

Reviews

BRINGING YOU THE BEST NEW EQUIPMENT

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AN IN-DEPTH LOOK AT THIS MONTH'S HOTTEST NEW PRODUCT

THE IMAGING SOURCE

DMK 21AF04.AS mono CCD camera

Take your astrophotography to the next level with this affordable CCD camera

by Pete Lawrence

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The humble altaz mount's time has come

BY REVIEWS EDITOR PAUL MONEY



It's never been easier to fix up an imaging system to your scope. There's no need for it to be complex when you look at the astounding results that can be achieved with a simple off-the-shelf webcam. Still, there comes a time when the quest for greater detail means buying a CCD camera designed especially for astro imaging. But how do you go about investing wisely in one of these sophisticated pieces of equipment?

Discover solar imaging with The Imaging Source's new offering



month's *First light* over the page.

Once upon a time, telescopes came mounted on simple altaz mounts, which you adjusted around the altitude and azimuth axes. In those days of yore, equatorial mounts were often heavy and very expensive. These days it's a different story: most scopes come mounted on equatorial mounts, thanks to modern engineering making them lighter and cheaper. But the humble altaz mount hasn't been left behind. There are now a good number of altaz mounts that offer full Go-To capabilities.

Under the spotlight

The launch of The Imaging Source's new range of astronomy cameras gave us a chance to answer this question, so we lent one to our guru of night-time imaging, Pete Lawrence. It's the kind of equipment with which experienced imagers can take stunning views of the planets that are outstandingly crisp and highly detailed; views that just a decade ago would have been the preserve of well-equipped professionals.

Regular imagers have found a friend in the Lumenera SKYnyx camera, but with the introduction of The Imaging Source's cameras, it may well have a serious rival. The DMK 21AF04.AS mono CCD camera is also more affordable. You can read all about what happened when Pete took the DMK for a spin – including how it compared to the SKYnyx – in this

We took a selection of these Go-To altaz mounts, and the optical tubes they are sold with, to see if they were a good way of providing that Go-To ability without the hassle of setting up an equatorial mount. Find out how well they followed selected objects, and whether they were intuitive to use, in this month's *Group test* on p90.

First light: DMK 21AF04.AS

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Pete Lawrence test drives The Imaging Source's new CCD camera and puts it up against its biggest rival: the SKYnyx 2-0M

Group test

ALTAZIMUTH GO-TO SCOPES UNDER £1,000

Fast and slew

Paul Money aims four Go-To altaz scopes at the stars



Group test: Go-To altazimuth mounts

90

Paul Money aims four altaz Go-To mounts and their accompanying scopes at the stars to see which one you should invest in

Books



Books

Ian McClurg-Welland reviews *The History Of Astronomy*, **Patrick Moore** has a laugh with **Colin Pillinger's** *Space Is A Funny Place* and author **Marcus Chown** reveals his favourite reads

Meet the reviewers

THIS MONTH, OUR PANEL OF CONTRIBUTING EXPERTS INCLUDES...



PETE LAWRENCE
An expert in image processing and one of the UK's foremost astrophotographers.



PETER GREGO
Peter directs the lunar section of Britain's Society for Popular Astronomy.

First light

AN IN-DEPTH LOOK AT THIS MONTH'S HOTTEST NEW PRODUCT

THE IMAGING SOURCE

DMK 21AF04.AS mono CCD camera

Take your astrophotography to the next level with this affordable CCD camera. Imaging expert **Pete Lawrence** records the sky and assesses the results...

VITAL STATS

- ▶ **PRICE** €330 (£230)
- ▶ **DIMENSIONS** 50.6 x 50.6 x 50.0mm
- ▶ **WEIGHT** 265g (0.56lbs)
- ▶ **SENSOR** 1/4-inch CCD (Sony ICX098BL)
- ▶ **RESOLUTION** 640 x 480 (VGA), 8-bit, 5.6µm-square pixels
- ▶ **CAPTURE RATE** 3.75, 7.5, 15, 30 and 60fps uncompressed
- ▶ **CONNECTION** Firewire (8-30V power supplied through cable)
- ▶ **EXPOSURE** 1/10,000s to 60 minutes
- ▶ **SUPPLIER** The Imaging Source
- ▶ **TEL** 00 49 421 335 910 (Germany)
- ▶ **WWW** www.astronomycameras.com

When it comes to imaging the Sun, Moon and brighter planets, the long focal lengths and high magnifications required are often thwarted by the state of the atmosphere above your head. Pockets of air of varying temperatures and densities rush between your telescope and the object it's pointing at, ruining the view and blurring fine detail.

The DMK 21AF04.AS is a monochrome high frame-rate camera designed to capture those brief periods when the atmosphere appears steady between the wobbles. It does this by capturing lots of image frames at varying rates up to an

impressive 60 uncompressed frames-per-second (fps). By contrast, if you push a typical webcam over 10fps, frames start to compress and unwanted artefacts start to appear. Of the thousands of frames captured, only a small percentage contain those moments when the atmosphere is still, which is why the DMK 21AF04.AS has the edge over some rivals.

Box of tricks

The device is a robustly built cube with a C-mount threaded opening at the front and a Firewire port at the rear. An adaptor is included so that you can insert the camera into a 1.25-inch eyepiece holder. An additional adaptor is needed if you want to couple the camera to a T-threaded accessory such as a filter wheel. There's also a standard tripod thread provided in a mounting block on the bottom of the camera.

In order to operate the camera on our Windows-based laptop, which didn't have a Firewire port, we used a PCMCIA Firewire card. We also needed a separate power supply, plugged into the card, to feed the camera with the necessary power to make it work.

Two pieces of software were supplied with the 21AF04.AS; a

driver and a program called IC Capture.AS, which provide the user interface to operate the camera on our laptop. IC Capture.AS was easy to use with friendly controls. In no time we were capturing videos of various Solar System targets.

We tested the camera out on the Moon, Sun and Mars with impressive results on each. This is a highly sensitive, low-noise device capable of producing top-notch results. If you're upgrading from a basic webcam or simply want to jump in at the deep end of Solar System imaging, then it's hard not to recommend the 21AF04.AS. Factor in the remarkably low price tag, something that will make the purchase of a set of colour filters a little easier, and the DMK 21AF04.AS becomes a very desirable camera indeed. ☺

VERDICT

BUILD QUALITY	90%
EASE OF USE	92%
FEATURES	91%
RAW IMAGE QUALITY	92%
VALUE FOR MONEY	97%
OVERALL	92%

Sensor aperture

At the front of the camera an aperture, threaded for a C/CS mount, exposes the imaging sensor to the outside world. Screw in the supplied adaptor and the camera is ready to fit into any 1.25-inch astro-standard focuser or holder.

Camera body

The camera is well built and feels very robust. The inner workings of the device are protected by a cubic metal body that provides just two interfaces to the outside world: one to attach the camera to a telescope or lens and another to connect the camera to a computer via Firewire.

PC connection

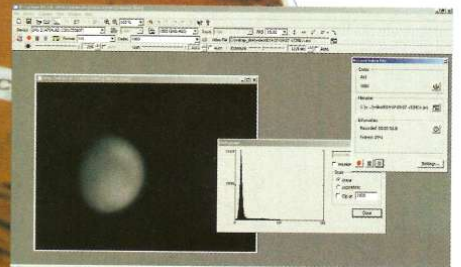
The camera needs a hefty PC connection to handle all of the data from its impressively fast, uncompressed frame-rate of 60fps. The Firewire port at the rear of the camera can transfer data up to 400Mb per second via a cable.

Sensor

A highly sensitive, low-noise, Sony ICX098BL CCD chip captures up to 60 640x480 uncompressed frames per second. It's also possible (via the IC Capture.AS software) to set a region of interest on the chip and only capture pixels in this rectangle. This is great for reducing the final file size, by cropping off regions that aren't needed.

Software

There are two programs to install from a CD-ROM: a camera driver and the main control software, called IC Capture.AS. Minimum recommended system specifications are an 800MHz processor, 128MB RAM and a 24- or 32-bit graphics card.



MORE OVER PAGE
THE DMK AND THE
SKYNYX COMPARED

First light

AN IN-DEPTH LOOK AT THIS MONTH'S HOTTEST NEW PRODUCT

CCD head to head

We put the DMK 21AF04.AS up against its closest rival, the SKYnyx 2-0M

If you're thinking of buying the DMK 21AF04.AS, you'll want to know how it compares to its main rival, the Lumenera SKYnyx 2-0M. Both devices offer the same resolution and maximum capture frame-rate, but the DMK is significantly cheaper than the SKYnyx, which costs €799 (£560). To discover more differences, we took each camera out for an imaging session.

Resolutions resolved

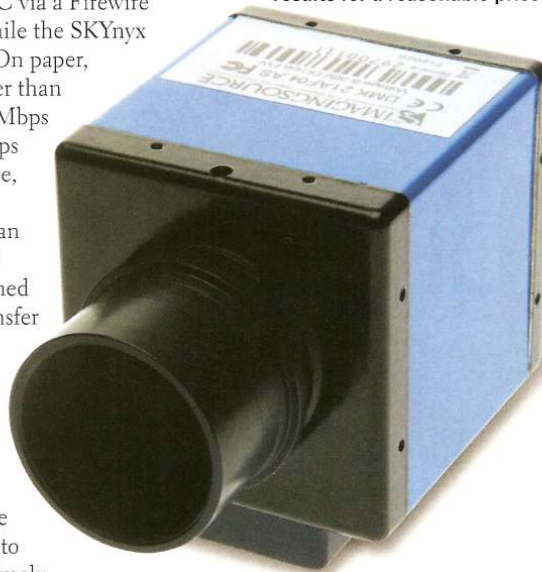
Both cameras operate at 640x480 resolution, but the SKYnyx has a 1/3-inch sensor with 7.4 micrometre pixels, while the 21AF04.AS's 1/4-inch sensor has 5.6 micrometre pixels. This has three main effects. First, it makes the SKYnyx's field of view larger, thanks to a smaller image scale for a given focal length. Second, the SKYnyx's larger pixels give it a higher sensitivity, since each pixel can catch more photons. And third, because the pixels catch more photons, it has a better signal-to-noise ratio.

Both are capable of generating large amounts of data very

quickly. The 21AF04.AS transfers this data to a PC via a Firewire connection, while the SKYnyx uses USB 2.0. On paper, USB 2.0 is faster than Firewire – 480Mbps against 400Mbps – but in practice, hardware differences mean that Firewire is better at sustained high-speed transfer rates.

For our imaging tests we started with a calcium-K PST solar scope at $f/20$, aiming to record an extremely faint calcium prominence. The feature was easier to image using the SKYnyx, and analysing the images showed that what we caught with the 21AF04.AS contained more noise. Moving on to Mars, both cameras showed excellent results at moderate focal ratios (a 350mm Schmidt-Cassegrain scope at $f/22$), but

The DMK produces great results for a reasonable price



The SKYnyx 2-0M can handle extreme focal ratios

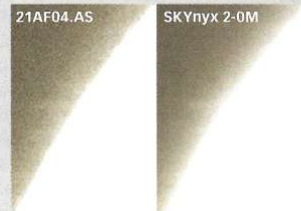


we felt that the SKYnyx had the edge when we pushed things to the extreme (the same telescope at $f/57$). We then imaged the bright targets of the Moon and the filtered Sun at moderate focal lengths. Both cameras produced very similar results.

It's only when these devices are pushed to the extremes of imaging that the superior signal-to-noise ratio and sensitivity of the SKYnyx begin to make a difference. Also bear in mind that the SKYnyx can capture 12-bit images (4,096 shades of grey) as opposed to the 8-bit image depth (256 shades of grey) of the 21AF04.AS. However, for most subjects you won't be able to notice the difference between an 8-bit capture and a 12-bit capture.

All in all the DMK 21AF04.AS and SKYnyx 2-0M are very evenly matched. It's only when you start using extreme focal ratios that the SKYnyx appears to just have the edge over its rival in terms of noise and sensitivity. ☼

SKYNYX VS DMK



A faint solar calcium-K prominence reveals noise and blue sensitivity differences between the two cameras



Little difference was observed between the cameras for bright sources like the Moon



Both cameras produced excellent results on Mars

DMK IN DETAIL



The 21AF04.AS performs well through a hydrogen-alpha PST



Lunar crater Plato captured under poor seeing with the DMK 21AF04.AS boasted fine detail