 2-megapixel camera, the Canon PowerShot A40 is a much better buy with superior overall image quality, optical zoom and continuous shooting modes.

PC PRO RATINGS
OVERALL 63
QUALITY 31 | FEATURES 64 | VALUE 81
100 IS THE AVERAGE

BenQ DC3310

PRICE £245 (£288 inc VAT) SUPPLIER dabs.com 0800 138 5182

VERDICT **The DC3310 struggled to provide good image quality, even with the advantage of a 3-megapixel CCD. Spend a little extra and you'll get much better results.**

The DC3310 is BenQ's top-of-the-range digital camera, costing £100 more than the DC2110. With three megapixels to play with, it can produce images at up to 2,048 x 1,536, theoretically giving much more detail to shots than the DC2210.

Controls are a bit more advanced than on the DC2210, but it still lacks some features we'd expect to see. Chief among these is an optical zoom – the DC3310 is limited to a 2x digital zoom, which simply enlarges the centre portion of images without providing any detail improvements.

The outdoor image quality of the DC3310 was a little better than its sibling's, but nowhere near what we expect of a 3-megapixel camera. There was still the slight yellow tint to the skin tones, and the camera was unable to give the sky a consistent colour, instead adding a green tinge in the centre of the image. Pincushion distortion was apparent in the wide-angle shot, making the Centre Point tower lean alarmingly. Noise and other artefacts were also visible in the shots, most clearly in the darker skin tones.

Indoors, the DC3310 had difficulty focusing without the flash, although it managed to get colours consistent between flash and non-flash modes. But this was about the only highlight, as both shots showed significant amounts of noise, and colour fringing was plainly visible around bright objects when taking pictures with the flash.

At least this camera is fairly easy to use. The lens cover acts as the power switch in the same way as it does on the Olympus C-300Zoom, and on the top lie three controls. The left-hand one changes flash modes, the centre switches from record to playback mode, while the right-hand control around the shutter button changes the recording mode. The DC3310 includes a burst-capture mode to accompany the movie mode, but don't get too excited – it can only record still images at 2fps, with a total of four at 1,024 x 768 or eight at 640 x 480.

The rear of the camera holds the 1.8in LCD screen, a menu button, a button for turning the LCD on and off, and navigation controls that double up as the macro and digital zoom selector. Sadly, the quality of the macro image was poor. Colours were completely inaccurate and there was colour fringing and even pixellation apparent.

Although £245 seems a good price for a 3-megapixel camera, the Olympus C-300Zoom and Sony DSC-P71 offer better features and far superior quality for about £20 more. With lacklustre image quality and no optical zoom, the DC3310 is no bargain.

PC PRO RATINGS
OVERALL 74
QUALITY 63 | FEATURES 92 | VALUE 73
100 IS THE AVERAGE

Jargon buster

Aperture priority The aperture is the opening inside the lens that lets light through to the CCD. It can be made larger or smaller by moving a series of leaves that expand or contract the central iris. The size is measured in f-stops, where the larger the number, the smaller the aperture. Aperture-priority modes allow you to set the aperture at a required value and then automatically adjust the shutter speed to get the correct exposure.
Captured bit depth Some cameras can capture up to 30-bit colour (10 bits per colour). This allows them to deliver more accurate colours once the image is down-mixed to 24-bit colour.
Depth of field The distance in which focus remains accurate. A narrow depth of field will keep a subject in focus while blurring the background. It's affected by the aperture, where a wide aperture (small f-stop) gives a narrow depth of field. This is particularly useful when shooting portraits.
EXIF A standard way of including extra information about an image with the file. Such information includes flash mode, aperture and shutter settings. For more information, go to **www.exif.org**
Exposure compensation Measured in EV and allows more sensitive tuning of the CCD's gain than changing the ISO level.
Focal length The distance from the centre of the lens to the CCD. Lower figures give a wider-angled shot. Zoom lenses are given their maximum and minimum values.
Gain The amount of amplification applied to the signal coming from the CCD. Brighter subjects require less gain than dark ones. High levels of gain increase the amount of noise in an image.
ISO This is the standard for sensitivity of film. The higher the number, the more sensitive it is. In digital cameras, it alters the gain of the CCD. Higher ISO settings allow images to be taken in darker surroundings but generally increase the noise present in the image.
Light metering The way cameras decide how the aperture and shutter should be set when in automatic or 'priority' mode. Most have more than one way of measuring. Spot measures the light at the centre of the scene, centre weighted takes an average from the central region of the scene, and multiregion takes the average from various points over the whole scene. Spot is best used to lock the exposure on a subject, while centre weighted and multiregion are good options for general use.
Shutter speed The amount of time the shutter remains open. A short shutter speed is best for capturing fast-moving objects without blur. Longer shutter speeds allow more light to enter the CCD, meaning dark subjects can be captured. This also increases the risk of noise.
White balance The camera's perceived colour of white changes due to lighting types. The camera therefore benefits from being told what type of lighting it's operating in to ensure colour accuracy. Generally, outdoor, tungsten and fluorescent settings are offered as a minimum.

Canon PowerShot A40

PRICE £177 (£208 inc VAT) SUPPLIER www.internetcamerasdirect.co.uk

VERDICT **Despite having just a 2.1-megapixel CCD, the Canon produced some of the best images in this category. With heavyweight features and a low price, it's a great buy.**

The PowerShot A40 defies the odds. How can a camera at this price include a huge amount of high-end features yet beat its budget rivals for quality hands down? We don't know the answer, but our advice is not to worry and to just go and buy it, because this camera is an absolute bargain.

It's based on a 2.1-megapixel CCD like several others, but it boasts the ability to add lenses to the body of the camera by removing the lens surround and adding an adaptor ring. It's also the only camera under £200 to allow some control of the exposure settings.

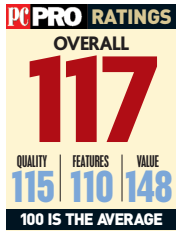
This latter feature gives much more control over the image than the simple auto modes seen elsewhere. Even without careful manipulation of the exposure controls, the A40 managed to generate excellent images indoors. There was little noise or artefacts on the photos. Not that it was perfect – without the flash, there was a yellow tinge as the auto white balance struggled in the low light. You can use the bundled ArcSoft PhotoImpression to improve this situation slightly, but it doesn't completely correct it.

Outdoors, the Canon was left slightly behind by other cameras in this section, with the Sony, Kodak, HP and Olympus all giving better images. This was mainly due to the extra detail provided by their higher resolution CCDs – but only Kodak and Sony gave better skin tones. The Canon overexposed our model slightly, but was able to capture good detail in the dark areas of the background.

Aside from the shutter release button, all the controls are crammed onto the back of the camera along with the 1.5in LCD. There's a dial to select the recording mode – burst at 2.5fps for up to 50 shots and a movie mode are included.

There's also direct access to the macro facility, but this was one of the few disappointing areas of the Canon's performance. It wasn't able to get as close to the subject as the likes of the Sony, while there was obvious barrel distortion and loss of focus in the corners of the image.

But this is a minor problem, as is the fact that Canon only supplies an 8MB CompactFlash card. After all, you can buy a 128MB card from dabs.com for less than £40. You might soon be tempted to do just that, as 8MB is only enough to store seven images at the highest quality. More compensation comes in the form of the comprehensive software suite bundled, but even if Canon hadn't provided a single program, at this price the A40 is a steal.



HP Photosmart 812

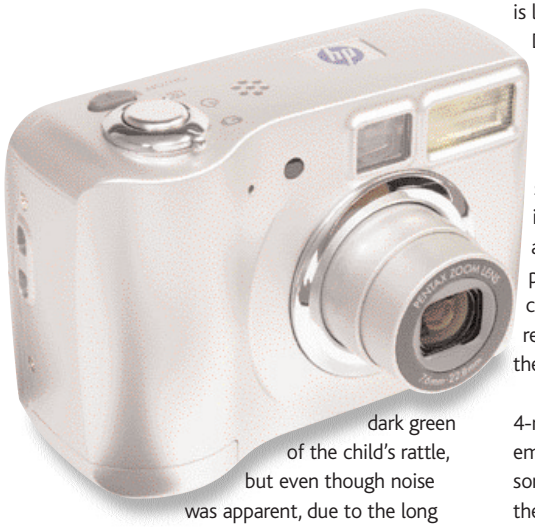
PRICE £259 (£304 inc VAT) SUPPLIER dabs.com 0800 138 5182

VERDICT **HP performs quite a feat by including a 4-megapixel CCD at this price, but the Photosmart can't match the impressive image quality of the Sony Cyber-shot DSC-P71.**

A 4-megapixel camera for under £300 is still quite a rarity. Only the HP and Kodak cameras fit into this category, but both make sacrifices in the process, particularly in terms of manual controls.

Both ship with 16MB memory cards, but the HP uses the smaller SD format while the Kodak takes CompactFlash. It's worth noting that while most cameras using SD cards also work with MMC cards, the HP doesn't function reliably with this format. It slowed to a crawl when viewing images taken with another camera and had to be powered off between taking images. But this is just a minor point – the 3x optical zoom is far more important, especially when the Kodak only includes a 2x zoom.

Indoors, the HP fared reasonably well for the price, partially due to its larger resolution. But even a 4-megapixel CCD doesn't guarantee excellent detail capture, with the 812 falling behind similarly specified but more expensive devices. Without the flash, it struggled with the



dark green of the child's rattle, but even though noise was apparent, due to the long shutter speed, it didn't overpower the image. Disappointingly, though, the flash of the HP was too concentrated. It lit the centre of the image brightly, but there was noticeable dimming in the corners.

Outdoors, the Photosmart was certainly passable. The skin tones were well reproduced even in shadowed areas. The portrait shot had a pleasingly short depth of field and, although the landscape picture showed slight barrel distortion, it didn't distract the eye too much.

Macro photos taken by the HP were a little disappointing, with the area covered by the shot a relatively paltry 128 x 96mm. This is larger than the Kodak and even the BenQ DC3310 captures a smaller area. Barrel distortion wasn't too obvious, but was visible all the same, and focus deteriorated towards the corners.

There are three buttons next to the screen, one of which allows you to mark images for printing or emailing. You can add addresses using software on the PC and the pictures will be emailed once you've connected up the camera. Rounding out the rear controls is a four-way direction pad with the OK button at its centre.

With only the Kodak for competition as a 4-megapixel camera below £300, the HP emerges from this Labs with some honour. However, the Sony Cyber-shot produces better images with its 3.3-megapixel CCD and costs only £6 more. Unless you really need the larger image size, choose the DSC-P71.

PC PRO RATINGS
OVERALL
100
QUALITY 108 | FEATURES 94 | VALUE 92
100 IS THE AVERAGE

Kodak EasyShare DX4900 Zoom

PRICE £259 (£304 inc VAT) SUPPLIER dabs.com 0800 138 5182

VERDICT **A few more features then the HP, but inferior image quality causes the Kodak to lag behind its 4-megapixel rival and even further behind the award-winning Canon and Sony.**

At exactly the same price as HP's 4-megapixel camera, we were a little disappointed by the Kodak. It lacks several of the features of the Photosmart, including the ability to capture video. While some consider this a needless frivolity, it can be useful to take short clips of moving images rather than one still shot.

The camera itself is slightly more bulky than the HP and has an almost Fisher-Price look and feel, especially the monstrous mechanical power switch. On the rear of the camera, alongside the 1.5in LCD screen, there are just three buttons. The most important of these controls the 2x optical zoom, another place where it lags behind the HP. However, one bonus is the potential to add lenses to the DX4900, which the HP doesn't allow.

Controls are simple to use. A dial switches between record, playback and setup modes, and there are direct buttons for setting the flash mode, macro focusing and self-timer.

As for image quality, the Kodak struggled indoors. It couldn't focus properly on our still life setup. This wasn't a physical problem with the camera, because we were able to focus at a similar distance outside. Without the flash, our still life had a serious purple tint where the white balance was unable to correct for the light. There was also a large amount of noise visible on the background. This disappeared when the flash was employed, as did the purple tint, but the focus was no better.

There were some good points. The flash was spread more evenly than the HP's, filling the corners of the image well. The macro mode was also better then on the Photosmart, with a smaller area of 94 x 63mm captured, although focus dropped off in the corners and edges.

Outside, the Kodak performed well. The only issues were with noise in the skin tones (showing up as a mottled effect) and a slight underexposure of our subject in the portrait. The depth of field in the portrait is much longer than the HP's. This is an effect you may wish for, but most people prefer the subject in sharp focus and the background more blurred than the Kodak managed.

While a 4-megapixel camera under £300 represents good value, the HP Photosmart 812 is the same price and includes the important 3x optical zoom and movie mode. Both are equipped with a respectable 16MB of memory, although the Kodak uses CompactFlash to HP's SD cards. However, neither can match the Sony for quality or the Canon for value.

PC PRO RATINGS
OVERALL
96
QUALITY 101 | FEATURES 97 | VALUE 90
100 IS THE AVERAGE

Casio Exilim EX-S1

PRICE £169 (£198 inc VAT) SUPPLIER www.internetcamerasdirect.co.uk

VERDICT **A camera you can slip into your pocket and it takes decent photos too. It's difficult not to fall in love with the Exilim.**

Delightful as all the digital cameras are in this group test, they have one shared problem: size. Slipping the Nikon Coolpix 5700 into your pocket could result in a serious injury, both for you and the camera. The Exilim, on the other hand, is designed to be so light and slim that you can take it with you wherever you go.

Of course, there are some sacrifices in return for this privilege. The most obvious is this camera's resolution. With just 1.24 effective megapixels inside the Exilim, its maximum true resolution is 1,280 x 960. Interpolation boosts this to 1,600 x 1,200, but this doesn't add any detail to photos and is a long way from the 3-megapixel cameras you could buy if you're willing to pay an extra £50. There's also no optical zoom – hardly surprising considering the camera's depth of 12.4mm.

Fortunately, Casio does make room for an SD/MMC slot to accompany the 12MB of memory built into the camera itself. You can fit around ten pictures in the Exilim at highest quality, so a 128MB card would extend this to over a hundred.

The Exilim can't match cameras like the Sony Cyber-shot DSC-P71 for image quality due to the difference in size between the lens and the CCD in the respective machines, but we were pleasantly surprised by the Casio's photos nonetheless. Skin tones were accurately reproduced and most of the photos we took were in focus. Naturally, though, if you zoom in on fine details like hair the resolution of higher spec cameras can't be matched.

This camera's credit card-like dimensions also mean that controls must be smaller, but the TFT screen deserves praise, with a sharp image across its 1.6in diagonal. We also appreciate the ability to zoom in on shots by 4x.

But it's not perfect. The four-way direction pad is tricky to push in the right direction, and Casio makes the mistake of putting the power button right next to the capture button – I often found myself switching the camera off by accident. It's also annoying that Casio doesn't include a protective case, as this makes the lens vulnerable to attack.

Despite these irritations, I must admit I love this little camera. I've carried it everywhere with me, and as a result I've taken photos that would have been impossible otherwise. It's also easy to use and very responsive – the gap between pressing the capture button and taking the picture is minuscule. True, the image quality isn't overly amazing, but this is a camera for taking snapshots. Its only threat is the just-released Casio Exilim EX-S2, which has a true 1,600 x 1,200 resolution for only a few pounds more.

TIM DANTON

Mustek MDC 3000

PRICE £112 (£132 inc VAT) SUPPLIER Redstore.com 0870 870 4457

VERDICT **Despite some promising specifications, the MDC 3000's results are disappointing. We recommend you spend more or buy a conventional 35mm camera.**

The MDC 3000 is the cheapest camera on test this month and it shows as soon as you take it out of the box. The plastic feels cheap in your hand and the batteries rattle around inside their compartment. The motor driving the focusing system is also noisy, with grinding sounds accompanying each press of the shutter button.

Despite the 3000 in the name, the Mustek is actually a 2-megapixel camera. This gives it a maximum optical resolution of 1,600 x 1,200, although like the BenQ DC2110 it can interpolate this up to 2,048 x 1,536. With this resolution, the Mustek is able to get 24 pictures on the supplied 16MB CompactFlash memory card in its top quality mode.

The two image-adjustment tools – exposure compensation and white balance – are reached though the menu system rather than having their own buttons. This makes it awkward to access these functions quickly to set up the camera for shots.

Controls on the camera are limited. The shutter button is the only control on the top, while the back is shared by the LCD screen, power button, mode switch and four-way direction pad, which also selects options. The LCD is the poorest in the Labs this month. Although the 1.8in diagonal sounds easy to see, it only has 61,600 pixels when most other screens have more than 100,000. This makes it tricky to check the focus of an image.

More worryingly, indoors and with the flash turned on, the Mustek was unable to take a clear picture. It produced a pink and yellow tinge and overexposed the centre while letting the outer edges fade away to grey, thanks to the overbearing flash. Without the flash, the picture was much better balanced. The colours were still nowhere near as accurate as other cameras and looked washed out, but at least there were no white balance problems. While it doesn't have a macro mode, when we performed this test the Mustek captured a smaller area than either the BenQ DC2110 or the Canon A40.

Outside, the MDC 3000 made a poor job of exposing the landscape picture, burning out most of the sky and the left-hand side of our model's face. There was also colour fringing around part of her hair, barrel distortion was present and JPEG artefacts were clearly visible even at the best quality setting. Our portrait photo was much better, with less colour fringing, although artefacts were still apparent.

With all these faults and without an optical zoom, the Mustek is a lacklustre introduction to digital photography. We recommend you either spend more and buy the Canon or choose a decent quality film camera.

PC PRO RATINGS
OVERALL 74
QUALITY 41 | FEATURES 78 | VALUE 90
100 IS THE AVERAGE

Olympus Camedia C-300Zoom

PRICE £255 (£300 inc VAT) **SUPPLIER** dabs.com 0800 138 5182

VERDICT **A good compromise between image quality and price, the C-300 is ideal for those starting out in digital photography.**

The C-300 sits at the base of Olympus' range of 3-megapixel cameras. As such, it lacks some of the more advanced features seen in other cameras. However, it's aimed more at those people looking to replace a compact APS or 35mm camera, most of which are fully automatic too.

The 3-megapixel CCD allow images up to 1,948 x 1,288 to be captured, and video can be recorded at 320 x 240 resolution. Everything is saved onto SmartMedia. As standard, the C-300 comes with a 32MB card and non-rechargeable lithium batteries. However, the 'luxury' package on review, available from dabs.com, includes a 64MB card, a charger, batteries and a case for only £20 more than the best price we found for the standard kit.

Outdoors, we were impressed with the quality of the C-300. Although the portrait shot featured an overexposed sky, thereby losing detail, the model's skin tones came out well on the shadowy side of her face. In the landscape shot, the camera coped remarkably with the harsh lighting and shows little barrel distortion at the edges of the frame.

Indoors and with the flash deactivated, there was noticeable noise throughout the image as the camera struggled with a slow shutter speed. There was also a slight yellow tinge to the picture, indicating that the automatic white balance wasn't doing its job properly. With the flash turned on, the noise all but vanished. Colour accuracy was only slightly better, with the yellow tinge still present, albeit at a reduced level. Detail capture was commendable, even compared to the 4-megapixel cameras from HP and Kodak, with the small text on the candle close to readable.

In macro mode, the Olympus impressed again. Although not the smallest area, 98 x 74mm compares well with other budget cameras. The outside of the picture was in focus and the only discernable problem was barrel distortion, which gave the ruler a distinct curve.

The C-300's controls are well laid out. Sliding the lens cover back turns the camera on, although you can leave the cover open and just push it back the last couple of millimetres when you actually need to take a picture. On top are the shutter button and zoom control for the 2.8x optical and 3.6x digital zoom.

Dabs.com's package is hard to beat and the only real argument against the Olympus C-300 is that Sony's Cyber-shot DSC-P71 is available for just £10 more. The lack of manual controls makes it a point-and-shoot camera, but if that's what you need you won't be disappointed.

PC PRO RATINGS
OVERALL
110
QUALITY 108 | FEATURES 124 | VALUE 104
100 IS THE AVERAGE

Panasonic Lumix DMC-LC20B

PRICE £195 (£230 inc VAT) **SUPPLIER** Jessops 0116 232 6000

VERDICT **The Lumix is well built and produces respectable photos for the price, but it can't compete with the Canon A40 for overall quality or features.**

The Panasonic LC20B looks like it was designed to resemble a traditional camera as much as possible, although not quite to the extent of its antique-looking larger brother, the DMC-LC5. It feels solid and well made, exuding an air of quality.

Controls are well placed, with the most commonly used options having their own button or selector position. We also like the LCD. Although only 1.5in in size, it has 110,000 pixels. This makes checking the focus of images easier than on the likes of the Kodak or Olympus C-300Zoom.

The LC20B uses SD cards for storage and comes supplied with only 8MB. This is disappointing, but with a maximum resolution of just 1,600 x 1,200 it still provides space for eight pictures at maximum quality, and 64 with maximum compression at 640 x 480.

Unfortunately, all but one of the test photos we took with the LC20B showed some problems when checked against pictures taken on other cameras. The shot we deemed most acceptable was the outdoor portrait where the skin tones were accurate, although the rest of the picture looked a little washed out. The other outdoor shot showed some strange phenomena. While the face of our model was well exposed, the buildings in the near background were dark and lacking in detail and the sky was so blue it looked like a polarizer had been used.

Indoors, detail capture was good for a 2-megapixel camera, but without the flash lighting up the scene there was a yellow cast over the whole image. There was also the noise we've become accustomed to seeing as a camera's small lens deals with the lack of light. Once the flash was allowed to fire, the colour cast changed from yellow to purple. The noise remained in dark areas of the image, but wasn't as prevalent as in the other picture.

The LC20B lacks the picture-enhancing features seen on cameras like the Sony DSC-P71, which has multiple focusing and exposure presets; the Panasonic simply has auto modes for both. This doesn't help when taking photos of difficult subjects. Flash modes are what we'd expect as a bare minimum, but only Canon, Olympus and Ricoh provide more than the basics.

While the Panasonic is a well-built camera, its disappointing overall image quality and lack of features leave it lagging behind the similarly priced Canon PowerShot A40. This shares the same resolution CCD, but gives more control over the image and, more importantly, produces better pictures.

PC PRO RATINGS
OVERALL
97

QUALITY	FEATURES	VALUE
92	94	112

100 IS THE AVERAGE

Ricoh Caplio RR30

PRICE £287 (£337 inc VAT) SUPPLIER Ricoh 020 8261 4031

VERDICT **The Caplio offers a stunning amount of control for such a well-priced camera, but its image quality can't compete with the best of its budget rivals.**

The Caplio RR30 marks a change of design for Ricoh. The RDC-i500 (*see Labs, issue 86, p110*) looked like an old 110-format camera, but the Caplio is closer to an APS compact, albeit a little longer. This compact size is reflected in the type of removable memory used, with an SD slot on hand. No card is supplied as standard though; Ricoh instead relies on 8MB of internal memory, although inserting a memory card disables this. The 3.3-megapixel CCD generates images up to 2,048 x 1,536, four of which can fit into the internal memory at maximum quality.

A couple of functions set the Ricoh apart from the rest of the sub-£300 crowd. First, it has a manual focus operated by the left and right arrow buttons on the rear of the camera. It's also the only camera on test to include a time-lapse mode. This allows the RR30 to take pictures at regular intervals from every 30 seconds up to every three hours.

But the Ricoh really stands out with its macro shot. Although the focus left a little to be desired at the edge of the image, we were able to get the area captured down to 19 x 14mm. Only the Nikon Coolpix 4500 could beat this, and that costs over one and a half times as much as the RR30.

Sadly, the other indoor shots didn't fare as well. There was plenty of noise visible, both with and without flash, while the illumination provided by the Caplio's small bulb tailed off significantly towards the edges of the image.

The Ricoh also struggled in bright sunlight. In the landscape shot, both our model's face and the sky were overexposed, although this did allow more detail to creep into the dark areas of the image. In the portrait shot, which we took at a later time, the exposure was improved but there was noise in dark areas of the image and a blue fringe around the model's hair.

As well as four presets for white balance, the Ricoh allows manual setting using a white backdrop. This should allow the colour to be accurate no matter what the lighting situation. And with an ISO range stretching from 125 to 800, the RR30 can be used in a wide variety of situations. However, digital noise is apparent at the higher settings.

With manual control over such a wide selection of settings, on paper the Ricoh looks like it should be challenging for awards. However, in practice, the results fell short of our expectations, with Sony winning the image quality battle.

PC PRO RATINGS
OVERALL
83
QUALITY 70 | FEATURES 123 | VALUE 75
100 IS THE AVERAGE

Sony Cyber-shot DSC-P71

PRICE £265 (£311 inc VAT) SUPPLIER dabs.com 0800 138 5182

VERDICT **Of the cameras below £300, the Sony took the best outside images, making it an excellent alternative to the Canon, if you can afford it.**

The DSC-P71 is exactly the same price as the DSC-P50 reviewed this time last year (*see Labs, issue 86, p110*). It makes an excellent comparison, allowing us to see the advances made in digital camera technology over 12 months. Most obvious is the CCD resolution – 2.1 megapixels in the P50, 3.3 in the P71. The new Cyber-shot has lost just one appealing feature, and that's a standard thread for taking additional lenses or filters.

The maximum resolution of the P71 is 2,048 x 1,536. However there's a slightly lower resolution that may prove more useful for those printing their photos. The resolution of 2,048 x 1,365 is in the ratio of 3:2, meaning that it exactly matches the aspect ratio of normally developed photographs. The only thing lacking is an uncompressed mode, although this is less important than the ability to take good pictures to start with. And we've certainly got no complaints on that front.

Indoors and without the flash, the Sony gave a well-balanced image, with accurate colours without any white balance error. Noise was only apparent in the darkest of shadows and resolution was sharp and showed clearly defined letters in our test shot. Once the flash introduced extra light, the noise all but disappeared. The colours took on a slight yellow tint, but it wasn't overly distracting. In macro mode, we were able to capture an image down to 103 x 77mm and the picture only lost focus right at the edges.

Outside, the DSC-P71 performed better than any of its budget rivals, with near-perfect exposure and accurate colours. However, the landscape image lost some detail in the dark area directly behind the model. There was also rainbow-coloured noise in the dark areas, which detracted slightly from the photo's impact. The portrait image was better in this regard while still being well exposed.

The Cyber-shot's continuous shooting mode can take 16 frames at up to 25fps. While this sounds better than other cameras, the 16 frames are merged onto a single 1,280 x 960 image, making them just 320 x 240 each.

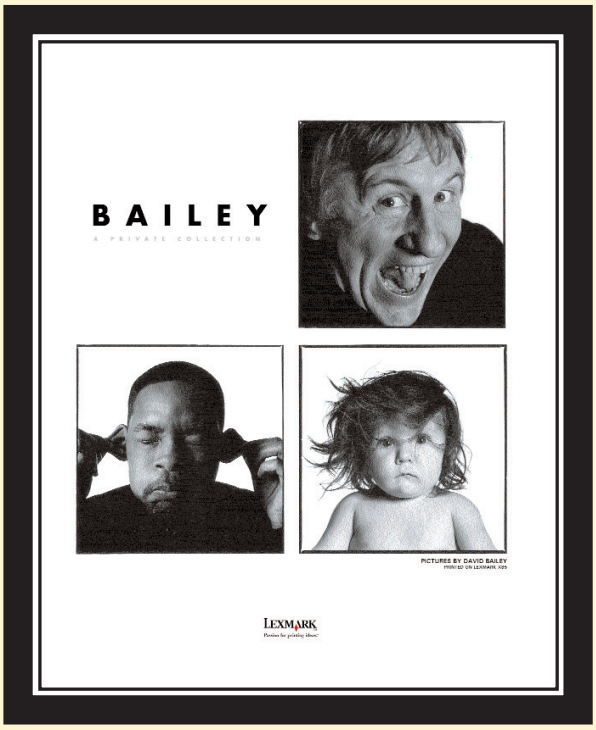
On a brighter note, the 1.5in LCD contains 123,000 pixels, making images easy to check for focus, while the 16MB Memory Stick supplied holds up to ten photos in the highest quality mode. Plus, the P71 comes with rechargeable NiMH batteries and a charger, and they give good battery life to boot.

Ultimately, the Canon PowerShot A40 offers better value for money, but the Cyber-shot DSC-P71 should be high on your shortlist if you want a 3.3-megapixel camera and slightly better image quality.

PC PRO RATINGS
OVERALL
114
QUALITY 121 | FEATURES 120 | VALUE 105
100 IS THE AVERAGE

Bailey on digital photography

The top British artist puts you in the picture



DIGITAL DILEMMAS

● *How and when do you use digital photography?*
One reason we use digital at the moment is because of X-rays. It's basically a backup in case the film gets X-rayed at the airport and ruined. It's a drag, as you've always got to take a laptop with you whenever you go on location, but it's a good backup.

● *How do you store your digital images?*
We burn them onto either CD or DVD when we're on location because the hard disk probably wouldn't be large enough for a location shoot with a lot of professional-quality images. We don't do any editing while we're shooting – we just save the images and don't usually use them unless there's something wrong with the film. Touch wood, nothing's ever been wrong with the film, even with X-rays, but it's good to have the backup, just in case.

● *Do you think digital will replace film in the future?*
I don't think it's a foregone conclusion, although it's going to keep growing. Most amateurs use digital because it's so convenient. On the other hand, as long as there's Kodak, Ilford and Agfa there will still be film. Film and digital photography offer different qualities and have different advantages. There's still something nice about getting pictures back from the chemist.

● *People are always comparing the quality of film and digital images. What are your thoughts?*
One isn't better than the other – one's just a better quality, but they both have a place. If I were a catalogue or a food photographer, I'd shoot in digital all the time. I've been using digital since it first came out, just not for all my work.

● *What's holding the digital scene back?*
I think the price is stopping a lot of people. The new Canon with 11 million pixels is expected to be £8,000 or so, which is a lot for someone who doesn't do photography for a living. I think the low-end cameras have got to be quicker at taking the image. At the moment, they're like when auto-focus first came out on film cameras. They muck about before they actually take the image and then the moment's gone. As soon as they get that right – which I guess will be in the next generation – there'll be no point in not using digital if you're an amateur.

● *How much emphasis should people put on lens quality and what should they look for in determining how good a lens might be?*
It's very important. You can tell simply by the price. If two lenses say they have the same specification and one is £1,500 and the other's £400, the first one's going to be a lot better.

● *To what extent should a digital zoom influence a purchase?*
I never use a digital zoom. When you try and make the image larger than it actually is, you're going to lose quality. It depends what you want, but digital zoom is nowhere near the same quality as optical.

● *How many megapixels would you recommend as a minimum?*
I'd be looking at around 10 million pixels, but that's what I'd need for professional work. I haven't really used the lower-resolution cameras aimed at amateurs.

● *What aperture range and shutter speed range should people be looking for? Is it important that these can be set manually?*
An aperture range of between f2 and f22 is ideal and you need from Bulb (open) to 1/10,000th of a second shutter speed.

● *How does digital ISO compare with film ISO?*
There doesn't seem to be much difference between 100 and 800 on digital, at least on the high-end cameras. Again, I don't know about the 'toy' cameras. They're certainly getting closer to being on an equal footing.

● *How can digital photographers counter digital 'noise'?*
The only real way around it is to use the best quality equipment.

● *What creative controls should you be looking for when buying a digital camera and why/how would you need them?*
I'd never use automatic settings, so I think as many controls as possible are a must. There are ways of altering the image with curves and levels that give you more control and better quality. But all that creative stuff is rubbish – if it looks good it's okay, and if it doesn't look good it's not okay.

● *How do you get a narrow depth of field on CCD?*
There's the option of shooting wide open using as wide an

aperture setting as possible. But you can always create the effect afterwards with layers using editing software. You can make the background blurred and bring out what you want. But it's best not to mess about with the original image. Always save the original image and then work on a copy.

● *To what extent would you encourage image editing with computer software and how does this affect the end image quality?*
Editing is editing. What's most important is the quality of the original image. I wouldn't be worried about how I'm going to print or edit – more what I'm going to print. As long as you save a copy of the original image before you start mucking around with editing there shouldn't be a problem.

● *Are there any differences in lighting techniques that people should consider when moving to digital?*
In a way, digital is more forgiving than film on lighting because it's easier to play with it afterwards.

● *What are the most common mistakes you see as people make the transition from film to digital photography?*
Because so much of photography is really about the picture, digital is just another paintbrush and you tend to see the same mistake of poor composition, subject and lighting.

● *How much impact would the use of a tripod make when using a digital camera?*
It depends on the subject, but it's just as important in digital photography as it is with film.

● *What are the pros and cons of using the LCD instead of the viewfinder?*
I never use them – I always look through the viewfinder as I find it easier. The LCD does, however, help to show you that things are working okay.

● *How do you deal with monochrome photography in digital?*
Shoot in colour and then change it in Photoshop. That's really the only way.

PRINTING PHOTOS

● *What attributes would you be looking for in a printer for digital photography?*
Obviously, you want good quality, but the most important thing to professionals is often speed. Some printers can take more than 16 minutes to knock out a quality image, while others can print in four minutes. That makes a big difference.

● *What are the printing differences between film and digital?*
There's not too much difference. It's all got to go through the computer.

● *What resolution is best for printing and for email?*
You want the highest resolution possible, but email can restrict the size of files you can send so you might have to compromise.

This interview was conducted by Stewart Mitchell, with thanks to David Bailey's sponsor, Lexmark.

Capture your memories

Image quality is paramount, but you also need to consider file size and storage, both on the camera and on your PC. Stewart Mitchell explores the options

As CCD improvements push the megapixel count upwards, the format you choose for mobile storage is becoming increasingly important and may even effect your choice of camera. Most cameras in the group test only accept one form of media, so think before you buy.

You'll almost certainly need to buy new media when you start using your camera, as the card supplied generally offers a bare minimum of storage. Take a few pictures at maximum resolution and you'll soon find you're full. You'll have a few considerations to make when it comes to storage media. Price per MB, maximum storage and roadmap lifespan are all important considerations. So what are your options?

COMPACTFLASH TYPES I AND II

Be aware: cameras that take CompactFlash Type II also accept Type I, but cameras designed for Type I won't work with the newer version. Generally regarded as having the highest capacity of removable storage media on the market, CompactFlash can already store up to 1GB and the roadmap has its sights set on 2GB within months. CompactFlash is also favoured for its speed, as it's faster than the other standards. This storage media is even good value for money, as popularity has brought prices down.

SMARTMEDIA

Generally slightly slower than other cards, with delay estimates varying from milliseconds to two or three times slower than CompactFlash, depending on the manufacturer and model. Being an old media, though, SmartMedia has the advantage of being cheap and uses minimal power. Maximum card size 128MB.

MEMORY STICK

Originally only used in Sony products, Memory Stick is slowly gaining popularity, although prices are similar to SD, rather than the cheaper CompactFlash. It's mid-range in terms of speed and presently has a maximum card size of 128MB.

SD/MMC CARDS

Almost as fast as CompactFlash, SD cards currently go up to 128MB, but it's a new technology so that will increase over time. The price – almost twice that of CompactFlash – should come down as the technology matures.

CD/DVD

Your other option is to carry a laptop (preferably with a CD or DVD burner) for storing images on its hard disk. There are dangers, though. Your data isn't as secure when it comes to physical abuse (such as dropping your camera bag), and thieves are more likely to target computer equipment than media cards.

SAVING IMAGES ON YOUR PC

Obviously, for editing and printing purposes you need to transfer your pictures to your PC, but there are several considerations when it comes to choosing a file format. The most popular debate lies between JPEG and TIFF (other choices include PNG and GIF), and a full comparative argument would take more space than is available here.

It's safe to say that many amateurs would be happy with JPEGs for most situations, because lower file sizes means they're easy to manage and transfer by email or to use on websites. Through high compression, JPEGs reduce file size considerably.

However, if you're looking at the quality of picture for editing rather than usability, JPEG is frowned upon by perfectionists as it's a 'lossy' format, which means some pixel information is lost during compression. When enlarged and examined, the fussier user will notice image degradation and pixellation.

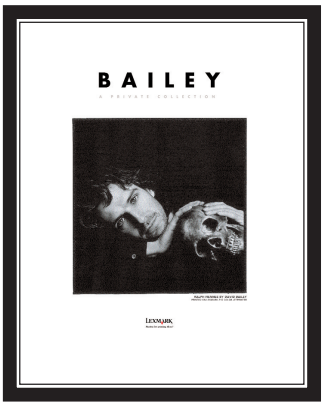
The simplest way around the problem is to use TIFF, which is lossless, but produces much larger files. TIFF uses 8-bit colour depth, equating to 3bytes for each of the red, green and blue channels. Total file size will be 3 x vertical resolution x horizontal resolution in bytes. The logical solution is to save a pre-edit master copy in lossless TIFF and use JPEG for editing and distribution.

Some cameras (like the Canon PowerShot S40) allow you to take uncompressed images to extreme levels using their RAW mode, which means you're working with raw data from the CCD before any processing algorithms have been applied. Excellent quality images result, but massive file sizes can become a burden, even with manufacturers' proprietary compression.

PAINTING A PICTURE

The technology can only take you so far, and when you're dealing with heavyweight storage issues it's important not to lose sight of why you're taking pictures.

How you store the image to many people is less important than the picture itself. According to David Bailey, master of capturing character, the human aspect remains photography's most powerful weapon. These are his tips.



- Emotion is more important than composition.
- God only seems to use one light. So keep the lighting simple – less is more.
- Focus on one subject – don't try to be a jack of all trades.
- Always talk about the subject, not yourself.
- Get the background out of focus.
- Just because a picture was hard to get doesn't mean it will be good.
- The exotic is often right on your doorstep.
- Take reportage pictures – old ladies are always good subjects and you're less likely to get hit.
- Don't use digital manipulation just because you can – only use it when you need to.

FEATURE TABLE

	Canon PowerShot S40	Fujifilm FinePix F601 Zoom Premium Kit	Fujifilm FinePix S602 Zoom	Kyocera Finecam S4	Nikon Coolpix 4500	Nikon Coolpix 5700	Olympus Camedia C-4000Zoom	Panasonic Lumix DMC-LC5	Sony Cyber-shot DSC-S85	Toshiba PDR-3310
Overall score	99	96	108	100	107	103	104	84	105	98
Price* (inc VAT)	£424 (£498)	£390 (£458)	£466 (£548)	£313 (£368)	£449 (£528)	£739 (£868)	£322 (£378)	£511 (£600)	£415 (£488)	£319 (£375)
Supplier	internetcamerasdirect.co.uk 0870 745 1036	internetcamerasdirect.co.uk 0870 745 1036	internetcamerasdirect.co.uk 0870 745 1036	internetcamerasdirect.co.uk 0870 745 1036	internetcamerasdirect.co.uk 0870 745 1036	internetcamerasdirect.co.uk 0870 745 1036	internetcamerasdirect.co.uk 0870 745 1036	Jessops 0116 232 6000	dabs.com 0800 138 5182	dabs.com 0800 138 5182
Manufacturer's website	www.canon.co.uk	www.fujifilm.co.uk	www.fujifilm.co.uk	www.yashica.com	www.nikon.co.uk	www.nikon.co.uk	www.olympus.co.uk	www.panasonic.co.uk	www.sel.sony.com	www.toshiba.co.uk
Basic warranty	1yr RTB	1yr RTB	1yr RTB	1yr RTB	1yr RTB	1yr RTB	1yr RTB	1yr RTB	1yr RTB	1yr RTB
OPTICS										
Optical zoom	3x	3x	6x	3x	4.1x	8x	3x	3x	3x	3x
Focal length (35mm equivalent)	35-105	36-108	35-210	35-105	38-155	35-280	32-96	33-100	34-102	35-105
Aperture range	f/2.8-f/8	f/2.8-f/8	f/2.8-f/11	f/2.8-f/9.6	f/2.6-f/10.3	f/2.8-f/8	f/2.8-f/11	f/2-f/8	f/2.1-f/8	f/2.8-f/9.6
Shutter speeds (seconds)	15-1/1,500	3-1/2,000	15-1/10,000	8-1/2,000	8-1/2,300, bulb	8-1/4,000, bulb	16-1/1,000	8-1/1,000	8-1/1,000	8-1/2,000
Lens manufacturer	Canon	Fujinon	Fujinon	Kyocera Yashica-Zeiss	Nikkor	Nikkor	Olympus	Leica DC	Carl Zeiss	Kyocera Yashica-Zeiss
CCD AND RESOLUTION										
CCD megapixels (effective)	4.1 (4)	3.3 (3.1)	3.3 (3.1)	4.13 (3.95)	4.1 (3.87)	5.24 (4.92)	4.1 (3.9)	4.1 (3.9)	4.1 (3.9)	3.34 (3.14)
Captured bit depth	24-bit (30-bit in RAW)	24-bit	24-bit	24-bit	Not stated	36-bit	Not stated	Not stated	Not stated	24-bit
Maximum optical resolution	2,272 x 1,704	2,048 x 1,536	2,048 x 1,536	2,272 x 1,704	2,272 x 1,704	2,560 x 1,920	2,288 x 1,712	2,240 x 1,680	2,272 x 1,704	2,048 x 1,536
Other resolutions	1,600 x 1,200, 1,024 x 768, 640 x 480	2,832 x 2,128**, 1,280 x 960, 640 x 480	2,832 x 2,128**, 1,280 x 960, 640 x 480	1,280 x 960	2,272 x 1,520 (3:2), 1,280 x 960, 1,024 x 768, 640 x 480	2,560 x 1,704 (3:2), 1,600 x 1,200, 1,280 x 960, 1,024 x 768, 640 x 480	3,200 x 2,400**, 2,288 x 1,520 (3:2), 2,048 x 1,536, 1,600 x 1,200, 1,280 x 1,024, 1,024 x 768, 640 x 480	1,600 x 1,200, 1,120 x 840, 640 x 480	2,272 x 1,567 (3:2), 1,600 x 1,200, 1,280 x 960, 640 x 480	1,024 x 768
File format	JPEG (EXIF 2.1), RAW	JPEG (EXIF 2.1)	JPEG (EXIF 2.1), TIFF	JPEG (EXIF 2.1)	JPEG (EXIF 2.2), TIFF	JPEG (EXIF 2.2)	JPEG (EXIF 2.2), TIFF	JPEG (EXIF 2.1), TIFF	JPEG (EXIF 2.1), GIF (text mode), TIFF	JPEG (EXIF 2.1)
Number of compression settings	3	3	4	3	3	4	4	2	2	3
Video capture (format, audio)	AVI (Motion JPEG)	AVI (Motion JPEG)	AVI (Motion JPEG)	AVI (Motion JPEG)	QuickTime (Motion JPEG)	QuickTime (Motion JPEG)	QuickTime (Motion JPEG)	QuickTime (Motion JPEG)	MPEG-1	AVI (Motion JPEG)
Video capture resolution	320 x 240, 61 seconds; 160 x 120, 223 seconds	640 x 480, unlimited; 320 x 480, unlimited	640 x 480, unlimited; 320 x 480, unlimited	320 x 240, 15 seconds	320 x 240, 35 seconds	320 x 240, 60 seconds	320 x 240, 33 seconds	320 x 240, 160 seconds	320 x 240, unlimited	320 x 240, 15 seconds
MEMORY										
Technology	CompactFlash Type I & II, Microdrive	SmartMedia	SmartMedia, Microdrive, CompactFlash Type I & II	SD/MMC	CompactFlash Type I & II, Microdrive	CompactFlash Type I & II, Microdrive (512MB and 1GB only)	SmartMedia	SD/MMC	Memory Stick	SD/MMC
Memory supplied (MB)	16	16	16 (SmartMedia)	16	16	32	16	32	16	16
Photo capacity (highest quality)***	4 (RAW), 7	6	0 (TIFF), 6	6	1	2	1	2	4	7
Photo capacity (lowest quality)***	165	33	33	60	229	459	114	236	118	54
SHOOTING MODES										
Time to ready (seconds)	4.3	2.3	3.7	5	4.7	5.2	6.7	2.8	6.4	5.1
Continuous shooting (number of frames, fps)	5, 2.5fps; 9, 1.5fps	4, 5.7fps; 40, 1.3fps (1,280 x 960)	4, 5.7fps; 40, 1.3fps (1,280 x 960)	✖	70, 30fps	3, 3fps	5, 1.4fps	8, 4fps	3, 1.8fps	✖
Self-timer	✔	✔	✔	✖	✔	✔	✔	✔	✔	✔
Panorama assist	✔	✖	✖	✖	✔	✖	✔	✖	✖	✖
CONTROLS AND FUNCTIONS										
Focus method	Auto 3 point, manual	Auto, AF area, manual	Auto, quick auto, AF area, manual	Auto, manual	Auto, manual	Auto, manual	Auto	Auto, manual	Auto, manual	Auto, manual
Focus assist lamp	✔	✖	✖	✖	✖	✖	✖	✖	✔	✖
Shutter-priority mode	✔	✔	✔	✖	✔	✔	✔	✔	✔	✖
Aperture-priority mode	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Full manual exposure	✔	✔	✔	✖	✔	✔	✔	✔	✔	✖
Exposure compensation	+/- 2EV	+/- 2EV	+/- 2EV	+/- 2EV	+/- 2EV	+/- 2EV with bracketing	+/- 2EV with bracketing	+/- 2EV	+/- 2EV with bracketing	+/- 2EV
Light-metering modes	Evaluative, centre weighted, spot AF	Multi, average, spot	Multi, average, spot	Evaluative, centre weighted, spot	256-segment matrix, centre weighted, spot, spot AF	256-segment matrix, centre weighted, spot, spot AF	iESP, spot	Multipattern, centre weighted, spot	Centre weighted, average, spot	Evaluative, centre weighted, spot
Manual white balance setting	✔	✖	✔	✖	✔	Fine tunable	✔	✔	✔	✖
Equivalent ISO rating	50-400	160-1,600	160-1,600	100-400	100-800	100-800	100-400	100-400	100-400	100-400
Manual ISO selection	✔	✔	✔	✖	✔	✔	✔	✔	✔	✔
Integrated flash (modes)	Auto, red-eye reduction, fill in, off	Auto, red-eye reduction, fill in, off, slow sync	Auto, red-eye reduction, fill in, off, slow sync	Auto, red-eye reduction, fill in, off	Auto, red-eye reduction, fill in, off, slow sync	Auto, red-eye reduction, fill in, off, slow sync, right mode	Auto, red-eye reduction, fill in, off, slow sync	Auto, red-eye reduction, fill in, off, low sync, rear/front curtain	Auto, red-eye reduction, fill in, off	Auto, red-eye reduction, fill in, off
Macro mode focus range (cm)	10-80	20-80	1-80	17-60	2-30	3-infinity	2-80	6-50	4-20	12-55
Macro area covered (mm) (H x W)	96 x 72	90 x 68	75 x 56 (31 x 23 in super-macro)	34 x 26	16 x 12	36 x 27	71 x 53	110 x 83	68 x 51	34 x 26
PHYSICAL FEATURES										
Viewfinder	Optical	Optical	Electronic, 180,000 pixels	Optical	Optical	Electronic, 180,000 pixels	Optical	Optical	Optical	Optical
LCD (size, pixels)	1.8in, 120,000	1.5in, 110,000	1.8in, 110,000	1.5in, 110,000	1.5in, 110,000	1.5in, 110,000	1.8in, 114,000	2.5in, 200,000	1.8in, 123,000	1.5in, 110,000
LCD/viewfinder coverage (%)	100/84	89/89	100/92	Not stated	97/80	97/97	Not stated	Not stated	Not stated	Not stated
Separate status LCD	✖	✖	✖	✖	✖	✔	✖	✔	✔	✖
Add-on lenses	✖	✖	✔	✖	✔	✔	✔	✔	✔	✖
Remote shutter connection	✖	✖	✖	✖	✔	✔	✖	✖	✖	✖
Hot shoe for external flash	✖	✖	✔	✖	Proprietary connection	✔	Proprietary connection	✔	Proprietary connection, cold shoe	✖
Weight with media & batteries (g)	300	250	600	200	374	512	400	450	410	200
Dimensions (mm) (W x H x D)	112 x 42 x 58	72 x 93 x 34	121 x 82 x 97	91 x 57 x 32	130 x 73 x 50	108 x 76 x 102	110 x 76 x 70	128 x 82 x 63	117 x 71 x 64	91 x 57 x 32
Connection type	USB	USB	USB	USB	USB	USB	USB	USB	USB	USB
BATTERY AND ACCESSORIES										
Battery type	1 x lithium ion	1 x lithium ion	4 x AA	1 x lithium ion	1 x lithium ion	1 x lithium ion	4 x AA	1 x lithium ion	1 x lithium ion (InfoLITHIUM)	1 x lithium ion
Charger included	✔	✔	✖	✔	✔	✔	✖	✔	✔	✔
AC adaptor included	✖	✔	✖	✔	✖	✔	✖	✔	✔	✔
Main software supplied	ArcSoft PhotoImpression, ArcSoft VideoImpression, ZoomBrowser EX 3.3, PhotoRecord 1.4, PhotoStitch 3.1	FinePix Viewer, DP Editor, ArcSoft VideoImpression, Adobe PhotoDeluxe HE 4	FinePix Viewer, DP Editor, ArcSoft VideoImpression, Adobe PhotoDeluxe HE 4	PIXELA ImageMixer, ArcSoft PhotoBase for Palm	Nikon View 5, Nikon PhotoStation Easy, Adobe Photoshop Elements	Nikon View 5, Nikon PhotoStation Easy, Adobe Photoshop Elements	Olympus Camedia Master 4	ArcSoft PhotoImpression	MGI PhotoSuite 8.1, MGI PhotoSuite 3 SE, MGI VideoWave 3 SE	Sierra Imaging Image Expert
Carry case	✖	✔	✖	✖	✖	✖	✖	✖	✖	✖
Lens cover	Sliding	Built in	✔	Built in	✔	✔	✔	✔	✔	Built in
Other	Wrist strap, video cable	Wrist strap, cradle, video cable	Neck strap, video cable	Wrist strap, video cable	Neck strap, audio/video cable	Shoulder strap, audio/video cable	Shoulder strap, video cable	LCD hood, shoulder strap, audio/video cable	Shoulder strap, lens cap strap, audio/video cable	Wrist strap, video cable

*Prices were correct at time of going to press. **With interpolation. ***With memory supplied.

Canon PowerShot S40

PRICE £424 (£498 inc VAT) SUPPLIER www.internetcamerasdirect.co.uk

VERDICT **What marks the S40 out from the rest is its tiny body, making it the perfect everyday companion. And it's matched by good image quality and features too.**

The S40 is an evolution of Canon's previous 'S' series cameras, the S10 and S20. It almost falls into the ultra-compact category, making it ideal for carrying everywhere with you. The blue metal casing looks good and build quality is excellent – the sliding lens cover protects the lens well. Hidden away inside is a 4-megapixel CCD, while the 3x Canon optical zoom lens gathers the light.

With a good range of manual controls, the S40 is well suited to those who want to grow into their camera. Aperture priority, shutter priority and full manual modes feature on the control dial, along with several preset 'scene' modes for taking quick shots in different circumstances. Unlike the manual-focus modes on some cameras, the S40's is very responsive and holding the button down brings up a handy distance meter.

Start-up time was fairly swift at 4.3 seconds, and we found the shot-to-shot times also quick in normal shooting. Only a 16MB CompactFlash card is included, but the official Microdrive support is good news, with the potential for 1GB of storage on one card.

The aperture range of f/2.8-f/8 is average on test – it's certainly not the fastest lens – but the wide shutter range of 15 seconds to 1/1,500 second makes the S40 extremely versatile. However, in full manual mode, we found that the range of selectable f-stops and shutter speeds was more limited than we'd have liked, and the minimum aperture of f/4.9 at telephoto meant the fastest shutter speeds weren't always available.

Image quality, though, was superb from such a small lens. The outdoor shots showed good resolution and saturation. Thanks to the evaluative metering mode, images were correctly exposed, in spite of the tough conditions in which we were shooting.

The S40 also provides comprehensive control over sharpness, brightness, contrast and saturation through the menus. Manual white balance is a welcome feature and helped to produce natural colours indoors. Again, resolution was seriously impressive, with the smallest text being readable. Flash performance was reasonable, although setting the white balance for flash is crucial to obtain the correct colours. In low light, the AF assist lamp proved invaluable for well-focused shots.

The S40's macro test was disappointing. The smallest area it could capture was 96 x 72mm, and this was at the widest setting, where barrel distortion was all too evident.

With its continuous shooting, movie and panorama stitch modes, the Canon is well featured, but it's outdone by others in this price bracket. At £424, the S40 isn't cheap, although its price may tumble in reaction to Canon announcing the S45.

PC PRO RATINGS
OVERALL
99
QUALITY 101 | FEATURES 98 | VALUE 98
100 IS THE AVERAGE

Fujifilm FinePix F601 Zoom Premium Kit

PRICE £390 (£458 inc VAT) SUPPLIER www.internetcamerasdirect.co.uk

VERDICT **A good selection of manual controls and features for the price, but the relatively poor indoor performance is disappointing.**

Fujifilm has retained its familiar upright design for the new F601 Zoom. It looks uncannily like the previous generation – the 4800 Zoom and 6800 Zoom – and still isn't the most ergonomic design we've seen. It's difficult to grip the camera firmly, so using the supplied wrist strap is essential.

The good news is that build quality is up to Fujifilm's usual excellent standard and there are lots of manual controls that – until the Olympus C-4000Zoom, which offers full manual control for £70 less – haven't previously been available at this price. The F601 Zoom uses the third generation of the SuperCCD and has 3.1 million effective pixels. As a result of the honeycomb pixel layout, a 6-megapixel image is generated for a maximum resolution of 2,832 x 2,128 pixels.

In our tests, we found the F601 could just about compete with the 4-megapixel cameras in this Labs, but the indoor shots highlighted the interpolation of the SuperCCD technology. Zooming in on the coloured balls reveals a strange mottling effect, but this isn't too noticeable from normal viewing distances.

Thankfully, these artefacts weren't as visible on the S602 (*see p111*). In spite of this shortfall, colours were vivid and the flash performance was good at this range. Macro ability wasn't great, with the F601 capturing a 90 x 68mm area – and significant barrel distortion at this wide angle was disappointing.

Outdoors, the F601 Zoom performed better, displaying superb colour accuracy without any detectable colour fringing. Skin tones were also accurate and generally images were correctly saturated and sharp. The automatic exposure mode produced respectable results, putting more expensive models to shame.

We appreciated the F601's fast shot-to-shot times and blistering start-up time of just 2.3 seconds. Two continuous modes allow you to take either four frames at 5.7fps at maximum resolution, or 40 frames at 1.3fps, but only at 1,280 x 960. Video clips are only limited to the memory capacity (a 16MB SmartMedia card is bundled) but the F601 has the advantage over most since it can capture at 640 x 480.

Another handy feature is the bundled cradle, which acts as a charger and USB connection for automatically downloading images. If you don't want to use the cradle, a separate USB cable is also supplied. One disadvantage is that you have to use the cradle for video output as there's no minijack socket on the camera.

Battery life was amazing. We never saw the low battery indicator throughout our testing, while other cameras had to be charged twice. But this isn't enough to make us recommend the F601; poor indoor results and awkward design rule it out of contention.

PC PRO RATINGS
OVERALL
96
QUALITY 98 | FEATURES 81 | VALUE 98
100 IS THE AVERAGE

Fujifilm FinePix S602 Zoom

PRICE £466 (£548 inc VAT) SUPPLIER www.internetcamerasdirect.co.uk

VERDICT **Excellent image quality, a good range of controls and a big zoom make the S602 Zoom our favourite this month.**

The FinePix S602 Zoom is the update to the 6900 Zoom, which won our last digital cameras group test (*see Labs, issue 86, p110*). Fujifilm has listened carefully to its customers' requests and has modified the 6900 Zoom to make it even better.

The major changes are a new CCD – the same as the F601 Zoom – which has 3.1 million effective pixels. There are now both SmartMedia and CompactFlash slots, plus support for the Microdrive. Sensitivity has been upped as well – the S602 is capable of ISO 800 and 1,600, albeit at 1,280 x 960 only. Long exposures up to 15 seconds are offered and, although only available in manual mode, the fastest shutter is an incredible 1/10,000 second.

Another boon is that the S602 uses AA batteries. Then there's the unlimited movie mode that allows you to capture as much footage at VGA as will fit in the available memory space – and at 30fps. Plus, the S602 has the same versatile continuous shooting modes as the F601.

Aside from these changes, the S602 keeps all the features we liked on the 6900 Zoom. The Fujinon 6x optical zoom lets you get closer than most cameras and there are all the manual controls you could want, including a focus ring.

We could go on and talk about the superb high-resolution electronic viewfinder (EVF) – 0.44in with 180,000 pixels – and the support for TIFF files, but we must cover image quality. Thankfully, it's fantastic. Outdoors is where the S602 shines – you only need to look at the photos on our website to see this is true. Metering is accurate, resolution excellent and colours vivid and natural.

Indoors, you can discern the interpolation artefacts caused by the SuperCCD, but it's not as bad as the F601. Colours remain accurate and flash performance is commendable too. Don't forget there's a hot-shoe for third-party flashguns as well. The new super-macro mode lets you get ridiculously close to your subject, but barrel distortion spoils images. The standard macro mode is respectable, capturing an area of 75 x 56mm.

The S602 isn't perfect. There's no AF assist lamp, so low-light focusing performance isn't great. At full wide, there's noticeable barrel distortion and slight pin cushioning is detectable at telephoto. Some people will also prefer a rechargeable lithium ion battery, as supplied with the Nikon Coolpix 4500, to the S602's AA solution.

Ultimately, though, the faults are outweighed by generally superb image quality. Add the 6x optical zoom, Microdrive support and huge range of manual controls, and the S602 is a superb buy at just £466.

PC PRO RATINGS
OVERALL
108
QUALITY 118 | FEATURES 104 | VALUE 101
100 IS THE AVERAGE

Kyocera Finecam S4

PRICE £313 (£368 inc VAT) SUPPLIER www.internetcamerasdirect.co.uk

VERDICT **It's the smallest 4-megapixel camera on test and produces quality photos, but the lack of manual controls is its stumbling block.**

Kyocera has continued to develop its Finecam range since we reviewed the Finecam S3 last year (*see Labs, issue 86, p110*). The S4 uses almost exactly the same design as the S3, but has a hidden pop-up flash rather than the S3's front-mounted unit.

The main changes are a 3x optical zoom against the older model's 2x, and a 4.13-megapixel CCD versus a 3.14-megapixel sensor. However, the features remain practically identical. You can set the white balance manually, select either f/2.8 or f/9.6 in aperture-priority mode and adjust the ISO sensitivity from 100 to 400. There's also a choice of spot, evaluative and centre-weighted metering, manual focus and long exposures up to eight seconds. However, shutter priority and full manual control are still missing, which is disappointing despite the price.

If you want to shoot moving subjects, the S4 is a bad choice since there are no preset scene modes either. We took plenty of shots of moving subjects and almost all were out of focus. In fact, the S4 appeared to have trouble focusing even on still subjects, as a number of our other test shots were also out of focus. This could be partially due to the camera's tiny dimensions, which made it difficult to hold the S4 still. That said, the shots that were in focus were rather good and a vast improvement over the S3.

In macro mode, the S4 captured an area of just 34 x 26mm and there was no detectable barrel distortion. Indoor shots showed that colour was the S4's strength, with good differentiation between the red and oranges in our test shot. Detail capture wasn't as good as we'd expect from a 4-megapixel camera, but the manual white balance control helped to give natural colours. Flash performance was also good, although whites turned slightly yellow and there was noticeably less light coverage at the edges of the frame.

Outdoors, the S4 performed surprisingly well and delivered neutral colours and realistic skin tones. Sadly, at wide angle, some barrel distortion was evident, though there was no detectable colour fringing. Our portrait shot again showed that the S4 lacks detail capture compared with other 4-megapixel cameras – this is particularly noticeable on hair, which tended to be fuzzy.

If image quality is your main priority, the Olympus C-4000Zoom is a more tempting proposition. For only £9 more, it produces notably superior photos. Where the Kyocera wins is for compactness. It's notably smaller than the Canon PowerShot S40 yet costs £111 less. If you don't mind some photos being out of focus, it's a good buy.

PC PRO RATINGS
OVERALL
100
QUALITY 100 | FEATURES 67 | VALUE 116
100 IS THE AVERAGE

Prints charming

We show you how to get the best prints from your digital photos

So you've chosen your digital camera and read David Bailey's tips on how to get the best results. However, shooting the pictures and storing them in the camera's memory is only half the story. What you do with them next could be the difference between a dramatic photo that brings your subject to life and a drab reproduction that could have been taken by any basic 35mm compact.

EDITING

One of the main benefits of digital photography is the ability to edit your photos before printing. If your editing package supports it, we recommend stretching the histogram to ensure that the image covers the whole luminosity range. This will lighten dark images and vice versa. Once you've retouched an image, it's also crucial to ensure that it's in the optimum format for printing.

The camera (and PC) sees an image in a very different way to a printer. Cameras and monitors work in ppi (pixels per inch) and printers work in dpi (dots per inch).

While your printer may be capable of resolutions of almost 3,000dpi, you don't need to adjust your image to 3,000ppi. As standard, most images will be stored with a resolution of 72ppi. All images in *PC Pro* are printed at 225dpi, and we recommend you boost the resolution to around this figure for the best quality. Many people are happy with the quality at just 150dpi, but printing images at varying resolutions on your specific printer is the only way to determine the ideal resolution for your setup.

The higher the dpi, the smaller the maximum print size becomes. You can work out the maximum size an image can be printed at by dividing the number of pixels horizontally or vertically by the target dpi. For example, suppose a camera has a maximum image size of 2,048 x 1,536. At 200dpi, you can print a 9.1 x 6.8in image from this camera.

On the feature tables (*see p82 and p102*), you'll find the file formats supported by each camera. The most common is JPEG, using the EXIF 2.1 standard. This stores information about the image only. JPEG EXIF 2.2, found in only the newest cameras, also stores information about the camera such as data on the shooting conditions and processing information during shooting.

For example, the exposure mode, white balance, flash mode, subject distance and exposure time is stored for the conditions. Other information includes whether digital zoom or any special effects – like sepia – were used, as well as sharpness, contrast and saturation settings. The extra data can then be used by printers that support EXIF 2.2 to allow them to adjust the image for the optimum printout.

Of course, if the camera supports uncompressed CCD capture, this will provide the best quality possible. You'll need plenty of storage though – a 4-megapixel camera will generate an 11MB file for each raw image. Several cameras on test support TIFF files, but these are slightly different from a raw capture as they can include post-CCD processing such as sharpening.

PRINTING

While it's worth bearing file formats in mind, ultimately your printer will determine the quality of the print. Our advice on this point is simple – use the A-Listed Epson Stylus Photo 950. We'd also advise using it at its highest resolution of 2,880dpi. You might have to wait longer for your prints, but the results are worth it.

The paper you print on is also critical: Epson's Premium Glossy Photo Paper will give the best results. Inks and papers are chemically matched to give photo-quality prints that last. We've tried other types of paper in the 950, but the quality can degrade markedly.

Printing a traditional 6 x 4in print costs around 30p on the 950. The price is competitive as the printer supports roll paper with no margins, so no paper is wasted.

The advantage of using a colour inkjet is its immediacy. You also have complete freedom over the size of the print, while high-street stores or online services may limit you to just a few choices.

INKJET ALTERNATIVES

If you don't want to shell out on an expensive inkjet, you can send your photos to an online printing service. We covered Jessops' service in the last digital cameras group test (*see Labs, issue 86, p110*) and found that you really need the extra speed of a broadband connection (rather than a V.90 modem) to upload the large JPEG files.

Jessops' current price for a 6 x 4in print is 34p (postage is free) – comparable with the Epson 950 – and you're guaranteed the optimum quality, since the JPEG files are printed on the same printers used for 35mm prints. Bonusprint charges just 25p for 6 x 4in prints and adds 70p postage in the UK. Plenty of other companies offer similar services, including Fuji and Kodak.

Another solution is to take your memory card to a high street store, just as you would a film. Or, safer still, copy the photos onto a CD-R and take that in. As with online printing, you get all the benefits of film processing but can choose which photos you want to print rather than wasting any.

JIM MARTIN

Nikon Coolpix 4500

PRICE £449 (£528 inc VAT) SUPPLIER www.internetcamerasdirect.co.uk

VERDICT **Packed with manual controls, the 4500 is well priced and is capable of excellent image quality. Well worth considering if you don't need the Fujifilm S602's big zoom.**

The Coolpix 4500 is an evolution of the 950 and 995, its swivel body an established Nikon trademark. The 4500 retains the 4x optical zoom of the 995, but the actual lens is a new design. The minimum aperture is a reasonable f/2.6 and relatively small f/10.3, but at telephoto the widest setting is a slightly slow f/5.1. But the main step up from the 950 and 995 is the new 4-megapixel CCD, which generates a maximum image size of 2,272 x 1,704 pixels.

Although the rear LCD viewfinder is now smaller at 1.5in, its effective anti-reflection coating and 110,000 pixels make it one of the clearest we saw in this test. Even outdoors in bright sunlight, it was still easy to see. Controls have been simplified and there's now a four-way direction 'stick' and control wheel, which makes navigation and selection easy.

The features score isn't a misprint – this camera is bursting with functions and controls. For example, a new scene mode lets you choose from 16 preset scenarios for the best results. These include a panorama assist mode – where the previous shot is overlaid on the viewfinder – and a double exposure mode for the ultimate in creativity.

The 4500 uses the same lithium ion battery as the 5700, which helps to keep the overall size and weight down, but we weren't overly impressed by battery life. This will get even worse if you buy a Microdrive too, but it's good to see official support for this now. However, only a 16MB Type I card is bundled.

Those upgrading from the 950 or 990/995 will appreciate that the 4500 supports all their add-on lenses. Plus, a new white LED adaptor helps the lighting of small subjects when taking macro shots. What's more, the 4500 had by far the best macro performance on test. It managed to capture an area just 16 x 12mm and was so sharp that we could see the paper fibres in the bank note we photographed.

Indoor performance was respectable, although we found that under incandescent light, oranges tended to fade to red. Resolution and white balance were good though. Outdoors, the 4500 put in an admirable performance. Colours were neutral and metering excellent. Only a slight amount of barrel distortion was detectable at full wide. Resolution wasn't quite as impressive as the 5700 or Fujifilm S602, but images remained some of the best we saw.

As the 4500 costs £17 less than the S602, it was a close match between the two. The S602's larger zoom, electronic viewfinder and slightly better image quality outdoors helped it to win this Labs. However, the 4500's smaller dimensions, better macro performance and extra features make it a superb alternative.

PC PRO RATINGS
OVERALL
107
QUALITY 103 | FEATURES 135 | VALUE 107
100 IS THE AVERAGE

Nikon Coolpix 5700

PRICE £739 (£868 inc VAT) SUPPLIER www.internetcamerasdirect.co.uk

VERDICT **An impressive package that delivers terrific image quality and plenty of control, but it's too expensive compared with the competition.**

We've already covered the Coolpix 5000 (*see Reviews, issue 91, p133*), and the 5700 represents a step up to the top end of the prosumer scale. It includes a huge 8x optical Nikkor zoom lens and has a 5-megapixel CCD for a top resolution of 2,560 x 1,920.

It uses the same great high-resolution electronic viewfinder as the Fujifilm S602 Zoom, and this proves much more useful than the small 1.5in flip-out LCD display – this is much smaller than we'd have liked. However, despite the big zoom, the 5700 is actually slightly smaller than the S602 Zoom, and almost 100g lighter. Build quality is faultless and the magnesium-alloy casing feels extremely sturdy.

As you'd expect, the Type II CompactFlash slot supports Microdrives, but only a 32MB card is bundled. A shoulder strap is the only other extra, although the software includes Nikon View 5 and Photoshop Elements, which helps to justify the high price. The 5700 offers the widest range of shutter speeds on test at 1/4,000 seconds to five minutes in bulb mode. The aperture range of f/2.8-f/8 isn't so remarkable though.

At first, the 5700's controls are slightly overwhelming, but they quickly become intuitive. The manual controls are more comprehensive than any other camera on test, and the three user-programmable modes are handy if you regularly shoot in similar conditions.

Image quality was as good as expected. The macro performance was particularly surprising considering the large zoom lens, capturing a tiny 36 x 27mm area. Indoors, images were super-sharp (as we've come to expect from Nikon), but oranges tended to turn out redder than we'd have liked. However, there's good control over white balance and saturation.

Outdoors, the 5700 accurately captured skin tones, but we found that skies were blown out to white more than other cameras. Control over AF points and exposure is second to none, and using such advanced features will combat the automatic mode's shortcomings. Barrel distortion was almost unnoticeable at wide angle, which is helpful since some users will be disappointed at the absence of the wide 28mm setting of the Coolpix 5000. The 5700 supports add-on lenses, including a 0.8x wide-angle lens for £150.

Disappointingly, like the Fujifilm S602 Zoom, the 5700 doesn't have an AF assist lamp, leading to poorer low-light shots. The slow start-up time can also be frustrating. However, generally fast auto focus, shot-to-shot times and playback viewing is appreciated. Another nice touch is four separate screens worth of information when playing back a shot, including a histogram and all camera settings used.

All these extra features help to justify its extra cost, but the 5700 is only worth buying if you'll take advantage of them.

PC PRO RATINGS
OVERALL
103
QUALITY 108 | FEATURES 146 | VALUE 69
100 IS THE AVERAGE

Olympus Camedia C-4000Zoom

PRICE £322 (£378 inc VAT) SUPPLIER www.internetcamerasdirect.co.uk

VERDICT **At such an aggressive price, the C-4000Zoom should be top of your shortlist if your budget is tight.**

Take a quick glance at the specifications of the C-4000Zoom, and you'd be forgiven for thinking that we'd printed the wrong price. With almost all the advanced manual features you could ask for – bar manual focus – and a 4.1-megapixel CCD, £322 seems a small price to pay.

The body is mainly plastic, although the underlying casing is metal. This gives the C-4000Zoom a less solid feel than all-metal cameras, but at 400g it's no featherweight. Only alkaline batteries are included, but at least they're AA size for easy replacement.

A 3x optical Olympus zoom lens offers apertures from f/2.8 right up to f/11 and shutter speeds from 16 seconds to 1/1,000 second. You have full control over exposures and there are aperture- and shutter-priority modes as well. On the rear is a 1.8in LCD viewfinder, which is fairly crisp, but like others on test it would benefit greatly from a decent anti-reflective coating.

Menus are easy to navigate using the four direction buttons, but there are only five other buttons on the camera's body – Olympus prefers to hide options away in menus, such as the shutter- and aperture-priority modes. Another gripe is the slow start-up time of almost seven seconds – other cameras with extending lenses are quicker.

However, the C-4000Zoom has so many features that this seems a small issue. There's an exposure-bracketing mode, manual focus with a distance indicator, five white balance presets with a manual one-push mode and even a live histogram in shooting mode.

QuickTime movies can be taken at 320 x 240 and there's enough room on the included 16MB SmartMedia card for 33 seconds of footage. JPEGs are stored in the latest EXIF 2.2 format and you can also choose to save as uncompressed TIFF files.

Image quality outdoors was respectable, with good detail capture and realistic skin tones. However, the iESP metering system tended to overexpose the shots, leading to less saturated colours and almost burnt out the sky and our model's face in the landscape shot. No matter how many pictures we took, the results were always the same.

Indoors, resolution was extremely good and the automatic flash white balance worked well to give natural colours. The shot without flash showed a slight green tinge to yellows, but there was almost no detectable noise. The macro mode had only slight barrel distortion and was able to shoot an area of 71 x 53mm.

The image quality isn't as good as the Fujifilm S602 or Nikon 4500, but if you're on a tight budget and you need full manual control – and a 4-megapixel CCD – the C-4000Zoom is a good choice.

PC PRO RATINGS
OVERALL
104
QUALITY 96 | FEATURES 97 | VALUE 125
100 IS THE AVERAGE

Panasonic Lumix DMC-LC5

PRICE £511 (£600 inc VAT) SUPPLIER Jessops 0116 232 6000

VERDICT **There are many promising signs, including the Leica lens and 2.5in LCD, but disappointing image quality spoils this otherwise decent package.**

Our first impressions upon opening the LC5's box were mixed. We were excited to see the world-renowned Leica name on the large lens and the huge 2.5in LCD viewfinder (with an incredible 200,000 pixels). The design is another matter. Although build quality is excellent, it's quite a bulky design and, while some will love the traditional 35mm look, others will see it as dated.

The Leica lens is the fastest on test at f/2-f/2.5 at wide angle. It stops down to a reasonable f/8 and has an equally good range of shutter speeds from eight seconds to 1/1,000 second. We loved the implementation of manual focus; the ring around the lens barrel gives excellent feedback on the LCD and you don't feel the fly-by-wire effect given by other cameras.

Menus and controls are intuitive and an exposure meter appears in fully manual mode, ensuring you don't accidentally overexpose or underexpose a shot. The MegaBurst feature takes eight shots at 4fps, an impressive feat at the maximum resolution of 2,240 x 1,680, but the shot-to-shot time in normal mode is disappointing at around six seconds.

The LC5 uses a lithium ion battery and comes with an AC adaptor for in-camera charging. Our test unit had a faulty battery that wouldn't charge, so we couldn't judge battery life. A 32MB SD card is included; this technology is favoured by many manufacturers thanks to its diminutive size and large capacity (roadmaps suggest up to 4GB can be achieved).

While the specifications and superb lens hinted at fantastic image quality, we were disappointed with the results. In isolation, the images look okay, but our panel of judges concluded that something wasn't quite right.

Outdoors in bright conditions, the LC5 captured some very odd colours. We ensured that the processing settings were all set to standard, but skies had an odd green tinge, as did skin tones. In the portrait shot, we found a disappointing amount of noise and our model's skin appeared almost solarised or posterised. This could be down to a poor tonal range, but images also seemed to be too saturated. Plus, when taking the outdoor shots, we found the LCD difficult to see – mainly due to the lack of an anti-reflective coating – although the supplied lens hood helped counter this.

The indoor shots weren't particularly impressive either. White balance was slightly off in the flash shot, making colours too warm, and without flash they were cold and muddy. Macro performance was also disappointing, capturing an area of 110 x 83mm, with barrel distortion to boot.

The DMC-LC5 has issues that Panasonic needs to address before we can recommend it. But we look forward to the next version.

PC PRO RATINGS
OVERALL
84
QUALITY 72 | FEATURES 110 | VALUE 75
100 IS THE AVERAGE

Sony Cyber-shot DSC-S85

PRICE £415 (£488 inc VAT) SUPPLIER dabs.com 0800 138 5182

VERDICT **Great image quality, plenty of controls and good battery life make this an excellent alternative to the award winners this month.**

Sony doesn't have quite the same photography heritage as Nikon, Olympus and Canon in this Labs. Its prowess is displayed in the electronics industry and as such it wisely opts for Carl Zeiss lenses in its more expensive models.

The DSC-S85 is by no means a new product – we reviewed it in the last digital cameras group test (*see Labs, issue 86, p110*) where its image quality was highly rated. This was in part due to the high-resolution 4.1-megapixel CCD, but the fast 3x optical zoom lens, with an aperture range of f/2.1-f/8, also played a big role.

With a maximum image size of 2,272 x 1,704, the DSC-S85 can still keep up with most cameras in this Labs and it's packed with features. The 1.8in LCD has 123,000 pixels, giving images extra sharpness and detail in preview and playback. The 5x playback zoom, while not as large as the Nikon 4500's 6x, is still enough to check focus.

A 16MB Memory Stick is bundled, which can hold around 16 shots at maximum resolution. The InfoLITHIUM battery remains impressive, detailing exactly how many minutes of power are left – and you can expect around three hours of use even with the LCD on.

The range of controls can't compete with the two Nikons on test, but there are plenty of manual controls, and a good range of apertures and shutter speeds are offered in the full manual mode. There aren't many preset white balances, but the manual setting compensates for this.

Movies can be shot at 320 x 240 and the length is only limited to the capacity of the Memory Stick. Sadly, the continuous shooting mode only allows three shots to be taken.

Image quality overall is excellent as expected. In low light, the AF assist lamp ensures good focus and there's little noise at the higher ISO settings. Our indoor shots showed accurate colours and the flash performance was also respectable – the DSC-S85 offers three intensity levels for different situations. Detail capture, while not quite matching the best, is nonetheless still very good.

Outdoors, the Sony took superb pictures. Colours were vivid, skin tones authentic and tonal range on a par with the best. Metering was slightly suspect – shots tended to be underexposed – but some simple editing in Photoshop quickly fixed these problems. Our one criticism, which remains from last year, is barrel distortion at wide angle; this is most noticeable in the macro shot.

The Cyber-shot still has its flaws – like the Memory Stick compartment in the base of the camera and slow start-up time – but at £415 it's better value than last year. If your budget won't stretch to the Fujifilm S602 or Nikon 4500, the DSC-S85 is the next best option.

PC PRO RATINGS
OVERALL
105
QUALITY 107 | FEATURES 104 | VALUE 112
100 IS THE AVERAGE

Toshiba PDR-3310

PRICE £319 (£375 inc VAT) SUPPLIER dabs.com 0800 138 5182

VERDICT **Similarly priced to the higher resolution Kyocera, but with similar image quality this could be an attractive option if the price drops. Just beware of the lack of manual controls.**

Place the PDR-3310 and Kyocera Finecam S4 next to each other and you'll see an uncanny resemblance between the two. It's only on close examination that you find the Toshiba has a subtly different finger grip design on the front panel to the Kyocera.

Aside from this and a lower resolution CCD – 3.14 megapixels here – the two are identical. Both share the same 3x optical zoom lens (manufactured by Kyocera) and 1.5in, 110,000-pixel LCD viewfinder.

On the rear, menus are navigated by four direction buttons and a selection button – one of the simplest and most effective designs on test. Another dial switches between shoot, play and setup modes, and there are separate macro and flash buttons for quick access to these functions.

Unfortunately for Toshiba, we can level exactly the same criticisms at the PDR-3310 as for the Finecam S4. Without a shutter priority mode or full manual settings, it's difficult to take shots of moving subjects – the camera's automatic mode always seems to select a slower shutter speed than is required. Considering the PDR-3310 claims to have a fastest shutter speed of 1/2,000 second, it's a shame you can't force the camera to use it.

Another problem we found in testing was that the power and shutter buttons (both round push buttons) are too close together. Several times we switched the camera off instead of taking a picture.

Like the Kyocera, a 16MB SD card is included and this can store around seven shots at highest resolution. Again, there's no support for TIFF files or RAW CCD grabs. The movie mode is also identical, allowing AVI files to be shot up to 15 seconds long, but with no audio.

Image quality was hard to tell apart from the Finecam S4 – the lower resolution CCD doesn't make a huge difference to the resulting images. This is generally good news for Toshiba, as the S4 produced great images – when in focus, that is. Highlights include neutral colours outdoors, excellent indoor colours and good flash performance. In macro mode, the Toshiba was able to capture images measuring just 34 x 26mm – exactly the same as the Kyocera.

Playing back images to check for focus is frustrating as you can only zoom by 2x, but the camera is very quick in playback mode, as well as in general shooting. The start-up time of five seconds is rather tardy though.

There isn't much to choose between the Toshiba and the Kyocera, but unless the 3310's price drops there's no reason to choose the Toshiba. And bear in mind that you could buy the fully manual Olympus C-4000Zoom for just £3 more.

PC PRO RATINGS
OVERALL
98
QUALITY 99 | FEATURES 64 | VALUE 111
100 IS THE AVERAGE