INSTRUCTION MANUAL

Orion® FunScope™ Astro Dazzle 4.5 Altazimuth Reflector

#10075

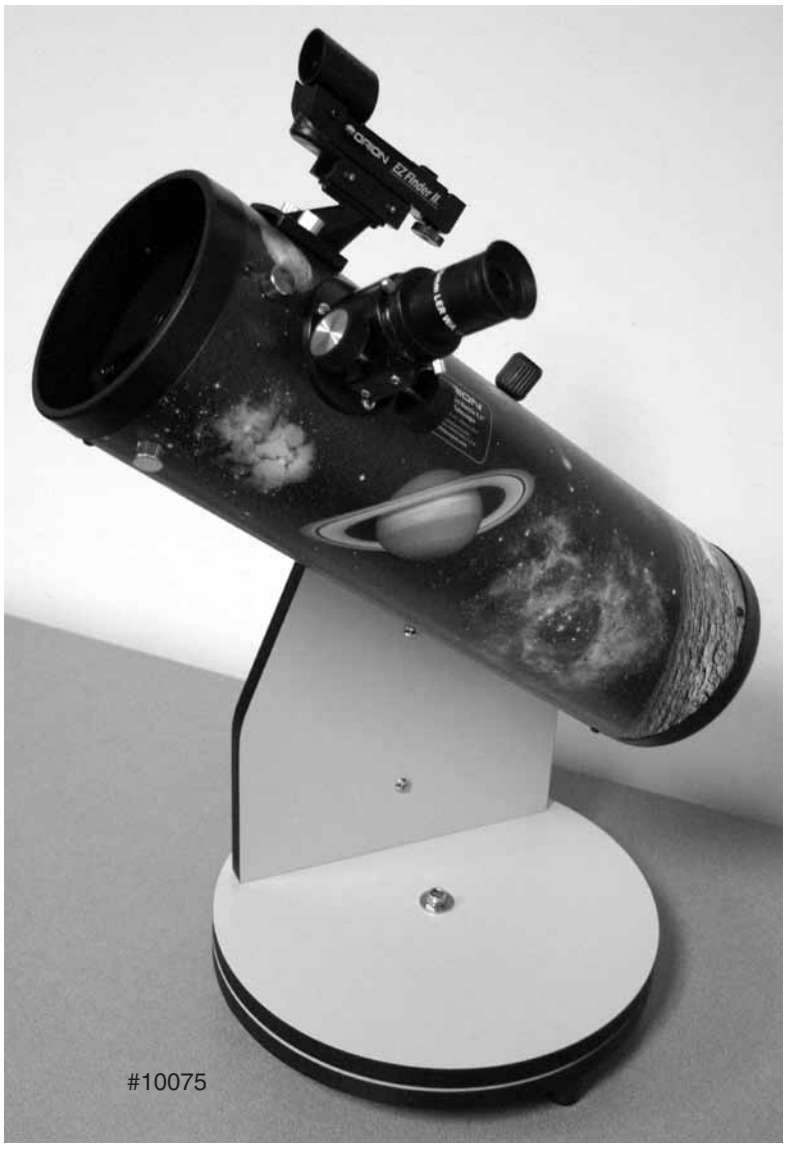

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Figure 1. Components of the FunScope Astro Dazzle 4.5. *(Not shown: 2mm Allen key and Starry Night digital download coupon)*

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Congratulations on your purchase of an Orion FunScope™ Astro Dazzle 4.5 Altazimuth Reflector telescope. Besides having the most dazzling appearance of any telescope on the market, the FunScope Astro Dazzle 4.5 is a great tool for kids and adults alike to explore the night sky’s celestial treasures. It’s a real telescope, not a toy, that will provide the whole family with breathtaking views of the Moon, planets, and even more-distant objects like the Orion Nebula and Andromeda Galaxy. These instructions will help you set up and operate your FunScope Astro Dazzle telescope; please read them thoroughly.

WARNING: ***Never look directly at the Sun with the naked eye or with a telescope – unless you have a proper solar filter installed over the front of the telescope! Otherwise, permanent, irreversible eye damage may result.***

1. Unpacking and Assembly

The telescope will arrive almost completely assembled in the box! You will just need to attach the tube to the base and install a couple of accessories and you’ll be all set for astro action. Make sure all the parts in the **Parts List** and shown in **Figure 1** below are present. If anything appears to be missing or broken, immediately call Orion Customer Support (800-676-1343) for assistance.

Parts List

Qty.	Description
1	Optical tube assembly
1	Altazimuth base
1	EZ Finder II reflex sight (with button cell battery)
1	10mm Kellner eyepiece, 1.25" barrel diameter
1	25mm Kellner eyepiece, 1.25" barrel diameter
1	MoonMap 260
1	Quick collimation capr
1	2mm Allen wrench
1	Starry Night SE digital download coupon

Attaching the Optical Tube to the Base

To attach the telescope optical tube to the base:

1. Orient the base as shown in **Figure 2A**, then loosen the tube clamp knob on the dovetail saddle **(2B).**
2. Slide the dovetail mounting bar on the tube into the dovetail saddle, then tighten the clamp knob to secure the tube. The open end of the optical tube should be facing forward, as in **Figure 2C**.
3. Tighten the altitude tensioning knob so there is no gap between the side panel and the dovetail saddle hub, as shown in **Figure 3**, but the telescope should move easily up and down with light hand pressure.

Installing the Battery in the EZ Finder II

Before installing the EZ Finder II on the telescope, you will need to insert the included CR2032 3V lithium button cell battery in the EZ Finder II. If there is a small plastic tab sticking out from the battery compartment cover, you must remove it for the battery to make contact with the EZ Finder’s electronic circuitry. The tab can then be discarded

1. Turn the EZ Finder II upside down as shown in **Figure 4A.**
2. Insert a small, flat-blade screwdriver into the notch in the battery compartment cover and gently pry it off.
3. Slide the battery under the retaining clip with the positive (+) side facing up (touching the clip) **(4B).**
4. Then press the battery compartment cover back on.

Should the battery die, replacement CR2032 batteries are available at many stores where small batteries are sold or online.

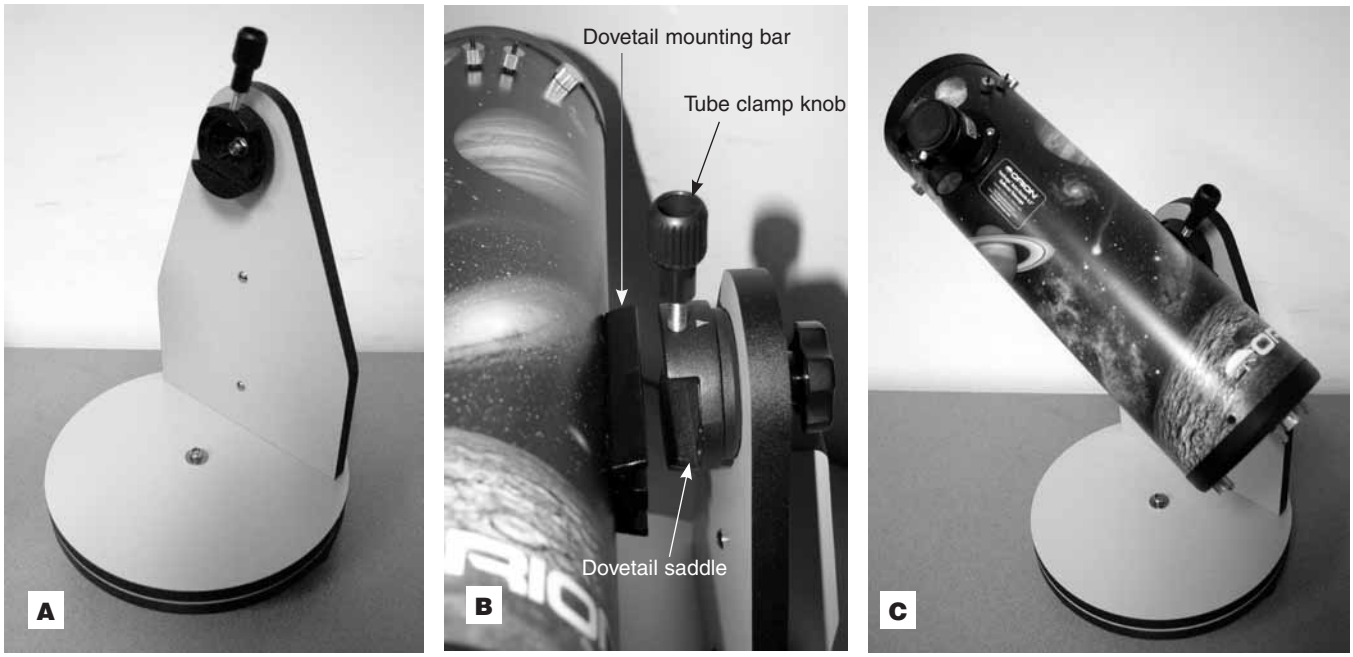


Figure 2. To attach the tube to the base, **A)** Orient the base as shown, then **B)** slide the dovetail bar into the dovetail saddle on the base, then **C)** tighten the tube clamp knob to secure the tube.

Attaching the EZ Finder II

1. Remove the two metal thumbnuts near the focuser **(Figure 5A)** to expose two screws.
2. Place the bracket of the EZ Finder II on the tube so that the holes in the bracket slide over the two screws. The EZ Finder should be oriented with the sight tube facing forward, i.e., toward the open end of the telescope tube **(Figure 5B)**.
3. Thread the thumbnuts back onto the screws to secure the EZ Finder II in place

Inserting an Eyepiece

The FunScope Astro Dazzle 4.5 comes with two eyepieces; one has a 25mm focal length and the other a 10mm focal length. The 25mm eyepiece provides lower power, which is better for locating objects to view. So, we'll start by installing the 25mm eyepiece.

1. Remove the dust cap on the focuser's eyepiece holder.
2. Loosen the two thumbscrews on the focuser's eyepiece holder.
3. Insert the chrome barrel of the 25mm eyepiece into the eyepiece holder, then lightly re-tighten the two thumbscrews **(Figure 6).**
4. Keep the 10mm eyepiece close by for use later.

Your telescope is now fully assembled and should resemble **Figure 1**. Remove the dust cap from the front of the telescope when it is in use. Replace it when you are finished observing.

2. Getting Started

It's best to get a feel for the basic functions of FunScope Astro Dazzle 4.5 during the day, before observing astronomical objects at night. Find a spot outdoors where you'll have a clear view of some object or vista that is at least 1/4 mile away.

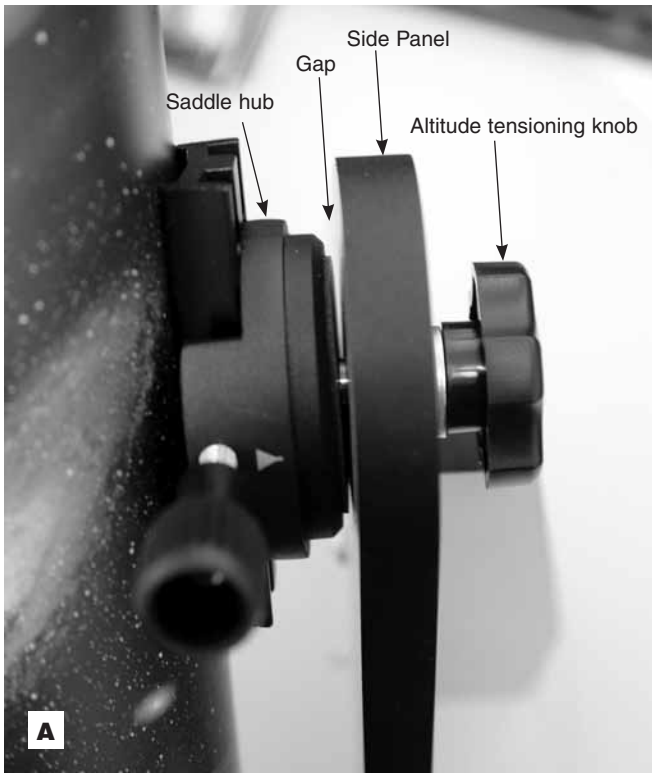
The FunScope Astro Dazzle 4.5 was designed specifically for visual observation of astronomical objects in the night sky. Like all Newtonian reflector telescopes, it is not well suited for daytime terrestrial usage because the image in the eyepiece is rotated from right-side-up

Readying the FunScope Astro Dazzle for Observing

One of the great assets of the FunScope Astro Dazzle 4.5 is its extremely portable size. Due to its overall short height, you – or kids especially -- may find that viewing while sitting down on the ground next to the telescope is the most comfortable. Or you may wish to raise it off the ground so that it can be used while standing or sitting in a chair. In that case, set the telescope on a sturdy platform, such as a milk crate, stool, or picnic table.

Moving and Pointing the Telescope

The FunScope Astro Dazzle's altazimuth base permits motion along two axes: altitude (up/down) and azimuth (left/right). Simply take hold of the telescope tube with one hand and move it left or right so that the base rotates **(Figure 7)**. Move it up or down in the same manner. Both motions can be made simultaneously and in a continuous manner for easy



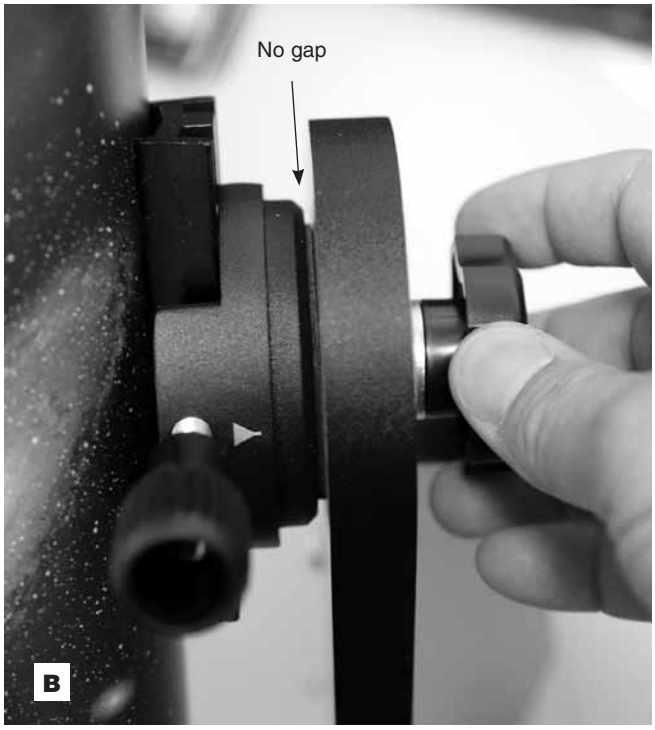


Figure 3. If there is a gap between the side panel and the saddle hub **(A)**, tighten the altitude tensioning knob until the hub is flush against the side panel, as in **B**. Set the tension so that the tube can be moved freely up and down with light hand pressure.

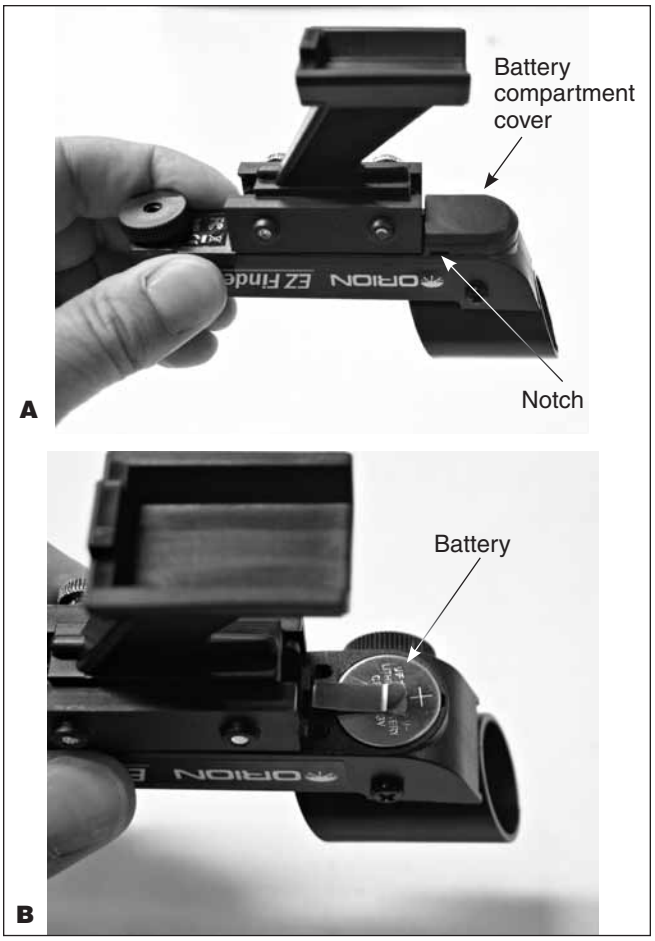


Figure 4. A) To install the CR2032 battery in the EZ Finder II, first turn it upside-down and remove the battery compartment cover. **B**) Install the battery with positive (+) side facing up, as shown.

aiming. This way you can point the scope to any position in the night sky, from horizon to horizon.

You may find it convenient to lightly hold the base with your other hand to steady it while moving and aiming the telescope.

When moving the telescope up and down, you want the telescope to move smoothly with just enough friction so that the tube stays aimed where you point it, and doesn't slip or drift once you let go. It the tube is too hard to move easily, or too loose to stay in place, you will need to adjust the altitude tension knob to achieve the desired friction **(Figure 3)**.

Focusing the Telescope

With the 25mm eyepiece installed the focuser, aim the telescope so the front (open) end is pointing in the general direction of an object at least 1/4-mile away. With your fingers, slowly rotate one of the focus knobs **(Figure 8**) until the object comes into sharp focus. Go a little bit beyond sharp focus until the image starts to blur again, then slowly reverse the rotation of the knob, just to make sure you've hit the exact focus point.

Using the EZ Finder II

The EZ Finder II is a non-magnifying "red dot" finder scope that rides piggyback on the main telescope. It's designed to help you locate celestial objects and center them in the main telescope's eyepiece.

The EZ Finder II works by projecting a tiny red dot onto a lens mounted in the front of the unit. When you look through the EZ Finder II, you line up the red dot with the star or other object you want to view **(Figure 9).** The red dot is produced by a light-emitting diode (LED), not a laser beam, near the rear of the sight. The 3-volt lithium battery that you installed previously provides the power for the red LED.

To use the EZ Finder II, turn the power knob clockwise until you hear a "click" indicating that power has been turned on. With your eye positioned at a comfortable distance behind the EZ Finder, look through the sight tube with both eyes open to see the red dot. The intensity of the dot can be adjusted by turning the power knob. For best results when stargazing, use the dimmest possible setting that allows you to see the dot without difficulty. Typically, a dim setting is used under dark skies and a bright setting is used under light-polluted skies or in daylight.

At the end of your observing session, be sure to turn the power knob counterclockwise until it clicks off.

Aligning the EZ Finder II with the Optical Tube

To work properly, the EZ Finder II has to be aligned with the main telescope so that they both aim at exactly the same point. When the EZ Finder II is so aligned, an object that is centered on its red dot will also appear in the center of the telescope eyepiece's field of view. Alignment of the EZ Finder II is easiest to do during daylight, before observing at night. Here's what to do:

1. Aim the telescope at a distant object at least 1/4 mile away, such as a telephone pole or chimney, and center it in the telescope's eyepiece.
2. Now, turn the EZ Finder II on and look through it. The object should appear somewhere near the red dot.

Note: Remember that the image in the eyepiece of the FunScope will be rotated or upside-down. This is normal for Newtonian reflector telescopes.

3. 3. Without moving the telescope, use the EZ Finder II's azimuth (left/right) and altitude (up/down) adjustment knobs **(Figure 10)** to move the direction of the EZ Finder II until the red dot is superimposed right smack on the object. Then check to make sure that the object is still centered in the telescope's eyepiece. If it isn't, re-center it and adjust the EZ Finder II's alignment again. When the object is centered both in the telescope eyepiece and on the EZ Finder's red dot, the EZ Finder II is properly aligned with the telescope.

Check the EZ Finder II's alignment before each evening's observing session, and make any necessary adjustments.

Figure 5. To attach the EZ Finder II, **A)** first remove the two thumbnuts near the focuser, then **B)** install the EZ Finder II bracket over the two exposed screws, then replace the thumbnuts.

3. Using Your Telescope

Choosing an Observing Location

When selecting a location for observing, get as far away as possible from direct artificial light such as street lights, porch lights, and automobile headlights. The glare from these lights will greatly impair your dark-adapted night vision. Avoid viewing over rooftops and chimneys, as they often have warm air currents rising from them. Similarly, avoid

Figure 6. After removing the dust cap on the focuser, insert a 1.25" eyepiece into the eyepiece holder, then lightly tighten the two thumbscrews to secure it in place.

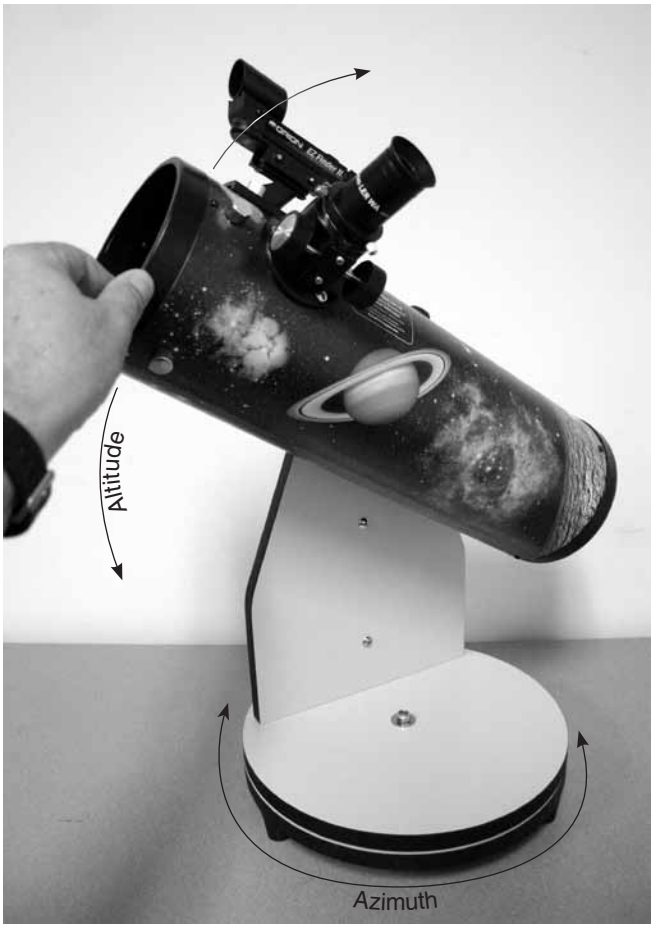


Figure 7. Move the telescope by grasping the tube and moving it up or down (altitude) and left or right (azimuth). It helps with doing this to place your other hand on the base to prevent the telescope from tipping.

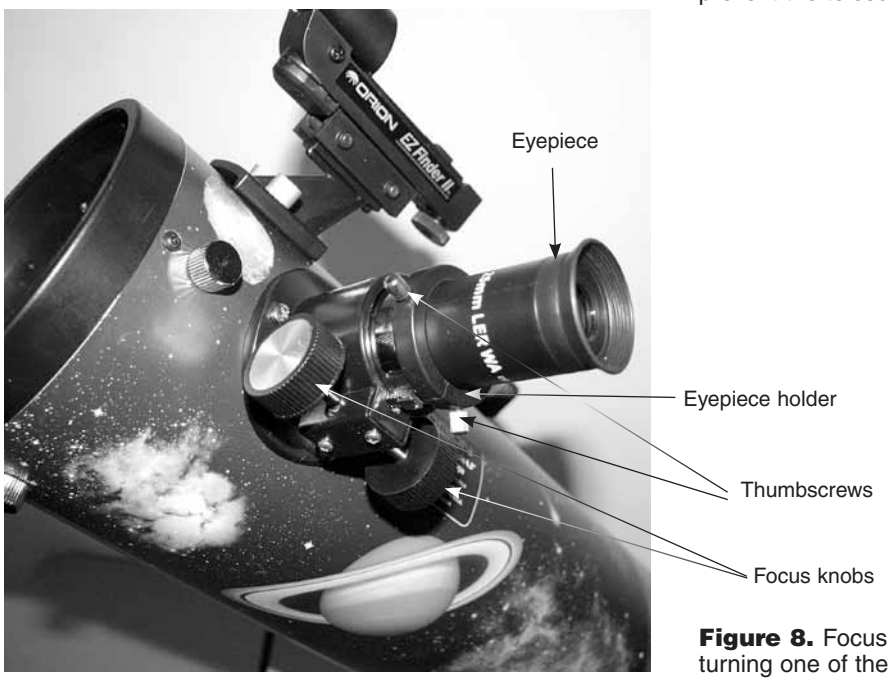


Figure 8. Focus the image in the eyepiece by slowly turning one of the focus knobs until the image is sharp.

observing from indoors through an open (or closed) window, because the temperature difference between the indoor and outdoor air will cause image blurring and distortion. If at all possible, escape the light-polluted city sky and head

for darker country skies. You'll be amazed at how many more stars and deep-sky objects are visible in a dark sky!

How are the "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". If, when you look up at the sky with your unaided eyes, the stars are twinkling noticeably, the seeing is bad and you will be limited to viewing with low powers (bad seeing affects images at high powers more severely). Planetary observing may also be poor.

In conditions of good seeing, star twinkling is minimal and images appear steady in the eyepiece. Seeing is best overhead, worst at the horizon. Also, seeing generally gets better after midnight, when much of the heat absorbed by the Earth during the day has radiated off into space.

Especially important for observing faint objects is good "transparency" -- air free of moisture, smoke, and dust. All of these tend to scatter light, which reduces an object's brightness. Transparency is judged by the magnitude of the faintest stars you can see with the unaided eye, e.g., 5th or 6th magnitude is desirable. Magnitude is a measure of an object's brightness. The brighter a star is, the lower its magnitude will be. Consult our online monthly star chart for magnitudes of specific stars.

Tracking Celestial Objects

The Earth is constantly rotating about its polar axis, completing one full rotation every 24 hours; this is what defines a "day". We do not feel the Earth rotating, but we see it at night from the apparent movement of stars from east to west. When you observe any astronomical object, you are watching a moving target. This means the telescope's position must be continuously adjusted over time to keep an object in the eyepiece's field of view. This is easy to do with the FunScope Astro Dazzle 4.5 because it moves smoothly in both axes. As the target object drifts slowly toward the edge of the field of view, just lightly nudge the telescope to re-center it.

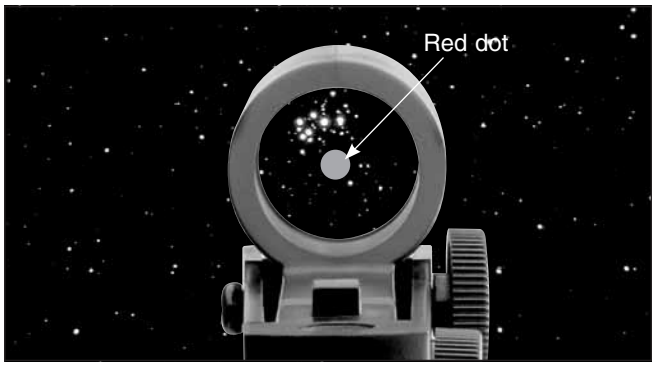


Figure 9. The EZ Finder II superimposes a tiny red dot on the sky, showing right where the telescope is aimed.

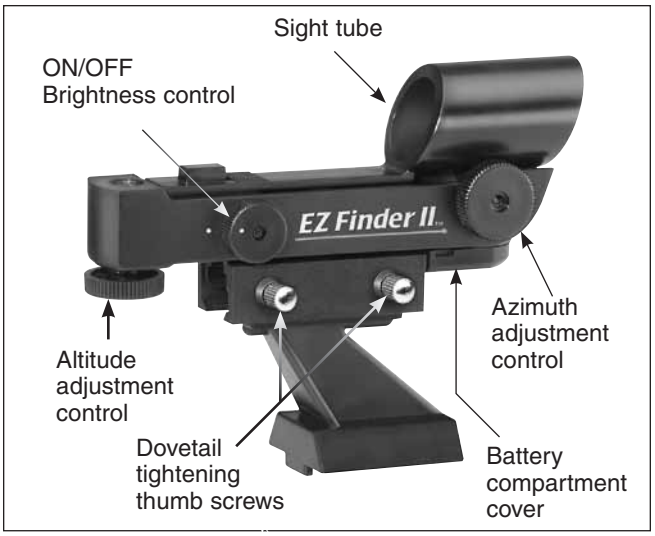


Figure 10. The EZ Finder II's On/Off and adjustment knobs.

Objects appear to move across the field of view faster at higher magnifications. This is because the field of view becomes narrower.

Eyepiece Selection

By using eyepieces of different focal lengths, it is possible to attain different magnifications, or powers, with the FunScope Astro Dazzle 4.5. Your telescope comes with two Kellner eyepieces: a 25mm, which provides a magnification of 20x, and a 10mm, which yields a magnification of 50x. Other, optional eyepieces can be used to achieve different powers. It is quite common for an observer to own several eyepieces to access a wide range of magnifications.

To calculate the magnification of a telescope-eyepiece combination, simply divide the focal length of the telescope by the focal length of the eyepiece.

Telescope Focal Length (mm) ÷ Eyepiece Focal Length (mm) = Magnification

For example, the FunScope Astro Dazzle 4.5 has a focal length of 500mm. When used with the 10mm eyepiece, you get:

500mm ÷ 10mm = 50x magnification

Whatever you choose to view, always start by inserting your lowest-power (longest focal length) eyepiece to locate and center the object. Low magnification yields a wide field of view, which shows a larger area of sky in the eyepiece. This makes finding and centering an object much easier. Trying to find and center objects with a high power (narrow field of view) eyepiece can be like trying to find a needle in a haystack! Once you've centered the object in the eyepiece, you can switch to a higher magnification (shorter focal length) eyepiece, if you wish. This is recommended for small and bright objects, like planets and double stars. The Moon also takes higher magnifications well.

The best rule of thumb with eyepiece selection is to start with a low power, wide-field eyepiece, and then work your way up in magnification. If the object looks better, try an even higher magnification eyepiece. If the object looks worse, then back off the magnification a little by using a lower-power (longer focal length) eyepiece.

What to Expect

So what can you expect to see with your FunScope Astro Dazzle 4.5? You should be able to see bands on Jupiter, the rings of Saturn, craters on the Moon, the waxing and waning phases of Venus, and many bright nebulas and star clusters. Do not expect to see color in faint objects, however, as you do in photographs of those objects. Unlike film or digital camera sensors, our eyes are not sensitive enough to see color in faint deep-sky objects except in a few of the brightest ones, and in the planets.

But as you observe keep in mind that you are seeing these cosmic denizens using your own telescope with your own eyes! You're seeing objects in the eyepiece in real-time, and in many cases that light has traveled mind-boggling distances to reach Earth, and over incredible lengths of time – sometimes even thousands or millions of years. When you gaze at the ethereal glow of the Andromeda galaxy (M31), for example, you're seeing ancient light – light that left the galaxy a couple million years before Neanderthals roamed present-day Europe! In this way you can think of your telescope as a modern day time machine. How cool is that?

Orion carries a variety of useful maps and guides to help you find your way around the night sky and get the most out of your telescope. Visit ***www.OrionTelescopes.com*** and browse our selection. You'll also find plenty of helpful FREE resources in the Community section of our website to get you started in your astronomical pursuits.

Enjoy! And let us know if you need any assistance getting up and running with your FunScope Astro Dazzle 4.5. We're always ready and willing to help! Send an email to ***support@telescope.com*** or call us toll-free at 800-676-1343.

4. Care and Maintenance

Store your telescope in a clean, dry, dust-free place, safe from prolonged exposure to sunlight and humidity. Sunlight can damage the printed vinyl finish of the telescope. Do not store the telescope outdoors, although storage in a garage or shed is okay. Small components like eyepiece and other accessories should be kept in a protective box or storage case. Keep the dust caps on the front of the scope and on the focuser when the scope is idle.

You should not have to clean the telescope's mirrors. Covering the telescope with the dust cap when it is not in use will help prevent dust from accumulating on the mirrors. Small specks of dust or flecks of paint have virtually no effect on the visual performance of the telescope.

5. Aligning the Mirrors (Collimation)

Your telescope's optics were aligned at the factory, and should not need adjustment unless the telescope is handled roughly. Accurate mirror alignment is important to ensure the peak performance of your telescope. Aligning the mirrors – a process called collimation -- is relatively easy to do and can be done in daylight.

A collimation cap **(Figure 1)** and 2mm Allen wrench are included with your telescope to aid in collimating the optics**.** In addition, the telescope's primary mirror is marked with an adhesive ring. This ring is also of great help in collimating the optics. ***The center ring sticker should not be removed from the primary mirror. Because it lies directly in the shadow of the secondary mirror, its presence in no way adversely affects the optical performance of the telescope or the image quality. That might seem counterintuitive, but it's true!***

A detailed collimation procedure can be found on our website in the support materials for this telescope.

Specifications

Primary mirror:	Parabolic, center marked
Primary mirror diameter:	4.5 inches (114mm)
Secondary mirror minor axis:	33mm
Mirror coatings:	Aluminum with SiO2 overcoating
Focal length:	500mm
Focal ratio:	f/4.4
Focuser:	Rack-and-pinion, 1.25"
Eyepieces:	25mm and 10mm Kellner, 1.25"
Magnification:	20x (with 25mm), 50x (with 10mm)
Finder:	EZ Finder II reflex sight
Mount:	Altazimuth
Weigh, assembled:	10.9 lbs.
Dimensions, assembled:	12-3/4" D x 24" H
Other included accessories:	Orion MoonMap 260, collimation cap
CPSIA certified:	Yes

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**.

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