

# Orion StarSeeker™ IV GoTo Telescopes



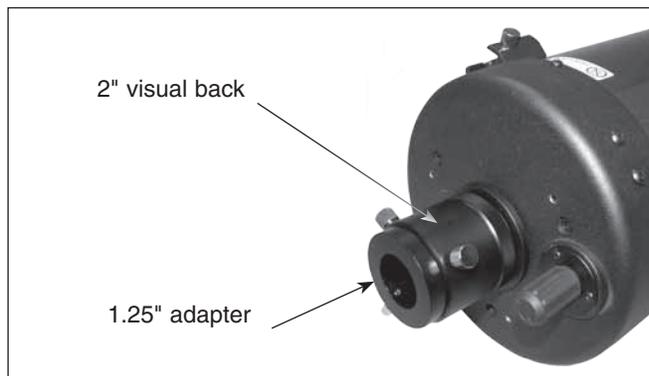
**Figure 1.** The StarSeeker IV 150mm Maksutov-Cassegrain GoTo Telescope.

The StarSeeker IV 150mm Maksutov-Cassegrain GoTo Telescope (#13166, **Figure 1**) is a new addition to the StarSeeker IV line and not included in the instruction manual (IN 542 Rev A) for the StarSeeker IV series of telescopes.

It is similar to the StarSeeker IV 127mm Maksutov-Cassegrain, but has a larger aperture optical tube assembly. One feature specific to the StarSeeker IV 150 Mak-Cass is a 2" visual back adapter with a 2"-to-1.25" adapter. This allows the user to use either 2" or 1.25" diagonals and eyepieces with the 150mm Mak-Cass, for added versatility (**Figure 2**).

To install a 2" diagonal, first remove the 1.25" adapter by loosening the two thumbscrews on the 2" visual back, then insert the barrel of the diagonal. Secure it in place with the two thumbscrews. Then insert an eyepiece into the diagonal and secure it with the thumbscrew(s) on the diagonal.

To insert a 1.25" diagonal instead of a 2" diagonal, leave the 1.25" adapter in the 2" visual back, and insert the barrel of the 1.25" diagonal into the 1.25" adapter. Secure it in place with the thumbscrew.



**Figure 2.** The 2" visual back and 1.25" adapter allow use of both 2" and 1.25" accessories.

**WARNING:** *Never look directly at the Sun through your telescope—even for an instant—without a professionally made solar filter that completely covers the front of the instrument, or permanent eye damage could result. Young children should use this telescope only with adult supervision.*

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## Terrestrial Viewing

For daytime land viewing, we recommend using a “correct image” 45-degree diagonal so that the image viewed through the telescope is oriented correctly. With a “star diagonal,” typically used for astronomical viewing, the image in the 150mm Maksutov-Cassegrain would be mirror reversed. For terrestrial viewing you will also probably want a correct-image finder scope, as a standard finder scope produces an upside-down view. That’s not a big deal for astronomy, but for terrestrial viewing is not ideal.

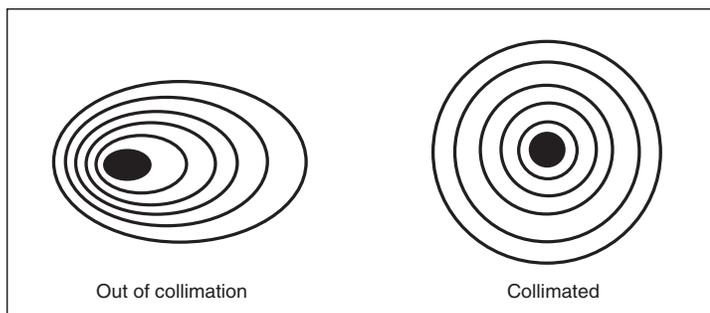
For daytime terrestrial viewing it’s best to stick with low power eyepieces that yield a magnification under 100x. At higher powers, images rapidly lose sharpness and clarity due to “heat waves” caused by Sun-heated air. Remember to aim well clear of the Sun, unless the front of the telescope is fitted with a professionally made solar filter and the finder scope is covered with a completely opaque material or removed altogether.

## Care & Maintenance

If you give your telescope reasonable care, it will last a lifetime. When not in use, keep the dust cover on the front of the tube and the dust cap on the eyepiece adapter. Store it in a clean, dry, dust-free place, safe from rapid changes in temperature and humidity. Do not store the telescope outdoors, although storage in a garage or shed is OK.

Your telescope requires very little mechanical maintenance. The optical tube is aluminum and has a smooth painted finish that is fairly scratch-resistant. If a scratch does appear on the tube, it will not harm the telescope. If you wish, you may apply some auto touch-up paint to the scratch. Smudges on the tube can be wiped off with a soft cloth and household cleaning fluid.

Any quality optical lens cleaning tissue and optical lens cleaning fluid specifically designed for multi-coated optics can be used to clean the front meniscus lens of the telescope. Never use regular glass cleaner or cleaning fluid designed for eyeglasses. Before cleaning with fluid and tissue, however, blow any loose particles off the lens with a blower bulb or compressed air. Then apply some cleaning fluid to a tissue, never directly on the optics. Wipe the lens gently, then remove any excess fluid with a fresh lens tissue. Oily fingerprints and smudges may be removed using this method. Use caution; rubbing too hard may scratch the lens. For the large surface of the meniscus lens, clean only a small area at a time, using a fresh lens tissue on each area. Never reuse tissues.



**Figure 3.** A star test will determine if a telescope’s optics are properly collimated. An unfocused view of a bright star through the eyepiece should appear as illustrated on right if optics are perfectly collimated. If circle is unsymmetrical, as in illustration on left, the scope needs collimation.

## Collimating the Optics

Collimating is the process of aligning a telescope’s optics. Your Maksutov-Cassegrain’s optics were aligned at the factory and should not need adjustment unless the telescope is handled roughly. Below you’ll find information on how to test the collimation of your telescope and instructions for proper alignment should that be needed.

### Star-Testing the Telescope

Before you start adjusting the primary mirror of your telescope, make certain that it is actually out of collimation by performing a star test. Take your telescope out at dusk and let it acclimate to the outside temperature; this usually takes 30-60 minutes. When it is dark, point the telescope upwards at a bright star and accurately center it in the eyepiece’s field of view. Slowly de-focus the image with the focusing knob. If the telescope is correctly collimated, the expanding disk should be a circle (**Figure 3**). If the image is unsymmetrical, the scope is out of collimation. Also, the dark shadow cast by the secondary mirror should appear in the very center of the out-of-focus circle, like the hole in a donut. If the “hole” appears off-center, the telescope is out of collimation.

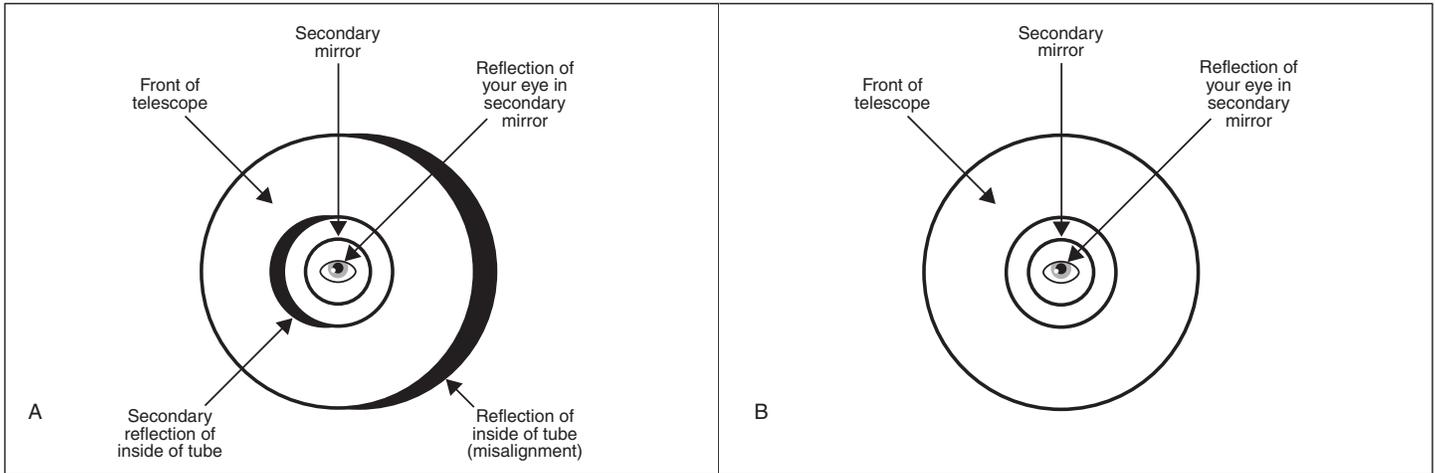
### Collimation Procedure

To collimate your telescope, remove the diagonal and eyepiece and look into rear opening of the tube (also remove the dust cover from the front of the tube). This should be done indoors, with the telescope pointed at a white wall in a well-lit room. Try to keep your eye centered with respect to the rear opening of the tube as best as possible. Using an Orion Collimating Eyepiece will aid greatly in keeping your eye centered and is strongly recommended.

If your telescope is out of collimation, what you see will resemble **Figure 4A**. A properly collimated scope will resemble **Figure 4B**. The direction of the misalignment in your telescope may differ from **Figure 4A**, but the diagram will give you the general idea of how things will look. Note there are three pairs of alignment screws on the rear cell of the optical tube (**Figure 5**), with each pair consisting of a large and a small screw. You will need 4mm and 2.5mm metric Allen wrenches to turn these screws. Each pair of collimation screws work together to adjust the tilt of the primary mirror. One screw pushes the mirror cell forward, while the other screw pulls the mirror cell back. One must be loosened and the other tightened by equal amounts in order to adjust the tilt.

Look into the rear opening of the tube and locate the black crescent that indicates the optics are out of collimation. Note which way the front of the telescope would need to move in order to “fill” that black crescent and resemble **Figure 4B**. Then look at the back end of the telescope and locate the pair of collimation screws that are nearest to the direction that the front of the telescope needs to move. Tighten one of these screws by one turn, and loosen the other screw of the pair by one turn. Look into the rear opening of the tube and determine if the black crescent has reduced in size, increased in size, or been “filled.” If the crescent has reduced in size, continue adjusting the pair of collimation screws in the same manner until the crescent has been completely “filled.” If the crescent has increased in size, the optics have been moved further out of alignment. To correct this, loosen and tighten the same pair of collimation screws by one turn to undo the previous adjustment. Then adjust the other two pairs of collimation screws until the black crescent is “filled.”

It will take a little trial and error to get a feel for how to tilt the mirror using the collimation screw pairs. Again, collimation should only



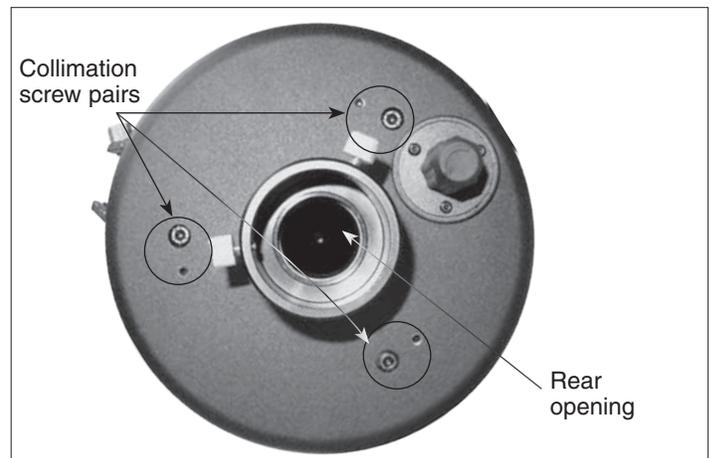
**Figure 4 A)** If the telescope's optics are out of alignment, the view through the rear opening of the telescope will look like this. **B)** When the optics are properly collimated the view will look like this.

be attempted if you have confirmed the telescope is actually out of collimation by performing a star test.

*Note: The secondary mirror of the 150mm Maksutov-Cassegrain is not adjustable.*

### Finishing Collimation

Once you have finished adjusting your telescope, you should perform another star test (described earlier) to check the collimation. If your telescope appears collimated after star testing, it should not need adjustment again unless it is roughly handled. If you have gone through this process and your telescope is still out of collimation, please contact Orion customer support. You may need to return the telescope for repair or replacement (covered under warranty for 1 year after purchase).



**Figure 5.** The primary mirror collimation screws of the 150mm Maksutov-Cassegrain.

## Specifications

Optical design:	Maksutov-Cassegrain
Aperture:150mm:	(5.9")
Effective focal length:	1800mm
Focal ratio:	f/12.0
Central obstruction diameter:	47mm
Primary mirror coating:	Aluminum with SiO <sub>2</sub> overcoat
Meniscus lens coating:	Anti-reflection multi-coatings on both sides of lens
Eyepiece adapter:	2" visual back with 1.25" adapter; accepts 2" or 1.25" accessories
Optical tube mounting plate:	Vixen-style
Tube length:	17-3/4" (45.1cm), including 2" visual back
Tube weight:	11.5 lbs.

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## **One-Year Limited Warranty**

This Orion product is warranted against defects in materials or workmanship for a period of one year from the date of purchase. This warranty is for the benefit of the original retail purchaser only. During this warranty period Orion Telescopes & Binoculars will repair or replace, at Orion's option, any warranted instrument that proves to be defective, provided it is returned postage paid to: Orion Warranty Repair, 89 Hangar Way, Watsonville, CA 95076. If the product is not registered, proof of purchase (such as a copy of the original invoice) is required.

This warranty does not apply if, in Orion's judgment, the instrument has been abused, mishandled, or modified, nor does it apply to normal wear and tear. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. For further warranty service information, contact: Customer Service Department, Orion Telescopes & Binoculars, 89 Hangar Way, Watsonville, CA 95076; (800)-676-1343.

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