FIRST light

Astrel Instruments AST8300-A-M-FW
standalone CCD camera

A great camera if you don't want to have to take a laptop out observing

WORDS: PETE LAWRENCE

VITAL STATS

- **Price** £2,030
- **Sensor** KAF-8300 (monochrome), 3,326x2,504 pixels (8.3 megapixels)
- **Readout noise** 6e-
- **Pixels** 5.4μm square
- **Mounting** T-thread, M42x0.75
- **Extras** Foam-filled protective case, vacuum pump, battery power cable, power cable extension with car lighter plug
- **Dimensions** 126mm diameter, 70mm depth
- **Weight** 880g without filters or display
- **Supplier** Ian King Imaging
- **www.iankingimaging. com**
- **Tel** 01580 212356

SKY SAYS...
Noise control is excellent, with the already low readout noise of the chip further augmented by active cooling

The AST8300-A-M-FW is a standalone CCD camera from Astrel Instruments. It endeavours to combine the convenience of a DSLR with the superior imaging quality of a cooled astronomical CCD. Although you don't get the clean, evolved lines of a modern DSLR, you do get a more or less self-contained astronomical CCD capable of taking impressive deep-sky images. With an optional touchscreen display fitted, all you need is a 12V power source and you're mobile.

The camera uses a Truesense KAF-8300 CCD sensor which has a peak quantum efficiency (QE) of around 55 per cent at 550nm and 45 per cent at the hydrogen-alpha wavelength. QE measures how many incoming photons are converted to signal.

Noise control is excellent, with the already low readout noise of the chip further augmented by active cooling. This can reduce sensor temperature to 42°C below ambient to an accuracy of 0.1°C. With this accuracy it's possible to build a library of calibration dark frames indexed by temperature.

Such a large temperature reduction can promote frosting: water vapour in the air surrounding the sensor may freeze onto its surface. Astrel addresses this by providing a manual vacuum pump for evacuating the sensor chamber. Once evacuated, frosting can be avoided as long as the chamber remains at low pressure, which it should for at least a couple of days. As we discovered, the pump does require a strong grip action to achieve the recommended pressure.

Experiment with your setup

Various ports are presented on the camera's body, including two USB connections. External storage or an optional Wi-Fi dongle can be inserted here. The latter can be used to create a hotspot for wireless connection from a phone or computer. A third-party virtual network computing (VNC) program can then connect to and control the camera. This generally works well, but we did find that different VNC programs gave different experiences, so it pays to experiment. A mention is made in the manual about correctly shutting the camera down after each use. If the connection corrupts and you can't get

back in, this becomes impossible to do. A connection can also be made over a physical ethernet link if one is available.

An optional touchscreen can be plugged in and physically attached to the camera body via an articulating mount. We found the display adequate, but on occasion the buttons were too small for our fingers. In addition, the screen's bevel sometimes prevented us from reaching controls. Being a resistive touch screen, a thin stylus would have ►

CONTROL SOFTWARE

The AST8300 is controlled via a set of internal applications running under Linux. These provide an interface to various aspects of the camera's hardware such as the cooling circuit and filter wheel. Imaging is carried out by selecting a filter and defining the number and length of exposures required. Once defined, the camera will carry out the exposure sequence by filter in order, although it is possible to alter this too.

Functions to assist in object framing and focus are provided as well as a routine to display your results. Various housekeeping functions are also provided to cover routines such as USB removal and camera shutdown. Extended functionality can be achieved by connecting the camera to a suitable mount to provide Go-To or autoguiding facilities. It's even possible for you to experiment with software applications of your own by tweaking an available copy of the open-source camera processor code. For most imagers, the supplied applications will be more than sufficient to allow some excellent images to be achieved. The flexibility and potential expandability of the system should also help keep even the most ardent tinkerer happy.

▲ The camera is controlled by a set of internal applications – these cover everything from cooling to image capture
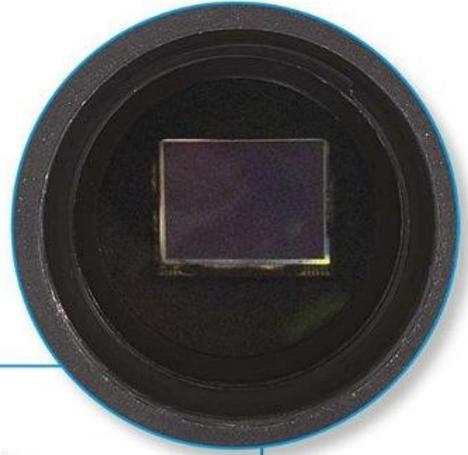
SENSOR

The AST8300 uses a Truesense KAF-8300 monochrome sensor, with 3,326x2,504 pixels in a 17.96x13.52mm array. The CCD is housed in a sealed chamber which needs to be maintained at low pressure to reduce the risk of frosting. A mechanical shutter covers the CCD when not imaging.

INTEGRATED FILTER WHEEL

The AST8300 has an integrated, motorised filter wheel with seven positions. The 27mm unmounted filters are sold separately. The wheel is controlled via the camera's onboard microprocessor. Filters can be self-installed, but we would recommend having them fitted by Astrel Instruments, for free, at the point of purchase.
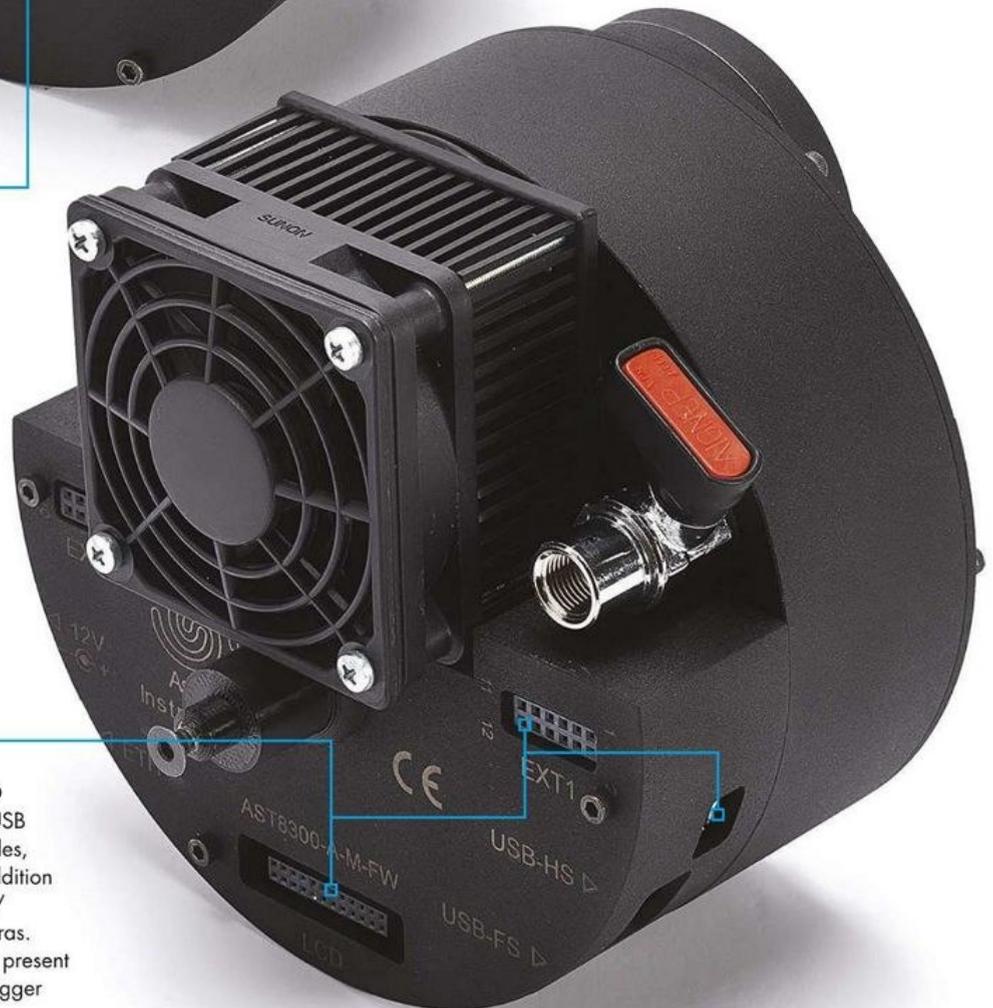
INTERFACES

The AST8300 has numerous interfaces including 12V (3A) power, ethernet, LCD connector for the optional screen, and USB full-speed host (12Mb/second) for dongles, hubs, mouse, keyboard and so on. In addition there is a USB high-speed host (480Mb/second) for devices such as guide cameras. Two general purpose I/O interfaces are present for external console connections or to trigger the camera from an external device.

FIRST **light**

SET POINT COOLING

The camera's cooling system uses a combination of electronic cooling, a heat sink and a fan. The CCD's temperature can be reduced by 42°C with an accuracy of 0.1°C. The current draw to achieve this is quoted at 2.2A. A vacuum pump is provided for the purpose of evacuating moisture laden air from the sensor chamber to avoid frosting.
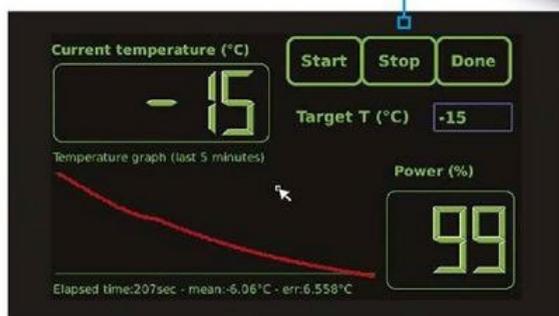
SCREEN

An optional touchscreen can be attached to the AST8300's body via a rod and clamps for articulated viewing. This is a resistive 4.3-inch LCD touchscreen with 480x272-pixel resolution and 1,024 colour/256 greyscale capability. Though not intended for high-quality viewing, it does allow full functional control as long as you can cope with the occasional tiny button.

▶ been useful here. We also found the display a little unrepresentative when reviewing our shots.

An onboard microprocessor running Linux keeps everything under control. The software runs from an internal 8GB storage card with free space available for image storage. It's pretty easy to pull any images off the camera via a remote third-party application running on a separate computer.

When we first powered up, there was a slightly disconcerting minute where you're shown a blank screen. Eventually the camera's readiness is announced by the appearance of control application tiles along with a beep sequence reminiscent of something an 1980s home computer would produce.

Camera operation via the control applications was pretty straightforward. The AST8300 contains a motorised filterwheel and in order to define a shooting sequence, a filter position needs to be selected along with number of exposures, exposure length and binning mode. We used globular cluster M13 in Hercules as our first target and were able to see it clearly through our 4-inch, f/9 scope, using the AST8300's Find and Focus application. The live view focus assist program also worked really well for us. Our results did show a lighter region towards one frame edge and two thin vertical lines down each image, each terminating with a hot-pixel. Calibration using a minimum of dark and flat frames would remove these. The general level of image quality was very good and the AST8300 certainly has the capability to produce some excellent results.

This is a great camera if you want to get into CCD imaging but don't want to lug around a laptop each time. The inclusion of a motorised filter wheel and excellent number of connections means this is also a tidy solution for anyone wanting to upgrade from DSLR to full-filtered CCD imaging. ◉
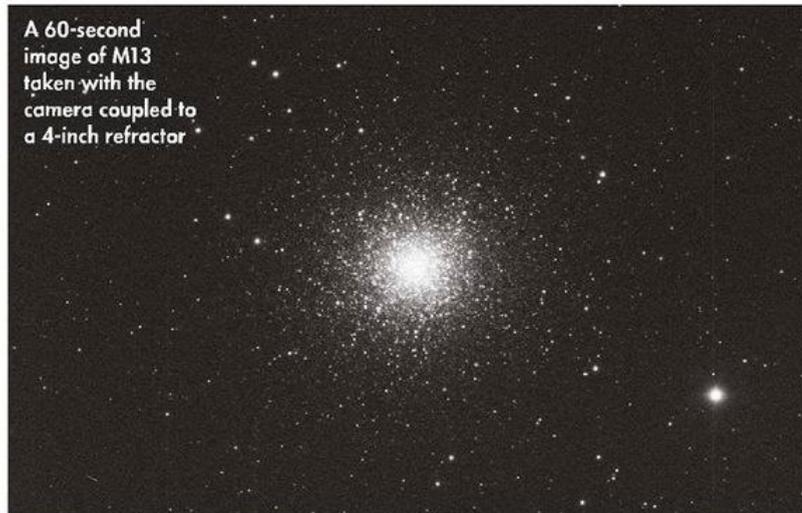
A 60-second image of M13 taken with the camera coupled to a 4-inch refractor

VERDICT

BUILD & DESIGN	★★★★☆
CONNECTIVITY	★★★★★
EASE OF USE	★★★★☆
FEATURES	★★★★★
IMAGING QUALITY	★★★★☆
OVERALL	★★★★☆