

The Maksutov-Cassegrain and ED120 OTAs mounted upon HEQ5 and EQ6 Pro-Series GOTO mounts.  
All images: David Woodward.

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# Sky-Watcher Pro-Series

The Sky-Watcher Pro-Series looks set to become a major feature of the amateur astronomy landscape. **Grant Privett** took the tour.

**U**ntil recently Sky-Watcher telescopes competed at the lower specification and less expensive end of the market, but the Pro-Series is a significant departure and marks a move toward the loftier end of the market.

The Pro-Series instruments consist of a Skymax 150mm aperture  $f/12$  Maksutov-Cassegrain and three Evostar ED apochromatic refractors; 80mm aperture  $f/7.5$ , 100mm- $f/9$  and 120mm- $f/7.5$ . They weigh in around 6kg for the  $f/12$ , then 3.5, 6.5 and 8kg respectively. The word apochromatic is what places these instruments above

those found in the more familiar achromatic Sky-Watcher Evostar range.

An apochromatic lens assembly employs low dispersion glass in the objective lens and can nearly eliminate the distracting false-colour fringes (chromatic aberration) seen around bright objects when using a normal achromatic refractor. In this instance, FPL53 fluorite glass has been used for one of the lens elements, and the fully multicoated optics are given away by the rich green reflections.

## Out of the box

The Skymax optical tube assembly (OTA) is purchased complete with a star diagonal, two eyepieces and a finderscope. The refractor OTAs can be purchased together with tube rings (option ED1) or with the rings, a star diagonal, a finderscope and two eyepieces (option ED2). Mounts can also be added to the package but we'll come to those later.



The ED 120, 80 and 100 OTAs showing the considerable internal baffling.



The SkyScan hand controller in a bracket attached to the eyepiece holder.

The business end of the Maksutov-Cassegrain showing the small size of its secondary.



Each OTA arrived in a single cardboard box with the lens assembly, tube rings and focusing mounts well protected. The boxes were certainly sufficiently strong for a single use, but exposure to a few damp nights would weaken them, so it's no surprise that robust aluminium carrying cases can be purchased as an optional extra. One comes as standard with the Evostar 80mm ED2.

The champagne-coloured tubes with stylish white fittings and tube rings seemed rugged and robust and the dew shields worked well on the nights I used them. The tube caps included differed in style between the models, with some more secure than others, but all were adequate. The tube rings were easy to use and adjust and boasted a mounting point suitable for attaching a SLR camera, thus making piggyback imaging a doddle.

The easily mounted 9 x 50mm finder scopes provided a field of view nearly four degrees across, complete with a crosshair. It could be argued that they are positioned a little too near the focus mount because I banged them several times with my forehead but they were still very usable. I particularly liked the adjustments used to align the crosshairs with the sky. The finder is held in its mount by two finger adjustable bolts with a third spring-loaded locator. This means only two bolts need to be adjusted to line things up and avoids the iterative tighten/loosen cycles that can be necessary to achieve a really good line-up between the crosshairs and the sky. This style of finderscope mount should be compulsory as far as I am concerned. It's so much easier than fiddling with three bolts.

### Getting going

The refractors were equipped with a Crayford style focuser that was smooth, responsive and exhibited no discernible backlash. It was a joy to work with and so a shame to discover that the Evostar 80 focusing mount does not allow sufficient travel to permit the OTA to be used without a diagonal or tube extension in place.

The eyepieces associated with the Pro-Series are 5mm, 9mm, 20mm

and 25mm, depending on the OTA purchased. They are long eye relief 1.25in-wide eyepieces of reasonable quality but users may wish to replace these with better quality ones to get the best performance out of the OTAs.

The Maksutov–Cassegrain OTA employs a 1.25in diagonal and the refractors a 2in diagonal plus 1.25in adaptor. I initially found it difficult to ensure that the diagonal remained flush against the end of the focusing mount and to tighten the small bolts that hold both the eyepiece and diagonal securely in place. However, once these were firmly located and flush, image quality was good.

### Grab-and-go telescope

The 80mm is a short tube grab-and-go telescope providing a good field of view (1.75 degrees with a 25mm eyepiece and 0.33 degrees with the 5mm) and surprisingly bright, sharp and attractive images given the quite modest aperture it affords. I was pleasantly surprised at how much detail I could discern on Mars, during mid-December 2005 when it was just 15 arcseconds across, and Saturn's Cassini division was quite easy to spot. I was also reassured by its ability to show a clear chunk of dark sky between the individual star pairs of epsilon Lyrae.

On deep sky objects the images were never going to be dramatic, but the components of the Trapezium were wreathed in nebulosity and M78 was immediately obvious when I inadvertently swept it up.

When viewing Mars using the Evostar 100mm OTA, the images were as good as you could hope for in this price range and considerably better than I have seen with some larger Newtonian reflectors. Saturn was lovely with the subtle banding and the Cassini division seen extensively. The Moon looked good with no apparent false colour and some of the smaller craters in Clavius resolved well. Perhaps the larger focal ratio helped. The cooling time of the 100mm tube seemed comparable with that of the 80mm and, whilst bigger, it was



The EQ6 and HEQ5 mounts are compatible with the ST4 autoguider.

light enough to retain the feel of a grab-and-go, certainly for those of us used to 250mm Newtonians.

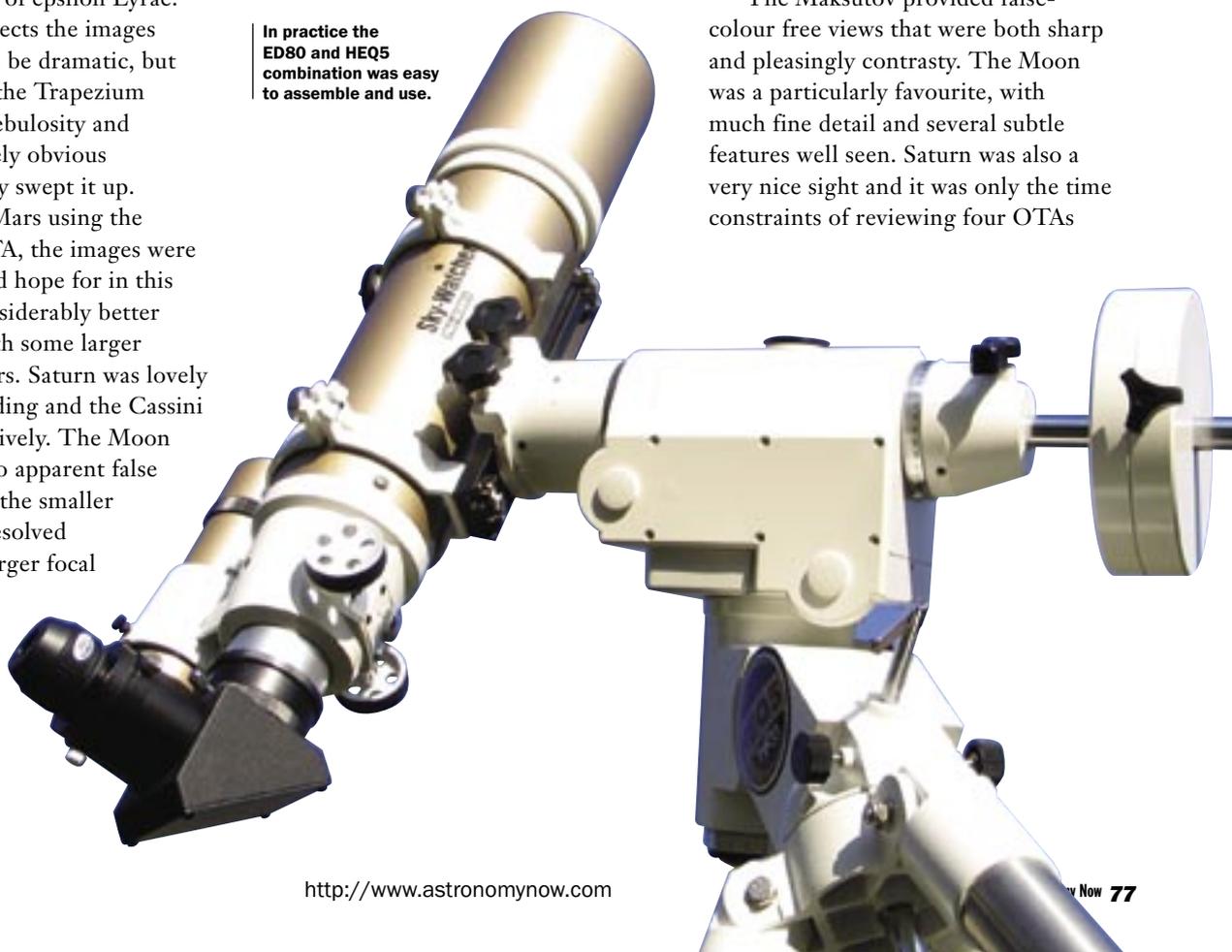
The 120mm was a little cumbersome to carry around, but the extra light gathering power made an obvious difference when examining nebulae and fainter clusters. On Mars it didn't seem to add that much detail to the view but it did make the images significantly brighter than the 100mm. The cooling time required was over 60 minutes, similar to that for the Maksutov–Cassegrain.

**In practice the ED80 and HEQ5 combination was easy to assemble and use.**

### Measuring up the Mak

The Maksutov–Cassegrain provided sharp images. When viewing the planets at high powers, some image shift occurred during focusing. Testing of the Maksutov revealed a nice set of optics that gave good sharp images after the OTA cooled from the indoor temperature to the ambient outside temperature. Cooling took about an hour for a 20 degree Celsius temperature difference. A Skymax 180mm version is due for launch in the summer.

The Maksutov provided false-colour free views that were both sharp and pleasingly contrasty. The Moon was a particularly favourite, with much fine detail and several subtle features well seen. Saturn was also a very nice sight and it was only the time constraints of reviewing four OTAs



and two mounts that prevented me getting out my webcam and a Barlow lens to capture some images. I would expect good results of this instrument if used for planetary imaging.

**The star treatment**

Star testing was carried out using a 5mm eyepiece and by inspection of well-known objects. I trained all the telescopes on the Moon (at five different phases), Mars, Saturn, Vega, Capella, Castor, epsilon Lyrae, the Trapezium and then M78, M42, M57 and M1 – the usual suspects – thereby encapsulating the types of object an observer might seek out with this size of aperture.

Observation of the Moon showed no obvious false colour edging and bright stars showed little dispersed

light, the starless background being quite dark at higher powers.

In addition, on three nights of good seeing, bright stars, Capella and Aldebaran mainly, were viewed when well placed. The star test results overall were good. All the refractors showed a very clean intra-focal diffraction pattern but a less distinct extra-focal pattern, in perfect keeping with what one should expect from this design of lens. Testing of the refractors showed nothing to cause concern. There was a subtle brightening of the outer diffraction ring on the intra-focal view for the 120mm, but the 100mm showed the closest result to a textbook star test result I have seen in some time.

Simply put, the Pro-Series ED refractors are good quality, competitively priced

apochromatics. The OTAs are undeniably good and likely to prove popular among refractor fans. If, when the time came to give them back, I could have kept one of them it would undoubtedly have been the 100mm with its fine images, reasonable cooling time, sound construction and a very nice focusing mount. The view it provided of Mars was

splendid. What more could I ask?

So now I've chosen the telescope, what about the mount to put it on?

**Mounting up**

A few years ago the EQ6 and HEQ5 German equatorial mounts appeared on the market and quickly became familiar items at star parties. Sturdy, quiet and well constructed, they were welcomed by observers and proved good for visual use but did not lend themselves too well to imaging. So, when the new Pro-Series range of EQ mounts, boasting GOTO and periodic error correction, were announced last year, many were curious to check them out.

Each mount arrived in three boxes containing the tripod, a portable rechargeable power unit and the mount itself. The boxes protected the contents, but would not survive frequent use. The appearance of the kit itself was striking. Gone is the anonymous black paint job of their predecessors, now a white finish is combined with black clutch levers to give the Sky-Watcher Pro-Series a distinctive appearance that certainly looked good when topped by the champagne trimmed Pro-Series OTAs.

The manufacturing ethos has clearly leaned in favour of sturdiness and rugged construction as priorities. The EQ6 and HEQ5 Pro mount heads are advertised as capable of carrying loads of 25kg and 18kg respectively. The mount heads themselves weigh in at 16kg and 10kg with the associated tripods adding an additional 21kg and 18kg. These are considerable – you would not want to drop one on your foot.

Each tripod was easily and quickly erected, with the legs locked in place by a rod connected to a three-pronged eyepiece tray. The extending tubular steel construction tripod legs allow mount levelling (the EQ6 has a bubble level) and a variety of observing heights. The mount head itself is lowered into a circular recess on the tripod top with a protruding

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The ED100 on an HEQ5 Pro-Series GOTO mount provided many fine views.



The complete Pro-Series range. One Maksutov-Cassegrain and three apochromatic refractors.

post on the tripod dovetailing neatly between the polar alignment bolts. The EQ6 and HEQ5 heads and tripods are not interchangeable. The counterweight shaft is stowed within the mount head during storage and extended when needed.

Once this had been accomplished, plugging in the SkyScan hand-controller and connecting the 12V power cable provided a viable observing system. The required 15-minute set up time extended to 20 minutes if I performed an accurate polar alignment. That may seem a long time, but realistically 20 minutes is not bad for a good quality mount and is broadly comparable with others. Demanding observers employing the periodic error training option should bargain on spending an additional 15 minutes, even with an ST4 autoguider doing the work.

With the mount set up and a 120mm f/7.5 refractor OTA attached, I centred on a star and rapped the tripod leg firmly with my knuckle. I was impressed to see that vibration all but ceased within a second, explained in part by the rubber-coated feet on the tripod legs. Rapping the OTA itself induced vibration of about 1.5 seconds duration. Clearly, this would be longer with more unwieldy OTAs, but the indications were certainly very promising.

### Manual magic

The manual is easy to read, free of obvious errors, and, most importantly, it details at length the polar alignment of the scope. There are some flaws, one of the diagrams showing OTA alignment uses a mount that is neither an EQ6 nor HEQ5, but these are minor quibbles. The manual covers the use of the hand-controller, setting up the scope for GOTO use and the power supply. Only the latter showed signs of being a rushed translation, but it's pretty difficult to misunderstand the words '12V Output' so the pack was easy to use. The manual suggested that the power pack should, like most lead-acid battery systems, not be used at temperatures below freezing. Despite this, it operated without fault on several nights with temperatures in the range 0 degrees Celsius to -4 degrees Celsius.

I did notice that applying the RA

| The Sky-Watcher LER eyepieces and 1.25 / 2-inch diagonals.



and declination clutches gave rise to some image shift which was considerably reduced but not completely eliminated when the clutches were tightened gently.

When running, the drives were nearly silent, and when slewing they generated a pleasant whirring that would be unlikely to wake your neighbours. I ran the mounts through several three-star alignments. Initially, I used a low power eyepiece and made no attempt to provide perfect centreing using a crosshair eyepiece, yet despite this the pointing accuracy was sufficient to place targets within a field of view a degree wide.

When I centred the reference stars more carefully, the pointing accuracy improved considerably and objects were placed near the centre of a half-degree field of view. The mounts proved very simple to use and the instructions were straightforward. So, as long as you can identify ten or so bright stars, you should have no problem. I experienced no cable tangles, no cable

disconnections and the controller display was still perfectly legible at -6 degrees Celsius. If you can use a DVD player you can handle one of these.

To test the drive accuracy I took a series of webcam exposures at five-second intervals and found a variation of 22 arcseconds peak-to-trough, forming a fairly smooth sinusoid encompassing the gear period. This is quite respectable. Use of the built-in periodic error training facility would reduce this considerably. Those of you with older EQ6 and HEQ5s will be glad to hear that GOTO upgrade kits are also available for £499 and £439 respectively.

To conclude, I like these mounts. They are solid, well thought out and work quietly and effectively. As a platform for portable viewing they are quite heavy, but they would be good value as permanent GOTO set-ups for larger telescopes. Recommended.

**Grant Privett, g.privett@virgin.net, an observer for 35 years, is currently enjoying the dark skies of Herefordshire – on those rare nights when it clears.**

### At a glance

<b>Product:</b>	Sky-Watcher Pro-Series
<b>Supplier:</b>	Optical Vision Ltd, Unit 2b, Woolpit Business Park, Woolpit, Bury St. Edmunds, Suffolk, IP30 9UP
<b>Web:</b>	www.opticalvision.co.uk
<b>Tel:</b>	01359 244200
<b>Prices:</b>	
Skymax 150mm Maksutov-Cassegrain	£499
Evostar 80mm ED1 refractor	£349
Evostar 80mm ED2 refractor	£499
Evostar 100mm ED1 refractor	£649
Evostar 100mm ED2 refractor	£799
Evostar 120mm ED1 refractor	£1349
Evostar 120mm ED2 refractor	£1499
HEQ5 Pro	£879
EQ6 Pro	£1149