The Ceravolo 300 Astrograph: two scopes in one

This telescope's dual optical configuration offers wide-field and close-up imaging. **by Bob Fera**

The field of astroimaging has exploded with equipment choices. One recent entry is the Ceravolo 300 Astrograph. Veteran amateur astronomers will recognize the name Peter Ceravolo, renowned optical designer who has designed and built systems for more than 30 years. He began Ceravolo Optical Systems in 1994. The company built the optics for Canada's Microvariability and Oscillations of Stars (MOST) space telescope. It also produced a line of Maksutov-Newtonian telescopes optimized for high-resolution visual work.

In 2003, Ceravolo saw a need for wide-field imaging that took advantage of large CCD chips. The first product of that work is the 300 Astrograph, and I jumped at the chance to test it.

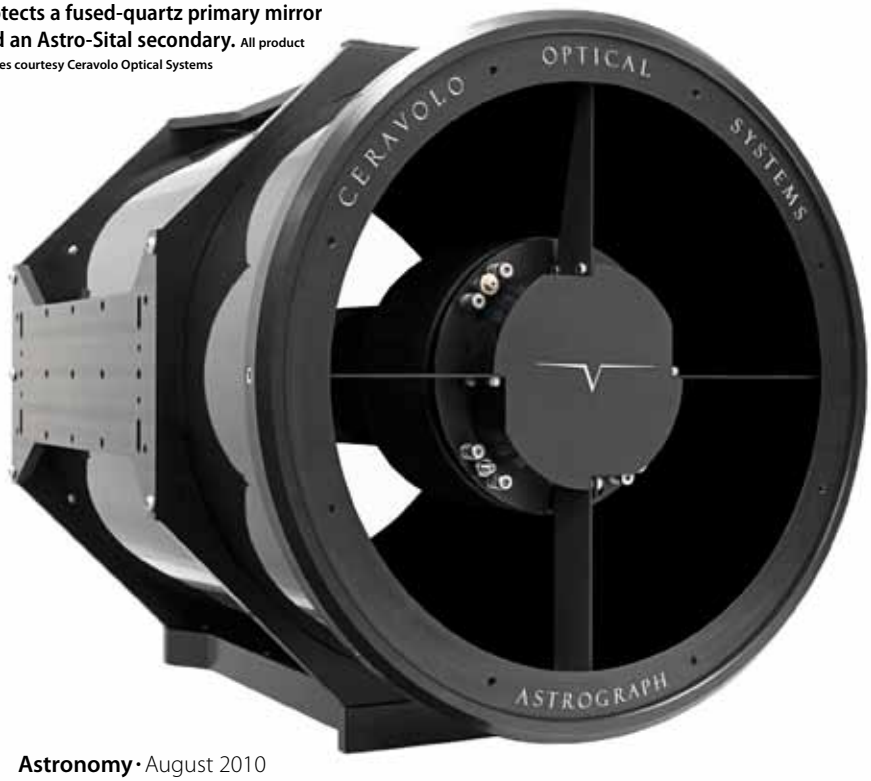
Under the hood

The 300 Astrograph features many intriguing design elements. The optics classify as Dall-Kirkham Cassegrain, but with a three-element field-corrector lens located behind the 11.8-inch (300 millimeters) primary mirror. This combination yields a flat, coma-free field large enough to cover today's CCD chips.

From the start, Ceravolo wanted to produce a system versatile enough for both wide- and narrow-angle targets. Most manufacturers do this by building a long-focal-length system and adding a removable telecompressor lens. Ceravolo reasoned, however, that to retain the highest image quality, it was better to build a short-focal-length system and employ a tele-extender lens when necessary. So, in its native configuration, the 300 Astrograph operates at f/4.9 with a focal length of 1,470mm. Replace the corrector lens, however, and you transform the scope into an f/9 system with a 2,700mm focal length that provides the same flat, corrected field.

The optical system gives the 300 Astrograph a powerful advantage over telescopes with other configurations. Because the scope's two mirrors have

The 300 Astrograph gives users the option of an f/4.9 or an f/9 focal ratio. Switching between the two is simple. Just change out the field corrector lens.



The Ceravolo 300 Astrograph is a Dall-Kirkham Cassegrain reflector with an aperture of 11.8 inches (300 millimeters). Its carbon-fiber tube protects a fused-quartz primary mirror and an Astro-Sital secondary. All product images courtesy Ceravolo Optical Systems

Product specifications

Ceravolo 300 Astrograph
Type: Dall-Kirkham Cassegrain reflector
Aperture: 11.8 inches (300 millimeters)
Focal ratios: f/4.9 and f/9
Focal lengths: 1,470mm at f/4.9; 2,700mm at f/9
System weight: Approximately 50 pounds (22.7 kilograms)
Includes: Pre-collimated primary mirror, carbon fiber tube, Optec TCF-S focuser, thermally isolated aluminum cradle, four side plates with accessory mounting holes, heavy-duty front end ring, front and back aluminum dust covers, either the f/4.9 or f/9 field corrector (The price for the second field corrector is $1,995)
Price: $18,995

simple figures (the primary is elliptical, and the secondary is spherical), collimation is a simple task. Ceravolo factory-aligns the primary and fixes it in place, so the only adjustment needed is the tip/tilt of the secondary mirror. Two orthogonal control knobs accomplish this.

The combination of a fused-quartz f/2 primary, an Astro-Sital secondary, and a 20-inch carbon fiber tube translates to a thermally and mechanically stable system. Ceravolo includes an Optec TCF-S focuser, one of the most rugged and stable available. Integrated electronics allow control of the focuser, cooling fans, and dew heaters by a personal computer.

Test experience

I first tested the 300 Astrograph at f/4.9. The scope's somewhat restricted back-focus combined with the Optec focuser's generous size eliminates the possibility of using an off-axis guider, so I mounted a guide scope to the tube. This arrangement was fine for guiding, and my Astro-Physics 1200 mount easily handled the 50-pound (22.7 kilograms) weight.

The 300 Astrograph comes with several large-diameter extension tubes, which easily let me position my CCD camera at the optimal focus position. Ceravolo bolts (rather than threads) its extension tubes together. This provides a superior connection.

For my test during the summer of 2009, the only way to focus was via the supplied software. This was the system's only weak point because the program was in testing at the time. Also, because no ASCOM driver (that allows software to "talk" to instruments) was available, autofocusing was not possible. No more. Current scopes include both ASCOM drivers and the ability to use the Optec hand controller.

Collimating the scope is easy. Just turn one of the two knobs that control the orthogonal motion of the secondary mirror.

The Witch's Broom (NGC 6960) shows vibrant, true colors and sharp stellar images to the edge of the field when the author imaged it with the Ceravolo 300 Astrograph at f/4.9. Bob Fera

Once I set up, I turned the 300 Astrograph to my first target, the Crescent Nebula (NGC 6888) in Cygnus, and the results delighted me. The wide field provided a panoramic vista of nebulosity around the Crescent with nice sharp stars out to the edges of my SBIG STL-11000M CCD camera's chip. Shots of the Butterfly Nebula (IC 1318) in Cygnus and the Snake Nebula (Barnard 72) in Ophiuchus reinforced my positive impressions from my initial images.

Testing, part 2

The following month, it was time to try the 300 Astrograph at f/9. This required removing the camera, focuser, and extension tubes, and then replacing the corrector lens assembly at the telescope's rear. The only tools that I needed were hex wrenches, so installing the lens was easy.

At f/9, the 300 Astrograph has a few inches of additional back-focus, which had several ramifications. It meant I could insert an off-axis guider into the system, but I also had to re-balance the scope. After going through the expected first-light gyrations of figuring out which extension tubes to use and touching up the collimation, I was ready to go.

While inspecting my initial shot, I noticed some odd aberrations in stars at the corners. I sent my image to Ceravolo, and he immediately identified the problem: The focal plane was not square to the telescope's axis. Clearly I had failed to tighten some set screws sufficiently while connecting my camera and guider because I had no such troubles at f/4.9. Unfortunately, other commitments prevented me from correcting the problem before I had to return the scope. However, I have examined other images taken through the 300 Astrograph at f/9. The shots show perfect stars to the corners, so I'll call my problem "pilot error."

Top-of-the-line gear

I had a great time testing the Ceravolo 300 Astrograph. It is a beautiful instrument you'll be proud to own. It also lives up to each of its promises: excellent image quality, versatility, and ease-of-use — a difficult combination, but one that makes for an enduring telescope.

Bob Fera *is a dedicated astroimager and long-time contributor to* Astronomy. *He images from Mount Pinos in the Los Padres National Forest.*

Contact information

Ceravolo Optical Systems
100 Craig Henry Drive, Unit 102
Ottawa, Canada K2G 5W3
[t] 613.228.2373
[w] www.ceravolo.com