

Half a year with Baader 95/560mm apochromat

For about half year, I was enjoying 95mm Baader apochromat. I admit, I'm hopeless refractor lover. It went that far that I have designed even my own lens. It is long 82mm f/20 oil doublet based on short flint, not unlike the first apochromats made by Zeiss still in 19th century¹.

After some time, I was contacted by equally enthusiastic observer from Germany. He was interested in my oil doublet and in exchange for it he made generous offer - I could play for couple of months with his Baader 95mm apochromat. I heard rumors about this oil fluorite triplet before and I could not resist the offer. After all, with this refractor, Baader was building on Zeiss experiences with their now legendary APQ lenses.

I have never looked through a fluorite lens and I was curious about its performance. I liked the design as well. As you have guessed by now, I have a sweet spot for oil lenses. I think this is a very good design for refractor with reduced air-to-glass surfaces to bare minimum and with good thermal behavior, thanks to the direct contact between the lenses. For me, as a backyard planetary observer, these two aspects are important.

So, we arranged a meeting and in February I was holding in my hands this little marvel. The telescope was surprisingly light for a 95mm triplet. It could ride on Zeiss Telementor mount. This was my favorable setup, very light and easy to set. When I wanted more comfort, I put the telescope on driven Zeiss 1b mount.

Mechanics was superb, more than adequate for visual observing. The tube had removable part for binoviewing and the telescope came with Baader MaxBright binoviewer. However, my eyes are strange, I struggle with keeping the two images to-

gether in binoviewers. As a result, unlike the majority of observers, I prefer single eye viewing. This is how I was using the telescope most of the time.

Optical performance

I'm not really a person that makes systematic evaluation of telescopes or eyepieces. I rather like to use the equipment for observing, as my time under the night skies is quite limited. At least, I keep a habit of star testing new telescope as the test is quick and quite informative. I could not see any optical aberration worth to be mentioned. Simply perfect.

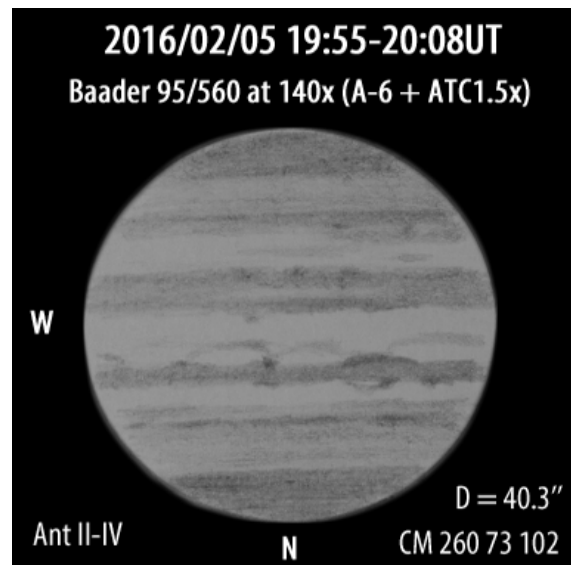
To further evaluate the performance, I checked several double stars. I was pleased, to see the very first night not only E component in Trapezium. F star was showing occasionally as well at power of 110 \times .

Unequal tight pairs, like E and F components in ϑ_1 Ori, are strong test of thermal properties. One -5°C freezing night, corresponding to 20°C temperature shock, it took my former ED 100/900mm doublet about 45 minutes to start to show the faint companion of ϑ Aur. This February evening was close to freezing and M42 with Trapezium was the first target I have visited that night. Yet, the Baader apochromat was performing from the very beginning despite being much faster triplet. It speaks well about the lens design.

Planetary sessions

The telescope arrived just in time for Jupiter and Mars apparitions. It took me a while to settle down right magnifications and eyepieces. For Jupiter, I ended up with two favorable options, either Zeiss Abbe Ortho (ZAO-I) 10mm combined with Televue Powermate 2.5 \times or ZAO-I 6mm with ATC 1.5 \times barlow. Both combinations were pro-

¹For details, look at the first light report [20140327.ATC82.pdf](https://www.cloudynights.com/attachment.php?attachmentid=20140327.ATC82.pdf)



viding magnification of 140 \times . If I wanted more, I replaced 6mm ortho with Pentax XO5 to get 165 \times . For Mars, I needed something around 200 \times . This was provided by a combination of Powermate 2.5 \times with TMB monocentric 7mm eyepiece or I was using Pentax XO2.5 directly.

As Mars attitude was never high, most of the time I observed this planet straight-through without any diagonal. This was my preferred mode for Jupiter viewing as well, although here it was more cumbersome. Other times, I was using T2 Baader mirror diagonal that came with the scope.

The level of performance was great. The telescope was definitely providing more resolution than my 80mm refractors that I'm

using usually for observing planets from my backyard. This is illustrated by Jupiter sketches I made within two days at roughly some rotation. The first one, top left, is from AS80/1200, the second, top right, is through Baader 95mm.

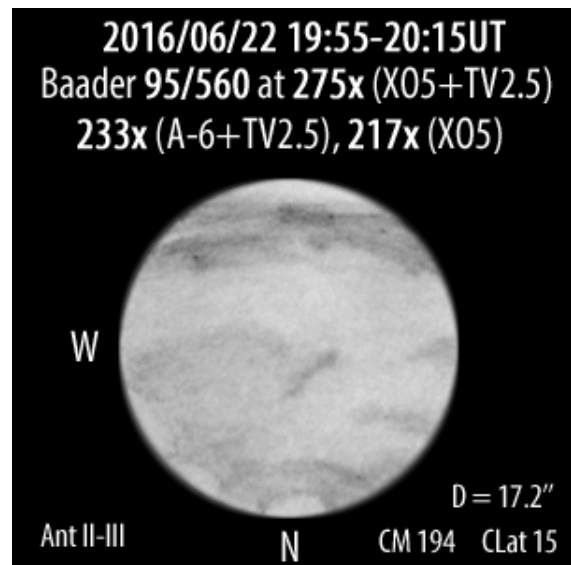
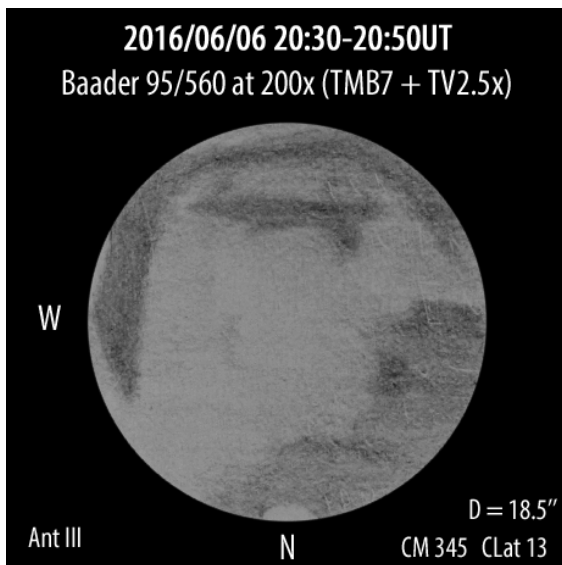
I was admiring the beautiful color of Great Red Spot, definitely much more pronounced than in 80mm refractors. The belts were full of details, festoons in equatorial zone were visible every observing session. The view was very clear and the whole surface was full of rich texture. Undoubtedly a sign of superb optics with good control of scattered light.

In several nights, I could even guessed a presence of small white ovals in South Temperate Zone (STZ), see the sketch at the bottom of the page. They were not directly visible. Their presence was revealed by texture in two belts bordering the temperate zone.

This was not a favorable Mars apparition. The planet was quite low and small, still I managed to record many albedo features. During spring and early summer, I scanned basically the whole globe. The hemisphere with Sinus Major was full of dark albedo areas. Even the *boring* side was showing interesting low contrast features. I had quite some fun trying to sharp my vision to observe them, see the two sketches on top of the next page.

Baader 95mm refractor was also provid-





ing breathtaking views of Saturn at 200 \times . I enjoyed especially the subtle colors on the globe. The southern hemisphere was of bright yellow colors, north equatorial belt was brownish with a hints of semi-arcs of two darker thin belts. North of this belt, there were darker subtly changing pastel colors. Some nights, I could even glimpse C ring occasionally.

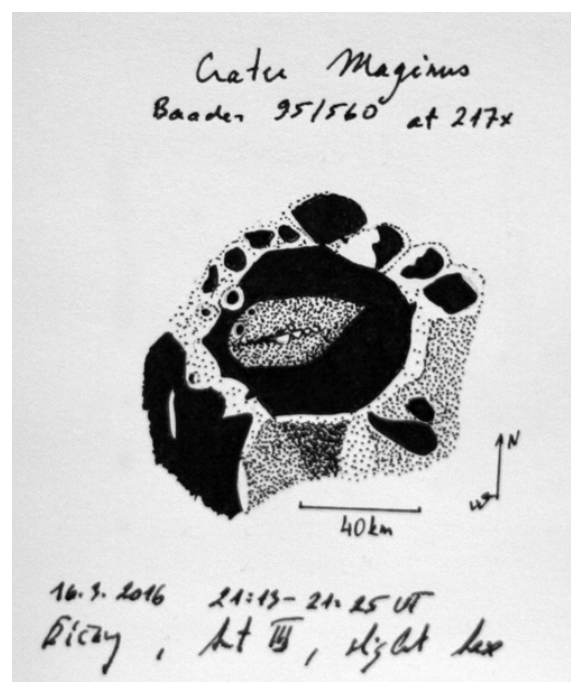
I was enjoying the Moon as well. Again the telescope was providing crisp views of our neighbor rough surface. One night, I have notice and interesting light on crater Maginus. The Sun was just rising over the crater and only central parts of the floor were lit by the Sun, see the sketch at the bottom of this page. My guess is that Maginus has concave floor, similar to crater Petavius.

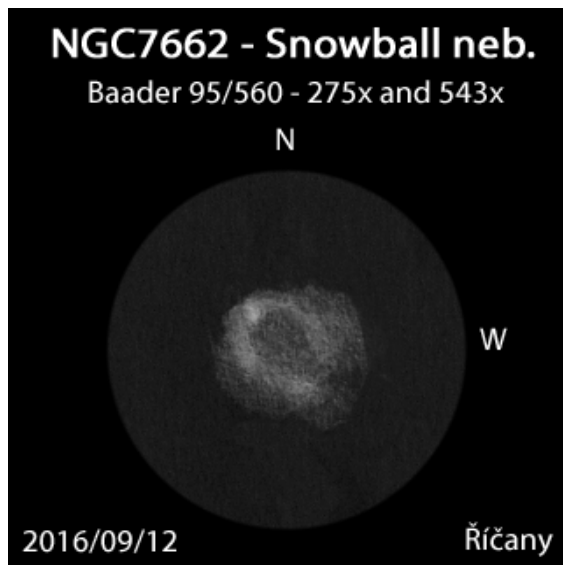
I was using the telescope in many backyard planetary sessions and I was never turned down. I was pleased to notice only mild temperature effects, the telescope was always ready to perform even on short notice. This was indeed a refractor with respectable size, while still being effective to take an advantage of short openings in clouds. Our unstable winter weather was offering only those in last several years. Not a trivial accomplishment when compared to my former 80/480mm Lomo triplet which needed at least one hour before getting to its top performance.

Deep sky sessions

Deep sky performance is of course limited by the 95mm diameter. For me, this is plenty of aperture as I'm doing most of the deep sky observing with 63mm and 80mm refractors.

The problem with this little telescope was its speed. More precisely, lack of eyepieces that would be able to cooperate with f/5.9 speed. This was true especially for low power views. I solved it by keeping ATC 1.5 \times barlow in the focuser permanently. My ATC 40mm Kellner was then providing power of 21 \times and 2 $^\circ$ field of view sharp to





the edge.

Most memorable was one late summer night when I took the telescope under darker sky. Beside revisiting several brighter familiar targets, they always look much better under better sky, I was chasing some very faint targets as well.

For example, I was able to see two Palomar globular clusters. Palomar 9 (NGC 6717) is quite bright, the difficulty comes from 2' distant star ν_2 Sgr. I had to pump the power to 165 \times (XO5+ATC1.5 \times) in order to clearly see it. Palomar 8 was more though, still, it was clearly there at 52 \times (ZAO-16+ATC1.5 \times) as very faint rounded glow.

Crescent nebula NGC 6888 is difficult target even in larger telescopes. Baader 95mm apochromat had no problem to reveal at 52 \times the main semi-arc between two brighter stars. The toughest target for the night was 5.5' large and faint planetary nebula Jones 1 in Pegasus. To my surprise, I was able to glimpse it at 21 \times with the help of OIII filter. And not only me, four observers who were around and looked through the eyepiece were able to see this planetary nebulae as well.

I also tested the telescope performance on small planetaries. These are my favorite targets from our backyard as the light pollution does not hurt too much the bright cores. Baader was doing very well with this respect, see the NGC 7662 sketch on this page.

The drawing was made with bright Moon on the sky. Some planetary nebulae can hold powers above 500 \times even in small telescopes. To reach these magnifications in 560mm focal length telescope was no problem with my barlow lenses.

Conclusion

I'm big fan of long refractors, I have found that they can supersede in performance short apochromats. This little fluorite apochromat forced me to change my mind. When they are well made, as this state-of-the-art marvel from Baader, they can really deliver perfect images. This includes not only superb optics packed in a small and light package. I appreciated also its practical performance in every night use, in particular the thermal properties which I consider an important aspect for the grab-and-go telescope.

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