ASTRONOMY TECHNOLOGY TODAY

Your Complete Guide to Astronomical Equipment

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The Stellarvue SV70T

Everything It's Advertised to Be!

Volume 11 • Issue 2
$6.00 US

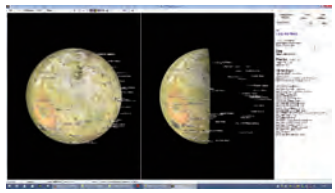
ATT Contents

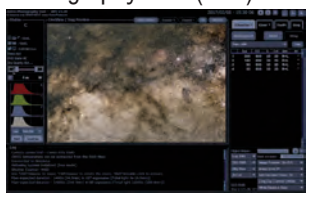
Cover Story: Pages 41-44

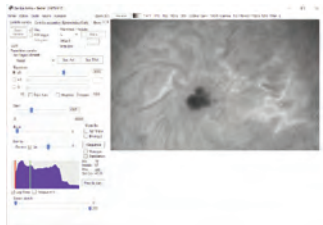
Our cover features Stellarvue's SV70T, a mechanically and optically excellent f/6, 70-mm apochromatic refractor that is highly portable and punches well above its weight in both visual and astrophotography performance. Dr. James R. Dire shares his impressions of the compact refractor in this issue. He also captured the background two-hour exposure of the Horsehead and Flame nebulae region using the SV70T.

In This Issue

Industry News/New Products







ATT Contributing Writers

Tony Bryan is an amateur astronomer, living in Jasper, Indiana and a member of the Evansville Astronomical Society (EAS), based in Evansville, Indiana with observatory facilities located in Lynnville, Indiana. He is currently serving as President of the EAS. Tony loves tinkering and is experienced in woodworking, car restoration, and electronics. His past ATM projects include: design and construction of an electronic telescope/camera clock drive, design and construction of portable power systems, design and construction of a roll-off-roof observatory, design and construction of various camera and telescope mount accessories, rebuild and electronics retrofit on a 16-inch Dobsonian, and rebuilding of several telescope drive systems.

Cliff De Lacy retired from the Defense Department after 35 years. He has a Master in HR Management and has taught Nuclear Physics/Radiological Control Fundamentals. A credentialed teacher, he also taught astronomy for the Napa Valley College for Kids Program and is currently a guest teacher in local school districts. He was appointed by JPL in 2003 as a Volunteer Solar System Ambassador for Outreach on NASA missions and enjoys conducting corporate and private star gazing sessions in Northern California . You can read about his outreach efforts at www.thestarguide.com.

Dr. James Dire has an M.S. degree in physics from the University of Central Florida and M.A.and Ph.D. degrees from The Johns Hopkins University, both in planetary science. He has been a professor of physics astronomy at several colleges and universities. Currently he is the Vice Chancellor for Academic Affairs at Kauai Community College in Hawaii. He has played a key role in several observatory projects including the Powell Observatory in Louisburg, KS,which houses a 30-inch (0.75-m) Newtonian; the Naval Academy observatory with an 8-inch (0.20-m) Alvin Clark refractor; and he built the Coast Guard Academy Astronomical Observatory in Stonington, CT, which houses a 20 inch (0.51-m) Ritchey–Chrétien Cassegrain telescope.

Eric Gentry is an astrophysics graduate student at UC Santa Cruz, studying the intersection of computation and physics. As an undergrad at MIT, he used the Hubble Space Telescope to study the most energetic processes in the universe (AGN). HE also helped build experimental X-ray telescopes and devices, and worked with an international collaboration to track how greenhouse gases move through our atmosphere.

Austin Grant, a high-school Chemistry and Biology teacher, is a self-described perpetual hobbyist, experienced in such areas as building computers and repairing arcade equipment. Austin stumbled into astronomy several years ago and it soon became his primary interest. Being a child of the digital age, it didn't take long for him to find digital astro-imaging and he sold his last pinball machine to fund his current imaging rig. Austin shares his passion for stargazing with his students.

Chuck Jagow serves as the President of the Back Bay Amateur Astronomers which is an astronomy club in South Eastern Virginia dedicated to bringing astronomy to the public. He lives in Chesapeake and is an IT professional for the Department of Defense and an ex-submariner. Chuck's initial interest in astronomy began while growing up in the Sangre De Cristo mountains of Colorado and was rekindled after a 30+ year hiatus by his wife giving him a 70mm go-to scope for Christmas almost 12 years ago. His greatest passion is astronomy outreach and dabbling in astro-imaging.

Gary Parkerson discovered early in his amateur-astronomy career that he was as fascinated by the tools of astronomy as by the amazing celestial objects they reveal – perhaps more so. When not writing about astro-tech, he covers industrial technology for a variety of online resources.

George Stallings has been observing for more than 25 years, though he has only recently jumped into the world of lunar and planetary imaging. A career information analyst and lifelong science-hobbies enthusiast, he navigates the fine line between late nights imaging and early mornings consulting for the federal government in northern Virginia.

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THE STELLARVUE SV70T Everything It's Advertised to Be!

By Dr. James R. Dire

Editor's Note: *Dr. Dire's report on the Stellarvue SV70T is a first installment of a two-part series on this popular telescope. Look for additional coverage in our next issue.*

I have owned no fewer than four Stellarvue refractors this century; two doublets and two triplets. They all have been superbly crafted instruments. The one I have held onto the longest is my SV102T, a 102-mm f/7.9 triplet Apo. Its 800-mm focal length is a great middle-of-the-road focal-length instrument for viewing the Moon, the planets, star clusters, double stars, and brighter galaxies and nebulae. The instrument has also proved to be stellar for CCD imaging, with and without my Tele Vue 0.8x focal reducer/field flattener.

Wanting a shorter focal-length refractor for overseas travel and wide-field imaging, I decided to test out Stellarvue's new SV70T. Some short focal-length apos are optically very fast, f/4.8-f/5. This is accomplished using four to five optical elements inside the telescope, which provide nice flat fields. But for visual use, the focal lengths are too short to achieve very high magnification. The SV70T is a 70mm f/6 apo triplet telescope. It has a 420-mm focal length. I purchased it with the Stellarvue 0.8x focal reducer/field flattener designed specifically for this instrument to convert it into a 336-mm f/4.8 focal-length astrograph. Like my SV102T system, I have the longer focal length for visual use and the shorter focal length for imaging.

Image 1 - The Stellarvue SV70T telescope mount on the autho's Orion Atlas mount.

Image 1 shows this fabulous instrument. As seen in the image, the telescope comes with a Stellarvue 2.5-inch dual-speed, rack-and-pinion focuser, a short Vixen-style dovetail bar, and heavy-duty tube rings. I already owned the telescope mount, two-inch diagonal, eyepiece and finderscope shown in the image, so I was prepared to use the telescope straight out of the box. This telescope also comes with a padded, airline carry-on-sized travel, soft-side case with plenty of extra room for the diagonal and a few eyepieces.

The objective is a multi-coated, three-element lens with an Ohara FPL-53 center element (**Image 2**). The center element ensures each color of the spectrum is in sharp focus simultaneously. Each lens has a broadband coating that transmits more than 99 percent in visible wavelengths. The tube is aluminum and the dew shield slides

Image 2 - The SV70T has a triplet objective with a center element made of Ohara FPL-53 glass, making it a true apochromatic telescope.

Image 3 - This view shows the two-speed focuser, heavy-duty Stellarvue tube rings and dovetail shoe for a finderscope that can be placed on other side of the top of the telescope using two socket cap screws as shown.

Image 4 - The focuser drawtube is graduated to allow users to record positions to return to for different eyepieces or cameras.

Image 5 - The SV70T attached to an Explore Scientific Twilight II alt-azimuth mount.

Image 6 - The focuser drawtube is graduated to allow users to record positions to return to for different eyepieces or cameras.

Image 7 - Stellarvue riser blocks come with two different-length Allen screws to accommodate different types of dovetail plates.

back and forth for storage in the case or dew protection when in use. The tube's inside is flat black and baffled to minimize stray light reaching the focal point.

The focuser (**Image 3**) provides a full 2.875 inches (73 mm) of travel. The focuser has an ultra-smooth (11:1 ratio) fine focus control (gold knob) to attain perfect focus every time. The focuser drawtube is graduated (**Image 4**) to allow users to record positions to return to for different eyepieces or cameras. Focusing was easy for both visual use and CCD imaging, and a locking screw kept it in place.

As I mentioned earlier, the telescopes does not come with a finderscope. It does come with a standard-size dovetail shoe that allows many types of finderscopes or red-dot finders to be attached. The dovetail shoe can be attached to the left or right sides of the optical tube (Image 3). Stellarvue also carries several different types of brackets to attach red-dot or optical finders to the tube rings. As you can further see in Image 3, the tube rings have three 1/4-20 tapped screw holes on the top sides of the rings (the same on the bottom sides).

Due to the large dovetail bracket on the head of my Orion Atlas mount, the SV70T balanced fine in declination with the two-inch diagonal, large finderscope and large two-inch eyepiece. The same was not true when I attached it to my Twilight II Alt-Azimuth mount. The only way I could balance it was to use a lighter 1.25-inch diagonal, with a smaller weight eyepiece, and forgo the finderscope (**Image 5**). In this configuration, I could add a red dot finder to either tube ring and have no trouble vectoring target objects into view. When I really want to travel light, this is how I will configure the telescope!

If I attach my Stellarvue 102T (**Image 6 blue OTA**) to the other side of the Twilight II mount, I can keep the heavier accessories on the SV70T. Balance is obtained by strategically positioning the larger telescope. I like having two side-by-side telescopes to go back-and-forth viewing objects in a wide field and then a zoomed-in narrow field.

To get the SV-70T to balance on the Twilight II with the two-inch diagonal, 8x50 finder and large eyepiece, I used a longer dovetail plate and a set of the optional Stellarvue riser blocks (**Image 7**). The riser blocks lift the tube rings 1.5 inches (38.1 mm) so that the dovetail plate does not hinder the focuser. The riser blocks come with two different length screws to accommodate different dovetail plate designs. This longer dovetail plate allows the assembly to balance, as seen in **Image 8**.

Image 9 shows how I can attach two refractors to the same German equatorial mount. This allows me to use the mounts go-to feature to find objects rather than star hopping with my manual alt-azimuth mount.

Stellarvue telescopes are made in California. They thoroughly test each one with star tests or on their optical bench. Interferometric test reports can be ordered at the time of purchase.

Image 8 - A longer length dovetail plate is required to balance the telescope when using a 2-inch diagonal, eyepiece, and 8x50 finder.

Image 9 - The Stellarvue SV70T and Stellarvue SV102T, both on an Orion Atlas go-to mount.

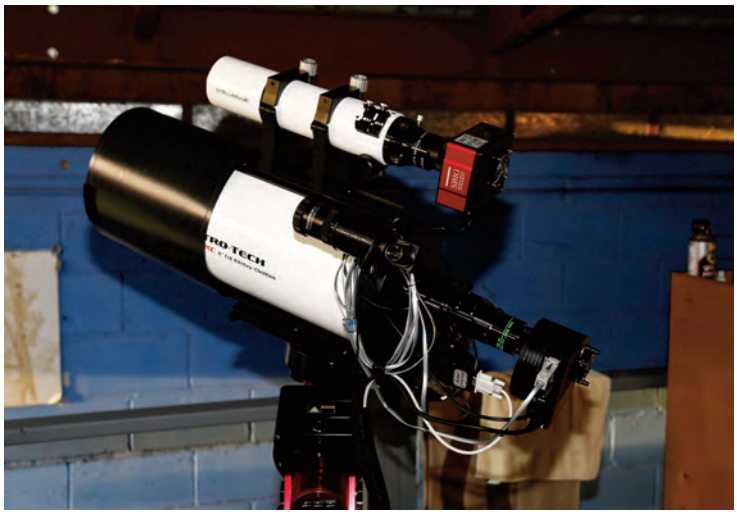

Image 10 - The author mounted the SV70T in an observatory for CCD imaging with an SBIG STF-8300C CCD camera.

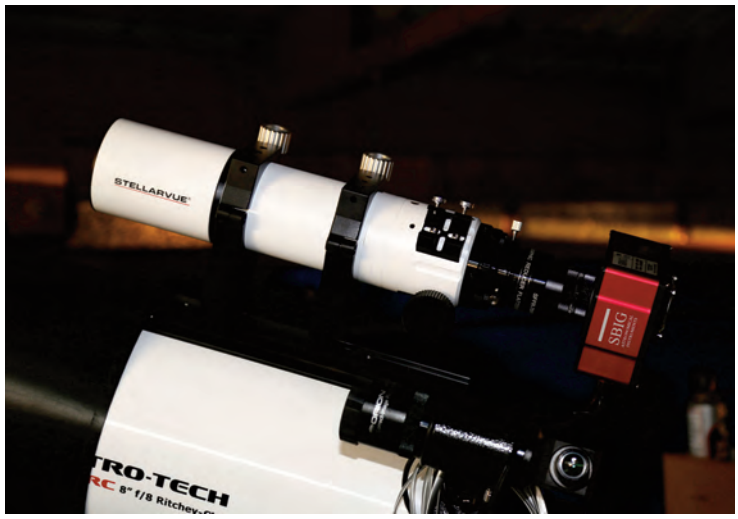

Image 11 - This image clearly shows Stellarvue 0.8x focal reducer/field flattener and required spacers between the telescope's focuser and the CCD camera.

Image 12 - NGC884 (left) and NGC869 (right), the Perseus Double Cluster taken with the SV70T with a 20-minute exposure.

I decided to visually test my scope before testing its CCD imaging capabilities. Stellarvue states the visual performance of the SV70T is "simply stunning," and it is. With my 5-mm Nagler eyepiece (84x), I could easily spy the Cassini Gap in Saturn's rings. Orion's Trapezium was also clearly resolved. Star clusters were superb for a 70-mm telescope, and the colors were vivid. Lunar views were equally impressive. Unlike larger telescopes, there was no need to stop down the aperture or use Moon filters.

With either a 26-mm Nagler or a 13-mm Ethos eyepiece, I was able to capture all of the Andromeda galaxy and its two elliptical galactic companions. Orion's entire sword filled the field of view, with M42 in its splendor. The telescoped captures an excellent wide-field view of the Pleiades with its scores of faint stars scattered around the Seven Sisters.

After visually testing the telescope, I brought it out to my observatory to test its imaging capabilities. I mounted it piggyback on top of an 8-inch Ritchey-Chrétien Cassegrain telescope (**Image 10**). Both rode atop a Software Bisque Paramount MyT German equatorial mount. For imaging, I used an SBIG STF-8300C single-shot color CCD camera.

For imaging, I used the before-mentioned Stellarvue 0.8x focal reducer/field flattener (FR/FF). The FR/FF has a 2.0-inch barrel that slides right into the telescope's focuser. Between the FR/FF and the camera are spacers (**Image 11**). Spacers are very important to optimize the benefit of the FR/FF to counter the field curvature inherent in short focal length refractor. If the spacing is not right, images will have elongated stars on the edges. I know, because I used the wrong spacing for the first images I took with this telescope. In addition to the 11-mm spacer installed on the Stellarvue FR/FF, an additional 55 mm of space is required between the CCD chip and the FR/FF. My CCD camera has 18

Image 13 - The author captured this image of the Horsehead Nebula (IC434) and Flame Nebula (NGC2024) with a two-hour exposure.

mm of back focus, so I needed to attach 37 mm of additional spacers.

Fortunately, spacer kits are available with pieces 25, 10, 5, 2, and 1 mm that can be screwed together in any combination. When using multiple spacers, I highly recommend placing the larger pieces on the camera and FR/FF and the smaller units in the middle. Those 1-mm and 2-mm spacers are hard to grip and unscrew from the camera to remove them.

Once I got the spacing right, the first picture I took was of the Double Cluster in Perseus (NGC869 and NGC884). The exposure was 20 minutes. Manually focusing the telescope with the camera was quite easy and only took a couple of minutes. Autoguiding was done with an SBIG ST-2000XCM CCD camera on the RC8 reflector.

As can be seen in this uncropped image (**Image 12**), the stars are pinpoint and round from corner to corner. The color contrast between red and blue stars is superb. I have taken many pictures of the Double Cluster over the years with various telescopes, and this one is undoubtedly my favorite.

The next object I photographed with the SV70T was the Horsehead Nebula in Orion (IC434). I picked up sufficient data for the image with a one-hour exposure, but I captured a second hour of data to bring out more faint detail in the red emission nebula surrounding the Horsehead. Also in the image is the Flame Nebula (NGC2024). The brightest star in the image is Alnitak, one of three bright stars in Orion's Belt. The color and detail obtained with only a 70-mm diameter telescope impressed me.

The quality and performance of the Stellarue SV70T is everything it is advertised to be. Over the years, I have come to expect nothing less from company owner Vic Maris. This is indeed an exceptional instrument that will stay in my equipment inventory for many years to come.