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## Zenithstar 80: Part 1

By [Otto Piechowski](#) - 9/13/2005

Zenithstar 80 Review: Part 1

### Overview:

The Zenithstar 80 (ZS80) has a beautiful appearance. It is well constructed, both optically and mechanically. Customer care and service by its manufacturer/assembler is excellent. The visual performance is good, but awaits further testing to prove if it is on a par with Short Tube 80s (ST80s), superior to ST80s or even comparable to similar focal length apochromatic refractors.

Tom Trusock and Fred Hissink have provided excellent reviews of the ZS80. They do a fine job of reviewing mechanical particulars of this system, most of which will not be repeated here. These reviews can be found at [www.cloudynights.com](http://www.cloudynights.com)

### Equipment Reviewed:

- ZS80 OTA; metal lens cap, eyepiece end cap, soft case
- AZ3 mount/tripod (altazimuth)
- Red dot Finder 2
- 35mm Ultima, UO Orthos 12.5 and 7mm, 2X Shorty Barlow (Orion), extension tube
- Filters: Neb1 (Sirius) and OIII (Lumicon), V-Block (Orion), planetary (Celestron/Meade)

### Observing Site:

A thirteen acre vacant lot, shielded from streetlights and house lights, within a city of a quarter million persons and within 2 miles of much of the retail of that city and less than a mile from a high school football field and a city park with multiple playing fields lit at night. On the best of nights, in the dark hours just before dawn, the faintest visible stars at the zenith approach magnitude 5. Magnitude 4.5 skies are common.

### Received Condition:

The OTA comes sufficiently and attractively packed. The scope, wrapped neatly in clear plastic, lies snug in its foam enclosed soft pack. The soft pack is beautiful as well, sporting thin inch long metallic grabbers chained to the zipper on the pack. The pack is doubled boxed in attractive well-made boxes. The retractable dew cap slides smoothly with just enough resistance. The Crayford focuser is very nice in its mechanical operation. The rotating cell that contains the focuser is a bit stiff. However, I never use it as both the 2-1.5 adaptor and the 1.5 eyepiece/diagonal holder have nicely made brass retaining/tightening rings that allow smooth full circular motion. The entire OTA is attractive; jet-black with highlights of gold. The paint finish is nicely done. All screws and bolts are silver in color and substantial.

The optical train revealed a noticeable lack of collimation. High magnification views of bright stars gave the appearance of an airy disk with multiple diffraction rings 2/3rds of the way around the airy disk and no rings on the other third. The appearance was nearly identical to what can be seen by inputting a coma error of .2 to .35 on Cor Berrovoet aberrator program.

The lack of proper collimation was noticed immediately upon receipt. Attempts by me to identify the source of collimation error and to attempt a correction led me to discover the baffling system used on these scopes. Reading Tom Trusock review revealed to me that the baffle on my scope was the original inadequate one. With Tom instructions I discovered that the effective aperture of the scope was 71mm, plus or minus 3mm. Tom Trusock review highlighted both of these defects back in May of 2005. My ZS80, with these same defects, was sold as new two months

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after that review. These two defects need to be considered separately.

It seems to me that a ZS80 sold as new with a defective baffle, two months or more after Tom Trusock review, should not have happened. There had been sufficient time for dealer and manufacturer to ascertain that the defectively baffled systems had been removed from the retail stream or repaired. However, this may have been the only unit with a defective baffle that slipped through the review process. It needs be said that the manufacturer was willing to send a replacement immediately and that the dealer in fact did send a replacement baffle at no charge for the baffle or its shipping.

The collimation error is not desirable. It is not aesthetically pleasing when looking at close bright double stars such as Castor. However, in areas other than double star observations, a quite noticeable collimation error might not detract from the visual performance of the scope. Further, even with this collimation error, the scope performed up to the advertising claims of William Optics as a well color corrected achromat allowing useable magnifications of 100X. In light of this, it seemed to me that I did not have a right to demand replacement/correction as the scope performed according to advertised expectations. However, the dealer was solicitous of my satisfaction and secured from the manufacturer the right to return it for repair or replacement; even though I told them it did perform to the advertised expectations. In light of the scope performing to the advertised standards, I asked the manufacturer if they would allow me to test my scope for six months and then, if I was still not satisfied, to avail myself of their offer to ship the scope free of charge for repair or replacement. To this, they quickly agreed.

Finally, it needs to be said that the intra and extra focal images are very similar. This is a good sign. To the best of my memory the similarity of these images was superior to an end-user improved ST80, an Orion F6 100mm, an APM 100mm Triplet achromat and perhaps better than an ED80.

#### Visual Performance Before End-User Repairs:

For about two months I used the scope with the collimation error noted above and without knowing that the scope had an effective aperture of around 71mm. Under the sky conditions outlined above, I was able to see a 12.3 magnitude star in the vicinity of SS Cygni. The companion of Polaris and the four components of epsilon Lyrae were visible at 38X. I was able to detect the companion of epsilon Bootis by means of a brightening on the first diffraction ring at the correct position. However, I was not able to resolve zeta Herculi or delta Cygni. With averted vision, M13 showed stars at the fringes. And, with an OIII filter, I was able to detect both of the main parts of the Veil Nebula and the North American Nebula as well. Albireo was beautiful at 38X with a 12.5mm UO ortho. Finally, as to the chromatic aberration; the ZS80 does not remove color nearly as well as an ED80 (Orion 80mm ED F7.5). However, it is better than the F5 ST80, the F5 100mm APM triplet and about equal with the Orion F6 100mm refractor.

Wide field views with a good eyepiece such as a Celestron Ultima 35X are just exquisite, combining a sharp wide field with the distinct sharp edge of the field stop. Also, nothing short of spectacular are views with a 12.5 UO ortho, without and with a Barlow. Views are crisp and sharp and snap into focus.

Even with the two defects, this is a well performing 80mm short tube refractor. Combined with its exquisite cosmetic appearance and well-designed mechanical features, I am comfortable saying it is worth the full price asked.

#### End-User Repairs:

Due to being told that an end user could not effect repair due to the cemented doublet, and knowing that an attempted repair by the end user might negate the warranty offer, I had used the scope with the noticeable collimation error for a couple months. However, once I decided that I would probably not return the scope to the manufacturer for collimation correction as it met the advertised standards, I chose to take the OTA apart and see what could be done about the collimation error.

I discovered that this scope is so well designed that disassembly is easy. One looses the outer retaining ring on the dew cap, slides the cap back down the OTA revealing the felt lined edge of the objective lens cell. Then, one unscrews the lens cell from the OTA. Once loose, I then realized that the baffle was attached to the objective lens cell. I also discovered that this baffle could be unscrewed from the lens cell thus allowing the objective lens to be lifted from the objective cell. Using non-cosmetically treated tissue paper, I removed the objective from the cell and discovered a one to two millimeter flange or lip on which the cemented objective rested. At one spot on this lip I placed a shim made of a piece of index card one millimeter wide and three to four millimeters long. Then I replaced the objective and screwed on the baffle. I reinserted the cell into the OTA and then proceeded to star test. The effect was noticeable and positive. There was noticeably less flaring on the one side and the multiple rings had been decreased in brightness if not in number. I then disassembled the dew shield and rotated the lens cell a bit over 1/2 turn counter-clockwise (loosening the cell) on the theory that different positioning on the objective cell on its screw might effect another slight correction to the overall collimation of the system. The effect was, again noticeable and positive; improving on the previous improved result. On bright stars highly magnified the diffraction ring totally encircled the airy disk. The diffraction ring was brighter on about 2/3rds of the ring. The other third of the ring was fainter and slightly red. At magnifications of 140X and above the airy disk was slightly elongated. There were also slight indications of very faint notches in the diffraction ring indicative of a bit of pinching or astigmatism. My best guess is that the retaining ring of the baffle pressed against the objective, now elevated at one point by the shim, created a slight amount of pinch.

As stated before, it was during this process that I discovered that the inadequate baffle had been installed. After placing emails and calls to the dealer and manufacturer, I received a new baffle within five days of the first email. Having become familiar with the objective lens cell and baffle system, replacing the baffle was an easy affair.

Visual Performance After End-User Repairs:

The improvement of visual performance, though not great, has been noticeable. Before, I had to stare and sometimes use averted vision to detect Polaris companion at 38X, 68X and 120X. Now, Polaris is easily visible with direct vision at both 38X and 68X. Also, on extended objects like the moon, planets and terrestrial objects it seemed that the sharpness visible before at 100X was now apparent at 120X and 140X. The appearance of detail on Mars was improved by tiny bits with each step of magnification increase from 68X to 80X to 100X to 120X to 140X to 175X. On the moon, though no new detail could be seen above 120X, details on the terminator retained a decent contrast even up to 400X. Color correction is about the same. Though there is no significant change, there may be a bit more color present; a little more purple during the daytime, a little more red on Mars, a tiny violet edge on the moon.

To Be Continued:

On a scale of 0 (poor) to 10 (excellent), the attractiveness of this scope is a 10, the mechanical functionality is a 10 and the price is a 10. The visual performance was a 7 and is now, an 8. Whether or not it is a 9 will depend on the scopes performance over the next few months on Saturn, the Trapezium and rima Birt.

The optics deserves a solid seven for the similarity of the intra/extra focal patterns and for the excellent baffle. There is pleasantly little stray light that enters the optical stream. Whether or not the end-user collimation repair will prove beneficial will need to still be proven. There are three indicators though that will indicate that this is an all around superior system: visual detection of rima Birt, a clear and often visible Cassini division and finally, the visual detection of star  $\theta$  in the Trapezium. Once I have sufficiently looked for these objects I will write up Part 2 of this report.

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