



INSTRUCTION MANUAL

Bushnell®



Model # 78-6114

LIT. #: 98-0810/08-06





WHERE DO I START?

Your Bushnell telescope can bring the wonders of the universe to your eye. While this manual is intended to assist you in the set-up and basic use of this instrument, it does not cover everything you might like to know about astronomy. It is recommended you get a very simple star chart and a flashlight with a red bulb or red cellophane over the end. For objects other than stars and constellations, a basic guide to astronomy is a must. Some recommended sources appear on our website at www.bushnell.com. Also on our website will be current events in the sky for suggested viewing. But, some of the standbys that you can see are:

The Moon—a wonderful view of our lunar neighbor can be enjoyed with any magnification. Try viewing at different phases of the moon. Lunar highlands, lunar maria (lowlands called “seas” for their dark coloration), craters, ridges and mountains will astound you.

Saturn—even at the lowest power you should be able to see Saturn’s rings and moons. This is one of the most satisfying objects in the sky to see simply because it looks like it does in pictures. Imagine seeing what you’ve seen in textbooks or NASA images from your backyard!

Jupiter—the largest planet in our solar system is spectacular. Most noted features are its dark stripes or bands both above and below its equator. These are the north and south equatorial belts. Also interesting are Jupiter’s four major moons. Pay close attention to their positions from night to night. They appear to be lined up on either side of Jupiter.

Mars—The Great Red Planet appears as a reddish-orange disk. Look at different times of the year and try to catch a glimpse of the white polar ice caps.

Venus—just like the moon, Venus changes phases from month to month. At times Venus appears brilliantly in the night sky, just as if you were looking at a distant crescent moon.

Nebulae—The Great Orion Nebula is a very well known night sky object. This and many others are brought to you by this telescope.

Star Clusters—View millions of stars densely packed in a cluster that resembles a ball.

Galaxies—One of the greatest and most interesting galaxies is our neighbor the Andromeda Galaxy. Enjoy this and many others.

Other Resources:

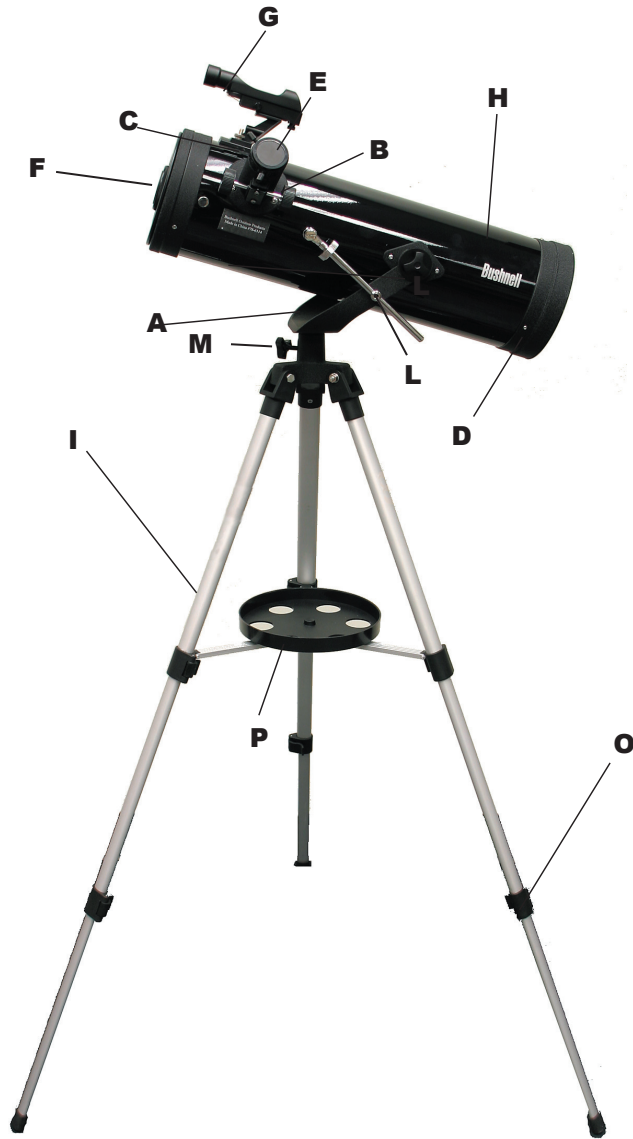
www.nasa.gov

www.space.com





PARTS DIAGRAM



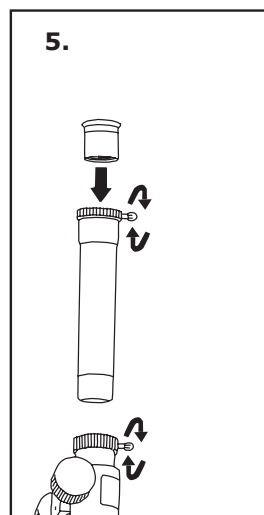
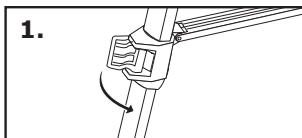
NOTE: Actual product may have improvements that are not shown in this diagram

- | | |
|-------------------------------------|-------------------------------|
| A. Yoke Mount | G. Finderscope |
| B. Focus Knob | H. Telescope Main Body |
| C. Focus Tube | I. Tripod Leg |
| D. Objective Mirror (not shown) | L. Yoke Locking Knob |
| E. Eyepiece | M. Azimuth Lock |
| F. Dust Cap (remove before viewing) | O. Tripod Leg Adjusting Clamp |
| | P. Accessory Tray |





ASSEMBLY DIAGRAMS



CAUTION! Viewing the sun can cause permanent eye damage.
Do not view the sun with this telescope or even with the naked eye.





TELESCOPE ASSEMBLY INSTRUCTIONS

1. Your telescope has adjustable (telescoping) legs (Fig. 1).
2. Stand tripod and spread legs. Loosen the three leg clamps. Grab tripod head and lift. Extend the tripod legs to the desired height (at equal lengths) and tighten the clamps on each leg to hold it in position (Fig. 1). Note: please tighten tripod head bolts after removing from box, as some vibration during shipment may have loosened them.
3. Attach the accessory tray (P) to the center leg braces on the tripod legs (Fig 2) and insert accessory tray and bolt through center of tray into braces and tighten bolt.
4. Remove telescope main body from the box. Attach telescope main body (H) by aligning the hole in the telescope saddle with that in the yoke. Screw yoke locking knobs (L) through both holes and tighten the knob.
5. Remove the finderscope (G) from the box. Remove the two knurled thumbscrews from the telescope main body. Position the finderscope bracket on the telescope main body so that the holes in the base of the bracket line up with the exposed bolts in the telescope main body. Replace the two-knurled thumbscrews and tighten securely (Fig. 3).
6. Insert eyepiece (E) into focus tube (C). Secure by tightening small retaining screw.
NOTE: In all astronomical telescopes, the image appears upside down. To use the telescope for terrestrial view and to correct the mirrored image, insert the erecting eyepiece in between the focus tube (C) and the eyepiece (E). We recommend the use of the low magnification eyepiece when the telescope is used for terrestrial viewing. Reflectors (mirrors) are used mainly for astronomical purposes.
The telescope is now fully assembled and ready for use.
7. To use the Barlow, insert Barlow (Fig. 5) into the focus tube. Secure by tightening small retaining screw. Insert eyepiece into open end of Barlow and secure.
8. To use the erecting lens, insert erecting lens (Fig. 5) into the focus tube. Secure by tightening small retaining screw. Insert eyepiece into the open end of the erecting lens and secure. This will allow you to view objects naturally on land—not upside down or backwards.

TO USE THE FINDERSCOPE

The finderscope is a small wide field of view telescope mounted alongside the main telescope and is used to search for the target and aim the main telescope at it. But before you can use the finderscope, you will need to line it up with the telescope. This procedure will become easier with practice.

1. Install the lowest power eyepiece (25mm) into the eyepiece tube. Pick out an easily recognized, unmoving object no closer than a thousand yards away. Aim your telescope toward your object until its image is centered in the eyepiece. Lock all the knobs on the mount so the telescope will not move.
2. Look through the finderscope. If the object you lined up in the telescope is not visible, adjust the two adjustment screws and move the finderscope around until you see it.
3. Recheck your telescope to make certain it is still on target. If it moved, realign it and adjust your finderscope. If it hasn't, you're all set. Your finderscope is now operational.





FINDING OBJECTS

1. Loosen the altitude locks on the sides of the telescope tube and the silver azimuth lock on the base of the altazimuth mount, then move the telescope in the desired direction.
2. Look through the finderscope and pan the telescope until the object appears in the field of view. Once it's in the field of view, tighten the altitude and azimuth locks.

FOCUSING

1. Once you have found an object in the telescope, turn the focus knob until the image is sharp.
2. To focus on an object that is nearer than your current target, turn the focusing knob toward the eyepiece (i.e., so that the focus tube moves away from the front of the telescope). For more distant objects, turn the focus knob in the opposite direction.
3. To achieve a truly sharp focus, never look through glass windows or across objects that produce heat waves, such as asphalt parking lots.

MAGNIFICATION

1. The magnification (or power) of a telescope varies depending upon the focal length of the eyepiece being used and the focal length of the telescope.
2. To calculate magnification, use the following formula, in which FL = focal length:

$$\text{Magnification} = \frac{\text{FL (telescope) in mm}}{\text{FL (eyepiece)}}$$

TECHNICAL SPECIFICATIONS

Objective Diameter:	114mm (4.5")
Focal Length:	500mm
Eyepieces:	H20mm (Low Power) H12.5mm (High Power)
Erecting Eyepiece:	1.5X
Barlow:	3X
Maximum Magnification:	120X
Accessories:	Finderscope, moon map, astronomy CD

EYE LENS CHART & THEORETICAL POWER LIMITS

H12.5mm Eye Lens Power:	40X
H20mm Eye Lens Power:	25X

NOTE: Magnification is calculated magnification.
Low power is recommended for most viewing conditions.



ENJOYING YOUR NEW TELESCOPE

1. First determine your targeted object. Any bright object in the night sky is a good starting point. One of the favorite starting points in astronomy is the moon. This is an object sure to please any budding astronomer or experienced veteran. When you have developed proficiency at this level, other objects become good targets. Saturn, Mars, Jupiter, and Venus are good second steps to take.
2. The first thing you need to do after assembling the telescope as planned is center the desired object in the finderscope. Provided you did a reasonable job aligning the finderscope, a quick look through the main telescope tube at low power should reveal the same image. With the lowest power eyepiece (the one with the largest number printed on it) you should be able to focus the same image that you saw through the finderscope. Avoid the temptation to move directly to the highest power. The low power eyepiece will give you a wider field of view, and brighter image—thus making it very easy to find your target object. At this point with a focused image in both scopes, you've passed the first obstacle. If you don't see an image after attempting to focus it in, you might consider aligning your finderscope again. Once you pass this step, you'll will enjoy the time spent ensuring a good alignment. Every object you center in the finderscope will be easily found in the main telescope tube, which is important for continuing your exploration of the night sky.
3. The low power eyepieces are perfect for viewing the full moon, planets, star clusters, nebulae, and even constellations. These should build your foundation. However, for more detail, try bumping up in magnification to higher power eyepieces on some of these objects. During calm and crisp nights, the light/dark separation line on the moon (called the "Terminator") is marvelous at high power. You can see mountains, ridges and craters jump out at you due to the highlights. Similarly, you can move up to higher magnifications on the planets and nebulae. Star clusters and individual stars are best viewed through the low power no matter what.
4. The recurring astronomical theater we call the night sky is an ever-changing billboard. In other words, the same movie does not play all the time. Rather, the positions of the stars change not only hourly as they seem to rise and set, but also throughout the year. As the earth orbits the sun, our perspective on the stars changes on a yearly cycle about that orbit. The reason the sky seems to move daily just as the sun and the moon "move across our sky is that the earth is rotating about its axis. As a result you may notice that after a few minutes or a few seconds depending on what power your are viewing at, the objects in your telescope will move. At higher magnifications especially, you will notice that the moon or Jupiter will :race: right out of the field of view. To compensate, just move your telescope to "track" it in the necessary path.





HELPFUL HINTS

1. Your telescope is a very sensitive instrument. For best results and fewer vibrations set your telescope up on a level location on the ground rather than your concrete driveway or your wooden deck. This will provide a more stable foundation for viewing, especially if you've drawn a crowd with your new telescope.
2. If possible, view from a location that has relatively few lights. This will allow you to see much fainter objects. You'd be surprised how much more you'll see from your local lake or park when compared to a backyard in the city.
3. Using your telescope out a window is NEVER recommended.
4. View objects that are high in the sky if possible. Waiting until the object rises well above the horizon will provide a brighter and crisper image. Objects on the horizon are viewed through several layers of earth's atmosphere. Ever wonder why the moon appears orange as it sets on the horizon? It's because you are looking through a considerable more amount of atmosphere than you would directly overhead. (Note: If objects high in the sky are distorted or wavy, you are probably viewing on a very humid night.) During nights of unstable atmosphere, viewing through a telescope can be frustrating if not impossible. Astronomers refer to crisp, clear nights as nights of "good seeing."

Bushnell®

Customer Service (800) 423-3537

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TELESCOPE LIFETIME LIMITED WARRANTY

Your Bushnell® telescope is warranted to be free of defects in materials and workmanship for the lifetime of the original owner. The Lifetime Limited Warranty is an expression of our confidence in the materials and mechanical workmanship of our products and is your assurance of a lifetime of dependable service.

If your telescope contains electrical components, these components are warranted to be free of defects in materials and workmanship for two years after the date of purchase.

In the event of a defect under this warranty, we will, at our option, repair or replace the product, provided that you return the product postage prepaid. This warranty does not cover damages caused by misuse, improper handling, installation, or maintenance provided by someone other than a Bushnell Authorized Service Department.

Any return made under this warranty must be accompanied by the items listed below:

- 1) A check/money order in the amount of \$15.00 to cover the cost of postage and handling
- 2) Name and address for product return
- 3) An explanation of the defect
- 4) Proof of Date Purchased
- 5) Product should be well packed in a sturdy outside shipping carton, to prevent damage in transit, with return postage prepaid to the address listed below:

IN U.S.A. Send To:

Bushnell Outdoor Products
Attn.: Repairs
8500 Marshall Drive
Lenexa, Kansas 66214

IN CANADA Send To:

Bushnell Outdoor Products
Attn.: Repairs
25A East Pearce Street, Unit 1
Richmond Hill, Ontario L4B 2M9

For products purchased outside the United States or Canada please contact your local dealer for applicable warranty information. In Europe you may also contact Bushnell at:

BUSHNELL Outdoor Products GmbH

European Service Centre

MORSESTRASSE 4

D- 50769 KÖLN

GERMANY

Tél: +49 (0) 221 709 939 3

Fax: +49 (0) 221 709 939 8

This warranty gives you specific legal rights.

You may have other rights which vary from country to country.

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