APT-LSCOPE

APERTURA

Library Telescope

User’s Manual

WARNING: Never look directly at the Sun with the naked eye or with this telescope. Permanent irreversible eye damage can result.

Introduction

Thank you for choosing the Apertura Library Telescope. If this is your first step into observational astronomy, we're glad to have you join the community!

At its core, the Apertura Library Telescope is a Newtonian-style reflecting telescope that uses a 114 mm diameter mirror. The telescope is mounted on a portable, easy-to-use table-top base. Building on an inherently compact "grab-and-go" aspect of this design, the Library Telescope incorporates a series of refinements that allow it to move from one library patron or student to the next, with ease.

Guided by extensive feedback from library telescope users and years of hands-on experience, the Library Telescope Program and Apertura have teamed up to establish a suite of upgrades that increase durability, ease of use, and long-term reliability. Apertura has integrated these enhancements into a robust, ready-to-circulate system that includes improved optical structure, a simplified red-dot finder, tethered dust caps, an Apertura LED headlamp, and additional durability-focused modifications.

Parts of the Telescope

1. Optical Tube
2. Base
3. Zoom Eyepiece
4. Tethered Eyepiece Shroud
5. Tethered Dust Cap
6. Tethered Lunar Caps
7. Apertura Ember LED Headlamp
8. Accessory Bag
9. Red Dot Finder
10. Informational Graphics

Using the Telescope

It is important to follow a few daylight procedures before using the telescope at night.

Charging the Headlamp

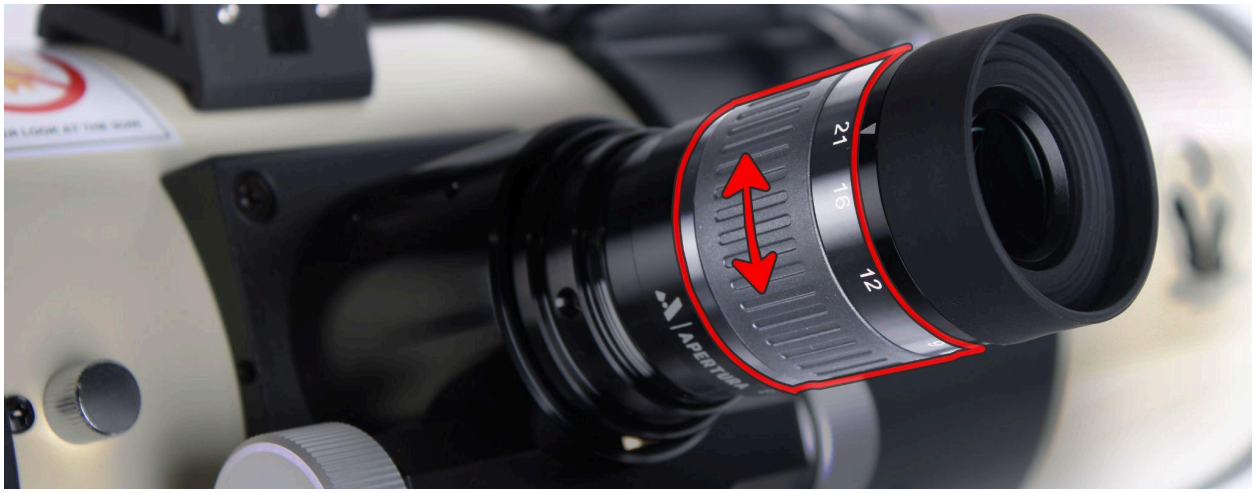
First, check that the LED headlamp has been charged. This headlamp charges using a common USB-C connection. When plugged in, a small red light will show if the battery is low, and a green light will show if it is fully charged.

1. Fold back the dust cover located on the bottom of the headlamp.
2. Connect the USB-C cable.
3. Plug the cable into a charging brick or station.
4. A small red light will show if the battery is low, and a green light will show if it is fully charged.

Using the Eyepiece and Focuser

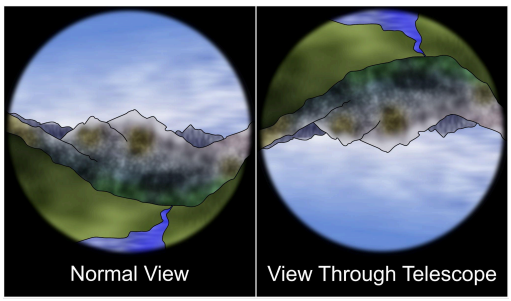
Since everyone's eyesight is slightly different and each telescope setup has its own unique optical characteristics, the telescope needs a way to compensate for these differences. This is the job for the focuser. It works much like the focusing mechanism on a microscope, allowing you to bring an object into sharp view. The Apertura Library Telescope uses a Rack and Pinion focuser, which relies on a small gear system to move the eyepiece smoothly and precisely for accurate focusing.

The eyepiece is also adjustable on the Library Telescope. It is a variable focal length model, which allows for an adjustable field of view, magnification, or "zoom." Always start off at the lowest magnification, which is the highest number marking on the eyepiece. This might sound contradictory, but an eyepiece is marked by the focal length in mm. An eyepiece with a longer focal length provides a lower magnification on telescopes. So the 21 mm setting is the lowest magnification, the widest field of view, and the brightest image. The 7 mm setting is the highest magnification, narrowest field of view, and least bright image. Always start at the 21 mm setting.



To adjust the focus, start out with the 21 mm setting on the eyepiece. Turn one of the focuser knobs in and then out, making note of which direction provides a better view. If turning the knob one way makes the image look better, continue to adjust the focuser in this direction until you notice the view is no longer improving but, instead, begins to blur. At this point, reverse the focuser direction and continue to adjust until the view is better. Make small iterations of this back and forth adjustment until you find the sharpest view.

Image Orientation



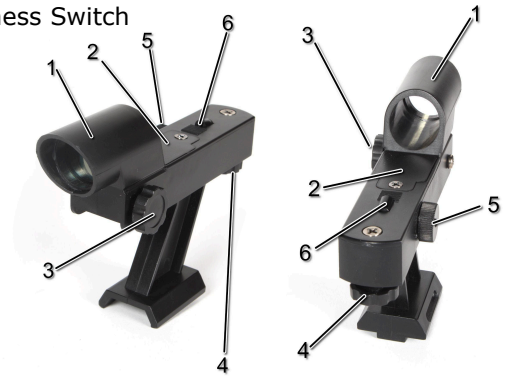
Images seen through the Library Telescope eyepiece will appear rotated or upside down. This is a normal characteristic of reflector telescopes. While this makes them less suitable for daytime terrestrial viewing, it does not affect astronomical observations; there is no "right side up" when observing the night sky.

Using the Red Dot Finder

The red dot finder provides a non-magnified red-dot reference point that simplifies initial object acquisition before viewing through the main telescope. An internal LED projects a red dot into the sight window, indicating the telescope's pointing direction. Before initial operation, remove the pull tab from the battery compartment so the pre-installed CR-2032 cell battery can make electrical contact. The removed tab may be discarded. If you are checking the telescope out of a facility, this should already have been completed.

Parts of the finder:

1. Sight Tube
2. Battery Compartment
3. Azimuth Adjustment
4. Altitude Adjustment
5. Power/Brightness Switch
6. LED Emiter



Turn the power knob clockwise until it clicks to activate the unit. View the sight with both eyes open and adjust the brightness by rotating the power knob. Lower brightness settings are recommended under dark skies to preserve night vision; brighter settings are suitable for daytime alignment or light-polluted environments.

Alignment should be checked at the start of each observing session. At the end of a session, turn the power knob counterclockwise until it clicks off.

Replacement 3-volt lithium (CR-2032) batteries are widely available at most retail outlets.

To replace a depleted battery:

1. Use a small Phillips head screwdriver to remove the battery cover located on the top of the red dot finder.
2. Gently pull back the retaining clip and lift out the old battery. Take

care not to bend the clip excessively.
3. Slide the new battery under the retaining clip at the back and push here (at the indicated #3 location) to seat the battery.
4. Once the battery has dropped into the battery compartment it will be positioned as such.

Aligning the Red Dot Finder

Proper alignment ensures an object centered on the red dot will also be centered in the telescope's eyepiece. Alignment is most easily performed during daylight. Follow the alignment procedure described in the next section to match the sight's aim with the optical axis of the telescope.

1. Remove the dust covers from the telescope and place them on the flat portion of the base.
2. Set the eyepiece to 21 mm and point the telescope at a clearly defined land target (ideally at least a quarter mile away) such as the top of a telephone pole, tree, or building.
3. Center the target in the telescope eyepiece.
4. Without moving the telescope, use the Red Dot Finder's altitude and azimuth adjustment knobs to position the red dot directly on the target.
5. Once the red dot is centered on the target, verify the object remains centered in the telescope's eyepiece. If necessary, re-center the target in the eyepiece and adjust the Red Dot Finder again. When the target is aligned in both the eyepiece and the Red Dot Finder, the finder is properly aligned with the telescope.

Aiming the Telescope

The Library Telescope base allows movement along two axes: altitude (up and down) and azimuth (left and right). These motions can be used together to smoothly point the telescope to any position in the night sky, from horizon to horizon. This mount style is referred to as an "Alt-Az" mount.

The altitude axis tension can be adjusted using the altitude tension knob. Proper tension ensures the telescope does not move too freely, which can make it difficult to keep an object centered in the eyepiece. At the same time, the tension should not be so high that smooth, precise adjustments are difficult. Turn the knob to achieve the right balance for comfortable aiming.

The azimuth axis rotation is preset at the factory to provide smooth, easy, left-to-right movement of the base.

Cooling the Telescope

All optical instruments require time to reach thermal equilibrium. The larger the telescope and the greater the temperature difference between indoor storage and outdoor conditions, the longer it takes to stabilize. Allow at least 20 minutes for the telescope optics to acclimate to the outdoor temperature before beginning high-magnification observations.

Allow Your Eyes to Dark-Adapt

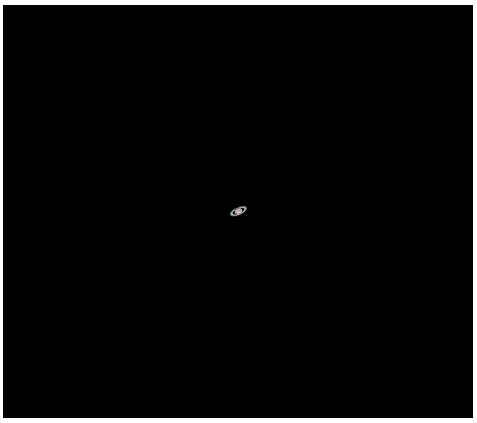
Moving from a well-lit area into nighttime darkness will not immediately reveal faint nebulae, galaxies, star clusters, or even many stars. Eyes take approximately 30 minutes to reach about 80% of their full dark-adapted sensitivity. As night vision develops, more stars will appear, and faint details in objects viewed through the telescope will become clearer. To maintain night vision while working in the dark, use a red-filtered flashlight like the included Apertura Ember headlamp, instead of white light. Red

light preserves dark adaptation and allows you to see what you are doing without reducing sensitivity. Keep in mind that nearby porch lights, street lights, and car headlights can also compromise night vision.

Objects to Observe

The Moon

The Moon is one of the easiest and most rewarding targets for observation. Its craters, trenches, and mountain ranges are easily viewed. Because the Moon goes through different phases, each night provides a slightly different view. The best time to observe is during a partial phase, when shadows along the terminator, the line between the illuminated and dark portions of the lunar surface, highlight surface details. A full Moon is very bright and lacks shadows, making it less ideal for detailed observation. Observing the Moon when it is high above the horizon provides the sharpest images. The front of the telescope cover has two small ports. If the moon is too bright to view, place the front cover back on the telescope and remove one of the small port covers. If the image is too dim now, remove the second port cover. A higher magnification will provide a darker view, and a lower magnification will show a brighter view. This is useful to keep in mind when observing.



The Planets

Planets move across the sky rather than remaining fixed in the cosmos, so their positions change nightly relative to the stars in the sky. To locate them, consult a sky calendar, astronomy magazines, online astronomy charts, or smartphone apps. Venus, Jupiter, and Saturn are the brightest objects after the Moon, while other planets may appear star-like in a small telescope. Higher magnification is recommended for observing planets and even then, they will still appear very small through this telescope.

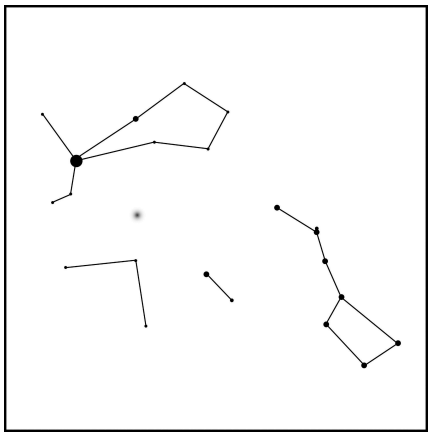
Jupiter is the largest planet and an excellent target. Through the telescope, the small disk of Jupiter can be seen, along with its four largest moons: Io, Callisto, Europa, and Ganymede. The disc of the planet is described as something that can be magnified, though it will likely be smaller than expected.

Saturn, shown in the image to the right, is famous for its rings. Depending on the tilt, the rings may appear edge-on or broadside. A steady atmosphere is important for a clear view. Titan, Saturn’s brightest moon, is often visible nearby.

Venus is extremely bright and can sometimes be seen during daylight at dusk or dawn. At its peak brightness, Venus appears as a thin crescent rather than a full disk. Remember, never point the telescope near the sun as permanent damage to eyesight is likely to occur.

Constellations

Constellations are patterns of stars in the night sky humans have grouped together and named. They are often drawn as imaginary lines that connect the brightest of stars. Constellations aren't physical clusters and most of the stars in a constellation aren't anywhere near each other in space. They only appear to form shapes because of our perspective from Earth. Because Earth rotates and orbits the Sun, different constellations are visible during different times of the year. Most objects we want to observe in space are stationary when compared to our human conception of time.



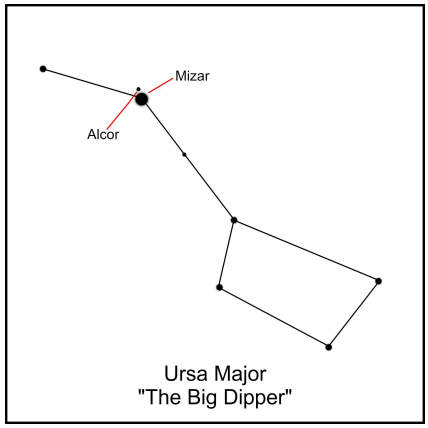
While constellations are too large to be viewed through the Library Telescope, they are very useful when it comes to locating stars and deep sky objects to view through the telescope. Constellations are the foundation of the "map" amateur astronomers use when locating objects. Devices called a Planisphere are very useful in locating the position of constellations in the sky from your location at any specific time of the year. There are many popular smart phone applications and free star charts are often available online for download.

The Stars

Stars will appear as points of light through the telescope. While stars cannot be magnified to appear larger, their colors can be observed, and many double or multiple star systems can be resolved from each other. Close stars, or double stars, can be observed even through heavy light pollution without dark adaptation and this makes them a popular choice no matter the observing location.

Mizar & Alcor - January through August (North)

Two stars which are close together in the constellation URSA Major, commonly known as the Big Dipper, are an enjoyable target to view. This is typically visible from January through August and facing the northern part of the sky. A small chart to the right shows the location within the Big Dipper where Mizar & Alcor can be located. When viewing the stars, it will not be possible to see Alcor without looking into the telescope. They are located at the bend in the Big Dipper's handle, second from the end star and third from the "ladel". Use the red dot finder to point the telescope here. Then center the star in the field of view of the telescope's eyepiece and increase the "zoom" of the telescope by setting the eyepiece to 9mm or 7mm. Remember to refocus after adjusting the eyepiece focal length.



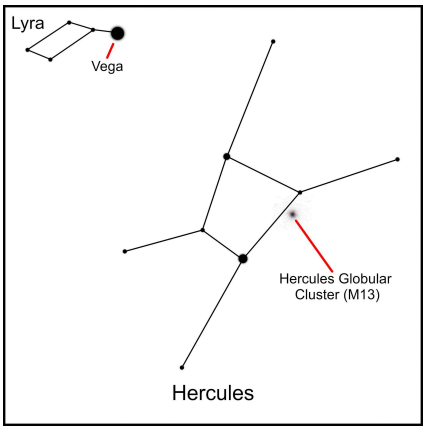
Deep-Sky Objects

Under dark skies, the telescope can reveal faint deep-sky objects such as gaseous nebulae, open star clusters, globular star clusters, and distant galaxies. Most of these targets appear as soft gray shapes rather than the vivid colors often captured in long-exposure photographs. Patience, fully dark-adapted eyes, and an observing site far from light pollution are essential. Without proper dark adaptation, many deep-sky objects become extremely difficult to see. As your observing skills improve, subtle details and structures gradually become more apparent.

Star charts, planetarium programs, apps, and planispheres are helpful tools for locating deep-sky objects. Low-power scanning of the Milky Way with the 21 mm eyepiece setting is a rewarding way to explore the dense fields of stars. Who knows, maybe you'll stumble across one of the great nebulae!

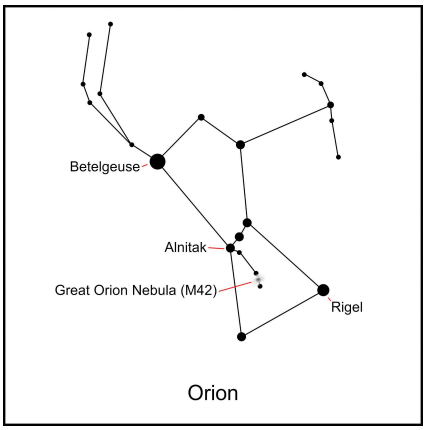
Hercules Globular Cluster - June through September (East to West)

This object is known as a Globular Star Cluster. A globular star cluster is a relatively tight grouping of stars arranged in tight orb-type shape. They are considered to be part of our galaxy. The Hercules cluster is located in the constellation of Hercules, as you might expect. The object looks like a fuzzy grey ball of stars in a small telescope. In large telescopes, individual stars can easily be resolved. Its location in the constellation of Hercules can be seen in the adjacent image. If Vega, one of the brightest stars in the sky, is familiar to you, the constipation of Hercules will be located nearby. The Hercules constellation main structure stands out as a "Cornerstone" shape, or a tapered rectangle.



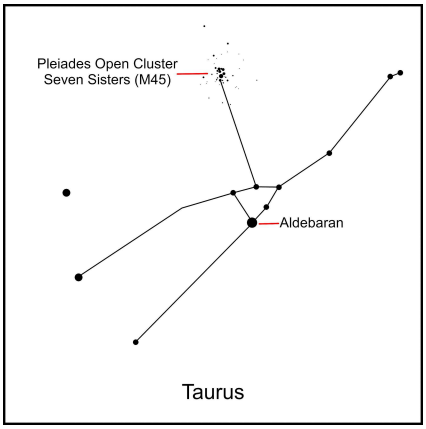
The Great Orion Nebula - November through January (South)

The Orion Nebula is a very large star forming region which can be located in the "Sword" of the Orion Constellation, at the middle of the three stars that make up the sword. The gaseous nebula is energized by the newly formed stars and glows like a giant fluorescent lightbulb in the night sky, emitting strong light at the Oxygen, Sulphur, and Hydrogen lines. At the core of this nebula lies a small open star cluster known as the Trapizium. This can be viewed at the highest of magnification and provide an interesting view. How many stars can you see in the Trapizium?



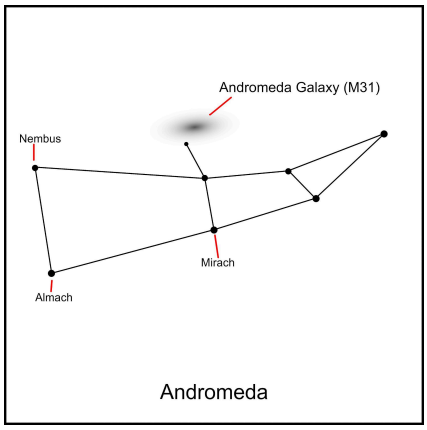
Pleiades Open Cluster - October through January (East to West)

The Pleiades, also known as Seven Sisters, is a young open cluster located in the constellation, Taurus. Taurus is located just "above" Orion, when in the East. The bow of Orion points to the constellation of Taurus. The Pleiades is visible in the fall through mid winter. By eye, it appears as a bright miniature constellation. Through the telescope, it can be seen as a grouping of very bright stars, and some might be able to notice the blue color of the stars. This is a very enjoyable object to observe, and it can be seen despite light pollution. For location reference, Orion's bow is pointing at the double cluster.



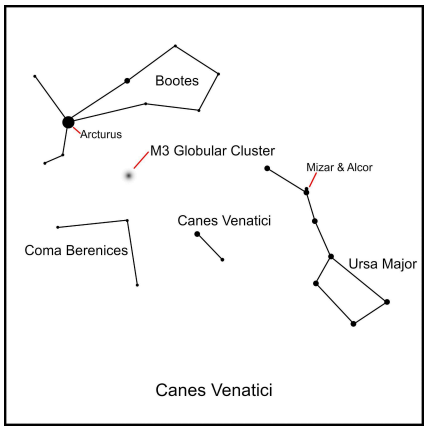
Double Cluster - July through February (North)

The Double Cluster consists of two large open clusters which are close together in the constellation, Perseus. The object is midway between Perseus and Cassiopeia constellations. Both are visible to the naked eye if you are in exceptionally dark skies and familiar with their location. With the eyepiece at the 21 mm setting, both clusters can be viewed at the same time. At a 7 mm setting, only one cluster at a time can be seen in the field of view. For location reference, The Pleiades cluster would be just off the side of this star chart, right of the Perseus constellation. So, if the Pleiades is easy to see, Perseus should be easier to locate.



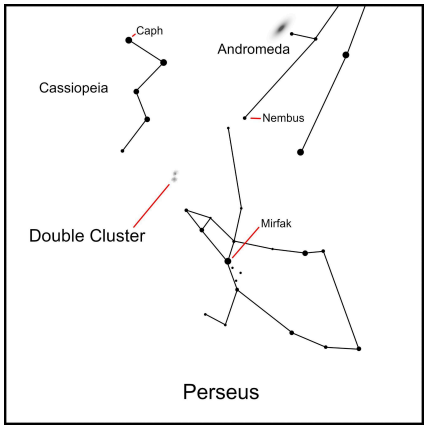
Andromeda Galaxy - August through February (North East through North West)

The Andromeda Galaxy is located in the constellation, Andromeda, near Cassiopeia. Referencing the Double Cluster image above will help to locate the object in relation to other visible targets. It is the closest major galaxy to our own Milky Way and appears as the largest galaxy in the night sky from our point of view. In heavy light pollution, this can be difficult to locate. From dark skies it stands out. In the scope it might look like an elongated blur or dense wisp of grey smoke. In exceptional conditions, a dark dust lane can be seen sweeping through one side of the galaxy and the galaxy can be seen as a small fuzzy patch by eye, without the telescope. In light polluted skies through the telescope, expect to see a small fuzzy patch a little brighter than the sky background.



Messier 3 Globular Cluster - February through July (East to West)

This Globular Star Cluster will appear similar to the Great Cluster in Hercules. It is a relatively tight grouping of stars arranged in a tight orb-like shape. This cluster is located in the constellation, Canes Venatici. The object looks like a fuzzy grey ball of stars in a small telescope. In large telescopes, individual stars can easily be resolved.



About the Library Telescope Program™

The Library Telescope Program™ was launched in 2008 by the New Hampshire Astronomical Society.

Public libraries and science organizations from around the globe are adopting the program. The Library Telescope Program empowers libraries to spark curiosity, expand access to astronomy, and foster community engagement through hands-on telescope lending – putting the stars within reach for all.

Where applicable, a local Club member acts as a foster parent to the scope. He or she will periodically clean and adjust the telescope, and act as a local astronomical resource to the library patrons. Additionally, a library member or student from a local school could be engaged as an apprentice astronomer to provide needed care to the scope.

For more information about this program visit: https://www.librarytelescope.org/

Warranty

The *Apertura Warranty* provides one year of coverage against product defects. It is important to keep your original receipt and the product's original boxes and packaging, should you need to make a claim.

Modification Policy

Any modifications to the telescope, including drilling, grinding, cutting, installation of third-party fasteners, adjustment of mirror spacing (excluding standard alignment using the factory tilt/tip collimation hardware, Apertura accessories, and approved 3rd party collimation hardware), or any other alterations, will void the warranty for the affected portion of the telescope. This includes subsequent "down stream" systems of the telescope which might be affected by said modifications. Apertura reserves the right to make the final determination regarding the effect of modifications and any resulting warranty invalidation.