

Astronomy Observation Journal

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Abstract

This document contains a collection of observation reports. It is auto-generated by running Java program AstroJournal (<https://pdp10@bitbucket.org/pdp10/astrojournal.git>) and the utility pdflatex (or texi2pdf). AstroJournal generates Latex code from tab-separated value (tsv) files exported using a SpreadSheet (e.g. Google Drive SpreadSheet). This allows users to: a) edit their observation reports using a spreadsheet easily, b) obtain a complete and formatted report in Latex, and c) benefit from versioning (if using a versioning system such as Git).

Atlases:

1. Deep Sky Hunter Star Atlas v2 (by Michael Vlasov)
2. Sky & Telescope's Pocket Sky Atlas (by Roger W. Sinnott)
3. Carte du Ciel (software)
4. Stellarium on tablet (software)

Observing techniques for DSO:

1. Eye adaptation at the eyepiece for 10min at least
2. Averted vision
3. Cover the other eye to relax the observing eye nerve
4. Know exact target position (precise star hopping)

Antoniadi Scale:

1. Perfect seeing, without a quiver.
2. Slight undulations, with moments of calm lasting several seconds.
3. Moderate seeing, with larger air tremors.
4. Poor seeing, with constant troublesome undulations.
5. Very bad seeing, scarcely allowing the makings of a rough sketch.

Transparency Scale (American Association of Amateur Astronomers):

1. Do Not Observe - Completely cloudy or precipitating. (Why are you out?)
2. Very Poor - Mostly Cloudy.
3. Poor - Partly cloudy or heavy haze. 1 or 2 Little Dipper stars visible.
4. Somewhat Clear - Cirrus or moderate haze. 3 or 4 Little Dipper stars visible.
5. Partly Clear - Slight haze. 4 or 5 Little Dipper stars visible.
6. Clear - No clouds. Milky Way visible with averted vision. 6 Little Dipper stars visible.
7. Very Clear - Milky Way and M31 visible. Stars fainter than mag 6.0 are just seen and fainter parts of the Milky Way are more obvious
8. Extremely Clear - overwhelming profusion of stars, Zodiacal light and the gegenschein form continuous band across the sky, the Milky Way is very wide and bright throughout

Date: 10/06/2015
Time: 10.00pm-12.00pm
Location: Cambridge, UK

Altitude (MAMSL): 12m
Temperature (C): 14 (wind: 5km/h)
Seeing (Antoniadi scale): 3 - Moderate seeing
Transparency (AAAA scale): 5 - Clear

Telescopes: Tele Vue 60 F6
Eyepieces: TV Panoptic 24mm, Nagler 13mm, Nagler 7mm, Nagler 3.5mm
Power, Exit pupil, FOV: 15x, 4mm, 4.30deg; 28x, 2.2mm, 2.80deg; 51x, 1.2mm, 1.54deg; 103x, 0.6mm, 0.77deg

Filters:

Target	Cons	Type	Power	Notes
Saturn	Lib	Planet	103x	Seen during civil twilight and later in the nautical twilight. Although the seeing was not great, Saturn appeared very crisp. The rings had a very nice inclination. The Cassini division was generally not detectable. For few seconds when the seeing stabilised, a hint of dimmer colour was visible on the external part of the rings. A nice band was visible all the time on the North Hemisphere of the planet. Titan was visible too. The view was really nice generally. Possibly due to the seeing, but I preferred the view when the sky was darker.
Alpha Sco	Sco	Star	15x	Antares. Lovely red star. I could see the Airy disc and diffraction rings very nicely. Antares is one of my favourite stars.
M107	Ser	Glob CL	15x, 51x	From Han, Zeta Oph, go slightly South and see a triangle. M103 is on the outside of one of the vertices. It was barely visible at 15x, also due to the bright sky. At 51x was detectable but still with difficulty. Not much to see. Just a grey smudge visible with averted vision.
M10	Oph	Glob CL	15x, 51x	Nice globular cluster. It does not have nearby stars, but is relatively large. Stars are not really visible, but the cluster appear with some hint of granulation particularly detectable on the outside.
M12	Oph	Glob CL	15x, 51x	Like M10, this is another nice globular cluster. Somehow I preferred it to M10 because of the presence of surrounding close stars at east. I believe this cluster is slightly bigger than M10, or at least it seemed so. Like M10, a hint of granulation was detectable.
IC 4665 - Cr349	Oph	Opn CL	15x	Summer Beehive cluster. Amazing open cluster of large size above the star Cebalrai. A pleasure to see with a low power eyepiece. Stars have similar colours and magnitude, but the shape is nice.
NGC 6633	Sct	Opn CL	15x	From 71-72 Oph to East, NGC 6633 and Cr386 appear in succession. Both are sufficiently large to be appreciable with a low power eyepiece. They are quite rich in stars.
IC 4756 - Cr386	Sct	Opn CL	15x	Graff's cluster. See above
Epsilon Lyr	Lyr	Dbl star	51x	Double Double. I could not split at 51x. The image suggested a possible elongation of the two stars, but I would not bet on this if I did not know they are doubles.
Beta1 Sco	Sco	Dbl star	51x	A very nice double star at 51x. The two stars have different colour and brightness. If I remember correctly the small one was blue. They were split but still quite tight. At 70x they should be split clearer.

Date:	06/06/2015	Telescopes:	Tele Vue 60 F6
Time:	3.00pm-6.00pm	Eyepieces:	Nagler 7mm, Vixen 5mm, Nagler 3.5mm
Location:	Cambridge, UK	Power, Exit pupil, FOV:	51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg; 103x, 0.6mm, 0.77deg
Altitude (MAMSL):	12m	Filters:	Variable Polarising Filter (VPF), Single Polarising Filter (SPF)
Temperature (C):	23 (wind: 5-32km/h)		
Seeing (Antoniadi scale):	3 - Moderate seeing		
Transparency (AAAA scale):	5 - Clear		

Target	Cons	Type	Power	Notes
Sun	Tau	Star	51x +/- VPF or SPF, 72x +/- VPF, 103x +/- VPF	I enjoyed observing the Sun a lot today. There were more than 30 sunspots and also a hint of granulation when the wind became calm for short moments. Very nice day. The wind did not allow to see Sun granulation most of the time. The seeing improved after 5pm when the wind became more moderate. Many sunspots were visible. Three larger umbrae were surrounded by nice areas of penumbra. One of this had an irregular shape and the South part vanished gradually. This at all powers. It was very attractive. A central area contain 4 well defined sunspots and many little grey spots. Around the larger sunspots, there were brighter and extended areas on the Sun surface. 51x gave the best view most of the time. 72x and 103x were interesting powers but only suitable when the wind was calm, which was rare! A VPF increased the detail noticeably. Apart from reducing image brightness, I appreciate this filter because it stabilises the image, particularly under average seeing. Surprisingly I found that I prefer the view through a SPF rather than VPF. A VPF reduces image brightness, whereas a SPF improves contrast to me. Through a SPF I could see a hint of granulation at 51x even when there was moderate wind. This did not happen with a VPF. I am considering whether separate the two filters. Having them separate would also be quite comfortable when watching planets in the twilight. SPF also improved contrast for all the sunspots. This works as follows: 0 (or 180) degrees shows the brightest image, 90 (or 270) degrees shows the darkest image. For observing both planets and the Sun, I found that I prefer the view when the SPF is positioned at 45 (or 135 or 225 or 315) degrees. The image was still bright, contrast was highest than all other options and the number of details was maximised. Nagler 7mm, Vixen 5mm, and Nagler 3.5mm form my best eyepiece combination for watching the Sun with the TV-60. All of them are really useful, although the first two achieve best results almost every time. The Nagler 3.5mm can show some very nice close-up of umbrae and penumbrae.

Date: 03/06/2015
Time: 9.40pm-11.30pm
Location: Cambridge, UK
Altitude (MAMSL): 12m
Temperature (C): 12 (wind: 0km/h)
Seeing (Antoniadi scale): 1 - Perfect seeing
Transparency (AAAA scale): 5 - Clear

Telescopes: Tele Vue 60 F6
Eyepieces: TV Panoptic 24mm, Nagler 3.5mm, Bresser SA 2x
Power, Exit pupil, FOV: 15x, 4mm, 4.30deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg
Filters: Single Polarising Filter

Target	Cons	Type	Power	Notes
Jupiter	Cnc	Planet	103x +/- SPF, 206x + SPF	Just a quick look until the sky became darker. No particular event tonight. It was very nice to see it. The two main bands revealed some subtle detail appearing like tiny shades. In particular these were more detectable for the main band in the North Hemisphere.
Moon	Sgt	Satellite	103x +/- SPF	Phase 96%. No many detail were revealed. The moon is not really interesting when full. Craters and seas were detectable but not immersive.
M57	Lyr	Pln Neb	103x	Ring nebula. The ring was visible with averted vision, but no other detail really. The contrast between the ring and the internal area is much more visible with an OIII filter. Still nice planetary nebula.
Zeta Lyr	Lyr	Dbl star	15x, 103x	Already split at 15x, but much nicer at 103x.
Delta Lyr	Lyr	Dbl star	15x, 103x	This is a very nice system of stars already visible at 15x. A larger triangle with a little internal triangle. Just beautiful.
Epsilon Lyr	Lyr	Dbl star	15x, 103x, 206x	Epsilon 1 and 2 were easily split at 15x. At 103x it was possible to detect that both Epsilon 1 and 2 are double stars themselves. At 206x this pair of tight double stars was visible although these double stars remained very close. Same colour.
Beta Lyr	Lyr	Dbl star	15x, 103x	Sheliak. Splendid double already split at 15x. This was very nice at 103x.
Beta Cyg	Cyg	Dbl star	15x, 103x	Albireo. Wonderful double. A bit tight at 15x, but very nice at 103x. One orange, the other one blue.

Date:	26/05/2015	Telescopes:	Tele Vue 60 F6
Time:	9.15pm-12.00am	Eyepieces:	TV Panoptic 24mm, Nagler 13mm, Nagler 3.5mm, Bresser SA 2x
Location:	Cambridge, UK	Power, Exit pupil, FOV:	15x, 4mm, 4.30deg; 28x, 2.2mm, 2.80deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg
Altitude (MAMSL):	12m	Filters:	Astronomik UHC, OIII, Single Polarising Filter
Temperature (C):	9-14 (wind: 15km/h)		
Seeing (Antoniadi scale):	2 - Slight undulations		
Transparency (AAAA scale):	5 - Clear		

Target	Cons	Type	Power	Notes
Jupiter	Cnc	Planet	103x +/- SPF	Observed in civil twilight. The seeing was not enough good for pushing magnification beyond 103x. At 103x, two major bands and two moons were visible. I did not spend much on this target tonight because it was too windy when I observed it.
Moon	Leo	Satellite	103x +/- SPF, 206x + SPF	Observed in the twilight. Visible almost 60% of its phase. The SPF seems to stabilise the image if the seeing is not good. This is a lovely target with the TV60, and keeps magnification pretty well. At 206x the moon surface appeared like a bubble at the poles due to the seeing, but there were moments in which it was possible to see a quasi stable image. Subtle details on the surface were observable as well as minute craters and shades on the ground. Interestingly, on the terminator mounts tips were illuminated whereas their bases were obscured. There is so much to see at 206x that one could spend the entire night observing our satellite! Montes Apenninus, Caucasus, and Alpes were incredible targets and appeared just beautiful. The crater Cassini and all the small nearby craters were spectacular. While I am not sure the SPF increased image contrast, I prefer the view with SPF as it seems that the image is just stabler at both 103x and 106x.
M57	Lyr	Pln Neb	28x +/- UHC, 103x +/- UHC or OIII	Ring Nebula. The UHC filter increases a little bit the visibility of this target at 28x, but does not improve the contrast. The object appears as a grey blob without a shape. At 103x the ring was detectable using an UHC filter using averted vision, but this was not easy too see. The ring shape was more noticeable with a OIII filter despite the severe loss in image brightness. Without filter the nebula appeared just as a grey blob and no ring was detectable. Generally, I think an exit pupil of 0.6mm is just too small for nebula filters. It seems to me that 1.0mm is the maximum usable effectively. As this is the exit pupil typically used when observing planetary nebulae, I would say that an OIII filter is a better choice for these targets as it allows to increase contrast which is needed on these targets. Conversely, for bright extended nebulae to watch with low power eyepieces (or exit pupils larger than 3mm), a UHC filter can be beneficial for targeting and maximizing nebulae extension.
M97	UMa	Pln Neb	28x +/- UHC	Owl Nebula. Invisible at 28x with or without UHC filter. This target requires an OIII filter for being detectable with small aperture telescopes. Consistently with what said for M57, the OIII filter is a better choice for planetary nebulae (and for extended nebulae where we want to maximise nebulae contrast).
M81	UMa	Galaxy	15x, 28x	Bode's nebulae. Not easy to find it at 15x with half moon, but M81 and M82 were detectable via star hopping from Dubhe. At 28x this large galaxy shows its core and a bit of brightness on the body. I was very impressed at seeing these two targets and I believe M31, M32, M101, M81, and M82 are the most appreciable galaxies for small telescopes. Averted vision improved the visibility of this target significantly.
M82	UMa	Galaxy	15x, 28x	Cigar galaxy. Its elongated shape was visible. It was amazing to see this galaxy and its neighbour M81 in the same field. These two targets are going to become one of my favourite objects.
M3	Boo	Glob CL	28x	As all the globular cluster seen with a small telescope, M3 also appears like a little grey cloud. This is a bright globular cluster and a hint of 'granulation' is perceptible although no star can be resolved. Not very easy to find due to the lack of bright stars to star hop from Arcturus.
M5	Ser	Glob CL	28x	It appears like a grey cloud. From the star Unukalhai (Alpha Ser), go South and you find it. It is a relatively easy target.
M13	Her	Glob CL	28x	Same as M3. Very bright and large globular cluster. Some granulation is perceptible but no star could be resolved.

Date:	20/05/2015	Telescopes:	Tele Vue 60 F6
Time:	9.30pm-12.00am	Eyepieces:	TV Panoptic 24mm, Nagler 13mm, Nagler 3.5mm, Bresser SA 2x
Location:	Cambridge, UK	Power, Exit pupil, FOV:	15x, 4mm, 4.30deg; 28x, 2.2mm, 2.80deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg
Altitude (MAMSL):	12m	Filters:	Astronomik OIII, Single Polarising Filter
Temperature (C):	9 (no wind)		
Seeing (Antoniadi scale):	3 - Moderate seeing		
Transparency (AAAA scale):	5 - Clear		

Target	Cons	Type	Power	Notes
Jupiter	Cnc	Planet	103x +/- SPF, 206x + SPF	Observed in the twilight. The SPF noticeably improved the view. Four bands and the transit of Callisto were easily visible at both 103x and 206x. The use of a SPF seemed to stabilise the image and improved contrast. A fair amount of shades were also perceptible on the main two bands. The transit appeared as a crisp black dot on the planet atmosphere. Without the SPF it was only possible to see the two main bands and no shade on them. They simply appeared as two thick lines across the planet. Interestingly the transit shadow appeared a tiny bit better without the filter. To me, using the SPF requires a bit of experience in order to rotate the eyepiece to gain the best contrast. However this is feasible.
Venus	Gem	Planet	103x +/- SPF, 206x + SPF	Observed in the twilight. Visible 60% of its phase. No cloud detail was detectable even with the SPF. Planet glare was reduced but it was very difficult to focus, likely due to the average seeing and high magnification.
NGC869 / NGC884 - C14	Per	Opn CL	15x, 28x	This target is superb with the Nagler 13. Although low on the horizon, it still offers nice contrast with the background sky and the 2.8deg of fov show the object with all its context.
M56	Lyr	Glob CL	15x, 28x	This is the first time I detect this target. It is quite challenging to find with a 60mm but not impossible. I used the Sheliak (Beta Lyrae) and Sulafat (Gamma Lyrae) as pointers to target M56 along the line passing through these two stars on the side of Sulafat. M56 was detectable with a 15x using an atlas but was very faint and averted vision was almost required to find it. At 28x the object was more visible, but did not show much detail as it only appeared as a soft grey patch. This target required larger aperture and / or darker skies.
M57	Lyr	Pln Neb	28x +/- OIII	Ring Nebula. I tried the OIII filter with the Nagler 3.5 (103x). Although the ring shape was noticeable, it was just too much magnification and the overall image was largely degraded. At 28x + OIII the Ring Nebula emerged from the background sky and appeared as a colourless bubble. I believe that an exit pupil of 1-1.5mm can improve the view for this target.
M97	UMa	Pln Neb	28x +/- OIII	Owl Nebula. Interesting target. Completely invisible without OIII filter. With the OIII, it emerges from the sky and the nearby stars. It is a quite large planetary nebula. No colour or shape was detectable, but it simply appeared as a grey bubble. At 15x + OIII was detectable, but was too small to see any major detail.
M108	UMa	Galaxy	15x, 28x	Surfboard Galaxy. Invisible at both 15x and 28x. This object as well as most of the other galaxies require larger aperture and / or a darker sky.
NGC6992 / NGC6960 - C33 / C34	Cyg	Glob CL	15x + OIII	Veil Nebula. Again, no visible although it is too low on the horizon.
Saturn	Sco	Planet	103x, 206x	It is still fairly low on the horizon. Titan was visible. The Cassini division was not detectable, but it was possible to see a shade in the middle of the ring. At 206x the image was just degraded and difficult to focus. I have to wait for a higher position of the planet.

Date: 13/05/2015
Time: 9pm-12.00am
Location: Cambridge, UK

Altitude (MAMSL): 12m
Temperature (C): 8 (no wind)
Seeing (Antoniadi scale): 1 - Perfect seeing
Transparency (AAAA scale): 5 - Clear

Telescopes: Tele Vue 60 F6
Eyepieces: TV Panoptic 24mm, Nagler 13mm, Nagler 3.5mm, Bresser SA 2x
Power, Exit pupil, FOV: 15x, 4mm, 4.30deg; 28x, 2.2mm, 2.80deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg

Filters: Astronomik OIII

Target	Cons	Type	Power	Notes
Jupiter	Cnc	Planet	103x, 206x	Observed in the twilight. The idea started as a joke because I thought the image would have been too dark for discerning any detail. Instead, it was possible to perceive a little amount of shades on the two major bands of the planet. The boundaries of the other two less visible bands (North and South hemisphere, respectively) were also there. At 103x I was able to see the boundaries of these two bands on the 'equator side', but not on the 'pole side'. At 206x these were noticeable. 4 moons were detectable and one was just about to get closer to Jupiter. I agree with Gerry (sgl: jetstream) that watching Jupiter in twilight shows more contrast. I was also able to see some red-ish colour on the major two bands, which instead is less noticeable when watching Jupiter in the dark. Looking at a bright source before watching the planet did not help me instead. I found I had more difficulty to notice details. Although the exit pupil was only 0.3mm, floaters did not cause me serious problems. Interestingly, I found floaters to be a problem when watching the Sun at 103x. Could these be related to overall image brightness?
Venus	Gem	Planet	103x, 206x	Observed in the twilight. Visible 60% of its phase. No cloud detail was detectable. At 206x, on one side of the focus, Venus appeared violet, on the other side green/yellow. When in focus, there was no colour aberration. Curiously, at this magnification it was still very bright suggesting that a variable polarising filter might be beneficial.
C1	UMi	Opn CL	28x	The detail of this target seemed accessible, but I did not manage to see anything in the position suggested by Stellarium. Unfortunately, I did not have a star atlas with me.
Polaris	UMi	Dbl Star	28x, 103x	A nice target because of the large difference in brightness between the two stars. The Alpha Polaris companion was dim grey and detectable at 28x with some difficulty. 103x easily split the two stars.
M60	Vir	Galaxy	28x	It was detectable with averted vision at 28x. It appeared as a grey patch without a structure. I tried M58, but it was not visible. I believe that to see these targets with this small telescope, very dark skies are required.
NGC6992 NGC6960 C33 / C34	/ - Cyg	Glob CL	15x + OIII	Veil Nebula. No visible, although it is not the best time of the year to see this target.
M57	Lyr	Pln Neb	15x + OIII	Ring Nebula. The OIII filter largely improves the detection of this nebula at 15x. Without a filter, its detection is not easy. It emerges in the sky as a grey little ball. I believe the Nagler 7mm or even the Vixen 5mm can give great views when combined with an OIII filter.
Saturn	Sco	Planet	103x	It was a bit higher than yesterday, but unfortunately, my telescope and eyepieces were soaked with humidity and could not really see this target after the first 5 min. Rings were clearly defined, and I believe the Cassini division could have been detectable.

Date: 12/05/2015
Time: 9pm-11.45pm
Location: Cambridge, UK

Altitude (MAMSL): 12m
Temperature (C): 6 (wind: 20km/h)
Seeing (Antoniadi scale): 2 - Slight undulations
Transparency (AAAA scale): 5 - Clear

Telescopes: Tele Vue 60 F6
Eyepieces: TV Panoptic 24mm, Nagler 13mm, Nagler 7mm, Nagler 3.5mm, Bresser SA 2x
Power, Exit pupil, FOV: 15x, 4mm, 4.30deg; 28x, 2.2mm, 2.80deg; 51x, 1.2mm, 1.54deg; 103x, 0.6mm, 0.77deg; 206x, 0.3mm, 0.38deg

Filters:

Target	Cons	Type	Power	Notes
Jupiter	Cnc	Planet	103x, 206x	Observed in the twilight. Still visible at 206x with some detail but the new tripod is not up to this sort of magnifications. To be fair, the new tripod was fine at 103x but only when there was no wind. 3 bands and 4 moons visible. It would be interesting to try 206x with my solid tripod.
Venus	Gem	Planet	103x	Observed in the twilight. Visible 60% of its phase. No cloud detail was detectable. A polarised filter might help on this target.
M44	Cnc	Opn CL	15x, 28x	The Nagler 13mm offers the best view. Its fov covers the whole object nicely. Image not degraded at all and the background sky was darkened just the right amount for maximising contrast. Exit pupil of about 2.0mm shows a really nice brightness / contrast for point source DSO.
NGC869 / NGC884 - C14	Per	Opn CL	15x, 28x	Again, the Nagler 13 offering almost 3 degrees of fov shows the full object with great detail but conserving an adequate image brightness.
Stock2	Cas	Opn CL	15x, 28x	As above.
M103 or C13 (NGC457)	Cas	Opn CL	28x	Not sure whether I saw M103 or C13 (the Owl Cluster) though. A clear double star was well visible and there were a few dim stars in the background were also detectable. This object starts being visible at 28x. It is relatively small, but a lovely target. I think it was M103 as my memory seems more similar to the images.
M60	Vir	Galaxy	15x, 28x	Turn West to Vindemiatrix. A little crown of star is visible slightly South. Continue and you see a little arrow of stars and a single star in the North. M60 is between these two objects. Not detectable at 15x. Detectable via averted vision at 28x. A patch of grey. The sky was not fully dark though and my eye was not dark adapted. I believe this object can show more detail.
27 Hya	Hya	Dbl Star	15x, 28x	Easily split. Colours detectable.
M13	Her	Glob CL	15x, 28x	Detectable at 15x, but nicer at 28x. No star was resolved. It would be interesting to try 51x although I guess this might be too much.
M57	Lyr	Pln Neb	15x, 28x, 51x	Ring Nebula. For the first time, I managed to see this object with the TV-60. I find extremely difficult to detect it at 15x unless I map the nearby stars with Stellarium. At 28x M57 is clearly visible and appears as a grey blob. At 51x the ring is detectable. I did not try to use an OIII filter because I was freezing due to lack of cloths and about to leave. I believe this target will show much more detail at 51x with OIII filter.
Saturn	Sco	Planet	103x	Very low on the horizon and therefore not the best moment for viewing this target. Despite this, rings and titan were visible. Cassini division and bands were not detectable.

Date: 30/04/2015
Time: 10.00pm-11.00pm
Location: Cambridge, UK
Altitude (MAMSL): 12m
Temperature (C): 6 (no wind)
Seeing (Antoniadi scale): 2 - Slight undulations
Transparency (AAAA scale): 5 - Clear

Telescopes: Tele Vue 60 F6
Eyepieces: TV Panoptic 24mm, Nagler 7mm T6, Nagler 3.5mm T6
Power, Exit pupil, FOV: 15x, 4mm, 4.30deg; 51x, 1.2mm, 1.54deg; 103x, 0.6mm, 0.77deg
Filters:

Target	Cons	Type	Power	Notes
Moon	Vir	Satellite	51x, 103x	Moon phase 91%. The moon at 103x did not need a filter. It was very crisp and showed details in the south hemisphere despite it was almost full. At 51x, the moon is simply scaled of a factor of 1/2, indicating that the Nagler 3.5mm behaves as a perfect 2x Nagler 7mm. It would be useful to have a Moon map to check the crater's names.
Jupiter	Cnc	Planet	103x	At 103x Jupiter showed 4 moons and 4 bands. No specific events were visible this evening.
M44	Cnc	Opn CL	15x	Beehive cluster. One of the best wide open cluster. Not many faint stars were visible because of almost full moon. However, the cluster still emerged in the sky.
NGC869 / NGC884 - C14	Per	Opn CL	15x, 51x	Double cluster. Superb cluster. Even if low in the sky, it was a pleasure to see it. At 51x, the cluster emerged from the background and showed more faint stars.
Stock2	Cas	Opn CL	15x	This cluster next to the double cluster is very nice and needs a wide field telescope. Its stars are not so bright and generally of similar magnitude and colour.
Mel20	Per	Opn CL	15x	Alpha Per moving cluster. Wide field telescopes or binoculars are the best for this superb cluster. Even if low in the sky, it was very beautiful to see. 70 stars detectable.
NGC2392 - C39	Gem	Pln Neb	15x, 51x	Eskimo nebula. At 15x it was detectable with averted vision. It was easily visible at 51x and appeared like a fuzzy blue/grey small patch next to the star.

Date: 14/04/2015b
Time: 9.30pm-11.20pm
Location: Cambridge, UK
Altitude (MAMSL): 12m
Temperature (C): 9 (no wind)
Seeing (Antoniadi scale): 2 - Slight undulations
Transparency (AAAA scale): 5 - Clear

Telescopes: Tele Vue 60 F6
Eyepieces: TV Panoptic 24mm, Plossl 20mm, Nagler 7mm T6, Vixen SLV 5mm, Nagler 3.5mm T6
Power, Exit pupil, FOV: 15x, 4mm, 4.30deg; 18x, 3.3mm, 2.7deg; 51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg; 103x, 0.6mm, 0.77deg
Filters:

Target	Cons	Type	Power	Notes
M35	Gem	Opn CL	15x	Under dark sky this object emerges clearly. A few bright stars with many little faint stars in background. Averted vision helps, but this object is not too demanding if the sky is sufficiently transparent.
M65	Leo	Galaxy	15x, 18x	This object requires aperture and dark sky to be detected and viewed properly. Just very faint object visible through averted vision. An exit pupil of 3.3mm is better than 4.0mm. I wonder whether something between 2.5 and 2.0mm can improve this view even more.
M66	Leo	Galaxy	15x, 18x	See above
Mel111	Com	Opn CL	15x	Coma Berenices star cluster. Located just south of Gamma Com, this large object is as spectacular as M44. Very rich of stars, some bright some small and fainting. Some are doubles. As this is a large object, 15x is the adequate magnification. As Coma Berenices does not have bright stars, you can find this object knowing that is between Denebola (Leo) and Cor Caroli (Alpha CVn).
M53	Com	Glob CL	15x, 18x, 51x	This object is not easy to find. It is just 1-2 degrees east of Diadem (Alpha Com), but this star is very dim to be seen, unless the sky is enough dark. Instead use the Virgo trapezium and point to north following the star Vindemiatrix (Virgo). You can find Diadem just going some degree north from Vindemiatrix. M53 appears as a little grey cloud at 15x. No detail of this globular cluster is visible. At 18x, the contrast is a bit improved, but the image is the same. At 51x this objects is larger and well detectable, but still appears like a grey cloud.
NGC5053	Com	Glob CL	15x, 18x, 51x	Invisible. This is a bit smaller and dimmer than M53. I could not find it.
M3	CVn	Glob CL	15x, 51x	Again, not easy to find. I used the axis from Gamma to Beta Com. This cluster is brighter than M54 and at 51x seems a large white/grey blob.
Jupiter	Cnc	Planet	103x, 72x	Transit of Ganymede on Jupiter. Little black dot on the Equatorial zone. All the other three main satellites were well distinct on right.

Date:	14/04/2015a	Telescopes:	Tele Vue 60 F6
Time:	6.00pm-7.00pm	Eyepieces:	Nagler 7mm T6, Vixen SLV 5mm, Nagler 3.5mm T6
Location:	Cambridge, UK	Power, Exit pupil, FOV:	51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg; 103x, 0.6mm, 0.77deg
Altitude (MAMSL):	12m	Filters:	Variable Polarizing Filter
Temperature (C):	21 (no wind)		
Seeing (Antoniadi scale):	2 - Slight undulations		
Transparency (AAAA scale):	5 - Clear		

Target	Cons	Type	Power	Notes
Sun	Psc	Star	51x +/- VPF; 72x, 103x	Today at 4pm there was a gigantic flare (CME) about 1 sun radius long. Unfortunately I was not at home. I looked at the Sun, but the flare was gone by the time I set up the telescope. A large group of black spots was visible in the North hemisphere. Around them granulation was clearly visible. Granulation was also detectable, although with some difficulty, on the Sun surface at 51x using a VPF. At 72x the Sun revealed a nice image where Sun spot details were visible as well as surface granulation. 103x was just too much for this seeing. Although it can be used for magnifying the solar spots, granulation is completely lost. In addition, floaters become a real issue when watching the sun using 0.6mm exit pupil. I think the best magnification is between 51x and 72x. The Vixen 5mm works very well with the Sun. This was used without VPF filter.

Date:	11/04/2015	Telescopes:	Tele Vue 60 F6
Time:	6.00pm-7.00pm	Eyepieces:	Nagler 7mm T6, Vixen SLV 5mm
Location:	Cambridge, UK	Power, Exit pupil, FOV:	51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg
Altitude (MAMSL):	12m	Filters:	Variable Polarizing Filter
Temperature (C):	12 (wind)		
Seeing (Antoniadi scale):	2 - Slight undulations		
Transparency (AAAA scale):	2 - Poor		

Target	Cons	Type	Power	Notes
Sun	Psc	Star	51x +/- VPF; 72x	Two spot areas: one in the north, the other one in the south. 5 small spots where visible in the north, 4-5 in the south spot area. 2 small spots in the centre of the sun. Best view 51x, using variable polarising filter. No granularity was visible due to the bad seeing.

Date: 09/04/2015
Time: 9.20pm-10.45pm
Location: Cambridge, UK
Altitude (MAMSL): 12m
Temperature (C): 9 (no wind)
Seeing (Antoniadi scale): 2 - Slight undulations
Transparency (AAAA scale): 2 - Poor

Telescopes: Tele Vue 60 F6
Eyepieces: TV Panoptic 24mm, Nagler 3.5mm T6
Power, Exit pupil, FOV: 15x, 4mm, 4.30deg; 103x, 0.6mm, 0.77deg
Filters: Variable Polarizing Filter

Target	Cons	Type	Power	Notes
Jupiter	Cnc	Planet	15x; 103x +/- VPF	At the eyepiece from right to left: Callisto, Io, Jupiter, Europa and Ganymede. This evening I decided to test my new eyepiece (Nagler 3.5mm). Due to the lack of transparency, I only tested this on Jupiter. This was the first time I observed at 103x without using a Bresser 2x SA. The difference was quite substantial. I had the impression that the Nagler 7mm T6 with Bresser 2x SA was more colour corrected than the Nagler 3.5mm T6 only at the edge (last 10% before the field stop). This might have been caused by the presence of light fog though, instead of the eyepiece. I will test this again. On the other hand, the lack of the Bresser 2x SA (4 lens less) improved transparency, and this was detectable. With a Nagler 7mm T6 and Bresser 2x SA, I am able to see a bit more than the two main bands only when the seeing is quite good. Tonight, although the seeing was acceptable, but the sky was quite foggy. The main two bands (North and South Equatorial Belts) were visible and other two bands at the poles were easily detectable (North Polar Region, S.S. Temperate Belt). In the North and South Equatorial Belts, some shades were also detectable. No direction was visible but it was possible to see that the borders and belt colours were rough and not homogeneous. This was particularly true for the North Equatorial Band. No GRS was detectable. The use of a single or double polarizing filter did not improve image quality. The whole image only appeared too dark and the minute details previously described were lost. Possibly, the VPF is more appropriate for brighter objects (e.g. the Sun and the Moon) or Jupiter during sunset or dawn.

Date:	06/04/2015	Telescopes:	Tele Vue 60 F6
Time:	9pm-10.45pm	Eyepieces:	TV Panoptic 24mm, Nagler 7mm T6, Vixen SLV 5mm, Bresser 2x SA Barlow
Location:	Cambridge, UK	Power, Exit pupil, FOV:	15x, 4mm, 4.30deg; 30x, 2mm, 2.15deg; 51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg; 103x, 0.6mm, 0.77deg
Altitude (MAMSL):	12m	Filters:	Astronomik UHC, OIII
Temperature (C):	8 (no wind)		
Seeing (Antoniadi scale):	2 - Slight undulations		
Transparency (AAAA scale):	3 - Somewhat clear		

Target	Cons	Type	Power	Notes
NGC1647	Tau	Opn CL	15x, 51x	In this period of the year, Taurus is quite low on the horizon. This object did not show many stars due to the light pollution and atmosphere. You will need darker skies or look at it when it is higher on the horizon. From Aldebaran, go east for 4 degrees. It is near a couple of stars and i Tauri (mag 5), which is the brightest star in the area. 51x did not help tonight, as the object became too dim. I suspect a 30x, exit pupil 2.0mm would be the best for these targets.
NGC1746	Tau	Opn CL	15x, 51x	After finding NGC1647, from i Tauri, go east for other 4-5deg until you see iota(?) Tauri (102 Tau, mag 4.6). NGC1746 is a medium size cluster at 15x at west of 102 Tau. It also appears very nice at 51x.
NGC1817	Tau	Opn CL	15x, 51x	After finding NGC1647, from i Tauri, go south-east for 5 deg until you see m Tauri (mag 4.9). NGC1817 and 1807 appear on the same field of view at both 15x and 51x. 15x is not sufficient for seeing details of these two clusters. These are accessible at 51x. NGC1817 seems less visible than NGC1807
NGC1807	Tau	Opn CL	15x, 51x	See NGC1817. NGC1807 is more spectacular than NGC1817 at 51x possibly because it has brighter stars.
NGC1662	Ori	Opn CL	15x, 51x	A little open cluster near the top of Orion's shield. It is also reachable from Aldebaran (Alpha Tauris) moving towards south for about 8deg. At 15x it only shows its compactness. At 51x it shows some stars. This is a compact open cluster formed by relatively visible stars.
M1	Tau	SN Rem	15x; 51x +/- OIII, UHC	Invisible after trying with different magnifications and averted vision. Filters did not help either. You need dark skies for this target. Possibly you need to use an eyepiece at 2.0mm exit pupil.
M65	Leo	Galaxy	30x	Leo triplet. Elongated grey patch visible with averted vision. Shape of a cigar. At 30x, the patch is visible more easily than at 15x. The leo triplet is more easily detectable when the telescope is slightly moved. The patches will move accordingly.
M66	Leo	Galaxy	30x	Leo triplet. As for M65.
M51	CVn	Galaxy	30x	Whirlpool Galaxy. Grey patch without a structure visible with averted vision. A darker sky will make the difference on this target.
Jupiter	Cnc	Planet	103x	Two bands clearly visible and a faint one on the south hemisphere was detectable. All four satellites were visible. Io and Europa were very tight at East of the planet.
NGC3242 - C59	Hya	Pln Neb	15x; 51x +/- OIII, UHC; 72x	Ghost of Jupiter. By naked eye, from Alpherat (Alpha Hydrae, mag 1.95), move east and detect the Lambda Hydrae (mag 3.6). This star appears like a star system extending north and south from Lambda Hydrae. Continue moving east following Hydrae body. The next star is slightly south of Lambda. This is Mu Hydra (mag 3.6). Then next one is Nu Hydra (mag 3.10). Mu Hydra will appear Yellow/Orange and almost isolated. It has a little star on the north. Slightly south, you see two bright couples of stars: two more distant at east (HIP50693, HIP50764), two closer at west (HIP51170, HIP51193). Consider the tight couple at west. There is a little star (near this couple in the direction of the other couple. If you use the tight couple and the little star as pointer and you move for another segment in the direction of the little star, the planetary nebula will appear. This appears as a faint tiny and diffuse light. No structure. At 51x it appears like a little full circle. An OIII seems more effective than an UHC filter here possibly because the planetary nebula is low on the horizon. The OIII filter makes it appear from the sky, whereas really few nearby stars are visible. 72x does not show more detail. UHC filter works fine but does not boost the object at the same level as the OIII does.

Date: 25/03/2015
Time: 9pm-10.45pm
Location: Cambridge, UK
Altitude (MAMSL): 12m
Temperature (C): 6 (no wind)
Seeing (Antoniadi scale): 2 - Slight undulations
Transparency (AAAA scale): 3 - Somewhat clear

Telescopes: Tele Vue 60 F6
Eyepieces: TV Panoptic 24mm, Plossl 20mm, Nagler 7mm T6, Vixen SLV 5mm, Bresser 2x SA Barlow
Power, Exit pupil, FOV: 15x, 4mm, 4.30deg; 18x, 3.3mm, 2.73deg; 30x, 2mm, 2.15deg; 51x, 1.2mm, 1.54deg; 72x, 0.8mm, 0.69deg
Filters: Astronomik UHC, OIII

Target	Cons	Type	Power	Notes
M47	Pup	Opn CL	15x	Rich of stars. These are quite spread, making this cluster easy to detect and study.
M46	Pup	Opn CL	15x	This is a compact cluster. It is detectable.
M48	Hya	Opn CL	15x	Dim open cluster. It requires transparent skies to shine properly.
M65	Leo	Galaxy	15x, 18x, 30x	Invisible. Sky not transparent enough. I think an exit pupil of 3.3mm is a good compromise between 4mm and 2mm. 2mm is too much for the TV60 on this targets.
M66	Leo	Galaxy	15x, 18x, 30x	Invisible. Sky not transparent enough.
NGC2244	Mon	Opn CL	15x	Satellite cluster. Six stars in two columns
NGC2264	Mon	CL+Neb	15x	Christmas tree.
NGC2392	Gem	Pln Neb	15x, 51x +/- OIII, UHC, 72x	Eskimo nebula, C39. From Wasat (Delta Gem) move east to 63 Gem. 63 Gem is the brightest star of a 'half moon' of 7 stars. The Eskimo nebula is next to the star HIP36370 (mag8.2), which is a bit isolated but very close to 63 on the opposite direction of Wasat. You can spot it at 15x without filters, but you see it only with averted vision. It appears as a very small patch next to the star. At 51x the nebula is visible as a grey little ball. The boundaries are obfuscated. An UHC filter helps increasing the contrast between the sky and the nebula. An OIII filter shows even more contrast, although I think an UHC filter is better at this exit pupil (1.2mm). Using these filters, the boundaries of the nebula appear much clearer although no structure is visible at this magnification. At 72x (and no filter) is still visible as a grey little ball. Boundaries are obfuscated.
Jupiter	Cnc	Planet	72x	Quick observation. Two bands and four satellite were visible.
Alphard	Hya	Star	72x	Yellow star
Spica	Vir	Star	72x	Blue star
Regulus	Leo	Dbl Star	15x, 72x	Blue-white double star visible at 15x. Clearly split at 72x although not all this magnification is actually required for split it.

Date: 24/03/2015
Time: 7pm-9.30pm
Location: Cambridge, UK
Altitude (MAMSL): 12m
Temperature (C): 5 (no wind)
Seeing (Antoniadi scale): 3 - Moderate seeing
Transparency (AAAA scale): 3 - Somewhat clear

Telescopes: Tele Vue 60 F6
Eyepieces: TV Panoptic 24mm, Nagler 7mm T6, Vixen SLV 5mm, Bresser 2x SA Barlow
Power, Exit pupil, FOV: 15x, 4mm, 4.30deg; 51x, 1.2mm, 1.54deg; 72x, 0.8, 0.69deg; 144x, 0.4mm, 0.35deg
Filters:

Target	Cons	Type	Power	Notes
M47	Pup	Opn CL	15x, 51x	Superb anchor shape. 51x reveals many more details. Quite tight double star near the centre. From Alpha Mon, go 5 degrees South.
M46	Pup	Opn CL	15x, 51x	Missed as I confused it with the aggregation of stars at North-West of 2 Pup A and 4 Pup.
M48	Hya	Opn CL	15x	Not easy to see if the sky is not very dark. Fortunately it is quite large. It is the third vertex of the triangle formed by the trio of stars "1Hya C Hya 2Hya (CHya mag 3.8 is the brightest in the middle of the trio) and 29 Mon (mag 4.35).
Moon	Tau	Satellite	72x	Waxing crescent 25%. Very crisp details.
Venus	Cet	Planet	72x, 144x	144x was too much. Possibly because the planet was too low, or because the eyepiece did not cool down properly. In any case, even at 72x, no planet atmosphere detail.
Mintaka	Ori	Dbl Star	72x	Easily split.
Alnitak	Ori	Dbl Star	72x	Separated components A and C. Cannot remember if B was detectable.
Sigma	Ori	Dbl Star	72x	Visible 5 stars, although only able to split Sigma Orionis into two stars.
Hatsya	Ori	Dbl Star	72x	Very nice double star. The companion is quite dim and small compared to Hatsya. Companion is grey.
Sirius	CMa	Dbl Star	72x	Not able to split Sirius. Too much bright.
Castor	Gem	Dbl Star	72x	The companion Castor B is also bright and the two stars are quite close to each other. Same colour. Castor C is very dim and more distant from the other two.
Mekbuda	Gem	Dbl Star	72x	Easily split double star.
M35	Gem	Opn CL	72x	Many other stars are visible.

Date: 22/03/2015
Time: 7pm-10pm
Location: Cambridge, UK
Altitude (MAMSL): 12m
Temperature (C): 3 (no wind)
Seeing (Antoniadi scale): 2 - Slight undulations
Transparency (AAAA scale): 3 - Somewhat clear

Telescopes: Tele Vue 60 F6
Eyepieces: TV Panoptic 24mm, Nagler 7mm T6, Vixen SLV 5mm, Bresser 2x SA Barlow
Power, Exit pupil, FOV: 15x, 4mm, 4.30deg; 51x, 1.2mm, 1.54deg; 144x, 0.4mm, 0.35deg
Filters: Astronomik OIII

Target	Cons	Type	Power	Notes
M45	Tau	Opn CL	15x, 51x	Very clear and defined. 15x offers the best fov.
M42	Ori	CL+Neb	15x + OIII, 51x	4mm exit pupil + OIII shows nebula extension. 51x shows trapezium
Sigma	Ori	Mlt star	51x	Sufficient for seeing 5 stars
NGC1980	Ori	Neb	15x + OIII	4mm exit pupil + OIII shows a bit of nebula around the star Hatsya
M78	Ori	Neb	15x	Unsuccess
NGC2244	Mon	Opn CL	15x	Satellite cluster. Six stars in two columns
NGC2237	Mon	Neb	15x + OIII	Rosette nebula. Detectable with OIII filter. A grey patch 2 degree large. No structure visible
NGC2264	Mon	CL+Neb	15x + OIII	Christmas tree + Cone nebula. Christmas tree is easily visible. Cone nebula is detectable with an OIII filter near and south of 15mon.
M35	Gem	Opn CL	15x	Under transparent night, many stars are visible inside.
M36	Aur	Opn CL	15x	Easy to find after finding M38. A bit difficult to see inside as it is quite dim.
M37	Aur	Opn CL	15x	Easy to find after finding M36. Still difficult to see inside.
M38	Aur	Opn CL	15x	Quite clear under transparent skies.
M44	Cnc	Opn CL	15x	Praesepe. Spectacular at 15x.
M67	Cnc	Opn CL	15x, 51x	King cobra. Not to easy to detect. Nicer at 51x.
M65	Leo	Galaxy	15x	Leo triplet. From Chertan (theta Leo), use the star pointers HIP54688 and HIP54711 to reach eta Leo. Eta Leo forms a 90Deg triangle with HIP55033 and HIP55262. From the latter look at south slightly. Galaxy detectable as patches. M56 is elongated. Averted vision for 10min is required. Cover the other eye to relax the observing eye nerve.
M66	Leo	Galaxy	15x	Leo triplet. As for M65. Maybe using an exit pupil of 2.7-2.0mm is better.
M95	Leo	Galaxy	15x	Unsuccess
M96	Leo	Galaxy	15x	Unsuccess
Pherkad-	UMi	Dbl Star	15x	Gamma Ursa Minor blue 3mag. It has a neighbour star 10.30mag. Pherkad Minor orange 5mag.
Pherkad minor				
19-20	Dra	Dbl Star	15x	4.5mag and 7mag.
Eta-	Dra	Dbl Star	15x	2.7mag and 6.05mag
HIP80309A				
M51	CVn	Galaxy	15x	Whirlpool Galaxy. From UMA-Alkaid, move south to 24CVn. Continue on that direction until HIP65768. This forms a triangle with HIP66004 and HIP66116. They are all 7mag stars. HIP65768 is the brightest in the area. M51 lies externally of the line between HIP65768 and HIP66004. Averted vision for 10min is required. You will see a grey patch. No structure.
M101	UMa	Galaxy	15x	Unsuccess
Jupiter	Cnc	Planet	144x	Order: Europa, Callisto, Jupiter, Io, Ganymede. Two bands very visible. The lower one was visible on the left (refractor). On the right the great red spot was detectable. Very minor bands north and south.

Date: 23/02/2015
Time: 7pm-9pm
Location: Cambridge, UK
Altitude (MAMSL): 12m
Temperature (C): 1 (no wind)
Seeing (Antoniadi scale): 2 - Slight undulations
Transparency (AAAA scale): 3 - Somewhat clear

Telescopes: Tele Vue 60 F6
Eyepieces: TV Panoptic 24mm, Plossl 20mm, Nagler 7mm T6, Vixen SLV 5mm, Bresser 2x SA Barlow
Power, Exit pupil, FOV: 15x, 4mm, 4.30deg; 18x, 3.3mm, 2.73deg; 103x, 0.6mm, 0.77deg; 144x, 0.4mm, 0.35deg
Filters: Astronomik OIII, UHC

Target	Cons	Type	Power	Notes
M42	Ori	CL+Neb	15x, 18x	4mm exit pupil + UHC shows nebula extension. OIII shows more contrast.
NGC2244	Mon	Opn CL	15x, 18x	Satellite cluster. Six stars in two columns
NGC2237	Mon	Neb	15x, 18x	Rosette nebula. Detectable with OIII filter. Very soft grey patch. No structure. Invisible with UHC filter.
M35	Gem	Opn CL	15x	Detectable but not much detailed.
M36	Aur	Opn CL	15x	Very poor detail, but detectable.
M37	Aur	Opn CL	15x	Very poor detail, but detectable.
M38	Aur	Opn CL	15x	The first of the group to find. Poor detail.
M44	Cnc	Opn CL	15x	Praesepe. Spectacular at 15x.
M67	Cnc	Opn CL	15x	King cobra. Not too easy to detect. Looks like a grey patch, more visible using averted vision.
Jupiter	Cnc	Planet	103x, 144x	A bit of wind, but the image stays crisp at high magnifications. No aberration.
NGC1662	Ori	Opn CL	15x, 51x	Found casually while scanning from Aldebaran to Beltegeuse. Very small little open cluster at 15x. Much better at 51x. Not easily detectable, because of its small size
NGC1647	Tau	Opn CL	15x	Beautiful open cluster easily detectable from Aldebaran
NGC1746	Tau	Opn CL	15x	Not sure I found it. It appeared smaller than NGC1647. Possibly a darker sky reveals more interesting features.
Cr65	Tau	Opn CL	15x	Nice aggregation of stars, although none of them really emerges. Wide field is required. North of Orion-Meissa.
Cr70	Ori	Opn CL	15x	Gorgeous Orion's belt. The chain of stars surrounding Alnilam is superb. Wide field telescope.

Date: xx/xx/1998
Time: Mar 1998 to Jan 2015
Location: Venice, Lorenzago (IT), Newcastle, Luton Devon, Cambridge, (UK)
Altitude (MAMSL): 10m - 880m
Temperature (C): -5 to +30 (wind: 0 to 40km/h)
Seeing (Antoniadi scale): 1 to 3
Transparency (AAAA scale): 3 to 5

Telescopes: Celestron Newton 114mm F8; Binoculars 15x70; Tele Vue 60 F6
Eyepieces: Kellner 24mm, Orion Sirius 10mm, Orion Shorty 2x Barlow. TV Panoptic 24mm, Plossl 20mm, Nagler 7mm T6, Vixen SLV 5mm, Bresser 2x SA Barlow
Power, Exit pupil, FOV: 36.4x, 3.1mm, 1.4deg; 72.8x, 1.6mm, 0.7deg; 91x, 1.3mm, 0.57deg; 182x, 0.6mm, 0.3deg. 15x, 4mm, 4.30deg; 18x, 3.3mm, 2.73deg; 103x, 0.6mm, 0.77deg; 144x, 0.4mm, 0.35deg
Filters:

Target	Cons	Type	Power	Notes
M1	Tau	SN Rem	36x	Crab Nebula. C114F8. Venice, IT.
M2	Aqr	Glob CL	15x	B15x70. Newcastle, UK
M 10	Oph	Glob CL	36x; 15x	C114F8; B15x70. Venice, IT; Newcastle, UK
M 11	Sct	Opn CL	15x	Wild duck cluster. B15x70. Newcastle, UK
M 12	Oph	Glob CL	15x	B15x70. Newcastle, UK
M 13	Her	Glob CL	36x; 15x, 51x	Hercules Globular Cluster. C114F8; B15x70; TV60F6. Venice, IT; Newcastle, UK
M 15	Peg	Glob CL	15x	B15x70. Newcastle, UK
M 20	Sgr	CL+Neb	36x	Trifid nebula. C114F8. Venice, IT
M 27	Vul	Pln Neb	15x	Dumbbell nebula. B15x70. Newcastle, UK
M 29	Cyg	Opn CL	15x	B15x70. Newcastle, UK
M 31	And	Galaxy	36x; 15x	Andromeda Galaxy. C114F8; B15x70; TV60F6. Venice, IT; Newcastle, UK; Luton, Devon, UK
M 32	And	Galaxy	15x	Companion to M31. B15x70. Luton, Devon, UK
M 34	Per	Opn CL	15x	B15x70; TV60F6. Newcastle, UK
M 35	Gem	Opn CL	15x, 72x	TV60F6. Newcastle, UK
M 36	Aur	Opn CL	15x, 30x	TV60F6. Newcastle, UK; Cambridge, UK
M 37	Aur	Opn CL	15x, 30x	TV60F6. Newcastle, UK; Cambridge, UK
M 38	Aur	Opn CL	15x, 30x	TV60F6. Newcastle, UK; Cambridge, UK
M 41	CMa	Opn CL	15x	TV60F6. Cambridge, UK
M 42	Ori	CL+Neb	36x; 15x, 18x, 30x, 36x, 51x, 72x	Orion nebula. C114F8; TV60F6. Newcastle, UK; Cambridge, UK
M 43	Ori	Brn Neb	36x; 15x, 18x, 30x, 36x, 51x, 72x	Detached part of Orion Nebula. C114F8; TV60F6. Newcastle, UK; Cambridge, UK
M 44	Cnc	Opn CL	15x	Beehive Cluster. B15x70; TV60F6. Newcastle, UK; Cambridge, UK
M 45	Tau	CL+Neb	36x; 15x, 51x	Pleiades. C114F8; TV60F6. Venice, IT; Newcastle, UK
M 57	Lyr	Pln Neb	37x; 15x	Ring Nebula. C114F8; B15x70. Venice, IT; Newcastle, UK
M 67	Cnc	Opn CL	15x	TV60F6. Cambridge, UK
M 81	UMa	Galaxy	15x	Bode's Galaxy. B15x70. Newcastle, UK
M 82	UMa	Galaxy	15x	Cigar Galaxy. B15x70. Newcastle, UK
M 92	Her	Glob CL	15x	B15x70. Newcastle, UK
M 110	And	Galaxy	15x	M31 Companion. B15x70. Luton, Devon, UK
C14	Per	Opn CL	15x, 51x	Double Cluster. B15x70; TV60F6. Exeter, UK; Newcastle, UK
C28	And	Opn CL	15x	B15x70. Newcastle, UK
C37	Vul	Opn CL	15x	B15x70. Newcastle, UK

C41	Tau	Opn CL	36x; 15x, 18x, 51x	Hyades. C114F8; B15x70; TV60F6. Venice, IT; Newcastle, UK
C49	Mon	Neb	15x	Rosette Nebula. TV60F6. Cambridge, UK
C50	Mon	Opn CL	15x	Satellite cluster. TV60F6. Newcastle, UK; Cambridge, UK
Stock1	Vul	Opn CL	15x	B15x60. Newcastle, UK
Stock2	Cas	Opn CL	15x	B15x60; TV60F6. Newcastle, UK
Mel20	Per	Opn CL	15x	B15x70; TV60F6. Newcastle, UK
Mel25	Tau	Opn CL	36x; 15x, 51x	Hydes. C114F8; TV60F6. Venice, IT; Newcastle, UK
Mel111	CmB	Opn CL	15x	B15x70. Newcastle, UK
Cr39	Ori	Opn CL	36x; 15x, 51x	TV60F6. Cambridge, UK
Cr65	Tau	Opn CL	15x	TV60F6. Cambridge, UK
Cr68	Ori	Opn CL	15x, 30x	TV60F6. Newcastle, UK; Cambridge, UK
Cr89	Gem	Opn CL	15x	TV60F6. Newcastle, UK; Cambridge, UK
Cr97	Mon	Opn CL	15x, 30x	TV60F6. Cambridge, UK
Cr106	Mon	Opn CL	15x, 30x	TV60F6. Cambridge, UK
Cr107	Mon	Opn CL	15x, 30x	TV60F6. Cambridge, UK
Cr399	Vul	Opn CL	15x	B15x70. Newcastle, UK
NGC1750	Tau	Opn CL	15x, 51x	TV60F6. Cambridge, UK
NGC1981	Ori	Opn CL	15x, 51x	TV60F6. Cambridge, UK
NGC2264	Mon	Opn CL	36x; 15x, 51x	C114F8; TV60F6. Venice, Italy; Cambridge, UK
NGC1980	Ori	Neb	15x	TV60F6. Cambridge, UK
NGC2392	Gem	Pln Neb	15x, 51x, 72x	TV60F6. Cambridge, UK
27 Hydra	Hya	Dbl Star	51x	TV60F6. Cambridge, UK
Pherkad-	UMi	Dbl Star	51x	TV60F6. Cambridge, UK
Pherkad minor				
19-20	Dra	Dbl Star	51x	TV60F6. Cambridge, UK
Eta-	Dra	Dbl Star	51x	TV60F6. Cambridge, UK
HIP80309A				
Albireo	Cyg	Dbl Star	72x	C114F8; TV60F6. Venice, IT; Newcastle, UK
Sun		Star	50x; 15x, 51x	TV60F6. Cambridge, UK
Moon		Satellite	36x, 90x, 180x; 15x, 51x, 72x, 103x, 144x	C114F8; B15x70; TV60F6. Venice, IT; Newcastle, UK; Cambridge, UK
Mercury		Planet	15x	B15x70. Newcastle, UK
Venus		Planet	36x; 72x, 144x	C114F8; TV60F6. Venice, IT; Cambridge, UK
Mars		Planet	36x, 90x, 180x	C114F8. Venice, IT
Jupiter		Planet	36x, 90x, 180x; 72x, 103x, 144x	C114F8; TV60F6. Venice, IT; Newcastle, UK; Cambridge, UK
Saturn		Planet	36x, 90x, 180x	C114F8. Venice, IT
Uranus		Planet	10x; 15x; 15x	B10x50; B15x70; TV60F6. Lorenzago, IT; Newcastle, UK