Celestron’s Advanced Series telescopes

The first go-to telescopes, introduced a decade ago, had one thing in common: they were expensive. But as technology improved, telescopes became cheaper to produce, and amateur astronomers saw an amazing evolution. Even introductory-level telescopes were outfitted with scaled-down computer-controlled drives. The introductory systems — as well as the advanced go-to telescopes — were big hits, but in their wake, they left a void in the middle of the market. No mid-priced, computer-controlled telescopes were being built for the serious hobbyist.

As the telescope world continues to evolve, we’re beginning to see that niche filled. The latest entries are Celestron’s Advanced Series, which includes 4-inch and 6-inch refractors; 6-, 8-, and 10-inch Newtonian reflectors; and 5-, 8-, and 9½-inch Schmidt-Cassegrain telescopes. These scopes are not new, having stood the test of time, but are redesigned instruments. What’s underneath these telescopes, however, is new. Except for the C4-R refractor and C6-N reflector, the improved CG-5 equatorial mount supports these telescopes.

The CG-5
The CG-5 mount has been a staple at Celestron since the mid-1990s. The original design was adequate for handling modest instruments but began to teeter under the weight of more substantial telescopes. My own review of the Celestron G-9½ Schmidt-Cassegrain in the June 2002 issue of *Astronomy* rated mounting stability as poor, commenting, “The guilty party here is the aluminum tripod. Like many imported tripods, the CG-5’s is made from thin-walled, stamped aluminum.”

To help steady the view, Celestron replaced the CG-5’s original tripod legs with far more substantial, 2-inch tubular legs made of stainless steel. The legs measure 32 inches long when collapsed and extend to 56.5 inches. Further, the redesigned CG-5 mount’s axes are smoother and more stable. The GT version of the mount adds a NexStar go-to system that features a database of more than 40,000 objects. When whizzing from one target to the next, the internal worm gear DC servo-motors move the telescopes at speeds up to 4° per second.

Of course, we wanted to find out how well the new Advanced Series CG-5GT mount performs. We also decided to test the optics of two of the most popular instruments in the line, so we put the C8-NGT Newtonian and C8-SGT Schmidt-Cassegrain through their paces.

Overview
Let’s begin with the 8-inch f/5 C8-NGT Newtonian reflector. The C8-NGT’s steel tube assembly is held in a pair of rings mounted to a dovetail bar that mates to the mount’s saddle. The telescope can be moved back and forth in the rings, and the dovetail assembly can slide 13 inches along the saddle for precise balancing.

Celestron uses a thin metal plate to cover the back end of the Newtonian’s tube to seal out dust. Although effective, it restricts access to the primary mirror cell’s adjustment screws, which you’ll need to collimate the optics. The plate also slows airflow through the tube, impeding the cooling process. I recommend you remove the plate altogether and — to keep dust from the optics — cover the end with a shower cap when the telescope is not in use.

THE CG-5 EQUATORIAL MOUNT is a go-to drive system. The CG-5 rides on a newly engineered tripod, which incorporates sturdy, tubular steel legs. *Astronomy* / JAMES FORBES
C8-NGT (above) is Celestron’s new 8-inch f/5 Newtonian reflector. This go-to telescope is a complete system that delivers superb optical performance. THE C8-SGT (right) is the latest in a generation of tried-and-true Schmidt-Cassegrain telescopes from Celestron. ASTRONOMY: JAMES FORBES
The other telescope, the C8-SGT, is built around Celestron’s tried-and-true 8-inch f/10 Schmidt-Cassegrain frame. The test C8-SGT came with Celestron’s new Starbright XLT coating, which is designed to increase light transmission by approximately 16 percent over optics with a standard coating. At its peak wavelength, the XLT coating reflects 89 percent of the light entering the telescope into the eyepiece. The coating works, as image brightness was excellent. The C8-NGT Newtonian, which is available only with standard aluminizing, reflects about 78 percent of the incoming light.

Each telescope was supplied with its own CG-5GT mount and tripod, enabling me to do side-by-side comparisons of optical quality as well as the chance to confirm mechanical consistency. Each mount included a NexStar hand controller, which features a two-line readout and a full-size keypad that I found easy to use even while wearing heavy gloves. The mount also can be controlled remotely using any of several planetarium-style programs, such as TheSky Level 1 software (included), by connecting an RS-232 cable between the hand controller and a computer.

Setup
I found setting up each telescope to be quick and straightforward. Open the tripod and extend the legs to the length you desire. Place the CG-5 mount on top of the tripod, line up the alignment pin with the recess on the underside of the mount, and tighten the knob on the tripod’s captive central rod. Finally, slip the accessory tray onto the central rod, lining up the three arms of the tray so that each is pushing against the inside of a leg, and tighten the tray in place with a second large knob. With the tripod and mount connected, screw the counterweight bar into the declination axis and attach two 11-pound counterweights that come with the telescope. The C8-SGT can get by with just one counterweight if the scope is used for observing, but it will need both to counterbalance a camera.

Each telescope’s computer and motors use 12-volt DC power. Because of power requirements, Celestron does not include a battery holder. Instead, Celestron includes a 24-foot cord to plug into an automobile cigarette lighter or rechargeable battery, which makes much more sense. A 110-volt AC adapter is sold separately.

Initializing the telescope’s computer is straightforward and well detailed in the operating manual. Begin by roughly aligning the telescope with the celestial pole. When you turn on the power, the hand controller offers you four ways to initialize its settings: Auto Align, where the telescope chooses three stars; Auto Three-Star Alignment, where the user chooses three alignment stars from a list; Quick Align, where the telescope simply tracks the sky but cannot use the onboard computer for finding objects; and Last Alignment, which continues to use the alignment that was saved when the telescope was last turned off. I prefer Auto Align because it’s easy and leads to accurate acquisition of objects.

Testing
To test the instruments, I aimed each at a 3rd-magnitude star. Checking the images both inside and outside of focus through the C8-SGT revealed a small amount of spherical aberration, which I confirmed with a Ronchi grating. Overall, I judged the telescope to have a final wavefront error of about \( \frac{1}{4} \)-wave, which is considered “diffraction limited.” This means the telescope will perform up to the limits of atmospheric conditions.

Phil Harrington is the author of the new observing guidebook Star Watch, which is published by John Wiley & Sons.
In actual use, the small amount of spherical aberration clouded the view a tiny bit, especially on bright objects such as planets. Saturn had a slight haze around it but was still sharp enough for me to distinguish the Cassini Division as well as the planet’s subtle equatorial belt. Close double stars, such as Castor and Rigel, were easy to resolve.

Switching scopes, I found the C8-NGT had some of the finest optics I’ve seen in a Newtonian reflector. Star testing proved the primary mirror was a nearly perfect paraboloid. Estimating its wavefront accuracy, I judged the mirror to be at least \( \frac{1}{10} \) wave, which translated into some stunning views of sky objects.

On a night when seeing conditions rated a 5 on a scale of 1 to 10, the C8-NGT delivered wonderful images of Saturn at 357x using a 7mm Pentax XL eyepiece and 2.5x Tele Vue Powermate. That same combination also showed six stars in the Trapezium (within the Orion Nebula). The C8-NGT also revealed lots of detail within Jupiter’s turbulent atmosphere.

The NexStar go-to system performed wonderfully night after night. At each stop, the target was within the field of the C8-NGT’s 20mm eyepiece (50x). Aiming accuracy was also good through the C8-SGT, although the narrower field of its 25mm eyepiece (81x) meant an occasional quick hunt for the target.

The overall stability of the Advanced Series CG-5 mount is better than earlier models thanks to the sturdier tripod. A direct comparison between the new CG-5 and my own, older CG-5 confirmed that vibration-dampening times have been cut in half with the new tripod.

Celestron has created an impressive line of intelligent telescopes with the Advanced Series CG-5GT family. The new CG-5 mount has undergone some welcome improvements, the NexStar go-to system proves to be a trustworthy companion, and the telescopes’ optics, especially the 8-inch Newtonian’s, are exceptional. Put all this together in a package that retails for between $950 and $1,500 each, and you have two great instruments that are sure to give owners enjoyment for years to come.
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