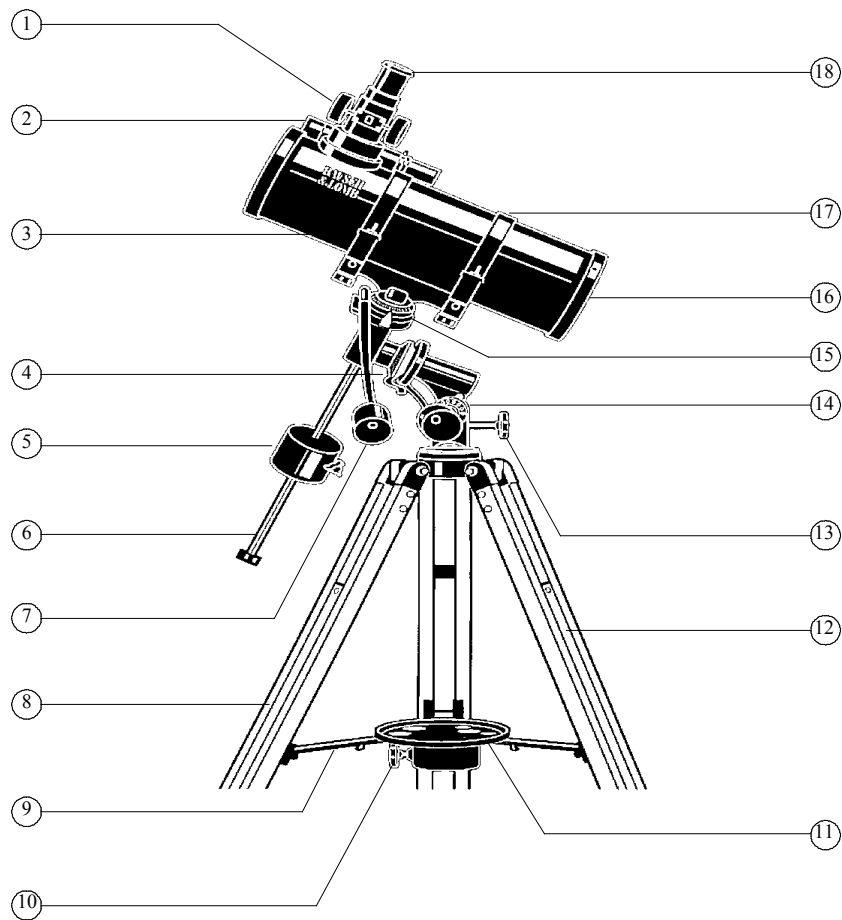


# BAUSCH® & LOMB

## PROFESSIONAL 4.5 INCH CATADIOPTRIC TELESCOPE MODEL 78-0045



- |                                     |                               |
|-------------------------------------|-------------------------------|
| 1. Rack & Pinion Focusing Mechanism | 10. Tripod Leg Lock Knob      |
| 2. Finderscope                      | 11. Accessory Tray            |
| 3. Telescope Body                   | 12. Tripod Leg Middle Section |
| 4. Right Ascension Axis             | 13. Latitude Adjustment Screw |
| 5. Counterweight                    | 14. Latitude Scale            |
| 6. Counterweight Shaft              | 15. Declination Axis          |
| 7. Fine Adjustment Cables           | 16. Primary Mirror            |
| 8. Aluminum Tripod Leg (3)          | 17. Cradles (2)               |
| 9. Accessory tray Supports          | 18. 1.25 Format Eyepiece      |

*Never Look Directly At The Sun With Your Telescope  
Permanent Damage To Your Eyes May Occur*

## **TELESCOPE ASSEMBLY INSTRUCTIONS**

**Remove all components from the carton and identify all components.**

**READ THROUGH ASSEMBLY INSTRUCTION BEFORE YOU ASSEMBLE YOUR TELESCOPE**

### **SET-UP TRIPOD**

1. Remove the three tripod legs (8) and Equatorial Mounting System (pre-assembled together) from carton.
2. Spread tripod legs (8) until accessory tray supports (9) are fully extended.
3. Attach accessory tray (11) by inserting bolt on underside of accessory tray (11) through accessory tray support (9) center hole. Tighten accessory tray nut onto bolt.
4. Beginning with one Tripod Leg (8) loosen Tripod Leg Lock Knob (10) that secures Tripod Leg Middle Section (12) and extend the Tripod Leg Middle Section (12).
5. Tighten the Tripod Leg Lock Knob (10) so that the Tripod Leg Middle Section (12) won't slide.
6. Repeat on remaining two Tripod Legs (8).

### **ATTACH FINDERSCOPE, COUNTERWEIGHT AND TELESCOPE**

1. Remove Telescope Body (3) and Finderscope (2) from carton.
2. Remove nuts located near the Rack & Pinion Focusing Mechanism (1) on Telescope Body (3).
3. Attach Finderscope (2) to Telescope Body (3) by inserting the screws extending from the Telescope Body (3) into the holes in the base of the Finderscope (2).
4. Refasten nuts so that Finderscope (2) is secure.
5. Remove Counterweight (5) and Counterweight Shaft (6) from carton.
6. Slide Counterweight (5) onto the Counterweight Shaft (6) and tighten thumb screw to secure.
7. Thread Counterweight Shaft (6) into the hole on the bottom of the Declination Column of the mount (near the Declination Axis), making sure it is tight.
8. Attach two Cradles (17) to the top of the Equatorial Mount as shown.
9. Remove Cradle Locking Clamps of the two Cradles (17) and open the Cradles (17) in preparation of placing Telescope Body(3) onto mount.
10. Set Telescope Body (3) into Cradles (17) making sure that the Finderscope(2) is on top.
11. Close Cradles (17) around Telescope Body (3) and tighten Cradle Locking Clamps so that the Telescope Body (3) is secure.

### ATTACH FINE ADJUSTMENT CABLES

1. Remove Fine Adjustment Cables (7) from carton.
2. Attach Fine Adjustment Cable (7) to one of the silver posts just under the Right Ascension Dial (on top of the Right Ascension Axis (4)) **Note: Both Right and Left hand Positions are Provided**
3. Secure by finger tightening set screw on shaft.
4. Attach second Fine Adjustment Cable (7) to the silver post of the Declination Axis (15).
5. Secure by finger tightening set screw on shaft.

### BALANCE TELESCOPE

1. Loosen Cradle Locking Clamps and Counterweight Thumb Screw.
2. Position Telescope Body (3) and Counterweight (5) to achieve desired balance.
3. Tighten Cradle Locking Clamps and Counterweight Thumb Screw to secure the balanced telescope and mount into place.

### THE FINAL STEPS

1. Remove 1.25" Format Eyepiece (18) from carton.
2. Insert into Rack & Pinion Focusing Mechanism (1).
3. Remove Protective Dust Cover from end of telescope nearest the Rack & Pinion Focusing Mechanism (1).
4. Let the adventure begin.

*Your Bausch & Lomb Telescope is now ready to be used. To obtain the fullest enjoyment from your telescope, please refer to the following additional information.*

*Astronomical Telescopes are designed in such a way that the image you will see appear will be UPSIDE DOWN and REVERSED, this is acceptable for viewing celestial bodies.*

### TELESCOPE USE

#### SELECTING AN EYEPIECE:

1. You should always start viewing with the lowest power eyepiece, which in this case is the 25 mm lens. Note: the base power of each eyepiece is determined by the focal length of the telescope objective element, which for this model is 1000 mm. A formula can be used to determine the power of each eyepiece: **telescope OBJECTIVE mirror focal length ÷ EYEPIECE focal length = MAGNIFICATION** (e.g. Using the 25 mm lens, the calculation would look like this:  $1000 \text{ mm} \div 25\text{mm} = 40\text{x}$  or 40 power.)
2. Included with this telescope is a Barlow lens. Barlow lenses are used to double or triple the power of your telescope. Place your Barlow between the focusing tube and the eyepiece. Using the example above, your 2x Barlow lens would give you a total power of 80x or 80 power. ( $40 \times 2 = 80\text{x}$  or 80 power)

### FOCUSING TELESCOPE:

1. After selecting the desired eyepiece, aim main telescope tube at a land-based target at least 200 yards away (e.g. A telephone pole or building). Fully extend focusing tube by turning Rack & Pinion Focusing Mechanism (1)
2. While looking through selected eyepiece (in this case the 25 mm), slowly retract focusing tube by turning Rack & Pinion Focusing Mechanism (1) until object comes into focus.

### ALIGNING FINDERSCOPE:

1. Look through low-power 1.25" format eyepiece (18) and establish a well-defined target (see focusing telescope section). Tighten all lock knobs (Declination, Latitude, Right Ascension, Horizontal Axis and Cradle) so that telescope's aim is not disturbed.
2. Looking through Finderscope (2), alternate tightening each Finderscope Adjustment Screw surrounding the Finderscope (2) in the Finderscope Mount until crosshairs of Finderscope (2) are precisely centered on the same object already centered in Main Telescope Tube's field of view as seen through the 1.25" Format Eyepiece (18).
3. Now, objects located first with the Finderscope (2) will be centered in the field of view of the main telescope as seen through the 1.25" Format Eyepiece (18).

### UNDERSTANDING THE EQUATORIAL MOUNT

The Equatorial Mount is designed to move in any direction. It can be set to allow manual controls to track the movements of celestial bodies across the sky. This is referred to as diurnal movement; movement of celestial bodies in the direction opposite to that of the earth's rotation and is around the earth's axis.

By aligning the telescope's polar axis (also referred to as the Right Ascension Axis (4)) with celestial North, you will place the telescope in parallel with the earth's axis and thus be able to locate stars in the sky based on star atlas information. To compensate for your position on earth, the polar axis is set in one of three ways:

- Set up the telescope at night. Loosen the Declination Axis (15) and rotate the telescope around the declination axis until the arrow on the declination scale points to 90 degrees. Tighten the Declination Axis (15). The telescope is now roughly in parallel with the polar axis.
- Loosen the Right Ascension Axis (4) and turn the telescope until the objective end faces due north. The objective end for reflector telescopes is nearest the Rack and Pinion Focusing Mechanism (1). This can be done by approximating the location of the pole star (Polaris or North Star) or by the use of a compass. True North is then found by directing the telescope at Polaris, as magnetic North is slightly away from true North.
- Look up the latitude of your area in any geographical atlas. Adjust the Latitude Adjustment Screw (13) and set the Latitude Scale (14) to the correct latitude for your area. Aim the Finderscope (2) at Polaris. You will probably notice that Polaris is not dead center in the Finderscope's (2) field of view. This is probably because your telescope is not absolutely level with the ground. Loosen the thumb screw located directly under the equatorial mount. This can be found in the center of the underside of the mount very close to the position where the Aluminum Tripod Legs (8) attach to the mount. Turn the telescope so that it is directly aimed at Polaris. Tighten both the thumb screw and Latitude Adjustment Screw (13). Polaris is 1 degree from the North celestial pole. Therefore, the sighting of stars will have to be slightly adjusted as you locate them in the heavens.

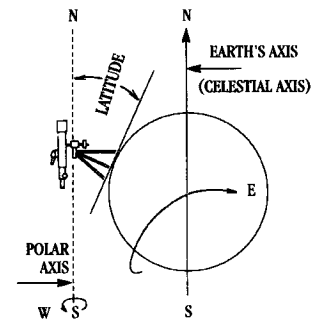


Fig. 1  
POLAR AXIS AND EARTH'S AXIS

## 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's cross hairs. 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 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, not the same movie plays 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 you 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 the fine adjustment controls on 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."

### **Where do I start?**

Your Bausch & Lomb 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. The first thing you need to do is 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](http://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 changed phases from month to month. Some views of brilliant Venus appear 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.

Much, much, more!

For further questions or additional information please contact:

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### ANSWERS TO COMMONLY ASKED QUESTIONS

<p>1. The image I see in the telescope is upside down and reversed from right to left ?</p>	<ul style="list-style-type: none"> <li>• An upside-down and reversed image is a common characteristic of most astronomical telescopes. Since telescopes are used for astronomical viewing orientation is not important. The image in the finderscope will also be upside down and reversed.</li> </ul>
<p>2. How do I determine the power my telescope ?</p>	<ul style="list-style-type: none"> <li>• The power of your telescope can be determine by dividing the focal length of the objective lens by the focal length of the eyepiece. The eyepiece focal length is the number printed on the eyepiece. (For example: <math>1000 \div 25 = 40X</math>)</li> </ul>
<p>3. Where do I find the Telescope Focal Length</p>	<ul style="list-style-type: none"> <li>• The telescope focal length is the same focal length as the objective focal length. For this telescope it is 1000mm. Telescope focal lengths range from 600mm to 1000mm on Bausch &amp; Lomb and Bushnell telescopes.</li> </ul>
<p>4. What can I see with my telescope ?</p>	<ul style="list-style-type: none"> <li>• Telescopes with power ranging from 25X to 50X can be used to view Star Clusters and Nebulae. 90X to 120X telescope can view galaxies. Most planets can be seen at any magnification.</li> </ul>
<p>5. What do the numbers on the eyepiece mean ?</p>	<ul style="list-style-type: none"> <li>• The numbers on the eyepiece represents the “focal Length” of the eyepiece.</li> </ul>

### TROUBLESHOOTING GUIDE

<p><i>If after you have set-up your new telescope you are unable to see any objects, use this Quick Reference guide to help you to understand the cause of the problem and quickly determine a remedy</i></p>	
<p>1. I've completed the set-up yet I cannot see anything</p>	<ul style="list-style-type: none"> <li>• Check to see if objective lens cover and all other lens covers have been removed.</li> <li>• Try to view an object that is 200 or more yards away.</li> <li>• If there is more than one eyepiece included</li> </ul>

with the telescope, use the lowest power (highest number) eyepiece to begin viewing.

- Use the Rack & Pinion Focusing Mechanism to bring the object you are trying to view into focus