

Managing IR in Video Astronomy

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Test Report #2 – August 26th, 2011

Objectives:

My objective on this evening's test was to do some more visual comparisons of how using different IR blocking filters affects the view produced by a Mallincam astro-video camera. The following filter combinations were tested:

1. no filters
2. Mallincam IR cut filter alone
3. Baader Planetarium UV/IR cut filter alone
4. Astronomik UHC filter alone
5. Astronomik UHC + MC IR cut (UHC then IR)
6. Astronomik UHC + BP IR cut (IR then UHC)
7. Astro Hutech IDAS LPS-P2

Methodology:

I used two deep-sky objects as my target: M57 Ring Nebula, and M27 Dumbbell Nebula. I used my 8" Meade LX10 SCT with Meade brand f/6.3 focal reducer (1260mm focal length). The scope was mounted to my Orion Atlas mount, and remotely controlled through my laptop from inside the house.

I used my Mallincam Xtreme to capture all image data. The camera and capture device were running with the following settings:

- AGC 6
- gamma 1
- APC vert & horz 4
- white balance ATW
- contrast 65 (full)
- hue 62
- saturation 45
- sharpness 1
- TEC set to "off"

Brightness and Integration time were adjusted throughout the testing, as will be described below. I refocused the telescope using a Bahtinov mask after each filter change, moving to the nearest bright star each time (Vega for M57 shots, Altair for M27 shots).

Results:

Testing was done during a moonless night, roughly Mv +3.5 skies, with M57 and M27 both pretty much directly overhead for the duration of the testing. Testing started with M57, followed by M27.

M57

- no-filter view was pale in colour, 0 brightness reached after 40sec INT
- adding the BP IR cut filter caused a shift in the white balance towards green, using AWC Set was successful in correcting colours back, resulting image was essentially the same as no-filter view, 0 brightness reached after 45sec INT
- adding the MC IR cut filter caused another shift in the white balance towards green, using the AWC Set was not able to correct the colours back and I didn't try correcting manually, view otherwise very similar to BP IR Cut, 0 brightness after 50sec INT
- adding the Astronomik UHC to the MC IR cut caused another shift in the white balance, but using AWC Set was successful in correcting colours, resulting image had far more intense colours than all images without UHC, 80 brightness after 50sec INT



no-filters (0 Brightness, 40sec INT)



Baader Planetarium IR Cut – before AWC Set (0 Brightness, 45sec INT)



Baader Planetarium IR Cut – after AWC Set (0 Brightness, 45sec INT)



Mallincam IR Cut – after AWC Set (0 Brightness, 50sec INT)



UHC + MC IR – after AWC Set (80 Brightness, 50sec INT)

M27

- UHC + BP IR cut gave a very pleasing colour balance with the red Halpha details within the interior being sharp and contrasty, stars were small and round and background was black, 75 brightness at 75sec INT
- UHC + MC IR cut gave a noticeably darker image than with the BP IR cut, colours were deeper, image had more intense greens, stars very slightly smaller than with BP IR cut, interior Halpha details not as clear as BP IR cut, 75 brightness at 75sec INT
- UHC + MC IR cut...post processed...when I adjusted up the brightness slightly and corrected the green channel down I was able to match very closely the image produced with the BP IR cut
- UHC + no IR cut was very similar to with BP IR cut filter except that stars were much brighter and larger in diameter, less contrast in interior, overall image brightness slightly higher, 75 brightness at 75sec INT
- no filters was over saturated at 75sec so reduced INT to 50sec for 0 brightness, resulting image very washed out, lower contrast, many many more stars visible
- LPS-P2 was noticeably better contrast and colour than no filters, but not as good as with UHC, red Halpha slightly subdued compared to UHC due to this filter letting more greens through, stars brighter and more numerous than UHC, overall image brightness higher than with UHC, 21 brightness at 75sec INT



Astronomik UHC + BP IR cut (75 brightness, 75sec INT)



Astronomik UHC + MC IR cut (75 brightness, 75sec INT)



Astronomik UHC + MC IR cut (post process brightness up, green down)



Astronomik UHC + no IR cut (75 brightness, 75sec INT)



no filters (0 brightness, 50sec INT)



Astro Hutech IDAS LPS-P2 (21 brightness, 75sec INT)

Conclusions:

The results from this evening's test were similar to those from August 16th. By itself the IR cut filters reduce star brightness and bloat as well as overall scene brightness. When added to the UHC light pollution filter both IR cut filters reduced star brightness and bloat, as well as increased contrast and sharpened focus slightly. The improvement in colour and contrast when using a light pollution filter was striking, with the UHC producing the nicest images from the two LP filters tested.

A curious discovery was that application of filters tends to cause some grief with getting the white balance set correctly. The UHC and BP IR cut caused colour shifts that the camera's AWC Set function could handle, but the auto white balance correction could not seem to fully compensate for the MC IR cut. I didn't try manually adjusting the white balance during my testing. I intend to investigate this further to try and find out what is going on.

If you have any questions, please feel free to contact me.

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