#10015

StarBlast 4.5" Astro Reflector Telescope



Instruction Manual

Never look at the sun with this telescope! Serious permanent eye damage, including blindness can occur.

Introduction

Thank you for choosing the Orion StarBlast 4.5 Astro Reflector. If this is your first step into observational astronomy, we're glad to have you join the community. If you're a seasoned observer, we'll think that you find great utility in this telescope.

The StarBlast 4.5 features a parabolic primary mirror and quality mechanics, offering performance well beyond what most people associate with a compact beginner telescope. Its small size and simple setup make it easy to share with family and friends while you explore a wide range of celestial objects.

The following guide will help you get the most from your new telescope. We encourage you to review it fully before your first observing session. If this is your first telescope, we also recommend taking a little time to become familiar with the night sky. Recognizing the major constellations and their star patterns will make your observing experience far more intuitive and rewarding. Under reasonably dark conditions, with a bit of practice and patience, this instrument can provide years of meaningful exploration and fun. Enjoy your time under the stars!

What's Included

- Optical tube
- Base
- 20mm eyepiece
- 10mm eyepiece
- Red dot sight
- Moon filter
- MoonMap 260
- Dust caps
- 2mm Allen wrench
- Collimation cap

When unpacking the telescope, it is advisable to retain the packaging materials. In the rare event that the instrument must be shipped back for service or return, the original packing will help ensure safe transport. Before proceeding with assembly, confirm that all components listed in the parts inventory are present and in good working order.

Parts of the Telescope

1. Optical Tube
2. Tube Clamp
3. Altitude Tension Knob
4. Base
5. Rack-and-Pinion Focuser
6. Red Dot Sight
7. 10 mm Eyepiece
8. 20 mm Eyepiece
9. Eyepiece Rack



Specifications

Optical design	Newtonian
Primary mirror figure	Parabolic
Primary mirror coating	Aluminum w/ SiO2
Secondary mirror	34mm minor axis
Secondary mirror coating	Aluminum with SiO2
Aperture	114mm
Focal length	450mm
Focal ratio	f/3.9
Central obstruction	34mm
Focuser	Rack and pinion 1.25"
Base	MDF with laminate finish
Mounting saddle	Vixen-style dovetail
Eyepieces	20mm 4-element Bertele 10mm 4-element Bertele
Finder scope	Red dot reflex
Moon filter	Neutral density
Weight	10lbs. 13.8 oz
Optical tube length 1	7.75"
Base diameter and height	14" D x 17" H

Setting Up the Telescope

The Orion Starblast telescope is shipped with the optical tube pre-mounted on the base. After opening the carton, lift the complete assembled unit out carefully and place it upright on its base. Remove the protective plastic covering.

For shipping, the optical tube is positioned vertically within the base with a foam block separating the tube from the mount. To move the tube into its standard observing position, loosen the tube clamp knob, draw the tube upward to clear the foam block, remove the foam, then rotate the tube to the desired orientation. Once positioned, tighten the clamp knob securely.

Installing an Eyepiece

Two eyepieces are included: one 20 mm model and one 10 mm model. Always start with the 20mm eyepieces for the widest field of view, lowest magnification, and brightest image.

To install an eyepiece, remove the focuser cap and loosen the thumbscrews to create clearance for the eyepiece barrel. Insert the barrel fully into the focuser and lightly tighten the thumbscrews to secure it.

Installing the Red Dot Finder

Slide the bracket foot of the red dot finder into the dovetail shoe on the telescope tube. The sighting tube should face the front end of the instrument.

Using the Red Dot Finder

The red dot finder provides a non-magnified red-dot reference point that simplifies initial object acquisition before viewing through the main telescope. An internal LED projects a red dot into the sight window, indicating the telescope's pointing direction. Before initial operation, remove the pull tab from the battery compartment so the pre-installed CR-2032 cell battery can make electrical contact. The tab may then be discarded.

Parts of the finder:

1. Sight Tube
2. Battery Compartment
3. Azimuth Adjustment
4. Altitude Adjustment
5. Power/Brightness Switch
6. LED Emiter



Turn the power knob clockwise until it clicks to activate the unit. View the sight with both eyes open and adjust the brightness by rotating the power knob. Lower brightness settings are recommended under dark skies to preserve night vision; brighter settings are suitable for daytime alignment or light-polluted environments.

Alignment should be checked at the start of each observing session. At the end of a session, turn the power knob counterclockwise until it clicks off.

Replacement 3-volt lithium (CR-2032) batteries are widely available at most retail outlets. To replace a depleted battery:

1. Use a small Phillips head screwdriver to remove the battery cover located on the top of the red dot finder.
2. Gently pull back the retaining clip and remove the old battery. Take care not to bend the clip excessively.
3. Slide the new battery under the retaining clip with the positive (+) side facing the clip.

Aligning the Red Dot Finder

Proper alignment ensures that an object centered on the red dot will also be centered in the telescope's eyepiece. Alignment is most easily performed during daylight. Follow the alignment procedure described in the next section to match the sight's aim with the optical axis of the telescope.

1. Remove the dust cover from the front of the telescope.
2. Install the 20mm eyepiece in the focuser and point the telescope at a clearly defined land target (ideally at least a quarter mile away) such as the top of a telephone pole, tree, or building.
3. Center the target in the telescope eyepiece.
4. Without moving the telescope, use the Red Dot Finder's altitude and azimuth adjustment knobs to position the red dot directly on the target.
5. Once the red dot is centered on the target, verify that the object remains centered in the telescope's eyepiece. If necessary, re-center the target in the eyepiece and adjust the Red Dot Finder again. When the target is aligned in both the eyepiece and the Red Dot Finder, the finder is properly aligned with the telescope.

Using the Telescope

Focusing the Telescope

The StarBlast 4.5 is equipped with a 1.25-inch rack-and-pinion focuser. It is recommended to practice focusing during the daytime to become familiar with the process.

With the 20mm eyepiece installed, aim the optical tube at a clearly defined object at least a quarter mile away. Slowly rotate either of the two focus knobs, which move together, until the object comes into sharp focus. Continue past sharp focus until the image begins to blur, then reverse the rotation gradually to precisely achieve the clearest focus point.

The focuser position can also be adjusted for comfort. Loosen the tube clamp knob and rotate the optical tube until the focuser is at a convenient viewing angle, then retighten the clamp.

Image Orientation

Images seen through the StarBlast 4.5 eyepiece will appear rotated or upside down. This is a normal characteristic of reflector telescopes. While this makes them less suitable for daytime terrestrial viewing, it does not affect astronomical observations, there is no "right side up" when observing the night sky.

Altitude and Azimuth (Aiming the Telescope)

The StarBlast 4.5 telescope base allows movement along two axes: altitude (up and down) and azimuth (left and right). These motions can be used together to smoothly point the telescope to any position in the night sky, from horizon to horizon.

The altitude axis tension can be adjusted using the altitude tension knob. Proper tension ensures the telescope does not move too freely, which can make it difficult to keep an object centered in the eyepiece. At the same time, the tension should not be so high that smooth, precise adjustments are difficult. Turn the knob to achieve the right balance for comfortable aiming.

The azimuth axis rotation is preset at the factory to provide smooth, easy left-to-right movement of the base.



Choosing an Observing Site

For the best viewing experience, choose a location as far as possible from artificial lights such as street lamps, porch lights, and car headlights. Bright lights interfere with dark-adapted night vision and reduce the number of visible stars and celestial objects. Avoid observing over rooftops or chimneys, which can produce warm air currents that distort the image. Observing from indoors, even through an open window, should also be avoided because temperature differences between indoor and outdoor air can blur and distort the view.

Whenever possible, travel away from city lights to darker rural skies. Under a dark sky, the number of visible stars and deep-sky objects increases dramatically.

Cooling the Telescope

All optical instruments require time to reach thermal equilibrium. The larger the telescope and the greater the temperature difference between indoor storage and outdoor conditions, the longer it takes to stabilize. Allow at least 20 minutes for the StarBlast 4.5 to acclimate to the outdoor temperature before beginning high magnification observations.

Allow Your Eyes to Dark-Adapt

Moving from a well-lit area into nighttime darkness will not immediately reveal faint nebulae, galaxies, star clusters, or even many stars. Eyes take approximately 30 minutes to reach about 80 percent of their full dark-adapted sensitivity. As night vision develops, more stars will appear, and faint details in objects viewed through the telescope will become clearer.

To maintain night vision while working in the dark, use a red-filtered flashlight instead of white light. Red light preserves dark adaptation and allows you to see what you are doing without reducing sensitivity. Flashlights with red LED lights are particularly effective. Keep in mind that nearby porch lights, street lights, and car headlights can also compromise night vision.

Moon Filter

The Moon Filter is a useful accessory for reducing glare from the bright lunar surface, making viewing more comfortable while enhancing contrast to reveal finer details. This neutral density filter transmits only a small percentage of incoming light, preventing the Moon's brightness from washing out surface features. It improves clarity and resolution, reduces eye strain. To use, simply screw the filter into the threaded barrel of the eyepiece which is on the bottom narrow portion that inserts into the telescope.



Orion MoonMap 260

The MoonMap 260 shows the locations and names of over 260 lunar features, including craters, mountains, valleys, and seas. It also marks the sites of past spacecraft landings. This detailed map is a valuable tool for beginners and families alike, providing a way to identify and learn about the features observed through the telescope. Using a red flashlight to read the MoonMap in the dark is recommended, as red light does not affect dark adaptation.

Objects to Observe

Once the telescope is set up and aligned, the next step is deciding what to explore in the night sky.

The Moon
The Moon is one of the easiest and most rewarding targets for observation. Its craters, maria, and mountain ranges are visible even from a distance of 238,000 miles. Because the Moon goes through different phases, each night provides a slightly different view. The best time to observe is during a partial phase, when shadows along the terminator, the line between the illuminated and dark portions of the lunar surface, highlight surface details. A full Moon is very bright and lacks shadows,

making it less ideal for detailed observation. Observing the Moon when it is high above the horizon provides the sharpest images.

The Planets
Planets move across the sky rather than remaining fixed like stars, so their positions change nightly. To locate them, consult a sky calendar, astronomy magazines, online astronomy charts, or smartphone apps. Venus, Jupiter, and Saturn are the brightest objects after the Moon, while other planets may appear star-like in a small telescope. Higher magnification is recommended for observing planets and even then, they will still appear very small through this telescope.

Jupiter is the largest planet and an excellent target. Through the telescope, the disk of Jupiter can be seen, along with its four largest moons: Io, Callisto, Europa, and Ganymede. The disc of the planet will likely be smaller than expected.

Saturn is famous for its rings. Depending on the tilt, the rings may appear edge-on or broadside. A steady atmosphere is important for a clear view. Titan, Saturn's brightest moon, is often visible nearby.

Venus is extremely bright and can sometimes be seen during daylight. At its peak brightness, Venus appears as a thin crescent rather than a full disk, and no surface markings are visible due to dense cloud cover.

The Stars
Stars will appear as points of light through the telescope. While stars cannot be magnified into disks, their colors can be observed, and many double or multiple star systems can be resolved. The two-color double star Albireo in Cygnus is a popular target. Slightly defocusing a star can sometimes enhance its color.

Deep-Sky Objects
Under dark skies, the telescope can reveal faint objects such as gaseous nebulae, open clusters, globular star clusters, and galaxies. Most deep-sky objects appear as dim gray shapes rather than the colorful images often seen in photographs. Patience, dark-adapted eyes, and a location away from light pollution are essential. Without dark-adapted eyes, most deep sky objects are extremely challenging to view. As observing skills develop, more subtle details and structures become visible.

Star charts, planetarium programs, apps, and planispheres are helpful tools for locating deep-sky objects. Low-power scanning of the Milky Way with the 20mm eyepiece is a rewarding way to explore the dense fields of stars. Maybe you'll stumble across one of the great nebulae! The Milky Way is especially impressive on summer and winter evenings.

Collimation – Aligning the Optics

Collimation is the process of aligning the optics of the telescope so that the mirrors are precisely positioned relative to each other and the telescope tube. For a reflector telescope, both the primary and secondary mirrors must be accurately aligned. The StarBlast 4.5 is aligned at the factory, and adjustments are generally not required unless the telescope has been handled roughly.

Accurate alignment ensures the sharpest possible images and should be checked occasionally. With practice, collimation is straightforward and can be done in daylight. Keep in mind that even a telescope that does not have a technically perfect collimation can still allow you to see good views of the night sky. While collimation is very important, don't let small deviations stop you from observing.

Perform collimation in a brightly lit room with the telescope pointed horizontally at a bright surface, such as a light-colored wall. Placing a piece of white paper opposite the focuser can help during alignment.

To check the current collimation, remove the eyepiece and look down the focuser. You should see the secondary mirror centered in the focuser, the reflection of the primary mirror centered in the secondary mirror, and the reflection of the secondary mirror, along with your eye, centered in the primary mirror reflection. Compare what you see with the provided illustration. If anything appears off-center, proceed with the collimation steps.

Precise collimation is easiest with the included collimation cap. This cap helps you keep your eye centered in the focuser.

Primary Mirror Center Mark

The StarBlast 4.5 features a small ring in the center of the primary mirror. This center mark allows precise collimation. It does not affect optical performance because it lies in the shadow of the secondary mirror.

Aligning the Secondary Mirror

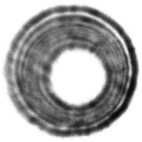
Begin with the secondary mirror. The secondary mirror adjustment screws are Allen screws. Look down the focuser at the secondary mirror. If the primary mirror reflection is not centered in the secondary mirror, adjust the tilt of the secondary mirror by loosening one screw and lightly tightening the others. The goal is to center the primary mirror reflection in the secondary mirror. Do not worry if the reflection of the secondary mirror itself is off-center at this stage. It will be corrected when adjusting the primary mirror. This process may take a few attempts to achieve precise alignment.

Aligning the Primary Mirror

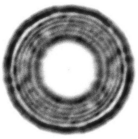
Next, adjust the primary mirror. If the primary mirror reflection is centered in the secondary mirror but the secondary mirror reflection is off-center, use the three spring-loaded collimation knobs and the three locking thumbscrews on the back of the optical tube. Loosen the locking thumbscrews slightly, then adjust each collimation knob in small increments, observing how the secondary mirror reflection moves. Repeat as needed until the reflection of the primary mirror's center mark is aligned with the collimating tool. Lightly retighten the locking thumbscrews to secure the mirror. A star test will confirm accurate collimation.

Star Testing the Telescope

At night, point the telescope at a bright star and center it in the eyepiece. Slowly defocus the star using the focuser. If collimation is correct, the out-of-focus star should appear as a symmetrical circle with the shadow of the secondary mirror centered, similar to a donut hole. If the shadow is off-center or the disk is unsymmetrical, further adjustment to the primary mirror is needed. Keep the star centered during testing; this is critical. Make slight adjustments to the telescope's position to center the star if necessary. Polaris, the North Star, is a convenient choice because it remains relatively fixed in the sky.



Out of Collimation



Collimated