APT-LSCOPE

APERTURA

Library Telescope

Service 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, which 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 Graphic

Parts of the Library Telescope Service Kit

1. Collimating Eyepiece
2. 8 mm Wrench
3. Phillips Screw Driver
4. 2 mm Hex Key
5. Instruction Card

Additional supplies to purchase locally or with our Amazon Affiliate Program

1. Isopropyl alcohol
2. Unscented dish soap
3. Cotton balls (without any lotion or additives)
4. Cotton swabs
5. Lighter fluid
6. Paper towels

Charging the Headlamp

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.

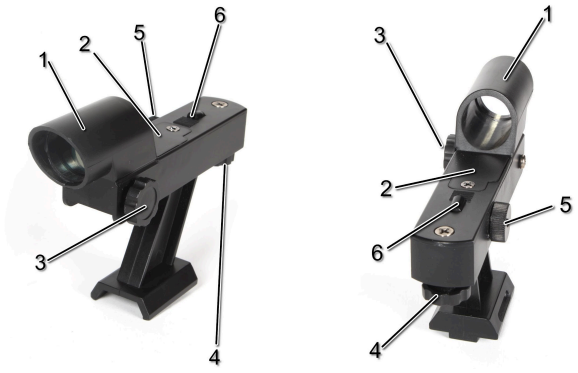
1. Fold back the dust cover located on the bottom of the headlamp.
2. Connect the USB-C cable.
3. Plug the cable into a charging brick or station.
4. A small red light will show if the battery is low, and a green light will show if it is fully charged.

Servicing 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



To activate the unit, turn the power knob clockwise until it clicks. 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. After use, 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.

Servicing the Telescope

What is Collimation?

Collimation is the alignment of the optics or process of aligning the optics inside a telescope. The more accurately the optics are aligned, the greater the chance the telescope will function at its highest level of performance and provide a uniform view.

The Newtonian telescope design uses a primary mirror and secondary mirror to focus and direct light into the eyepiece. The primary mirror is the larger focusing mirror at the bottom of the telescope tube. The secondary mirror is the smaller elliptical flat mirror that sits just behind the focuser at the top of the telescope tube. You will see four thin vanes that support this secondary mirror's structure.

Each of the mirrors have three adjustment fasteners spaced equally at 120° from each other. The central hub is the circular portion to which the four thin vanes are attached. It is important to note the larger center screw for the secondary mirror should not be adjusted in this process.

While it might seem a bit intimidating at first, It’s important to remember even a telescope that is collimated only marginally well can still allow us to see things in the night sky, and the process of aligning the optics generally becomes easier and more familiar with time and practice. Do not be discouraged if the telescope is not perfectly aligned with your first few attempts at this process, especially if you are new to the hobby.

Before making any adjustments to the telescope please take the time to observe and become familiar with the components of the telescope.

Using the Collimation Eyepiece

The Apertura Cheshire Collimating Eyepiece is a simple precision machined tool built to our exacting specifications. It consists of four major parts. The first being the main tubular aluminum housing which supports and centers the optical components. Starting from the back of the collimation tool, we have the viewing aperture which is located on the very end of the wider portion of the tool, with the printed logo. This is the portion we look into when using the tool. This small aperture allows for a precision alignment. Next is the illuminator which is the polished silver colored 45° surface. The job of this elliptical reflecting surface is to direct diffuse light down onto the final component of this tool: the crosshair wires. These wires give us a reference for centering the reflections within the telescope optics and make it much easier to get an accurate alignment of the system.

Begin the collimation process by setting up your telescope in a well lit area. Having a bright wall or area to point the telescope at can help you to see the different parts inside the telescope. Be sure the telescope cannot accidentally be pointed at the Sun, and do not point it at a bright light when aligning the mirrors. It is necessary to remove the eyepiece from the Library Telescope in order to align the optics. To remove the eyepiece, use the hex key to loosen the two screws and then gently lift the eyepiece out of the focuser. This is where the collimation tool will be inserted.

Before we put the tool into the telescope, let's familiarize ourselves with some of the parts, and what they look like. This will make adjusting the telescope much easier to understand. Begin by looking into the small hole at the end of the collimation eyepiece; this is the end opposite of the wires. While looking into the eyepiece, notice how the wires look. Now, rotate the eyepiece in a circle while looking through it. You can see the wires dim and get bright as the reflector points toward the light and away from the light. This will be useful for us later in the process.

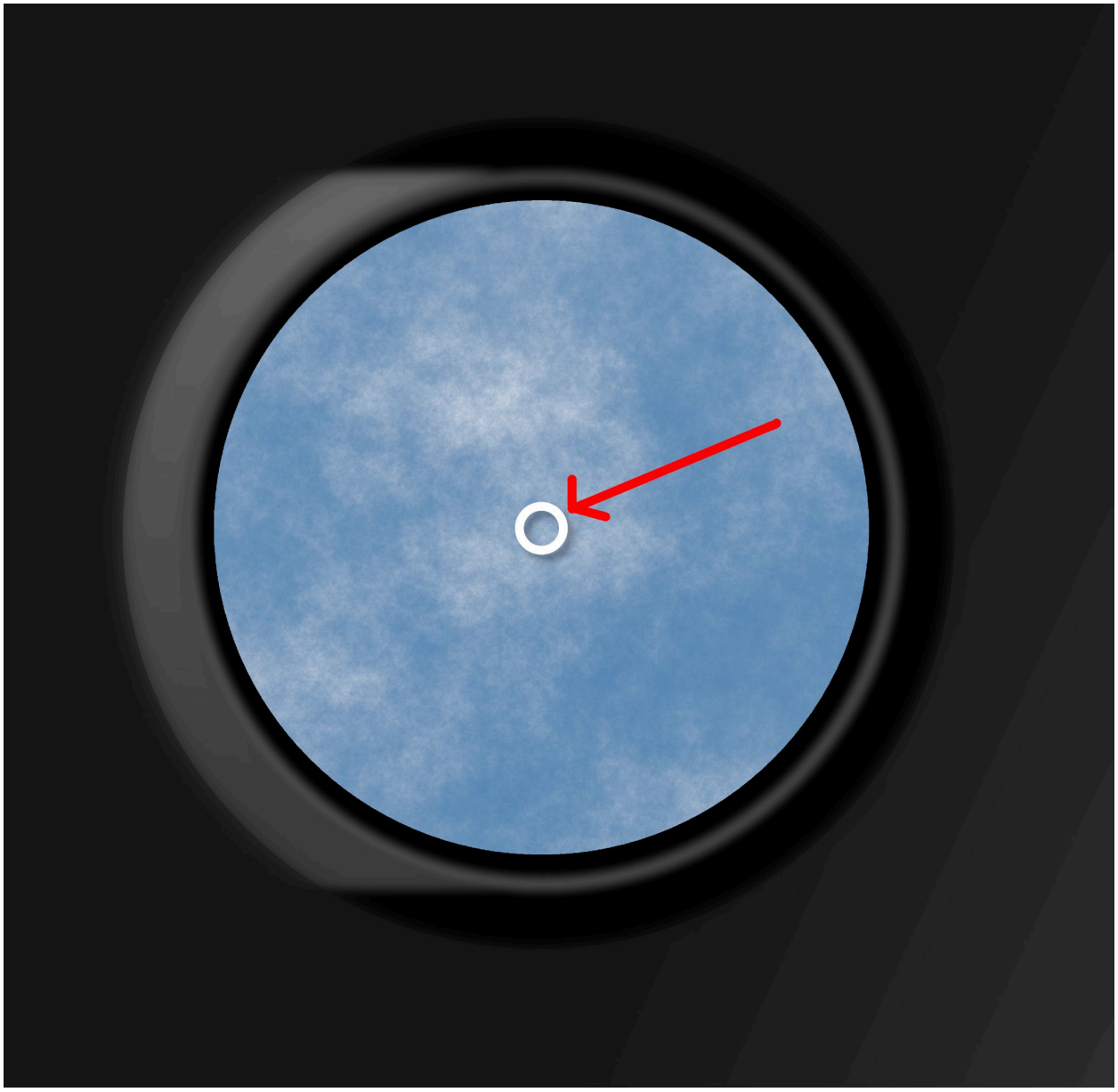
Next, let's examine the telescope and become familiar with some of the internal parts. Remove the front cover of the telescope and look down into the front of the tube. You should be able to see a 4.5” round mirror at the bottom of the tube. At the center of this mirror is a small circular marking. This marking is called the Primary Mirror Center Spot; it is the central marking spot located on the primary mirror.

Next, look at the front of the telescope opening. You should see a cross structure with a small circle in the middle of it. This is the secondary mirror spider support. This holds and positions the secondary mirror, which directs the light from the primary mirror into the focuser, which is located on the side of the telescope.

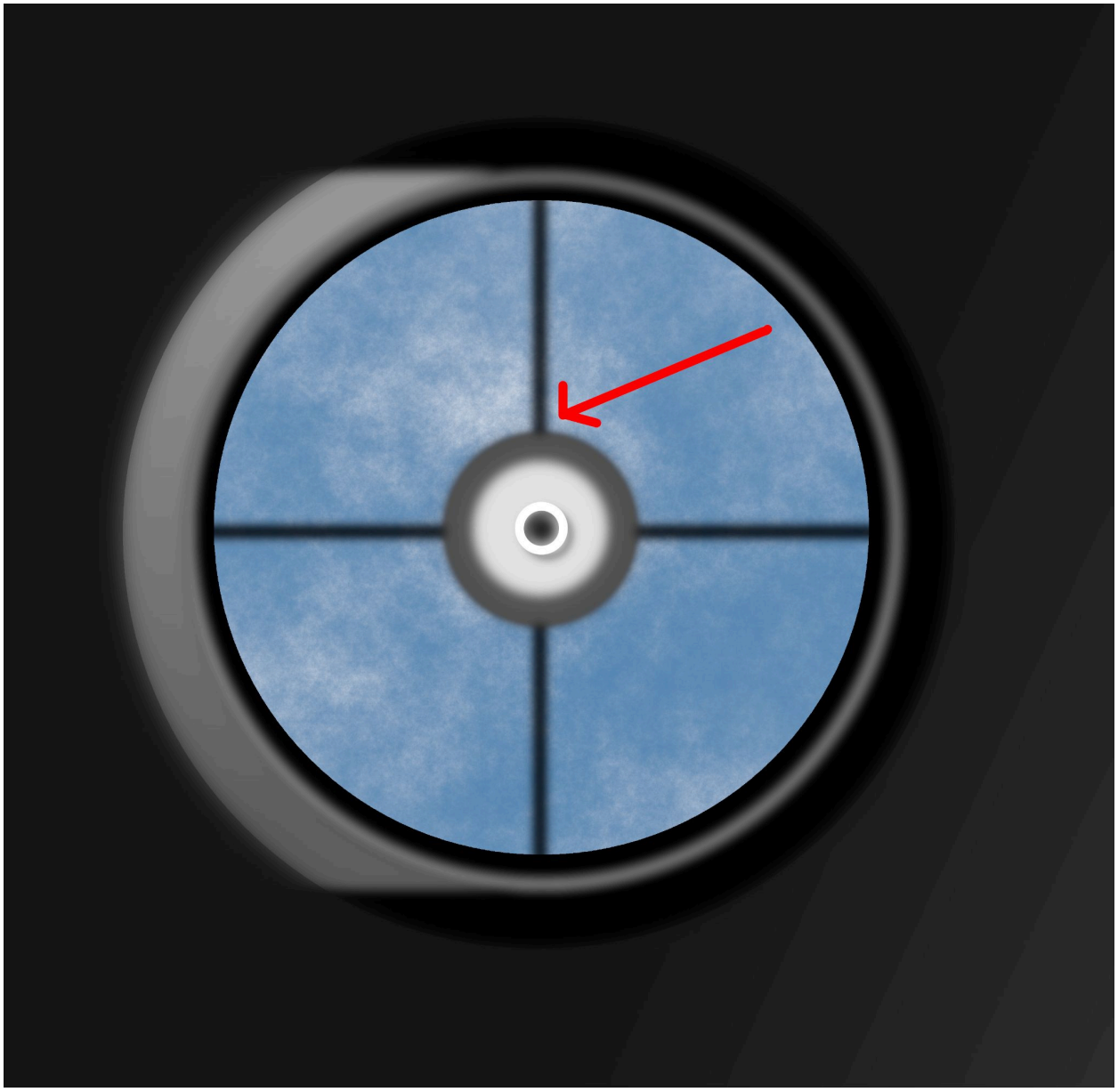
Without the eyepiece in the focuser, look into the focuser. You will see the secondary mirror which is supported in the center of the tube, a reflection of the primary mirror, and an image of the object on which the telescope is pointed. Let's look at some simulated images.

Looking into the focuser, you'll first see the secondary mirror. This is an elliptical mirror positioned at a 45° angle. It looks circular from this perspective because it is tilted. There will be many other things reflected in this mirror, but, for now, take note of how the mirror is just below the focuser in the center of the tube. It will look like this:

Looking deeper into this view, you should notice the primary mirror reflection down at the bottom of the tube. The primary mirror center spot we viewed earlier should be visible.



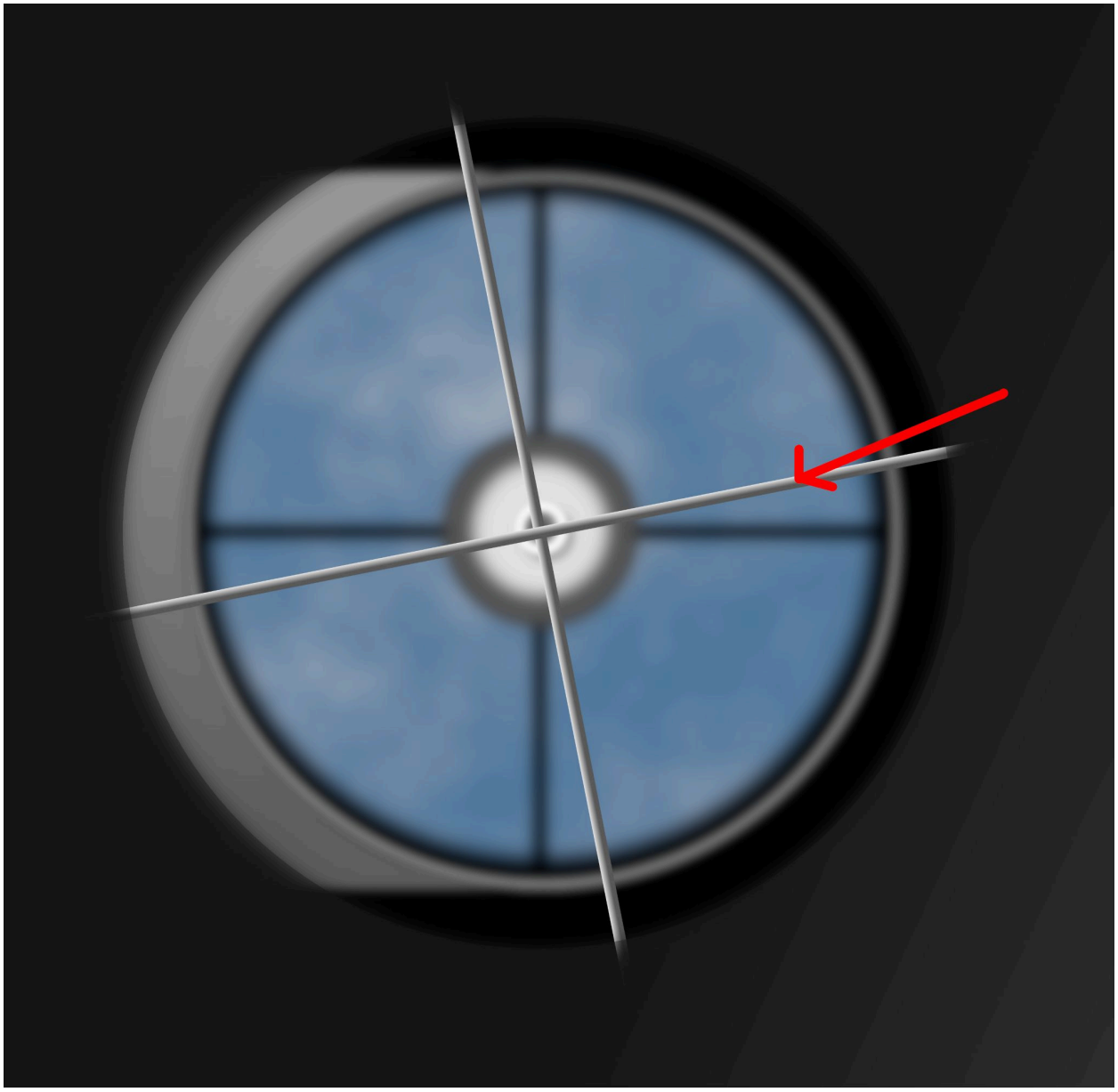
Looking further still, the spider and secondary mirror support structure we saw earlier when looking into the front of the telescope will be visible. This is the large cross structure.



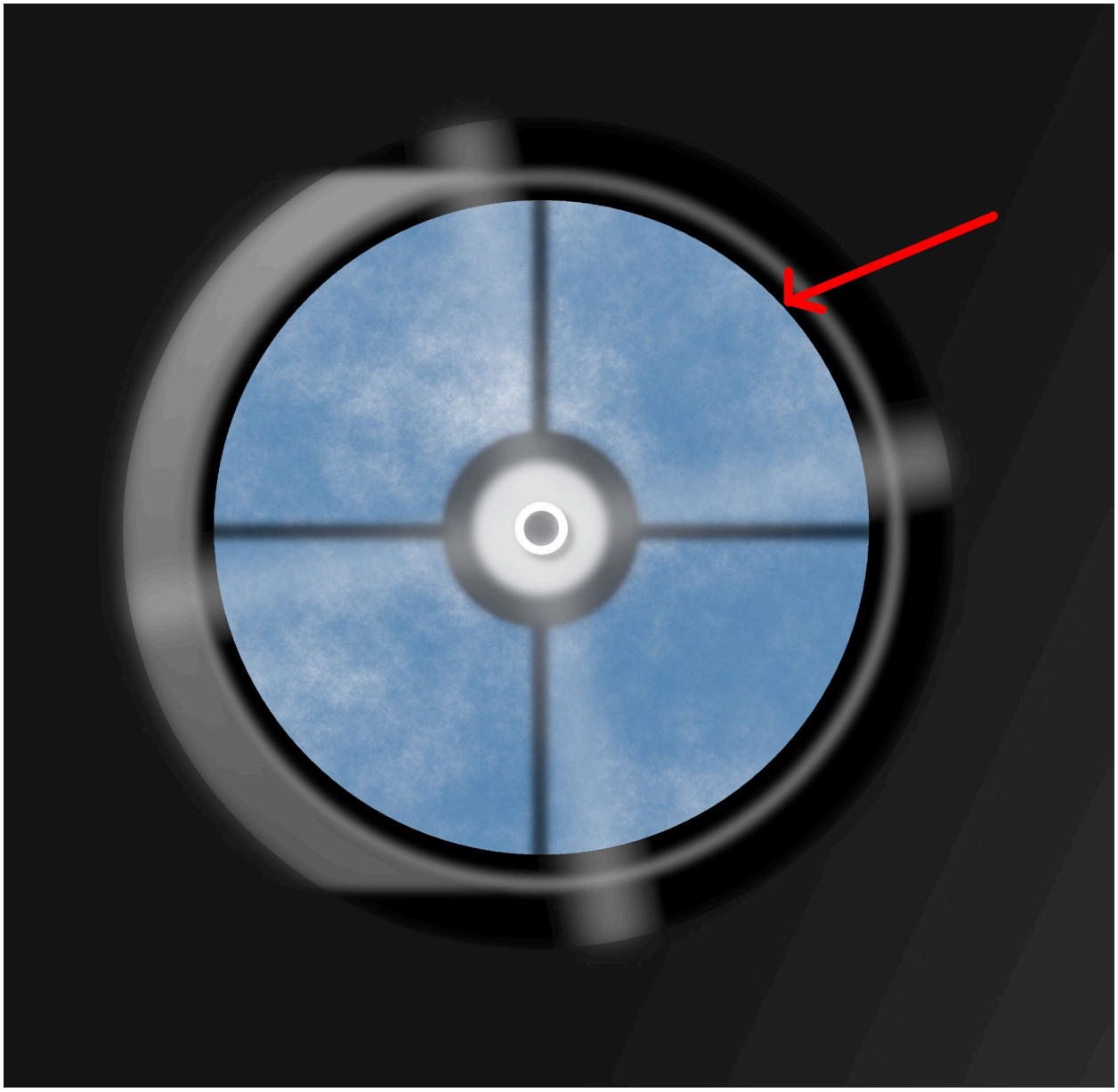
Finally, you might notice a reflection of your eye, and that’s a good sign the alignment is probably not too far off.

Before we insert the collimation eyepiece into the telescope and begin assessing the quality of the mirror alignment, let's take one last look at the collimation eyepiece on its own. Holding it back up to your eye, looking through the small hole opposite the wires, notice how the wires look. Focus on them and see how crisp they become. Now, looking through the eyepiece still, look at something far away, across the room. Notice the wires are still visible, but they blur and become diffuse. It seems as if you can almost see through them.

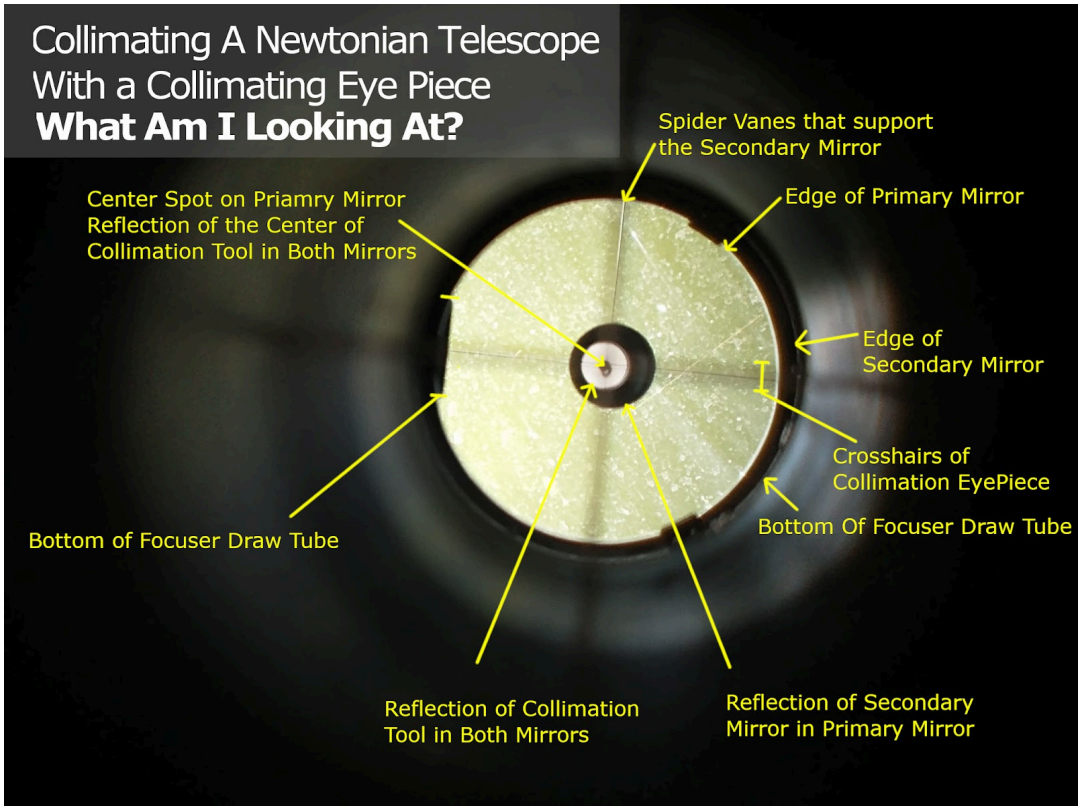
Let's insert the collimation eyepiece into the telescope. Fully insert the eyepiece so it sits against the flared shoulder. Rotate the eyepiece while looking into the telescope and find the position where the wires are best illuminated by the ambient light. The wires might be at an angle, and that’s okay. The image should look something like this:



Now shift your focus to the primary mirror and its center spot and notice how the view changes. The wires blur, and the edge of the primary mirror and the center spot become crisp. At this point, you might notice the center spot is not in line with the cross hairs, or the intersection of the spider and secondary mirror are not aligned with the crosshairs. This is a great observation and part of what will need to be adjusted in just a little bit.



Have a look at the following real image taken through the collimation eyepiece and see how it compares to the simulated images and what you are seeing in the telescope.



Checking and Adjusting the Secondary Mirror

The first mirror we want to check and adjust when collimating the telescope is the secondary mirror, located near the telescope's focuser. The center spot on the primary mirror, along with the crosshairs of the collimation eyepiece, are what we will use to adjust the secondary mirror. Looking back into the collimation eyepiece that has been installed in the telescope, notice the eyepiece crosshairs and see if the center spot aligns with the crosshairs. When it is perfectly centered, the center spot on the mirror can seem to form a four leaf clover shape around the crosshairs. This is a perfect alignment!

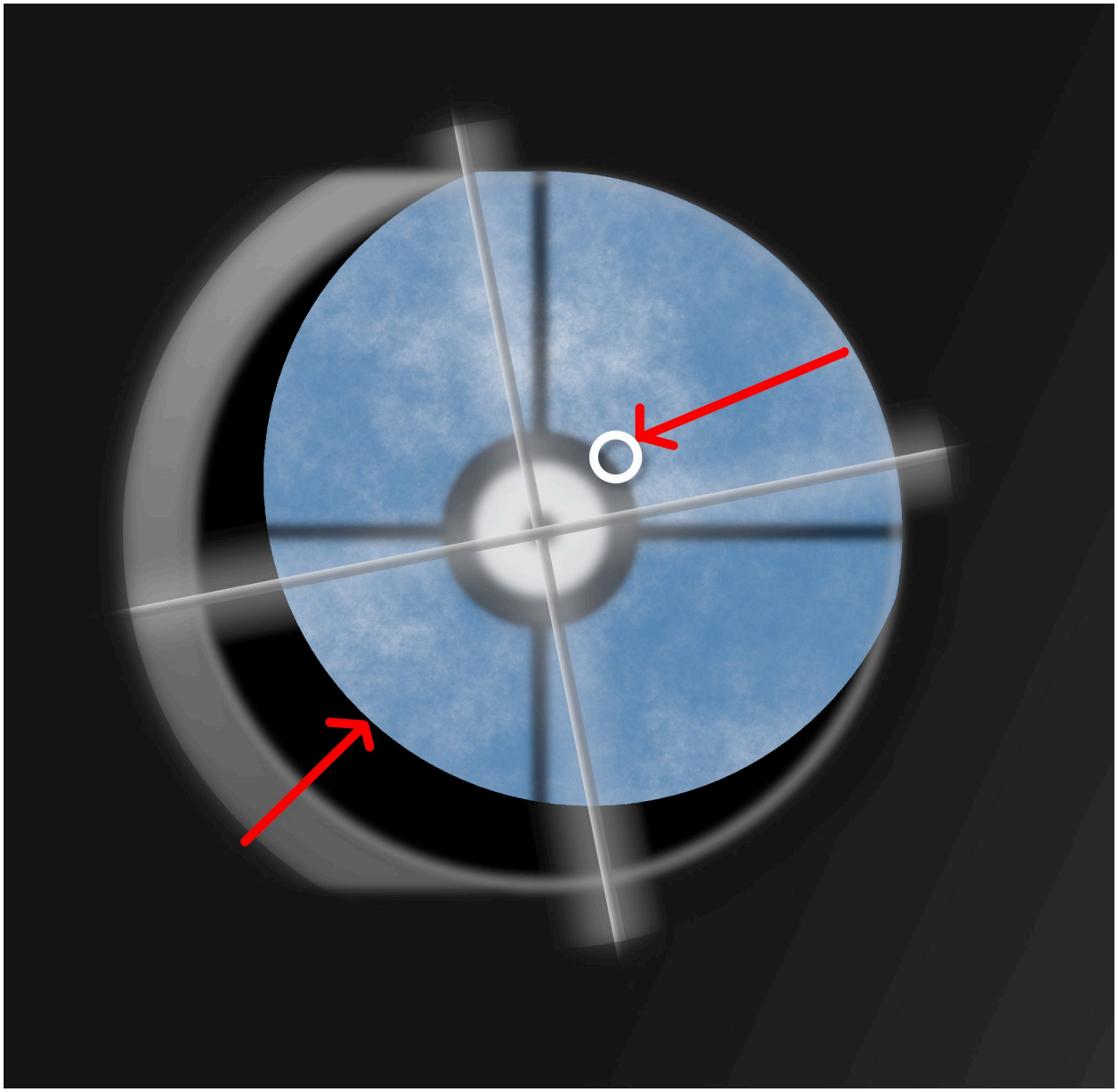
If you do not see the center spot aligned with the wires, the secondary mirror will need to be adjusted. The secondary mirror is the small mirror mounted at the front of the telescope by the focuser. Looking in the front of the telescope tube you should see four strips of material, suspending a circular piece with several screws in it. There are three small screws for a triangle and one center screw. Never adjust the center screw.

Choose one of the three screws at the front and slightly tighten it while looking into the telescope. Did the center spot move closer or further away from the wire crosshairs? If it moved further away, slightly loosen it back to the original position and choose a different screw. Slightly tighten this second screw while looking into the collimation eyepiece. Did the center spot move closer or further away from the crosshairs? If it moved further away, slightly loosen it back to the original position and choose the last of the three screws. Slightly tighten this screw until the spot is as close as it can get to the center of the crosshairs without passing through to the other side and moving farther away.

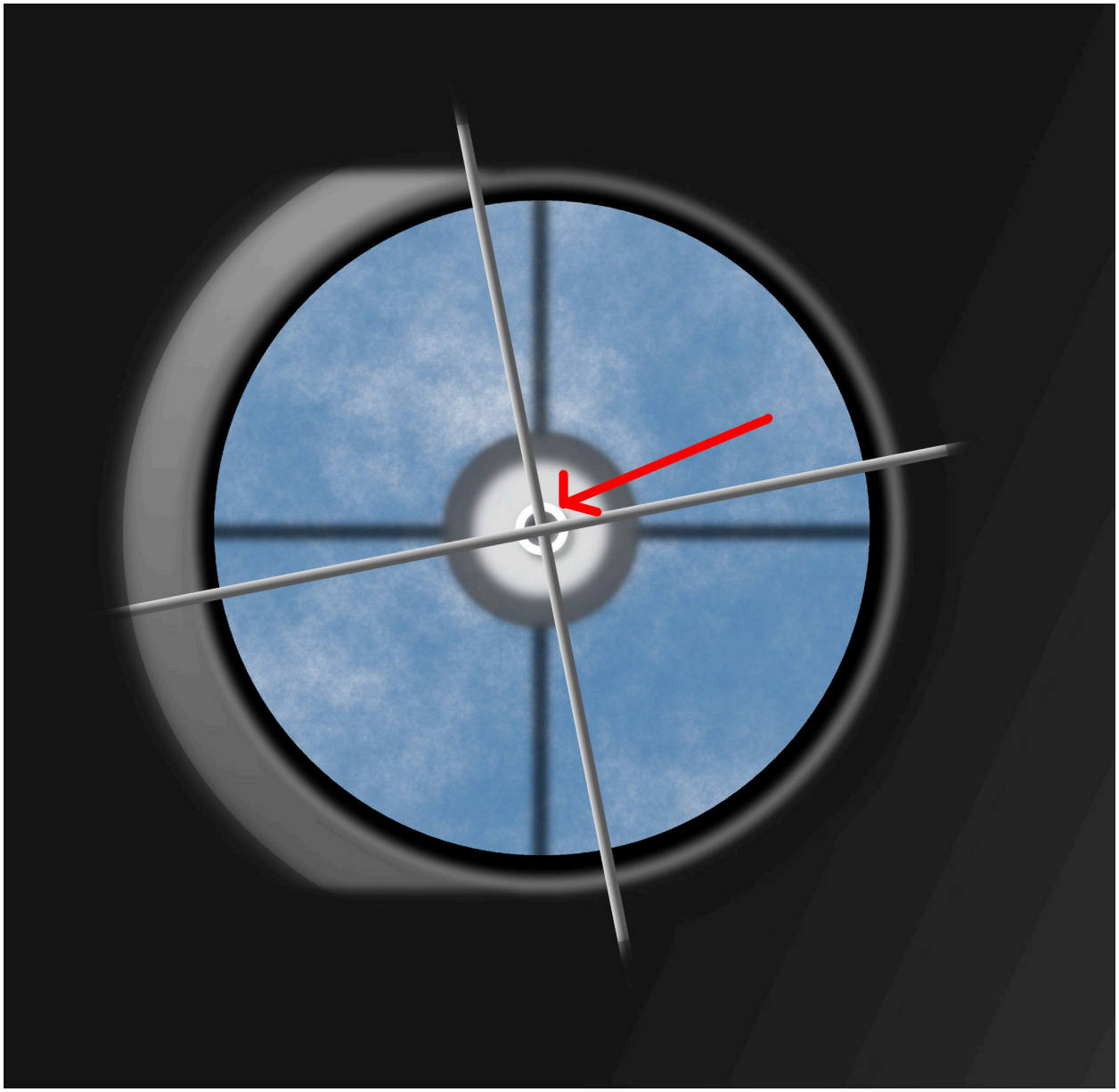
At this point, if the spot is not exactly bisected by the crosshairs, move back to a different screw and repeat the process until the circular center spot is bisected by the crosshairs.

The view through the telescope might look like this when the secondary mirror is misaligned. Notice the edge of the primary mirror is far off to the side, and the center spot is not aligned with the

crosshairs of the collimation eyepiece. It’s important not to confuse the crosshairs of the eyepiece with the spider structure of the telescope.



When the secondary mirror is properly aligned, the view will look like the following image. Notice the center spot on the primary mirror and the wires of the collimation eyepiece intersect at the center of the view.

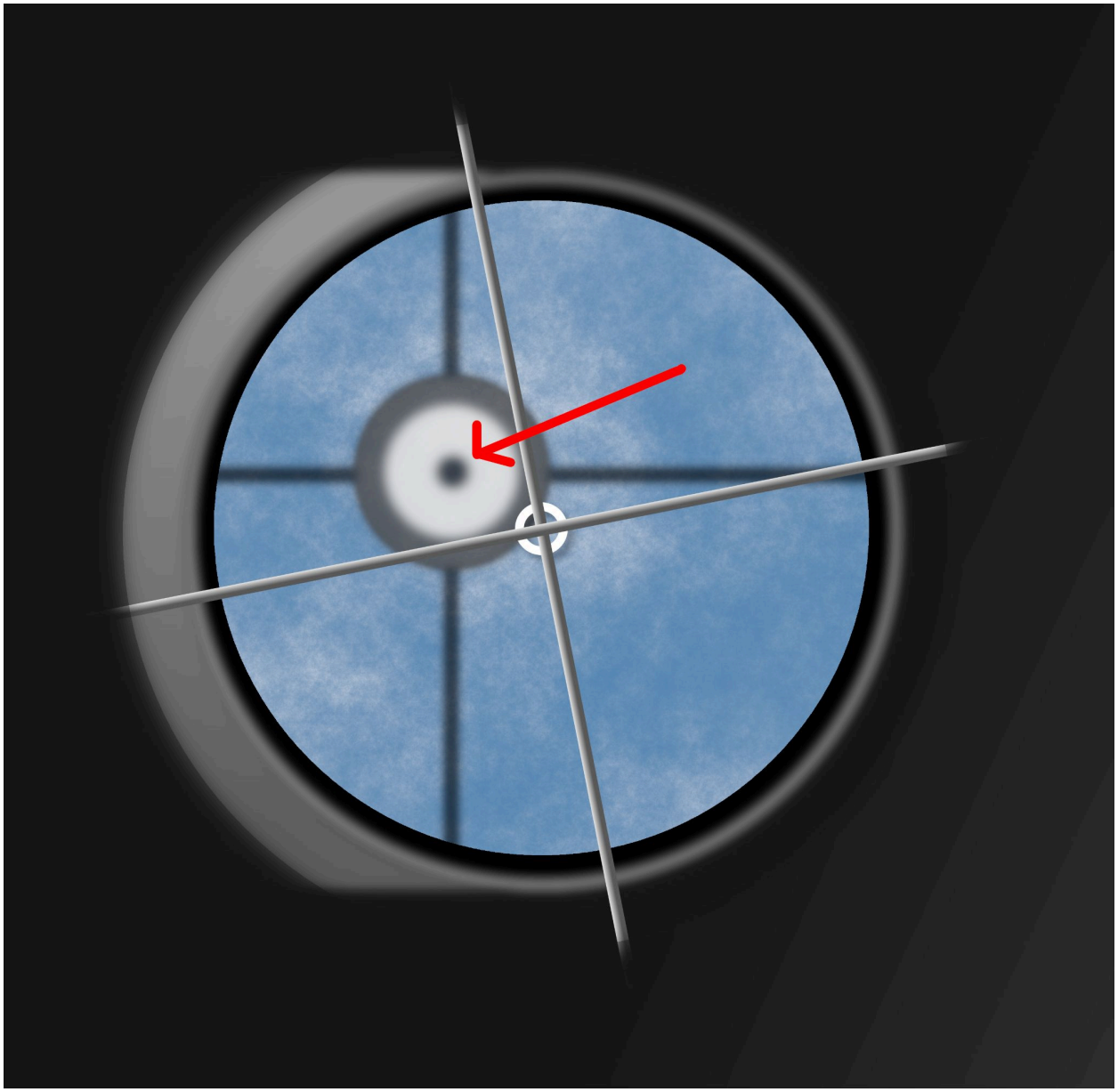


Checking and Adjusting the Primary Mirror

Now that the secondary has been adjusted so the center spot on the primary mirror aligns with the collimation eyepiece wires, we will want to adjust the primary mirror. To do so, you will need the 8 mm wrench from the Library Scope Service Kit.

When adjusting the primary mirror, we judge its alignment based on the reflected view of the collimation eyepiece. To see what part of the view this is, cover and uncover the small reflector on the side of the collimation eyepiece while looking into the telescope. The portion that seems to appear and disappear as you cover and uncover it is the reflection we will use to align the primary mirror. Look in the Apertura Cheshire Collimation Eyepiece and see if the primary mirror needs to be adjusted. The following two images will show a reflection in the primary mirror of the collimation tool, secondary mirror, and spider. If the reflection is centered, no major adjustments likely need to be made. If the

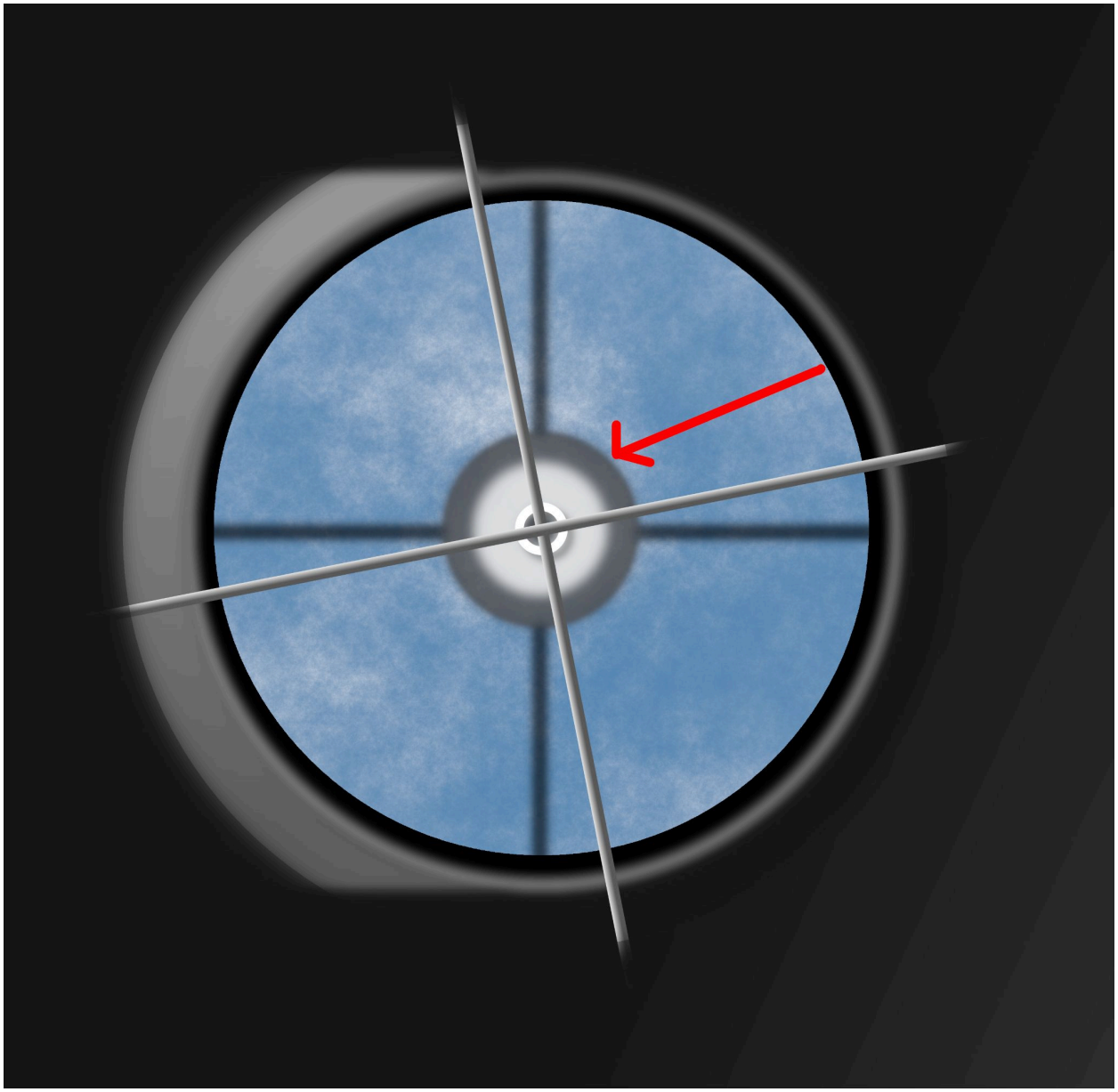
reflection is off to the side like the following image indicates, then the primary mirror is in need of adjustment.



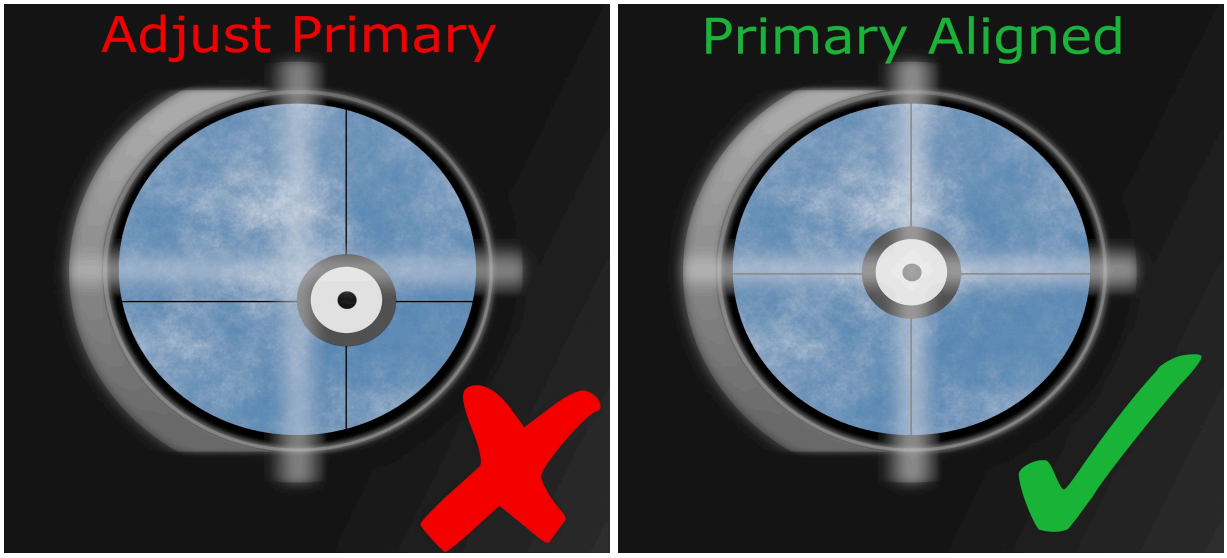
NOTE: Even though the center spot on the primary mirror is aligned properly with the blurry collimation tool crosshairs, the reflection of the secondary mirror and spider vanes in the view might be offset some. Meaning, the blurry crosshairs of the collimation eyepiece might not perfectly align with the sharper crosshairs of the secondary mirror spider/support as seen in the reflections. The important part is that the center spot of the primary is centered on the crosshairs, and the reflection of the collimation eyepiece lines up with the crosshairs of the collimation eyepiece.

Before calling the final alignment "Good," it is best to look for the bright but smaller reflection of the collimating tool in the telescope's mirrors. In the center of the bright circle will be a small dark dot. This is the hole you look through on the tool. This spot should be centered on the primary mirror

center spot, as well as the collimation eyepiece crosshairs for the greatest accuracy. The perfectly collimated view might look like this, where all visible parts are centered.

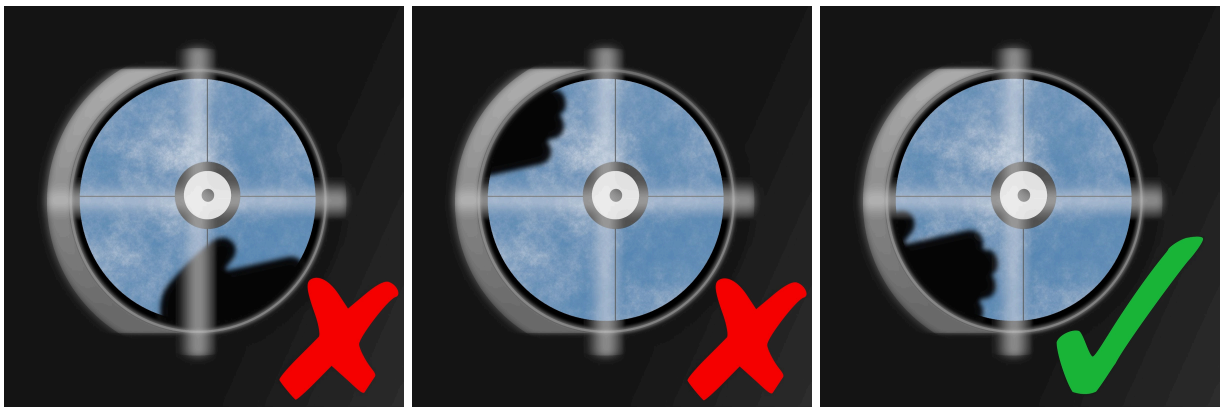


Tips and Tricks for Adjusting the Primary Mirror



When aligning the primary mirror, it can be difficult to know which screw to adjust. Partially placing your hand in front of the telescope while looking through the collimation eyepiece can give an idea of which screw needs to be adjusted. While looking in the scope, move your hand around the front of the telescope until it is either opposite of or closest to the offset image of the primary mirror spot. There are three images below that show examples of this step. Once your hand is in a position that corresponds to the reflection's offset, pull your head back from the collimation eyepiece but keep your hand in front of the scope. Make a mental note of where your hand is on the telescope tube so when we look at the back of the telescope, we know in which direction the mirror is offset.

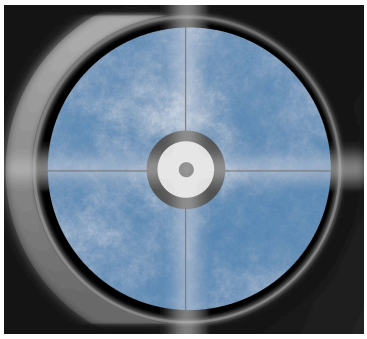
Example: Your hand is in line with the focuser at the front of the telescope. Look for an adjustment knob in line with the focuser at the back of the telescope. If one is not located at that position, look to see if there is an adjustment screw directly across the tube from this position. If not, find the closest adjustment screw to this imaginary line. This will be the screw we want to adjust first.



It will take some time and experience to gain a better understanding of how much to adjust each screw and in what direction to turn it. Knowing which screw to adjust is a huge help. Start by turning this screw ¼ of a turn clockwise. Then, look back into the collimation eyepiece to see the results of

this adjustment. If the center marking on the primary mirror moves in the direction we want to move, continue to adjust this screw until the reflection is as centered as you can get it. Then perform this step again, placing your hand in front of the telescope observing the offset, finding the position of this offset, and locating which screw to adjust next.

Looking in the collimation eyepiece, all reflections should be centered within one another. If they are not, repeat this process from the start until you are satisfied with the results.



It is important you can see the following:

1. All of the primary mirror reflected in the secondary mirror.
2. The center spot of the primary line up with the crosshairs of the collimation eyepiece.
3. The reflection of the eyepiece in the mirror lines up with the primary center spot and crosshairs.

Remember these mirrors do not need to be perfectly adjusted for casual low power observing. For high-magnification, planetary viewing, observing double stars, or for the best possible performance, it is ideal to have them aligned as much as possible. Don't be discouraged if it takes some time to do or even if you can not align them perfectly at first. It will become easier with time and experience.

Some users find they check and adjust their collimation before every observing session, and this is good practice. Though other users only check from time to time. Either way you choose, the Apertura Cheshire Collimation Eyepiece will help simplify the collimation process while offering potential for more accurate results. Enjoy your freshly aligned Newtonian Telescope!

Cleaning the Eyepiece

The top lens of the eyepiece is most susceptible to dust, debris, and fingerprints. This is the surface of the telescope that will likely need the most maintenance. It is important to follow the outlined procedure, starting at the top and working your way down, step by step, until the lens is clean. Deviating from the process can lead to lens damage over time.

Supplies needed for cleaning the eyepiece that are included in the kit:

- Bulb blower

Purchase locally:

- Cotton swabs
- Cotton balls
- Isopropyl rubbing alcohol
- Lighter fluid

> *Note: It is important to familiarize yourself with the safety precautions, first aid, storage requirements of these fluids and cleaners in accordance with your location or facilities recommendations, and recommended best practices from the manufacturers.*

Process:

1. Clean any dust and debris from the eye lens surface using the bulb blower.
2. Following the isopropyl alcohol manufacturers safety precautions, apply a small amount of fluid to a clean cotton ball, being mindful not to touch the side of the cotton ball which will come in contact with the eyepiece lens.
    a. Gently dab the cotton ball against the eye lens, being sure not to wipe, swipe, or twirl the ball against the lens.
    b. Repeat this application until debris is no longer seen on the eye lens.
3. If any small particles remain on the lens, dampen a cotton swab with isopropyl alcohol and gently roll it across the portion of the lens with debris.
    a. If all dust and debris are removed, proceed to the next step. If debris remains, start back at step one.
4. If only small streaks remain, dampen a fresh cotton ball and clean the optic with a swipe motion, moving to a fresh part of the ball each time. Feel free to use multiple cotton balls to finish the procedure.
5. In the event oily residue remains on the surface, apply a small amount of lighter fluid to a cotton swab and lift the oil from the lens with a rolling and sweeping motion. Again, follow all of the manufacturers safety precautions.

Cleaning The Mirrors

Please note: It is not recommended to clean your mirrors unless necessary. Many times, a simple bulb blower can remove a majority of dust and debris from the mirror without ever removing it from the cell. Generally, the following process would only need to be performed after several years of heavy use in a dusty or pollen filled environment. Most dirt, dust, debris, or imperfections you might see on an optical surface will typically have no detectable effect on the view through the telescope. Though, if you do wish to clean the optics, the following procedure will guide you along the way. There are many ways the optics can be cleaned, this is just one of them. Cleaning the optics will cause the collimation to be off, and the whole system will need to be realigned.

> *Please be sure you are experienced and confident in the collimation process before attempting to clean the telescope. A dirty, but well aligned, telescope will outperform a clean but grossly misaligned optic.*

When cleaning optics, there is always the risk of damage!

Careful attention to detail is required.

Prepare the telescope to be worked on by placing it on a large, flat, clean work area. It is important to note that there are many methods and processes available for cleaning optics, and this is just one of the many ways to perform this task with common materials and supplies.

To perform the cleaning, you will need the following items:

- #2 Phillips screwdriver
- Dawn dish soap (recommended)
- 1 Gallon distilled water
- Optics cleaning bulb blower
- Optical cleaning wipes
- A sink to work in
- Paper towels
- Masking tape
- Paper towels

Note: Damage caused to the optical coatings by improper cleaning is not covered by the manufacturer warranty.

Removing the Mirrors

Place the telescope on the work surface and use the masking tape to mark the back plate of the telescope. Then, place a second piece of tape in line with this on the metal tube of the telescope body. This will allow you to easily position the primary mirror in the same location when reinstalling it in the telescope tube. To remove the primary mirror, remove the telescope tube from the stand by completely loosening the clamshell retaining knob and stand the telescope face down with the primary mirror cell facing up. When loosening the knob, it is important to hold the telescope so it does not fall. Loosen and remove the four Phillips-head screws at the back of the telescope.

Then, carefully lift the primary mirror cell out of the telescope. Once the mounting cell is loose from the tube, flip it over and lay it down on your work area with the mirror facing upright. Be extra careful not to touch the mirror face.

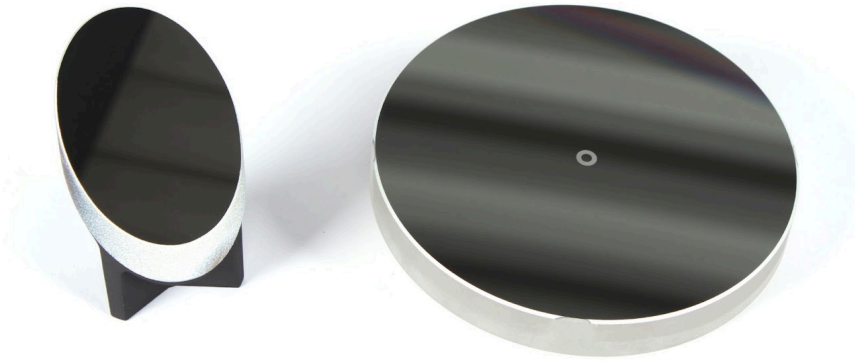
If light dust needs to be cleaned from the mirror, use the bulb blower and remove as much dust as possible. Then, reassemble the telescope. Next, realign the primary mirror using the outlined collimation procedure and Apertura Cheshire Collimating Eyepiece.

If the primary mirror still needs more attention, use the screwdriver to remove the three retaining clips screws around the perimeter of the mirror. Each clip is held in place with two Phillips-head screws. Be extra careful not to strip the head of these screws. Also, be careful not to slip and scratch the mirror with the screwdriver. Once the three clips have been removed, you can carefully remove the primary mirror from its cell and place its reflective side up on a flat clean surface.

If the secondary mirror needs to have some dust removed, use the bulb blower to carefully reach in from the bottom of the telescope, with the primary mirror removed as described in the previous step, and gently blow the dust from the mirror, being careful not to touch the surface.

In the event the secondary mirror needs to be cleaned more than the bulb blower will allow, turn the telescope over so the front of the tube is facing up. Remove the secondary mirror from the telescope by loosening one of the secondary mirror collimation screws a very small amount, about half of a turn. While supporting the secondary mirror holder, remove the central screw from the secondary mirror. It is imperative the collimation screws are not touched from this point forward. Continuing with the secondary mirror removal, there is a captive spring which might fall and needs to be removed once the secondary mirror holder is removed. It is important to retrieve the spring so it is not lost and does not accidentally damage the primary mirror.

Carefully remove the now loose secondary mirror and holder from the front of the telescope and place it face up. The secondary mirror will be left on the holder for the cleaning process.



Cleaning

Now it is time to clean the optics! Telescope mirrors are made from a large, thick piece of precision-made glass. The glass is over-coated with a several atom thick layer of aluminum, and that aluminum is usually over-coated with a clear and fairly durable protective layer of silicon monoxide (SiO) or silicone dioxide (SiO2). This protective coating can hold up to a reasonable amount of contact without damaging the surface. However, it is always best to treat the surface as if it is extremely fragile because, when compared to most things we interact with in daily life, it is. But, if proper precautions are taken, there is less risk of damaging the mirror.

Place your gallon of distilled water next to the sink work area. Place a water absorbing towel next to the work area. If you prefer, latex or similar gloves can be worn to minimize the risk of getting oils on the mirror surface. The cleaning will be done in several stages.

First, wash your hands, and if you have long sleeves on your shirt, roll them up. Then, carefully place the mirror into the sink with the reflective side up. Thoroughly wet the surface under the running faucet, allowing the water to flow over and flush the entire mirror face. After a minute of this, reduce water flow to a very narrow, but steady, stream.

Saturate the optical cleaning wipe and apply several drops of the dish soap. Using only the pressure of the wet cleaning wipe and not adding any extra scrubbing force or effort, gently wipe the cleaning wipe across the surface of the mirror. Working in a straight line from the center of the mirror towards the edge and working around the mirror one pass after another, gently wipe the entire surface. Discard the optical cleaning wipe and, with a new fresh one, wet, soap, and repeat the process. Doing this several times should help ensure a clean mirror surface at the end.

Now, with the mirror surface cleaned with the gentle soap and cleaning wipe, increase the water flow and pressure and again flush with large quantities of water. While the water flushes the soap from the mirror surface, open your gallon of distilled water that was placed next to the sink. Turn off the faucet and flush the surface of the mirror with at least one quart of the distilled water. This will help to reduce any chances of water spots as we dry the mirror.

Remove the mirror from the sink and stand it on edge, resting one side of the mirror on the water absorbing towel. Using the bulb blower, gently blow the water from the top of the mirror down to the bottom and off of the mirror surface.

Reinstalling the Mirrors

To install the secondary mirror, position the spring back in place and carefully pass the secondary mirror through the front of the telescope. The secondary mirror should face the focuser. Start the threads on the center screw and tighten the screw. Then, re-tension the collimation screw with the half turn used to loosen it.

Now, it is time to reinstall the primary mirror into the cell and reassemble the telescope. Carefully place the primary mirror back into the mounting cell, being mindful not to touch the freshly cleaned surface.

Start all of the screws a few turns in each retaining clamp. Then, tighten the screws just until the rubber clamp touches the edge of the mirror. The goal is to not have any space between the clamp and the mirror, but we also do not want to squash the rubber retainer down tightly on the mirror as this force can distort the precision surface of the mirror, causing stars to have extra diffraction spikes or odd geometric shapes. Some users prefer to allow for a small amount of space between the primary mirror and the clip, but this might not always be the best choice for everyone. Having a small amount of contact will help ensure the mirror does not move within its cell during transport.

Once all three retainers have been properly installed, gently insert the assembly back into the telescope, being sure to align the two tape marks. Loosely reinstall the four screws to hold the assembly in place. Once all screws are in place, it is time to tighten them.

The collimation of the primary and secondary mirror should be checked and adjusted if necessary.

Enjoy your freshly cleaned optic!

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.