Head to head:
The TMB Supermonos and the 3mm – 6mm Nagler Zoom

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4mm Supermono, 3-6 Nagler Zoom, 5mm Supermono

Supermono Hots	Supermono Nots
Contrast, contrast and more contrast **Excellent resolution** **Excellent color rendition** **No eyeball reflections** **Surprisingly useable eye relief**	**Curved Field** **Tiny (30 deg) AFOV** **Very specialized eyepiece** **Not for eyeglass wearers**

Nagler Zoom Hots	Nagler Zoom Nots
Ability to pick your perfect focal length **Good resolution** **Can replace several eyepieces** **Constant 50 deg AFOV** **Good eye relief** **Good general use eyepeice** **Ability to zoom in and out**	**Warmer image than the monos** **Under the best conditions the monos outperformed the zoom in contrast** **Zoom can get "sticky" in cold weather** **Eyeball reflections possible when viewing bright objects** **Not for eyeglass wearers**

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In the summer of 2003, Thomas Back (TMB) and APM released a new line of planetary eyepieces, the TMB SuperMonocentrics. In essence TMB took an old idea - the monocentric eyepiece - and made it new again. In doing so, they set sights on the most discriminating of amateurs - the planetary observer. In a nutshell, the major benefit of the monocentric eyepiece is that even though although there are three lenses, there are only two air to glass surfaces. The fewer air to glass surfaces, the less the opportunity for light loss and (perhaps more importantly in this case) loss of contrast due to scatter. Theoretically, this design results in an eyepiece with extremely high levels of contrast. However – it should be noted that these eyepieces are not without their drawbacks - they have an extremely small afov - only 30 degrees, and the eye relief is minimal (the 5mm and 4mm eyepiece having 4mm and 3.2mm of eye relief respectively).

Al Bellig recently compared the TMB supermonos to some of the best planetary eyepieces in existence. If you are looking for an introduction to the Supermonos, you can read his excellent article, and I'd highly recommend it. I'm not about to duplicate his work here. Instead, I thought I'd compare the Supermonos to another somewhat controversial planetary eyepiece - the 3-6 Nagler Zoom.

Daniel Mousey, in his thought and discussion provoking article "Planetary Eyepieces", found the nagler zoom to leave something to be desired, preferring instead simpler designs. In my experience, I've found the zoom to have an excellent raison d'etre and after having had one for over a year can't imagine being without it. Even so, to discount Mr Mousey's paper would be ill advised, and it too is highly recommended reading.

When asked if I would be interested in testing a few supermonos this fall, my thoughts naturally turned to a comparison of the monos and zoom. Uppermost in my thoughts: Would the supermono's finally convince me to give up my nagler zoom?

Supermonos – Initial Impressions

When I opened the package containing the 4mm and 5mm supermonos the first thing that struck me was how extraordinarily tiny the eye lenses were. Instantly, the thought that popped into my head was "How in the world do you clean these if/when they get gunked up?". Within moments, I had fired off an e-mail to my anonymous benefactor and instantly, the reply came back "I have no idea. Just don't get them gunked up." Hrummm. Ok.... Was this to be strike one against the monos?

In the long run though, this fear proved pretty groundless. As it turns out a small eye lens has several advantages, not the least of which was they were much harder to “gunk up”.

Physically, the supermonos are tiny, lightweight and physically unpreposing eyepieces. Color coded for focal length, they come with a safety undercut and are threaded for filters. They do not have rubber eye guards per se, but the lenses are slightly recessed and given the minimal eye relief the eyepiece body itself serves as a quite functional eye guard.

The Nagler Zoom

Before I go any further, I'll let you in on a secret. For 99% of my viewing, I really, really, dislike most zoom eyepieces. Typically, zooms have wide fields of view in the short focal lengths, narrow fields of view in the longer focal lengths - exactly the opposite of what I consider beneficial. Many also suffer from internal reflections, and it's rare indeed to find one that even comes close to equaling the contrast or resolution provided by a fixed focal length eyepiece. I’ll admit, they do have their uses, but my preferences lie elsewhere. Or so I thought until I had a chance to use the Nagler zoom. The Nagler Zoom is a different animal altogether.

When the 3-6 Nagler zoom was introduced back in 2001 it speced out as having 5 elements in three groups (six air to glass surfaces), 10mm (constant) eye relief, providing click stops on the mm from 3mm to 6mm, supplying a constant 50 deg afov, weighing a mere 5.7 ounces, and remaining par focal over it's entire range. Initially it was something of a bombshell. The old guard (me included) figured it wouldn't be much better than the TeleVue 8-24mm zoom (manufactured by Vixen) - a decent eyepiece, but one (in my opinion) still bettered by those with fixed focal lengths. Imagine the surprise when initial reports were so positive! From the usenet and groups postings, most users were extremely happy with the zoom, and many were critical observers that I knew well and valued their opinions. At the time, I was using mainly radians and barlows for higher power, but the zoom intrigued me and I acquired one in 2002. Prolonged comparison to the 4mm radian showed that except for the extra eye relief, and 10 deg afov difference, the Nagler zoom was indeed a match for the radian. It seemed there finally WAS a zoom that was the equal of at least some highly regarded fixed focal length eyepieces. Thus, with zoom in hand both radians and barlows departed my equipment case.

After more than a year of using the zoom, I now appreciate it's functionality more than ever. In my opinion, there are a few huge pluses. It gives you the ability to dial in the exact magnification the seeing will support for the individual target. It's quite cost effective, and effectively replaces multiple

eyepieces / barlow combinations. If you've ever lost a target when changing eyepieces at high power, you will appreciate the fact that you can start with a lower power / wider field and, well, ZOOM in on the target. If you happen to lose the target, simply zoom out and reacquire. And finally, zooming in on targets, well, it's a kick. Watching a globular explode in your eyepiece, double stars shooting apart, or just coming in for a landing on the moon, this is an experience that's unknown to those who stick with fixed focal lengths. Amazingly the zoom has seen use in all my scopes. I knew it would be useful in the shorter focal lengths, but in a 15" f5 or a 10" f7.5? Astonishingly, yes. Outside of lunar and planetary work, I've found the zoom quite useful when studying planetary nebula at high powers. It's instructional to see exactly what changes as you zoom in closer and closer, and thus it fast became my favorite eyepeice for detailed inspection of planetary nebulas in my 10" f7.5.

So naturally, when the little birdie (who raved about these monos) sent me his TMB's, my first thought was - How would they stack up to the Nagler zoom?

I was fortunate enough to be able to use them for several months in various and sundry scopes, but admittedly they saw by far the the most use in my two 4" apos (101mm f5.4 and 102mm f8.6), and my 3.1" apo (80mm f7.5), all of which are capable planetary performers.

One thing to watch when comparing eyepieces with different apparent fields of view, is to ensure that when you compare edge performance (and performance in general to a certain degree) you need to compare the same percentages of the field with each other. For example one eyepiece may have terrible edge correction at 78 afov, but wonderful at 45 deg afov.

Head to Head

My first light was on a twelve day old moon as I cast my eyes upon Aristarcus and Cobra Head. I was using the 102mm f8.6 apo and was initially shocked at the difference between the zoom and the monos. My jaw dropped. Initially, the difference seemed to be night and day - the monos appeared to yield far more contrast, provide less scatter and seemed much sharper than the zoom.

However, appearances can be deceiving.

In the zoom, Aristarcus Z and Vaisala appeared like two tiny eyes staring out of the lunar surface, with the illusion somewhat spoiled only by the intrusion of Aristarcus B further off to the side. When I switched to the mono's, my attention was immediately drawn to the smaller crater lying nearly in between Vaisala and Aristarcus B. Where was this feature when I'd been looking through the zoom? I didn't think I'd seen it. Quickly switching back, I found I was mistaken. It was there in the zoom, I simply hadn't noticed it. But why? Was it as simple as increased contrast in the mono? Human error? Psychological or physiological effects? Was I initially thinking I was seeing more detail in the mono simply because I expected to based on conventional wisdom? I suspect, from extended testing, that all of these played a part.

Over and over again, night after night, the pattern repeated. On the moon, I'd spot a tiny rill or low contrast dome in the mono, and would be certain I hadn't seen it in the zoom, but when I switched back -

there is was. On Mars, I'd spot some subtle contrast feature, swear I hadn't seen it in the other eyepiece only to find that once again, I was wrong. On occasion it went the other way, but usually I'd spot the tougher target in the mono first. Once seen, though I could then pick it out in the Nagler zoom (working at the same focal length) without much if any more difficulty than with the Supermono.

Between the zoom and the monos, I felt that overall contrast was generally better in the moncentrics. Some observers feel that the perception of contrast is increased with the use of a smaller field stop. The idea is that the black field stop can give the illusion of an extended dark field or improved contrast, when compared to the larger (and lighter) sky background in the eyepiece with the larger true field of view. While may be the case for deep sky work, I don't feel this was what was happening when the monos showed more contrast on a bright extended target – i.e. Luna. I'd be more prone to attribute the improved contrast to the fewer air to glass surfaces and thus ultimately to the lack of scatter in the monos.

Later I spent some time with the 80mm mining Platolets with both eyepiece designs, and was pleased to pick out three - four if you count the one as a known double. Once again, they were easier in the mono, but once spotted, all could be seen in the zoom as well.

I found the zoom to impart a warmer (but not objectionable) tone to the lunar surface.

Tests on doubles showed the monos to yield slightly greater throughput and slightly cleaner images, but admittedly, all the doubles I tried split about equally well with both eyepieces. This is one area where the ability of the zoom, to, well.... ZOOM played into the fun aspects of the hobby, and evn though I'm not a double star fan, I still found it quite enjoyable to watch doubles fly apart.

Whoops?

Initially, when comparing the zoom and the monos, I caught several interesting things. I was reminded of something I'd seen when I first obtained the Nagler zoom - there is a fine blue "ring of fire" around the extreme outer edge of the afov when viewing Luna. I'd noticed this when I first obtained the zoom, and promptly forgot about it. Additionally, the 5mm mono showed what I later determined to most likely be an illuminated inside wall of the retaining ring/field stop while gazing at the Moon. It was only noticeable with my eye in certain positions, and while initially annoying, I quickly forgot about it and simply enjoyed the view. The 4mm showed no signs of this effect. Ironically, in the long run, I almost grew fond of it. If I'd forgotten which mono I had in the focuser, a quick glance toward the field stop gave me an easy confirmation.

I've also discovered that contrary to my initial belief, the Nagler zoom seem like it isn't *quite* par focal. I've found even when I focus at the 3mm setting before changing to lower powers, I often get better results by adjusting the focus a tiny bit for whatever focal length I wind up at. Often it's not worth the effort, but then again I've been known to get lazy in my pursuit of fun at times. This is a *hobby* after all.

The field of the Nagler zoom is quite flat, and shows little rectilinear distortion - either pincushion or

barrel. While the mono also shows little rectilinear distortion, it does suffer slightly from some flat field issues. At faster focal lengths (f5.4 apo and f5 dob), with the center in focus, the edges would be slightly out of focus. At f8.6 this was barely detectable, and I would not have noticed it unless I had been specifically looking for it. Even then it was a tough catch.

While observing mars with the Nagler zoom, I caught myself chasing reflections through the field of view on several occasions. The Martian light was reflecting off my eyeball, onto the eye lens and then back into my eye. This was not observed in the mono, most likely because the eye lens was simply too small to catch the reflection.

I've been doing long duration tests with Tom Peter's DM-6 mount, and at the moment don't own a driven platform. This, in my opnion is where the real drawback of the monocentrics lay. While the 4 and 5mm were still very useable on the 102mm f8.6 apo, I quickly found that on an undriven mount, the 50 deg afov of the zoom was far preferable to the 30 deg afov of the monos. I also discovered that due to the curved field, this was even more of a factor at faster focal lengths.

The only other concern I'd like to note is that one very cold evening in early winter, I found the zoom got extremely sticky when moving to the 3mm setting. So sticky, it basically froze. In my case I feel it was largely due to the cold conditions it experienced during storage and use (I've recently taken to storing equipment in an unheated location). After I brought it inside and gave it a chance to warm up the zoom moved freely again. While it's only happened to me once, I was able to confirm this has happened with several other observers as well, although cold more than likely was not the issue for at least one - as that gentleman lives in Arizona.

Summary and conclusions

After a few months with the monos, I came to a couple of conclusions.

These are extremely specialized eyepieces that work best with longer focal length scopes on driven mounts. They excel at all types of high resolution work. However, for deep sky, or on an undriven mount, the field size leaves a lot to be desired. If you are working within the proper parameters the supermonos will give you some unforgettable views, and during good to excellent seeing conditions (Pickering 7 plus) the supermonos handily outperformed the zoom in contrast and apparent sharpness. I hesitate to say resolution, simply because I was completely unable to find a real world target which was visible in the mono’s, but invisible in the zoom under any seeing conditions. When seeing degraded, I was very hard pressed to note any differences in contrast or resolution at all. Some nights, I could only tell which was in the focuser by the size of the apparent field of view.

The Nagler zoom is simply a wonder of engineering. I found it's most useful aspects are its ability to replace several eyepieces in my case and zoom in and out on the target. I can't understate how useful that is - especially if you are fond of alt/az mounts. And while it lacks the sheer contrast of the monocentrics the wider field of view can be a godsend.

In the end, I wasn't convinced that I needed to trade the zoom in on a set of monos, but they have landed

themselves firmly on my wish list. I imagine I'll have the zoom for a long time.

If you are after the ultimate in contrast, have a good mount that can keep a narrow fov centered for long period of time and can visually/mentally deal with the 30 deg afov, then when considering the two, I'd recommend the monos. Otherwise the zoom has a lot going for it.

Depending on your requirements, both the Nagler zoom and the TMB Supermonos come highly recommended.