



Cornerstones
of Science

awakening curiosity. enriching lives



STAR Program

(Sharing Telescopes and
Astronomical Resources)

Please
read this BEFORE
using telescope.

Orion StarBlast 4.5" Telescope Instruction Manual

This telescope was modified by

The Southern Maine Astronomers

The SMA is a state chartered nonprofit educational organization, promoting public awareness of astronomy. We hold public star parties, demonstrations, presentations and discussions, all free of charge. Our main objective is outreach in the community.

2 Visit: www.southernmaineastronomers.org for a calendar of events, information and links to astronomy-related sites.

SMA meets regularly at the Southworth Planetarium on the USM Campus, on Falmouth Street in Portland.

The Club provides Cornerstones of Science with ongoing support in education, modification and maintenance of the telescope.

We hope you enjoy using it.

WARNING

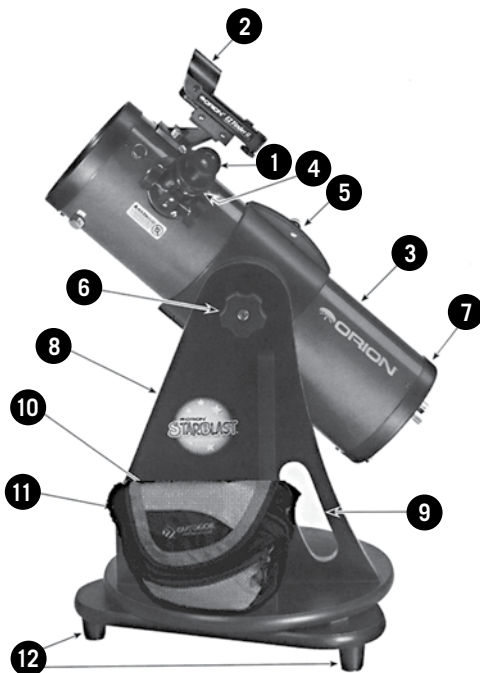
Never look directly at the Sun through your telescope or its finder scope – even for an instant – as permanent eye damage could result.

- Do not point the telescope at the Sun, as parts will melt!
- Children should use this telescope only with adult supervision.

Telescope Parts

- Zoom eyepiece
- EZ Finder and battery pack
- Optical Tube Assembly (OTA)
- Focus Wheels
- Tube Clamp; loosen to rotate
- Elevation Knob
- Mirror Assembly; rear cell
- Rotating Azimuth Mount
- Handle
- Accessory bag
- Constellations* book, headlamp and this Instruction Manual in the bag
- Feet on base

Use on a stable, sturdy table.



Getting Started

Now that you have the telescope at home, please get familiar with the different parts and functions shown on page 3. The brief explanation at the library should help to get you started. Practice indoors with the telescope before going outside and trying to use it in the dark.

4 When the telescope is not in use, please leave the eyepiece dust cap and the front cover in place.

Setting up: Set-up the telescope on a stable surface to help avoid vibrations. Do this while it is still daylight to make it easy to see and to allow the mirror to reach ambient temperature. The image will be much better if you let the telescope cool down to outside air temperature before you start observing after dark, and it is much easier to set-up in daylight, just before sunset.

Try out the telescope during the day:

DO NOT LOOK AT THE SUN! You will permanently damage your eyes.



Normal



In the Eyepiece

The images will be upside down and backward when viewing in the eyepiece. When seen at night, the objects in the sky are light years away. That they are upside down really doesn't matter.

The Zoom eyepiece is permanently mounted in the focuser. Remove the dust caps from the eyepiece and front of the telescope tube.

Focusing the Telescope

Always start by using the lowest power. Turn the body of the Zoom so the pointer is at 21mm, to locate and center the object. Low magnification shows a larger area of sky in the eyepiece and makes finding and centering an object much easier. If conditions permit, zoom in for a closer look. 7mm is about 65X power of magnification. The Zoom in the image below is shown at 9mm.

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Eyepiece with Zoom set at 9 mm.

With the eyepiece adjusted for low power (21mm), practice aiming the telescope in the general direction of an object at least 1/4-mile away. Use a steeple, utility pole, or a chimney. Slowly rotate the Focus Wheels until the object comes into sharp focus. Go a little bit beyond sharp focus until the image starts to blur again, then reverse the rotation of the wheels to make sure you've hit the exact focus point. Use this same technique at night when focusing on objects in the sky.



Focusing may be difficult when viewing at night using high power, if the air is turbulent. Zoom down for a clear, sharp image. Better to be small and clearly see Saturn's rings than a fuzzy ball.

Once you've centered an object in the eyepiece, you can zoom to a higher magnification by rotating the eyepiece barrel. This is recommended for small and bright objects, like planets and double stars. You may have to refocus slightly, after changing the Zoom setting.

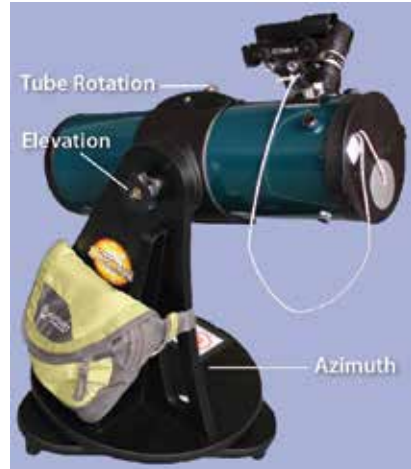
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If you find that it's awkward to put your eye up to the eyepiece, you can rotate the tube by loosening the Tube Rotation screw on the Tube Clamp and rotate the tube until the focuser is in a convenient position. Be sure to tighten it again. Great for kids!

You may find the telescope is either too hard to move up or down or does not stay in place. Use the Elevation Knob, (it holds the telescope

to the upright part of the base), to find the right level of tension.

Rotate the telescope on the base to the north or south direction (Azimuth) you want to look toward.



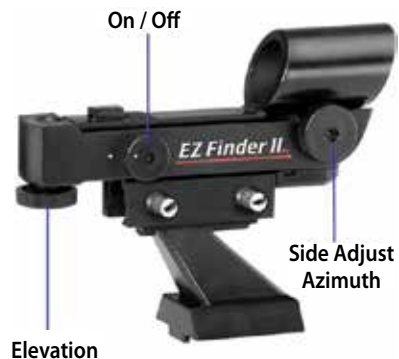
Operating the EZ Finder

This is not a LASER and it will not hurt your eyes. The **EZ Finder** helps you find things. It's like a sight on a rifle. The EZ Finder works by projecting a tiny red dot from a red LED onto a lens mounted in the front of the unit, so that when you look at the lens, the red dot will appear to float in space. Turn the power knob clockwise until you hear a click indicating the power is ON. Rotate clockwise to increase the intensity of the red dot to be brighter during the day. Remember to rotate the switch to OFF (white dots aligned) when you are finished observing.

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Adjusting the EZ Finder

Refer to figures on pages 6 and 7 for Elevation & Azimuth adjustments on the tube and EZ Finder.



Set the Zoom eyepiece to 21mm for a wide field of view. Look for an insulator or large bolt on a distant utility pole and center it in the eyepiece. Tighten the Elevation Knob on the Rotating Azimuth Mount to keep the telescope from moving up and down. With the object centered in the eyepiece, turn the EZ Side Adjust Azimuth

left or right to place the red dot in line with the object. Check the eyepiece to keep the object centered. Turn the EZ Elevation adjustment up or down to place the red dot on the object. Re-check the eyepiece for the centered object and fine adjust the red dot on the object. To make this more accurate, find Polaris at night. Center Polaris in the eyepiece and fine adjust the red dot to Polaris. Repeat with a higher power setting (7mm) for greater accuracy. This will be very accurate. Place the red dot on an object such as Mars, and it should be in the eyepiece.

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Warning: Never look directly at the Sun through your telescope or its finder scope – even for an instant – as permanent eye damage could result. Do not point the telescope at the Sun, as parts will melt! Children should use this telescope only with adult supervision.

Care of the Telescope

Store the telescope with the dust caps on and in a clean, dry, dust-free place, safe from rapid temperature changes and humidity. Do not store the telescope outdoors. Please keep the dust cover and eye piece cap on the telescope when it's not in use. Keeping the telescope dry is most important.

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Fog on the mirrors and eyepiece: Please do not wipe the eyepiece with a tissue or cloth. One of the odd things that happens during stargazing is that dew forms on almost everything (and everyone). The big mirror is down at the bottom of the telescope and it does not get much dew. Eyepieces, however, often have dew form on them, making them useless until they warm up and dry. **If dew is settling, it is best to take the telescope inside to warm up and**

dry off. The eyepiece has special coatings that could be damaged if it is rubbed or scratched. Please ask people to not touch the glass on the eyepiece.

Please don't clean or adjust the lenses or mirrors. Let the librarian know if the lenses seem dirty. The main mirror can be quite dusty before anyone would notice the image becoming poor. Eyepieces, however, can get dirty fairly quickly, particularly when poked with fingers. If it happens, let the librarian know and she or he will have it cleaned. It is very easy to scratch and damage the coating on the lenses!
Please try not to touch the glass.

Observing the Night Sky

When in view, planets will look small, but you might be able to see a bright Venus, cloud bands on Jupiter, the rings of Saturn, a dusty red Mars and a blue Uranus and Neptune. The waxing and waning of Venus should be visible and many bright deep sky objects will fill the eyepiece. Craters on the Moon will be clear and numerous.

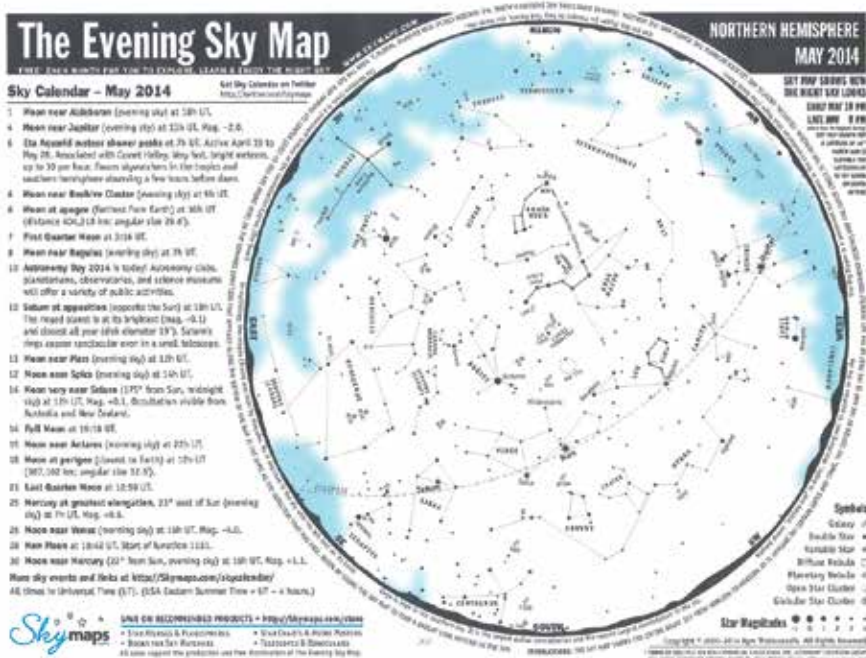
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Don't expect to see color as you do in professional photographs. Our eyes are not sensitive enough to see color at night except for planets and some bright stars.

Amazingly, the light you are seeing from the Andromeda Galaxy, over 2.5 million light years away, left there 2.5 million years ago. Yet, you can see this light with your own eyes!

Each session with your telescope will be a learning experience. It will get easier to use and stellar objects will become easier to find.

Go to www.skymaps.com to download *The Evening Sky Map* for the current month and learn the night sky. Page two of the map will describe the objects you could see with your eyes with binoculars and other objects where you need a telescope. Many will be too faint to see unless you have very dark skies and conditions are perfect...which is seldom. Please don't be disappointed as there are many wonderful objects you can find without an observatory and perfect sky conditions.



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Stargazing Checklist

Wait for a night that is clear and dark as you can see more stars when the Moon is not shining brightly. Get away from streetlights. Give your eyes about 20 minutes to adjust to the dark.

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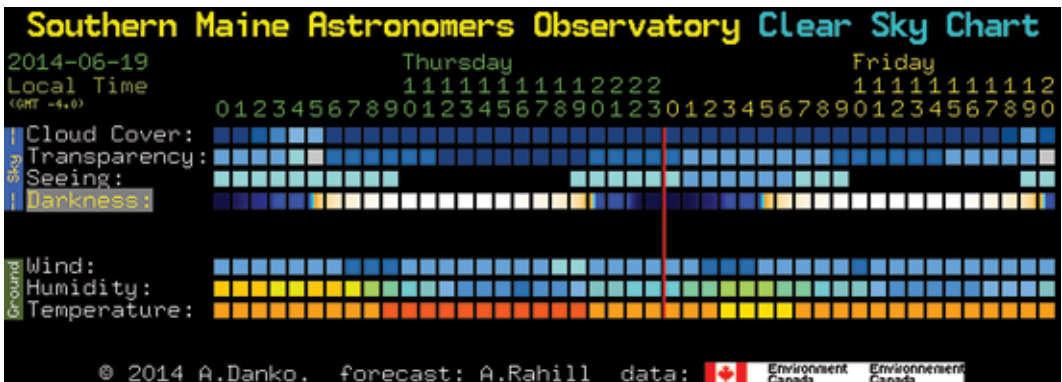
- Lawn chair and or blanket
- A sturdy table or box to put under the telescope (to avoid vibrations)
- www.skymaps.com for a chart
- Warm clothing
- Bug spray or hand warmers (in season)
- Warm boots or sneakers (season)
- Red flashlight (red cellophane)
- Observing log to help you keep track of the objects you see in the night sky.

- Plan a break for food and drink, indoors, away from the telescope

If you go to www.southernmaineastronomers.org you will find on the home page a link to the SMA Clear Sky Clock. The chart is a time line for weather. If you click on the center of the chart, you will find detailed explanations. On the Clear Sky Chart home page, you will find a link to other charts. Find the closest one to you for local weather conditions.

For example, let's use the SMA chart below: The first 4 bars are the most important: Is it cloudy? How clear is the sky? What is the seeing and finally, how dark is it? The deeper blue the squares are, the better. The chart below shows acceptable nights for seeing. Light blue boxes could indicate some jet stream turbulence.

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SMA Clear Sky Clock found at: www.southernmaineastronomers.org

Objects to Observe

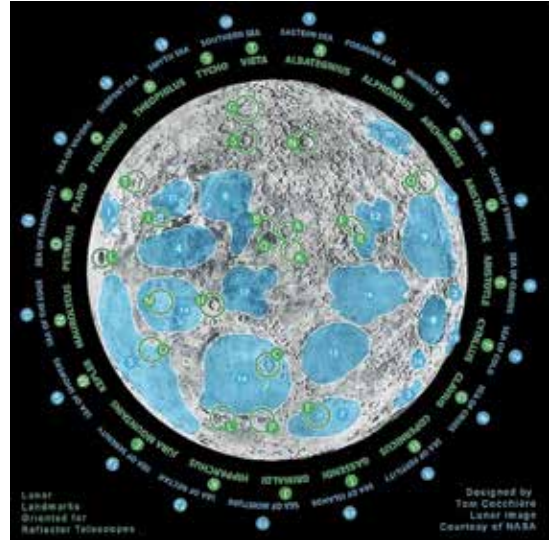
The Moon is one of the easiest and most interesting targets to view with your telescope. Lunar craters, seas, and even mountain ranges can all be clearly seen from a distance of 238,000 miles!

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With its ever-changing phases, you'll get a new view of the Moon each night. Make sure to observe the Moon when it is well above the horizon to get the sharpest images. The best time to observe is during a partial phase—that is, when the Moon is *not* full.

During partial phases, shadows are cast on the surface which reveals more detail, especially right along the border between the dark and light portions of the disk (called the terminator). Use the map on the telescope tube to find the major craters and features.

The Moon map below is oriented as you would see it in the eyepiece...upside down and flipped.



The Planets do not stay at fixed locations like the stars do. To find them you can refer to *What's In The Sky This Month* (www.telescope.com), or charts published monthly in *Astronomy* and *Sky & Telescope* magazines. Venus, Jupiter, and Saturn are the brightest objects in the sky after the Sun and the Moon. The monthly star chart at www.skymaps.com (see page 10) will show the position of the planets.

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Stars: Even powerful telescopes cannot magnify a star to appear as more than a point of light. You can, however, enjoy the different colors of the stars and locate many pretty double and multiple stars. Look at the middle star in the handle of the Big Dipper. It is really two stars very close together, Mizar and Alcor. Being able to separate the two stars is called star splitting. The beautiful two-color double star, Albireo,

in Cygnus, is a favorite and is sometimes referred to as the Scout Star because it is blue and gold like the Cub Scouts colors. Defocusing a star slightly can help bring out its color.

Deep Sky Objects: Under dark skies, you can see lots of fascinating deep sky objects, including nebulae, star clusters and a variety of different types of galaxies.

Most deep sky objects are very faint, so it is important that you find an observing site well away from light pollution. Take plenty of time to let your eyes adjust to the darkness. Do not expect these objects to appear like the photographs you see in books and magazines; many will look like dim gray smudges. As you become more experienced and your observing skills increase, you will be able to define more and more subtle details and structure of these objects.



With the right atmospheric conditions, you can see all of these objects with this telescope!

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The collage on page 16 shows some of what you can view in this telescope at different times of the year. Deep sky objects, also referred to as dim-fuzzies, are often hard to find. They are worth the effort, being some of most wonderful sights in the night sky. To find a deep sky object, look at the monthly *Evening Sky Map* (www.skymaps.com) to see what constellations are visible this month. Use the [National Audubon Society Constellations Pocket Guide](#) and locate a visible constellation. They are listed alphabetically and have a detailed description of the constellation and note if there are any deep sky objects within. Many constellations have hidden objects within them that are only visible with a telescope or binoculars. Pay particular attention to objects with a Messier Number, such as the Orion Nebula (M-42) and the Andromeda Galaxy (M-31). First published in 1774, Charles Messier made this list to help observers identify objects

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that might be mistaken for comets. The list of 110 Messier objects includes some of the brightest and most attractive deep sky objects observable from the northern hemisphere.

Star clusters are particularly pretty, usually bright and easy to see. Note that some Messier objects are very faint, and will take a while to find and see. A few are very dim, but may seem to appear like magic when you look at them out of the corner of your eye. This is called “averted vision” and works well when looking at very dim objects in a telescope or binoculars.

You can also try a low-power (21mm) scan of the Milky Way. Just cruise through the star clouds of our galaxy. You’ll be amazed at the rich fields of stars and objects you’ll see!

Conditions for Observing

Seeing and Transparency: Atmospheric conditions vary significantly from night to night, caused mostly by the jet stream flowing west to east and over us in Maine. There are times when the jet stream is NOT over us and conditions can vary from good to excellent, but this is rare. Most of the time, conditions are typically fair to good, as shown in the star image below.

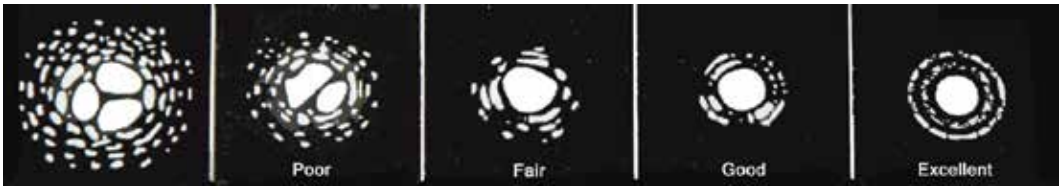
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Seeing refers to the steadiness of the Earth's atmosphere. In conditions of poor seeing,

atmospheric turbulence causes objects viewed through the telescope to look fuzzy and hard to focus. If you cannot focus on a star or anything else, pack up and go have a cup of hot chocolate, tea or coffee and watch *Cosmos*.

Transparency refers to clarity of the air. Is it dry or are there high thin clouds that will affect transparency? If it's not too bad, you can still have a decent time observing.

In conditions of good seeing, star twinkling is minimal and images appear steady in the eyepiece. Seeing is best overhead, distorted at



Conditions for Seeing and Transparency.

the horizon. Good transparency is especially important for observing faint objects. Transparency is judged by the magnitude of the faintest stars you can see with the unaided eye. Mag. 1 is very bright, 2 is dimmer, and so on... 4th magnitude or fainter is desirable.

Looking at the Little Dipper will show you how good the viewing is. If you can see all the stars,

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The Little Dipper

you are doing pretty well. Be sure to wait until your eyes adapt to the dark. This can normally take 15 to 20 minutes. Once adapted, you'll be surprised at how well you can see.



Warning: Never look directly at the Sun through your telescope or its finder scope – even for an instant – as permanent eye damage could result. Do not point the telescope at the Sun, as parts will melt! Children should use this telescope only with adult supervision.

Resources

Astronomy Clubs in Maine

- ◆ **Acadia Astronomical Society:**
acadiaastronomicalsociety@gmail.com
- ◆ **Astronomical Society of Northern New England** (Kennebunk area): www.asnne.org
- ◆ **Celestial Observers Guild** (Skowhegan area): www.cogastronomy.org and www.facebook.com/pages/Celestial-Observers-Guild/189330281140020
- ◆ **Central Maine Astronomers** (Mid-coast and Central Maine): www.maineastro.com
- ◆ **Downeast Amateur Astronomers** (Calais-Pembroke area): www.downeastaa.com
- ◆ **Southern Maine Astronomers** (Portland area): www.southernmaineastronomers.org
- ◆ **Penobscot Valley Star Gazers** (Hampden area): www.gazers.org

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Additional Information

- ◆ www.cornerstonesofscience.org/videos
- ◆ www.spaceweather.com
- ◆ www.kidsastronomy.com
- ◆ www.eyesonthesky.com

Books

Nightwatch, by Terrence Dickinson

Constellations of the Night Sky, by Bruce LaFontaine, a Dover Coloring Book

Stars of the First People, by Dorcas Miller

The Stars, A New Way to See, by H. A. Rey

They Dance in the Sky, by Monroe and Williamson