

The Stellarvue SV70 Achromatic Refractor

A great refractor that can be used as a super-sized finder scope, a guide scope for imaging with a larger instrument, and for wide-field imaging.

By Dr. James R. Dire

While at the Northeast Astronomy Forum (NEAF) in 2003, an astronomy vendor friend of mine introduced me to Vic Maris and his Stellarvue line of refractors. I ended up going home with Vic's display 80-mm $f/6$ achromatic refractor. I was quite impressed with the telescope's workmanship and optical quality.

Due to aperture fever, two years later I traded up to a Stellarvue 105-mm $f/6.2$ apochromatic refractor. This was an excellent model for observing and a great photographic instrument. But I found I wanted a longer focal length for planetary observing. So in 2006, I traded this one in for a 102-mm $f/7.9$ Stellarvue apo. Its 800-mm focal length provides 200x with my 5-mm Nagler eyepiece and 400x when using a Barlow. For a wider field of view and faster optical system during DSLR or CCD imaging, I use a 0.8x focal reducer/field flattener. Thus, I had found the perfect 4-inch apo tele-



Image 1 – The authors Stellarvue SV70 (white tube) and SV102 (blue tube) telescopes on a German equatorial mount.

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Image 2 – The Raptor version of the Stellarvue SV70 comes with a black carbon fiber tube. Photo by Stuart McDaniel, Shelby, NC.

scope system.

Recently yearning for a guide scope to use with this system, I decided to try out the Stellarvue SV70 achromatic re-

fractor. This scope uses a 70-mm, f/6 air-spaced doublet objective made with extra-low dispersion (ED) glass. The telescope is fully baffled and comes with a

stardust white aluminum tube (Image 1) or a zero expansion black carbon fiber tube (Image 2). The scope has a 93-mm diameter, 6-inch long dewshield and is only 11.75-inches long with the dewshield retracted.

My scope came with a nice padded aluminum carrying case and a removable aluminum mounting base with Vixen sized dovetail. The mounting base has two 1/4-20 holes and can easily be attached to a tripod. Unexpected on this size scope is a very nicely machined 2-inch dual-speed Crayford focuser. The aluminum tube model weighs only 4.5 pounds with the base attached.

With the base removed, I attached the SV70 piggyback on the SV102T using adjustable mounting rings and aligned the two scopes parallel (Image 1). Then I slewed to some of my favorite June celestial objects to test the

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telescope visually.

The SV70 has an extremely flat field. With every eyepiece I tried, stars were sharp from center to edge. I observed virtually no chromatic aberration, even on first magnitude stars and Saturn. With a 2-inch diagonal I tested the scope with 26-mm (16x) and 12-mm (35x) Nagler eyepieces. The former provided great views of large clusters such as M44 and numerous star fields scattered along the summer Milky Way. The latter gave great views of star clusters (M25, Omega Centauri, and M13) and nebulae (M8, M16, M17, and M20). I used a 5-mm (84x) Nagler for viewing Saturn. Even at this low magnification, the Cassini division and gap between the planet and the rings were sharp. I easily found three Saturnian moons.

In my January/February 2011 *ATT* article, I discussed the differences between an achromatic refractor and an apochromatic refractor. Due to their superior correction for chromatic aberration, apochromats are better for imaging with single-shot color DSLR and CCD cameras. However, one can still achieve excellent results with achromats by shooting through color filters. It's just necessary to refocus the telescope for each individual color filter, since the focal point varies slightly with wavelength.

I attached my SBIG ST2000XCM CCD camera to the SV70 telescope and used a hydrogen-beta filter. This filter has a 12-nm band pass centered on a wavelength of 486.1-nm (blue-green light).

My first target was M44, the Beehive Cluster. At prime focus, the SV70's 420-mm focal length yields a 1.6X1.2 degree field of view with my CCD camera. The Beehive Cluster has diameter of 1.2 degree, thus the entire cluster is captured on the chip. A 4-minute exposure capturing stars to magnitude 13 is shown in **Image 3**. This is approximately the limiting magnitude of this telescope in the



Image 3 – The Beehive Cluster, M44. 4-minute exposure through the SV70 telescope using a hydrogen-beta filter on an SBIG ST-2000XCM CCD camera.

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Image 4 – Galaxy M102 resides at the center of this 60-minute exposure taken through the Stellarvue SV70.



Image 5 – An arc of seven galaxies 11th-magnitude and brighter stretch from upper left to lower right in this 100-minute exposure through the SV70 telescope using a hydrogen-beta filter on an SBIG ST-2000XCM CCD camera.

best sky conditions and simulates quite closely what I saw in the eyepiece. Note that the stars are perfectly round from the center to the edges.

Of course, this telescope is not the one to use to view faint galaxies. My second image was a 60-minute exposure of the galaxy M102 (**Image 4**). Notice how small the galaxy appears in the image. Visually, I was easily able to see this 10th-magnitude galaxy in the eyepiece, but it wasn't as rewarding as seeing it in an 8-inch or larger telescope.

For a long time, I have wanted to capture the string of galaxies known as Markarian's Chain on a single image. Markarian's Chain is a 1.5-degree long arc of seven galaxies 11th-magnitude and brighter near the Coma Berenices-Virgo boundary. Until now, no optical system I have used provided a wide enough field of view with my either my CCD camera or larger format DSLR camera. But now, with the SV70, I could make an attempt.

Image 5 is the product of 20 five-minute exposures of Markarian's Chain through the hydrogen-beta filter. From upper left to lower right, the chain contains galaxies NGC4477 (10.3, S), NGC4473 (10.1, E), NGC4461 (11.0, S), NGC4435 (10.6, S), NGC4438 (10.1, S), M86 and M84 (9.1, E). In parentheses after each, I have included the galaxies' magnitudes and classification – spiral or elliptical. This image shows that despite its small size, the Stellarvue SV70 can capture some pretty interesting objects.

To conclude, the SV70 is a great refractor that can be used as a super-sized finder scope, a guide scope for imaging with a larger instrument, and for wide-field imaging. Its low weight, compact size and padded carrying case make it an excellent option for a grab-and-go travel scope that performs superbly for its size. Vic bench and star tests every telescope he makes at his Auburn, California shop and stands behind their quality and workmanship. [AT](#)