

At the San Jose Astronomical Association's annual swap meet and auction, I bought a well-used 1960s-vintage 60 mm f/11.7 refractor imported from Japan, for ten dollars. I was curious how the quality of a beginner's instrument of this vintage compared with that of, say, the non-achromatic Tasco model 301051F that I reviewed here a few months ago. Although I had once borrowed a Tasco of similar size vintage that had excellent optics, I found to my disappointment that the Monolux objective left a lot to be desired.

I performed tests using a hybrid 1.25"/0.965" star diagonal and good eyepieces. Although a preliminary look at Venus was encouraging -- there was not a trace of color -- nevertheless, star testing showed something clearly wrong. Images were not round, and the focus was not sharp. The shapes remained constant when I changed eyepieces, and did *not* rotate to follow when I twisted the star diagonal about the optical axis. Suspecting distortion by the cell, I took all apart, cleaned everything, and put the air-spaced, coated objective back together. The crown was slightly smaller in diameter than the flint, with about one mm of play inside the cell. I improvised spacers of card stock to hold it more closely centered, and tried again.

No go. The images were now at least symmetrical about an axis -- the cell front end had indeed been screwed on too tightly -- but they still showed what looked like a mixture of coma and astigmatism. Was there a squaring-on problem? I took the outermost retainer off the lens cell in the field, and started pushing the crown from side to side and rotating it with respect to the flint.

Oops! The asymmetry rotated with the crown! It didn't change shape at all, but its axis changed orientation reliably, by just the amount I rotated the piece of glass. I went back inside and inspected the offending component. To my surprise, it had an amount of wedge that was almost visible to the naked eye. I measured the edge thickness of the glass at several positions with a good scale, and found variations of one or two tenths of a millimeter. That's not very good quality control for Japan, Incorporated, even in the 1960s.

The Monolux mounting had had some custom work done to it, and in consequence ended up a great deal better than when it left the factory, so I can't entirely evaluate it as a production unit. Basically, it was a decent light altazimuth tripod, whose stiffness could have been considerably improved by attaching a triangular platform 30 or 40 cm down the legs, but which was nonetheless reasonable to use without, given a light touch. The custom work had featured slow-motion controls and clutches reworked by the machinist father of the previous owner. The mount is a goodie, I think I will keep it. But I will have to look for a better 60-mm OTA, or use it for something else.

A few weeks ago I described my experience with a Monolux 60 mm

f/11.7 refractor, a 1960s-vintage beginner instrument, that I bought for ten dollars at a swap meet, that turned out to have a seriously flawed objective (one or two hundred microns of wedge in the crown). I fixed the problem with new optics from Sheldon Faworski, a used- and remaindered-equipment entrepreneur who advertises regularly in, e.g., The_Starry_Messenger_. For \$20 I received a matching objective, coated, in a cell, with a dewcap. There was no sure indication of origin of the new unit, but the dewcap was Meade blue, so there isn't much doubt.

Threading on both tube and dewcap end of the new cell matched the Monolux exactly -- Japan, Incorporated has probably been stamping these things out since the time of Hideyoshi -- so I was able to install the Meade unit with no trouble. And this one is a goodie; star testing tonight, at 117 diameters, revealed a classic Airy disc (though the seeing was not good enough for much inside/outside focus comparison), gave a clean split of both components of the double double, and showed the gibbous waxing moon free of chromatic aberration and rich with fine detail. It is pleasant to be reminded of just how nice a small refractor can be; this instrument almost certainly outperforms the 63mm f/5.6 Brandon I described here a few months ago. Well it should, for the Brandon uses conventional glasses, and has lots of secondary chromatic aberration at that high speed, whereas f/11.7 is as good as fluorite at getting a 60mm doublet to perform. The Brandon is much more portable, though, and its smaller size makes for less rickety mounting.

I mentioned before, that the simple altazimuth mounting had had some extra work done on it; tonight I was able to appreciate it -- how nice to have slow motions and clutches that actually function. I will probably do some tweaking in the future, for there is still some slop in some of the original parts, but with a light touch, the instrument is usable as is, even at an 0.5 mm exit pupil.

I think I am going to have to call this one the Scotch Tape Telescope, because it is a 3M product -- M_eade / M_odified M_onolux.

Lately I have been using my "new" Monolux 60 mm f/11.7 refractor, with mechanical enhancements and a Meade objective, to chase down double stars from my yard in Palo Alto, and have figured out something I didn't know before about why even slightly imperfect seeing makes things so tough for high-resolution work, not just for double stars but for the Moon and planets as well.

Summer seeing from the Bay side of the southern San Francisco Peninsula has been pretty good; for several weeks I have been able to take small telescopes into my yard and count on seeing a diffraction pattern, though not necessarily a steady one. It's been good enough,

though, that moments of real steadiness occur with sufficient frequency to allow the telescope to perform at full capability, and that turns out to be considerable. The optics are quite nice -- the diffraction pattern is round and symmetric, and such faint rings as are visible off rapidly in brightness away from the central disc.

The problem is, that good optics don't help unless they are well focused. I was trying to split phi Virginis, a pair rather like epsilon Bootis -- wider, but fainter, and with a greater difference in magnitude between the primary and its companion. Even with a 6 mm eyepiece, at 117 diameters, I couldn't do it. Later in the same evening, I failed to resolve epsilon Boo itself, which was very frustrating, because I had split it on other nights with that same telescope and eyepiece, in seeing no worse.

Could something be wrong? Well, yes. The telescope was not focused accurately, but with the image motion and focus jitter caused by seeing, it took a long time to detect the problem: I stared carefully into the eyepiece for many minutes, watching the Airy disc, and it looked fine, except that at its best, sharpest and steadiest, the first ring looked brighter than I thought it ought to be.

I remembered that one of the first symptoms of poor focus is too much light in the rings, and tweaked the focus knob. Oops! Wrong direction -- it was easy to see that I had done something to make it worse. Let's try back the other way. I made the adjustment and waited another few minutes, again watching carefully, trying to make up my mind whether things were better or worse. It took several more touches of the knob to get it right. Even though the seeing was very good -- I could see the Airy disc and rings at all times, even though the rings were almost always in motion -- it took me ten or fifteen minutes to accomplish a task -- focusing the telescope -- that would not have taken that many seconds had the seeing been excellent. Lots of people wouldn't know to take time to do that -- I certainly didn't.

Anyhow, with the focus correct, epsilon Boo was an easy split. I went back to phi Vir and tried again. I lucked out, and found the star in the high-power eyepiece, so did not have to spend time refocusing, and it, too, was split wide open.

Imperfect seeing could prove especially vexing if you are trying to show other people an object requiring high resolution. It will take each of them as long to refocus as it took you in the first place, and if they don't do it, they may not see what you are trying to show.