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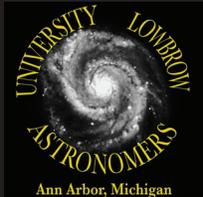
343 S. Fifth Avenue

Ann Arbor, Michigan

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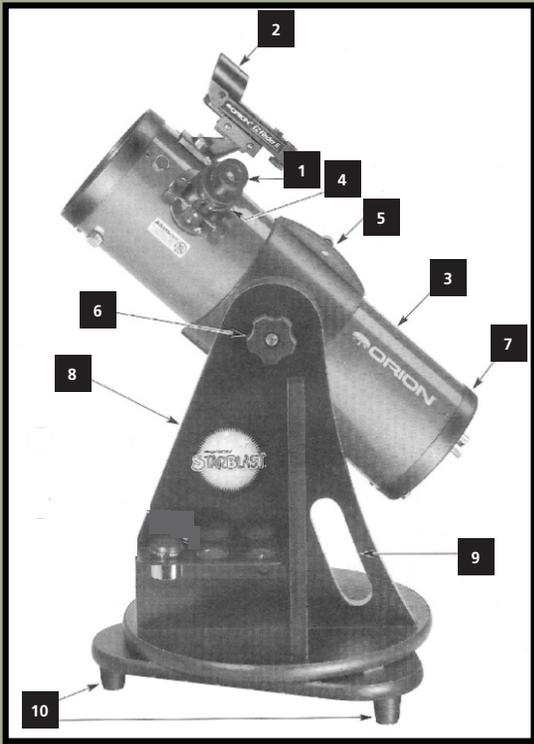
ORION STARBLAST 4.5" TELESCOPE INSTRUCTION MANUAL

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.*



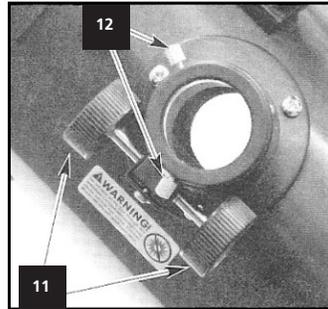
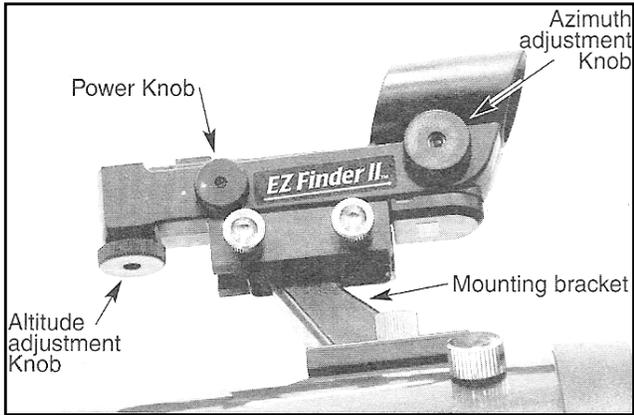
Sponsored in part by the University Lowbrow Astronomers, a non-profit educational organization promoting public awareness of astronomy. They hold public sky watches, demonstrations, presentations, and discussions, all free of charge. For a calendar of events, including information about the open houses at the Peach Mountain Observatory, visit www.umich.edu/~lowbrows/

The Club is providing AADL with ongoing help in education and maintenance of the telescopes. We hope you enjoy using it.



Telescope Parts

1. Eyepiece
2. EZ Finder
3. Optical tube
4. Focuser
5. Tube Clamp
6. Altitude Clamp
7. Mirror Assembly (*Please don't touch*)
8. Support
9. Handle
10. Feet



Focuser Details

11. Focus Knobs

12. Eyepiece Securing Thumb Screws

Getting Started

Please read the instructions and practice with the telescope inside before you take it out in the dark. When setting up the telescope, put it on something solid, like a picnic table or a wooden box. The telescope must be on something solid because any vibration or movement will be magnified when looking through it.

This is a “Push-to” telescope. Once you find what you are looking for, you can either watch the object move through your “field of view” (what you see through the eyepiece) and then reposition the telescope, or keep pushing the scope to hold the object in the center of the eyepiece. Objects appear to move across the field of view faster at higher magnifications. This is because the field of view becomes narrower. You may find it helps to hold one hand near the carrying handle to steady it while moving and aiming the telescope.

Like all Newtonian reflector telescopes, the image in the eyepiece is upside-down. Turning the eyepiece won't help. When looking at star charts or Moon maps, you will have to keep this in mind.

NOTE: The Moon map on page 8 has been flipped to match what you see in the eyepiece.

Do You Wear Eyeglasses?

If you wear eyeglasses, you will probably be able to observe with your glasses off by just refocusing the telescope to your unaided vision. If your eyes are astigmatic, images will probably appear best with glasses on. This is because a telescope's focuser can accommodate for nearsightedness or farsightedness, but not astigmatism.

Focusing the Telescope

Always start by using your lowest-power (turn the body of the Zoom so the pointer is at "24") to locate and center the object. Low magnification shows a larger area of sky in the eyepiece, making finding and centering an object much easier.

With the eyepiece adjusted for low power (24 mm), aim the telescope in the general direction of an object at least 1/4-mile away. Use a steeple, telephone pole, or a chimney. Slowly rotate the focus knob 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 knob, just to make sure you've hit the exact focus point.

Once you've centered an object in the eyepiece, you can switch to a higher magnification by twisting the Zoom's barrel, if you wish. This is recommended for small and bright objects, like planets and double stars. The Moon also takes higher magnifications well. You may have to refocus a little after changing power.

If you find that it's awkward to put your eye up to the eyepiece, you can rotate the tube by loosening the knob on the tube clamp and moving the optical tube until the focuser is in a convenient position. Be sure to tighten it again!

You may find that the optical tube is either too hard to move or does not stay in place. Use the altitude adjustment tension knob (it holds the telescope to the upright part of the base) to find the right level of tension.

Operating the EZ Finder

A “finder scope” helps you find things. It’s like a sight on a rifle. The EZ Finder works by projecting a tiny red dot onto a lens mounted in the front of the unit, so that when you look through the lens, the red dot will appear to float in space. Turn the power knob clockwise until you hear a “click” indicating that power is on.

With your eye positioned at a comfortable distance, look through the back of the EZ Finder with both eyes open to see the red dot. The intensity of the dot can be adjusted by turning the power knob. Use the dimmest possible setting that allows you to see the dot without difficulty. At the end of your observing session, be sure to turn the power knob counterclockwise until it clicks off.

Aligning the EZ Finder

When the EZ Finder is properly aligned with the telescope, an object that is centered on the EZ Finder’s red dot should also appear in the center of the field of view of the telescope’s eyepiece. Alignment of the EZ Finder is easiest during daylight. Aim the telescope at a distant object at least 1/4 mile away, such as the top of a telephone pole or chimney and center it in the telescope’s eyepiece. Now, turn the EZ Finder on and look through it. The object will appear in the field of view near the red dot. If the red dot is centered on the object in the eyepiece, you’re done!

If not:

Without moving the telescope, use the EZ Finder's left/right (azimuth) and up/down (altitude) adjustment knobs to position the red dot on the object in the eyepiece.

When the red dot is centered on the distant object, make sure that the object is still centered in the telescope's field of view. If not, re-center it and adjust the Finder's alignment again. When the object is centered in the eyepiece and on the red dot, the Finder is properly aligned with the telescope. This doesn't need to be exact, but the closer it is, the easier it will be to find things in the eyepiece!

The finder scope has a battery pack attached to the telescope, instead of the stock "button" battery. To change batteries, just slide the cover off the pack, and replace the two AAA batteries.

Fog on the mirrors and eyepieces:

One of the odd things that happens when stargazing is that dew forms on pretty much everything (and everyone). The big mirror is tucked safely down at the bottom of the telescope, and so it does not get much dew on it. Eyepieces, however, often have dew form on them, making them useless until they warm up and dry out. As it warms up, the fog should disappear. Please don't wipe the lens with a tissue or cloth. The eyepiece has special coatings on it that could be damaged if you do. There is a Lens Pen in the accessory pack. Use the brush to remove any dust, then use the "cup" (under the cap) to clean the lens. This will not work for dew. Please do not ever touch the lens.

Images will be much better if you set up the telescope outside fifteen or more minutes before you start observing. This allows the optics to cool down to air temperature, reducing image-degrading air currents inside the telescope's open tube.

Setting Magnifications

This eyepiece chart shows what magnification you will have for each setting of the Zoom eyepiece. The "True Field" describes the width of the image in the eyepiece. A full Moon is 30 minutes of arc (or 1/2 of a degree) wide, so you could fit about four full Moons in the field of view when using the 18mm setting. Change the Zoom setting until your target fits the eyepiece the way you like. You will have to tweak the focus.

EYEPIECE MAGNIFICATION CHART		
TELESCOPE SPECIFICATIONS	F/ 3.9	450MM
EYEPIECE	POWER	FIELD OF VIEW IN DEG
8	56X	.55
12	38X	1.23
18	25X	2.05
24	19X	2.46

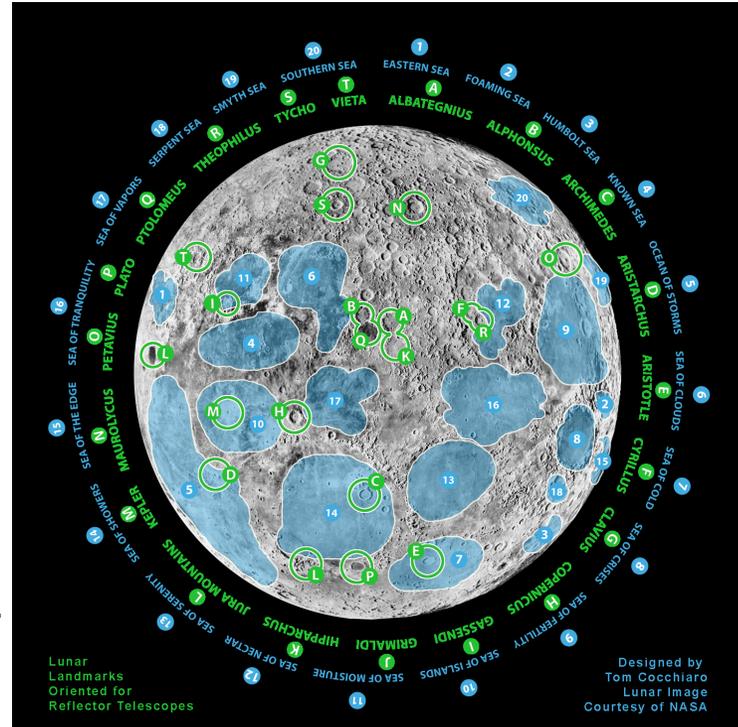
What to Expect

Depending upon what is in the sky, planets will look small, but you might be able to see cloud bands on Jupiter or the rings of Saturn. Craters on the Moon will be clear and numerous, the waxing and waning of Venus should be visible, and many bright deep-sky objects will fill the eyepiece. Don't expect to see color as you do in NASA photos as our eyes are not sensitive enough to see color in deep-sky objects, except in a few of the brightest ones. Remember that you are seeing these objects using your own eyes! Each session with your telescope will be a learning experience. Each time you work with the telescope, it will get easier to use, and stellar objects will become easier to find.

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 away! With its ever-changing phases, you’ll get a new view of the Moon every night it’s up.

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 reveal more detail, especially right along the border between the dark and light portions of the disk (called the “terminator”). Use the Moon Map here to find the major craters and features.



The Planets do not stay at “fixed” locations like the stars do. To find them, you should refer to the Sky Calendar (telescope.com), or to charts published monthly in *Astronomy*, *Sky & Telescope*, or other astronomy magazines and web sites. Venus, Jupiter, and Saturn are the brightest objects in the sky after the Sun and the Moon.

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, Mizar. It is really two stars very close together. Being able to see the two stars separate is called “Star Splitting.”

The gorgeous two-color double star, Albireo, in Cygnus is a favorite. 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 nebulas, 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 dark. Do not expect these subjects 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 get sharper, you will be able to ferret out more and more subtle details and structure.

Deep-Sky Objects, also referred to as “faint fuzzies” are often hard to find at first. They are worth the effort since they are some of most wonderful things in the night sky. To find deep-sky objects, look up the seasonal sky charts in the included National Audubon Society Pocket Guide to Constellations (starting on page 34). Find your season and a clear direction and match the stars with the chart. After locating a constellation that is high in the sky, turn to page 74 and thumb through the alphabetical list of constellations and look for the heading “Deep-Sky Objects.” Many constellations have numerous objects hidden within them that are only visible with a telescope or binoculars. Pay particular attention to objects with a “Messier Number,” like 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 that might be mistaken for comets. Messier’s list 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.

You can also try a low-power (24 mm) scanning 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!

Care and Maintenance:

Store the telescope with the dust caps on in a clean, dry, dust-free place, safe from rapid temperature changes and humidity. Do not store the telescope outdoors. Please keep the dust caps on the telescope and eyepiece when not in use.

Regarding cleaning the lenses or mirrors: Please don't. Just let Library staff know if they seem dirty. The main mirror can be quite dusty before anyone would notice the image getting poor. Eyepieces, however, can get dirty fairly quickly, particularly when poked with fingers. If that happens, let the Library staff know and she or he will have it cleaned. It is very easy to scratch the coatings on the lenses!

In case of minor smudges, you might try using the Lens Pen that has a retractable camel-hair brush for safe removal of dust, and a flexible cleaning tip to eliminate fingerprints and smudges. The cap contains a specially formulated non-liquid spill-proof cleaning compound designed to never dry out. Just place the cap onto the cleaning tip and give it a half-twist to replenish the cleaning compound.



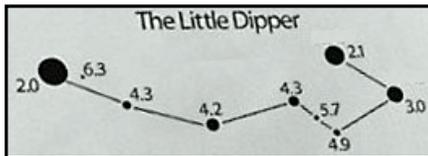
This is important enough to say again:

WARNING: *Never look directly at the Sun through your telescope or its finder scope — even for an instant — as permanent eye damage could result. Young children should use this telescope only with adult supervision.*

When To Go Observing:

“Seeing” and Transparency: Atmospheric conditions vary significantly from night to night. “Seeing” refers to the steadiness of the Earth’s atmosphere at a given time. In conditions of poor seeing, atmospheric turbulence causes objects viewed through the telescope to “boil.”

In conditions of good seeing, star twinkling is minimal and images appear steady in the eyepiece. Seeing is best overhead, worst at 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, you are doing pretty well. Be sure to wait until your eyes adapt to the dark.

Sky Watching 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.

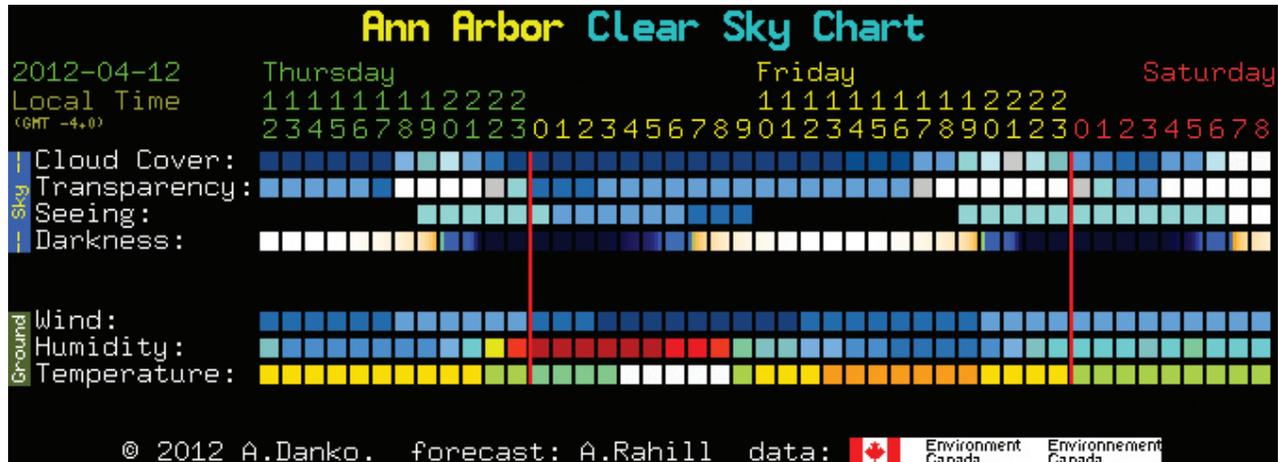
Take Along a Sky-watching Kit:

- Lawn chair and/or blanket
- A sturdy table or box on which to place the telescope
- A friend or more
- Jacket and clothing to keep warm
- Bug spray (in season)
- Munchies (avoid sticky fingers)
- Hot chocolate (extra thick, with marshmallows), it gets cold at night...
- Observing log to help you keep track of the objects you see in the night sky
- To help preserve your night vision, use a dim, red flashlight (included) for reading charts and books.

You may wish to visit the Ann Arbor Clear Sky Chart at:

aadl.org/go/sky

The chart is a timeline for the weather. Take a look at the Ann Arbor chart below: The first four 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.



Items included with the telescope:

- A Lens Pen
- National Audubon Society Pocket Guide of Constellations
- Two red flashlights
- One Instruction Manual

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