THE TAL SUPER PLÖSSL
(As Viewed through a 4” f/8 APO and 10” f/4.7 Dobsonian)

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Figure 1.
6.3mm, 10mm, 17mm, 25mm, and 40mm TAL Super Plössls
Image by the Author; Eyepieces courtesy of www.talteleoptics.com

I. Introduction

TAL telescopes and eyepieces, made in Russia by Novosibirsk Instrument-Making Plant (www.npzoptics.com), is a long respected brand for optics in amateur astronomy. TAL astronomy products are available worldwide from multiple sources including:

United States: www.talteleoptics.com,
Russia: www.telescopes.ru,
United Kingdom: www.acecameras.co.uk, www.1stoptics.com, www.opticalvision.co.uk.

The TAL Super Plössls are marketed as a Symmetrical design (i.e., two identical doublets). For this review, the TAL 6.3mm, 10mm, 17mm, 25mm, and 40mm Super Plössls were examined and field tested.

The TAL Super Plössls are advertised to have the following characteristics (see http://www.npzoptics.com/files/Okulars.pdf):

Focal Length (mm)	AFOV	Eye Relief (mm)	Weight (oz)	Elements/Groups	Coatings	Barrel (inches)
6.3	45º	6	2.1	2 / 2	FMC	1.25
7.5	45º	6	2.3	2 / 2	FMC	1.25
10	45º	7.5	2.5	2 / 2	FMC	1.25
12.5	45º	10	2.8	2 / 2	FMC	1.25
17	45º	11	3.2	2 / 2	FMC	1.25
20	45º	14	3.5	2 / 2	FMC	1.25
25	45º	18.7	3.9	2 / 2	FMC	1.25
32	45º	22	6.0	2 / 2	FMC	1.25
40	38º	32	7.4	2 / 2	FMC	1.25

Table 1. Manufacturer supplied data for the TAL Super Plössls

II. Physical, Mechanical, and Optical Examination

The TAL Super Plössls are robustly built. The have the traditional chromed brass barrels (with no undercut - thank you), all metal housings, removable soft rubber eye guards, and the 17mm, 25mm, and 40mm also have rubber grip panels. The fixed eye guard, while flexible and can be pressed down, does not stay in the down position. The interior of the eyepiece uses metal retaining rings to secure the optics and the field stop and filter threading are integral (i.e., milled) with the barrel. The interior is also blackened with a satin, instead of flat, finish. The bottom of the barrel is threaded for standard filters, and filters easily thread onto the barrel. Lens edges appear to be fully blackened.

Figure 2. Interior view of the 25mm (left) and 10mm (right) TAL Super Plössls
Image by the Author; Eyepieces courtesy of www.talteleoptics.com

Lens coatings give a distinctive purple-blue/violet, or amber/yellow colors to light reflected off the surface. Graphics appear to be silk-screened on the surface of the housing. Overall, they give the impression of being sturdy, well built, have good heft, and have a fit-and-finish that while not up to the standard of what would be called premium, is clearly quite good.

Figure 3. Eye lens multicoating reflections
Image by the Author; Eyepieces courtesy of www.talteleoptics.com

While the TAL Super Plössls are a Symmetrical Plössl design, the diagrams available on the www.npzoptics.com website show an unconventional double-convex design for each doublet. Two double-convex doublets is a departure from the typical Plössl/Symmetrical, which usually has convex surfaces only on the inward facing surfaces of each doublet, and either flat (plano) or slightly concave surfaces on the external facing surfaces of each doublet (see diagram below - *illustrative only, lens curves and spacing are not to scale*). Visual inspection of the external facing surfaces for the 17mm TAL Super Plössl confirms this unconventional convex design.

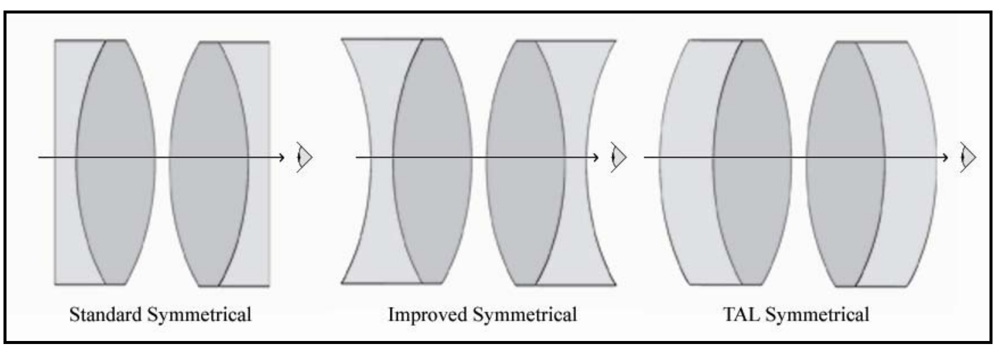

Figure 4. Examples of the typical doublets used for modern Symmetrical & Plössl Eyepieces
Illustration by the Author

Measurement of the eye relief and apparent field of view (AFOV) characteristics of the TAL Super Plössls reveals a departure from the advertised statistics. The manufacturer states that the AFOV is 45º for all but the 40mm. Visually they give the impression of being much wider. Bench testing indicates their AFOV is closer to 51º instead of the stated 45º for the 6.3mm, 17mm, and 25mm. Visual comparison of the AFOV of the TAL Super Plössls compared to the 44º Pentax 5mm XO also confirmed their AFOV as being sizably larger. Finally, the field stop measure of the 25mm TAL showed a diameter of 21.2mm, which is what would be expected for an eyepiece nearer 50º degrees rather than 45º. The manufacturer's statistics therefore seems to be understated for all but the 40mm, where bench measures indicated an AFOV of 37º, very close to the manufacturer's 38º (well within the measure's margin of error).

Next, the orthoscopic nature of the TAL Super Plössl was examined, in particular, that of the 10mm TAL compared to the 10mm Baader Classic Ortho (BCO) -- *Not that the BCO Ortho is a classic 4 element 2 group design in a 1-3 configuration that is based on the Zeiss Jena .965 orthoscopic eyepieces*. To conduct this test a telescope was set up indoors (an 80mm f/6.25 APO) and test targets were examined to highlight the ability of each eyepiece to maintain correct geometry. The test target consisted of a series of circles, squares, and triplet parallel lines oriented both horizontally and vertically. These various geometric shapes were then positioned throughout the field of view (FOV) to determine if the shape's geometry altered. The first test was for rectilinear distortion (RD) using the parallel horizontal and vertical lines. Both eyepieces showed RD, however it was very little, in fact some of the least RD I have seen testing various eyepieces over the years. While this test cannot quantify the exact amount of RD, it is useful for comparison of one eyepiece against another. When switching back and forth between the TAL and the BCO, the RD looked almost equal, with the TAL perhaps showing just a very slight amount more. It required careful scrutiny they were so close, but after many trials the TAL definitely showed a very slightly larger amount of RD. To test for angular magnification distortion (AMD), I find the easiest method is to view three parallel lines as they bisect the center of the field of view (FOV). If there is AMD and the lines and spacing between the lines is magnified nearer the field stop, then they will appear to diverge apart slightly as the exit the field of view. Like the RD, both the TAL and the BCO showed a very slight amount of AMD, however, it was easy to tell that the BCO showed slightly more. Observing a circle on the test target brought out the interplay of AMD and RD more easily. As the circle was moved from the center of the FOV to the field stop, it distorted into a more pronounced oval shape in the BCO compared to the TAL.

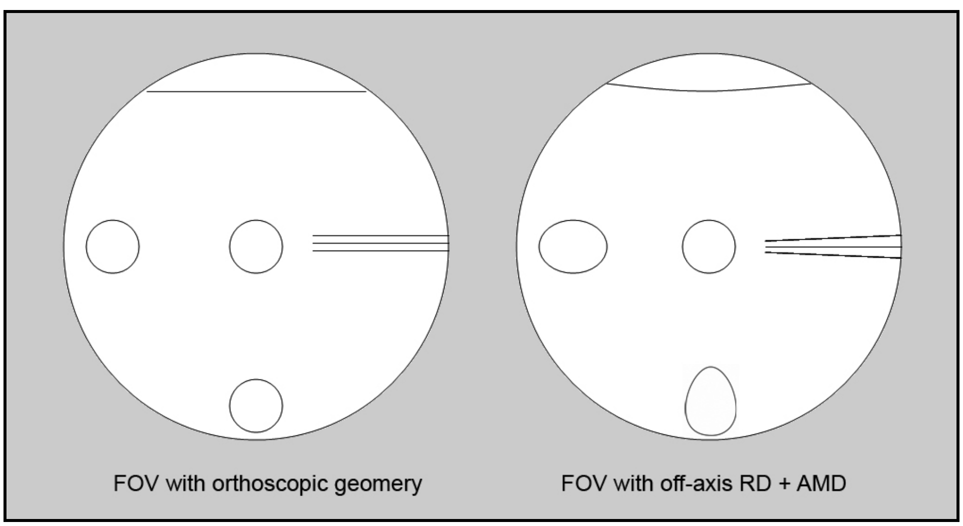

Figure 5.
Orthoscopic FOV (left), non-orthoscopic FOV where lines/angles/shapes distort.
Depending on the interplay of RD and AMD, note that off-axis circles may show as ovals, football-shapes, or even egg-shapes depending on the aberration interplay
Illustration by the Author

While both the 10mm TAL Super Plössl and 10mm Baader Classic Ortho preserved geometry of objects better than typical wide field eyepieces, overall the TAL did a better job than the BCO when objects neared the field stop. Overall, both showed excellent orthoscopic qualities with the edge going to the TAL 10mm.

Finally, eye relief measurements did not closely correspond to the advertised numbers provided by marketing/technical documentation. Most manufacturers state the "design's" optical eye relief when they provide these figures (i.e., measured from the center of the eye lens surface). When eyepieces are manufactured, one can reasonably expect the manufactured eyepiece to deviate slightly from the design parameters due to production variances (including its eye relief). As can be seen from the table below, measured optical eye relief was less than that advertised for all but the 40mm. However, more important for the observers who wear eyeglasses while observing is the eye relief from the top of the eye guard and from the top of the housing when the eye guard is removed. Those measures, sometimes referred to as usable eye relief, are provided in the table below. Since many eyeglass wearers report needing at least 13mm of eye relief to view the entire AFOV of an eyepiece while wearing their glasses, only the 25mm and 40mm of the TAL Super Plössls reviewed fell within this range. Presumably, the untested 32mm should also be adequate. For the other focal lengths (which is typical of Plössls), observers using eyeglasses should not expect to see the entire AFOV when viewing unless they remove their eyeglasses.

Focal Length (mm)	ADVERTISED		MEASURED / OBSERVED				
	AFOV	Eye Relief (mm)	AFOV	Eye Relief (mm) from Eye Lens	Eye Relief (mm) from Top Housing	Eye Relief (mm) from Eye Guard	Field Stop
6.3	45º	6.0	51º	3.2	2.9	-3.0	Not Sharp
10	45º	7.5	51º	5.8	5.3	-0.5	Sharp
17	45º	11.0	51º	9.8	9.1	2.3	Sharp
25	45º	18.7	51º	15.1	12.6	5.7	Sharp
40	38º	32.0	37º	32.0	17.5	10.6	Sharp

Table 2: Manufacturer supplied data vs. measured data for the TAL Super Plössls

III. Field Observations

For the initial outings, the TAL Super Plössls were used with the Orion 10" f/4.7 XT10 with a Tele Vue Paracorr in place to correct the mirror's coma. Targets observed where the Ring Nebula (M57), the Great Hercules Cluster (M13), and the Perseus Double Cluster. Overall, all the TAL Plössls provided an outstanding view showing excellent transmission with bright pinpoint stars on velvety dark backgrounds for a pleasingly high visual contrast view. In comparison to the 25mm and 17mm Sterling Plössls, the TALs showed a slightly richer black background FOV with very slightly less transmission (as judged by how easy it was to observe faintest stars visible). Comparing the TAL 40mm to my favorite vintage Meade 3000 40mm Plössl, the richness of the background FOV in the TAL was far superior to the Meade, giving star field more of that diamonds on velvet appearance. This was quite surprising as the difference was visually significant. Unlike the Meade and Sterling's however, the TAL 40mm did show a very minor amount of light fall-off or dimming of the view right at the field stop. The performance of the field stop for the TAL 6.3mm was similar, but also showed the field stop as non-distinct, instead of being a sharply defined edge as it was in the 10mm, 17mm, 25mm, and 40mm TALs.

Turning the XT10 to the Great Orion Cluster (M42), the TALs rendered this showpiece nebula magnificently. Nebulosity was extensive and the mottled structure of the nebula was clearly displayed. Using the 6.3mm and the 10mm, the elusive Trapezium E and F components were clearly and strongly visible. Comparing the 6.3mm and 10mm TALs the 6mm and 10mm Baader Classic Orthos (BCOs), the TALs easily held their own, whether viewing the faintest components of the Trapezium or rendering the faintest extents of the nebula wisps within reach of the XT10's 10 inches of aperture.

Moving from M42 to the Perseus Double Cluster (NGC 869/884), both the TAL Plössls and the BCOs showed this cluster in the classic diamonds on velvet rendering. Both brands showed the faintest stars in this cluster steadily and as finely defined pinpoints, indicating similarly excellent transmission and contrast performance.

With the TAL Plössls holding their own against Orthos on various Deep Sky Objects, how would they fare for Lunar/Planetary targets, for which the Ortho is generally considered as the de facto standard for optimum performance? For this test the 4" f/8 TSA-102 apochromatic refractor was chosen. With Jupiter placed high in the early morning sky, the 6mm and 10mm BCOs were used to provide baseline observations. Through the BCO the primary atmosphere belts were nicely rendered with internal and edge structure, as well as the Great Red Spot with hints of perimeter swirls, shadings and gradations within the Polar regions, and brightness and color variations for the four Galilean moons. When the 6.3mm and 10mm TAL Plössls were compared to the baseline observation of the BCO Orthos, the TALs provided the same excellent and detailed views of Jupiter. All features visible with the BCOs were similarly visible in the TALs. Tonal qualities were very slightly warmer in the TAL and scatter around Jupiter appeared slightly less in the TALs than in the BCOs, particularly with the 10mm. Overall, both the Ortho design of the BCO and the double-convex Symmetrical design of the TAL Super Plössls provided similarly excellent planetary performance.

Finally, Lunar performance of the TALs were assessed, again using the TSA-102 as the primary instrument. Like their performance on Jupiter, the TAL Super Plössls not only held their own on the Moon when compared to the BCO, but did a slightly better job. Levels of detail were a little bit crisper in the TAL, and tonal qualities of the TAL were warmer which made contrasting Maria features more easily discernable. I am usually not a fan of warmer toned eyepieces but the particular tone of the TALs proved to be advantageous for lunar observing. Stray light control was also excellent as no flare presented itself in the TAL eyepieces when the Moon was in or just out of the field of view. However, from an aesthetic point of view, the less distinct and slightly fuzzy field stop in the 6.3mm TAL, detracted from the view as compared to the sharply defined field stops in the 10mm, 17mm, and 25mm TALS and the 6mm and 10mm BCOs.

As the evening's lunar observations progressed, and the temperatures fell, the high humidity on some of the evenings resulted in a propensity for the 6.3mm TAL Plössl's eye lens to fog after a few moments of use. The BCO did not show this problem, likely due to the volcano design of its housing and the slightly longer eye relief indicative of the Ortho's 1-3 design. The 6.3mm TAL was the only TAL Plössl to have this occasional fogging, but it was easily resolvable by waving my hand to create air flow across the eyepiece to dissipate the moisture.

When dewing of eyepieces becomes a problem, it can often be alleviated or at least reduced by using eyepieces with longer eye relief. When doing high magnification observing where short focal lengths are needed, using a Barlow becomes advantageous. Using the 25mm and 17mm TALs with a 2.4x Siebert Barlow did just the trick as these already have some generous eye relief, and the Barlow even adds a little more. Both TALs worked great with the 2.4x Barlow providing extremely sharp views without any dewing issues. Comparing the 25mm and 17mm Sterling Plössls with Barlow similarly provided great results with long eye relief and no dewing, however the extended eye relief generated by the Barlow resulted in occasional kidney beans, especially with the 25mm Sterling. The 25mm TAL did not have these issues. Overall, the TAL Super Plössls provided excellent and satisfying lunar observing.

IV. Conclusion

The TAL Super Plössls provide strong performance, keeping pace with other well respected Plössls and even Orthos for critical planetary observing. Their build quality is satisfyingly robust and sturdy, with fit and finish being generally good. Eye guards were functional, easy to remove to increase usable eye relief, and appeared to be made of sturdy rubber. While the eye guards could fold down, they would not stay in the down position making removal of the eye guard the only option to obtain more usable eye relief. Overall, eye relief was as expected from the Plössl design, tight for shorter focal lengths and adequate to comfortable for the longer focal lengths. Obtaining proper eye position was easy to find and maintain for all focal lengths, even when a 2.4x Barlow was added. All the eyepieces provided excellent stray light control, never showing instances of flare or ghosting with any target, even bright targets like Jupiter and the Moon. Scatter control was similarly very good. Transmission, visual contrast, and sharpness were all excellent, with rich velvet black backgrounds being particularly distinctive in providing visually high contrast views of star fields. The only weaknesses encountered was the lack of a distinctly sharp field stop for the 6.3mm. Overall, the 17mm and 25mm focal lengths quickly became my favorites providing comfortable eye relief, excellent ease of use, and outstanding views both with and without Barlow (and honorable mention to the 6.3mm and in particular to the 10mm as well for their excellent lunar/planetary performance).

Figure 6. TAL 25mm & 17mm Super Plössls
Image by the Author; Eyepieces courtesy of www.talteleoptics.com

End Notes:

The methodology used for this review was to have a single experienced observer evaluate each available focal length of the eyepieces during each observing session. Each observing session used either one or two telescopes, and generally evaluated no more than two or three performance criteria on one or two celestial targets. This approach, while increasing the number of observing sessions necessary, reduces possibilities of both confusion and fatigue as each observing session allows concentration and focus on only a limited number of criteria.

Figure 7. Orion 10" f/4.7 XT10 & Takahashi 4" f/8 TSA-102
Image by the Author

All observations were performed through both a 4-inch Takahashi TSA-102 f/8 APO and a 10-inch Orion XT10 f/4.7 Dobsonian. Each instrument was thoroughly checked for proper collimation prior to each observing session, and was given the required time to reach thermal equilibrium to ensure peak optical performance. These two instruments were chosen to gauge performance of the eyepieces in both medium and fast focal ratio telescopes. A Tele Vue Paracorr coma corrector was used throughout all observations with the Orion XT10.

The observations were conducted in both evenings and early mornings during September and October 2013 from a light-to-moderately light polluted suburban Virginia location west of Washington D.C. At this location the typical limiting magnitude varies between 3.5 and 5.0. Unless otherwise noted, seeing conditions were never below Pickering 5 for stellar and/or deep space object observations, and were never below Pickering 6 for lunar and/or planetary observations.

Disclaimer - No matter the outcome of this or any other review, your individual results with the equipment being reviewed should be expected to vary. Given the variation between the same equipment types due to manufacturing tolerances, and the differences in seeing conditions, telescopes, observer physiology, and observer psychology (i.e., likes, dislikes, expectations), your unique "optical chain" may alter your results when compared to this review. Therefore, like any review or eyepiece/telescope comparison you read, remember that it should only be viewed as a guideline to indicate generally how the equipment being reviewed may perform for you when used in similar telescopes. When used in your unique equipment, always remember the adage "Your Mileage May Vary" (YMMV).

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