



TELESCOPE REVIEW

With good optical quality and lots of included accessories, these two scopes are ones to watch. /// BY PHIL HARRINGTON

TAL's 150K and 200K

Among most city-bound amateur astronomers, the idea of lugging a long refractor or large Newtonian reflector great distances to dark skies is far from appealing. Instead, most opt for the more compact design of either a Schmidt-Cassegrain or Maksutov-Cassegrain. These designs, however, have drawbacks such as field curvature.

In addition, dew condensing on the front corrector lens can bring an observing session to an early end.

In 1974, Yuri Klevtsov, an optical engineer from Koltsovo, Russia, addressed these issues with a new design. Klevtsov's design uses a fast focal ratio and a spherical primary mirror like Schmidt- or Maksutov-based designs, but it does not use a large corrector lens at the front of the tube. Instead, Klevtsov's design has an open tube that uses a two-element "Mangin secondary."

Invented in 1876, a Mangin secondary is a combination mirror and lens assembly used to correct spherical aberration. It is a two-lens assembly with the rear surface of the second lens (that is, the lens surface closest to the front of the tube) aluminized like a mirror. Light passes through the two elements of the Mangin secondary, reflects off the aluminized back of the second element, and travels back through the two lenses through a hole in the primary mirror to the eyepiece.

One immediate benefit of the Klevtsov-Cassegrain design is a greater resistance to dewing because there's no front-end corrector lens. Another benefit of the open tube is that the optics cool faster.

Despite these pluses, Klevtsov's design has seen only limited use in the amateur

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THE 8X50 FINDER SCOPE of the TAL 200K is a noteworthy accessory. Sharpen the field of view by turning a nicely machined helical FOCUSER. ASTRONOMY: WILLIAM ZUBACK

market. In fact, only Vixen Optical Industries in Japan and the Novosibirsk Instrument-Making Plant in Russia manufacture amateur-size Klevtsov-Cassegrain telescopes, or KCTs. The name Novosibirsk may not be familiar, but you might know their line of TAL Newtonian reflectors. Heavy-duty German equatorial mounts and robust metal tube assemblies characterize these instruments.

Following the same manufacturing philosophy, the TAL family of telescopes includes two KCT models: a 6-inch f/10.3

150K and an 8-inch f/10 200K. Like the TAL Newtonians, the TAL KCTs are solidly made, all-metal instruments.

A complete system

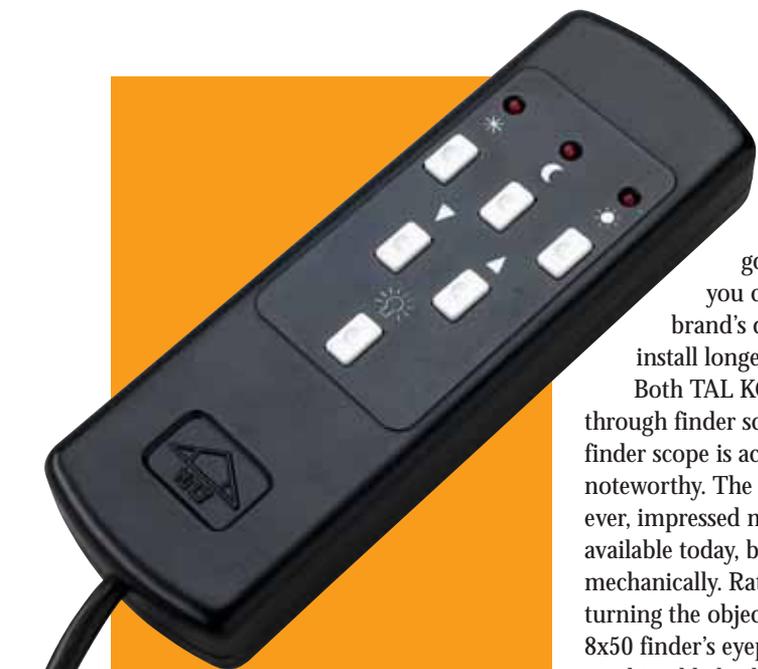
For this review, I received both instruments in one shipment from Novosibirsk's North American distributor, TAL of Kingston, Ontario, Canada. Each TAL KCT features a glossy white tube that is well accessorized with 10mm and 25mm Plössl eyepieces, a 1¼" mirror star diagonal, a 2x "shorty" Barlow lens, a straight-through finder scope, a camera adapter, a set of color filters, Sun and Moon filters, and a dovetailed plate for attaching the tube assembly to the pier-mounted German equatorial mount. In short, you get everything you need to start observing right out of the box.

I must issue one warning up front. The Sun filter that comes with these instruments is the kind that screws into a telescope eyepiece. **Such filters are extremely dangerous and should never be used under any circumstances.** "Eyepiece" solar filters have been known to shatter within a few seconds of exposure to the focused fury of the Sun's light and heat, instantly blasting blinding light into an observer's eye. Most manufacturers — even those that sell low-end telescopes — have long since discontinued making these ill-conceived filters. So throw away the Sun filter as soon as you unpack the telescope.

The TALscopes arrived safely, strapped and shrink-wrapped to a wooden pallet. The 150K was packed in a heavy, fitted wooden case with brackets that secured the telescope's tube assembly, equatorial mount, finder scope, and other accessories. The 200K was sent as an optical tube assembly (OTA) only because both the



THE TWO TALSCOPES are both Klevtsov-Cassegrain designs. Both the 8-inch f/10 200K (left) and 6-inch f/10.3 150K arrive as complete systems. *ASTRONOMY: WILLIAM ZUBACK*



THE HAND CONTROLLER for the 150K and 200K TALscopes allows three different tracking rates and slow and fast slewing motions.

ASTRONOMY: WILLIAM ZUBACK

150K and the 200K scopes can be used interchangeably on the same mount.

Specifications

The TAL KCTs are hefty telescopes for their sizes. The 150K measures only 14.5 inches in length (including the focuser) but weighs 16 pounds, while the larger 200K measures 19 inches long and weighs 19.5 pounds.

The German equatorial mount and 40.5-inch-long steel pier are no lightweights either, weighing 47 pounds when assembled. A shorter, 31.5-inch-long pier cuts off 4.5 pounds, but it's best suited for viewing through the telescope from a seated position. With everything assembled, including the taller pier, the TALscope 150K weighs 63 pounds, while the 200K tips the scale at 66.5 pounds.

Both TAL KCTs use rack-and-pinion focusers rather than moving the primary mirror in and out, as Schmidt-Cassegrain and most Maksutov telescopes do. Neither focuser worked smoothly because each came coated with thick, sticky grease on its drawtube. Once I removed the grease with a solvent and then coated the drawtubes lightly with a dry silicone spray, the focusers worked much better.

Incidentally, the TAL 1¼" focuser is designed to accept only Novosibirsk's unusual star diagonal. Because the diagonal's barrel tapers slightly, users can loosen

the thumbscrews that hold the diagonal in place to rotate it without dropping it out of the focuser. While it's a good idea, this also means you cannot substitute another brand's diagonal unless you first install longer thumbscrews.

Both TAL KCTs come with straight-through finder scopes. The 150K's 6x30 finder scope is acceptable but not terribly noteworthy. The 200K's 8x50 finder, however, impressed me as one of the finest available today, both optically and mechanically. Rather than focusing by turning the objective lens housing, the 8x50 finder's eyepiece is set into a nicely machined helical focuser.

I have two small complaints about the finders, however. First, the 6x30's crosshairs are too thick, while the 8x50's are too thin, completely disappearing from view on dark nights. Second, both finders come with plastic, slip-on dew caps that seem to belie the finders' quality. But even with these issues, I still give the 8x50 finder high marks. This finder scope also may be purchased separately for \$89, a price that includes a dovetailed mounting plate.

Mount and drive

TAL's GEM200K German equatorial mount is the standard mount for both telescopes. The GEM200K uses preloaded ball bearings in both axes for smooth motions in right ascension (R.A.) and declination (Dec.). When secured, locking levers hold the axes tightly. I found, however, that the spring-loaded R.A. lock sometimes shifted the telescope's aim when the lock clamped into place. The mount is reasonably sturdy though. Vibrations from focusing or tapping the tube dampen out in about four seconds with the 150K on top, and in about six seconds under the extra weight of the 200K.

Each telescope comes with a permanently mounted dovetailed plate that uses captured hardware (bolts that remain attached to the plate at all times) and has a pair of tapered guide pins for aligning the telescope to the mount. I really came

to appreciate these little niceties whenever I attached the tube to the mount in the dark — when it can be nearly impossible to align the two pieces. The dovetailed plate also can slide forward and backward to make balancing the scope easier.

The mount comes with a clock drive that uses a 180-tooth worm gear on the R.A. axis. The drive can be sped up or slowed down using the included hand controller. Although the drive uses a 12-volt DC motor, the only power is via a small transformer that plugs into a 110-volt AC outlet. At present, Novosibirsk does not offer a connector for an automobile accessory plug, although according to the company, one will be available soon. A polar alignment scope with reference grids for aligning with both the north and south celestial poles also is included. The drive, however, is set up for tracking only from the Northern Hemisphere.

The hand controller lets you change between solar, lunar, and sidereal tracking rates. Each axis also has a manual motion control. No provision has been made for a declination motor. Although the clock drive tracked the stars accurately, operating the hand controller was not intuitive.

Setting the tracking speed is simple. Just press one of three rate buttons on the controller. While that's straightforward enough, every time



NO FRONT CORRECTOR LENS means that dew has a more difficult time forming on the optical surfaces of the 150K and 200K TALscopes. ASTRONOMY: WILLIAM ZUBACK

either the slow or fast slew button is pressed, the drive rate is canceled. This means the user has to turn the drive back on by pressing one of the three rate buttons again. This odd arrangement is not well detailed in the instructions.

The GEM200K mount came perched atop a heavy, well-designed steel pedestal. Three aluminum legs attach to the pier with captured hardware and have feet that are cushioned with plastic pads. The plastic pads work to a limited degree, but separate vibration pads are a better solution. The TAL KCTs also may be purchased with wooden tripods, if desired.

Star testing

The results of my star-tests were that neither scope showed any astigmatism, but each suffered from a small amount of spherical aberration. Although the results are difficult to compare precisely against those in Richard Suiter's book *Star Testing Astronomical Telescopes*, the optics in the 150K were approximately one-quarter wave. Those in the 200K were slightly less precise at about one-third wave. Quarter wave optics, typically referred to as "diffraction limited" by manufacturers, is the minimum level of precision needed to achieve proper focus at reasonably high magnifications (above 200x).

The large diameters of the central obstructions created by the TAL KCT secondary holders also work against image contrast. The 150K's secondary holder measures 2 1/8" in diameter, while the 200K's is 2 13/16" across. These translate to central obstructions of 35.4% and 35.2%, respectively, similar to Schmidt-Cassegrain telescopes.

The included 10mm and 25mm eyepieces worked well, but they were no match for my 9mm orthoscopic in terms of sharpness and contrast. The "shorty" Barlow lens that came with the telescope worked very

well, and it's definitely a keeper. Like the 8x50 finder, the Barlow also is available for purchase separately (\$45).

Under the stars

As a result of the above factors, my views of Mars through the TAL KCTs last autumn didn't show the level of detail I saw through an 8-inch Newtonian (with a smaller central obstruction) set up nearby. Mars, of course, is an unforgiving target, even under the best conditions. Both TAL models did better with Jupiter and Saturn. The Ringed Planet looked especially nice through the 150K when viewed with my 9mm orthoscopic eyepiece.

The TAL KCTs worked fine when it came to resolving star clusters. Both telescopes nicely resolved the great globular cluster M13 in Hercules. The 150K proved the sharper of the pair, but the 200K's images were distinctly brighter. Other showpiece objects, such as the Ring Nebula (M57), the Dumbbell Nebula (M27), and globular clusters M22, M15, and M2, looked quite nice through both telescopes. The supplied eyepieces worked but did not let either instrument live up to its potential. When I used premium eyepieces from Tele Vue, Vixen, and Pentax, I noted quite a difference in visual performance, although even with these, images did not "snap" into focus.



THE QUALITY WORKMANSHIP is readily apparent in the TAL KCTs. Each optical tube is mated to its mount by a dovetailed plate (lower right). ASTRONOMY: WILLIAM ZUBACK

The compact design and well-appointed accessories set the TAL KCTs apart. If you're looking to buy a complete telescope package where all you need to add are star charts and a clear night sky, and if you're willing to overlook a few idiosyncrasies, then the TAL Klevtsovs from Novosibirsk are worthy of consideration. ■

TALSCOPE 150K AND 200K SPECIFICATIONS

Scope	Aperture	Focal ratio	Weight (OTA)	Weight (Total)	Mounting	Price
150K	6 inches	f/10.3	16 lbs.	63 lbs.	German equatorial on pier	\$1,295 total \$1,050 (OTA only)
200K	8 inches	f/10	19.5 lbs.	66.5 lbs.	German equatorial on pier	\$1,550 total \$1,295 (OTA only)

Equipment

- R.A. clock drive with hand controller
- Manual slow motion controls on both axes
- Setting circles
- Dovetailed plate
- 6x30 finder scope (Note: the 200K comes with an 8x50 finder scope)
- 10mm and 25mm 1 1/4" Plössl eyepieces
- 1 1/4" star diagonal
- 1 1/4" 2x Barlow lens
- Moon filter
- Sun filter (see warning in article)
- Camera adapter for converting to standard T2 camera mount
- Wooden storage crate

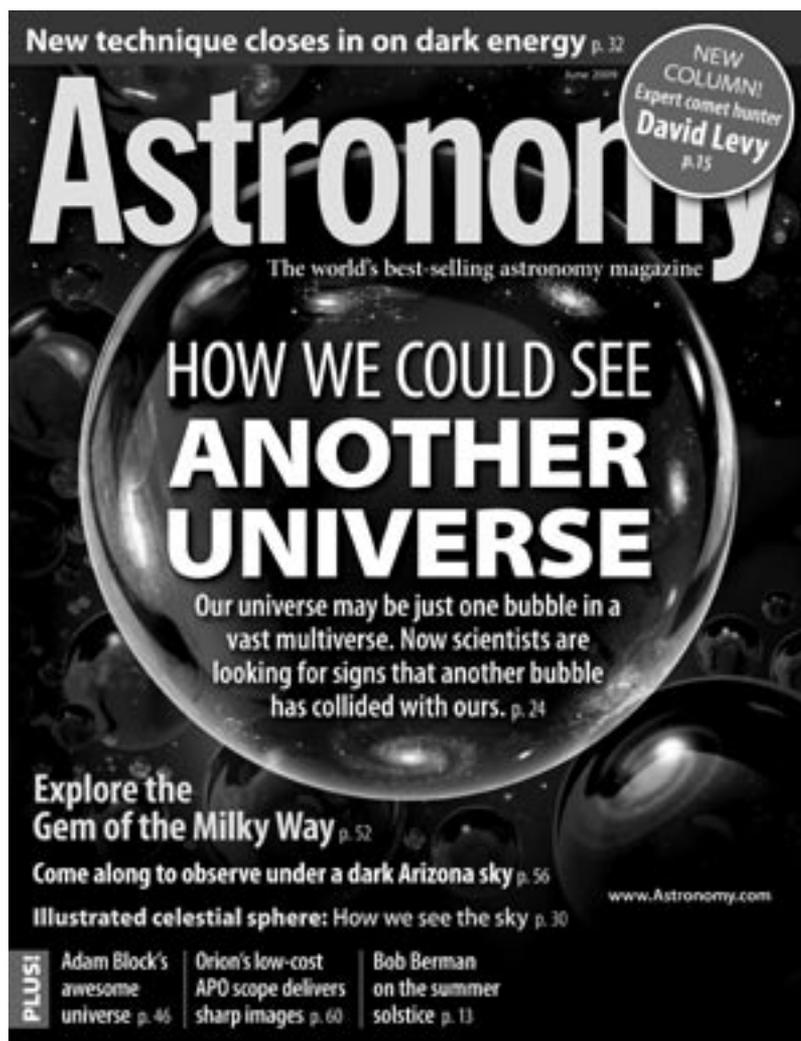
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