

## Konus 150 MotorMax HM

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The Konus 150 MotorMax HM is a 6" f/12 Maksutov. The telescope is of Chinese manufacture (probably Guangzhou Bosma – [www.bosma.com.cn/en/](http://www.bosma.com.cn/en/)), distributed by Konus ([www.konus.com](http://www.konus.com)), a diversified Italian corporation. Konus distributes a number of different telescopes, including a 90mm and 130mm Maksutov, as well as some refractors and reflectors.



The complete Konus 150 package includes the optical tube assembly (OTA), an 8x50 finder, two eyepieces (25mm and 10mm Plossls), mirror diagonal, moon filter, dust covers, German Equatorial Mount (GEM) with motor drives on both axis and hand controller, manual slow motion controls, polar finder scope, tripod, hand controller holder, accessory tray, a small optical polishing cloth, and an instruction manual printed in 8 languages. Even the batteries for the hand controller are included. All of this sells for around \$825. Can this package be any good at such a low price? Read on to find out.

### About the Reviewer

Since telescope reviews are often based on the reviewer's subjective impressions, knowing something about the person's background and experience can help you evaluate the validity of the findings. In my case, astronomy has been an on again, off again hobby since the 1950's. A few years ago I experienced a resurgence of interest, and have bought and sold a fair number of telescopes. Among those I currently or have recently owned include: NexStar11 GPS, NexStar 8i; Meade AR-6; Orion Astroview 120mm refractor; ETX-125; NexStar 4 GT, 1961 Questar; and an ETX-90 M. It is these that form the basis for comparison in this review. It should be noted that I am primarily a visual observer, and consider my skills to be about average.

### Why Did I Buy This?

For the past few years, most of my observing has been done with GOTO telescopes. While these make it very easy to find objects, I discovered I was not enjoying observing as much. I often found myself spending more time fiddling with the electronics than I spent looking through the eyepiece. I decided it was time to get a non-GOTO scope of reasonable aperture and portability to provide a lower tech observing experience. I was poised to purchase the Orion Starmax 127, a proven performer, when I ran across an ad for the Konus 150. The larger aperture and low price made it a tempting package. I could find no reviews and very little information about this offering, so at the end of December 2004, I ordered one online. Only after I placed my order did I find some messages about these scopes on both Yahoo! and Cloudy Nights forums. The consensus was that the Konus 150 had some problems. In spite of this information, I

chose to 'stay the course' and take delivery. I was hopeful that the problems could be corrected, and the result would be a rare bargain.

### The UPS Man Cometh

Few things in life compare with both the excitement and the apprehension associated with seeing the brown UPS truck pull up in front of your house with a new telescope. As the boxes are unloaded, you look anxiously for evidence of rough handling. The Konus boxes appeared to be in good shape. I carefully carried them inside and proceeded to unpack my new acquisition.



The Konus is shipped in two boxes. The OTA, finder, eyepieces, moon filter, and diagonal are shipped in one box that weighs 23 lbs. The GEM, counterweights, tripod, hand controller, and accessory tray are shipped in a second box that weighs 47 lbs. Everything is well packed to survive the journey half way around the world, as is shown in the following pictures.



### Looking for Trouble

Perhaps because I was expecting the worst, each component was subjected to a very careful inspection as the Konus was unpacked. Unfortunately, the first item I unpacked was the OTA. I was stunned to see an otherwise nicely painted medium blue tube marred with white streaks all over. A quick wipe with a damp cloth did not remove the streaks. At that point, I felt I should immediately send it back, but I was curious as to what the rest of the components looked like. All other components looked very good. And so, I decided to go ahead and see what the scope looked like all set up.

### Putting it all Together

It takes about 5 minutes to assemble the Konus. All you have to do is attach the mount to the tripod, the counterweights to the mount, attach the finder to the OTA, and attach the OTA to the mount. An experienced amateur can do this without reading the instructions, and as I soon discovered, it would have been better if no instructions had been included. I chose to follow the instructions to see how well the English translation was rendered. Not only was the translation poor, the instructions appeared to reference

an older version of the mount! I got thoroughly confused, and had to discard the instructions and rely on my experience to complete the assembly.

When finished, the Konus looks very attractive. The blue tube (it's a lighter shade of blue than is found on Meade scopes), the hammertone grey mount, and the chrome tripod all combine to make this look like a very classy instrument. The entire telescope is made of metal – there is no plastic except for some of the components of the tripod and the motor housings on the mount. Even the focuser is a knurled metal knob.

### **Evaluation – One Piece at a Time**

I have approached this review from the standpoint of what I would like to have been able to see before making a purchase decision. In that regard, each component of this telescope will be subject to a detailed description.



### **\*\* Optical Tube Assembly (OTA)**

The OTA is 6 ½" in diameter and 19 ½" long. It houses the 150mm, 1800mm focal length f/12 Maksutov-Cassegrain optical system. The tube is aluminum, with aluminum end rings, an aluminum dovetail for attachment to the mount, and an aluminum finder dovetail. As far as I can tell, there is no plastic. The OTA weighs 16lbs, including the finder. I was able to remove the white streaks with some vigorous buffing with an automotive wax, resulting in a beautiful waxed tube.

The optics arrived clean and dust free. It was difficult for me to tell if the corrector is coated or not, as in the sunlight it appears to be clear glass with no tint or hue. The Konus website, however, states the optics are multi-coated. The secondary mirror measures approximately 1-7/8" in diameter, yielding a central obstruction of 31%.



A plastic dustcover for the corrector end of the OTA is furnished. The cover has an off-center 1-5/8" diameter opening that is covered with another plastic cover. I'm not certain what the purpose of this is, other than to provide an unobstructed small aperture viewing option. The dust cover fits tightly, and I have learned to remove the cover from the smaller opening to make removal and attachment of the dust cover easier.

The back end of the OTA has a threaded visual back and adapter that accommodates 1 ¼" accessories. Two thumb screws hold a diagonal or other accessories in place. The focus knob is to the right of the visual back - It is 1" in diameter and is of knurled aluminum. The knob turns very smoothly, and feels slightly stiffer to turn than my NexStar 11. Focusing is achieved by moving the primary mirror. The Bosma website

shows some 2" accessories for this OTA, so it may be possible to get an adapter that supports this size.

The inside of the OTA is painted flat black. The protrusion of nuts that hold the mount and finder dovetails can be seen, and some showed the slight reflection of metal, indicating some quality control problems in the painting process.



One problem I experienced was the mounting of the finder dovetail. It was not in line with the optical axis, and resulted in making it impossible to align the finder. This problem has been reported by at least two other owners. I found that by loosening the two mounting screws, turning the dovetail slightly, then retightening the screws solved the problem.

It should be noted that the corrector and primary mirror cells appear to be held in place by four easily accessible screws. Removing these to access the inside of the OTA should present no problem.

### **\*\* The Finder**

The finder is an 8x50 straight through, reverse image affair. It is painted the same color as the OTA, and mounts in two rings, each of which has 3 alignment screws. As with the OTA, there is no plastic – everything is aluminum. The finder focuses by turning the objective cell, then tightening a retaining ring. It attaches to the OTA by sliding it into the dovetail, then by tightening a single screw. Removing and reattaching the finder to the dovetail does not affect the finder's alignment. The optical quality of the finder is about average – the crosshairs are medium in size, making it easy to center objects without completely hiding them.



Alignment of the finder isn't too difficult once the dovetail problem is corrected. I do dislike the two-ring, 6 alignment screw setup, however, as it takes a bit of fiddling to get things just right. The alignment screws are metal – to minimize damage to the paint on the finder's OTA, plastic strips are provided that fit between the screws and the OTA.

### **\*\* The Mount**

The Konus German Equatorial Mount is what may be termed a CG-5 clone (a copy of a mount that Celestron has sold, which in turn, was a copy of the Vixen Great Polaris mount). Konus calls it an EQ-10. The mount has slow motion controls on both axis, motors on both axis, a polar alignment scope, 2 ¼" setting circles, and a small bubble

level. The mount weighs 22.5 lbs without counterweights. Two 10 lb counterweights are included.

The overall appearance of the mount is quite good – it has a grey hammertone finish. As with the OTA, there is almost no plastic on the mount. The motors have plastic covers, and these are painted the same color as the mount, lending an integrated appearance to the whole affair.

The OTA dovetail attaches to the mount by sliding it into a rectangular shaped recess. The OTA is secured by two thumb screws, a large one and a small one, that apply pressure to one side of the dovetail. This arrangement appears to be fairly common on some Chinese imports. The advantage of this setup is, in the absence of mounting rings, you can adjust the position of the OTA by sliding it to achieve a good balance. The disadvantage, in my opinion, is that this is not a foolproof way of attaching expensive optics. If you fail to tighten one of the screws tightly, or if, while observing, you accidentally loosen one, believing that it is one of the axis locks, your optics may take a tumble, and at the very least, will require collimation.



Depending on the ambient temperature, the mount is very stiff when rotating on either axis. At room temperature, it isn't too bad, and if you close your eyes, you can pretend that you are moving a huge observatory telescope on a precision engineered mounting. The stiffness makes the OTA feel smooth and massive. When the temperature gets below 40 degrees, however, things start to get difficult. You have to use two hands to turn each axis. This stiffness is well documented on sites like

[www.astronomyboy.com](http://www.astronomyboy.com) that contain detailed instructions on how to fix the problem. Basically, some of the Chinese imports use thick, glue-like grease that becomes almost solid in cold weather. The solution is to take the mount apart, remove the old grease, and apply synthetic grease. It has been speculated that the thick grease is used to hide rough machining and looseness in some of the bearings.

The slow motion controls work well (unless the temperature is cold, then you have to turn very hard to overcome the mount's stiffness), although the placement of the Dec control is inconvenient. It faces the front of the OTA, meaning you have to reach around to the front of the mount while observing to make changes in Declination. The obvious solution is to rotate the Dec axis 180 degrees to place it to the rear. But when you do this, it collides with the RA slow motion control in certain observing positions. So having the Dec control facing forward seems to be the best solution.

Each axis has a motor – the motors are already attached so no assembly is required. To engage the motor, you have to turn a knurled knob on the same shaft the slow motion controls are located on. The knob makes metal to metal contact with a disk on the shaft, creating a friction clutch. You have to turn the knob quite hard to make good

contact. You should also not use the slow motion controls when the motors are engaged.

The motors are controlled by a hand controller. A very convenient holder is provided that allows the controller to be attached to the tripod legs. An on/off switch is on the left side of the controller. The right side has a speed switch where you can select a speed that is 2x, 4x, 8x, and 16x the sidereal rate. On the top of the controller are 4 directional buttons, a north and south button, and 4 indicator lights that show which way the motors are slewing. When you turn on the controller, you have to remember to press either the North or South button (depending on your hemisphere) to begin sidereal tracking. One nice feature of the controller is that it contains the batteries needed to power it – 6 ‘AA’ batteries. This eliminates the need to carry a separate battery pack and having extra wires dangling around. Speaking of wires, it should be noted that there are only two wires connected to the scope – one runs from the hand controller to the RA motor box. The second runs from the RA motor box to the Dec motor box. The wires are miniature coiled cables, with small plugs reminiscent of a PC’s mouse port connector.



As with other CG-5 clones, the EQ-10 has a nice system for adjusting latitude and azimuth for good polar alignment. The polar alignment scope has a reticle that allows alignment in both hemispheres. Curiously, the focus of the polar scope appears relatively fixed – for persons with 20/20 vision. Take off your glasses, and it’s hard to adjust the focus enough to sharpen the images.

The built-in bubble level is a nice touch. I’ve had other mounts with these and they didn’t appear to work well, but this one does the job.

### **\*\* The Tripod**

The tripod legs are 1-1/2” in diameter, and adjust in height from approximately 2’ – 4’. The spreader collapses, allowing the tripod legs to be quickly folded – this is a nice feature compared to other tripods I own that require you to remove a rigid tripod shelf before being able to fold the legs. This tripod comes with a small, circular shelf that quickly screws onto the spreader (the screw is built into the shelf). In a throwback to older tripods and older telescopes, the shelf has holes for four 1-1/4” eyepiece and four .928” eyepieces.

When I first set up the Konus, I noticed that the angle at which the tripod legs extend outward was not as great as on my other tripods. As I feared, this led to a serious lack of stability – a significant bump against the mount or OTA could topple everything! Fortunately, the tripod spreader is not attached to the legs in a fixed position. It is attached by clamps, and by



loosening the clamps and moving them upward, you can achieve the proper angle for stability.

In a scope that has practically an all metal OTA and mount, a fair amount of plastic is used in the tripod. The top of each leg that attaches to the mount is plastic. The spreader clamps are plastic. And the bottom clamps that permit the legs to be extended are also plastic.

### **\*\* Miscellaneous Items**

A 1-1/4" mirror diagonal is supplied. It appears to be of average quality, no better nor worse than standard Meade and Celestron diagonals I own. Likewise, the two supplied Plossl eyepieces appear to be of average quality. The supplied Moon filter is similar to others I have. The instructions are, of course, not helpful due to poor translation and reference to an older mount. And a polishing cloth? I have no idea what this is for, as it feels too coarse to use on optics, and emits an acrid smell when first removed from its plastic bag.

### **Where the Optics Meet the Sky**

So how do all these parts work in the field? When I purchased the scope, I had forgotten the rule that you should not purchase an unknown telescope in the winter. Between bad weather and variable seeing, it's hard to get a good handle on how good the optics are. Nevertheless, over a two week period, I was able to use the Konus enough to get a rough idea on how well it works. But I will admit that more observing under better conditions needs to be accomplished before I can make a definitive ruling on the optics.



For starters, I found the Konus to be fairly portable. The stiff mount meant I could safely carry tripod, mount, and OTA (and leave the counterweights for a second trip) outdoors in one piece without fear that the OTA would rotate on the polar axis and crash against something. Being able to easily fold the tripod legs was a big help navigating through doorways. All told, the Konus, minus counterweights, weighs 40 lbs, which isn't too bad. A second trip with the counterweights and eyepiece case was all I needed to start observing. And the little things, like not having to carry a separate battery pack, or remembering to carry a small bubble level, added to a feeling that this may be a scope I can quickly get out and use with a minimum of fuss and hassle.

Polar alignment is fast and easy. Although the polar scope is not illuminated, you can still visualize where Polaris should be. I found I could quickly get an alignment that was good for visual purposes.

On nights when the temperature was below 40 degrees, the stiff mount made it difficult to quickly point to an object – it would take two hands and some effort to point the OTA

where you wanted it. But on nights where it was 60 degrees or above, I found the mount was sufficiently loose to provide a satisfactory experience.

The stiff mount does make it difficult to find the correct balance points. You really need to start tracking an object, then adjust the position of the counterweights until tracking improves. If you are patient, tracking can actually be quite good – I had Saturn in the FOV of a 145x (.36 field of view) eyepiece for about 45 minutes. In a sense, I liked this capability. One of my GOTO scopes had notoriously poor tracking that I could do nothing about. But the Konus, thanks to the GEM, lets you fine tune tracking to your heart's content. And of course, you can always dispense with use of the motors and use the slow motion controls.

Engaging the motors is a bit frustrating. Not only do you have to turn the clutch knobs tightly, you also have to engage the motors while turning to ensure good contact is made. And each time you change objects, you have to loosen, then tighten the clutches again. This may be the poorest designed part of the Konus. There is also considerable backlash – it can take upwards of 20 seconds for a change of direction to occur.



The mount itself is reasonably stable. At higher magnifications (186x), a sharp rap on the OTA or tripod would cause vibrations to last no more than 2-3 seconds. The use of vibration suppression pads reduced this to 1-2 seconds. The included setting circles are useable, and they allow you to place an object within the finder's field of view.

Variable weather and fickle seeing made it difficult to accurately assess just how good the optics really are. On one occasion Saturn appeared as good as I remember it through my other scopes – very sharp

Cassini's division all around, an equatorial belt, and darkening at the pole. Likewise, M42 showed nice contrast, and the four stars visible in the Trapezium looked as good as they do through my AR-6 refractor. Another of my favorite objects, the Double Cluster in Perseus, showed pin point stars, and both clusters almost fit in the 1 degree field of view with a 40mm Plossl at 45x. It should be noted that all observing was done with Meade 4000 Plossls.

Star testing revealed perfectly concentric diffraction rings, indicating very good collimation. The diffraction pattern inside and outside of focus were similar, but more testing needs to be done in this area because seeing conditions compromised my ability to thoroughly test this aspect of the optics. I suspect there may be some spherical aberration, but in many respects, the star tests looked similar to what I get through my ETX-125 and Questar.

One night I had both my Questar and the Konus out side by side. Seeing was not very good – about 5 on a scale of 10. There was a half Moon. I felt the Questar displayed a slightly sharper image with more contrast, but the Konus showed more detail, owing to its larger aperture. I'm not normally a lunar observer, but the view through the Konus

Click to Discuss article in forums could change that! Saturn appeared approximately the same in both M42. Of course, images through the 6" Konus were brighter than through the 3.5" Questar – poor seeing adversely affected the ability of either scope to show much in the way of detail. On another night, I watched Jupiter appear and disappear behind some clouds that were moving rapidly in front of an incoming storm. In rare moments of stability and clarity, using 120x, I saw 4 – 5 belts, and sufficient detail within the belts to suggest that the planetary performance of the Konus will be equivalent to my AR-6, minus the false color.

One remarkable feature of the Konus is that there is zero image shift when focusing. Every SCT or Mak I have used has image shift – but not the Konus.

I did not time how long it takes the Konus to cool down when moved from indoors to outdoors for observing. Subjectively, it felt like anywhere from 1 to 1 ½ hours, depending on the temperature difference.

### **Final Thoughts and Conclusion**

With all the tweaking I had to do, I wasn't sure if buying the Konus was such a good idea. To help me sort things out, I listed the advantages and disadvantages of the scope:

#### **Advantages**

- Low purchase price
- Attractive appearance
- Reasonable portability
- Good optics (subject to further verification)
- Zero image shift
- Reasonably solid mount
- Easy polar alignment
- Separate battery pack not needed
- Convenient hand controller holder

#### **Disadvantages**

- Poor quality control (OTA paint)
- Tweaking needed (finder, tripod)
- Stiff mount
- Motor backlash, clutch engagement
- Fussy tracking
- Location of Dec control

After reviewing this list, and considering the price, I concluded that this may not have been such a bad purchase. In a sense, you get what you pay for. To avoid the problems I experienced, products like an Intes OTA and a Losmandy G8 mount would be needed, at a cost of 3 to 4 times that of the Konus. Assuming that the optics end up being as good as I suspect they are, this is not a bad deal if you are willing to accept the need for tweaking and buffing. And for me, it meets the goal of providing an alternative to the GOTO observing experience. There is, however, a psychological factor that needs to be considered. When you buy something new, and there are problems that need fixing as I have described in this review, you somehow feel a bit cheated, regardless of price, and you never really feel as good about your purchase as when you get a quality product that needs no fixing, polishing, or tweaking.

### **Disclaimer**

I have no undisclosed interest in Konus or its products. The telescope used in this review was purchased from an online dealer. All pictures in this review were taken by me and are my property. I grant Cloudy Nights permission to reproduce them.

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