

EXTREME COSMOS:
The Gamma-Ray Universe

PAGE 22

IMAGING:
Double Your Photons

PAGE 60

DEEP SKY:
Splashing Around the Dolphin

PAGE 56

SKY & TELESCOPE

THE ESSENTIAL GUIDE TO ASTRONOMY

OCTOBER 2020



All Eyes on
MARS

Striking Close-ups & Observing Tips

Pages 12 & 48

skyandtelescope.org

19 Glorious
Globulars

Page 28

Catch a
Geosat Flash

Page 36

A Dobsonian
Masterpiece

Page 72

\$6.99US \$7.99CAN

A|A
T|S
10>



0 74470 02207 7

Sky-Watcher's EQ8-R Pro Mount

This mid-heavyweight German equatorial mount is equally suited for use in the field or permanently installed in an observatory.

EQ8-R Pro Mount

U.S. Price: \$4,050 (equatorial head and counterweights)
skywatcherusa.com

What We Like

Extremely solid mount
Accurate tracking and Go To performance
Very quiet slewing

What We Don't Like

Needs better software for remote operation and use with planetarium programs

"WHAT TELESCOPE DID YOU USE?"

someone called out as one of our astronomy club members projected a photograph of the Dumbbell Nebula on the screen during a show-and-tell session. "That's not the question to ask," came the reply. "What you really should ask is what mount did I use?"

That unexpected response was so spot-on that now, more than 50 years later, it still rattles around in my head whenever I hear someone ask what telescope was used to create a stunning deep-sky image. As a beginning astrophotographer, I quickly learned that a telescope's mount and drive system played more of a role in creating a successful long-exposure photograph than did the scope's optics. And with few commercial options available back then, most of the leading astrophotographers — Clarence Custer, George Keene, Alan McClure, and Henry Paul, to name a few luminaries — were building their own equipment.

Times have changed. Driven by the increasing interest in deep-sky photography that began in the 1970s and accelerated into the 21st century fueled by digital imaging, today there's an abundance of excellent commercial mounts tailor-made for imaging setups, whether they be as lightweight as a camera and lens or as massive as the largest observatory astrographs.

One of the newest mounts to enter the mid-heavyweight category is the EQ8-R Pro from Sky-Watcher, a company with a reputation for making quality products with attractive price tags.

◀ Sky-Watcher's new EQ8-R Pro German equatorial mount has a rated capacity of up to 110 pounds and is equally suited for use in a permanent observatory setting or assembled in the field for portable use.

The EQ8-R Pro is rated for equipment weighing up to 110 pounds (50 kg). It's also massive itself, with the equatorial head alone tipping the scales at 57 pounds, and the counterweight shaft and a pair of 22-pound counterweights adding a total of 52 pounds more. The optional tripod/pier (\$950 when ordered with the EQ8-R Pro) weighs 65 pounds, and even the adjustable footpads for the tripod legs are a hefty 4 pounds each. This stuff is all solidly made.

The most obvious benefit of this weight is stability. The EQ8-R Pro proved to be an exceptionally good platform for astrophotography. And while it should be a no-brainer to think that any mount good enough for long-exposure imaging would be good for visual observing too, it took a pandemic to make that point to me beyond a shadow of a doubt. More about that later.

You'll find a full list of specifications for the EQ8-R Pro on the Sky-Watcher website, so I'll mention just a few here. The mount requires a power source that delivers between 11 and 16 volts DC with at least a 3-amp capacity, which means it will run fine off of a car battery. There's an optional polar-alignment scope (\$160) that bolts onto the mount's declination-axis housing. But I've become a big fan of electronic polar scopes such as the PoleMaster from QHYCCD or the iPolar from iOptron, since they are fast, accurate, and don't require you to be a back-bending contortionist to use them.

The EQ8-R Pro equatorial head has very robust adjustments for azimuth and especially altitude when doing polar alignment. They worked smoothly even when the mount was loaded with a telescope and counterweights, which is my preferred configuration when dial-



ing in polar alignment to avoid possible changes due to flexure when weight is added or removed from a mount.

Sky-Watcher does not give a value for periodic error of the approximately 7-inch diameter, 435-tooth right-ascension worm gear. But I measured the error to be less than 6 arcseconds one night when viewing double stars with a calibrated reticle eyepiece. The tracking was very smooth and free of sudden jumps that might compromise guiding. I made several dozen 10-minute autoguided exposures without a single one showing guiding errors. And all but a few of my dozens of 2-minute unguided exposures were successful. I have no doubts that the mount will meet the demands of today's deep-sky photographers guiding manually (does anyone still do that?) or with an autoguider.

For people wanting to push the limits of unguided exposures, the EQ8-R Pro is available with a high-resolution Renishaw encoder on the right-ascension axis that should reduce periodic error well into the sub-arcsecond range. It's a \$3,050 option.

Cables and Electronics

The EQ8-R Pro has an internal cable-management system for equipment mounted on a telescope. This can eliminate most loose wires hanging from a telescope that could snag on a moving mount. There are input ports on the fixed end of the polar-axis housing for

▲ The author made this view of the Christmas Tree Cluster and Cone Nebula in Monoceros with a 200-mm f/3 astrograph and CCD camera. It was assembled from a dozen 10-minute autoguided exposures with the EQ8-R Pro mount.

power, USB 3.0 (connected to an internal USB hub), and RJ10, RJ12, and RJ45 modular jacks (the RJ45 jack is for 8-pin Ethernet cables). On the sky end of the telescope saddle there are three power output ports and four powered USB 3.0 ports, while the other end of the saddle has the corresponding output ports for the modular jacks.

As nice as this cable-management system is for electronic equipment

on a telescope, the EQ8-R Pro does require some wires to be attached to the declination-axis housing, which is fixed relative to telescope moving in declination and also moves as the polar axis rotates. These are for the mount's main power input, SynScan hand control, autoguider input, and a USB cable if you want a hard-wire connection between the mount and a computer. Recently Sky-Watcher introduced a \$65 WiFi



▲ *Left:* The mount's polar alignment can be precisely adjusted with heavy-duty controls on the azimuth and altitude motions of the polar axis. *Right:* While the EQ8-R Pro has an optional polar-alignment scope available, the author used its mounting cap screws to attach his QHYCCD PoleMaster to electronically dial in the mount's alignment.

adapter that replaces the need for the USB cable (see page 63 of last August's issue). The declination-axis housing also has the power on/off switch with a rather bright, red LED indicator, and a "snap" port for a remote-release cable that will operate Canon EOS cameras via the hand control or through the USB computer connection.

The SynScan hand control is the most straightforward way to operate the EQ8-R Pro as a standalone mount. But there are also free software apps that run on Windows computers and Android devices (for USB and WiFi connections to the mount) and iOS devices (for WiFi only). I tested only the Windows version running on a laptop.

The SynScan has most of the features and databases that have become pretty much standard fare for Go To telescopes. The manual does a good job explaining the hand control's setup and operation with one small exception that I encountered in the beginning. Initialization starts with entering date, time, and location, all of which remain in the controller's memory for future use with the exception of the time, which always defaults to 8 p.m. on power up. This means you only have to change the date and enter the correct time when you start the mount on another night, assuming your location is the same. If you're into luxury, there's a \$175 GPS module that plugs into the SynScan controller and will update the necessary



information each time you power up the mount.

Sky alignment of the mount begins by sending the mount automatically to its home position, which places the telescope above the polar axis and aimed at the celestial pole. And from there you perform a 1-, 2-, or 3-star alignment. The more stars you use, the better the Go To pointing accuracy is if the mount is only roughly polar aligned. Since most of my testing was done with the mount accurately polar aligned in my observatory, a 1-star sky alignment was always sufficient. Furthermore, since

◀ The SynScan hand control has illuminated buttons and a backlit LCD panel that's easily visible at night or in full daylight.

I usually shut down the mount with a park command, no alignment was needed when I powered up on the next night and resumed observing from the parked position.

As for that bump in the road during my first sky initialization, it was the question "Renew H.P.O.?" that appeared on the SynScan display after I finished my star alignment. There was no mention of that in the manual. I simply selected "no" as my answer and went about my observing. Later I noodled out that H.P.O. stands for "home position offset," and it enters a correction (if needed) to correlate the aim of your telescope with the mount's fixed home position. This makes the mount's pointing very accurate when you start from the home position — an important feature if the mount is operated remotely.

The Windows app worked well, and it does offer some features that are not available with the hand controller. But by itself the app offered little advantage for observing over operating the mount from the SynScan controller. Furthermore, the controller has more catalogs of celestial objects and is thus better for Go To observing. One advantage of the app that I did use occasionally was the option of selecting Venus as a daytime alignment "star" when initializing the

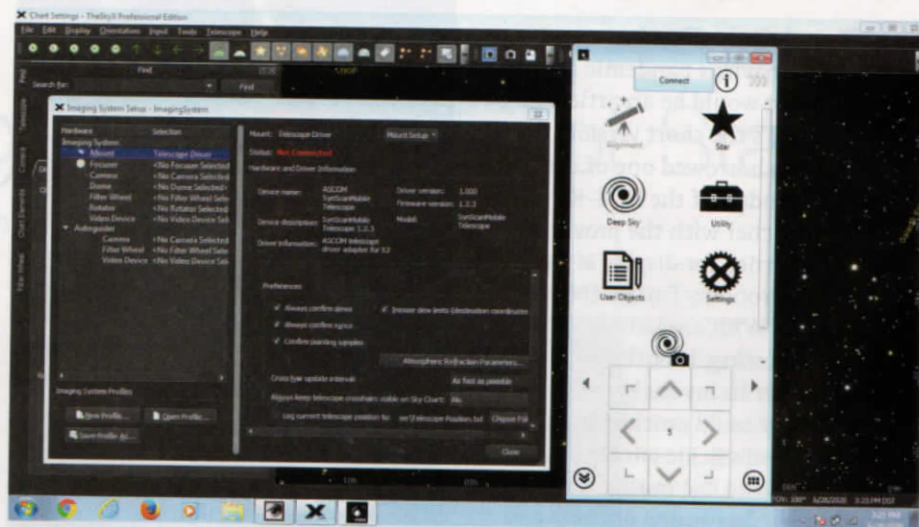


mount if I wasn't starting from a parked position. The SynScan hand controller only lists stars for alignment, albeit many can be seen (and thus used) in a clear daytime sky, especially given the mount's accurate Go To pointing starting from the home position.

The app's real utility is its ability to allow control of the mount from a planetarium program. Indeed, it's the *only* way to do this, since there is currently no software for direct control of the mount from planetarium programs. The process of getting everything running is somewhat clunky, and the features, unfortunately, are limited.

I tested the app with Software Bisque's *TheSkyX Professional* running on my laptop. This required having the ASCOM Platform installed on my computer as well as installing the SynScan ASCOM driver that is available for free from the Sky-Watcher website. In a nutshell, I first launched the *SynScan Pro* app and connected it to the mount, and after completing a star alignment with the app I'd launch *TheSkyX* and connect it to the app. This let me select objects and issue slew-to commands to the mount from *TheSkyX*. But that's about all you can do. If you want to do something even as simple as nudging the scope to center an object, you have to toggle back to the app and use its move "buttons" rather than using controls in *TheSkyX*. Not exactly ideal.

With some effort I was able to use



▲ Operating the EQ8-R Pro from a computer requires launching the SynScan app (white box) and establishing a connection to the mount. Then it's connected as an ASCOM device to planetarium software such as *TheSkyX* shown here and tested by the author.

this configuration to run the EQ8-R Pro remotely via the conventional method of connecting to the computer controlling the mount with remote-desktop software (*TeamViewer*, for example) running on another computer. Sky-Watcher's Kevin LeGore tells me that the company is working on software that will allow direct control of the EQ8-R Pro from planetarium software. That's good news, since in my opinion the EQ8-R Pro has all the mechanical features needed to make it a great mount for remote operation.

The mount performed extremely well during my tests, and I encour-

tered only a few minor issues worth noting. One is that occasionally when sending the mount to the home position or when slewing between objects, a telescope can briefly point slightly below the horizon. This might present problems for optics that aren't fully restrained (think of a Dobsonian with a primary mirror in an unrestrained sling mount). Sometimes when using the hand control's direction buttons to center an object, the mount would briefly continue to move after I released a button. It was never an issue when guiding, only when using the faster centering slew speeds. I've also experienced this issue with other Go To mounts. It's mildly annoying, but not a showstopper.

Unlike most of the Go To mounts I've tested, the SynScan controller does not have a "synchronize" feature that lets you realign the pointing to a given object while observing. It does, however, have a nice feature, especially for a mount set up permanently, called "Pointing Accuracy Enhancement." It divides the sky into 85 small sections and remembers any corrections needed to center objects within a section and apply them to future Go To slews to that part of the sky. This would nicely compensate for telescope flexure that varied for different parts of the sky.



◀ Described in the accompanying text, the EQ8-R Pro has an internal cable-management system for power, USB 3.0, and modular-jack cables. Input ports (far left) on the fixed end of the polar-axis housing have corresponding outputs on the declination saddle (middle, only one end shown). The mount's power, autoguider, and computer USB connections (left) are on the side of the declination-axis housing.

The Pandemic Factor

How the coronavirus pandemic affected this test report would be an article in itself. But here's the short version. For this review we borrowed one of the first production models of the EQ8-R Pro from Sky-Watcher with the provision that it be returned for display at the Northeast Astronomy Forum (NEAF) in early April. With a relatively short schedule for testing, I set the mount on an existing pier in my backyard observatory, where I could quickly respond to New England's fickle winter weather. All went well, and the testing was finished by the beginning of April. But by then NEAF was cancelled because of the pandemic. There was no immediate way to return the mount given that the shipping boxes were locked up in Sky & Telescope's shuttered offices.

With Massachusetts in a virtual shutdown, I suddenly had free time on my hands, which I used to dust off some back-burner astronomy projects, including modifying and testing several imaging setups. The EQ8-R Pro was the perfect platform for these projects, with its heavy-duty capacity, accurate pointing, and smooth tracking. I was only



▲ The author's 6-inch refractor (made with parts cannibalized from other scopes) and the EQ8-R Pro helped launch an observing project that was more than 40 years in the waiting.

interested in image quality, so short, unguided exposures sufficed, and the mount handled them nicely.

But it was another project (one that had languished in the recesses of my

thoughts for more than 40 years) that gave me the best appreciation for how well the EQ8-R Pro performs for visual observing. I spent many late spring and early summer nights using a home-made 6-inch refractor to follow in the footsteps of England's Admiral W. H. Smyth, observing the objects he viewed with a 6-inch refractor and described so poetically in his 1844 *Bedford Catalogue*. Many were double stars that required high magnifications, and having a solid mount that didn't jiggle when focusing was a real joy, and the accurate Go To pointing was a plus for identifying many of my targets.

I have little doubt that the EQ8-R Pro will satisfy the needs of astrophotographers and visual observers alike. And with the anticipation of updated software for control of the mount via third-party planetarium software, the EQ8-R Pro is sure to be a contender in the realm of mid-heavyweight mounts suitable for remote operation.

■ Senior Contributing Editor DENNIS DI CICCIO often spends clear nights testing equipment from his backyard observatory in Boston's western suburbs.



◀ Far left: The optional tripod/pier for the EQ8-R Pro is a substantial piece of hardware, weighing 65 pounds. It can vary the height of the EQ8-R Pro's base between approximately 30 and 40 inches above the ground.

◀ Left, top: Adjustable footpads that assist with leveling the tripod/pier have a non-slip rubber ring on the base and a locking collar on the elevation jack screw.



◀ Left, bottom: Plastic pads and a center bolt (turned by the green hand knob at left) make for smooth operation of the EQ8-R Pro's azimuth motion when polar aligning the mount on the tripod/pier.