

## INSTRUCTION MANUAL

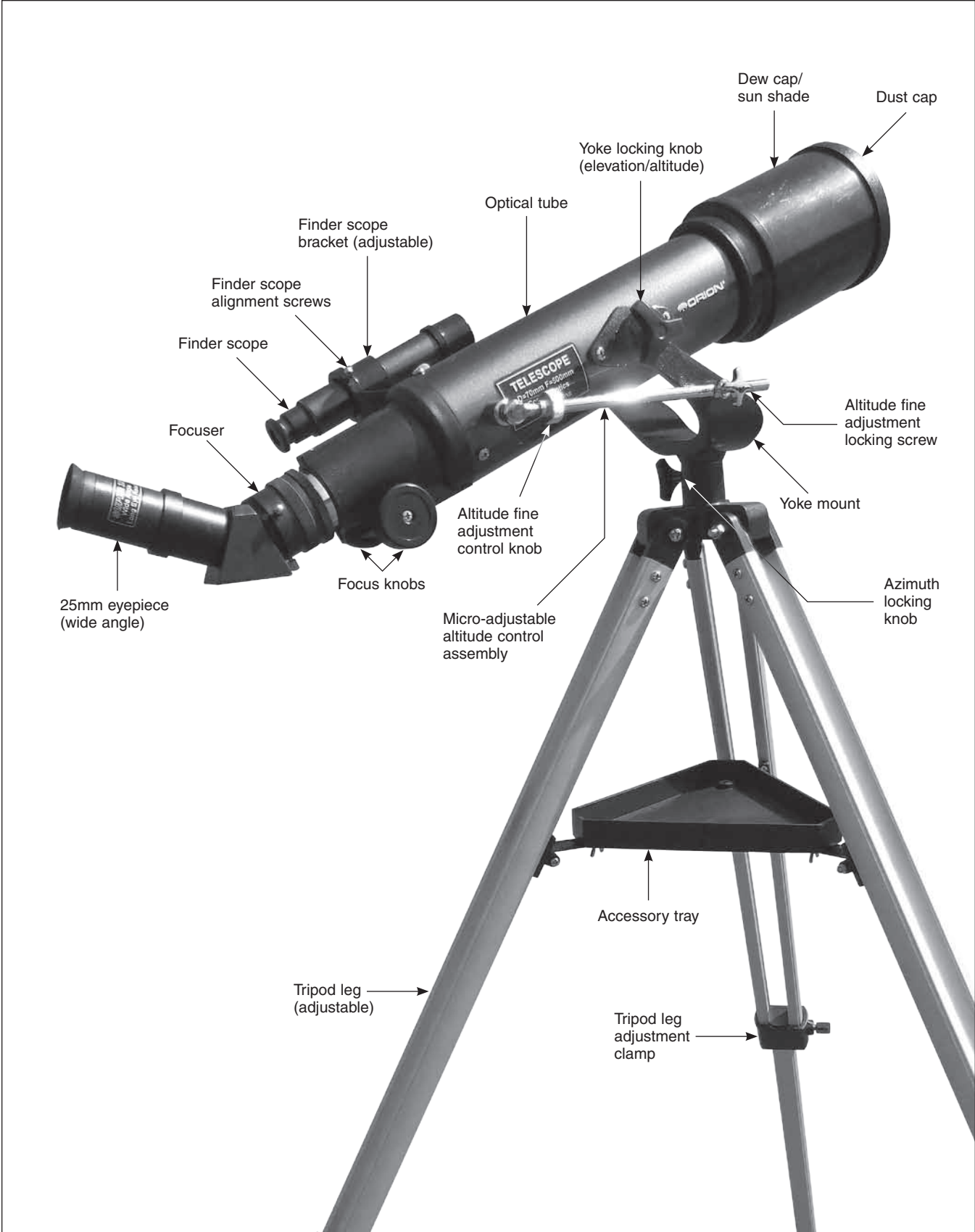
# Orion® StarBlast™ 70 and StarBlast™ 90 Refractor Telescopes

#10028 StarBlast 70, #10029 StarBlast 90

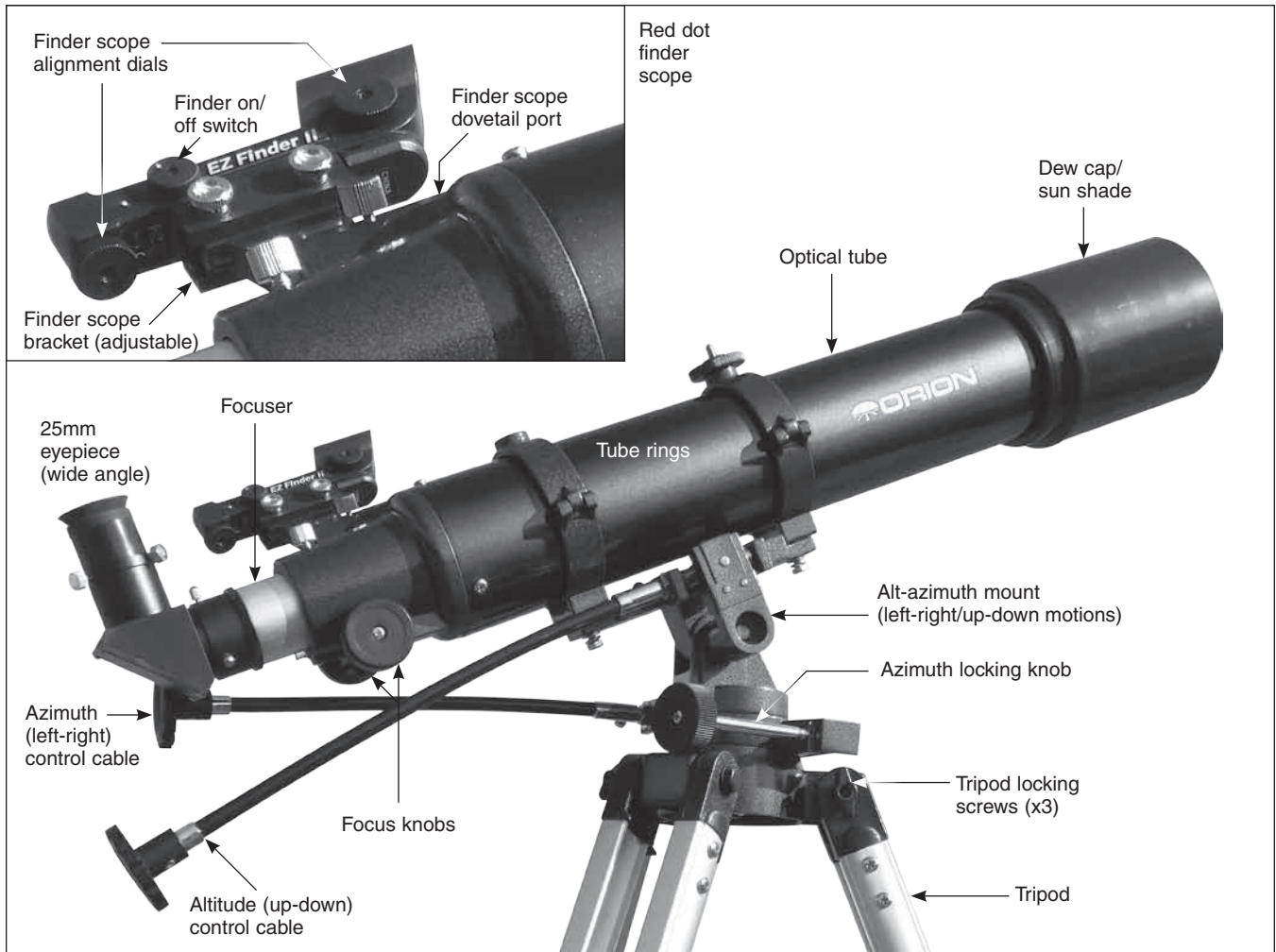


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**Figure 1.** StarBlast 70



**Figure 2.** StarBlast 90

Congratulations on your purchase of a quality Orion StarBlast telescope. Your telescope is a high quality optical instrument for viewing the Moon, the Planets in our Solar System and the brighter deep sky objects (when used away from city lights). It can also be used for viewing birds, wildlife and other earth-bound objects you want to see more closely.

Below we offer assembly instructions for your telescope and general operating instructions; detailed advice on how to use a telescope, the use of popular accessories and how to find objects in the sky can be found online in Orion's online Community Center: <http://www.telescope.com/catalog/community.jsp>

**WARNING: DO NOT VIEW THE SUN without a professional SOLAR FILTER. KEEP THE TELESCOPE'S OPTICS COVERED IF THE TELESCOPE IS LEFT OUTSIDE DURING THE DAY – an uncovered lens may concentrate sunlight if pointed near the sun and damage the telescope or objects around it and cause eye damage if someone looks through it without a solar filter.**

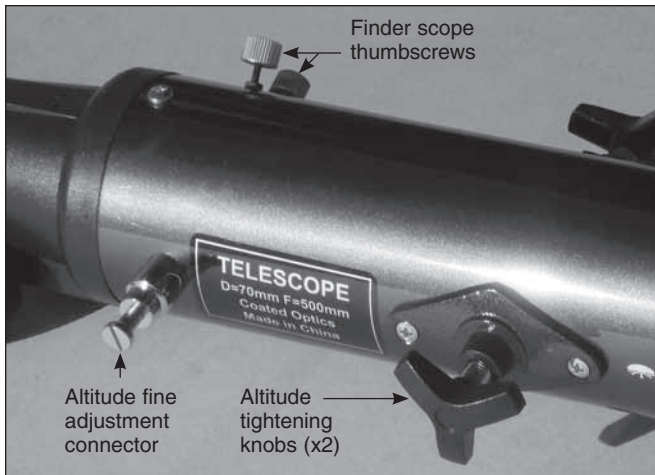
## Assembly Instructions

### StarBlast 70 Tripod Assembly

1. Unpack the telescope and lay the parts out in clear work area.
2. Take each tripod leg and loosen the height adjustment clamp, extending the tripod leg, retighten the clamp securely (finger-tight, no need for tools).
3. Spread the tripod legs apart and stand the telescope tripod upright. Adjust the tripod legs' height to make the telescope level, if needed.



**Figure 3.**



**Figure 4.**

4. Place the accessory tray on TOP of the center bracket between the tripod legs and secure it with the three wingnut locking knobs from UNDERNEATH. (Figure 3)



**Figure 5.**



**Figure 6.**

#### Telescope Assembly

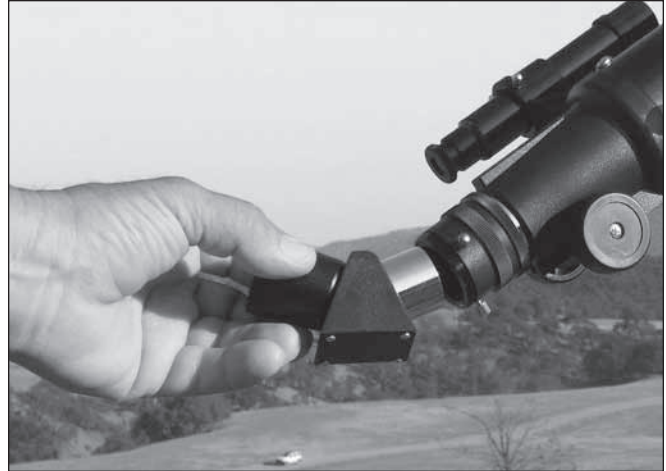
1. Remove the Altitude Tightening Knobs on the side of the tube. (Figure 4)
2. Slide the telescope tube into the slots on the ends of the fork arms of the Yoke Mount, use the Altitude Tightening Knobs to secure the tube to the Yoke Mount. (Figure 5)
3. Insert the Micro-Adjustable Altitude Control into the Altitude Knob Control Assembly on the side of the yoke mount; the end with the fine adjustment knob goes towards the back (the way the yoke curves). (Figure 6) Remove the Machine Screw installed on the side of the telescope and use this to attach the Micro-Adjustable Altitude Control to the side of the telescope tube. (Figure 7)

#### Finder Scope Assembly

1. Remove the thumbscrews on the top of the Telescope.



**Figure 7.**



**Figure 9.**



**Figure 8.**



**Figure 10.**

2. Locate the finder scope in the accessory box and position it over the screws on the telescope; secure with the thumbscrews removed earlier. **(Figure 8)**
3. More instructions on aligning the finder scope, below.

#### **Eyepiece Installation**

1. Locate the Wide Angle (25mm) eyepiece and the 45 Degree Correct Image Diagonal.
2. Remove the rear Dust Cover in the Focuser and place the Diagonal into the back of the telescope; secure with the set screw on the side of the focuser. **(Figure 9)**
3. Remove the Eyepiece Dust Covers and place the eyepiece into the diagonal (only the correct direction fits into the diagonal) and secure with the set screw on the Diagonal. **SAVE THE DUST COVERS FOR PROPER STORAGE. (Figure 10)**

#### **Your First Look**

Tighten or loosen the Altitude and Azimuth locking bolts tension control knobs (if needed) so that the telescope is easy to move, but secure enough to keep the telescope pointed where you aim it.

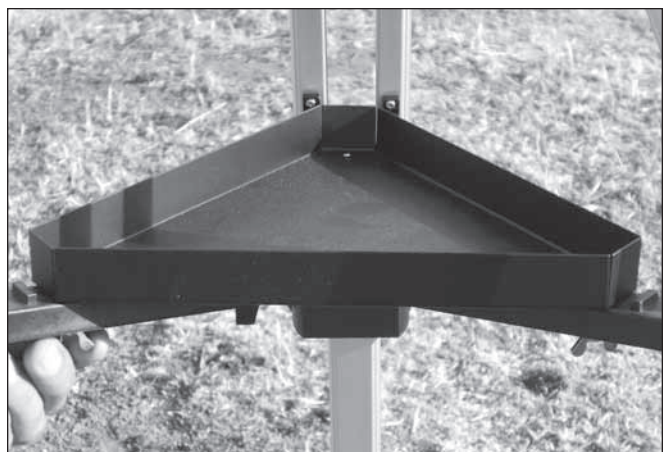
Use your hands to move the telescope close to a target, fine adjustment in the up/down direction can be made by the Altitude Fine Adjustment Control Knob. Tension in the up/down direction is controlled by tightening the Altitude Locking Screw and the Yoke Locking Knobs – if too loose the telescope will move too freely (it will give “shaky” views); if too tight, it will be hard to move the telescope.

1. During the daytime, sight along the tube to a distant, easily recognizable object and push the telescope tube (not the tripod) towards that object. With the dust caps removed, look through the telescope and use the FOCUS KNOBS to move the eyepiece in-and-out until the object comes into focus!

2. If the object you have chosen is at least a half mile to a kilometer away, look through the finder and center the cross hair on the same part of the object you are viewing through the telescope using the three set screws on the side of the finder scope. Now, with the finder scope aligned, you can point the wide-field finder at brighter objects in the sky and they should be visible in the main telescope. **(Figure 11)**
3. Get used to the “feel” of operating your telescope by practicing on objects on the ground during the day.
4. Orion suggests your first night time target be the first quarter moon!
5. Go to Orion’s Community Learning Center to find out where the planets are and where other interesting objects in the night time sky are located and how to star-hop to locate them: <http://www.telescope.com/catalog/community.jsp>
6. The 10mm high power eyepiece gives higher power for close ups of the moon and planets; use the 25mm wide angle eyepiece to find any object on the ground and sky, switch to high power, if needed and if the object is bright enough (many deep sky objects are best seen with the wide angle eyepiece).
7. The high power eyepiece will probably be needed to see the rings of Saturn and details on Jupiter; the moon will look spectacular! The StarBlast 70 can usefully reach powers of about 137X with high power eyepieces (many sizes are available as options).
8. Always try to observe away from city lights for the most impressive views!



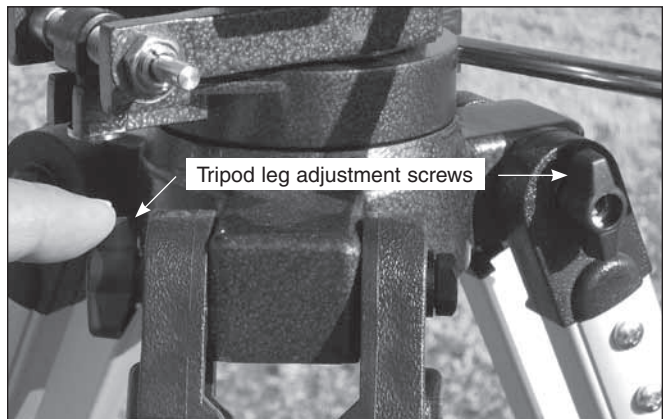
**Figure 11.**



**Figure 12.**

### **StarBlast 90 Tripod Assembly**

1. Unpack the telescope and lay the parts out in clear work area.
2. Take each tripod leg and loosen the height adjustment clamp, extending the tripod leg, retighten the clamp securely (finger-tight, no need for tools).
3. Spread the tripod legs apart and stand the telescope tripod upright. Adjust the tripod legs’ height to make the telescope level, if needed.
4. Place the accessory tray on TOP of the center brackets between the tripod legs and secure it with the three wingnut locking knobs from UNDERNEATH the center bracket and the tray. **(Figure 12)**
5. The Alt-azimuth Mount itself is attached to the tripod by three wing nuts on long screws that go through the top of the tripod legs (the mount may be packaged separate in some versions of this telescope; if not you don’t need this step!). **(Figure 13)**



**Figure 13.**



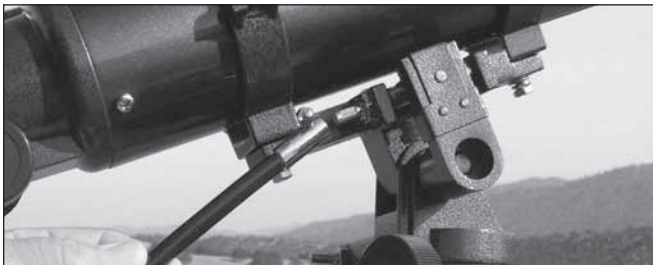
**Figure 14.**



**Figure 15.**



**Figure 16.**



**Figure 17.**



**Figure 18.**

### Telescope Assembly

1. Remove the tube rings around the telescope tube by loosening the thumb nuts on the rings and opening the hinges. (Figure 14)
2. Attach the tube rings to the Alt-Azimuth Mount using the screws provided (attach from the bottom, tighten). (Figure 15)
3. With the Tube Rings open, lay the telescope tube in the rings, close the rings and secure with the thumb nuts on the Tube Rings. Finger-tight is fine, do not over-tighten. (Figure 16)
4. Loosen the Tube Rings to adjust the balance if needed.
5. Install the Slow Motion Control Cables by sliding the open end with the thumbscrew over the notched pins on the Altazimuth Mount. Tighten the thumbscrew when it is over the flat surface on the notched pin. The Slow Motion Cable near the base of the Mount, will move the telescope slowly left-right, the other Slow Motion control Cable will move the telescope up and down. The telescope is aimed by holding the tube and moving it to the general area, the slow motion Control Cables will allow you to center an object and track it as it moves across the sky (everything in the sky slowly moves east to west, caused by the earth's rotation – motorized or computer controlled telescopes do this “tracking” for you automatically). (Figure 17)

### Finder Scope Assembly

1. The finder will slide into a “Dovetail” bracket/port on the top/side of the telescope.
2. Locate the “Red Dot” Finder scope in the accessory box and install the battery in the Red Dot Finder – make sure it is off when you store the telescope – it will drain the battery if left on for an extended period.
3. Position the red Dot Finder scope in the dovetail port on the top of the telescope; secure with the thumbscrew on the side of the port. (Figure 18)
4. The Red Dot Finder scope or Finder is a “reflex” finder – when you look through the finder (from about a foot away), keeping BOTH eyes open, you will see a red dot where the telescope is aiming (you need to initially align the finder scope, as described later).
5. The red Dot Finder scope has adjustable brightness (there is a dial on the side), you will want to keep it pretty dim when your eyes have dark adapted and you are looking for faint objects in the sky. Again, *be sure to turn it off after using the telescope*. Since it is a dim red light, the Red Dot is not really meant to be used during the day.

### Eyepiece Installation

1. Locate the Wide Angle (25mm) eyepiece and the Star Diagonal.
2. Remove the rear Dust Cover in the Focuser and place the Diagonal into the back of the telescope; secure with the set screw on the side of the focuser. (Figure 19)
3. Remove the Eyepiece Dust Covers and place the eyepiece into the diagonal (only the correct direction fits into the diagonal) and secure with the set screw on the Diagonal. SAVE THE DUST COVERS FOR PROPER STORAGE. (Figure 20)

### Your First Look

1. Tighten or loosen the Altitude and Azimuth Locking Bolts so that the telescope is easy to move by pushing on the tube, but secure enough to keep the telescope pointed where you aim it.
2. During the daytime, sight along the tube to a distant, easily recognizable object and push the telescope tube (not the tripod) towards that object. With the dust caps removed, look through the telescope and use the FOCUS KNOBS to move the eyepiece in-and-out until the object comes into focus! Use the Slow Motion Control Knobs to center the object in the field of view.
3. If the object you have chosen is at least a half mile to a kilometer away, look through the Red Dot finder and center the cross hair on the same part of the object you are viewing through the telescope using the up-down and left-right dials on the finder scope. This might best be done at dusk when the ambient light is low, but you can still see distant objects easily on the ground. Now, with the finder scope aligned, you can point the wide-field finder at brighter objects in the sky and they should be visible in the main telescope.
4. Get used to the “feel” of operating your telescope by practicing on objects on the ground during the day. Orion suggests your first night time target be the first quarter moon!  
<http://www.telescope.com/catalog/community.jsp>
5. Go to Orion’s Community Learning Center to find out where the planets are and where other interesting objects in the night time sky are located and how to “star-hop” to locate them:
6. The 10mm high power eyepiece gives higher power for close ups of the moon and planets; use the 25mm wide angle eyepiece to find any object on the ground and sky, switch to high power, if needed and if the object is bright enough (most deep sky objects are best seen with the wide angle eyepiece).
7. The high power eyepiece will probably be needed to see the rings of Saturn and details on Jupiter; the moon will look spectacular! The StarBlast 90 can usefully reach powers of about 175X with high power eyepieces (many sizes/powers are available as options). Higher power eyepieces are possible, but the image usually gets very dim and somewhat fuzzy – ALL Telescopes start to give

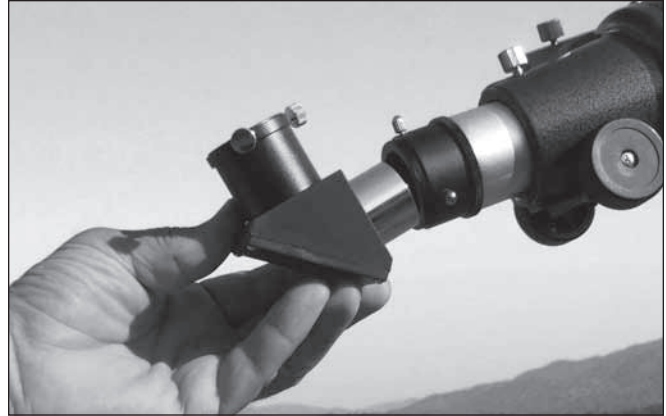


Figure 19.

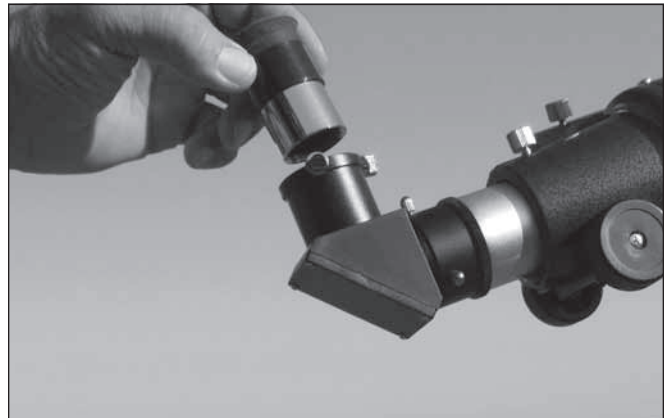


Figure 20.

less satisfactory images when you increase the power above about 50x per inch of aperture.

8. Always try to observe away from city lights for the most impressive views!

### Tips For Using a Telescope

For a good astronomical viewing experience, Orion always recommends:

1. The “Golden Rule for Astronomy” – Seek out an observing site as far from city lights as possible.

If you cannot get away from the city, go to a location away from streetlights and other sources of nighttime light pollution. Astronomical objects are very dim, and light pollution strongly impacts how much you can see through **any** telescope. Your StarBlast 70 or 90 is the perfect companion to take camping! From a “dark sky site” – a place remote from city lights where the Milky Way is visible – there are hundreds of objects that can be found with the StarBlast telescopes!

Even if “remote” observing is the “Golden Rule” for astronomical observing, the Orion StarBlast telescopes have quality optics and will be able to show you objects from near or within a city – the moon, the planets and the brighter star clusters are within reach of this telescope. Refer to a star chart or Orion’s online learning center to learn where to look.



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## 2. Start with Low Power

The 25mm low power eyepiece means the images you see will be **brighter** and you get a **WIDE field of view**, so it is much easier to find objects with your StarBlast at low power. The *bigger* the number on the eyepiece the sharper and brighter the view will be. After you locate an object in low power, switch to the high power eyepiece to see if the view is better.

## 3. Don't View Through Windows

The optics in your StarBlast refractor have been polished to an accuracy of a millionth of an inch. Window glass is thousands of times less accurate; by looking through a window, you are effectively putting a "distorting warp filter" in front of your telescope, and views will never be sharp. That said, you can accomplish some casual daytime or lunar viewing through a window at low power, but the view will never be sharp.

## 4. Take the Proper Tools with You

- a) **Dress warmly**, if you go out in wintertime; Orion's view is that you can never overdress in winter – hats, gloves, insulated shoes, many layers, etc.
  - b) Take **binoculars** – they are the perfect complement to a telescope and will help you find larger objects in the nighttime sky or terrestrial targets on the ground. A good general binocular for astronomy is a 10x50 size – 10 power and with 50mm diameter lenses.
  - c) Bring a **star chart** – this will help you find your way around the night sky. Better ones, and astronomy guidebooks will show you how to "star hop" to find faint objects outside the solar system like star clusters and nebula.
- ## 5. Attend a "Star Party"

It's always fun to share astronomy. Larger cities have local astronomy clubs that will tell you the best places to observe and will hold public observing events that can give you great tips on using a telescope and what's good to look at during the night (this varies during the year!!!).

### Optional Accessories For StarBlast Telescopes

1. Additional Eyepieces – use any 1.25" standard eyepiece with the StarBlast 70 or StarBlast 90. Different Powers can be reached by attaching different eyepieces. To calculate the power, divide the focal length of the telescope (in mm) or 500 (for the StarBlast 70) by the mm focal length of the eyepiece used. For the 10mm eyepiece the power is  $500/10 = 50X$ . For the 25mm eyepiece the power is  $500/25 = 20X$ .

The Orion Sirius Plössls or the Telescope Accessory Kits are great additions to the Orion StarBlast. The Plossl design eyepiece is a very high performance eyepiece design and will give you sharper views than the standard eyepieces included with most telescopes.

2. V-block 1.25" filter – When viewing planets at high powers (above 100x) the color fidelity can be improved with an Orion v-block filter – 1.25". Simply thread it into the bottom of the eyepiece and observe. Colors are more

natural with this filter at high powers. Works for terrestrial applications at high power as well.

3. Orion Jupiter Filter – The dark cloud bands and the "Great Red Spot" of the gas giant planet Jupiter will be easier to spot with the 1.25" Jupiter Filter. Like the v-block, simply thread it into the bottom of the eyepiece and observe.
4. Moon filter 1.25" – The Moon can be overpowering! Drop the glare & brightness and see more detail with an Orion 1.25" Moon filter.
5. O-III Filter 1.25" – Got a desire to track down planetary nebula or large emission nebula like the North American Nebula? The O-III filter greatly enhances viewing of "Emission Nebulae" – the colorful gas clouds photographed in our galaxy which are formed by stars that are dying or giving birth. Note: nighttime views through any telescope are in black and white, the eye can't respond to color at low light levels.

### What Can You See in the Sky?

Use your StarBlast 70/90 to explore the moon and planets. Bright comets are a special treat, with the wide field of view at low power. Under a dark sky (away from city lights) you will be amazed what you can see outside the solar system – most of the brighter messier objects are visible through these telescopes *from a dark sky location*. That means this telescope can be used to locate and see planetary nebula, supernova remnants, double stars, open & globular star clusters, emission nebula (like the Orion Nebula, M42) and even other galaxies!

Go to the Orion Community Center to learn how to find deep sky objects!

### Solar Warnings!!!

- a) Do not point the telescope at the sun without using a proper solar filter (optional) that fits over the front end (objective) of the telescope.
- b) If using a solar filter (that fits over the front or objective of the telescope) cover the front of the finder scope so that the finder does not get damaged by exposure to solar radiation/solar energy.
- c) Do NOT use eyepiece type solar filters – they may crack with the intense heat from concentrated solar energy.
- d) Do not use the telescope to project an image of the sun onto a flat object – the concentrated solar energy will damage the telescope and may cause a fire.
- e) Always keep the optics of an unattended telescope covered during the daytime – if accidentally left pointing at the sun, the telescope may be damaged by the concentrated solar radiation.

## Care and Maintenance

1. Keep the dust caps on when not in use – if you always keep the optics of the telescopes and accessories covered, you may never need to clean them.

2. Store the telescope inside when not in use – it is not designed to be weatherproof.
3. If you do leave the telescope outside during the daytime between observing sessions, **COVER THE OPTICS!** If the scope is pointed towards the sun, it may concentrate solar energy and damage the telescope or surrounding objects and/or injure someone. The optics will also stay cleaner if you always cover them.
4. Clean the optics, if necessary, with an optical brush to remove lint/dust, optics detergent for fingerprints and cleaning cloth (available separately). A little dust will not impact the performance of the telescope.
5. Refractor optics are robustly supported and unless the telescope is abused, should never require collimation (alignment).

## Specifications

### **StarBlast 70 Travel Refracting Telescope**

Objective Lens: 70mm Diameter  
 Focal Length: 500mm (f/7.14)  
 25mm Eyepiece – 1.25" (20 Power)  
 10mm Eyepiece – 1.25" (50 Power)  
 5x24 Finder scope (inverted image)  
 45 Degree Correct Image Star Diagonal – 1.25"  
 Adjustable Aluminum Tripod  
 Weight: 7 Pounds  
 Height of Eyepiece: 60 Inches (telescope tripod fully extended, telescope pointed level)

### **StarBlast 90 Travel Refracting Telescope**

Objective Lens: 90mm Diameter  
 Focal Length: 600mm (f/6.67)  
 25mm Eyepiece – 1.25" (24 Power)  
 10mm Eyepiece – 1.25" (60 Power)  
 Red-Dot Finder scope (correct image)  
 90 Degree Star Diagonal – 1.25" (Inverted Image)  
 Adjustable Aluminum Tripod  
 Weight: 13.5 Pounds  
 Height of Eyepiece: 58" (telescope tripod fully extended, telescope pointed level)

## 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. Proof of purchase (such as a copy of the original receipt) is required. This warranty is only valid in the country of purchase.

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. It is not intended to remove or restrict your other legal rights under applicable local consumer law; your state or national statutory consumer rights governing the sale of consumer goods remain fully applicable.

For further warranty information, please visit [www.OrionTelescopes.com/warranty](http://www.OrionTelescopes.com/warranty).

## Orion Telescopes & Binoculars

89 Hangar Way, Watsonville CA 95076

**Customer Support Help Line (800) 676-1343 • Day or Evening**

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