GROUP test

Picture the planets

We review four planetary cameras for shooting the Solar System

WORDS: PETE LAWRENCE

Ever since astronomers recognised the astro imaging potential of desk-bound webcams, many of us have used their high frame rates to take fantastic pictures of the Sun, Moon and planets. Coercing webcams into looking down a telescope tube with a bit of modification was certainly a ground-breaking move, but things have come on apace since then.

This month we're looking at what those early home-modified webcams have evolved into: high-frame-rate colour cameras made specifically for use with a telescope. Both those early progenitors and today's specialised descendants work in the same way. You look at a planet through the churning air currents of Earth's atmosphere, so the planet's detail gets blurred and distorted. But by taking lots of still images of the planet in quick succession, there will be a few taken during still periods that look fairly sharp. Pull those out and add them together and magically, from the mush, a masterpiece emerges.

They're suitable if you're a beginner or at intermediate level because, unlike their monochrome equivalents, these colour planetary cameras don't require you to fiddle about with filters at the telescope. Plus there's less post-processing needed to get the finished result. In this *Group test*, we reveal which model produced the best pictures.

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How we tested

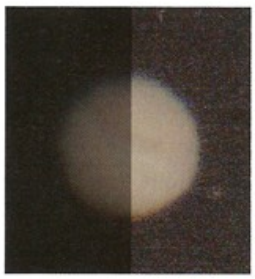
The four planetary cameras were tested using the same criteria: build and design, connectivity, ease of use, features and imaging quality. These criteria were given a percentage rating and the average was taken to give an overall score. The features we looked at included:

Colour

Mars, Jupiter and the Moon were on view at the time we were testing. We imaged each planet and assessed just how accurate the colours were. We also checked to see how well each device could cope with tricky surface detail.

Installation

Before you can do any imaging, the camera needs to be installed on a computer. We evaluated how easy it was to install each camera and whether or not it was simple to load up the camera's control software and get it working.



Noise

To find out the level of noise (electronic interference) that our four test cameras were picking up, we pulled their image capture sequences apart and looked at individual image frames to determine what should have been there, and what shouldn't.

Sensitivity

Imaging the planets is a compromise between frame rate and signal strength. High frame rates are all very well, but if the sensor is weak you get lots of frames with very little on them. We imaged the planets at high magnification to test this.

Software

The four cameras presented us with four very different control packages. After several weeks of use we were able to reach a conclusion on whether each camera's control software was up to the job, or more of a hindrance than a help.

The Imaging Source DFK 21AU04.AS

VITAL STATS

- **Price** £290
- **Chip** 0.25-inch CCD (Sony ICX098BQ)
- **Resolution** 640 x 480
- **Pixel size** 5.6 x 5.6 microns
- **Colour depth** 8-bit (24-bit colour)
- **Exposure range** 1/10,000s to 60mins
- **Connectivity** USB 2.0
- **System requirements** Windows 2000, XP, Vista; 800MHz processor; 128MB RAM; 20MB free disk space
- **Extras** USB cable, install disc, 1.25-inch adaptor
- **Supplier** Modern Astronomy
- **Tel** 0208 763 9953
- **www.**modernastronomy.com

A GREAT CAMERA with a terrible name, some would say the moniker of the DFK 21AU04.AS is useful because it describes the characteristics of the camera. But it hardly trips off the tongue.

Housed in a metal cube, the DFK has a very solid feel. One nice touch is a set of standard tripod screw holes along its base – useful if you want to fit a video lens and use it as a general-purpose colour video camera. The camera's driver is competent, while the control software's installation procedure is extremely well thought out and gave us no problems whatsoever.

The capture software, called IC Capture, provides excellent control over all the camera's functions via on-screen toolbars. These can be turned off and on as required, but if you turn the majority of them on, the clean interface of IC Capture can rapidly become quite cluttered and we felt that this might confuse a beginner.

One area that isn't particularly well explained is the use of the colour format and codec settings. These dictate how the camera delivers its images and how they're encoded into a movie file. Different combinations have different effects and, confusingly, some let you see colour output on screen but save video in monochrome.

CCD sensors tend to be a bit oversensitive to infrared (IR) light and this can upset colour balance and cause a loss of definition. DFK cameras have an IR blocking filter fitted over the sensor to stop this problem. The equivalent DBK range includes the same cameras with no IR filter fitted.

Colour co-ordinated

The camera's USB 2.0 connection allows it to generate 60 uncompressed 640x480 frames per second (fps). Like most colour cameras, the DFK 21AU04 has a monochrome sensor at its heart, but each pixel site on the sensor is covered by a red, green or blue filter in a repeating pattern called a Bayer matrix. A special process called 'debayering' analyses the relative intensities of the greyscale image filtered through the Bayer matrix to produce a full colour image. If the camera has to do this itself, its maximum frame rate is limited to 30fps. The IC Capture software gives you the option of turning debayering off in the camera, deferring the processing to your PC and allowing the camera to run at its full speed of 60fps. There are plenty of programs around that can do the debayering, including Registax.

We really liked using the DFK. Its comprehensive control software combined with great sensitivity made it an excellent tool for planetary, lunar and solar imaging. The camera produced excellent results on Jupiter, showing the planet's delicate colour variations well. It also fared extremely well on the Moon and recorded the subtle lunar colour with ease. Finally, it also gave the best results when we imaged the Sun through an h-alpha filter, capturing the subtle surface mottling.

We'd recommend the DKF 21AU04 if you're a beginner looking to move into more serious imaging, or you're more experienced but don't fancy messing around with a mono camera and filters.

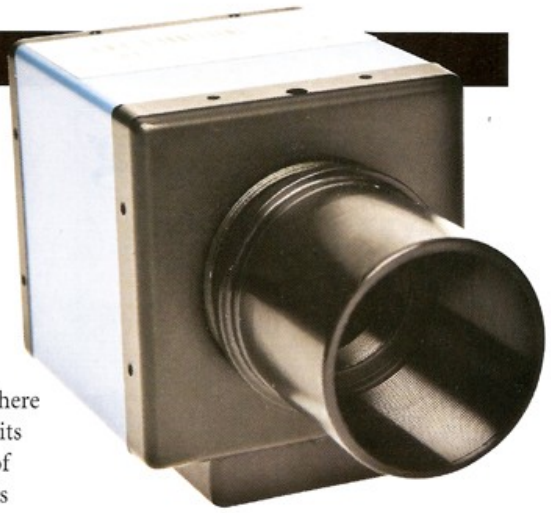
VERDICT

FOR Great camera control
AGAINST Confusing full control display

BUILD AND DESIGN	94%
CONNECTIVITY	91%
EASE OF USE	89%
FEATURES	91%
IMAGING QUALITY	96%
OVERALL	92%

OVERALL WINNER

The Imaging Source DFK 21AU04.AS



THE FOUR CAMERAS on test this month are all capable of producing some truly impressive pictures of the brighter planets, Moon and Sun. Taking the packages as a whole, the Meade LPI provides so much bonus software on its install disc that it was hard not to give it a suitably hefty 'Features' rating. The LPI's 'Connectivity' rating was helped by its ability to autoguide, but this was countered by its slow USB 1.1 connection. The NexImage also uses this slow USB connection and lost points because of it.

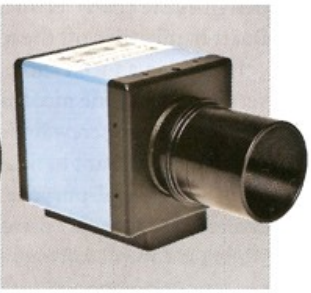
As these cameras are generally targeted at beginners and intermediate imagers, ease of use is an important factor. Again, the NexImage lost points in this category due to its use of AMCap control software. The QHY5V camera also took a knock here because of the slightly technical bias of its QGVideo32 control software and lack of documentation. The LPI fared better: its AutoStar Envision controls were pretty easy to get to grips with.

The top performer, though, was the DFK 21AU04.AS. Although the controls can look a little intimidating at first, the toolbars in IC Capture provided tremendous control over the camera's capabilities. Couple this with a high speed USB 2.0 connection and the ability to capture uncompressed raw frames at 60fps, and the camera came out a clear winner. Success does come at a price though – it's worth noting that the DFK is over three times the price of the cheapest camera on test, the Meade LPI.

NEXT MONTH

WE TEST SIX HIGH-POWER EYEPIECES WITH WIDE FIELDS OF VIEW

At-a-glance guide



MODEL	Celestron NexImage	Meade LPI	QHY5V	The Imaging Source DFK21AU04.AS
PRICE	£134	£84.99	£149	£290
CHIP	0.25-inch CCD	0.3-inch CMOS	0.3-inch CMOS	0.25-inch CCD
RESOLUTION	640 x 480	640 x 480	752 x 480	640 x 480
PIXEL SIZE	5.6 x 5.6 microns	8.0 x 8.0 microns	6.0 x 6.0 microns	5.6 x 5.6 microns
COLOUR DEPTH	8-bit (24-bit colour)	8-bit (24-bit colour)	8/10-bit (24/30-bit colour)	8-bit (24-bit colour)
EXPOSURE RANGE	1/10,000s to 1/5s	1/1,000s to 16s	1/1,000s to 1/10s	1/10,000s to 60mins
CONNECTIVITY	USB 1.1	USB 1.1	USB 2.0	USB 2.0
EXTRAS	Install CD, 2.13m USB cable, 1.25-inch eyepiece adaptor	Parfocal ring, USB cable, autoguider cable, RS-232 adaptor, AutoStar Suite CD	USB cable	USB cable, install CD, 1.25-inch adaptor
SUPPLIER	David Hinds	Telescope House	Modern Astronomy	Modern Astronomy
SCORE	78%	84%	86%	92% WINNER

ALL PHOTOS BY PAUL WHITFIELD