

Brandon 63 mm f/5.6 Refractor Review

I had been looking for a small, interesting telescope for nature study and for "quick look" astronomy, that is, to take outside on short notice when I am too lazy to set up something larger. So when I saw Joe Sunseri's ad in *_Starry_Messenger_* for a 63 mm f/5.6 Brandon refractor optical tube assembly for only \$225, I gave him a call: Brandon is well known as a first-rate label.

Joe had some tube assemblies with Brandon optics and Unitron focusers. He was selling them with Celestron prism star diagonals and 26 mm Celestron Plossl eyepieces. There was no way to attach the tube to a tripod -- buyers would have to invent one -- but that's simple. Joe is local, and I have known him for years, so I ordered one.

I spent the next few days thinking up cute names for the hybrid -- Branditron? Don Uni? Celebratron? But when it arrived, alliteration and small size won, and I dubbed it the Baby Brandon. The unit is quite pretty, with tube and screw-on dewcap in the robin's-egg blue used for Brandon refractors a decade or so ago, to create product identity. The right color for a telescope tube is almost certainly white or silver, but pale blue is better than a darker color for not soaking up the sun by day, and not gathering dew by night.

I promptly took everything apart. Well, not quite, I left the objective in its cell. It is an air-spaced doublet with the two pieces of glass almost touching -- I could tell because three reflections of distant lights showed in the lens, one double on close inspection. All surfaces are coated, but don't appear multicoated. The tube has one internal baffle, and the forward end of the 1.25-inch rack and pinion forms another. The focuser does indeed look like Unitron. There's no finder, and it doesn't need one.

Someone thought hard about how to put this goodie together; the focuser is short and stubby, with only an inch or so of travel. With such a fast system, any more and the focus tube would block the edge of the objective, even at the center of the field. I calculate that there is about a 10 mm unvignetted field, which is reasonable.

The Celestron Plossl is from Taiwan, and the diagonal -- Celestron part 94115-A -- is not labeled with country of origin. It's just as well, too, as I shall explain in a moment.

The immediate problem was how to attach the Baby Brandon to a mounting. The tube seemed too thin for nuts and bolts. I nosed around at a hardware store, and found that a 2.5-inch slip coupling

for schedule-40 white PVC plumbing pipe would fit over the tube with an eighth of an inch of slop. I sawed one in half lengthwise, filed off the ridge where the pipe seats, glopped contact cement over the inside, and layered on 1/16-inch cork. After adding an expansion-type 1/4-20 threaded fitting for a tripod attach point, and two hose clamps to hold the coupling to the telescope, I was ready for first light.

Something was wrong. Star images showed coma and astigmatism all across a high-power field. A collimation problem? The lens cell was screw-on with no adjustments -- no fix there. Close inspection of the diagonal showed the difficulty: The plastic body of the prism holder was too narrow at the 90-degree corner -- a manufacturing defect -- and the prism wasn't seating where it should. The optical axis, leaving the prism, was several millimeters away from the center line of the tube that holds the eyepiece. I am sure Joe would have been upset, and eager to replace the diagonal, but it was easy enough to fix with a little filing -- I didn't even have to bring out my infamous Questar-eating hack saw. Besides, why waste a perfectly decent opportunity to whine.

The diagonal still had a problem. When I screwed its two tubes back into the plastic body, I found that their threaded portions were too long; they bore against the glass of the prism, and pushed it out of alignment again. No problem, I improvised some spacer rings by wrapping a turn or two of thin rosin-core solder around the threads. But what shoddy design -- it wouldn't even have cost any more to do it right! This is not the way to compete with Japan, Incorporated.

There was something else wrong, and this time it was fundamental. A star test at 88x showed a good deal of chromatic aberration -- some is of course expected with a fast, ordinary doublet -- and rather more spherical aberration than I was hoping for, though it is a little hard to unravel the two aberrations in white light. The seeing was less than perfect -- diffraction rings were visible, but always in motion, and the telescope was splitting Castor, gamma Leonis, and gamma Virginis easily, but even so, I was worried. Then I remembered that a prism is not optically identical to a mirror; the thick slab of glass introduces both spherical and chromatic aberration, in quantities that increase rapidly with declining focal ratio. I looked up some algebra, and convinced myself that at f/5.6, longitudinal chromatic aberration from 35 mm of prism glass was likely dominating all else, to the tune of several times the Rayleigh limit.

I didn't have a mirror star diagonal, and the focuser wouldn't rack out enough to use an eyepiece straight through. So it was back to the hardware store to buy a canonical el cheapo 1.25-inch eyepiece

extender tube -- either that or borrow one from my bathroom sink drain. A 1.25-inch sink trap extension has a long portion with 1.25-inch outer diameter and a shorter one with 1.25-inch inner diameter, capped with a loose, threaded nut that fits over most of my eyepieces to keep them from falling out. With no prism, the performance was much better, though the seeing was still ratty. I could split Polaris, which I hadn't the night before, probably because the chromatic blur had been swamping the faint companion.

The prism effect is significant; I will keep my extender and look for a mirror diagonal. Yet at lower magnification, the prism is okay. (Incidentally, at $f/10$ or so a prism is fine.)

Next, I needed a better mounting. My original tests had been done using the short, spindly tripod of the ludicrous Tasco model 301051F, the non-achromatic 50 mm refractor I reviewed on sci.astro.amateur in early 1996. So configured, the Baby Brandon looked like a giant pale blue "daddy longlegs". A local photo shop had Chinese "ProMaster" tripods on sale. Names like "ProMaster" make me suspicious, but these were better triangulated than more expensive kinds, and seemed mechanically adequate for occasional duty, so I bought the lightest one that would reach my eye height, the ProMaster 6300, for \$69.95.

I was tempted to buy a heavier unit. I had to keep reminding myself that for solidity, I could put the Baby Brandon on my Great Polaris, or on the mount for my Celestron 14. I wanted something very light, to encourage me to haul out the telescope frequently, and to carry it for nature watching. The ProMaster 6300 is almost too jiggly at 88 diameters magnification, with a 4 mm eyepiece, but nevertheless it will be fine for the lower powers I shall most commonly employ.

In summary, the Brandon 63 mm $f/5.6$ is a fine instrument, and an outstanding bargain at \$225, notwithstanding being equipped with what was surely the Edsel of star diagonals. I am well pleased, and can recommend the telescope to anyone interested in a small spotter or a highly portable instrument for astronomy. Joe might have a few left.

-- Jay Freeman

APPENDIX: To identify prism misalignment of the form I encountered, take the star diagonal out of the telescope and hold it at arm's length with no eyepiece installed. Turn it so you are sighting down the tube where the eyepiece goes. You will see four roughly concentric circles; namely, from smaller to larger, (1) the sky end of

the tube that fits into the telescope, (2) the prism end of the tube that fits into the telescope, (3) the prism end of the tube that holds the eyepiece, and (4) the eye end of the tube that holds the eyepiece. Circles (1) and (2) will be viewed by reflection in the prism.

Position the diagonal so that circles (1) and (2) are perfectly concentric -- that means that you will be looking squarely down the reflected mechanical axis of the tube that fits into the telescope. Without tilting the diagonal any more, ask yourself if circles (3) and (4) are concentric with (1) and (2). If not, then the reflected axis of the tube that fits the telescope is not coincident with the axis of the tube that holds the eyepiece, and that's a no-no. Any error big enough to see is probably too much, particularly for a fast system.

(And there are lots of other ways to botch a prism diagonal. Just because one passes this simple test doesn't mean that it's good.)

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I took the Baby Brandon 63 mm f/5.6 refractor, that I reviewed here a few days ago, to Fremont Peak State Park, near Salinas, California, on the night of 13-14 April, 1996. There was no fog in the valleys or on the coastal plain, so things weren't terribly dark, but it was warm enough that I was comfortable with a light jacket on, and there was no dew that I noticed.

Comet Hyakutake is indeed hanging in there -- between the last full moon, a run of bad weather in the Bay Area, and assorted early-evening commitments, I hadn't made any observation worth reporting for quite a while. But there it was, prominent at a glance in the twilight to the northwest, showing at least a ten-degree naked-eye tail. At 18 diameters the Brandon showed a coma more concentrated toward the center, and of higher surface brightness, than I remembered from observations in late March. Because of excessive light, I did not attempt a magnitude estimate.

For me, the first order of business with any new astronomical instrument is a Messier hunt. I have been through the Messier catalog twelve times before; the Brandon is the thirteenth try. With a 20 mm Erfle eyepiece, I had a field nearly four degrees wide. The light tripod of adjustable height made observing a cinch -- it was almost as easy to tick off Messier objects as with my 10x70 binocular (which is the easiest so far).

I got there too late to spot M79 in Lepus, and was too tired to wait for the summer Milky Way to rise, but in a two-hour interval I went through more than half the Messier catalog, everything else from the Pleiades east through M5, plus M13 and M92. At eighteen diameters

magnification, all were easy to identify: The Brandon is about as much telescope as Messier used for most of his observations. Highlights included NGC 5195 -- the companion to M51 -- and a hint of structure in the Owl Nebula.

Around eleven PM I put in a 6 mm eyepiece for a look at epsilon Lyra, peeping through tree branches. Both components showed hints of asymmetry, but with the object so low, the seeing was too poor to permit saying for sure whether it was resolved. (Of course, as I previously reported, I had already split Polaris, Castor, gamma Virginis and gamma Leonis, all at 88 diameters, so there was no doubt that the instrument gave at least reasonable performance on fine detail.)

The Baby Brandon seems well suited for the kind of quick-look astronomy that I bought it for. Setup took only about one minute, and it was neat to be able to pick up the instrument with one hand and move it sideways to peer around a misplaced tree.

After I put the telescope away, I wandered around chatting with friends. One person who reads sci.astro.amateur had his new Questar 7 set up on a Parsec mounting -- he had gotten the Questar used recently. I teased him about having left my hack saw at home. Another regular had two small fluorite refractors, a three-inch Takahashi and a 55 mm Celestron; I was glad I had put the Brandon to bed, because I am sure either of them would have outperformed it thoroughly.

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I had the Baby Brandon 63 mm f/5.6 refractor, that I have reviewed here recently, outside my house in Palo Alto, California, last night. Since the seeing was pretty good and the telescope was doing a fine job at the kind of astronomy I bought it for, I thought I would write some more about it.

The little blue beast is an easy one-hand carry on the lightweight Promaster 6300 tripod, which vastly expedited the night's observing; I was printing out some files on my old Macintosh, one at a time, on a slow dot-matrix printer, so what I would do was go outside and observe while one was printing, then -- not wishing to leave the telescope unattended in my front yard -- bring it inside while setting up the next file, and then back out again. I pointed it at a heater to keep it from dewing up in my warm living room.

My yard is full of big rose bushes (one is at four meters), and

there are lots of trees and street lights in my suburban neighborhood, so the ability to pick up and carry the telescope contributed also to finding spots optimum for viewing specific objects.

First on the list, early in the evening, was Comet Hyakutake, low in the northwest, almost lost visually due to city lights and skyglow. "Northwest" means "up the driveway, under the birch branches, and over the garage roof", but I was able to find a good spot between the Geo Metro and the Honda Civic, and there was the comet at 18 diameters, showing fine central concentration and a tail four or five degrees long.

Later I went after some double stars. The seeing was half way decent; at 88 diameters magnification, diffraction rings were generally visible and occasionally steady for seconds at a time. Both components of the double double were worth the toil and trouble of peering over the neighbor's hedge -- the Baby Brandon split all of epsilon Lyrae clearly. Epsilon Bootis was visibly elongated at times, which rates a "wow" with this aperture and seeing. I split gamma Virginis, just barely -- it has closed noticeably since I last looked at it (with larger aperture), and is now quite challenging for this small a telescope. (It will be down to 0.3 arc seconds in 2007.) Polaris was easy. All these observations were made with no star diagonal in place, because of the spherical and chromatic aberration introduced by prism diagonals, which are all I happen to have in 1.25-inch size.

Finally, I chased down some more Messier objects, at 28 x. The ring nebula was easy, with a hint of the hole in the ring visible. I suspect more magnification would have shown it. The big globulars, M10, 12 and 14, were ghost-like and hard to find in the vast, light-polluted regions of Ophiuchus, but I eventually chased them down. M4 was obvious near Antares despite skyglow, and M80 took only a little more work.

The little Brandon continues to serve well as the "quick look" telescope that I hoped for when I bought it.

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63 mm "Baby" Brandon -- Extended Use Report

Recently I finished a Messier survey with the 63 mm f/5.6 Brandon refractor I bought in spring, 1996. That seemed reason enough for an extended-use report on the instrument.

I got the "Baby Brandon" for quick-look astronomy and nature study, uses for which many people get a Celestron C-90 or a Tele Vue Ranger. At \$225, the Brandon optical tube assembly cost enough less to be a bargain despite its smaller size.

The optics are nice, though at $f/5.6$, without special glass types, bright objects show chromatic aberration. The short focal ratio challenges many eyepieces, too, and forbids a prism star diagonal for critical work, since prisms introduce spherical aberration and longitudinal color at fast f numbers. Yet I use the instrument at low enough magnification that I have not bothered to buy a mirror diagonal.

The mechanical parts are good, too. The Unitron 1.25-inch focuser is delightfully well built. Tube and dew cap look very pretty in Brandon's robin's-egg blue. There was no finder, and I haven't been tempted to add one. I faked a tube ring from a PVC pipe coupling sliced in half lengthwise and padded with sheet cork, with a $1/4-20$ threaded fitting in a hole through one side. Hose clamps hold it on.

The telescope came packaged with remaindered accessories, including a padded carry bag, a good Celestron Plossl eyepiece, and a poor prism-type star diagonal, also with the Celestron label. The prism did not seat in its housing: Some whacks with a file set things right.

I mounted the unit on a light photographer's tripod, a Taiwan import, the Promaster 6300. That's fine for magnifications to 88x (4 mm eyepiece), but inadequate for more. Yet I will not get a sturdier tripod: For quick looks, portability is everything.

I have done a moderate amount of observing with this telescope. It works fine. Messier objects are a cinch -- 63 mm is plenty of aperture, and 20x shows them all non-stellar. Once I watched Columbia reenter -- what fun to track the glowing plasma candle through the eyepiece!

Yet the most satisfying observations with the Baby Brandon came when I chucked it casually into the car, to take to parties or pot-lucks. I might not have bothered to haul along a larger telescope, or to carry in one which took many trips to unload. Fortunately, the Brandon is a one-hand carry on its collapsed tripod, dangling a little cloth pouch containing eyepieces and the tiny Ridpath and Tirion star atlas from Running Press.

Set up in kitchen or living room, the pretty blue tube draws admiration and fires curiosity, and if the night is clear, it is another one-hand carry to yard, patio, or deck. Even at only twenty or thirty diameters magnification, a 63 mm can and does give a view of the Moon,

Jupiter, or Saturn, or of any bright Messier object, or of a wide double like Albireo or Mizar, that awed beginners will not forget.

Every amateur astronomer should have a telescope like this one.

-- Jay Freeman