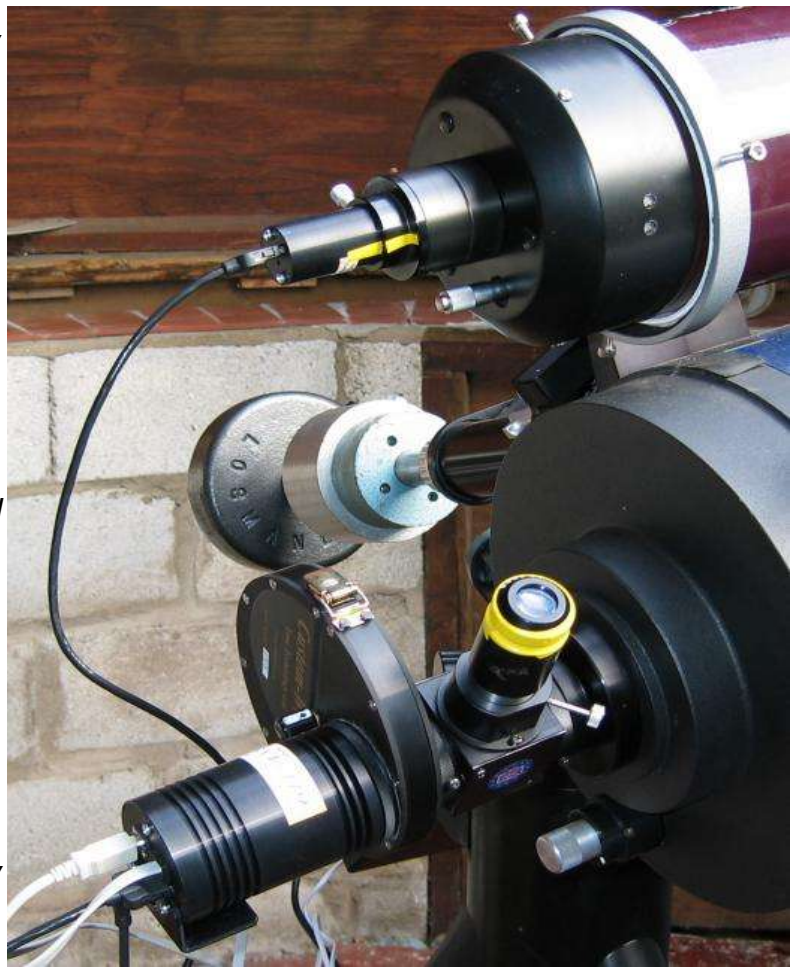
Starlight Xpress SXV-H9 and SXV Guider

Introduction

It is easier to quote from the Starlight manual rather than try and describe this "mega pixel" monochrome CCD camera:



"The SXV-H9 is an advanced, very high-resolution cooled CCD camera, especially designed for astronomical imaging. It is a second generation version of the very popular HX916 and incorporates many substantial improvements and extra features. These include a built-in, fully programmable, USB 2 super-fast computer interface (USB 1.1 compatible), an optional add-on autoguider output and integrated dual serial ports for filter wheel and telescope control. The SXV-H9 uses a Sony ICX285 'ExView' progressive scan CCD, with 1392 x 1040 x 6.45uM pixels in a 8.98 x 6.71mm active area. ExView devices have excellent quantum efficiency, with a broad spectral response peaking at around 65% in the green, and an extremely low dark current, well below that of any comparable CCD currently available. While this device has an excellent blue light sensitivity, it also has a strong infra-red response, which makes it ideal for all aspects of both planetary and deep-sky imaging, especially with an H-alpha filter."

The interfaces are for the companion SXV guide camera, an "ST4" guiding output and serial ports for filter wheels. The companion guide camera is an un-cooled HX516 CCD sized camera in an 1.25" tube. The earlier SXV cameras were reported to be low in sensitivity, my later model doesn't seem too bad with plenty of guide stars available in an f14 guide telescope. I understand from the Yahoo Starlight Group that some form of "adaptive optics" interface is currently under development.

Starlight software is provided, but for most purposes I prefer guiding with AstroArt 3, which is compatible with both the SXV-H9 and it's SXV Guide camera.

Installation and setup

The camera is threaded "T2" and comes with an M42 thread adapter. I continue to be surprised as to why these obsolete camera lens mounts continue to be the "standard" for high end astro CCD cameras. Using a bayonet mount would enable the camera to be removed from a telescope without powering it down in order to disconnect the cables and would enable more modern lenses to be used. Not having any M42 threaded lenses, I was limited in my early tests. As I couldn't use a filter wheel with a camera lens, such tests were of limited value. The SXV Guider is threaded to take a C mount TV camera lens, having one of these meant I could at least test the guiding camera with a small LED light

source in a dimly lit room. By using the original Losmandy G-11 electronics and stepper motors (removed from the mount following an upgrade to Gemini), I was able to test the interface without waiting for a clear sky. While this would do little more than check the interface worked, it was a start and was done by mounting the guide camera on a photo tripod and pointing the lens towards a small LED. With the G-11 electronics set to their maximum speed the tripod was pushed slightly up, down, left and right.

First use

My intention is to use the OMC-140 Maksutov telescope (140mm diameter, f14) as a guide scope. The first problem I encountered was the focus mechanism on that telescope literally fell out. It didn't take too long to rectify the problem after speaking with Orion Optics and finding out the safe way to dismantle the rear cell of the telescope. My next problem was to utilise the True Technology flip mirror finder that had lain virtually unused since adapting my earlier Starlight MX5-C to bayonet mount. While I had all the necessary adapters to fit everything together, the focal point for an eyepiece used with the flip mirror was well outside the unit and needed an extension that I didn't have. Eventually I found an old barlow lens and removed the optics to leave an almost perfect length extension tube. True Technology offer an extension tube at low cost. An additional complication is the extra focal length required to use both a flip mirror finder and a filter wheel, at f6.3 (the basic optical tube assembly is a 10" f6.3 SCT) there is sufficient focus travel to accommodate the extra items, when I add a focal reducer to f4 by using a Meade 4000 series "f6.3" reducer, then I can only just (and only just) reach focus. There is nothing to spare and I might have to consider doing away with the flip mirror unit.

The image of NGC7331 shown above, together with it's "companion" galaxies were the sum of 7 x 5 minute exposures stacked in AstroArt 3 and taken at f4 with a 10" SCT using an Astronomiks hydrogen alpha filter.

Having sorted out getting the main and guide cameras to focus, as well as the flip mirror eyepiece, the next problem turned out to be mirror shift in the main SCT. This never seemed to be a problem when focussing the old MX5-C, but with 1.4 million pixels the image needs to be sharp! There is a resizable focus window in AA3 which seems to work reasonably well except that it doesn't cope with the large amount of image shift present in an old Meade 2120 SCT. I have tried a Broadhurst Clarkson and Fuller "Astro

Engineering" mirror locking bolt, this is similar to the MAPUG design from the internet. The bolt doesn't seem to fix the image shift, but may reduce focus shift as the mount tracks across the sky.

Back to image taking, as none of the above issues have anything to do with Starlight! Having previously used a STAR 2000 interface with an MX5-C camera, there was no need to use a guide scope as everything was done with the image taking camera. Now I had the added complexity of having to move the guide scope to find a guide star after having centered the "wanted" deep sky object with the main SCT. At least "any" star I could find that was reasonably bright seemed to track well with AstroArt. Initially I kept losing the guide star, this was due to not using an aggressive enough setting in AA3, eventually I settled for "15" which was able to keep the guide star on "the wires" indefinitely. By the way, I used a strip of PVC tape to ensure the same orientation was used for the guide camera each time it was fitted to the guide scope (shown in the above picture). One of the supplied cables doesn't seem long enough, this is the "ST4" output cable from the SXV-H9 camera to the Losmandy Gemini control box. As it's just a 6 way RJ11 cable with a 6 way male plug on each end, I made up a longer lead from spare cables and plugs from the local electronics shop.

Having very high levels of moisture in the atmosphere means that even a small amount of light pollution creates a sky glow. For this reason I decided to try my hand at narrow bandwidth filters for colour imaging. There are some very good images around taken with hydrogen alpha, hydrogen beta and oxygen III filters as pseudo red, blue and green filters. As hydrogen alpha cuts out nearly all light pollution, especially from sodium street lights, I decided to try this one first. Due to endless cloudy nights (which usually happens when I buy something new for astronomy), I've only been able to take images of a couple of objects and then only in Ha light.

The image of M15 (above) was taken at f6.3 and was a 3 x 5 minutes exposure, again through a Ha filter.

To add to my difficulties, the ra motor on the Gemini mount burnt out... fortunately it was replaced for the cost of return air mail by Scott Losmandy