NEAR INSTANT GRATIFICATION The MallinCam SkyRaider DS16C is quick and easy to set up and use. On his very first night with the camera, the author was able to capture images of the Moon and several deep-sky objects from his light-polluted backyard.

WHAT'S IN THE BOX The MallinCam SkyRaider DS16C comes complete with 1¼- and 2-inch focuser adapters, a five-metre USB 3 cable and an ST4 cable that allows the camera to be used as an auto-guider for a separate camera. With no Peltier cooler to power, only one USB cable is required for the DS16C and its built-in cooling fan.

THE MALLINCAM SKYRAIDER DS16C

We test a new camera designed for both video astronomy and conventional imaging Text and images by MARC RICARD

MALLINCAM FOUNDER ROCK MALLIN was frustrated by how little of the deep sky was visible from his light-polluted backyard. Utilizing his background in electronics, he created a line of video cameras to allow city-bound observers like himself to enjoy detailed views of clusters, nebulas and galaxies. The company's recently introduced SkyRaider DS16C was designed to satisfy that goal—and more.

SkyNews arranged a loan of the DS16C, which I tested for this article. The camera is built to accommodate both real-time observing and imaging of deep-sky and solar system targets. In addition, the device can serve as an auto-guider, though it can't guide and image at the same time. Having never used a MallinCam camera before, I was eager to try this one to see how it would perform in my suburban yard.

Tipping the scales at 430 grams, the DS16C actually weighs less than some of my 2-inch eyepieces. The heart of the instrument is a 16.3-megapixel Panasonic vMaicovicon CMOS sensor, measuring 17.6mm by 13.3mm (4656 by 3518 pixels). That's roughly the same size as the venerable KAF-8300 CCD chip found in numerous imaging devices and only a couple of millimetres smaller than the APS-C-sized sensors typical of most basic DSLR cameras.

To the best of my knowledge, the DS16C is the only astronomical camera employing a vMaicovicon chip, which uses "micro colour splitters" instead of a conventional Bayer filter array to render colour images. According to Panasonic, this configuration yields a colour image twice as bright as one produced by a chip with a Bayer filter array.

SET UP AND GO

Setting up the SkyRaider DS16C was a breeze once its drivers and the MallinCam-Sky software were installed in my computer. All I had to do was screw in the focuser adapter, connect the USB cable and slip the camera into the scope's focuser. That's it. Thanks to the sensor's low thermal-noise characteristics, a separate Peltier cooler—and its associated power supply and cord—weren't needed.

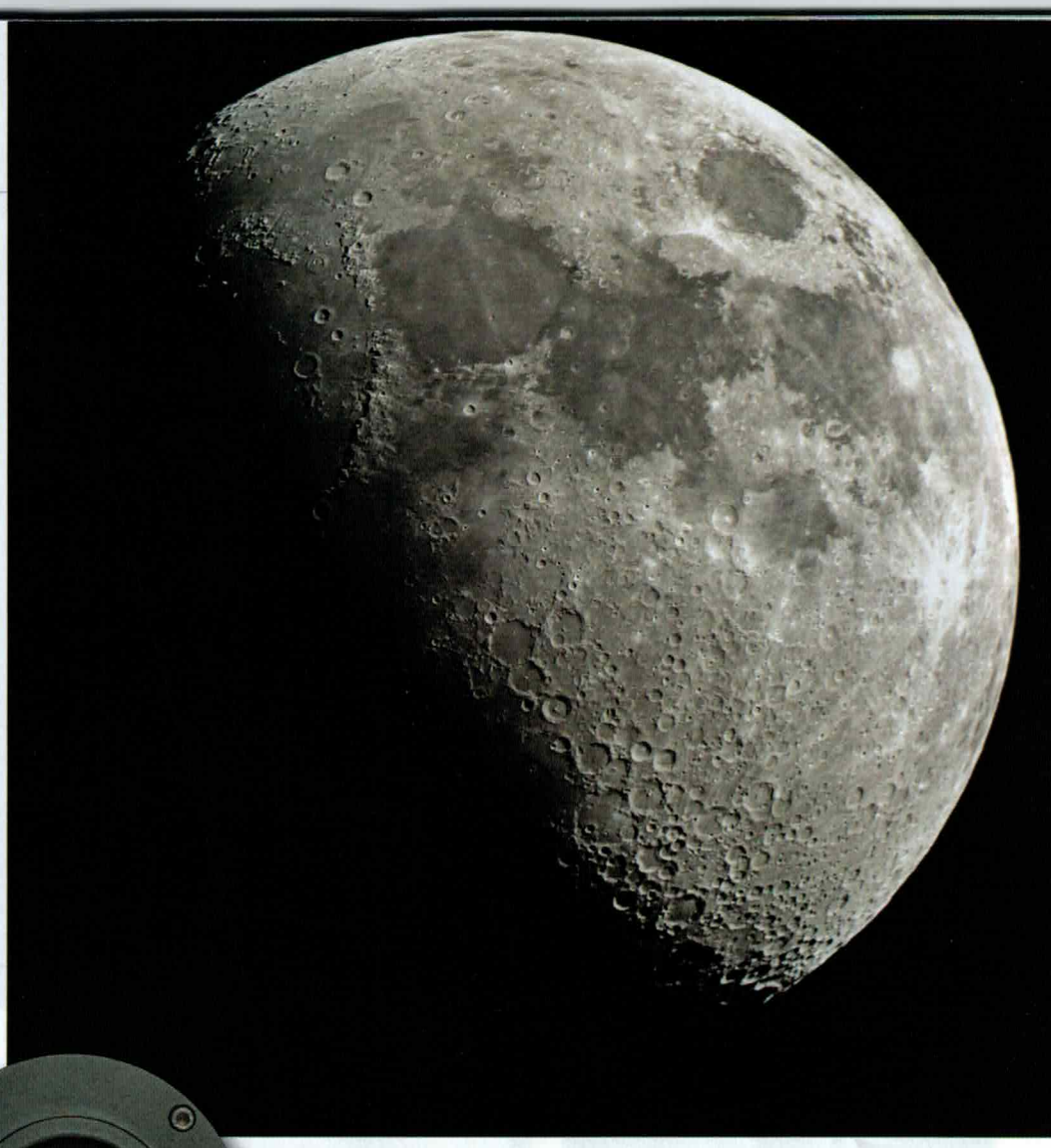
Operating the camera is straightforward. After I started up MallinCamSky and selected the DS16C from the camera list, images began displaying in the software's large video window. Image-capture controls are accessed by clicking on the appropriately named Capture and Resolution tab.

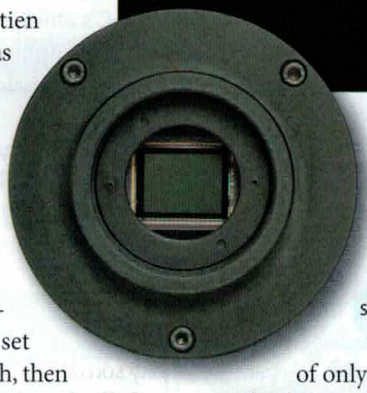
When first activated, the camera defaults to Video mode, which is primarily intended for lunar and planetary imaging,

since the maximum exposure time is just 5 seconds. (Longer exposures are acquired in Trigger mode.) I found that setting the gain to maximum and the exposure to 5 seconds was sufficient to allow me to focus my scope. Unfortunately, no on-screen aids, such as half-flux radius or full-width half-maximum, are provided to help achieve critical focus. Nevertheless, I was able to get good results by zooming in to 300 percent and eyeballing the displayed image.

As the Moon was well positioned for my tests, I centred it in my scope, reduced the camera's gain to zero and set the exposure to a minuscule 10 milliseconds. I was pleased to note that the camera's chip is large enough to accommodate the entire lunar disc despite the narrow field of view offered by my MallinCam VRC-8 8-inch f/8 Ritchey-Chrétien telescope. Less pleasing was the poor atmospheric seeing conditions, which made the Moon appear as if it was lying at the bottom of a swimming pool. Undaunted, I consulted the manual. I followed the simple step-by-step planetary workflow, set the resolution and bit depth, then specified the folder where I wanted the video sequence to be saved. All that remained was to click record. The resulting image, shown here, demonstrates what can be done with this unit even when conditions aren't ideal.

Next, I slewed my scope to the lovely 5.9-magnitude globular cluster M3, in Canes Venatici. With the scope still in video mode, I bumped up the gain and exposure values to their maximum, and in barely five seconds, the cluster materialized on my computer screen. Switching over to Trigger mode, I reduced the gain to 15 to prevent the brighter stars from becoming overexposed, then recorded a series of images. I was happy to discover that an exposure of only 60 seconds yielded a well-resolved image containing just a few faint coloured noise specks.





FIRST-QUARTER DETAILS By combining the 27 sharpest frames from a 60-second video sequence captured with the DS16C, the author created this image of the lunar disc. This technique produces good results even on nights with mediocre seeing conditions. Left: Seen in this front view, the 16.3-megapixel sensor of the DS16C is only slightly smaller than those found in many DSLR cameras. The MallinCam's 4656-by-3518-pixel ceramic CMOS sensor measures 22 millimetres diagonally and is protected by a multicoated optical window.

IMAGING ON THE FLY

All camera functions and image controls are easily accessed from the MallinCamSky drop-down menus located on the left sidebar. However, image adjustments are applied only when the captured image is refreshed. This took some getting used to, yet the software's capabilities proved to be a game changer when it came to noise suppression. By simply capturing a single 60-second dark frame and activating Dark Field Correction, the coloured noise specks in my images vanished. A real-time, flat-frame correction is also available, but unfortunately, only dark frames can be exported and imported for later use.

Additional adjustments can be performed by utilizing the software's Colour Balance, Histogram and Gamma drop-down menus. The software can even centre and combine images as they are recorded, thanks to the live-stacking feature. This did a great job of improving the signal-to-noise ratio in my shots. As a result of these capabilities, I spent more time imaging and less time postprocessing.

I've never had much luck imaging galaxies from my light-polluted backyard, so I was curious to learn what this camera could do with my scope working at f/6, courtesy of the optional MallinCam 0.75× focal reducer. When I targeted M82, in Ursa Major,

GREAT HERCULES GLOBULAR The well-known globular cluster M13 is easily resolved in this photo made using the DS16C and the author's 8-inch f/8 Ritchey-Chrétien reflector telescope. A total of 16, 30-second exposures were combined to create the final image.

BONUS ROUND Popularly known as the Ring Nebula, M57 is a visual delight for telescopes of all sizes. The ring's central star is a notoriously difficult target even in large instruments, but with the DS16C used on the author's 8-inch Ritchey-Chrétien telescope (working at f/6 with the focal reducer), it showed up on a computer screen after only 30 seconds. This image was made by combining 16, 35-second exposures. Right: MallinCam offers several different focal reducers as optional extras, including this 0.75× model (approximately $250) used by the author.

I was surprised to see its distinctive cigar shape and numerous irregular bright and dark patches appear on my laptop screen. Nice. Next, I slewed to the Ring Nebula, M57, in Lyra. With a single 30-second exposure, I was rewarded with a multi-coloured ring—complete with its faint central star. Wow!

It's fair to say that die-hard, deep-sky imagers seeking to push the limits of what can be captured amid city lights are better served by a monochrome CCD camera and a set of narrowband filters. But such a complex setup isn't for everyone. The DS16C's ability to quickly capture, process and stack images "on the fly" is truly remarkable. Although a similarly priced DSLR is a more versatile photographic tool, beginners might be discouraged by the effort required to capture a sufficient number of frames and the hours of postprocessing needed to achieve results comparable to those easily obtained using the DS16C. And if you're an observer whose scope has been languishing in the closet because of light pollution, I feel the DS16C's ability to show deep-sky objects under a compromised sky is worth the price of admission alone. ✦

Marc Ricard started imaging in 2002 with a simple webcam. Today, he uses a monochrome CCD camera to image the sky from his suburban backyard in Pointe-Claire, Quebec.

MALLINCAM SKYRAIDER DS16C

Approximate retail price: $1,820

www.MallinCam.net

Summary: An easy-to-use astrocamera that is ideal for real-time planetary and deep-sky imaging.

PLUSES

- Sensitive low-noise sensor
- Easy to set up and use
- Included software allows real-time image processing

MINUSES

- Flat-fielding feature doesn't let user save and import files
- Software lacks focusing aids