

Acknowledging the requests of advanced astrophotographers, Tele Vue has reworked its premium line of apo refractors and accessories to make them better suited for today's large-format CCD cameras. Notable modifications include a heavy-duty, imaging-friendly focuser and optics that provide better illumination across wide fields. We tested the TV-NP127is model shown here fitted with several optional accessories.

SKY
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TEST REPORT

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Tele Vue's Flagship Imaging System

Without compromising its visual performance, Tele Vue's top-of-the-line apo refractor is now customized for astrophotography.

By Dennis di Cicco



WHAT WE LIKE:

Outstanding optical performance

Focuser built for imaging applications

Overall Tele Vue quality

WHAT WE DON'T LIKE:

Tube relatively long and heavy for scope's focal length and aperture

Tube rings not included

CONSIDERING ITS PEDIGREE, I had high expectations for Tele Vue's TV-NP127is. The original version of this 5-inch f/5.2 apo refractor was simply a bigger brother to the TV-NP101, which received our highest-ever rating when Alan Dyer reviewed it (S&T: May 2002, page 44). And I had successfully put the TV-NP101 through demanding imaging tests while reviewing Santa Barbara Instrument Group's STL-11000M CCD camera (S&T: July 2002, page 96). So why should I have expected less of the new TV-NP127is?

A better question, perhaps, is why Tele Vue introduced this scope in the first place. The answer is simple. Although I had good results working with the TV-NP101, high-end astrophotographers asked for more. Many felt that the original 2-inch focuser was too small and too lightweight for today's big CCD cameras. And because the four-element optical

Now Made for Astrophotographers

Tele Vue-NP127is apochromatic refractor with dual-speed focuser, 2-inch accessory adapter, Imaging System Adapter, and fitted, hard-shell carrying case.

US price: \$6,985

Tele Vue Optics
32 Elkay Dr., Chester, NY 10918
845-469-4551; www.televue.com

system was designed principally for visual observing, it suffered moderate vignetting (light falloff) across the field of large-format cameras.

Tele Vue responded with the "is" (pronounced "eye ess," for "imaging system") line of scopes. These have beefier, 2.4-inch focusers replete with imaging-friendly refinements. The rear lens elements of the Nagler-Petzval (hence "NP") design are also enlarged to reduce vignetting.

When the TV-NP127is debuted last year, it seemed an obvious candidate to test with Apogee's new Alta U9000 CCD camera (reviewed last month, page 64), especially since Tele Vue's optional Large Field Corrector (\$265) was designed to render excellent star images across the field covered by the camera's huge chip. Late last year Tele Vue loaned us a TV-NP127is for use with the Alta U9000 and an Astro-Physics Mach 1 German equatorial mount, which we'll review in an upcoming issue.

Optics

There's no accolade I can offer about the visual performance of the TV-NP127is that others haven't already bestowed on it. The scope has it all: high-contrast, color-free, textbook-perfect images spread across a remarkably flat field. The Moon, planets, double stars, and bright deep-sky objects are all rendered exquisitely in the eyepiece. While the TV-NP127is can't defy the laws of optics and provide performance reserved for larger apertures, if you expect better from a 5-inch f/5 refractor, you probably haven't been living on this planet.

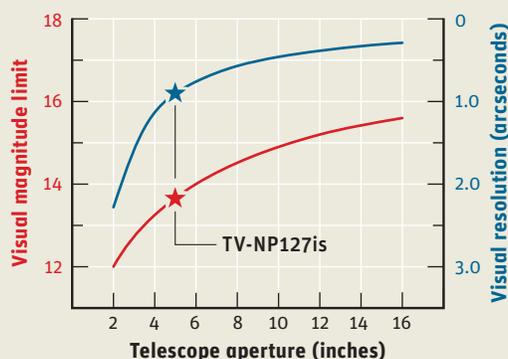
The scope also performs superbly for imaging. Fitted with the Large Field Corrector (the only way I tested the scope), the TV-NP127is delivers pinpoint stars across a field the size of a 35-mm film frame with only a little more than 10% light drop due to vignetting at the edge of the frame's long axis. Only at the outermost edge of the 37-mm-square Apogee CCD did stars appear a touch elongated. And there's a chance this performance may yet be improved.

As I mentioned last month, at the time of my tests there were no commercial adapters for attaching the Apogee camera



The face-on spiral galaxy M101 in Ursa Major was the principle target in this deep, tricolor CCD exposure made with the TV-NP127is and Apogee Alta U9000 camera. But the tack-sharp stars on the full-resolution frame (greatly reduced here for publication) allowed the author and his colleague Sean Walker to identify hundreds of tiny background galaxies simply by their telltale "fuzzy star" appearance. The field is 1.6° wide with north up. The color image of the Rosette Nebula in last month's review of the Apogee camera was made with this same setup.

THEORETICAL PERFORMANCE



Star symbols indicate the relative theoretical performance of the telescope reviewed here. Resolution is the calculated Dawes limit giving the minimum resolvable separation for a pair of stars of equal brightness. The magnitude limit is for stars observed at 150x under good sky conditions — your mileage may vary.

to any telescope. I machined my own based on the critical spacing of the Large Field Corrector from the CCD specified by Tele Vue. Past experience suggests that tweaking this spacing can improve performance. I was happy with my initial results, so I didn't want to waste time machining more experimental adapters.

By examining star images at the corners of the frame, I could see that the chip in the Apogee camera was slightly out of parallel with the camera body. The focuser on the TV-NP127is has a unique tilt adjustment that allows you to square any camera (and thus its chip) to the scope's optical axis. The process is a bit tedious, and it would be best done for imaging setups that can remain fixed for long periods. But Tele Vue's inclusion of a tilt adjustment on its focuser shows an unusual level of commitment to making the "is" scopes imaging friendly.

Just as stars visually snap into focus with quality optics, I found it easy to tell when the TV-NP127is was in perfect focus for imaging. The faintest stars appeared as mere pinpricks, and brighter ones were sharply defined dots. Indeed, star images were so crisp that my colleague Sean Walker and I would hunt for tiny galaxies in wide-field images by looking for "stars" that were ever-so-slightly fuzzy.

I saw no focus shift when switching between standard red, green, and blue filters used for conventional tricolor imaging — a tribute to the TV-NP127is's superb color correction. There was, however, a focus shift as the scope cooled in the

night air. It was consistent with the telescope tube shrinking due to thermal contraction. A temperature drop of 5°F (3°C) had an obvious effect on the focus. But when the temperature was stable, so was the focus. During one dusk-to-dawn imaging marathon the temperature leveled off near the freezing mark around 1 a.m. I ended the night with a 3-hour series of exposures of the Whirlpool Galaxy, M51. The focus at the end of the sequence was almost as perfect as at the beginning.

Mechanics

The TV-NP127is has all the mechanical hallmarks of previous Tele Vue refractors: solid, well made, and beautifully finished. Like its predecessors, the tube assembly is relatively heavy for its aperture. Its Petzval optical heritage also results in a tube that is longer than the focal length would suggest. While the TV-NP127is's focal length is specified as 660 mm, its focal plane lies almost a meter behind the front objective.

The telescope tube has no light baffles. Instead, a lining of textured, flat-black material effectively suppresses glare and scattered light.

The biggest mechanical departure from Tele Vue's earlier telescopes is the focuser. In addition to its features mentioned earlier, I've highlighted

The wispy, nebulous-looking background on this image of the well-known galaxies M81 (center) and M82 is quite real; it's due to tenuous dust clouds pervading our Milky Way (S&T: July 2006, page 78). The fact that they were recorded with the TV-NP127is from a suburban Boston backyard is a testament to many of the extraordinary advances taking place in the world of amateur astrophotography. The field is about 3° wide with north up.



S&T: DENNIS DI CICCO & SEAN WALKER

SPECIFICATIONS & MEASUREMENTS*

Tele Vue-NP127is

Aperture	127.0 mm
Focal length	656 mm (f/5.2)
Tube weight	16 pounds (7 kilograms)

* All values measured by Sky & Telescope



While some people have commented that the Focusmate (6:1 speed reducer) and optional motor drive for the TV-NP127i have the look of add-on parts, the author found them to work flawlessly. Furthermore, the motor drive required no delicate tinkering and could be engaged and disengaged with a simple twist of the motor in its bracket. A unique feature of the Tele Vue “is” line of scopes is a tilt adjustment (using push-pull screws in the end ring) that allows you to square large-chip CCD cameras to the optical axis. The focuser has 2.4 inches of clear aperture (with a 3-inch non-vignetting front aperture) and comes with the pictured 2-inch accessory adapter and a threaded “Imaging System Adapter,” both of which lock solidly in place with four thumbscrews. At least one additional adapter (starting at \$35) is needed to connect specific cameras to the telescope.

others in the accompanying photographs. It worked very well, and I have no complaints. Combined with the scope’s sharp optics, it made quick work of focusing.

But I do agree with others who have commented that the Focusmate (the 6:1 focus-speed reducer) and the optional focus motor (\$195) look like parts added as afterthoughts. They lack the streamlined appearance you might expect of an integrated system. But the system operated flawlessly, and it didn’t require any fiddling to keep it adjusted — a small twist of the focus motor in the dark was all I ever needed to engage or disengage the unit, and the drive never slipped or stalled even during winter’s coldest nights.

Initially I considered the optional digital indicator (starting at \$470) a welcome accessory, since I’ve added similar ones to my own imaging scopes. But the TV-NP127i’s motor drive and focuser were so consistent, I never made much use of the indicator. If the scope and camera were untouched since a previous night, I’d start a new imaging session by

pressing the “out” button on the focus-motor controller for a few seconds, and then tapping the “in” button while running the CCD camera’s focus routine. I always found the point of best focus quickly and easily.

Al Nagler told me that Tele Vue is about to introduce a little “black box” developed in cooperation with the folks at Shoestring Astronomy (www.shoestringastronomy.com) that will connect the focus motor and digital indicator to a computer via a single USB connection. With these additional accessories, you’ll then be able to focus the telescope remotely from a computer.

Celestial targets in the northern springtime sky (think galaxies) are not ideal for showcasing the 3.2°-wide coverage of the TV-NP127i and Apogee camera. In addition to my images here, there’s a tricolor shot of the Rosette Nebula in last month’s review, page 65. There are also images in recent Tele Vue ads that Tim Puckett and Adam Block made with an identical setup, and which I find consistent with my own color results.

Tele Vue set about addressing the concerns of high-end astrophotographers when it designed the “is” line. I feel the company exceeded its goals. There’s no such thing as an all-purpose optical system for astrophotography, but if you’re looking for a 5-inch f/5.2 refractor that can cover today’s 37-mm-square CCDs, then you’ll be hard pressed to do better than the TV-NP127i. *

Senior editor DENNIS DI CICCIO is continually awed by the exponential rise in the quality of equipment available to today’s high-end astrophotographers.

S&T RATINGS

TV-NP127is	
Optics	★ ★ ★ ★ ½
Mechanics	★ ★ ★ ★ ½
Overall	★ ★ ★ ★ ½

★★★★★ Sensibly perfect. No meaningful improvements possible.
 ★★★★ Any shortcomings will go unnoticed in normal use.
 ★★★ Problems noticeable but do not seriously affect performance.
 ★★ Problems noticeable during normal use — performance compromised.
 ★ Problems so severe that the equipment is virtually unusable.

Ratings are intended to convey performance compared with equivalent equipment and should not be used to predict the relative performance of instruments having markedly different apertures or optical designs.

Bottom-line summary:
A superb instrument for visual observing and wide-field astrophotography, with only the slightest hint of image degradation at the extreme corners of the largest detectors currently available. You’ll need to supply a mount.