USING A CCTV STYLE CAMERA & FRAME GRABBER

TO CAPTURE A DEEP SKY OBJECT WITH SHARPCAP
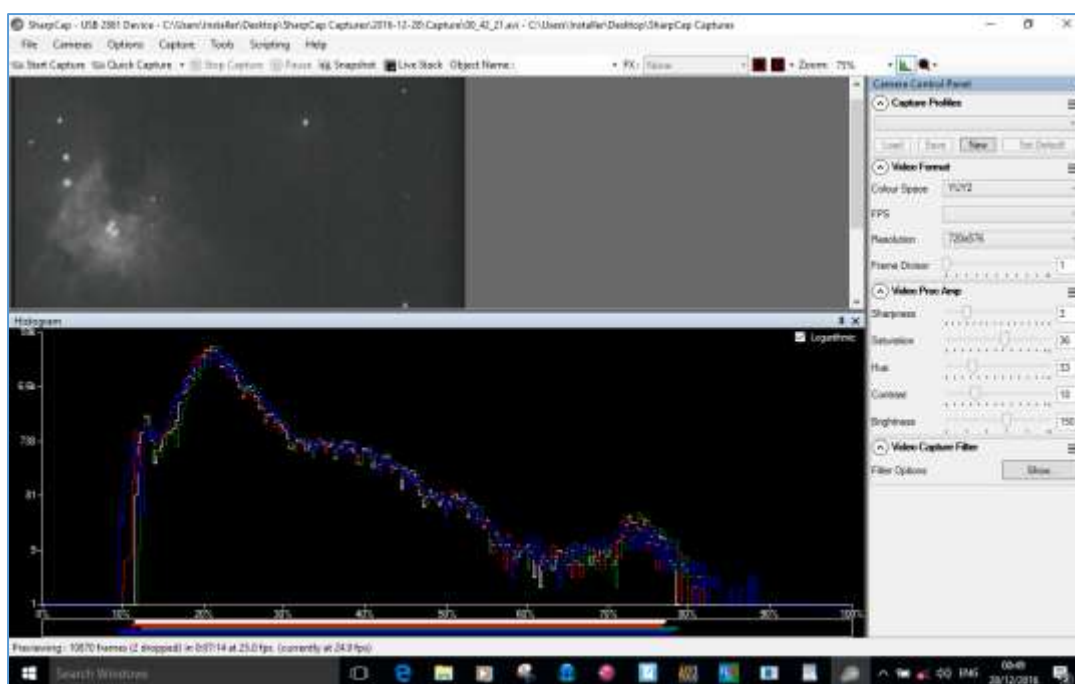
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Sample Session Deep Sky - COLOUR

This colour capture uses the following process:

- Align the mount using the camera and *SharpCap Reticule*.
- Focus the telescope using a *Bahtinov Mask*.
- Camera settings adjusted using the *SharpCap Image Histogram* tool.
- Test capture, PNG and FITS, to prove reasonable data being collected.
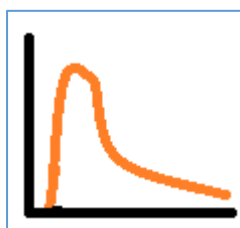- Capture images using *SharpCap's Live Stack*.

This capture was taken using an AVS DSO-1 analogue video camera with USB2 video capture device (frame grabber). The video grabber is classed as a DirectShow device, no camera controls are exposed in SharpCap, so adjustments are made using the camera's internal menu.

The equipment used:

- Celestron C8 SCT
- Celestron CG5 Equatorial Mount
- AVS DSO-1 analogue video camera set to YUY2 colour space (no choice)
- A 0.5x focal reducer and Astronomik CLS filter
- Imaging laptop was a Lenovo T400 ThinkPad, with 2.4GHz Core 2 Duo CPU, 8Gb RAM, 240Gb SSD & Windows 10 Pro 64-bit.

Checking against the guidelines for a deep sky histogram (with vertical log scale):

- Horizontal LRGB bars not touching left axis (otherwise black clipped).
- Horizontal LRGB bars not touching right axis (otherwise white saturated).
- Red and blue horizontal bars approximately level at each end (colour balance).
- LRGB histograms very close together in the graph.
- Histogram peak at around 20% on horizontal axis.
- Sharp gradient at left of peak.
- Gentle gradient to right of peak.

The four Trapezium stars at the core of M42 can be seen. Improvements here would be to try to extend the histogram more to the right, by adjusting exposure, gain and brightness.

The resultant *Save as Viewed* PNG file when the *Live Stack* count was 293 is shown below (*Save as Viewed* = no post-processing). The core was blown out but some nebulosity was captured.
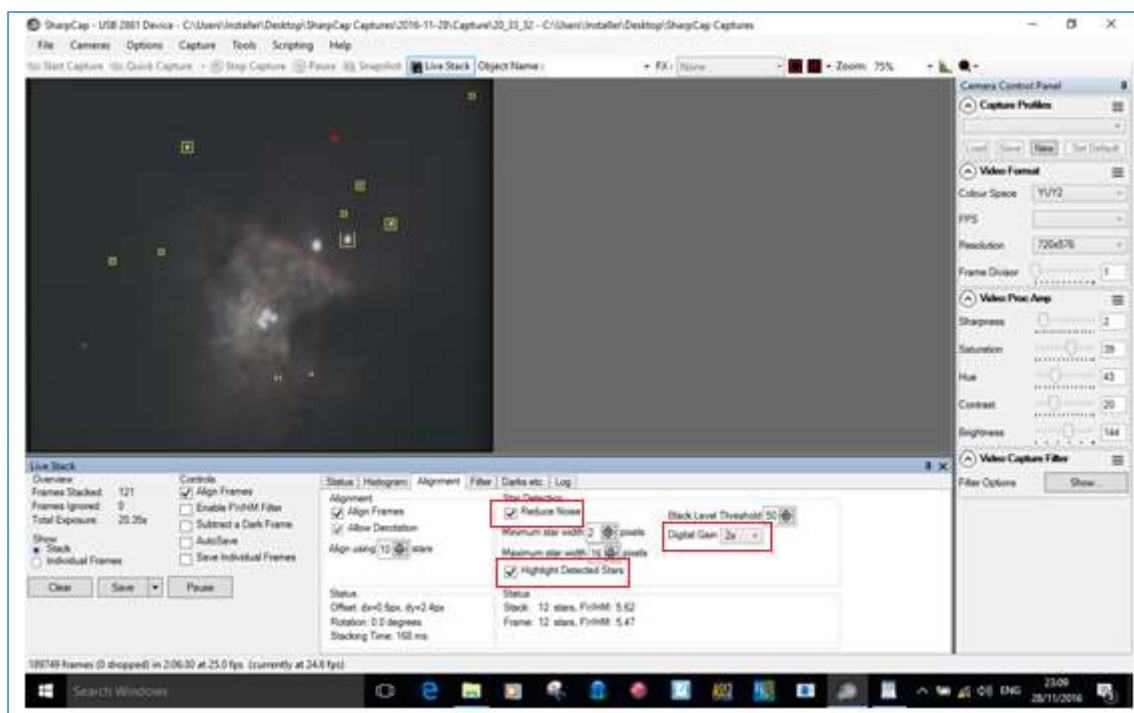
Here are the camera's internal settings.

DSO-1 Camera Settings	
AGC	24
INTG	X8
BRIGHTNESS	20
COLOR	Manual RED= 64, BLUE=102
GAMMA	0.3
INTMUL	5

Here are the SharpCap settings from the file *Stack_293.png.CameraSettings.txt*.

```
[USB 2861 Device]
Frame Divisor=1
Resolution=720x576
FPS=25.00
Colour Space=YUY2
Brightness=134
Contrast=18
Hue=56
Saturation=29
Sharpness=3
TotalExposure(s)=15.829
StackedFrames=293
```

Sometimes during a *Live Stack* operation, the *Frames Stacked* count stops incrementing, or SharpCap shows a message about stars not being visible (even though they are on the screen). To investigate this, from the *Alignment* tab, select *Highlight Detected* stars. Stars that SharpCap can see and is using are highlighted with yellow squares, stars that are seen but not being used are highlighted with red squares. Selecting *Reduce Noise* and turning *Digital Gain* on can be beneficial. Sometimes the reason is faint cloud, not visible to the unaided eye but detected by the imaging camera.
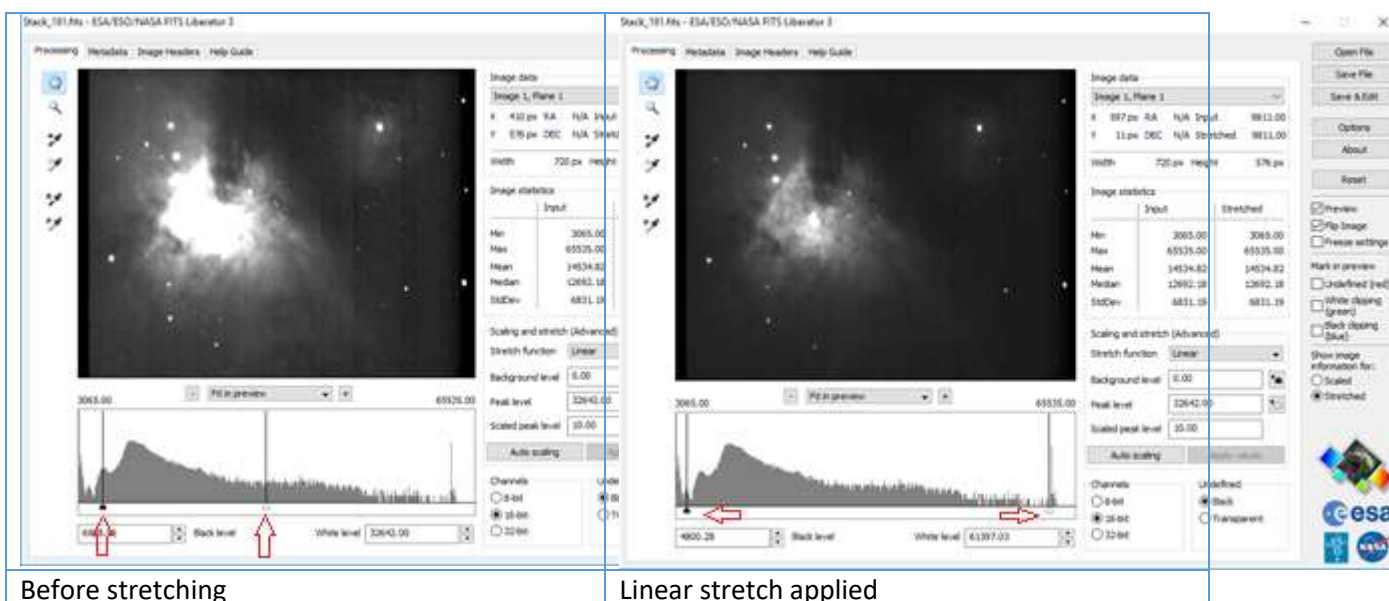
Some easy post-processing can be applied to the image using FITS Liberator. **Always work on a copy of the data**.

A useful tutorial for applying a stretch function using FITS Liberator can be found at https://www.aao.gov.au/files/NGC6751_Image_Tutorial_CS5.pdf .

Further image manipulation techniques using the open source image processing application GIMP can be found at https://www.aao.gov.au/files/NGC6751_Image_Tutorial_GIMP.pdf .

The next two graphics shown the effect on an image of moving the black and white sliders outward and applying a Linear Stretch in FITS Liberator.

Before stretching

Linear stretch applied